THE STATE OF SOUTH CAROLINA
In the Court of Appeals

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SC Court of Appeals

APPEAL FROM
THE ADMINISTRATIVE LAW COURT

H.W. Funderburk, Jr., Administrative Law Judge

Case No. 18-ALJ-07-0100-CC
Appellate Case No. 2019-001159

Trident Medical Center, LLC d/b/a Trident Medical Center,..... Respondent,

v.

South Carolina Department of Health and Environmental Control and Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County, ... Respondents,

Of Which, Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County is the..... Appellant.

RECORD ON APPEAL
VOLUME IV

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Certificate of Counsel

MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
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June 30, 2018

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MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
Statements of Net Position
June 30, 2018 and June 30, 2017

Assets and Deferred Outflows	**At 6/30/2018**	**FYE 06/30/2017 (audited)**
Current Assets:		
Cash and Cash Equivalents	$ 267,424,069	$ 215,160,012
Cash Restricted for Capital Projects and Major Programs	8,009,530	42,423,262
Investments Restricted for Capital Projects and Major Programs	29,761,740	19,939,220
Patient Accounts Receivable, Net of Allowance for Uncollectible Accounts of approximately $71,700,000 and $79,600,000	224,788,917	215,658,349
Due from Third-Party Payors	8,870,693	8,582,273
Due from Joint Ventures and Partnerships	404,163	-
Other Current Assets	60,708,989	55,555,553
Total Current Assets	599,968,101	557,318,669
Investments Held by Trustees Under Indenture Agreements	52,061,361	51,460,891
Investments in Joint Ventures and Partnerships	884,635	162,706
Due from Joint Ventures and Partnerships - Restricted	6,657,750	-
Capital Assets, Net	638,024,738	556,737,311
Total Assets	1,297,596,585	1,165,679,577
Deferred Outflows	179,429,293	161,804,958
Total Assets and Deferred Outflows	$ 1,477,025,878	$ 1,327,484,535
Liabilities, Deferred Inflows and Net Position		
Current Liabilities:		
Current Installments of Long-Term Debt	$ 17,596,572	$ 17,067,498
Current Installments of Capital Lease Obligations	3,815,962	3,833,459
Current Installments of Notes Payable	1,407,650	1,359,441
Due to Related Parties	6,185,148	11,736,625
Accounts Payable	62,379,765	68,426,322
Liabilities Payable from Current Restricted Assets	-	8,703,844
Accrued Payroll, Withholdings and Benefits	70,914,621	68,148,182
Other Accrued Expenses	11,981,688	14,515,649
Unearned Revenue	541,655	521,859
Total Current Liabilities	174,823,061	194,312,879
Long-Term Debt	452,524,300	367,646,086
Capital Lease Obligations	8,105,255	8,846,518
Notes Payable	5,698,674	7,106,324
Net Pension Liability	786,017,635	746,860,160
Net OPEB Liability	641,598,965	-
Other Liabilities	7,237,838	7,229,315
Total Liabilities	2,076,005,728	1,332,001,282
Deferred Inflows	62,050,391	878,235
Total Liabilities and Deferred Inflows	$ 2,138,056,119	$ 1,332,879,517
Net Position:		
Net Investment in Capital Assets	166,480,981	172,453,992
Restricted		
Under Indenture Agreements	52,061,361	51,460,891
Expendable for:		
Capital Projects	14,215,678	23,839,082
Major Programs	30,204,422	29,819,556
UnRestricted (deficit)	(923,992,683)	(282,968,503)
Total Net Position	(661,030,241)	(5,394,982)
Total Liabilities, Deferred Inflows and Net Position	$ 1,477,025,878	$ 1,327,484,535

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MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
Statements of Revenues, Expenses and Changes in Net Position
For the 12 Month Periods Ending June 30, 2018 and 2017

	2018	2017 (audited)
Operating Revenues:		
Net Patient Service Revenues	$ 1,427,061,841	$1,370,066,698
Other Revenues	37,469,334	31,384,513
Total Operating Revenues	1,464,531,175	1,401,451,211
Operating Expenses:		
Compensation and Employee Benefits	602,361,194	570,284,785
Pension Benefits - A	41,547,544	33,791,979
Other Postemployment Benefits - B	16,955,760	-
Services and Supplies	741,234,431	684,571,224
Depreciation and Amortization	65,320,629	66,267,743
Total Operating Expenses	1,467,419,558	1,354,915,731
Operating Income (Loss)	(2,888,383)	46,535,480
NonOperating Revenues (Expenses):		
State Appropriations - C	25,220,000	29,000,000
Gifts and Grants - D	11,017,452	25,982,108
Investment Income	428,975	(1,439,526)
Interest Expense	(18,647,408)	(18,294,818)
Loss on Disposal of Capital Assets	(509,076)	(1,547,621)
Other NonOperating Expenses	(2,149,361)	(1,565,463)
CHWP Debt Issuance Costs	-	(5,167,360)
Total NonOperating Revenues (Expenses)	15,360,582	26,967,320
NonOperating Payments to MUSC Entities	(2,500,876)	(9,051,972)
Change in Net Position	$ 9,971,323	$ 64,450,828

Notes

A - Expected Pension Cost	37,030,538
Additional Pension Cost from the State	4,517,006
B - Expected Postemployment Benefits	-
Additional Postemployment Benefits	16,955,760
C - Telehealth	20,000,000
Adult Burn Unit	3,000,000
Innovation Funds	1,850,000
Shawn Jenkins	370,000
D - Shawn Jenkins	7,049,000
Duke Telehealth Grant	200,000
OPEB Non Employer Contribution	3,768,452

MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
SRECNA - Comparative Variance Analysis
For the 12 Month Periods Ending June 30, 2018 and 2017

	Current Month			Comparative Period		Fiscal Year To Date			Comparative Period	
	Actual	Budget	Variance	Jun 2017	Variance	Actual	Budget	Variance	Jul-Jun FY2018	Variance
Operating Revenues:										
Net Patient Service Revenues	$ 124,211,645	$ 118,519,971	4.80%	$124,545,977	-0.27%	$ 1,427,061,841	$ 1,411,466,621	1.10%	$ 1,370,066,698	4.16%
Other Revenues	2,522,622	2,559,365	-1.44%	1,505,087	67.61%	37,469,334	30,369,889	23.38%	31,384,513	19.39%
Total Operating Revenues	126,734,267	121,079,336	4.67%	126,051,064	0.54%	1,464,531,175	1,441,836,510	1.57%	1,401,451,211	4.50%
Operating Expenses:										
Compensation and Employee Benefits	48,740,645	48,863,416	0.25%	43,007,545	-13.33%	602,361,194	588,997,418	-2.27%	570,284,785	-5.62%
Pension Benefits	3,085,880	3,085,880	0.00%	1,329,063	-132.18%	37,030,538	37,030,538	0.00%	15,948,756	-132.18%
Services and Supplies	68,184,906	56,937,837	-19.75%	61,481,293	-10.90%	741,234,431	690,781,359	-7.30%	684,571,224	-8.28%
Depreciation and Amortization	5,652,484	5,612,814	-0.71%	5,515,080	-2.49%	65,320,629	67,353,735	3.02%	66,267,743	1.43%
Total Operating Expenses	125,663,915	114,499,947	-9.75%	111,332,981	-12.87%	1,445,946,792	1,384,163,050	-4.46%	1,337,072,508	-8.14%
Operating Income (Loss)	1,070,352	6,579,389	-83.73%	14,718,083	-92.73%	18,584,383	57,673,460	-67.78%	64,378,703	-71.13%
Operating Margin	0.84%	5.43%		11.68%		1.27%	4.00%		4.59%	
Other Postemployment Benefits	1,364,750	-	-	-	-	16,955,760	-	-	-	-
Additional Pension Expense:	293,156	-	-	1,318,620	-77.77%	4,517,006	-	-	17,843,223	74.69%
Adjusted Operating Income (Loss)	(587,554)	6,579,389	-108.93%	13,399,463	-104.38%	(2,888,383)	57,673,460	-105.01%	46,535,480	-106.21%
Adjusted Operating Margin	-0.46%	5.43%		10.63%		-0.20%	4.00%		3.32%	
NonOperating Revenues (Expenses):										
State Appropriations	2,703,333	1,666,663	62.20%	875,000	208.95%	25,220,000	20,000,000	26.10%	29,000,000	-13.03%
Gifts and Grants	4,268,452	833,337	412.21%	69,419	6048.82%	11,017,452	10,000,000	10.17%	25,982,108	-57.60%
Investment Income	97,531	93,044	4.82%	(538,722)	118.10%	428,975	1,116,473	-61.58%	(1,439,526)	129.80%
Interest Expense	(4,976,795)	(1,223,390)	-306.80%	(4,656,298)	-6.88%	(18,647,408)	(14,680,724)	-27.02%	(18,294,818)	-1.93%
Loss on Disposal of Capital Assets	(127,362)	(81,274)	-56.71%	(578,513)	77.98%	(509,076)	(975,266)	47.80%	(1,547,621)	67.11%
Other NonOperating Expenses	22,295	(1,000,000)	-102.23%	(36,590)	160.93%	(2,149,361)	(1,000,000)	114.94%	(1,565,463)	-37.30%
CHWP Debt Issuance Costs	-	-	-	-	-	-	-	-	(5,167,360)	100.00%
Total NonOperating Revenues (Expenses)	1,987,454	288,380	589.18%	(4,865,704)	-140.85%	15,360,582	14,460,483	6.22%	26,967,320	-43.04%
Income (Loss) Before NonOperating Payments to MUSC Entities	1,399,900	6,867,769	-79.62%	8,533,759	-83.60%	12,472,199	72,133,943	-82.71%	73,502,800	-83.03%
NonOperating Payments to MUSC Entities	3,273,307	(587,722)	656.95%	-	-	(2,500,876)	(7,052,675)	64.54%	(9,051,972)	-72.37%
Change in Net Position	$ 4,673,207	$ 6,280,047	-25.59%	$ 8,533,759	-45.24%	$ 9,971,323	$ 65,081,268	-84.68%	$ 64,450,828	-84.53%
Margin	3.69%	5.19%		6.77%		0.68%	4.51%		4.60%	
Adjusted Margin	5.00%	5.19%		7.82%		2.15%	4.51%		5.87%	

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MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
Schedules of Functional Expenses
For the 12 Month Periods Ending June 30, 2018 and 2017

	2018	2017
Nursing Services:		
Administration and Education	$ 87,173,883	$ 58,842,673
Medical and Surgical	79,035,251	75,907,392
Pediatrics	13,863,552	21,094,144
Emergency and Trauma Units	21,754,456	22,674,479
Intensive Care Units	63,299,159	62,902,549
Coronary Care Units	8,165,829	8,029,254
Psychiatric	24,985,140	25,758,184
Operating Rooms	46,604,598	44,755,960
Recovery Rooms	5,962,276	5,322,503
Delivery and Labor Rooms	8,107	4,785,109
Obstetrics	8,107	6,357,440
Total Nursing Services	$ 350,860,358	$ 336,429,687
Other Professional Services:		
Laboratories and Laboratory Support	$ 60,046,308	$ 58,137,734
Electrocardiology	9,418,175	8,357,095
Radiology	39,773,353	34,916,304
Pharmacy	184,375,961	169,966,179
Heart Catheterization	12,414,368	12,059,676
Central Services and Supply	119,484,039	113,033,925
Anesthesiology	36,875,783	31,019,402
Nuclear Medicine	1,386,412	1,372,097
Respiratory Therapy	15,704,192	16,238,582
Physical Medicine	13,883,670	12,511,932
Dialysis	2,492,763	2,082,037
Pathology	3,970,026	3,830,972
Transplant	31,716,893	31,663,737
Other Miscellaneous Services	23,114,032	21,813,339
Medical Records and Quality Assurance	9,318,900	8,954,235
Resident Support	65,871,934	48,888,434
Total Other Professional Services	$ 629,846,809	$ 574,845,680
General Services:		
Dietary	$ 15,355,277	$ 14,930,401
Plant Ops, Maintenance, Security	69,093,140	67,026,072
Housekeeping	20,851,618	20,128,929
Total General Services	$ 105,300,035	$ 102,085,402
Fiscal and Administrative Services:		
Admitting	$ 7,636,976	$ 7,079,111
Administration	76,735,612	77,918,179
Shared Services	12,638,030	12,729,755
MUSC Support (Funds Flow)	6,951,210	6,152,749
Accounting	4,916,622	9,240,270
Patient Accounting	12,505,921	12,691,953
Marketing	9,419,597	8,908,374
Human Resources	5,973,401	34,530,295
Communications	2,210,214	2,207,670
Information Solutions	46,079,040	53,566,118
Telehealth	22,741,869	-
Pension Benefits	41,547,544	-
Other Postemployment Benefits	16,955,760	-
Total Fiscal and Administrative Services	$ 266,311,796	$ 225,024,474
Ambulatory Care:		
Ambulatory Care	49,779,931	50,262,745
Total Ambulatory Care	$ 49,779,931	$ 50,262,745
Other:		
Depreciation	$ 65,320,629	$ 66,267,743
Interest	18,647,408	18,294,818
Loss on Disposal of Capital Assets	509,076	1,547,621
CHWP Debt Issuance Costs	-	5,167,360
Other NonOperating Expenses	2,149,361	1,565,463
Total Other	$ 86,626,474	$ 92,843,005
Total Expenses	$ 1,488,725,403	$ 1,381,490,993

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MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
Schedule of Revenues and Expenses - Actual versus Budget
For the 12 Month Periods Ending June 30, 2018

	Approved Budget	Year To Date Budget	Year To Date Actual	Variance Favorable/ Unfavorable	
Operating Revenue:					
Patient Service Revenue:					
Inpatient	$ 2,551,766,738	$ 2,551,766,738	$ 2,508,964,949	$ 42,801,789	U
Outpatient	1,858,184,979	1,858,184,979	1,911,575,337	53,390,358	F
Gross Patient Service Revenue	4,409,951,717	4,409,951,717	4,420,540,286	10,588,569	F
Less: Charity Care	(166,120,578)	(166,120,578)	(131,415,784)	34,704,794	F
Patient Service Revenue net of Charity Care	4,243,831,139	4,243,831,139	4,289,124,502	45,293,363	F
Additions (Deductions) To/From Patient Service Revenue:					
Contractual and Other Adjustments	(2,869,173,302)	(2,869,173,302)	(2,898,445,081)	29,271,779	U
Payment from DHHS	18,628,621	18,628,621	18,628,621	-	F
Disproportionate Share	18,180,163	18,180,163	17,753,799	426,364	U
Net Additions (Deductions) To/From Patient Service Revenue	(2,832,364,518)	(2,832,364,518)	(2,862,062,661)	29,698,143	U
Net Patient Service Revenue	1,411,466,621	1,411,466,621	1,427,061,841	15,595,220	F
Other Operating Revenue:					
Other and IIT Transfers	30,369,889	30,369,889	37,469,334	7,099,445	F
Total Other Operating Revenue	30,369,889	30,369,889	37,469,334	7,099,445	F
Total Operating Revenue	$ 1,441,836,510	$ 1,441,836,510	$ 1,464,531,175	$ 22,694,665	F
Operating Expenses:					
Nursing Services	$ 339,091,215	$ 339,091,215	$ 350,860,358	$ 11,769,143	U
Other Professional Services	595,441,091	595,441,091	629,846,809	34,405,718	U
General Services	102,625,406	102,625,406	105,300,035	2,674,629	U
Fiscal and Administrative Services	230,828,793	230,828,793	266,311,796	35,483,003	U
Ambulatory Care	48,822,810	48,822,810	49,779,931	957,121	U
Other Expenses	67,353,735	67,353,735	65,320,629	2,033,106	F
Total Operating Expenses	1,384,163,050	1,384,163,050	1,467,419,558	83,256,508	U
Income (Loss) from Operations	57,673,460	57,673,460	(2,888,383)	60,561,843	U
NonOperating Revenue (Expense):					
State Appropriations	20,000,000	20,000,000	25,220,000	5,220,000	F
Gifts and Grants	10,000,000	10,000,000	11,017,452	1,017,452	F
Interest and Investments	(13,564,251)	(13,564,251)	(18,218,433)	4,654,182	U
Loss on Disposal of Capital Assets	(975,266)	(975,266)	(509,076)	466,190	F
Other NonOperating Expenses	(1,000,000)	(1,000,000)	(2,149,361)	1,149,361	U
Total NonOperating Revenue (Expense)	14,460,483	14,460,483	15,360,582	900,099	F
Income before NonOperating Payments to MUSC Entities	72,133,943	72,133,943	12,472,199	59,661,744	U
NonOperating Payments to MUSC Entities	(7,052,675)	(7,052,675)	(2,500,876)	4,551,799	F
Change in Net Position	$ 65,081,268	$ 65,081,268	$ 9,971,323	$ 55,109,945	U

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MEDICAL UNIVERSITY HOSPITAL AUTHORITY
(A Component Unit of MUSC)
Schedule of Functional Expenses - Actual versus Budget
For the 12 Month Periods Ending June 30, 2018

	Approved Budget	Year To Date Budget	Year To Date Actual	Variance Favorable/ Unfavorable
Nursing Services:				
Administration and Education	$ 63,090,061	$ 63,090,061	$ 87,173,883	$ 24,083,822 U
Medical and Surgical	76,625,667	76,625,667	79,035,251	2,409,584 U
Pediatrics	23,280,111	23,280,111	13,863,552	9,416,559 F
Emergency and Trauma Units	21,392,822	21,392,822	21,754,456	361,634 U
Intensive Care Units	62,631,157	62,631,157	63,299,159	668,002 U
Coronary Care Units	7,592,127	7,592,127	8,165,829	573,702 U
Psychiatric	20,889,970	20,889,970	24,985,140	4,095,170 U
Operating Rooms	46,107,092	46,107,092	46,604,598	497,506 U
Recovery Rooms	5,555,191	5,555,191	5,962,276	407,085 U
Delivery and Labor Rooms	5,284,368	5,284,368	8,107	5,276,261 F
Obstetrics	6,642,649	6,642,649	8,107	6,634,542 F
Total Nursing Services	$ 339,091,215	$ 339,091,215	$ 350,860,358	$ 11,769,143 U
Other Professional Services:				
Laboratories and Laboratory Support	$ 59,112,725	$ 59,112,725	$ 60,046,308	$ 933,583 U
Electrocardiology	9,255,140	9,255,140	9,418,175	163,035 U
Radiology	36,173,515	36,173,515	39,773,353	3,599,838 U
Pharmacy	166,850,246	166,850,246	184,375,961	17,525,715 U
Heart Catheterization	11,928,340	11,928,340	12,414,368	486,028 U
Central Services and Supply	109,935,347	109,935,347	119,484,039	9,548,692 U
Anesthesiology	36,653,525	36,653,525	36,875,783	222,258 U
Nuclear Medicine	1,107,913	1,107,913	1,386,412	278,499 U
Respiratory Therapy	16,001,121	16,001,121	15,704,192	296,929 F
Physical Medicine	13,644,572	13,644,572	13,883,670	239,098 U
Dialysis	2,278,749	2,278,749	2,492,763	214,014 U
Pathology	3,847,563	3,847,563	3,970,026	122,463 U
Transplant	33,486,573	33,486,573	31,716,893	1,769,680 F
Other Miscellaneous Services	22,104,241	22,104,241	23,114,032	1,009,791 U
Medical Records and Quality Assurance	9,075,829	9,075,829	9,318,900	243,071 U
Resident Support	63,985,692	63,985,692	65,871,934	1,886,242 U
Total Other Professional Services	$ 595,441,091	$ 595,441,091	$ 629,846,809	$ 34,405,718 U
General services:				
Dietary	$ 15,563,941	$ 15,563,941	$ 15,355,277	$ 208,664 F
Plant Ops, Maintenance, Security	66,822,142	$ 66,822,142	69,093,140	2,270,998 U
Housekeeping	20,239,323	20,239,323	20,851,618	612,295 U
Total General Services	$ 102,625,406	$ 102,625,406	$ 105,300,035	$ 2,674,629 U
Fiscal and Administrative Services:				
Admitting	$ 7,206,275	$ 7,206,275	$ 7,636,976	$ 430,701 U
Administration	79,586,689	79,586,689	76,735,612	2,851,077 F
Shared Services	12,330,864	12,330,864	12,638,030	307,166 U
MUSC Support (Funds Flow)	2,777,473	2,777,473	6,951,210	4,173,737 U
Accounting	5,243,833	5,243,833	4,916,622	327,211 F
Patient Accounting	12,282,108	12,282,108	12,505,921	223,813 U
Marketing	9,405,685	9,405,685	9,419,597	13,912 U
Human Resources	7,282,197	7,282,197	5,973,401	1,308,796 F
Communications	2,240,125	2,240,125	2,210,214	29,911 F
Information Solutions	43,363,801	43,363,801	46,079,040	2,715,239 U
Telehealth	12,079,205	12,079,205	22,741,869	10,662,664 U
Pension Benefits	37,030,538	37,030,538	41,547,544	4,517,006 U
Other Postemployment Benefits	-	-	16,955,760	16,955,760 U
Total Fiscal and Administrative Service	$ 230,828,793	$ 230,828,793	$ 266,311,796	$ 35,483,003 U
Ambulatory Care:				
Ambulatory Care	$ 48,822,810	$ 48,822,810	$ 49,779,931	$ 957,121 U
Total Ambulatory Care	$ 48,822,810	$ 48,822,810	$ 49,779,931	$ 957,121 U
Other:				
Depreciation	$ 67,353,735	$ 67,353,735	$ 65,320,629	$ 2,033,106 F
Interest	14,680,724	14,680,724	18,647,408	3,966,684 U
Loss on Disposal of Capital Assets	975,266	975,266	509,076	466,190 F
Other NonOperating Expenses	1,000,000	1,000,000	2,149,361	1,149,361 U
Total Other	$ 84,009,725	$ 84,009,725	$ 86,626,474	$ 2,616,749 U
Total Expenses	$ 1,400,819,040	$ 1,400,819,040	$ 1,488,725,403	$ 87,906,363 U

Statement of Revenues, Expenses, and Changes in Net Assets:
For the twelve months ended June 30, 2018 and 2017
Actuals Compared to Budget

As of June 2018, MUHA's net income is $55.1 million below budget. The following drivers (YTD) explain this variance:

* Inpatient surgeries are 4.3% below budget;
* Case Mix Index is 0.9% below budget;
* Children's gross revenues are $16.8 million below budget, Heart and Vascular's gross revenues are $10.3 million below budget, Anesthesia gross revenues are $10.3 million below budget, and Therapies are $10 million below budget.
* Additional pension expense of $4.5 million
* OPEB expense is $16.9 million
* Telehealth expenses were $7.7 million over budget
* Pharmaceutical costs are $15.1 million over budget
* Medical supplies are $10.7 million over budget

Net patient service revenues are over budget by 1.1%, mainly due to adjusted discharges exceeding budget by 3.9%. Offsetting that result, our overall Case Mix Index finished 0.9% below budget and our inpatient surgeries finished 4.3% below budget.

Total operating expenses finished above budget by $61.8 million. Compensation and benefits are $13.3 million over budget. This is mainly due to FTE's per Adjusted Occupied Bed on a case mix adjusted basis finishing over budget by 0.88%, which correlates to 62 FTE's. Services and supplies are $50.4 million over budget, mainly due to pharmaceutical costs being over budget by $15.1 million, medical supplies being over budget by $10.7 million, Radiation Oncology being $3.5 million over budget and Telehealth expenses being $7.7 million over budget.

Through June 2018, the operating income is $60.6 million under budget. For the month of June, operating income is $7.2 million below budget, mainly due to the same drivers listed above. Investment income is $0.7 million below budget. With the Federal Reserve beginning to increase interest rates in the short-term, it has negatively impacted the market valuation of the fixed rate securities in our mortgage reserve funds.

Unusual and non-recurring items impacting current month earnings:

The Authority received $3 million in December 2017 of State Appropriations for the Adult Burn Unit.

Other Post Employment Benefit (OPEB) expenses are being recorded this year due to the implementation of GASB Statement No. 75 which is effective for our fiscal year ended June 30, 2018. This Statement requires for that the entire liability for these benefits be recorded on our balance sheet with the changes in the liability from year to year being recorded as an operating expense. As of June 30, 2018, we have recorded expense of $16.9 million.

Confidential

Statement of Revenues, Expenses, and Changes in Net Assets:
For the twelve months ended June 30, 2018 and 2017
Actuals Compared to Prior Year

Operating Revenues:

Net patient revenue is up 4.2% from the same period last year. Inpatient census is up 1.1% compared to last fiscal year. June's ADC remained the same as May at 685 and is 2.5% lower than June of last year. ER visits are down 2.4%. Inpatient surgical cases are down 2.8% and outpatient surgical cases are up 4.4%. 415 transplant cases have been performed for the fiscal year compared to 414 for last fiscal year – a 0.2% increase.

On a volume adjusted basis (adjusted discharges), net patient revenue is even with the prior year at $20,024 per case.

Other revenues increased 19.4% or $6.1 million over the same period last year, mainly due to increased 340B activity with retail pharmacy.

Operating Expenses:

When compared to last fiscal year, salaries and benefits increased $32.1 million or 5.6%. This increase mainly relates to the merit increase and additional FTEs. Paid FTEs are up 130 from the same period last fiscal year. The average hourly rate is up 3.3% from the same period last fiscal year. Compensation costs (including benefits and excluding pension expense and other postemployment benefits) are 42.2% of net patient revenue. FY 17 costs were 42.0% of net patient revenue.

The unfunded pension expense is $7.8 million higher than last year.

Services and supplies are up $56.6 million or 8.3% compared to last year. The following explain the majority of this variance:

* Pharmaceuticals are $13.1 million or 11.9% higher;
* Medical Supplies are $9.9 million or 5.9% higher;
* College of Medicine expenses are $8.8 million or 13.8% higher;
* Resident support expenses are $16.9 million higher;
* Telehealth expenses are $6.4 million higher as a result of adding three new agreements;
* Radiation Oncology expenses are $2.2 million or 14.7% higher;

The Other Post Employment Benefit accrual is $16.9 million higher than last year since fiscal year ended June 30, 2018 is the first year the Authority was required to record this expense.

Depreciation expense is $0.9 million or 1.4% lower than prior year.

Non-Operating Revenues and Expenses:

State Appropriations are $3.8 million lower than prior year mainly due the one time receipt of funding in fiscal year 2017 for the construction of the Shawn Jenkins Children's Hospital.

Gifts and Grants are $14.9 million lower than prior year, mainly due to the larger donations for the Shawn Jenkins Children's Hospital received in fiscal year 2017.

Interest expense is up $0.3 million or 1.9% compared to prior year.

Balance Sheet: As of 6/30/2018 and 06/30/2017

Assets:

Cash and cash equivalents, including cash and investments restricted for construction and telemedicine projects, increased $27.7 million to $305 million from June 30, 2017. Unrestricted cash increased from $215.2 million to $267.4 million for this same period. Through June 30, 2018, $24.3 million of restricted funds have been spent for the Telehealth program and $61.6 million has been spent on capital purchases, of which $28 million are construction payments from the equity account related to the Children's Hospital. To date, we have received $19 million of the state's FY18 Telehealth program appropriation including $1 million as an Anmed passthru and $3 million of the state's appropriation for the Adult Burn Unit. We settled 2012 and 2013 obligations to the Medicare DSH and Medicaid programs in the amount of $11.2 million. Fiscal year ended June 30, 2018 DSH funds received totaled $36.4 million. Cash collections from Hospital Patient Accounting for FY 18 are up about $37.0 million from the same period in FY 17. Days in accounts receivable of 57 are equal to the prior year's result.

Net patient accounts receivable is up $9.1 million from the prior year. The collection percent has decreased from 33.3% to 32.3% during the same period. The budgeted collection percent for FY 18 is 32.0%. Year to date case mix index (an indication of patient acuity) at 1.92 is 0.9% below prior year. June's case mix index remained flat from May's CMI of 1.92. Case mix index for the month of June 2017 was 1.91.

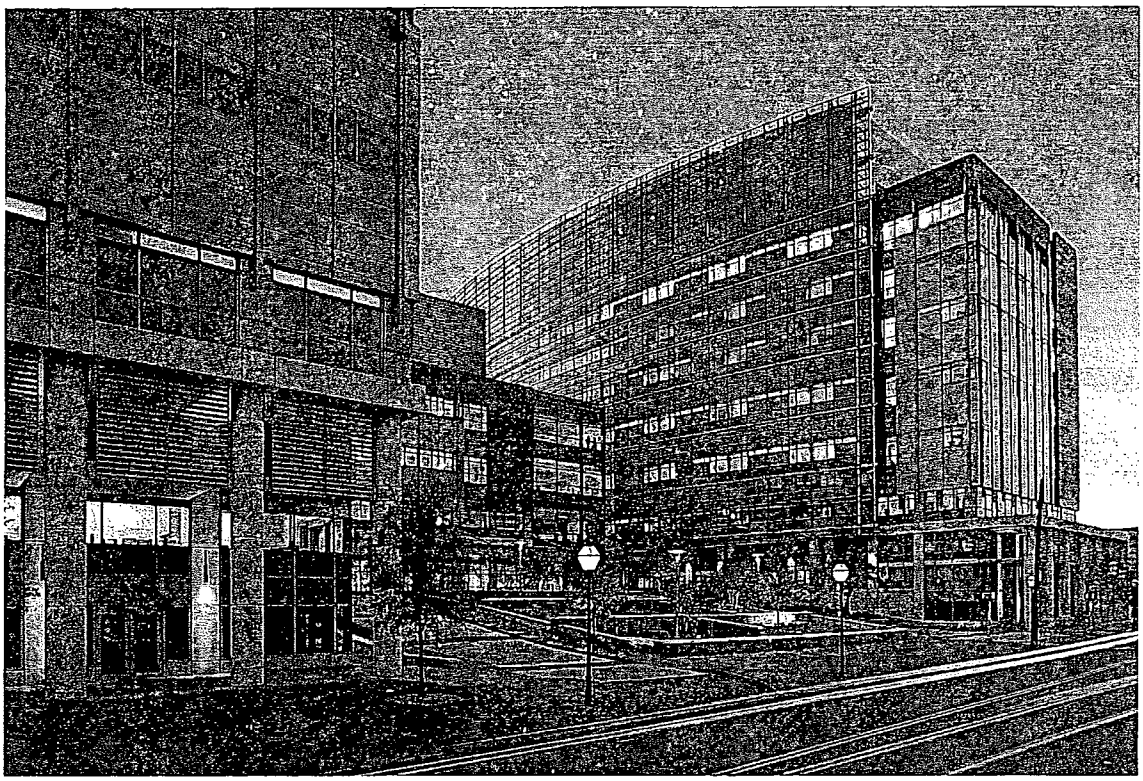
Other Current Assets increased by $5.1 million from 6/30/17.

Liabilities:

As of June 2018, Current Installments of Long-Term Debt relates to HUD debt for ART and the Central Energy Plant. Current Installments of Notes Payable relate to the note payable for the Sabin St. energy plant.

Long term debt (including current portion, capital lease obligations, and net of deferred issuance costs) increased $83.3 million. Prior to the December 2012 refinancing, principal was paid semi-annually. Under the new debt structure, principal is paid monthly. In June 2013 MUHA accessed the State's loan program to borrow $13.8 million for the Sabin Street central energy plan project. This is shown in the long term debt section as Notes Payable. In November 2016, MUHA closed on the HUD loan for the Shawn Jenkins Children's Hospital and Pearl Tourville Women's Pavilion. To date, long term debt in the amount of $147.0 million has been recorded based upon the monthly draw requests. This outstanding loan balance will increase during the construction phase as funds continue to be drawn down from the mortgage proceeds.

Long term debt also now includes the total estimated liability for Other Post Employment Benefits for retiree healthcare costs under the State Health Plan of $641.6 million. This liability is similar to the Net Pension Liability that represents the future liability for pension benefits under the South Carolina Retirement Systems. This liability is being recorded pursuant to the implementation of GASB Statement No. 75 which is effective for the fiscal year ended June 30, 2018.



The Medical University of South Carolina

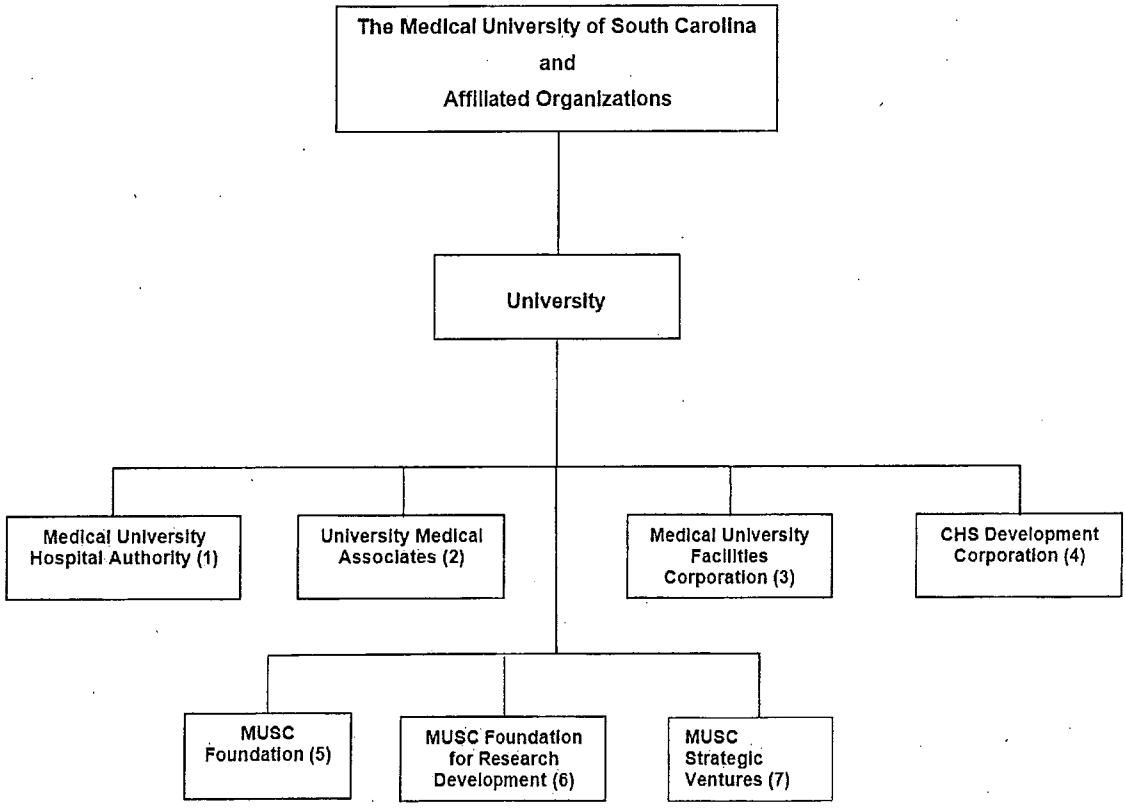
Charleston, South Carolina

Comprehensive Annual Financial Report

For the Year Ended June 30, 2018

A component unit of the State of South Carolina

THE MEDICAL UNIVERSITY AND AFFILIATED ORGANIZATIONS



Notes:

1. The Medical University Hospital Authority (MUHA) was formed in June, 2000 to manage and operate the hospitals and clinics of the University.
2. University Medical Associates (UMA) is a non-profit corporation established to promote and support the educational, medical, scientific, and research purposes of the University.
3. Medical University Facilities Corporation (MUFC) is a non-profit corporation established in fiscal year 1992 to obtain financing for the University to acquire real property.
4. CHS Development Corporation (CHS) is a non-profit corporation established in fiscal year 2003 to obtain financing for the University to acquire and develop real property.
5. The MUSC Foundation (MUSCF) is a non-profit corporation established in 1966 as an educational, charitable, eleemosynary foundation.
6. The MUSC Foundation for Research Development (MFRD) is a non-profit corporation established in 1995 to manage the University's intellectual property and technology marketing and to foster cooperation between the University and business and industry.
7. MUSC Strategic Ventures (MSV) was formed in September 2015 to allow affiliation with tax exempt entities to support the missions and programs of The Medical University of South Carolina, UMA and MUHA.

NETWORK MANAGEMENT AGREEMENT

This Network Management Agreement (the "Agreement") by and among Alliance Oncology, LLC, a Delaware limited liability company (" Alliance"), MUSC Health, a South Carolina non-profit corporation ("MUSC-H"), and MUSC Health Cancer Care Network, LLC, a Delaware limited liability company (the "Company"), is made and entered into as of this 22nd day of January, 2016.

WHEREAS, the Company has been organized to form a strategic relationship between Alliance and MUSC-H for the development, operation and management of the oncology service line for certain hospitals in South Carolina, in order to extend MUSC-H's reputation for academic excellence to various communities and Alliance's operations and marketing expertise with respect to oncology services (the "Network"); and

WHEREAS, the Company has formed and/or will form limited liability companies (collectively, the "Contractors") as joint ventures between the Company and certain hospitals (collectively, the "Hospitals") as part of the Network, for the provision of certain services by the Contractors to the Hospitals, including certain oncology and related medical equipment, as well as any additional equipment that may be added (collectively, the "Equipment") at various sites in South Carolina to be mutually agreed upon by the parties hereto (each, a "Site" and, collectively, the "Sites") , necessary information technology software, and all technical personnel necessary to perform those procedures customarily performed with the Equipment (collectively, the "Technical Personnel") , all as described in more detail in separate Service Agreements between the Contractors and their respective Hospitals (collectively, the "Service Agreements"); and

WHEREAS, Alliance and MUSC-H desire to describe their respective obligations with respect to the services to be provided by the Contractors to the Hospitals pursuant to the Service Agreements.

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. GENERAL STRUCTURE/SERVICES

Pursuant to the terms of the respective Service Agreements with individual Hospitals, the Contractors shall provide the Hospitals with the Equipment and other services described therein, including marketing, information technology, Technical Personnel and research related services, in addition to other services described in their respective Service Agreements. The Contractors shall provide such services in exchange for fair market value charges which are expected to be based on a percentage of collections with respect to oncology services provided to each Hospital, as described in more detail in the Service Agreements. In addition, each Contractor shall have a management agreement with the Company (each, a "Management Agreement"), pursuant to which the Company shall receive a management fee equal to five percent (5%) of the Contractor's net revenues.

RESP. MUSC'S TRIAL EXHIBIT 4

2. TERM

The initial term of this Agreement is ten (10) years, commencing on January 22, 2016 (the "Commencement Date") and ending on the day prior to the tenth (10^{th}) anniversary of the Commencement Date, unless this Agreement is earlier terminated pursuant to Section 8 below. This Agreement shall be extended for additional terms of five (5) years each, upon the terms and conditions set forth herein, unless either party gives written notice of its intent not to renew this Agreement at least twelve (12) prior to the expiration date of the then current term. Upon termination of this Agreement for any reason, the individual Service Agreements shall remain in effect but Alliance, at its option, shall have the right to assume the Company's ownership interest in any or all Contractors, in which case the Company's ownership interest in each such Contractor shall be assigned to Alliance, pursuant to the terms of the applicable Contractor's Operating Agreement.

3. ALLIANCE'S RESPONSIBILITIES

(a) Capital Expenditures. Alliance shall assist the Company in procuring the Equipment for each of the Sites, including without limitation assisting each Contractor with obtaining favorable pricing and financing terms for the purchase of the Equipment, and in securing any necessary office space for administrative personnel. In addition, Alliance shall provide budgeting services with respect to all capital expenditures for the Sites and operating budgets for the Sites, subject to the input of MUSC-H and the related Hospital.

(b) Personnel. All physicists, dosimetrists and other personnel required to perform services using the Equipment at the Sites or any necessary administrative services, as mutually agreed upon by the parties hereto (the "Personnel") , shall be employees of Alliance and shall be selected by Alliance. Such Personnel shall report to MUSC-H with respect to quality assurance but shall be managed by the Company. Alliance shall coordinate moving such Personnel from one Site to another as necessary for each Contractor to fulfill its obligations under its Service Agreement, and shall prepare staffing plans with respect to such Personnel and their respective Sites. Each Contractor shall be responsible for paying Alliance for the salary and benefits of all such Personnel performing services at its Site.

(c) Marketing Strategy. Alliance shall assist with developing and executing an overall marketing strategy plan for the Sites, subject to the input of MUSC-H, including but not limited to physician education, community outreach, media and public relations and program development (including products for breast and lung cancer treatment and genetic counseling and telemedicine services). The costs of any such services shall be allocated among the Sites based on their respective usage of such services.

(d) Billing and Collection. Either Alliance or Hospital shall have the right to bill and collect from patients and third party payors for all technical fees for oncology and related services provided to a Hospital's patients using the Equipment at a given Site, as well as all billable items and supplies provided to Hospital's patients, and shall bill for such items and services in the applicable Hospital's name and using its Medicare and other provider

numbers. If Alliance performs billing and collection services for a Site, the applicable Hospital shall delegate to Alliance the right to bill and collect in the Hospital's name and using its Medicare and other provider numbers, pursuant to the terms of a Billing Agreement. Alliance shall provide billing protocols and, if applicable, shall bill for services provided by a Hospital, but shall not bill or collect any amounts from patients or third party payors for any items or services that a Contractor will provide to a Hospital pursuant to its Service Agreement with such Hospital. Whichever entity, Alliance or Hospital, is actually and physically conducting the billing and collections services shall be entitled to any fee associated with the service. At such times as requested by Alliance, but not generally less than on a quarterly basis, Alliance, acting on behalf of the applicable Contractor, shall meet with each Hospital to conduct an audit of such Hospital's billing and coding for services using the Equipment provided pursuant to the terms of its Service Agreement ("Periodic Audit"). The Periodic Audit shall include, but not be limited to, a review of all payor explanations of benefits for patients provided services using such Equipment, a review of coding compliance to ensure that proper codes are being billed for services using such Equipment and a review of relevant provisions of payor contracts with regard to services provided using such Equipment (to the extent permitted by applicable law and the provisions thereof).

(e) Working Capital. To the extent that Company's daily cash requirements exceed its available cash, pursuant to the terms of the Management Agreements, Alliance may, but is not required to, make advances to fund such excess (collectively, "Advances"). For purposes of this agreement, the maximum cap on an Advance will be five hundred thousand dollars ($500,000.00). To the extent that the Company's daily cash balances exceed its daily cash requirements on any given day, such excess shall be used to repay any outstanding Advances prior to any other payments made by Company, and Company shall assign and pledge such amounts to Alliance to be used to repay any outstanding Advances. If any individual Advance has not been paid in full to Alliance within twelve (12) months of issuance then that particular Advance immediately becomes due and payable. Interest on Advances shall be paid in monthly installments due and payable on the last calendar day of each month at a rate equal to five percent (5%) or Alliance's cost of borrowing a t the time of the Advance, whichever is higher. Interest shall be computed on the basis of a 365-day year for the actual number of days elapsed.

4. MUSC-H'S RESPONSIBILITIES

(a) Quality Assurance. MUSC-H shall provide the Company with the clinical standards developed by the Hollings Cancer Center, and as may be amended or revised from time to time, and the Company shall provide such standards, as well as the standards developed by the Company's Clinical Standards Committee (collectively, with the Hollings Cancer Center clinical standards, the "Clinical Standards"), to each Contractor. As part of the Company's overall quality assurance and utilization review programs, Alliance and MUSC-H shall take reasonable action to establish procedures to jointly ensure the consistency and quality of all items and services provided by the Contractors pursuant to the Service Agreements, in compliance with the Clinical Standards. MUSC-H shall also supply quality metrics to be met at each Site. The Company shall work to integrate the clinical

services of each Hospital with the services provided by the other Hospitals in the Network, in compliance with the Clinical Standards, including without limitation those related to standardized treatment pathways, a central pharmacy and therapeutics committee, central navigation and nurse education, physician extenders, benchmarks and performance-based metrics and centralized information technology.

(b) Telemedicine. MUSC-H shall develop and provide telemedicine services to the Sites, in consultation with each Hospital, pursuant to terms to be set forth in service agreements with each Hospital.

5. JOINT RESPONSIBILITIES

In addition to the services provided hereunder by either Alliance or MUSC-H, the parties acknowledge and agree that they shall work cooperatively to provide the following services in order to enable each Contractor to perform the services described in its respective Service Agreement.

(a) Information Technology. Alliance shall manage information technology strategy, including without limitation the purchase of information technology services needed to provide connectivity among the Sites and electronic medical records interfaces, all in consultation with MUSC-H, subject to applicable laws and regulations. Alliance and MUSC-H shall share their respective information technology resources (including personnel) and the other costs related to such information technology in a manner to be mutually agreed upon by the parties.

(b) Research. The parties shall jointly work to create a research data bank, in compliance with all applicable laws and regulations, including without limitation support for oncology clinical trials, including a central Institutional Review Board for the Network providing access to trials at all Network Hospitals, enrollment targets for such programs at each Site, central regulatory support and study coordination throughout the Network and the development of a virtual tumor board.

6. ASSIGNMENT

Except in connection with (i) the sale of all or substantially all of either party's assets or a majority of either party's equity ownership, or (ii) the assignment of this Agreement to an affiliate of either party, neither Alliance nor MUSC-H may assign this Agreement or any interest herein without the written consent of the other party hereto. Any consent to assignment shall not be deemed a consent to any subsequent assignment.

7. EVENTS OF DEFAULT

An event of default ("Event of Defaul t") shall occur hereunder: (i) by either Alliance or MUSC-H, if the other party fails to perform or observe any other material covenant, condition or agreement to be performed or observed by it hereunder or breaches a

representation or warranty set forth herein, and such failure or breach shall continue unremedied for a period of thirty (30) days after being provided written notice of such breach by the other party; or (ii) by either Alliance or MUSC-H, if the other party makes an assignment for the benefit of creditors, whether voluntary or involuntary, or if a petition is filed by or against such party under any bankruptcy, insolvency or other consumer legislation, unless such petition is set aside, withdrawn or ceases to be in effect within ninety (90) days of the date of filing. If, upon expiration of the applicable cure period described in (i) above, the breaching party is still diligently pursuing effectuation of such a cure, or has diligently attempted to effect such a cure but cannot complete such cure because of the failure of a third party (such as a governmental agency) to act within such cure period, then the breaching party shall have a reasonable time beyond such cure period to complete its cure of the alleged event of default.

8. REMEDIES/TERMINATION

(a) Upon Event of Default. Upon the occurrence of any Event of Default, the non-breaching party may, in its sole discretion, do any one or more of the following: (i) upon notice to the breaching party, if the breaching party fails to cure such default within the applicable cure period (if any) described in Section 7 above, terminate this Agreement (in which case the provisions set forth in the last sentence of Section 2 hereof shall apply); (ii) exercise any other right or remedy which may be available to it under this Agreement, the Uniform Commercial Code or any other applicable law; (iii) proceed by appropriate court action, to enforce the terms hereof or to recover damages for the breach hereof; or (iv) pursue any other remedy at law or in equity. In addition, the breaching party shall be liable for all reasonable legal fees and other costs and expenses reasonably resulting from the foregoing defaults or the exercise of the non-breaching party's remedies. No remedy referred to in this Section is intended to be exclusive, but each shall be cumulative and in addition to any other remedy referred to above or otherwise available to the non-breaching party at law or in equity. Notwithstanding the foregoing, in no event shall either party be entitled to punitive damages.

(b) Immediate Termination by MUSC-H. MUSC-H may terminate this Agreement immediately by written notice to Alliance upon the occurrence of any of the following events:

(i) Alliance's failure to make a timely disclosure required pursuant to Section 28 hereof; or

(ii) Alliance's conviction of a criminal offense related to health care, or Alliance's listing by a Federal Health Care Program as being debarred, excluded, suspended or otherwise ineligible for Federal Health Care Program participation.

(c) Immediate Termination by Alliance. Alliance may terminate this Agreement immediately by written notice to MUSC-H upon the occurrence of any of the following events:

(i) MUSC-H's failure to make a timely disclosure required pursuant to Section 28 hereof; or

(ii) MUSC-H's conviction of a criminal offense related to health care, or MUSC-H's listing by a Federal Health Care Program as being debarred, excluded, suspended or otherwise ineligible for Federal Health Care Program participation.

(d) Automatic Termination. This Agreement shall automatically terminate and be of no further force and effect upon the dissolution of the Company or at such time as neither Alliance (or its affiliates) nor MUSC-H (or its affiliates) owns an interest in the Company.

(e) Effect of Termination. In the event of termination of this Agreement, neither party shall have any further obligation hereunder, except for obligations accruing prior to the date of termination and obligations by their nature extending beyond the date of termination. The expiration or earlier termination of this Agreement will not affect the rights of either party to damages based on any breach by the other party prior to such expiration or termination, or indemnification pursuant to the provisions of Section 9.

9. INDEMNITY

Each party shall indemnify and hold harmless the other party (which, for purposes of this paragraph only, shall include all of its agents, directors, officers, employees and contractors) from and against any and all claims, losses, damages, causes of action, liabilities and expenses, including, without limitation, attorney's fees, relating to or arising out of, directly or indirectly, any injury, death or other loss or damage that results from or arises out of or in connection with, in whole or part, directly or indirectly, (i) any breach by the indemnifying party of any provision of this Agreement or (ii) negligence or willful misconduct by the indemnifying party. Neither party assumes any liability or responsibility for the negligence of the other. Each party understands and agrees that this indemnity provision is in no way intended to reduce or eliminate any insurance coverage maintained by either party. The obligations set forth in this Section 9 shall survive the expiration or earlier termination of this Agreement.

10. COVENANTS TO RUN TO SUCCESSORS

Subject to the restrictions set forth in Section 6 hereof, it is hereby covenanted and agreed between the parties hereto that all covenants, conditions, agreements and undertakings contained in this Agreement shall extend to and be binding upon the respective successors and assigns of the respective parties hereto to the same extent as if they were in every case named and expressed.

11. NOTICES

All notices required or permitted under this Agreement shall, unless otherwise specifically provided herein, be in writing, and shall be deemed effective (i) when actually delivered to the following addresses, (ii) three (3) days after deposit in the U.S. mail, prepaid and certified, to the following addresses or (iii) when sent by facsimile transmission to the following facsimile telephone numbers:

Alliance:	Alliance Oncology, LLC c/o Alliance HealthCare Services, Inc. 100 Bayview Circle, Suite 400 Newport Beach, California 92660 Attention: General Counsel Fax: (602) 773-3602
with a copy to:	Alliance Oncology, LLC 1801 West End Avenue, Suite 700 Nashville, Tennessee 37203 Attention: President Fax: (615) 665-8228
and a copy to:	Waller Lansden Dortch & Davis, LLP 511 Union Street, Suite 2700 Nashville, Tennessee 37219 Attention: Beth E. Vessel, Esq. Fax: (615) 244-6804
MUSC-H:	MUSC Health 274 Calhoun Street Charleston, South Carolina 29425 Attention: Office of General Counsel

Either party may change its address to which notices shall be sent by a notice similarly sent.

12. ATTORNEY'S FEES

If any action at law or in equity is brought to enforce any of the terms of this Agreement, the prevailing party shall be entitled to reasonable attorney's fees and costs in addition to any other relief.

13. ENTIRE AGREEMENT; AMENDMENTS

This Agreement constitutes the entire agreement between the parties with respect to the services described herein and supersedes any and all prior agreements, either oral or written, between the parties with respect to the subject matter hereof. This Agreement may be amended or modified only in writing signed by each of the parties hereto.

14. ENFORCEABILITY

In the event that any of the provisions of this Agreement are held to be invalid or unenforceable by any court of competent jurisdiction, the remaining provisions hereof shall not be affected thereby. The parties further agree that if any provision contained herein is, to any extent, held invalid or unenforceable in any respect under the laws governing the Agreement, they will take any actions necessary to render the remaining provisions of this Agreement valid and enforceable to the fullest extent permitted by law and, to the extent necessary, will amend or otherwise modify this Agreement to replace any provision contained herein that is held invalid or unenforceable with a valid and enforceable provision giving effect to the intent of the parties.

15. CONSTRUCTION

Wherever from the context it appears appropriate, each term stated in either the singular or the plural shall include the singular and the plural, and pronouns stated in the masculine, the feminine or the neuter gender shall include the masculine, feminine and neuter. The term "person" means any individual, corporation, partnership, limited liability company, trust or other entity. Every covenant, term and provision of this Agreement shall be construed simply according to its fair meaning and not strictly for or against either party.

16. CAPTIONS

Captions contained in this Agreement are inserted only as a matter of convenience and in no way define, limit or extend the scope or intent of this Agreement or any provision hereof.

17. COUNTERPART EXECUTION; FACSIMILE EXECUTION

Separate copies of this Agreement may be executed by the parties hereto, with the same effect as though all parties had signed the same copy of this Agreement. Signatures on this Agreement transmitted by facsimile shall be accepted as original signatures.

18. WEEKENDS AND HOLIDAYS

If any due date contained herein falls on a Saturday, Sunday or bank holiday, the due date shall be deemed to be the following business day.

19. WAIVER

Failure by either party to enforce any of the provisions hereof for any length of time shall not be deemed a waiver of its rights set forth in this Agreement. Such a waiver may be made only by an instrument in writing signed by the party sought to be charged with the waiver. No waiver of any condition or covenant of this Agreement shall be deemed to imply or constitute a further waiver of the same or any other condition or covenant, and nothing contained in this Agreement shall be construed to be a waiver on the part of the parties of any right or remedy at law or in equity or otherwise.

20. TIME

Time is of the essence with respect to all provisions of this Agreement.

21. WAIVER OF JURY TRIAL

EACH PARTY HERETO HEREBY IRREVOCABLY WAIVES ANY AND ALL RIGHTS IT MAY HAVE TO DEMAND THAT ANY ACTION, PROCEEDING OR COUNTERCLAIM ARISING OUT OF OR IN ANY WAY RELATED TO THIS AGREEMENT OR THE RELATIONSHIPS OF THE PARTIES HERETO BE TRIED BY JURY. THIS WAIVER EXTENDS TO ANY AND ALL RIGHTS TO DEMAND A TRIAL BY JURY ARISING FROM ANY SOURCE INCLUDING, BUT NOT LIMITED TO, THE CONSTITUTION OF THE UNITED STATES OR ANY STATE THEREIN, COMMON LAW OR ANY APPLICABLE STATUTE OR REGULATIONS. EACH PARTY HERETO ACKNOWLEDGES THAT IT IS KNOWINGLY AND VOLUNTARILY WAIVING ITS RIGHT TO DEMAND TRIAL BY JURY.

22. REGULATORY REQUIREMENTS

The parties expressly agree that nothing contained in this Agreement shall require either party, its owners, affiliates, agents or employees to refer any patients to the other party or any affiliate of the other party, to use the Equipment or to otherwise generate business for the other party. The parties further acknowledge that no provision in this Agreement nor any consideration paid in connection with this Agreement is intended to induce, encourage, solicit, arrange for or reimburse the referral of any patients or business, including any patients or business funded in whole or in part by state or federal health care programs (including, but not limited to, Medicare, Medicaid and TriCare). The parties acknowledge and agree that there is no requirement under this Agreement or any other agreement between Alliance and MUSC-H that either Alliance or MUSC-H, or any of their

respective owners, affiliates, agents or employees, refer patients to each other or any of their respective owners or affiliates or to any particular Hospital. The parties further agree that the benefits under this Agreement do not require, are not payment for and are not in any way contingent upon the admission, referral or other arrangement for the provision of any item or service reimbursed in whole or in part by any state or federal health care program. Notwithstanding any unanticipated effect of any provision of this Agreement, neither party will knowingly or intentionally conduct itself in such a manner as to violate any applicable state, local and federal laws, including without limitation the Medicare/Medicaid Anti-fraud and Abuse Amendments and Section 1877 of the Social Security Act.

23. NO THIRD-PARTY BENEFICIARIES

This Agreement is not intended to benefit, does not benefit and may not be enforced by any person or entity other than the parties hereto.

24. GOVERNING LAW

This Agreement is made under, and shall be interpreted and enforced in accordance with, the laws of the State of South Carolina, without giving effect to those principles of conflict of laws which might otherwise require the application of the laws of another jurisdiction.

25. FORCE MAJEURE

Neither party shall be liable to the other for nonperformance or defective or late performance of any of its obligations under this Agreement to the extent and for such periods of time as such nonperformance, defective performance or late performance is due to acts of God, fire, flood, strikes, industrial disturbances, accidents, war (declared or undeclared), riots, acts of terrorism, revolution, explosions, sabotage, nuclear incidents, lightning, weather, earthquakes storms, sinkholes, epidemics, action of any governmental authority or other causes beyond the reasonable control of the pertinent party, so long as such performance is commenced as soon as reasonably possible after the cessation of the cause of the failure to perform.

26. CONFIDENTIALITY OF INFORMATION

Each party to this Agreement will hold in confidence, and not use to the detriment of the other party, and will cause its representatives to hold in confidence, and not use to the detriment of the other party or its affiliates, any confidential or proprietary information ("Confidential Information") it receives regarding such party or its affiliates arising out of or in connection with this Agreement. Failure to mark information as confidential or proprietary will not affect its status as Confidential Information. Each party shall not, at any time, discuss or disclose any of the Confidential Information to any third party or take any action that could compromise the confidentiality of the Confidential Information without the written consent of the other party. The obligations of the parties with respect to

Confidential Information will not apply to the extent that (i) any such information was already known to such party or other others not bound by a duty of confidentiality or such information becomes publicly available through no fault of such party, or (ii) the disclosure of such information is required by applicable law, provided, however, that prior to disclosing such Confidential Information, a party must notify the other party thereof, which notice will include the basis upon which such party believes the information is required to be disclosed. Upon termination of this Agreement, the restrictions on the parties' use of Confidential Information as provided herein will continue in effect, and neither party will take or retain, without prior written authorization from the other party, any papers, patients lists, fee schedules, patient records, files or other documents or copies thereof or other Confidential Information of any kind belonging to the other party. Except for disclosure to the other party's legal counsel, accountant or financial advisors, neither party shall disclose the terms of this Agreement to any person who is not a party or signatory to this Agreement, unless disclosure thereof is required by law or otherwise authorized by this Agreement or consented to by the other party. The parties acknowledge and agree that each party would be damaged irreparably in the event of a breach of this Section 31 and that any such breach could not be adequately compensated by monetary damages. Accordingly, each party agrees that, in addition to any other right or remedy to which the parties may be entitled, at law or in equity, each party will be entitled to enforce this Section 31 by temporary, preliminary and permanent injunctive relief to prevent breaches or threatened breaches of this Section 31, without posting any bond or other undertaking.

27. HIPAA.

The parties shall only use or disclose Protected Health Information (as such term is defined by the Standards for Privacy of Individually Identifiable Health Information, 45 C.F.R. Part 160 and Subparts A and E of Part 164 (the "Privacy Standards"), as promulgated by the Department of Health and Human Services pursuant to the Administrative Simplification provisions of the Health Insurance Portability and Accountability Act of 1996) in compliance with the Privacy Standards and other applicable law and shall reasonably safeguard the confidentiality, integrity and availability of Protected Health Information as required by the Privacy Standards and the Security Standards (45 C.F.F. Part 160 and Subparts A and E of Part 164). Each party agrees to comply with the Health Information Technology for Economic and Clinical Health Act of 2009 and the rules promulgated thereunder. In the event that Protected Health Information is disclosed by a party or its agents to the other party, its employees, contractors, subcontractors or agents, such other party agrees to take reasonable steps to maintain, and to require its employees, contractors, subcontractors and agents to maintain, the privacy and confidentiality of such Protected Health Information consistent with applicable law. Upon request of MUSC-H, Alliance shall execute a business associate agreement with MUSC-H in a form reasonably acceptable to MUSC-H.

28. REQUIRED DISCLOSURES

Each party shall notify the other party in writing within three (3) days after any of the following events occur: (i) an event occurs that substantially interrupts all or a portion of such party's operations or that materially adversely affects a party's ability to perform its obligations hereunder; or (ii) such party's, or its owners or employees, being convicted of a criminal offense related to the provision of health care items or services or such party's, or its owners or employees being listed by a federal agency as being debarred, excluded or otherwise ineligible for participation in a Federal Health Care Program.

29. INDEPENDENT ORGANIZATIONS.

Alliance and MUSC-H intend to act and perform as independent contractors pursuant to this Agreement. The relationship between Alliance and MUSC-H is solely that of two independent parties contracting with each other at arm's -length for the purpose of effectuating the terms of this Agreement. None of the provisions of this Agreement is intended to create, or shall be deemed or construed to create, any other relationship. Except as specifically set forth in this Agreement, neither party nor its agents, employees or representatives shall be deemed the agent, employee or representative of the other party, and no joint venture or partnership shall result from this Agreement. Each party shall be responsible for and shall comply with all state and federal laws pertaining to employment taxes, income withholding, unemployment compensation contributions and other employment-related statutes applicable to that party. Neither party shall have authority, or represent that it has authority, to act on behalf of the other party. Each party shall act at all times under this Agreement as an independent contractor. The provisions of this Section shall survive expiration or other termination of this Agreement, regardless of the cause of such expiration or termination.

Signature Page Follows.

IN WITNESS WHEREOF, Alliance, MUSC-H and Company have executed this Agreement as of the latest date this Agreement is executed by any party as set forth on the signature page below.

ALLIANCE:

ALLIANCE ONCOLOGY, LLC

By: _____

Title: PRESIDENT

Date: 21 JAN 2016

MUSC-H:

MUSC HEALTH

ASA
1/21/16

By: _____

Title: Patrick J. Cawley, MD
CEO, MUSC Health
Medical University of South Carolina

Date: 1/21/16

COMPANY:

MUSC HEALTH CANCER CARE NETWORK, LLC

By: _____

Title: MANAGING MEMBER

Date: 21 JAN 2016

Confidential
ROA_1521
MUSC_00013

THE MEMBERSHIP INTERESTS ISSUED UNDER THIS AGREEMENT HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933 ("'33 ACT") OR UNDER THE DELAWARE SECURITIES ACT, AS AMENDED ("STATE ACT"), AND MAY BE OFFERED OR SOLD BY A PURCHASER OF THE MEMBERSHIP INTERESTS ONLY (1) UPON REGISTRATION OF THE MEMBERSHIP INTERESTS UNDER THE '33 ACT AND THE STATE ACT OR PURSUANT TO AN EXEMPTION THEREFROM, AND (2) AFTER COMPLIANCE WITH ALL RESTRICTIONS ON TRANSFER OF MEMBERSHIP INTERESTS IMPOSED BY THIS AGREEMENT.

OPERATING AGREEMENT

OF

MUSC HEALTH CANCER CARE NETWORK, LLC

(a Delaware Limited Liability Company)

January 22, 2016

RESP. MUSC'S TRIAL EXHIBIT 5

OPERATING AGREEMENT

OF

MUSC HEALTH CANCER CARE NETWORK, LLC

This Limited Liability Company Operating Agreement of MUSC Health Cancer Care Network, LLC (the "Company"), a limited liability company organized pursuant to the Delaware Limited Liability Company Act, is executed effective as of January 22, 2016 ("Effective Date"), by and among the Members (as defined below).

RECITALS:

WHEREAS, the Members desire to form a strategic relationship focused on the development, operation and management of the oncology service lines, including without limitation oncology centers, for certain hospitals throughout the State of South Carolina (the "Network").

WHEREAS, the Members desire for the Company, either directly or indirectly through separate facility-specific entities in which it owns an interest, to provide oncology equipment, space, staffing (including a regional director for administrative services and physicists and dosimetrists), physician recruitment, integrated clinical services, marketing services, billing protocols, clinical standards, research support, related information technology solutions and all other technology used in cancer treatment for the facilities in the Network.

WHEREAS, the Members formed the Company to serve as a vehicle for such relationship.

WHEREAS, the Medical University of South Carolina has established Hollings Cancer Center, a cancer treatment and research center in Charleston, South Carolina (the "Hollings Cancer Center").

WHEREAS, the Members desire for the facilities in the Network to be a part of the Hollings Cancer Center network.

WHEREAS, as part of the Network, the Members agree that the Company and its affiliated service lines shall abide by the clinical standards of the Hollings Cancer Center and shall extend its reputation for academic excellence, as well as the operational and marketing expertise with respect to oncology services of Alliance Oncology, LLC ("Alliance"), to various South Carolina communities.

WHEREAS, the Members intend for the Company to identify opportunities to develop, acquire or hold ownership interests in, and hold ownership interests in facility-specific entities which own and operate cancer programs, including oncology centers, as determined and agreed to pursuant to the terms of this Agreement, which programs shall be subject to the clinical standards of the Hollings Cancer Center.

NOW, THEREFORE, in consideration of the mutual premises, covenants, and undertakings hereinafter contained, and other good and valuable consideration, the receipt and

sufficiency of which is hereby acknowledged, the parties to this Agreement hereby agree as follows:

ARTICLE I
DEFINITIONS

When used in this Agreement, the following terms shall have the meanings set forth below:

"Act" means the Delaware Limited Liability Company Act, as amended from time to time.

"Affiliate" of a specified Person shall mean a Person that directly or indirectly through one (1) or more intermediaries, controls, or is controlled by, or is under common control with, the Person specified. As used in this definition, the term "control" shall mean the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of such specified Person, whether through ownership of voting securities, by contract, or otherwise.

"Agreement" means this Limited Liability Company Operating Agreement, including all schedules and exhibits hereto, as such Agreement, schedules, or exhibits may be amended from time to time.

"Alliance" means Alliance Oncology LLC., a Delaware limited liability company that operates oncology centers across the United States.

"Alliance Board Appointees" has the meaning set forth in Section 10.2(a).

"Alliance Member" means Alliance.

"Available Cash Flow" means all cash funds of the Company on hand at the end of each calendar month less: (i) provision for payment of all outstanding and unpaid expenses of the Company at the end of such month (including those which are in dispute); (ii) the minimum amounts (principal and interest) currently due with respect to any loans and advances made to the Company; (iii) provision for Reserves, but without deduction for depreciation and other non-cash expenses; and (iv) Sale Proceeds.

"Billing Agreement" has the meaning set forth in Section 10.12.

"Board of Managers" or "Board" means the board that shall manage the business of the Company pursuant to Article X of this Agreement.

"Capital Account" means, with respect to any Member, the capital account maintained by the Company for such Member in accordance with Section 7.1 of this Agreement.

"Capital Contribution" in respect of any Member or transferee of such Member means all property, tangible or intangible, contributed by such Member to the capital of the Company.

"Cash" means cash as defined by GAAP.

"Center" means each oncology facility or program in which the Company has a direct or indirect ownership interest, with such locations to be agreed upon by the Members.

"Certificate of Formation" means the Certificate of Formation of the Company filed with the Delaware Secretary of State on January 21, 2016, as amended or restated from time to time.

"Code" means the Internal Revenue Code of 1986, as amended, or any corresponding provisions of succeeding law in effect at such time.

"Committee" means the Company's Clinical Standards Committee, which shall create and implement clinical standards for the Centers, pursuant to Section 10.5 of this Agreement.

"Company" means MUSC Health Cancer Care Network, LLC, a Delaware limited liability company formed pursuant to the Certificate of Formation and to which this Agreement is applicable.

"Company Return" means Form 1065, the U.S. Return of Partnership Income, of the Company.

"Competing Facility" has the meaning set forth in Section 17.1(a).

"Confidential Business Information" has the meaning set forth in Section 17.4.

"Effective Date" has the meaning set forth in the opening paragraph hereof.

"Family Member" means a husband or wife, birth or adoptive parent, child, or sibling; stepparent, stepchild, stepbrother, or stepsister, father-in-law, mother-in-law, son-in-law, daughter-in-law, brother-in-law, or sister-in-law; grandparent or grandchild; and spouse of a grandparent or grandchild.

"Fiscal Year" has the meaning set forth in Section 14.3.

"GAAP" means United States generally accepted accounting principles, as consistently applied by the Company.

"Indemnified Person" has the meaning set forth in Section 16.4.

"IRS" means the United States Internal Revenue Service.

"Management Agreement" has the meaning set forth in Section 10.12.

"Managing Member" shall mean Alliance Oncology, LLC or any replacement member of the Company approved by the Board.

"Member" means each Person designated as a Member of the Company, on Schedule I hereto, or any other Person admitted as a Member of the Company in accordance with this Agreement or the Act. "Member" excludes any Person who ceases to be a Member of the Company pursuant to this Agreement. "Members" refers to such Persons as a group.

"MUSC Agreements" has the meaning set forth in Section 10.15.

"MUSC Board Appointee" has the meaning set forth in Section 10.2(a).

"MUSC Member" means MUSC Health, a South Carolina non-profit corporation.

"Network Management Agreement" has the meaning set forth in Section 10.12.

"Non-Transferring Member" has the meaning set forth in Section 18.1.

"Operating Company" means any other entity in which the Company acquires a direct or indirect ownership interest and that operates a Center.

"Operating Company Governing Document" means the certificate of formation, articles of organization, operating agreement, limited liability company agreement, or other similar governing or formation document and/or agreement with respect to any Operating Company.

"Percentage Interest" means, with respect to each Member, the number of Units owned by such Member divided by the total number of issued and outstanding Units. The initial Percentage Interests of the Members are set forth on Schedule I hereto.

"Person" means an individual, trust, estate, corporation, partnership, limited partnership, limited liability company, unincorporated association, or other entity or association.

"Physician" is defined as set forth in 42 U.S.C. §1395x(r).

"Profits" and "Losses" means, for each Fiscal Year, an amount equal to the Company's taxable income or loss for such Fiscal Year, determined in accordance with Code Section 703(a) (for this purpose, all items of income, gain, loss, or deduction required to be stated separately pursuant to Code Section 703(a)(1) shall be included in taxable income or loss), with the following adjustments:

(a) Any income of the Company that is exempt from federal income tax and not otherwise taken into account in computing Profits or Losses pursuant to this provision shall be added to such taxable income or loss;

(b) Any expenditures of the Company described in Code Section 705(a)(2)(B) or treated as Code Section 705(a)(2)(B) expenditures pursuant to Regulations Section 1.704-(1)(b)(2)(iv)(i), and not otherwise taken into account in computing Profits or Losses pursuant to this provision shall be subtracted from such taxable income or loss;

(c) If the book value of property is adjusted pursuant to Regulations Sections 1.704-1(b)(2)(iv)(f) or (g), such adjustment shall be taken into account as gain or loss from the disposition of an asset and, in lieu of depreciation as calculated for federal income tax purposes, subsequently such deductions shall be computed in accordance with Regulations Sections 1.704-1(b)(2)(iv)(g)(3) or 1.704-3(d)(2), as the case may be. Subsequent calculations of gain or loss resulting from the disposition of an asset for federal income tax purposes shall be computed by

reference to its book value as reflected in Members' Capital Accounts rather than its adjusted tax basis;

(d) To the extent an adjustment to the adjusted tax basis of any Company asset pursuant to Code Section 734(b) or 743(b) is required to be taken into account in determining Capital Accounts as a result of a distribution other than in complete liquidation of a Member's interest in accordance with Regulations Section 1.704-1(b)(2)(iv)(m)(4), the amount of such adjustment to the Capital Accounts shall be treated as an item of gain (if the adjustment increases the basis of the asset) or loss (if the adjustment decreases such basis) from the disposition of the asset and shall be taken into account for purposes of computing Profits and Losses; and

(e) Any items which are specially allocated pursuant to Section 9.3 to the extent applicable to minimum gain, chargeback, partner minimum gain chargeback, 754 adjustments, and Section 9.4 and 9.6 hereof shall not be taken into account in computing Profits or Losses.

The amounts of items of Company income, gain, loss, and deduction available to be specifically allocated pursuant to Sections 9.3 and 9.4 hereof shall be determined by applying rules analogous to those set forth in Subparagraphs (a) through (d) above.

"Purchase Notice" has the meaning set forth in Section 17.2.

"Referral Source" means any of the following, who is or could reasonably be expected to be a source of referrals to the Company, any Operating Company, Alliance Member, MUSC Member, or any of their respective Affiliates: Physician, Family Member of a Physician, and any entity owned, directly or indirectly, in whole or in part, by one or more Physicians or Family Members of Physicians.

"Regulations" mean the Income Tax Regulations promulgated under the Code, as such regulations may be amended from time to time (including corresponding provisions of succeeding regulations).

"Representatives" has the meaning set forth in Section 17.4.

"Regulatory Allocations" has the meaning set forth in Section 9.7.

"Reserves" mean funds or amounts set aside or otherwise allocated or designated (a) to pay taxes, insurance, future or anticipated obligations, contingent or unforeseen obligations, and all other costs, expenses, and liabilities incident to the Company's operations and ownership of property; (b) to fund three (3) months of the Company's operations; (c) to fund the Company's debt obligations due within the next twelve (12) months (including any debt obligations the Company may be liable for under any Operating Company Governing Document); (d) to make repairs and capital improvements to, and acquisitions and replacements of, Company assets (or to fund any contributions to an Operating Company for the purchase, repair or improvement of assets of such Operating Company); or (e) for any other valid purpose relating to the Company, as reasonably determined by the Managing Member.

"Restricted Area" has the meaning set forth in Section 17.1(a).

"ROFR Notice" has the meaning set forth in Section 18.2.

"Sale Proceeds" mean all proceeds of any sale, exchange, foreclosure, abandonment, financing, or refinancing of capital assets of the Company, or from condemnation awards or casualty insurance claims, less applicable expenses and any debt paid or prepaid with the proceeds of or in connection with such transaction occurring upon the liquidation of the Company or sale of all or substantially all of the Company's assets outside the ordinary course of business.

"Standards" means the clinical standards developed from time to time by the Committee, pursuant to the terms hereof.

"Tax Matters Member" has the meaning set forth in Section 10.9.

"Transfer" has the meaning set forth in Section 18.1.

"Transfer Notice" has the meaning set forth in Section 18.1.

"Transferring Member" has the meaning set forth in Section 18.1.

"Unit" means an interest (and all related governance and/or financial rights) as a Member in the capital and Profits and Losses of the Company.

ARTICLE II
ORGANIZATION

2.1 Formation. The Company has filed the Certificate of Formation with the Delaware Secretary of State, and has taken all actions reasonably necessary to maintain the status of the Company as a limited liability company under the laws of Delaware, and each jurisdiction in which the Company does business, as appropriate. In consideration of the mutual promises and covenants contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree that the rights and obligations of the parties and the administration and termination of the Company shall be governed by this Agreement, the Certificate of Formation, and the Act. By executing this Agreement, each of the Members hereby adopts and ratifies the Certificate of Formation. Except as stated in this Agreement, the Act and the Certificate shall govern the rights and liabilities of the Members.

2.2 Name. The name of the Company is MUSC Health Cancer Care Network, LLC. The business of the Company shall be conducted under this name or such other name as the Board of Managers may determine in accordance with the provisions hereof.

2.3 Property Rights. All real and personal property owned by the Company shall be owned by the Company as an entity, and no Member shall have any ownership interest in such property. Each Member's interest in the Company shall be personal property for all purposes.

2.4 Independent Activities. The Board members, and the Members and their Affiliates, shall be required to devote only such time to the affairs of the Company as may be reasonably necessary to manage and operate the Company. Board members, and the Members and their Affiliates (i) shall be permitted to engage in other business endeavors, including those which may

compete with the Company (except that nothing herein shall abrogate any obligations set forth in Article XVII hereof), and (ii) shall not be under any obligation to offer business opportunities to the Company.

2.5 No State Law Partnership. The Members intend that the Company not be a partnership or joint venture and that no Member be a partner or joint venturer of any other Member as a result of being Members, for any purposes other than federal and state tax purposes, and this Agreement shall not be construed to suggest otherwise.

ARTICLE III
PRINCIPAL PLACE OF BUSINESS

3.1 Principal Place of Business. The principal place of business of the Company shall be located at 100 Bayview Circle, Suite 400, Newport Beach, California 92660, or at such other place as the Members may from time to time designate.

3.2 Registered Agent and Office. The registered agent and registered office of the Company are set forth in the Certificate of Formation, and may be changed from time to time by the Members, in which case the Members shall make any filing of such change required by the Act. The Company shall maintain at its registered office such records as may be specified by the Act.

ARTICLE IV
BUSINESS

4.1 General Business Purpose. The business to be conducted by the Company shall be to hold, directly or through one or more of the Operating Companies, ownership interests in Centers, to provide services for the entire oncology service line for the Centers and to carry on any and all activities necessary, proper, convenient, or advisable in connection therewith.

4.2 MUSC Health's Charitable Purpose. It is the intention of the parties that the Company and the Center will be operated in such a manner as to preserve the tax-exempt status of MUSC Health. For so long as MUSC Health or one or more of its Affiliates is a Member, the Company and each Center shall be operated and managed in a manner that furthers MUSC Health's charitable purposes by promoting health for a broad cross-section of the community, especially those persons who are poor. Specifically, Company and each Center shall be operated and managed in a manner that:

(a) Provides access to patient care services based on medical necessity, without regard to the patient's race, creed, national origin, gender, payor source, or ability to pay;

(b) Provides access to patient care services to individuals covered by Medicare or Medicaid;

(c) Offers care to qualifying indigent patients without expectation of payment; and

(d) Will not, in the reasonable opinion of MUSC Health, on advice of its legal and/or tax counsel, cause it or any of its tax-exempt Affiliates to act other than exclusively in furtherance of its respective tax-exempt purposes or adversely affect its tax-exempt status under Section 501(c)(3) of the Code.

All Members are aware of the limitation on the actions of the Company due to the tax-exempt status and charitable purpose of MUSC Health, and each Member agrees that any decision of the Company (i) to forego an action which would be inconsistent with the tax-exempt status of MUSC Health or (ii) to take an action which furthers the charitable purposes over any profit-making motives of the Company, shall not be a breach of the duty of loyalty or a breach of any fiduciary duty to the Company, notwithstanding that any such decision is not in the best interests of the Company.

ARTICLE V
TERM

The Company commenced on the date of the filing of the Certificate of Formation and shall continue until the Company is liquidated and dissolved pursuant to Article XIII of this Agreement.

ARTICLE VI
MEMBERSHIP INTERESTS

The respective Percentage Interests and the Units of each Member shall be as set forth on Schedule I, as it may be amended from time to time. As of the Effective Date, the Members have contributed capital in the amounts set forth opposite their names, in proportion to their respective Percentage Interests, to be used for the Company's start up working capital. Subject to Section 10.4, the Company shall issue additional Units on the terms approved by the Board of Managers.

ARTICLE VII
CAPITAL CONTRIBUTION AND CAPITAL ACCOUNTS OF MEMBERS

7.1 Creation and Maintenance of Capital Account. The Company shall establish and maintain a Capital Account for each Member for the full term of the Company, which Capital Account shall be increased by such Member's Capital Contribution and allocations of Profits and items thereof to such Member and decreased by distributions and allocations of Losses and items thereof to such Member and otherwise maintained in accordance with the capital account maintenance rules of Regulations Section 1.704-1(b)(2)(iv). The foregoing provision and the other provisions of this Agreement relating to the maintenance of Capital Accounts are intended to comply with Regulations Section 1.704-1(b), and shall be interpreted and applied in a manner consistent with such Regulations. Upon occurrence of any of the events specified in Regulations Section 1.704-1(b)(2)(iv)(f)(5), the Managing Member in its sole discretion may revalue all Company assets and adjust the Capital Accounts to reflect such revaluation if the Managing Member reasonably determines that such adjustments are necessary or appropriate to reflect the relative economic interests of the Members in the Company; further, all of the rules of Regulations Section 1.704-1(b)(2)(iv)(f) shall be complied with upon any such revaluation and Capital Account adjustment. In the event the Managing Member shall determine that it is prudent to modify the manner in which the Capital Accounts, or any debits or credits thereto, are computed in order to

comply with such Regulations, the Managing Member may make such modification, provided that it is not likely to have a material effect on the amounts distributable to any Member upon the dissolution of the Company. The Managing Member shall make appropriate modifications in the event that unanticipated events might otherwise cause this Agreement not to comply with Regulations Section 1.704-1(b). In the event that a Member transfers an interest in the Company in accordance with the terms of this Agreement, the transferee shall succeed to the Capital Account of the transferor Member to the extent it relates to the transferred interest. The Capital Accounts of the Members as of the date of this Agreement are set forth on Schedule I.

7.2 Additional Funds. No Member shall be required to contribute additional capital to the Company except as set forth in Section 10.4(j).

7.3 Limited Liability. No Member shall be bound by, or personally liable for, the expenses, liabilities, or obligations of the Company, except as provided in the Act or as otherwise provided by applicable law. Notwithstanding the foregoing, in the event that a third-party commercial lender requires a Member to guarantee the Company's obligations under a loan as a condition of financing and the Member agrees to do so, the Member would be liable under the guaranty according to its terms.

7.4 Withdrawal of Capital Contributions. No Member shall have the right to withdraw or reduce its Capital Contribution. No Member shall have the right to demand or receive property other than cash in return for its Capital Contribution, and no Member shall have priority over any other Member, either as to the return of Capital Contributions or as to profits, losses, or distributions, except as expressly provided otherwise in this Agreement. No interest shall be paid on Capital Contributions or on balances in the Capital Accounts, except as specifically provided in this Agreement.

7.5 No Negative Capital Account Make-Up. Members will not be subject to additional assessments for contributions to the capital of the Company. Notwithstanding any other provision in this Agreement or any inference from any provision in this Agreement, no Member shall have an obligation to the Company, to the other Members, or to third parties to restore a negative Capital Account balance during the existence of the Company or upon the dissolution or termination of the Company.

ARTICLE VIII
EXPENSES OF THE COMPANY

8.1 Organizational Expenses. All expenses incurred in connection with the formation of the Company shall be paid by the Company; provided that each Member shall be responsible for its own legal fees; provided, further, the Company shall reimburse any Member for all such formation expenses that the Member incurs other than legal fees.

8.2 Fees Receivable by Member or Affiliate of a Member. Subject to Section 10.4, the Company may contract with others, including Members and Affiliates of Members, to perform certain services. Any such arrangements with Members or Affiliates of Members will be on terms that are fair and reasonable to the Company and no less favorable than could reasonably be realized with unaffiliated persons.

ARTICLE IX
ALLOCATION OF INCOME AND LOSS; CASH DISTRIBUTIONS

9.1 Profits. After giving effect to the special allocations set forth in Sections 9.3 through 9.8 for each Fiscal Year, Profits for each Fiscal Year shall be allocated as follows:

(a) First, to the Members in proportion to and to the extent of the amount equal to the remainder, if any, of (i) the cumulative Losses allocated to each such Member (or such Member's predecessor in interest) pursuant to Section 9.2(b) for all prior Fiscal Years, over (ii) the cumulative Profits allocated to each such Member (or such Member's predecessor in interest) pursuant to this Section 9.1(a) for all prior Fiscal Years.

(b) Second, in proportion to the Members' respective Percentage Interests.

9.2 Losses. After giving effect to the special allocations set forth in Sections 9.3 through 9.8 for each Fiscal Year, Losses for each Fiscal Year shall be allocated as follows:

(a) First, in accordance with the Members' respective Percentage Interests.

(b) Second, losses allocated pursuant to Section 9.2(a) shall not exceed the maximum amount of Losses that can be so allocated without causing any Member to have a deficit balance in such Member's Capital Account at the end of any Fiscal Year except as allowed by Regulations Section 1.704-1(b)(2)(ii)(d). All Losses in excess of the limitation shall be allocated to the other Members in proportion to the Members' respective Percentage Interests.

9.3 Compliance with Treasury Regulations. The provisions of this Article IX are intended to comply with Regulations Sections 1.704-1(b), 1.704-2, 1.704-3, and any successor regulations, and shall be defined and interpreted consistently with this intention and the Company shall make such special allocations determined necessary by the Members for the allocations of income and loss to be respected for federal income tax purposes pursuant to Regulations Section 1.704-1(b) and 1.704-2. This Article IX is specifically intended to comply with the "alternate test for economic effect" under Regulations Section 1.704-1(b)(2)(ii) and thus all of the requirements necessary to comply with such test, including a qualified income offset, are incorporated herein by reference. In addition, the provisions in Regulations Section 1.704-2 pertaining to minimum gain charge-backs and nonrecourse deductions are incorporated herein by reference.

9.4 Nonrecourse Deductions. Nonrecourse Deductions (as such term is defined in Regulations Section 1.704-2(b)) shall be specially allocated to and among the Members in accordance with their respective Percentage Interests. Partner Nonrecourse Deductions (as such term is defined in Regulations Section 1.704-2(i)) shall be specially allocated to the Member who bears the economic risk of loss with respect to the "partner nonrecourse liability" to which such Partner Nonrecourse Deductions are attributable.

9.5 Gross Income Allocation. In the event that a Member has a deficit Capital Account at the end of any Fiscal Year, which is in excess of the sum of (i) the amount such Member is treated as being obligated to contribute subsequently to the capital of the Company as determined under Regulation Section 1.704-1(b)(2)(ii)(c), if any; and (ii) the amount such Member is deemed

to be obligated to restore in accordance with the next to last sentences of Regulation Sections 1.704-2(g)(1) and 1.704-2(i)(5), each such Member shall be specifically allocated items of Company income and gain in the amount of such excess as quickly as possible. An allocation made in accordance with this Section 9.5 shall be made only if and to the extent that such Member would have a deficit Capital Account in excess of such sum after all other allocations provided for in this Article IX have been made.

9.6 Allocations in Event of Recharacterization or Imputed Interest Transactions. In the event that any otherwise deductible payment made by the Company to a Member or an Affiliate of a Member is recharacterized as a distribution from the Company, then the Member which is deemed to have received the distribution shall be allocated items of Company income or gain for such Fiscal Year (and, if necessary for subsequent Fiscal Years) in an amount equal to the distribution. In addition, if, pursuant to the Code or Regulations, a Member recognizes imputed interest income as a result of a transaction between such Member and the Company, such Member shall be allocated any related Company deduction for such imputed interest.

9.7 Corrective Allocations. The allocations provided in Sections 9.3, 9.4, and 9.5 above (collectively, the "Regulatory Allocations") are intended to comply with certain requirements of the Regulations. It is the intent of the Members that, to the extent possible, all Regulatory Allocations may be offset either with other Regulatory Allocations or with special allocations of other items of Company income, gain, loss, or deduction pursuant to this Section 9.7. Therefore, notwithstanding any other provision of this Article IX (other than the Regulatory Allocations), the Managing Member may make such offsetting special allocations of Company income, gain, loss, or deduction in whatever manner it determines appropriate so that, after such offsetting allocations are made, each Member's Capital Account balance is, to the extent possible, equal to the Capital Account balance such Member would have had if the Regulatory Allocations were not part of the Agreement and all Company items were allocated pursuant to Sections 9.1, 9.2, and 9.8. In exercising its discretion under this Section 9.7, the Managing Member shall take into account future Regulatory Allocations under the minimum gain chargeback and member minimum gain chargeback incorporated into this Agreement by Section 9.3 that, although not yet made, are likely to offset other Regulatory Allocations previously made under Section 9.4 and under the allocation of member nonrecourse debt incorporated herein by Section 9.3.

9.8 Allocations Upon Liquidation. After giving effect to any allocations required by Sections 9.3, 9.4, or 9.5, upon the liquidation of the Company, all items of income, gain, loss, and deduction shall be allocated among the Members to cause the ending Capital Account balance of each Member to equal, as near as reasonably practicable, an amount equal to the distribution that is anticipated to be distributed to each such Member under Sections 9.10 and 9.11. Such allocations shall be made among the Members according to the following ratio: (i) the difference between each Member's Capital Account and the amount of the anticipated distribution under Sections 9.10 and 9.11, over (ii) the sum of such differences for all Members. Thereafter, all remaining items of income, gain, loss, and deduction shall be allocated among the Members in accordance with their respective Percentage Interests.

9.9 Tax Allocations: Code Section 704(c). Income, gain, loss, and deduction as computed for income tax purposes with respect to Company property subject to Code Section 704(c) shall be allocated in accordance with said Code Section and/or Regulations Section 1.704 -

1(b)(4)(i), as the case may be, using any reasonable method permitted under Regulations Section 1.704-3(b) that is selected by the Managing Member. Allocations pursuant to this Section 9.9 are solely for purposes of federal, state, and local taxes and shall not affect, or in any way be taken into account in computing, any Person's Capital Account or share of Profits and Losses, other items, or distributions pursuant to any provision of this Agreement.

9.10 Distributions of Available Cash Flow. Subject to Section 13.2, and except to the extent that Available Cash is needed, in the reasonable discretion of the Managing Member, to fund capital expenses (which shall be subject to the approval requirements of Section 10.4(a)), the Company shall distribute the Available Cash Flow to the Members in accordance with their respective Percentage Interests. Such distributions shall be made at least quarterly but no more frequently than monthly or at such other time or times as the Managing Member shall deem practicable.

9.11 Distributions of Sale Proceeds. Except as provided in Section 13.2, the Company shall distribute any Sale Proceeds in accordance with the Members' respective Percentage Interests. Such distribution shall be made as soon after the receipt by the Company of Sale Proceeds as the Managing Member deems practicable. Notwithstanding anything to the contrary above, in the event that the Company sells its assets for a combination of cash and notes, the Members shall be entitled to (i) their proportionate share (in accordance with the Members' respective Percentage Interests) of the remaining cash, and (ii) an undivided interest in each note received by the Company, and shall be paid their proportionate share (in accordance with the Members' respective Percentage Interests) of principal and interest and such notes as the purchaser pays such amounts.

9.12 Consequences of Distributions. Upon the determination to distribute funds in any manner expressly provided in this Article IX, made in good faith, the Members shall not incur any liability on account of such distribution, even though such distribution may have resulted in the Company retaining insufficient funds for the operation of its business which insufficiency resulted in loss to the Company or necessitated the borrowing of funds by the Company.

9.13 Tax Credits. Tax credits for any Fiscal Year shall be allocated among the Members in accordance with the Members' respective Percentage Interests. Such allocations shall not be taken into account in computing any Member's Capital Account balance.

ARTICLE X
MANAGEMENT OF THE COMPANY

10.1 Managing Member. The Members hereby designate Alliance Oncology, LLC as the Managing Member. The Board may appoint a replacement Managing Member. The Managing Member shall possess all of the rights and powers delegated to the Managing Member hereunder and by the Board, including without limitation the right to manage its employees providing services to the various Operating Companies. Subject to the direction of the Board described herein, the Managing Member shall have the authority to bind the Company as an agent in the ordinary course of business. The Managing Member shall be reimbursed for all direct out-of-pocket expenses incurred by it in performing its duties hereunder, excluding any corporate overhead expenses of the Managing Member and its Affiliates. Each Member hereby makes, constitutes and appoints the Managing Member, and any officer thereof, with full power of substitution and resubstitution, its agent and attorney-in-fact to file for record, and to sign, execute, certify and acknowledge, any other instruments approved in accordance with the terms of the Agreement which may be required of the Company or of the Members by law. Subject to the terms of this Agreement, each Member authorizes such attorney-in-fact to take any further action which such attorney-in-fact shall consider necessary or advisable in connection with the foregoing, hereby giving such attorney-in-fact full power and authority to act to the same extent as if such Member were himself personally present, and hereby ratifying and confirming all that such attorney-in-fact shall lawfully do or cause to be done by virtue hereof. The power of attorney granted in this Section is a special power of attorney coupled with an interest, is irrevocable, and shall survive the dissolution of the granting Member

10.2 Board of Managers.

(a) Except to the extent otherwise provided herein or pursuant to the terms of the Management Agreement, the non-clinical portion of the Company's business shall be managed by a Board of Managers consisting of five (5) members. Three (3) members of the Board shall be appointed by Alliance Member (the "Alliance Board Appointees") and two (2) members of the Board shall be appointed by MUSC Member (the "MUSC Board Appointees"). In addition, one representative from each Operating Company shall be provided with notice of, and be given the right to attend, all Board meetings with observation but no voting rights. An Alliance Board Appointee shall manage the Board's meetings and agendas and chair its meetings. As of the Effective Date, the Alliance Board Appointees and the MUSC Board Appointees are as follows:

Alliance Board Appointees	MUSC Board Appointees

Each Board member shall be deemed to be acting at all times solely as the representative of the Member appointing such Board member, and no Board member shall be deemed to have any fiduciary or other duties or obligations to the Company or to any Member other than the Member appointing such Board member. A Board member may resign at any time and may only be removed, and a successor selected, by the Member initially appointing such member. The Member appointing a replacement Board member shall promptly notify the other Members in writing of the identity of such substituted Board member. Notwithstanding anything

to the contrary in this Agreement, no Person may be a Board member who: (i) is excluded from participation in Medicare, Medicaid, or any other federal health care program; (ii) is debarred, suspended, or otherwise excluded from participating in any other federal procurement or nonprocurement program or activity; or (iii) is convicted of a criminal offense described in 42 U.S.C. §1320a-7(a). A Member shall immediately remove any Board member, appointed by such Member, upon the failure of such Board member to remain qualified to be a Board member under the preceding sentence. The Board may appoint other Persons as officers or subordinates with such authority as it shall delegate to such Persons and with such titles as it may designate, including officers as outlined in Article XII hereof; provided, however, that no such delegation shall eliminate the approval requirements set forth elsewhere in this Agreement, including Section 10.4.

(b) The Board shall meet as often as it elects to meet, but shall meet at least annually. Each Board member shall have one (1) vote on a particular question or issue before the Board. A vote of three (3) Board members shall constitute the act of the Board and shall be sufficient to authorize any actions of the Company, except as set forth in Section 10.4.

(c) The presence of three (3) Board members at a duly called and noticed meeting of the Board, at least one (1) of whom shall be a MUSC Appointee, shall constitute a quorum for the transaction of business.

(d) Each Board member may authorize any individual to act on the Board member's behalf by proxy on all matters in which a Board member is entitled to participate, whether by waiving notice of any meeting or by voting or participating at a meeting. Every proxy must be signed by the Board member authorizing such proxy or such Board member's attorney-in-fact. No proxy shall be valid after the expiration of eleven (11) months after the date thereof unless otherwise provided in the proxy. Every proxy shall be revocable at the pleasure of the Board member executing it.

10.3 Management.

(a) Subject to Sections 10.1, 10.3(d), 10.4 and Section 10.5 and the terms of the Management Agreement, the Board shall have the right to manage the non-clinical business of the Company and to make or approve all decisions regarding the business of the Company.

(b) Subject to Sections 10.1, 10.3(d), 10.4 and 10.5 and the terms of the Management Agreement, the Board is granted the right, power, and authority to do in the name of, and on behalf of, the Company all things that, in the Board's judgment, are necessary, proper, or desirable to carry out the purposes of the Company, including but not limited to the right to amend this Agreement to the extent provided in Section 20.19.

(c) The Members hereby agree that only the Managing Member and the officers and Persons authorized by the Board shall have the authority to bind the Company as provided herein. No Member or individual appointed to the Board by a Member, other than an officer or other Persons authorized by the Board or the Managing Member, shall take any action to bind the Company, and each Member shall indemnify the Company for any costs or damages incurred by the Company as a result of the unauthorized action of such Member or its appointed member of the Board of Managers.

(d) To the maximum extent permitted by law, other than (i) the right of each Member to appoint persons to serve on the Board of Managers, (ii) the right of each Member to appoint persons to serve on the Committee (as defined below), and (iii) as set forth in the Act, Members do not have any right to vote on any matter. To the extent that the Members are required under Delaware law to approve a matter, then such voting rights are expressly held by the Members. As to any matter requiring the approval of the Members under Delaware law, such matter shall be deemed approved if a holder of majority of the Percentage Interests approves such matter at a meeting or by written consent, subject to the approval requirements of Sections 10.3 and 10.4.

10.4 Actions Requiring the Consent of Supermajority. Subject to any requirement of Delaware law that the Members approve a matter and notwithstanding the foregoing provisions of this Article X, or any other provision of this Agreement, the consent of four (4) members of the Board, two (2) of whom shall be MUSC Appointees, shall be required in order for any of the following actions to be taken from time to time by the Board on behalf of the Company, an Operating Company and/or a Center:

(a) Excluding expenses relating to personnel of the Company, an Operating Company or a Center, causing the Company, an Operating Company or a Center to acquire significant assets or make cash payments that are not included in the then existing budget and that are greater than $350,000;

(b) Dissolution of the Company, any Operating Company or a Center; or declaring bankruptcy or entering into any insolvency proceeding with respect to the Company, any Operating Company or a Center;

(c) Amendment of this Agreement or the Certificate of Formation; provided, however, a simple majority vote of the Board is all that is required for those items identified in Section 20.19;

(d) Change the tax structure or the nature of the business of the Company, an Operating Company or a Center;

(e) Relocate a Center;

(f) Change the distribution policies of the Company, including without limitation the timing requirements set forth in Section 9.10 above;

(g) Amend Schedule II to re-define the Restricted Area as set forth in Section 17.1(a);

(h) Waive or agree to waive a non-competition provision of an Operating Company Governing Document;

(i) Incurrence of debt or other long term liability in excess of $350,000 by the Company or any Operating Company on a per Company or per Operating Company basis, as applicable, provided guarantees of the debt by a Member is required;

(j) Calls for additional capital from the Members; and

(k) Any material change to the business, purpose or mission of the Corporation which could adversely impact the tax-exempt status of a Member under IRC Section 501 (c)(3).

10.5 Clinical Standards Committee. The Company shall establish a Clinical Standards Committee (the "Committee") which shall develop Standards consistent with the clinical standards of Hollings Cancer Center to be provided to each Center and which shall set clinical staffing levels for the Operating Companies. The Committee shall consist of five (5) members, three (3) of whom shall be appointed by the MUSC Member, and two (2) of whom shall be appointed by the Alliance Member. Each member of the Committee shall have the right to one vote. The Centers shall be required to follow and implement the Standards developed from time to time by the Committee. The MUSC Member shall execute a license agreement allowing the Operating Companies to use the Hollings Cancer Center name at each Center. A member of the Committee appointed by the MUSC Member shall manage the Committee's meetings and agendas and chair its meetings.

10.6 Meetings of the Board of Managers or the Committee. A meeting of the Board of Managers or of the Committee may be called at any time by at least two (2) members of the applicable entity or by the Managing Member. Meetings of either the Board or Committee may be held at any place within the United States, selected by the member calling the meeting, subject to the ability of members thereof to participate by telephone, as set forth in Section 10.7. Notice of the time and place of a meeting and applicable telephone number(s) shall be given to each Member of the Board or Committee, as applicable, pursuant to Section 20.1 at least seventy-two (72) hours prior to the time of the holding of a meeting. Except as otherwise provided by the Act or this Agreement, a notice need not specify the purpose of the meeting.

10.7 Participation by Telephone or Similar Communications. The Board or Committee may participate and hold a meeting by means of conference telephone or similar communications equipment by means of which all members participating can hear and be heard by one other, and such participation shall constitute attendance and presence in person at such meeting. For any quarterly or other meeting of the Board or Committee, the Company shall make a telephone or other communications link to the meeting available to any member thereof requesting such a link.

10.8 Actions by Written Consent. Any action required or permitted to be taken at a meeting of the Board or Committee may be taken without a meeting provided that a consent or consents in writing, setting forth the action so taken, shall be signed by not less than the minimum number of members thereof that would be necessary to authorize or take such action at a meeting at which all of the Board or Committee members, as applicable, were present and voted thereon; provided that all members thereof are presented with such consent and given the opportunity to sign such consent. Such consent or consents shall be filed with the minutes of the meetings of the Board or Committee, as applicable. Action taken under this section is effective when the requisite number of Board or Committee members have signed the consent or consents, unless the consent or consents specify a different effective date.

10.9 Tax Matters Member.

(a) The Tax Matters Member shall be the Alliance Member. The Tax Matters Member shall have the following duties with respect to the Company, along with any other duties required by the Code, to the extent and in the manner provided by the Code:

(1) Furnish the name, address, profits, interest, and taxpayer identification number of each Member to the IRS;

(2) Keep each Member informed of the administrative and judicial proceedings for the adjustment of any item required to be taken into account by a Member for income tax purposes; and

(3) Within thirty (30) days of receiving a notice of a Company audit by the IRS, forward a copy of such notice to the Members.

(b) The Tax Matters Member is hereby authorized, but not required, to:

(1) Enter into any settlement with the IRS with respect to any tax audit or judicial review, in which agreement the Tax Matters Member may expressly state that such agreement shall bind the other Members, except that such settlement agreement shall not bind any Member who (within the time prescribed pursuant to the Code and regulations thereunder) files a statement with the IRS providing that the Tax Matters Member shall not have the authority to enter into a settlement agreement on behalf of such Member;

(2) If a final administrative adjustment of a Company item required to be taken into account by a Member for tax purposes is mailed to the Tax Matters Member, seek judicial review of such final adjustment, including the filing of a petition for readjustment with the United States Tax Court, the District Court of the United States for the district in which the Company's principal place of business is located, or the United States Claims Court;

(3) Intervene in any action brought by any other Member for judicial review of a final adjustment;

(4) File a request for an administrative adjustment with the IRS at any time and, if any part of such request is not allowed by the IRS, file a petition for judicial review with respect to such request;

(5) Enter into an agreement with the IRS to extend the period for assessing any tax which is attributable to any item required to be taken into account by a Member for tax purposes, or an item affected by such item;

(6) File a petition as contemplated in Sections 6226(a) and/or 6228 of the Code; and

(7) Take any other action on behalf of the Members or the Company in connection with any administrative or judicial tax proceeding to the extent permitted by applicable law or regulations.

(c) The Company shall indemnify and reimburse the Tax Matters Member for all expenses, including legal and accounting fees, claims, liabilities, losses, and damages incurred in connection with any administrative or judicial proceeding with respect to the tax liability of the Members and against any and all loss, liability, cost, or expense, including judgments, fines, amounts paid in settlement and attorneys' fees and expenses, incurred by the Tax Matters Member in any civil, criminal, or investigative proceeding in which the Tax Matters Member is involved or threatened to be involved solely by virtue of being Tax Matters Member, except such loss, liability, cost, or expense arising by virtue of the Tax Matters Member's gross negligence, fraud, malfeasance, breach of fiduciary duty, or intentional misconduct. The payment of all such expenses shall be made before any distributions are made. The taking of any action and the incurring of any expense by the Tax Matters Member in connection with any such proceeding, except to the extent required by law, is a matter in the sole discretion of th e Tax Matters Member and indemnification set forth in this Agreement and shall be fully applicable to the Tax Matters Member in its capacity as such.

10.10 Services Agreement. The Company will cause each Operating Company to enter into a Services Agreement with the applicable provider, in substantially the form attached hereto as Exhibit A (subject to any modifications to such form agreed to by the Board and as the same may be amended from time to time).

10.11 Operating Company Software and Equipment. The Company, acting through the Managing Member, will procure the acquisition of software and equipment for each Center in the Network on behalf of each Operating Company. The software and equipment may include, but is not necessarily limited to oncology-related equipment, CT simulators, information technology software, and physics software. The software and equipment may be financed by either the Alliance Member, through its parent company Alliance Healthcare Services, Inc., or by a third party financial institution and the debt service will be paid by the respective Operating Company. The Alliance Member will use commercially reasonable efforts to obtain the most advantageous terms available.

10.12 Management Rights and Powers of Members. In addition to any management rights described herein, the Members shall have the rights and obligations set forth in the Network Management Agreement, in substantially the form attached hereto as Exhibit B (the "Network Management Agreement"). Such services shall be performed in connection with each Operating Company's Management Agreement with each Center (each, a "Management Agreement"). Pursuant to such Management Agreements, the Managing Member shall have day-to-day operational authority for the Company and the Operating Companies in the absence of a specific directive from the Board of Managers or a specific Standard, as well as the rights and authority set forth in the Management Agreements. In all cases consistent with and subject to directives of the Board of Managers, the Managing Member shall have all powers necessary to manage, administer, and operate the business and affairs of the Company and the Centers for the purposes herein stated, and to do all things which are necessary in the conduct of the day-to-day business and affairs of the Operating Companies. In addition, the Alliance Member shall perform billing services for all of the Centers pursuant to the terms of a Billing Agreement with the Company, in substantially the form attached hereto as Exhibit C (the "Billing Agreement").

10.13 Operating Company. Upon the formation of an Operating Company and at the direction of the Board, the Company will enter into the Operating Company Governing Documents, including a Limited Liability Company Operating Agreement of the Operating Company. It is anticipated that the Operating Company Governing Documents will provide for, among other things, a non-competition provision, as well as the usual and customary restrictions on the transfer of ownership interests. Notwithstanding the foregoing, no Referral Source shall be permitted to be an owner of any Operating Company.

10.14 Approval of New Center. Notwithstanding anything to the contrary, it is the intent of the Company to locate and invest in new markets in South Carolina and to create Centers and grow the Network. Therefore, any member of the Board, through request made at a properly called Board meeting, may direct Alliance to perform preliminary due diligence with regard to a specific new market. At such direction, Alliance shall perform or obtain preliminary market analysis sufficient to recommend to the Board, at a properly called Board meeting, whether or not the new market is a viable option for the Company. The Board will through action instruct Alliance to perform more intensive due diligence on the new market or through action or non-action decide the new market, is not a viable option. In the event the Board instructs Alliance to perform more intensive due diligence on the new market, Alliance shall perform such diligence and will use its commercially reasonable efforts to within one hundred and twenty (120) days present the Board with a non-binding term sheet detailing the financial and deal terms for the new market. The consent of at least four (4) members of the Board, two (2) of whom shall be MUSC Appointees, shall be required to approve the entrance into a new market and the non-binding term sheet. In the event the Board approves the new market and term sheet, Alliance will move to produce definitive agreements for the new market, which may be approved majority vote pursuant to section 10.2(b) herein. In the event the Board elects not to enter the new market by a split vote, the Member who appoints any Board Member voting against the entrance into the new market shall waive any applicable non-compete provision pursuant to this Agreement for a period of one (1) year from the date of the vote to allow the entity who appoints any Board Member voting in favor of the new market to consummate a transaction in the new market. If a transaction is consummated within the one (1) year time frame, the non-compete pursuant to this Agreement will be permanently inapplicable to such new market.

10.15 MUSC Agreements. The MUSC Member or an Affiliate thereof shall execute additional agreements with the Company necessary for the operations of the Network, including without limitation a telemedicine agreement and a clinical standards agreement (collectively, the "MUSC Agreements").

ARTICLE XI
TRANSFER OF UNITS IN THE COMPANY

11.1 In General. A Member may not sell, assign, pledge, hypothecate, grant a security interest in, or otherwise transfer any or all of the Units owned by it or any interest in a Unit, except as otherwise set forth herein except upon the approval of the members of the Board not appointed by the transferring Member. Any sale, assignment, pledge, hypothecation, or other transfer that does not comply with the provisions of this Section 11.1 shall be null and void, and each Member and its successor, transferee, or assignee agrees that any such transfer may and should be enjoined and rescinded. Notwithstanding the foregoing, the following shall not be considered a transfer

subject to the restrictions set forth in this Article XI: (i) the merger of consolidation of a Member or an Affiliate of a Member with or into another entity; (ii) the sale o f a majority of the securities of a Member or an Affiliate of a Member in a single transaction or series of related transactions; and (iii) the sale, in a single transaction or series of related transactions, of all or substantially all of the assets of a Member.

(a) Notwithstanding the foregoing, no Board approval shall be required for any transfers arising by reason of legislation enacted, regulations promulgated, a decision of a court with jurisdiction over the Company rendered or an opinion of a government agency is issued that, in the reasonable opinion of legal counsel to the Company, which counsel and opinion is reasonably acceptable to the Members, affects the legality of this Agreement, the ability of the Company to operate in accordance with applicable laws, rules and regulations, or makes it unlawful for either Member or its Affiliates to own a direct or indirect interest in the Company or any Operating Company or to enter into the transactions and agreements contemplated by this Agreement, in which such event the provisions of Section 19.1 shall apply prior to any transfer to a third party.

(b) Notwithstanding anything to the contrary in this Section 11.1, each of MUSC Member and Alliance Member and their permitted transferee Affiliates shall have the right to transfer all, but not less than all, of its interest to an Affiliate at any time, so long as the transfer does not permit the transferring party to avoid its obligations under this Agreement and the transfer complies with the provisions in Sections 11.1 (c).

(c) The transferring Member and its purchaser, assignee, or transferee must execute and deliver to the Company such instruments of transfer and assignment with respect to such transaction as are in form and substance satisfactory to the non-transferring Members, including, without limitation, the written acceptance and adoption by such Person of the provisions of this Agreement (including the prohibition on further transfers as outlined in Section 11.1(a)).

(d) Such transferring Member must pay the Company a transfer fee which is sufficient to pay all reasonable expenses of the Company in connection with such transaction.

(e) The transferring Member must comply with the provisions of Article XVIII unless transferring to an Affiliate pursuant to Section 11.1(b).

11.2 Substituted Members. Any Affiliate of a Member shall become a substituted Member upon satisfaction of the conditions set forth in Section 11.1 with respect to such transferee. Any other purchaser, assignee, or transferee of a Unit shall become a substituted Member within the meaning of the Act if:

(a) The Board has consented in writing to such Person becoming a substituted Member;

(b) Such Person executes and acknowledges such other instruments as the Company may deem necessary or advisable to effect the admission of such Person as a substituted Member, including, without limitation, the written acceptance and adoption by such Person of the provisions of this Agreement; and

(c) Such Person pays a transfer fee to the Company which is sufficient to cover all reasonable expenses connected with the admission of such Person as a substituted Member within the meaning of the Act.

Upon satisfaction of these conditions, the Board shall take any other steps which, in the opinion of the Board, are reasonably necessary to admit such Person as a substituted Member under the Act. Notwithstanding anything to the contrary contained herein, no Referral Source shall be admitted as a Member.

ARTICLE XII
OFFICERS OF THE COMPANY

The Board may appoint officers of the Company to assist the Board in its duty and right to manage and control the Company. The officers of the Company shall have such authority and perform such duties in the management of the Company as may be determined by the Board. Such officer or officers shall serve in their appointed capacity until their death, disability, resignation or removal by the Board. Specifically, and without limiting the generality of the foregoing, each officer of the Company, acting in the capacities specified from time to time by the Board, shall have such duties and responsibilities as are generally accorded to officers, acting in the same or similar capacities, of a corporation formed and existing under the laws of the State of Delaware; provided, however, that no such delegation shall eliminate the approval requirements set forth elsewhere in this Agreement, including Section 10.4. Upon the death, disability, resignation or removal of the officer, the Board may appoint a new officer to fill the vacated position. As of the Effective Date, the officers of the Company and each Operating Company are as follows:

Name	Title
	President and Chief Executive Officer
	Vice President
	Chief Financial Officer
	Secretary

ARTICLE XIII
DISSOLUTION AND WINDING UP OF THE COMPANY

13.1 Dissolution of the Company. The Company will be dissolved upon the occurrence of any of the following events:

(a) All or substantially all of the assets of the Company are sold, exchanged, or otherwise transferred (unless the Members have elected to continue the business of the Company, in which event the Company will continue until the Members elect to dissolve the Company);

(b) The affirmative vote of the Board as provided in Section 10.4 (b);

(c) The entry of a final judgment, order, or decree of a court of competent jurisdiction adjudicating the Company to be bankrupt under Chapter 7 of the United States Bankruptcy Code and the expiration without appeal of the period, if any, allowed by applicable law in which to appeal;

(d) By action of the Members, upon their mutual determination that applicable state or federal regulations or laws, or any legal developments thereunder, as applied to the Company or to the Units of the Members, would adversely affect (or potentially adversely affect), in a manner deemed substantial by the Members, the operations of the Company or the Members (provided, however, that any disagreement among the Members pursuant to this Section 13.1(d) which they are unable to resolve within fifteen (15) days may, at the request of either Member, be submitted to binding arbitration pursuant to Section 20.11(c));

(e) At any time there are no Members; or

(f) The entry of a decree of judicial dissolution or the issuance of a certificate for administrative dissolution under the Act.

Nothing contained in this Section 13.1 is intended to grant to any Member the right to dissolve the Company at will (by retirement, resignation, withdrawal, or otherwise), or to exonerate any Member from liability to the Company and the remaining Members if it dissolves the Company at will. Any dissolution at will of the Company, including dissolution caused under Section 13.1(f), shall be in contravention of this Agreement for purposes of the Act.

13.2 Winding Up of the Company. Upon the dissolution of the Company, the Members shall take full account of the Company's assets and liabilities, and the assets shall be liquidated as promptly as is consistent with obtaining the fair value thereof and in accordance with the Act. Unless otherwise agreed by the Members, at the time of liquidation, any property owned by the Company shall be sold for cash, and each Member shall have the right to bid competitively for any such asset being sold. The proceeds from the sale of the Company's assets, to the extent sufficient therefor, shall be applied and distributed as provided in the Act and this Agreement; provided, however, that after payment of or creating adequate reserves to provide for all Company debts, obligations, and liabilities, the remaining Company assets, notwithstanding anything contained in this Agreement to the contrary, shall be distributed to the Members in accordance with their respective ending positive Capital Account balances after all allocations and any other Capital Account adjustments for the Fiscal Year are made. All Company assets shall be distributed by the later of (i) the last day of the tax year of the liquidation as defined in Regulations Section 1.704-1(b), or (ii) ninety (90) days after the liquidation; provided, however, if the Company creates reserves or holds installment obligations owed to Company, such amounts will be distributed as soon as practicable and in the ratios of the Members' ending positive Capital Account balances. Unless otherwise agreed by the Members at the time of winding up of the Company, the Alliance Member shall be responsible for winding up the Company.

13.3 Certificate of Cancellation. After all debts, liabilities, and obligations have been paid and discharged (or adequate provision made therefor) and all of the assets have been distributed to the Members, the Members shall cause a Certificate of Cancellation to be executed on behalf of the Company and filed with the Secretary of State. The Members shall execute, acknowledge, and file any and all other instruments necessary or appropriate to reflect the dissolution of the Company.

ARTICLE XIV
BOOKS OF ACCOUNT, ACCOUNTING, REPORTS, FISCAL YEAR, BANKING, AND TAX ELECTION

14.1 Books of Account. The Company's books and records (including a current list of the names and addresses of all Members) and an executed copy of this Agreement, as currently in effect, shall be maintained at the principal office of Alliance, and each Member shall have access thereto at all reasonable times. The books and records shall be kept by the Company using an appropriate method of accounting consistently applied and shall reflect all Company transactions and be appropriate and adequate for the Company's business. The Company shall also keep adequate federal income tax records using an appropriate method of accounting applied on a consistent basis.

14.2 Financial Reports. Within thirty (30) days following the end of every month, the Alliance Member shall provide each Member with the Company's, Operating Companies' and Centers' unaudited financial statements (including balance sheet and income statement) and operating reports, with such financial statements and operating reports showing results for the prior month, year to date, and latest trailing twelve month periods, as well as the same comparative periods for the previous year. Additionally, the reporting prepared by the Alliance Member shall include monthly trended income statements and operating metrics for the latest trailing twelve month period on a side-by-side, comparison basis. All such financial statements shall be prepared on an accrual basis of accounting in accordance with GAAP. Not later than March 31 of each year, the Alliance Member, on behalf of the Company, shall also furnish to each Member whatever information may be necessary for Members to file their federal income tax returns. The Alliance Member will also make available to each Member a copy or summary of all state and/or local tax returns which are filed by the Company. The Alliance Member will make available to the Members any audited balance sheet of the Company, if one has been prepared.

14.3 Fiscal Year. The Fiscal Year of the Company shall be the calendar year.

14.4 Tax Election. Upon the transfer of an interest in the Company or in the event of a distribution of the Company's property, the Company may, but is not required to, elect pursuant to Code Section 754 to adjust the basis of the Company's property as allowed by Sections 734(b) and 743(b) thereof; provided, however, that upon the request of either Alliance Member or MUSC Member, the Company shall elect pursuant to Code Section 754 to adjust the basis of the Company's property as allowed by Sections 734(b) and 743(b) thereof and cause, where possible, such an election to be made by any partnership in which the Company is a partner, directly or indirectly.

14.5 Tax Returns. The Tax Matters Member shall, for each Fiscal Year, file on behalf of the Company with the IRS a Company Return within the time prescribed by law (including any extensions) for such filing. The Tax Matters Member shall also file on behalf of the Company such state and/or local income tax returns as may be required by law.

ARTICLE XV
POWER OF ATTORNEY

15.1 Appointment of Attorney-in-Fact. Subject to the rights of the Members as set forth in this Agreement, each Member hereby makes, constitutes, and appoints such Member's Board appointees, with full power of substitution and resubstitution, its agent and attorney-in-fact to file for record, and to sign, execute, certify, acknowledge, and file for record any other instruments which may be required of the Company with respect to the Company's business by law, to the extent that Board approval of such documents is required, including, but not limited to, amendments to or cancellations of this Agreement or the Certificate of Formation. Each Member hereby constitutes and appoints each of its Board appointees, with full power of substitution and resubstitution, its agent and attorney-in-fact to sign, execute, certify, and acknowledge the Member's consent or approval of any action requiring the consent or approval of the Member.

15.2 Effect of Power. The power of attorney granted pursuant to Section 15.1 of this Agreement is a special power of attorney coupled with an interest, is irrevocable, and shall survive the dissolution of the granting Member.

ARTICLE XVI
LIABILITY AND INDEMNIFICATION

16.1 Liability. Except as otherwise expressly provided by the Act, the debts, obligations, and liabilities of the Company, whether arising in contract, tort, or otherwise, shall be solely the debts, obligations, and liabilities of the Company, and none of the Board of Managers, officers, or any Member shall be obligated personally for any such debt, obligation, or liability of the Company solely by reason of being a Member, officer, or Board member. Except as otherwise expressly required by law, a Member shall have no liability in excess of (a) the amount of its Capital Contributions; (b) its share of any assets and undistributed profits; (c) its obligation, if any, in writing signed by the Member to make any other payments; and (d) the amount of any distributions wrongfully or erroneously distributed to the Member.

16.2 Exculpation. No Member, officer, Board member or Affiliate of a Member or officer or Board member of the Company shall be liable to the Company or any other Member, officer, or Board member for any loss, damage, or claim incurred by reason of any act or omission performed or omitted in good faith on behalf of the Company and in a manner reasonably believed by the Member, officer, or Board member or Affiliate to be within the scope of authority conferred on the Member, officer, or Board member by this Agreement, except that the foregoing shall not exclude or limit any Person's liability for illegal conduct or willful misconduct. A Member, officer, or Board member shall be fully protected in relying in good faith upon the records of the Company and upon such information, opinions, reports, or statements presented to the Company by any Person as to matters the Member, officer, or Board member reasonably believes are within such other Person's professional or expert competence and who has been selected with reasonable care by or on behalf of the Company, including information, opinions, reports, or statements as to the value and amount of the assets, liabilities, profits, losses, or any other facts pertinent to the existence and amount of assets from which distributions to Members might properly be paid.

16.3 Duties and Liabilities of Certain Persons.

(a) If and to the extent that, at law or in equity, a Member, officer, or Board member has duties (including fiduciary duties) and liabilities relating thereto to the Company or to any other Member, such Member, officer, or Board member acting under this Agreement shall not be liable to the Company or to any other Member for its good faith reliance on the provisions of this Agreement. The provisions of this Agreement, to the extent that they restrict the duties and liabilities of a Member, officer, or Board member otherwise existing at law or in equity, are agreed by the parties hereto to replace such other duties and liabilities of such Member, officer, or Board member.

(b) Unless otherwise expressly provided herein, (i) whenever a conflict of interest exists or arises between or among the Company and any one (1) or more Members, Board members, or officers; or (ii) whenever this Agreement or any other agreement contemplated herein or therein provides that a Member, Board member, or officer shall act in a manner that is, or provides terms that are, fair and reasonable to the Company or any Member, the Member, Board member, or officer shall resolve such conflict of interest, taking such action or providing such terms, considering in each case the relative interest of each party (including its own interest) to such conflict, agreement, transaction, or situation and the benefits and burdens relating to such interests, any customary or accepted industry practices, and any applicable generally accepted accounting practices or principles. In the absence of bad faith (such as taking action for the purpose of injuring the Company) by the Member, Board member or officer, the resolution, action or term so made, taken or provided by the Member, Board member, or officer shall not constitute a breach of this Agreement or any other agreement contemplated herein or of any duty or obligation of the Member, Board member, or officer at law or in equity or otherwise.

(c) Whenever in this Agreement a Member, Board member or officer is permitted or required to make a decision (i) in its "discretion" or under a grant of similar authority or latitude, the Person shall be entitled to consider only such interests and factors as it desires, including its own interests, and shall have no duty or obligation to give any consideration to any interest of or factors affecting the Company or any other Person; or (ii) in its "good faith" or under another express standard, the Person shall act under such express standard and shall not be subject to any other or different standard imposed by this Agreement or other applicable law.

16.4 Indemnification. To the fullest extent permitted by applicable law, each Member, Board member, and the officers and the Members' respective officers, employees, agents, successors, and assigns (each, an "Indemnified Person") shall be entitled to indemnification from the Company for any loss, damage, or claim incurred by such Indemnified Person by reason of any act or omission performed or omitted by such Indemnified Person in good faith on behalf of the Company and in a manner reasonably believed to be within the scope of authority conferred on such Indemnified Person by this Agreement or a resolution of the Board, in the case of officers, except that no Indemnified Person shall be entitled to be indemnified in respect of any loss, damage, or claim incurred by such Indemnified Person by reason of willful misconduct with respect to such acts or omissions; provided, however, that any indemnity under this Section 16.4 shall be provided out of and to the extent of Company assets only, and no Person other than the Company shall have any personal liability on account thereof.

16.5 Expenses. To the fullest extent permitted by applicable law, expenses (including reasonable legal fees and expenses) incurred by an Indemnified Person in defending any claim,

demand, action, suit, or proceeding arising by reason of the fact that the Indemnified Person is or was a Member, Board member, or officer of the Company shall, from time to time, be advanced by the Company prior to the final disposition of such claim, demand, action, suit, or proceeding upon receipt by the Company of an undertaking by or on behalf of the Indemnified Person to repay such amount if it shall be determined that the Indemnified Person is not entitled to be indemnified as authorized in Section 16.4 hereof.

16.6 Insurance. The Company may purchase and maintain insurance, to the extent and in such amounts as the Board shall, in its sole discretion, deem reasonable, on behalf of the Members, the Board members, officers, and such other Indemnified Persons as the Board shall determine, against any liability that may be asserted against or expenses that may be incurred by any such Indemnified Person in connection with the activities of the Company or such indemnities, regardless of whether the Company would have the power to indemnify such Indemnified Person against such liability under the provisions of this Agreement. Notwithstanding the foregoing, as of the date of this Agreement, Alliance Member and MUSC Member intend that Alliance Member shall maintain directors and officers liability insurance for the Alliance Board Appointees and MUSC Member shall maintain such insurance for the MUSC Board Appointees, in such amounts as mutually agreed upon by the parties. The Board and the Company may enter into indemnity contracts with any Indemnified Persons and adopt written procedures pursuant to which arrangements are made for the advancement of expenses and the funding of obligations under Section 16.5 hereof and containing such other procedures regarding indemnification as are appropriate.

16.7 Ancillary Agreements. Notwithstanding anything to the contrary herein, the terms of any agreements between a Member or its Affiliate and the Company regarding the duties and obligations to be performed under such agreements and the indemnification provided for therein shall control with respect to such duties and obligations over the terms of this Agreement, including, without limitation, the terms of this Article XVI relating to indemnification, advancement of expenses, and exculpation of Members (*e.g.*, a Member providing management services under a management agreement shall be responsible to the Company without reference to the exculpation provisions of this Article XVI).

ARTICLE XVII
RESTRICTIVE COVENANTS

17.1 Covenant Not to Compete; Competing Opportunities.

(a) Each Member hereby covenants and agrees that for so long as a Member remains a member of the Company and for one (1) year thereafter, such Member and its Affiliates shall not, directly or indirectly, through one or more intermediaries, partners, or members, hold or acquire any direct or indirect ownership interest in, or substantially all of the assets of, manage, lease, develop, or otherwise have any financial interest (through a corporation, partnership, limited liability company, trust, or other entity in which such party owns or has a beneficial interest other than an Operating Company) in, any business or entity which develops, owns, manages, leases, or provides property to, a center that provides oncology services (a "Competing Facility") located or to be located within the Restricted Area (as defined below). For purposes of this Agreement, the "Restricted Area" shall mean the area within a fifty (50) mile radius of each Center owned by an

Operating Company, unless a different geographic area is agreed to by the parties pursuant to Section 10.4 with respect to any one or more such facilities, which other geographic area shall be set forth on Schedule II attached hereto and made a part hereof (identified in miles, counties or zip codes, as appropriate).

(b) Each Member hereby covenants and agrees that for so long as a Member remains a member of the Company and for one (1) year thereafter, neither the Member nor any of its Affiliates shall (i) solicit any current employees or independent contractors of the Company, an Operating Company or a Center, nor (ii) solicit or engage in strategic discussions with physicians that in good faith were already being recruited by the Company, an Operating Company or a Center. Notwithstanding the foregoing, nothing in this Section shall restrict a Member or any of its Affiliates from the right to recruit or solicit generally in the media.

(c) Notwithstanding anything herein to the contrary, neither Alliance Member nor MUSC Member shall be prevented from owning, either directly or indirectly, less than five percent (5%) of the voting stock of a publicly-held company which owns or operates one (1) or more health care facilities or from entering into a new market pursuant to the terms of Section 10.14, after compliance with the terms of such Section.

17.2 Purchase Option upon Breach of Section 17.1. In the event that a Member breaches the provisions of Section 17.1 and does not cure such breach within sixty (60) days after being given written notice by the nonbreaching Member of the nature of such breach, the nonbreaching Member shall have the option to elect to purchase all, but not less than all, of the breaching Member's Units or to cause the Company to purchase such Units in exchange for payment to the breaching Member in cash of a purchase price as described in Section 17.3, below. In order to exercise this option, the nonbreaching Member shall give the breaching Member notice of the exercise of this option (the "Purchase Notice") pursuant to this Section 17.2 within thirty (30) days following the expiration of the sixty (60) day cure period. If the nonbreaching Member fails to give the Purchase Notice within the applicable thirty (30) day time limit, the option to purchase shall lapse. Unless agreed otherwise by the parties, the terms of the purchase shall be those set forth below in Section 17.3. The nonbreaching Member shall have the right to assign the option to purchase the breaching Member's Units to an Affiliate. The nonbreaching Member's decision whether or not to exercise the option described in this Section 17.2 shall in no way affect, limit, or be exclusive of any other legal or equitable right or remedy described herein or otherwise available to the nonbreaching Member.

17.3 Closing of the Purchase of the Breaching Member's Units and Payment Terms. If the Company or the nonbreaching Member is purchasing the Units of the breaching Member pursuant to Section 17.2, the closing of the purchase of such Unit(s) shall be deemed effective as of the date the Company or the nonbreaching Member, as the case may be, delivers the purchase price required to purchase the Units, which shall be no later than ninety (90) days after the breaching Member's receipt of the Purchase Notice. The purchase price for a purchase under Section 17.2 shall be the breaching Member's Percentage Interest multiplied by the amount, if any, by which (1) the Company's aggregate earnings, as determined in accordance with GAAP, for the prior 12-month period before taking into account interest expense, income taxes, depreciation and amortization exceeds (2) any debt of the Company existing as of such date, including without limitation any third party and intercompany debt. The nonbreaching Member or the Company, as

the case may be, shall pay the purchase price to the breaching Member, in immediately available funds in one (1) payment.

17.4 Confidentiality. Each Member shall, and shall cause each agent, principal, director, officer, employee, and advisors (including, without limitation, attorneys, accountants, consultants, bankers, and financial advisors) thereof (collectively, "Representatives"), to keep secret and confidential, all information acquired relating to the following (all such information being hereinafter referred to as "Confidential Business Information"): (a) the financial condition and other information relating to the business of each of the Company, the Operating Companies and the Centers, including, without limitation, rates for services, operations and contracts, and business plans and arrangements; (b) the systems, products, plans, services, marketing, sales, administration and management procedures, trade relations or practices, techniques and practices heretofore or hereafter acquired, developed, and/or used by the each of the Company, the Operating Companies and the Centers; and (c) in connection with the Center's patients, providers, clients, customers, suppliers, vendors, lenders, independent contractors, and payors, the provisions and terms of any agreements or proposed agreements between any Operating Company or any Center and any of such individuals or entities. No Member shall at any time disclose any such Confidential Business Information to any person, firm, corporation, association, or other entity, or use the same in any manner other than in connection with operating the business and affairs of the Operating Companies; provided, however, a Member may disclose Confidential Business Information to a bona fide, potential third-party purchaser of any interest in any Operating Company or the Center, if the purchase is to be made in accordance with any applicable provisions hereof and if such third party has executed a confidentiality agreement acceptable to the Board pursuant to which such third party has agreed to keep the Confidential Business Information strictly confidential; provided, further, a Member may disclose Confidential Business Information to any of its Representatives, to the extent necessary, who agree to keep such information confidential; provided, further, each Member hereby accepts responsibility for any breach of this Section 17.4 by any of its Representatives. Notwithstanding the foregoing, the term "Confidential Business Information" shall not include the following: any information which was independently developed by a Member without the use of the Confidential Business Information; any information which is or becomes available in the public domain during the term of this Agreement other than through a breach of this Agreement or other agreement with an Operating Company or a Center; any information which is ordered to be released by requirement of a governmental agency or court of law or is required to be included in any required public filings; and any information independently made lawfully available to a party as a matter of right by a third party. In addition, each Member agrees that, except pursuant to the terms of a license agreement with the MUSC Member for the use of the Hollings Cancer Center name, it will not use the other Member's or its Affiliate's name in connection with the pursuits identified in this Agreement or otherwise without first obtaining the other Member's written consent. Each Member agrees that these confidentiality covenants shall apply while a Person is a Member and for three (3) years thereafter. Notwithstanding any provisions to the contrary herein, each Member may use and disclose Confidential Information for benchmarking and similar applications, as long as such information is not specifically identifiable to the Company, an Operating Company or a Center and is fully compliant with the requirements of all applicable laws and regulations.

ARTICLE XVIII
RIGHT OF FIRST REFUSAL

18.1 Notice of Transfer. If either Member or any of their respective Affiliates (the "Transferring Member") has received a bona fide written offer from a third party (i.e., any entity other than an Affiliate of the Member) to directly purchase some or all of its Units in the Company that it intends to accept (a "Transfer"), then the Transferring Member shall promptly give written notice (the "Transfer Notice") to the other Member (the "Non-Transferring Member") at least thirty (30) days prior to the closing of such Transfer. The Transfer Notice shall describe in reasonable detail the proposed Transfer including, without limitation, the number of Units to be transferred, the nature of such Transfer, the consideration to be paid, and the name and address of each prospective purchaser or transferee.

18.2 Right of First Refusal. For a period of thirty (30) days following receipt of any Transfer Notice described in Section 18.1, the Non-Transferring Member shall have the right to purchase all or a portion of the Units subject to such Transfer Notice on substantially the same terms and conditions as set forth therein. The Non-Transferring Member's purchase right shall be exercised by written notice signed by an officer of the Non-Transferring Member (the "ROFR Notice") and delivered to the Transferring Member within such thirty (30) day period. The Non-Transferring Member shall effect the purchase of the Units, including payment of the purchase price, within sixty (60) days following the delivery of the ROFR Notice, and at such time the Transferring Member shall transfer its Units to the Non-Transferring Member free and clear of all liens and encumbrances.

18.3 Consummation of Sale. In the event that the Non-Transferring Member fails to exercise its right to purchase all of the Units subject to Section 18.2 hereof, following the exercise or expiration of the rights of purchase set forth therein, then the Transferring Member may enter into an agreement providing for the closing of the Transfer of such Units within thirty (30) days of the expiration of (a) the period in which the Non-Transferring Member was required to provide the Right of First Refusal Notice (if no Right of First Refusal Notice was provided) or (b) the period in which the Non-Transferring Member was required to effect the purchase of the Units (if a Right of First Refusal Notice was given but the Units were not purchased by the Non-Transferring Member during the required period) on terms and conditions not more favorable to the transferee than those described in the Transfer Notice, provided that the Transferring Member has met the requirements of Section 11.1. No Transfer shall be effective until the proposed transferee shall sign this Agreement and agree to be bound hereby as if an original signatory hereto. In such case, the transferee shall be deemed a Member of the Company, and the Board shall be deemed to have approved the Transfer. Any proposed Transfer on terms and conditions more favorable to the transferee than those described in the Transfer Notice, as well as any subsequent proposed Transfer of any of the Units by the Transferring Member, shall again be subject to the first refusal rights of the Non-Transferring Member under this Article XVIII and shall require compliance by the Transferring Member with the procedures described in this Article XVIII and Section 11.1.

ARTICLE XIX
CHANGE IN LAW; APPRAISED VALUE

19.1 Regulatory Restrictions; Change in Law.

(a) In the event that applicable legislation is enacted, applicable regulations are promulgated, a decision of a court with jurisdiction over the Company is rendered or an opinion of a government agency with jurisdiction over the Company is issued that, in the reasonable opinion of legal counsel to the Company, which counsel and opinion is reasonably acceptable to the Members, affects the legality of this Agreement, the ability of the Company to operate in accordance with applicable laws, rules and regulations, or makes it unlawful for either Member or its Affiliates to own a direct or indirect interest in the Company or any Operating Company or to enter into the transactions and agreements contemplated by this Agreement, the Members shall negotiate in good faith to amend this Agreement or otherwise restructure the Company to comply with such change in laws; provided, however, to the maximum extent possible, any such amendment shall preserve the underlying economic, financial and governance arrangements between the Members. In the event no restructuring can eliminate the prohibition within forty-five (45) days after the Members have commenced negotiations to so amend this Agreement, Alliance Member shall have the option for a period of forty-five (45) days following the expiration of such forty-five (45) day negotiation period to purchase all, but not less than all, of MUSC Member's Units at a purchase price equal to the Appraised Value of the Units (as defined in Section 19.1) by delivering written notice of such election (a "Change in Law Purchase Notice"). If Alliance Member does not exercise its option to purchase MUSC Member's Units, MUSC Member shall have the option for a period of forty-five (45) days following the expiration of Alliance Member's option period to purchase all, but not less than all, of Alliance Member's Units at a purchase price equal to the Appraised Value of such Units (as defined in Section 19.2) by delivering a Change in Law Purchase Notice.

(b) The closing date for a purchase of either Member's Units pursuant to delivery of a Change in Law Purchase Notice shall be the later of (i) fifteen (15) days following the date the Appraised Value of the Units is determined or (ii) sixty (60) days following the date the Members cease negotiations to attempt to amend this Agreement as contemplated above.

19.2 Appraised Value.

(a) The Appraised Value of the Units shall be the product determined by multiplying (i) the Appraised Fair Market Value of the Company (hereinafter defined), times (ii) the Percentage Interest associated with the Units being sold. For purposes of this Agreement, the term "Appraised Fair Market Value of the Company" shall mean the fair market value of the Company, as determined below.

(b) The Members shall negotiate in good faith with one another following delivery of a Change in Law Purchase Notice to determine the Appraised Fair Market Value of the Company. The Members agree to use their best efforts to negotiate an agreed upon Appraised Fair Market Value of the Company. If the Members reach an agreement as to the Appraised Fair Market Value of the Company, then the Appraised Fair Market Value of the Company shall be the amount determined by the Members.

(c) If the Members are unable to agree upon the Appraised Fair Market Value of the Company within thirty (30) days following the date a Change in Law Purchase Notice is delivered, then either Member may notify the other Member that it is initiating the Appraisal Process, described below (or such other appraisal process upon which the parties may mutually agree in writing within ten (10) days of the date on which either party has initiated the appraisal process (the "Alternate Appraisal Process")). If either Member shall have initiated the Appraisal Process (and the parties shall not have agreed in writing to an Alternate Appraisal Process within ten (10) days), then the Members shall engage a Qualified Appraiser, or if they are unable to agree upon the selection of the Qualified Appraiser within fifteen (15) days after the date upon which one Member received notice of the other Member's intent to initiate the Appraisal Process (the "Initiation Date"), each Member shall engage a Qualified Appraiser (collectively, the "Initial Appraisers" and individually, an "Initial Appraiser") within thirty (30) days after the Initiation Date, and the Initial Appraisers shall select a third Qualified Appraiser (the "Third Appraiser" and, collectively with the Initial Appraisers, the "Appraisers") on behalf of the Members. Each of the Members shall pay the fees and expenses of its respective Appraiser, and the fees and expenses of the Third Appraiser shall be shared equally by the Members. For purposes of this Agreement, the term "Qualified Appraiser" shall mean an independent, third party, nationally recognized appraiser who (i) is experienced in the valuation of health care entities comparable to the Company and (ii) has, consistently over the twenty-four (24) month period preceding the date of the Change in Law Purchase Notice, delivered appraisals and/or fairness opinions, on a going concern basis, in connection with transactions involving the sale of oncology centers. The Appraisers so selected shall each then conduct an appraisal to determine the Appraised Fair Market Value of the Company (i) on a going concern basis (or using such other factors as the parties may agree at the appropriate time), (ii) using valuation techniques then customary and accepted in the industry, (iii) using performance information respecting the Centers that is acceptable to the Members and that has been supplied to each of the Appraisers, (iv) viewing the enterprise of the Company as a whole, (v) taking into account the future prospects of the Centers and (vi) assuming that the Company were to be sold on a stand-alone basis (and not as a part of a portfolio sale). Each Appraiser's determination of the Appraised Fair Market Value of the Company (individually, a "Valuation" and collectively, the "Valuations") shall be expressed as a single value rather than a range of values. Each Member shall cause the Initial Appraiser engaged by it to submit such Initial Appraiser's Valuation to the other Member within sixty (60) days of the Initiation Date, and both Members shall use their commercially reasonable efforts to cause the Third Appraiser to submit its Valuation to both Members within such period. Once the Members have received from all three Appraisers their respective Valuations, the Appraised Fair Market Value of the Company shall be determined based upon the Valuations as follows:

(1) if the three Valuations are within five percent (5%) of another (i.e., if each of the highest Valuation and the mid dle Valuation is no greater than 1.05 times the lowest Valuation), the Appraised Fair Market Value of the Company shall be the average of all three Valuations;

(2) if subsection (1) above is inapplicable and two Valuations are within five percent (5%) of one another (i.e., if the higher of such two Valuations is no greater than 1.05 times the lower of such two Valuations), the Appraised Fair Market Value of the Company shall be the average of such two Valuations;

(3) if subsections (1) and (2) above are inapplicable and the three Valuations are within ten percent (10%) of one another (i.e., if each of the highest Valuation and the middle Valuation is no greater than 1.10 times the lowest Valuation), the Appraised Fair Market Value of the Company shall be the average of all three Valuations;

(4) if subsections (1) through (3) above are inapplicable and two Valuations are within ten percent (10%) of one another (i.e., if the higher of such two Valuations is no greater than 1.10 times the lower of such two Valuations), the Appraised Fair Market Value of the Company shall be the average of such two Valuations;

(5) if subsections (1) through (4) above are inapplicable and the three Valuation are within twenty percent (20%) of one another (i.e., if each of the highest Valuation and the middle Valuation is no greater than 1.20 times the lowest Valuation), the Appraised Fair Market Value of the Company shall be the average of all three Valuations;

(6) if subsections (1) through (5) above are inapplicable and two Valuations are within twenty percent (20%) of one another (i.e., if the higher of such two Valuations is no greater than 1.20 times the lower of such two Valuations), the Appraised Fair Market Value of the Company shall be the average of such two Valuations; and

(7) if subsections (1) through (6) above are inapplicable, the Appraised Fair Market Value of the Company shall be the average of all three Valuations.

ARTICLE XX
MISCELLANEOUS

20.1 Notices. Except as otherwise provided in this Agreement, any notice, payment (other than a distribution), demand, request, or communication required or permitted to be given by any provision of this Agreement shall be in writing and shall be duly given by the applicable party if given to the other party at its address set forth below:

If to the Company:	MUSC Health Cancer Care Network, LLC c/o Alliance HealthCare Services, Inc. 100 Bayview Circle Suite 400 Newport Beach, CA 92660 Attn: General Counsel
with a copy to:	Alliance Oncology, LLC 1801 West End Avenue Suite 700 Nashville, TN 37203 Attn: President
If to Alliance Member:	Alliance Oncology LLC. 100 Bayview Circle

Suite 400
Newport Beach, CA 92660
Attn: General Counsel

with a copy to: Alliance Oncology, LLC
1801 West End Avenue
Suite 700
Nashville, TN 37203
Attn: President

If to MUSC Member: MUSC Health
274 Calhoun Street
Charleston, South Carolina 29425
Attention: Office of General Counsel

or to such other address as the Company may from time to time specify by written notice to the Members; and

If to any other Member, at such Member's address set forth in the Company records, or to such other address as such Member may from time to time specify by written notice to the Member.

Any such notice shall, for all purposes, be deemed to be given and received:

(a) If by hand, when delivered;

(b) If given by nationally recognized and reputable overnight delivery service, the business day on which the notice is actually received by the party; or

(c) If given by certified mail, return receipt requested, postage prepaid, five (5) business days after posted with the United States Postal Service.

20.2 Section Captions. Section and other captions contained in this Agreement are for reference purposes only and are in no way intended to describe, interpret, define, or limit the scope, extent, or intent of this Agreement or any provision hereof.

20.3 Severability. Every provision of this Agreement is intended to be severable. If any term or provision of this Agreement, or the application thereof, becomes or is declared by a court of competent jurisdiction to be illegal or invalid for any reason whatsoever, such illegality or invalidity shall not affect the validity of the remainder of this Agreement. The parties hereto agree to use their commercially reasonable efforts to replace such void or unenforceable provision of this Agreement with a valid and enforceable provision that shall achieve, to the extent possible, the economic, business and other purposes of such void or unenforceable provision.

20.4 Waiver of Action for Partition. Each Member irrevocably waives during the term of the Company and during the period of its liquidation following any dissolution, any right to maintain any action for partition with respect to any of the assets of the Company.

20.5 Counterpart Execution. This Agreement may be executed in one (1) or more counterparts all of which together shall constitute one and the same Agreement. Delivery of an executed counterpart of this Agreement may be made by facsimile or other electronic transmission. Any such counterpart or signature pages sent by facsimile or other electronic transmission shall be deemed to be written and signed originals for all purposes, and copies of this Agreement containing one or more signature pages that have been delivered by facsimile or other electronic transmission shall constitute enforceable original documents. As used in this Agreement, the term "electronic transmission" means and refers to any form of communication not directly involving the physical transmission of paper that creates a record that may be retained, retrieved and reviewed by a recipient of the communication, and that may be directly reproduced in paper form by such a recipient through an automated process.

20.6 Parties in Interest. Except as otherwise provided in this Agreement, this Agreement shall be binding upon the parties hereto and their successors, heirs, devisees, assigns, legal representatives, executors, and administrators.

20.7 Compliance with Laws. The Members agree that all business activities and operations of the Company and its Members conform, and shall continue to conform, with applicable provisions of law including the Ethics in Patient Referral Act, 42 U.S.C. Section 1395nn, et seq., and the Anti-Kickback Statute, 42 U.S.C. Section 1320 a-7b(b), and any similar State statutes, rules and regulations. The Members agree that no part of this Agreement shall be construed to induce or encourage the referral of patients or the purchase of health care services or supplies. Moreover, MUSC Member represents and warrants that it has structured its relationship with its affiliated medical groups in such a manner that the compensation paid by MUSC Member or its affiliates to its physician contractors and affiliated medical groups will not vary or be based upon the volume or value of physician referrals to any Operating Company.

20.8 Construction of Pronouns. The feminine or neuter of the words "he," "his," and "him" used herein shall be automatically deemed to have been substituted for such words where appropriate to the particular Member executing this Agreement.

20.9 Integrated Agreement. This Agreement, including the schedules and exhibits, constitutes the entire understanding and agreement among the parties hereto with respect to the subject matter hereof, and there are no agreements, understandings, restrictions, representations, or warranties among the parties other than those set forth herein or herein provided for. All representations, promises, and prior or contemporaneous understandings between the parties with respect to the subject matter of this Agreement are merged into and expressed in this instrument and any and all such prior agreements are hereby canceled.

20.10 Time is of the Essence. Time is of the essence to this Agreement and to each and all of its provisions.

20.11 Dispute Resolution.

(a) *Meet and Confer.* In the event that any dispute arises between the parties arising out of or related to the validity, interpretation, enforcement, or performance of this Agreement, or otherwise arising out of the relationship between the parties or the termination of

that relationship, any party may, by written notice ("Dispute Notice") to all parties, call a meeting regarding such dispute to be attended by an executive officer of each party who has the authority to negotiate and bind that party to a resolution. At the meeting, the parties shall attempt in good faith to resolve the dispute. All negotiations pursuant to this subsection are confidential and shall be treated as compromise and settlement negotiations for purposes of applicable rules of evidence.

(b) *Non-Binding Mediation.* Other than disputes with respect to Section 13.1(d), which may be submitted to binding arbitration in accordance with the terms thereof, if the dispute cannot be resolved through the meet and confer process described in subsection (a), above, within forty-five (45) days from the date of the initial Dispute Notice, and if any party wishes to pursue the dispute, the parties have the option of participation in non-binding mediation under the auspices of the American Health Lawyers Association ("AHLA"). The parties, acting in good faith, shall jointly notify AHLA of their intent to use AHLA's mediation service, select a mediator from the AHLA roster, and mediate pursuant to the terms of the AHLA's Agreement to Mediate. No mediator shall be selected who previously represented any party, Member, or Affiliate of a Member in any capacity. The mediation shall be conducted in Nashville, Tennessee. The parties agree to share equally the mediator's fee and administrative costs of mediation and will bear their own attorney fees, expenses, and costs. Mediation involves each side of a dispute meeting in person with an impartial person to attempt to reach a voluntary settlement, with no formal court procedures or rules of evidence, and the mediator having no power to render a binding decision or force an agreement on the parties. All negotiations pursuant to this subsection are confidential and shall be treated as compromise and settlement negotiations for purposes of applicable rules of evidence.

(c) *Binding Arbitration.* If the dispute is not resolved by mediation within ninety (90) days of selection of the mediator, or if mediation is waived, and if any party wishes to pursue the dispute, such dispute shall be submitted to binding arbitration in accordance with the AHLA Alternative Dispute Resolution Service Rules of Procedure for Arbitration or an agreed upon arbitrator, subject to the right of any party to seek an injunction or other equitable relief from a court with applicable authority. The same person shall not serve both as the mediator and as the arbitrator.

(i) Any such binding arbitration shall be conducted in Nashville, Tennessee in accordance with the AHLA Alternative Dispute Resolution Service Rules of Procedure for Arbitration unless the Parties agree otherwise in writing. Unless the parties agree to use an arbitrator outside of this process, each party shall select an arbitrator from a list provided by the AHLA Alternative Dispute Resolution Service ("Service") within ten (10) days after the list is provided, and shall seek to mutually agree upon the arbitrator to be used.

(ii) In the event that the parties are unable to agree upon a single arbitrator, then each party shall designate an arbitrator, and all arbitrators so selected shall meet for the sole purpose of mutually agreeing upon and selecting a similarly qualified, independent arbitrator, from a list provided by the Service, who shall serve as the sole arbitrator to resolve the matter. No arbitrator shall be selected who previously represented any party, Member, or Affiliate of a Member in any capacity.

(iii) Promptly after the independent arbitrator has been selected, such arbitrator shall establish a discovery schedule and a hearing schedule for the dispute.

(iv) The arbitrator shall apply the substantive law of the State of Delaware, or federal law, or both, as applicable to the claim(s) asserted.

(v) Any party may file a motion for summary judgment with the arbitrator under the Federal Rules of Civil Procedure. The arbitrator is entitled to resolve some or all of any claimant's claims through such a motion.

(vi) Any decision rendered by the arbitrator shall be in writing, setting forth the basis for his/her decision and shall be final and binding on all the parties and shall be enforceable in any court having jurisdiction thereof. The parties shall maintain the confidential nature of the arbitration proceeding and the arbitration award, except as may be necessary to prepare for or conduct the arbitration hearing on the merits, or except as may be necessary in connection with a court application for a preliminary remedy, a judicial challenge to an award or its enforcement, or unless otherwise required by law or judicial decision. At the request of any party, the arbitrator, attorneys, witnesses, experts, court reporters, or other persons present at the arbitration shall agree in writing to maintain the strict confidentiality of the arbitration proceedings. The arbitrator shall have the authority to require the losing party to pay all costs associated with such arbitration, including expenses and fees of arbitrators. Costs shall include reasonable legal, consulting, and other fees incurred by a party in the course of such arbitration.

(d) *Acknowledgement.* EACH MEMBER HAS READ AND UNDERSTANDS THIS SECTION 20.11, WHICH DISCUSSES MEDIATION AND ARBITRATION. EACH PARTY UNDERSTANDS THAT BY SIGNING THIS AGREEMENT, THE MEMBER AGREES TO SUBMIT ANY CLAIMS ARISING OUT OF, RELATING TO, OR IN CONNECTION WITH THIS AGREEMENT, OR THE INTERPRETATION, VALIDITY, CONSTRUCTION, PERFORMANCE, BREACH, OR TERMINATION THEREOF TO MEDIATION AND ARBITRATION, AND THAT THE DISPUTE RESOLUTION PROVISIONS SET FORTH IN THIS SECTION 20.11 CONSTITUTE A WAIVER OF THE MEMBER'S RIGHT TO A JURY TRIAL.

20.12 Legal Counsel. The Company may benefit from legal services provided by legal counsel to one (1) or more of its Members. Such benefits, no matter how direct, exclusive, and intended, shall not cause any Member's legal counsel to have any attorney-client relationship with the Company. The Members are each sophisticated business organizations who have agreed to this Section 20.12 out of each Member's desire to (a) avoid the expense, inexperience, inefficiency, and burden of engaging entirely separate counsel to provide legal services to the Company; and (b) maintain a relationship with their own legal counsel that is untainted by conflicts of interest, so that such counsel may advise them of their rights and duties respecting the other Members and the Company, notwithstanding that such counsel may have provided legal services that directly, exclusively and intentionally benefited the Company. Nothing herein shall prevent the Company from engaging separate and independent counsel when and as determined to be appropriate by the Managing Member.

20.13 Governing Law. This Agreement shall be governed by the laws of the State of Delaware, without giving effect to any conflict of law rule or principle that might require the application of the laws of another jurisdiction.

20.14 Assignment. Except to the extent specifically contemplated by this Agreement, this Agreement may not be assigned by either Member without the prior written consent of the other Member.

20.15 Further Assurances. The Members agree to execute and deliver all documents, provide all information, and take or forbear from taking all those actions that may be necessary or desirable to effectuate the contemplated transactions.

20.16 Construction. Every term and provision of this Agreement is to be construed simply according to its fair meaning and not strictly for or against either Member. No provision of this Agreement is to be interpreted as a penalty upon, or a forfeiture by, either Member. The Members acknowledge their right to separate legal counsel, and agree to obtain any appropriate advice or opinions about this transaction from their respective counsel. The Members acknowledge that they and their respective legal counsel have had the opportunity to participate equally in the drafting of this Agreement and that in the event of a dispute, neither Member shall be treated, for any purpose, as the author of this Agreement nor have any ambiguity resolved against it on account thereof.

20.17 Waiver. No waiver of any provisions of this Agreement or a breach thereof shall be valid or enforceable unless in writing and signed by both Members. The waiver by either Member of any breach of any term, covenant, warranty, or condition contained in this Agreement shall not be deemed to be a waiver of any subsequent breach of the same or any other term, covenant or condition contained in this Agreement.

20.18 Execution. By their signatures below, each of the signatories to this Agreement represent that they have the authority to execute this Agreement and to bind the Member on whose behalf their execution is made. Each Member represents and warrants that it has the right to enter into this Agreement and that its performance under this Agreement shall not: (i) cause it to be in violation of any contractual agreement previously entered into by it or (ii) conflict with, violate, or interfere with any rights of any other person or entity. This Agreement constitutes the legal, valid, and binding obligation of the Members enforceable in accordance with its terms.

20.19 Amendments. Except as otherwise expressly provided in Section 10.3 and Section 10.4, the Board may, upon the simple vote of the majority of the members of the Board, and without the consent of any Member, amend any provision of this Agreement and execute, swear to, acknowledge, deliver, file and record whatever documents may be required in connection therewith to reflect:

(a) a change in the location of the principal place of business of the Company not inconsistent with the provisions of this Agreement, or a change in the registered office or the registered agent of the Company;

(b) admission of a Member into the Company or termination of any Member's interest in the Company in accordance with this Agreement;

(c) qualification of the Company as a limited liability company under the laws of any state or that is necessary or advisable in the opinion of the Managing Member to ensure that the Company will not be treated as an association or publicly traded partnership taxable as a corporation for federal income tax purposes, provided, in either case, such action shall not adversely affect any Member;

(d) a change (i) that is of an inconsequential nature and does not adversely affect the Members in any material respect; (ii) that is necessary or desirable to satisfy any requirements, conditions or guidelines contained in any opinion, directive, order, ruling or regulation of any federal or state agency or contained in any federal or state statute, compliance with any of which the Managing Member deems to be in the best interest of the Company and the Members; or (iii) that is required or contemplated by this Agreement;

(e) an addition to the representations, duties, or obligations of the Board;

(f) a change to any provision in this Agreement required to be so changed by the staff of the Securities and Exchange Commission or other federal agency or by a State Securities Commissioner or similar official, which change is deemed by such commission, agency or official to be for the benefit or protection of the Members; or

(g) a change necessary, in the reasonable written opinion of the regular independent certified accountants of Alliance HealthCare Services, Inc., for Alliance HealthCare Services, Inc. and its subsidiaries to be able to consolidate the financial results of operations and financial condition of the Company with the financial results of operations and financial condition of Alliance HealthCare Services, Inc. and its subsidiaries under applicable requirements of GAAP, as such may change from time to time.

~ Signature Page For Operating Agreement ~

IN WITNESS WHEREOF, this Agreement has been executed as of the date first above written.

MUSC Health

By: _____

Name: Patrick J. Cawley, MD

Title: CEO, MUSC Health
~~Medical University of South Carolina~~

AJA
1/21/16

Alliance Oncology, LLC
a Delaware limited liability company

By: _____

Name: Gregory Sparlock

Title: President

4824-2403-0245.9

SCHEDULE I

SCHEDULE OF MEMBERS
As of January 22, 2016

Name	Units	Percentage Interest	Initial Capital	Capital Accounts
Alliance Oncology, LLC		51%	$51,000.00	$
MUSC Health		49%	$49,000.00	$
Total		**100%**	**$100,000.00**	**$**

4824-2403-0245.9

SCHEDULE II

RESTRICTED AREA



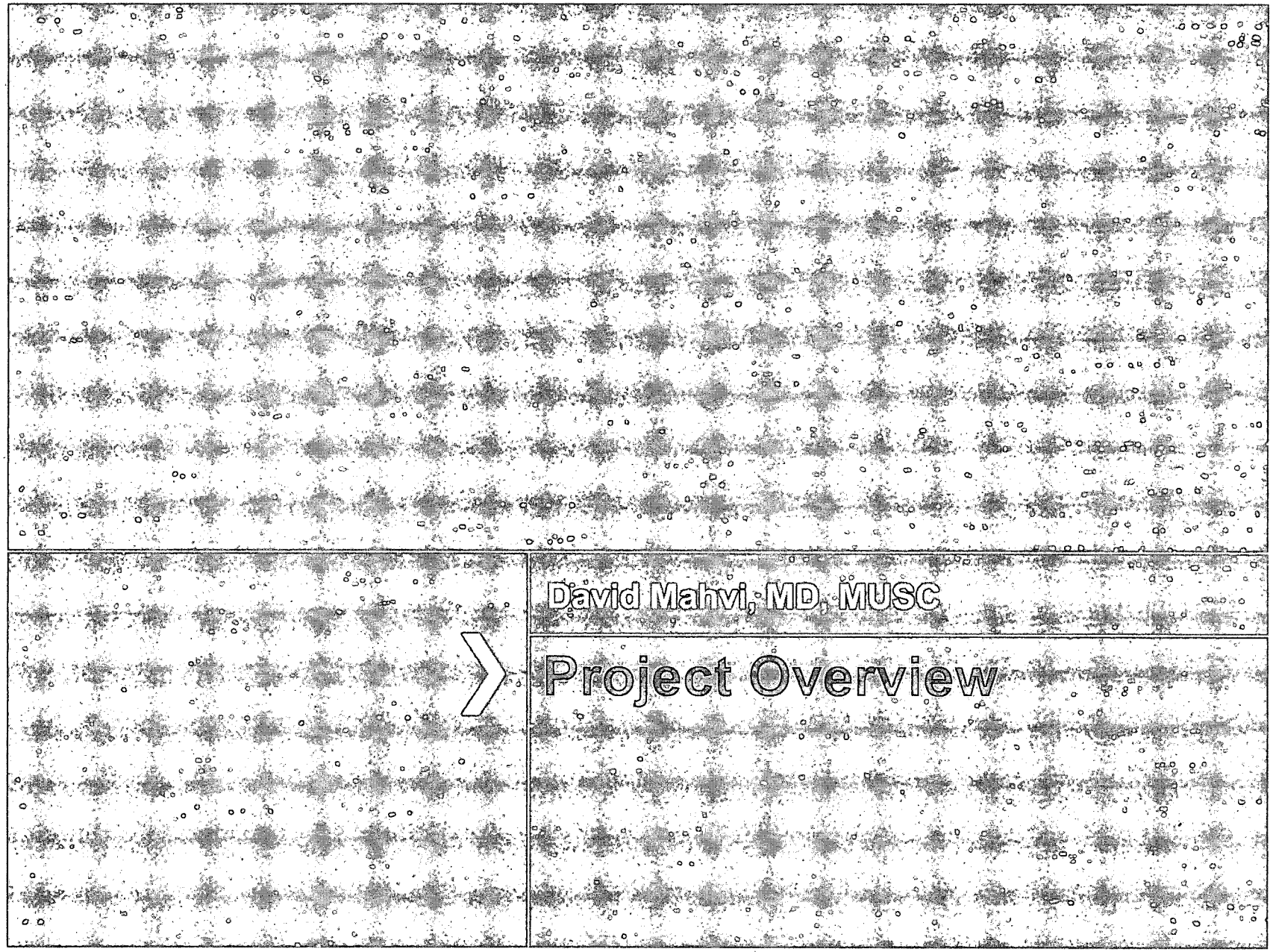
RESP. MUSC'S TRIAL EXHIBIT 9

MUSC_00542

Introductions

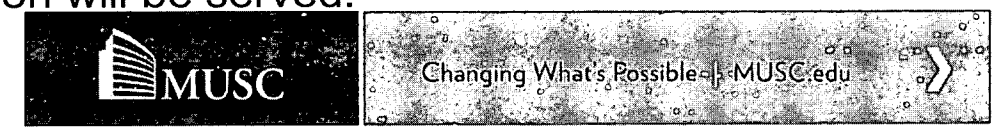
- David Mahvi, MD, Chief of the Oncology Integrated Clinical Center for Excellence, MUSC
- David Carroll, Executive Director – Palmetto Primary Care Physicians
- David Levitt, Levitt Healthcare Affiliates




David Mahvi, MD, MUSC
Project Overview

Project Overview

- MUSC Hollings Cancer Center is one of the leading cancer treatment centers in the Southeast.
  - The Center combines the full range of cancer specialties – including medical oncology, radiation oncology, surgical oncology, chemotherapy, and reconstructive surgery – to deliver a higher level of care to patients.
- Due to continued growth and capacity constraints, MUSC proposes to develop a radiation therapy facility in Berkeley County.
  - The project will increase access to care while alleviating radiation therapy capacity constraints at MUSC.
- The project scope includes:
  - Adding a sixth linear accelerator to a freestanding medical office building.
  - The project also includes a CT scanner, treatment planning space, exam rooms and support space.
  - Total costs associated with the proposed project are $9.8 million.
- The existing patient population will be served.



Project Overview

- MUSC Hollings Cancer Center combines the full range of cancer specialties to deliver a higher level of care to patients.
  - Medical, radiation and surgical oncology as well as chemotherapy and reconstructive surgery are all available. Often in just one day and under one roof, patients receive individualized attention from several specialists and complete the diagnostic procedures needed for a confident assessment.
  - Hollings Cancer Center is one of only 69 cancer centers in the US and the only one in SC to achieve NCI Cancer Center Designation.
- MUSC Cancer Care Network, LLC will manage the center.
  - This company is a strategic partnership between Alliance Oncology, LLC, the nationwide leader in radiation oncology and radiosurgery programs, and MUSC Strategic Ventures, an organization established to support the missions and activities of MUSC and University Medical Associates.
- The Network is committed to providing the highest quality of care for its patients at the most affordable cost, creating a value proposition currently not available Berkeley County.

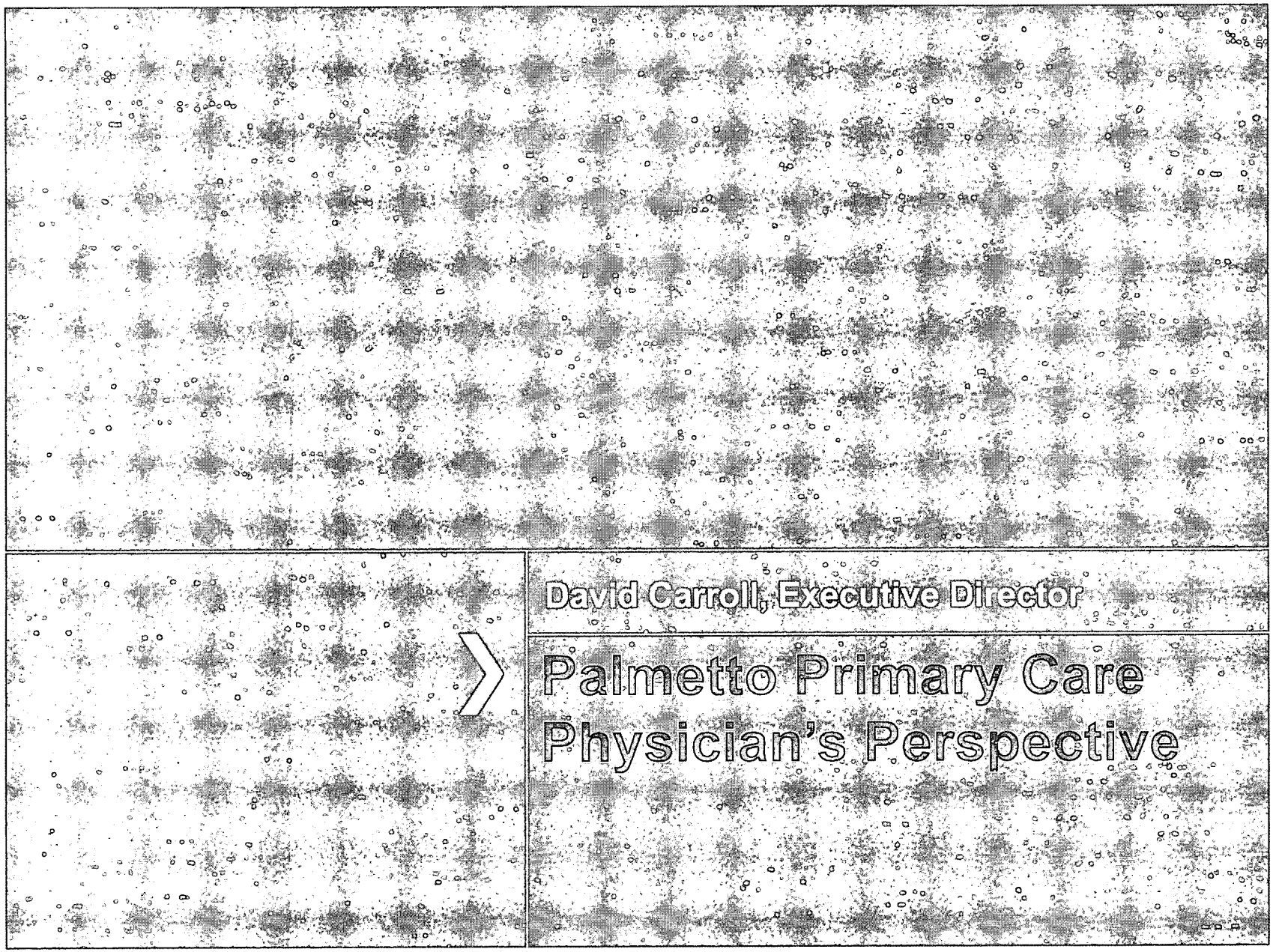
Project Overview

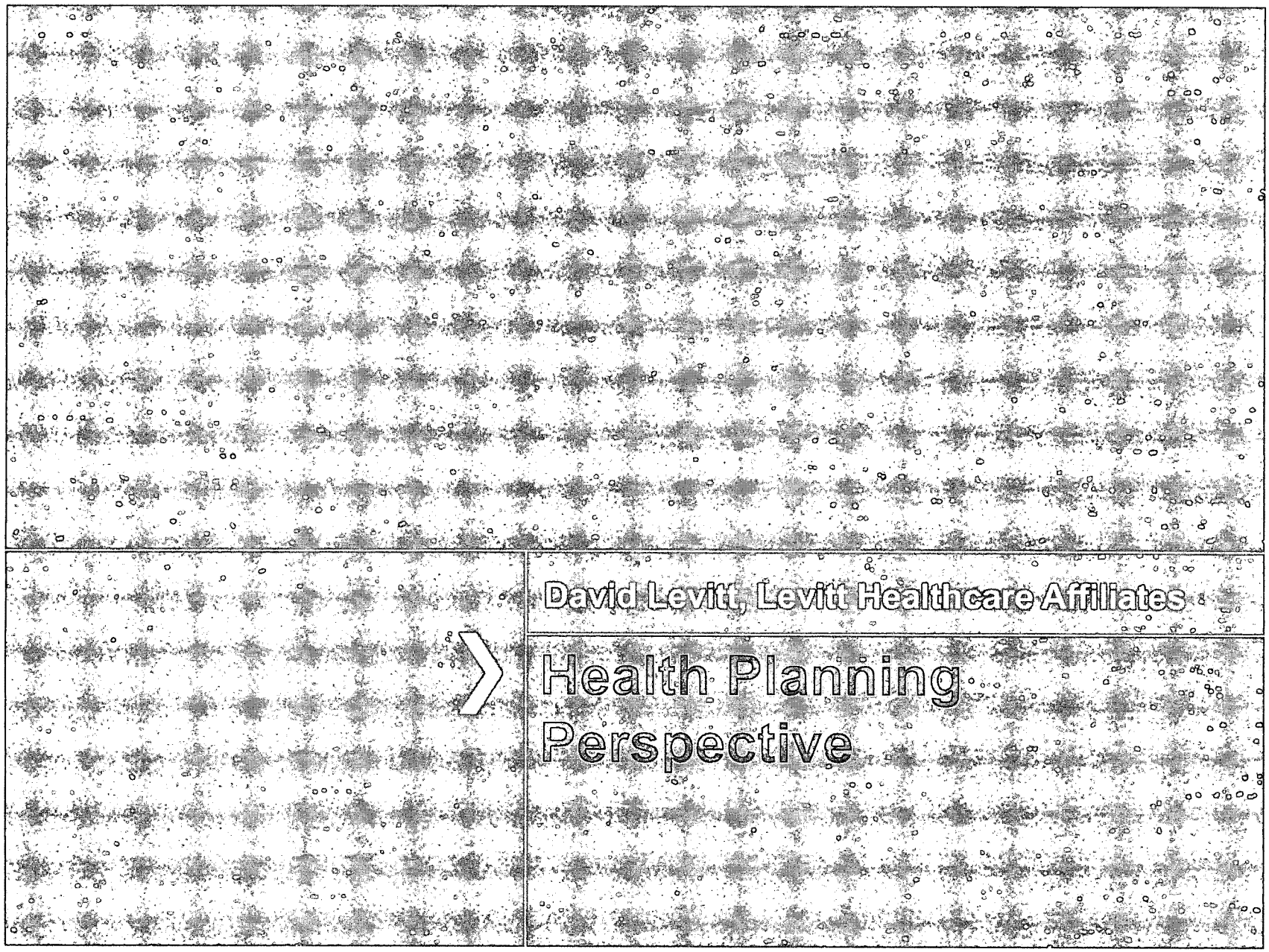
- The project site is located in the Nexton development in Berkeley County.
  - Nexton is a 4,500-acre mixed-use Planned Unit Development (PUD) located near Summerville that is planned to include 10,000 homes, 6 million square feet of commercial space, several schools and hotels, and fifty miles of bike and walking trails when the community completes its 30-year build out.
  - Several office buildings, retail space, an apartment complex, an elementary school, two Marriott hotels, Phase 1 of a new home community and initial infrastructure are already underway.
  - Additionally, Palmetto Primary Care Physicians recently started construction in Nexton for the first phase of a new medical campus in the Berkeley County community with a $32 million project that includes primary care and specialty care services, as well as an imaging center and lab.
- Community growth continues to expand and shift along Interstate 26 towards the Summerville area.
  - The site is easily accessible for MUSC patients.
- With this in mind, the Nexton development is an ideal location for the proposed project.



Project Overview

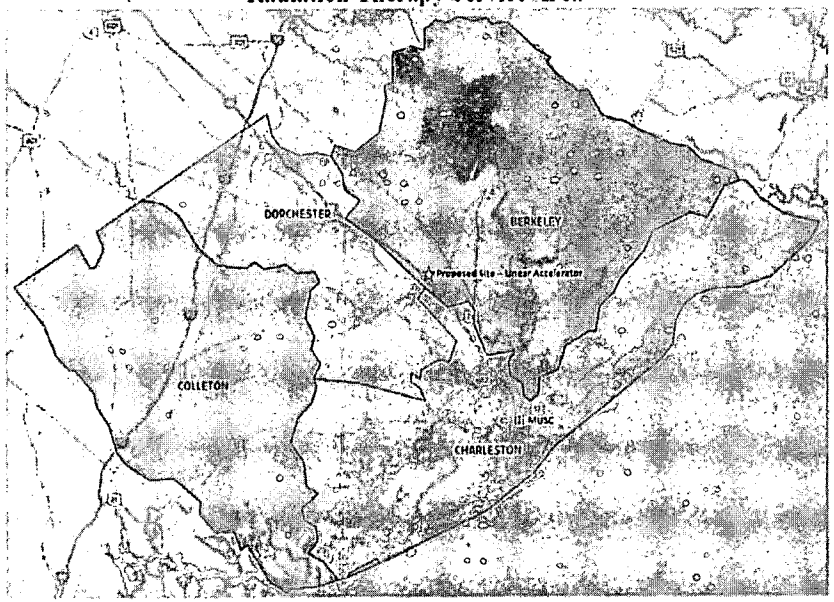
- The project is intended to benefit the residents of the service area by providing increased access to radiation therapy.
  - This project brings a radiation therapy facility into the community MUSC already serves, and into a county which does not currently have any radiation therapy services available within the county boundaries.
- The outpatient setting is the optimal setting for radiation therapy, as it enhances scheduling and operational efficiencies and promotes cost containment.
  - Shifting more oncology services from the inpatient acute care setting to the outpatient setting will also achieve cost containment, as outpatient oncology centers do not carry the costly overhead required for 24/7 care at hospitals.
- The project will allow MUSC to provide radiation therapy services in a patient friendly, outpatient environment in a cost-effective manner.
  - Improved access in this type of environment translates to increased patient satisfaction.
  - Renovating an existing medical office building will further cost containment.


David Carroll, Executive Director
Palmetto Primary Care
Physician's Perspective


David Levitt, Levitt Healthcare Affiliates
Health Planning Perspective

Project Overview

MUHA
Radiation Therapy Service Area



Approximately 16 percent of radiation therapy patients, the largest distribution of patients from the Tri-County, reside in the submarkets of Moncks Corner and Summerville. Another 15 percent are from North Charleston. (31% combined)

The health plan defines the service area as Charleston, Dorchester, Berkeley and Colleton Counties.

MUSC Linac Patient Origin FY 15 & FY 16

	FY15	FY16
Tri-County	62%	58%
East Cooper	12%	12%
Moncks Corner	3%	5%
North Charleston	16%	15%
Peninsula Charleston	4%	3%
Sea Islands	7%	7%
Summerville	10%	11%
West Ashley	9%	6%
Secondary	19%	24%
Beaufort	5%	6%
Colleton	3%	3%
Florence	1%	2%
Georgetown	3%	3%
Horry	5%	7%
Orangeburg	2%	2%
Tertiary	17%	16%
Outside SC	2%	2%

Notes: Volumes represent distinct patients.
Source: MUSC Internal Data

MUSC Changing What's Possible | MUSC.edu

Project Overview

MUHA
Service Area Population Projections
All Ages and Age 65+

	Total		Age 65+		Percent Change	
County	**2016**	**2021**	**2016**	**2021**	**Total**	**Age 65+**
Berkeley County	158,622	173,046	21,132	26,700	9.1%	26.3%
Charleston County	383,738	414,813	58,977	73,288	8.1%	24.3%
Colleton County	35,107	34,943	6,572	7,371	-0.5%	12.2%
Dorchester County	209,194	227,241	25,232	32,622	8.6%	29.3%
Service Area Total	**786,661**	**850,043**	**111,913**	**139,981**	**8.1%**	**25.1%**
South Carolina	4,891,954	5,153,835	799,964	957,412	5.4%	19.7%

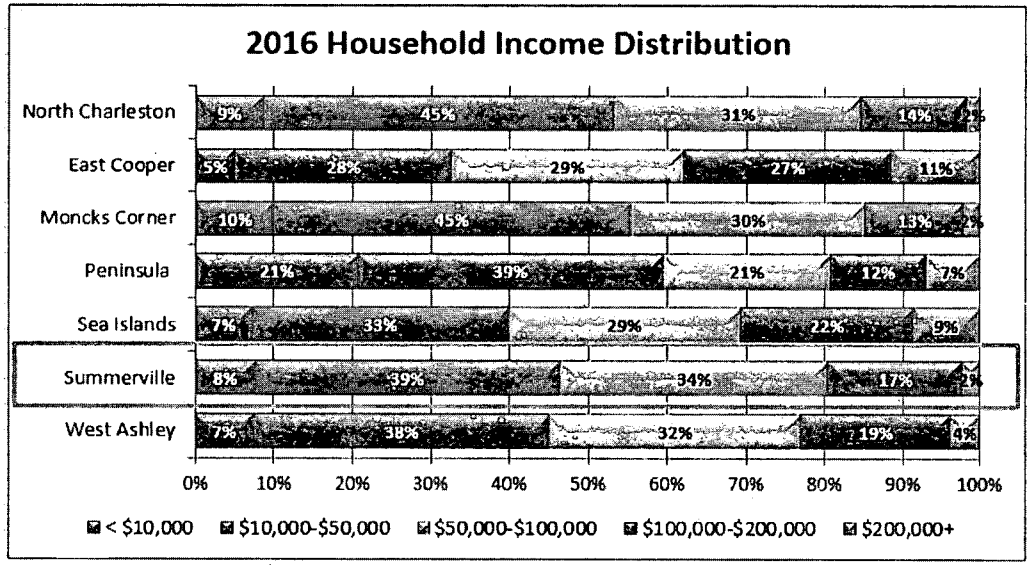
Source: The Nielson Company (2016)

Population growth in the service area is strong, particularly in Berkeley County, the proposed location for the project.

The Summerville submarket, the proposed location of the project, has a lower socioeconomic status. Approximately 48 percent of households in the Summerville submarket have an average household income less than $50,000.

The project will increase accessibility to low income persons and further MUSC's mission.

Median Household Income Analysis by Tri-County Submarket



Source: Nielson Demographic Data.

MUSC
Changing What's Possible | MUSC.edu

Project Need – Health Plan

- Per the South Carolina Health Plan, to expand radiation therapy services the existing provider needs to operate at a utilization rate of 80 percent of capacity for the past two years.
  - This standard was exceeded, supporting the need for an additional linear accelerator at MUSC.

		Capacity		Treatments	
Facility	**Units**	**Capacity/Unit**	**Total Capacity**	**2015**	**2016**
MUSC	3	5,000	15,000		
	2	4,500	9,000		
Total	**5**		**24,000**	**19,823**	**19,221**
Capacity				**82.6%**	**80.1%**

Source: Joint Annual Reports.



Project Need – Utilization

- The total number of new cancer cases in the radiation therapy service area grew by approximately 21 percent between 2008 and 2013 according to the South Carolina Central Cancer Registry.

2008-2013 Service Area Cancer Incidence

County	2008	2009	2010	2011	2012	2013	2008-2013 % Growth	2008-2013 CAGR
Berkeley	727	771	790	826	886	905	24%	4.5%
Charleston	1,562	1,767	1,852	1,866	1,980	1,933	24%	4.4%
Colleton	196	259	235	244	244	225	15%	2.8%
Dorchester	592	614	635	643	700	666	13%	2.4%
Total	3,077	3,411	3,512	3,579	3,810	3,729	21%	3.9%

Source: South Carolina Central Cancer Registry

- The new cancer cases applied to population results in the following cancer incidence rates per 1,000 population.

2008-2013 Service Area Incidence Rates
Cases per 1,000 Population

County	2008	2009	2010	2011	2012	2013	2008-2013 % Growth	2008-2013 CAGR
Berkeley	4.29	4.44	4.44	4.50	4.67	4.66	9%	1.7%
Charleston	4.49	4.97	5.29	5.22	5.42	5.19	16%	2.9%
Colleton	5.02	6.60	6.04	6.32	6.40	5.95	19%	3.5%
Dorchester	4.66	4.71	4.65	4.56	4.91	4.58	-2%	-0.3%
Total	4.50	4.88	4.99	4.97	5.18	4.97	10%	2.0%

Source: South Carolina Central Cancer Registry, South Carolina DHEC Population Estimates

MUSC Changing What's Possible. | MUSC.edu

Project Need – Utilization

- Berkeley and Dorchester Counties had 905 and 666 new cancer cases in 2013, respectively. Annual population growth rates were applied to the 2013 new cancer cases to estimate new cancer cases for 2019; it's estimated that Berkeley and Dorchester Counties will have 1,005 and 736 new cancer cases, respectively, or 1,740 combined.

- As mentioned, neither Berkeley nor Dorchester County currently has a linear accelerator. The proposed project will increase access to radiation therapy services closer to home for these residents.

- To determine projected radiation therapy cases, the percent of total cancer cases requiring radiation therapy was determined to be 50 percent.

  - Per the American College of Radiation Oncology, radiation therapy is used as part of initial treatment in approximately one-third of newly diagnosed cancer cases and an additional 25 percent of patients will receive further radiation therapy treatment during the course of their cancer treatment. Given this, 50 percent is a conservative estimate.



Project Need – Utilization

- 1,740 new cancer cases for Berkeley and Dorchester Counties, 870 will require radiation therapy.
- MUSC historically captured 46 percent of unduplicated radiation therapy patients (based on 2013-2015 Joint Annual Report data) for linear accelerators in the service area. Applying this capture rate results in 400 new cancer cases for MUSC in 2019.
- MUSC also anticipated a slight shift of existing radiation therapy patients who originate from the Moncks Corner, Summerville and North Charleston submarkets to the proposed linear accelerator due to enhanced access closer to home.

Project Need – Utilization

- 3,911 treatments by PY3 is projected for the proposed linear accelerator.
  - PY1 projections also assume 40 percent of patients from Moncks Corner and Summerville will be re-directed from MUSC's downtown and Mount Pleasant campuses.
  - Treatments for the proposed Berkeley linear accelerator and existing equipment applies the Tri-County population growth rate.
  - Baseline volumes represent the most recent fiscal year of data (7/2015-6/2016).
  - Berkeley utilization totals approximately 18 percent of total MUSC volumes.

MUSC Linac Projected Volumes

Linear Accelerator Description	Historical Volumes	Interim Volumes		Project Years 1-4			
	FY16	2017	2018	2019	2020	2021	2022
Berkeley Linac	0	0	0	3,786	3,848	3,911	3,975
Berkeley Linac % of Capacity (5,000)				*76%*	*77%*	*78%*	*80%*
Other MUSC Linacs (5)	19,221	19,529	19,841	16,379	16,647	16,920	17,197
Total MUSC Linacs (6 as of 2019)	19,221	19,529	19,841	20,166	20,496	20,831	21,172

Source: Population growth from the Nielson Demographic data, please refer to **Attachment F**. Historical volumes from MUSC Internal Data, applied patient origin percentages provided in Figure 2.

Distribution (Accessibility)

- The proposed site is well positioned to serve the service area and MUSC's radiation therapy patients.
  - Community growth continues to expand and shift along Interstate 26 towards the Summerville area.
- Approximately one-third of linear accelerator patients originate from areas of the Tri-County service area that would be more accessible to the proposed location (such as the Summerville, Moncks Corner and North Charleston submarkets).
  - This doesn't even factor in the increased access and convenience from other parts of the state such as Orangeburg and Colleton Counties.
- Time to access services was calculated from MUSC's service areas for the proposed location versus the downtown main campus and Mount Pleasant location.
  - Access to the proposed location would be more convenient for a significant number of patients, versus traveling to the downtown campus or Mount Pleasant location.



Distribution (Accessibility)

Drive Time Analysis
MUSC Submarkets

Departure Location	Proposed Site		MUSC				Hollings Cancer Center East Cooper		Total Time Difference Range (Downtown - Proposed Site)**	Total Time Difference (Mt. Pleasant - Proposed Site)
	Miles	Driving Time (Min.)	Miles	Driving Time (Min.)	Total MUSC Time with Parking/ Wayfinding Time of 10 minutes	Total MUSC Time with Parking/ Wayfinding Time of 20 minutes	Miles	Driving Time (Min.)		
MUSC Hollings/Peninsula	23.3	26	0	0	10	20	6.9	10	(6) - (16)	(16)
Sea Islands	30.3	34	5.5	9	19	29	15.9	28	(5) - (15)	(6)
East Cooper	26.4	26	3.4	11	21	31	1.7	6	(5) - 5	(20)
West Ashley	21.8	24	4.2	9	19	29	12.1	18	(3) - 7	(6)
Summerville	2.3	3	25.2	28	38	48	31	38	35 - 45	35
Moncks Corner	14.5	17	32.3	39	49	59	32.4	36	32 - 42	19
North Charleston	15.1	16	21.1	34	44	54	20.2	29	28 - 38	13
Orangeburg	53.7	50	75.7	73	83	93	79.4	73	33 - 43	23
Colleton	35.2	45	46.9	57	67	77	59.3	75	32 - 42	30
Georgetown	78.3	93	74.4	87	97	107	66.7	76	15 - 25	(17)
Beaufort	98.8	104	93.2	110	120	130	102	125	16 - 26	21
Horry	106.7	125	104	118	128	138	97.1	112	(7) - 3	(13)
Florence	116.5	108	130.9	121	131	141	145.2	137	30 - 40	29

Notes:

* Assumes an average range of 10-20 additional minutes for parking/way-finding at MUSC downtown. Refer to attached maps with locations identified.

Submarket and County addresses are mapped from the zip code with the highest Linac volume in the area

** Sorted by Smallest to Largest Total Difference in Drive Time from Downtown to the Proposed Site in Berkeley County

Source: Microsoft MapPoint



Distribution (Accessibility)

- As a state-of-the-art academic medical center, MUSC's patients often seek care for specific reasons:
  - MUSC is a tertiary/quaternary referral hospital, and patients from throughout the state travel for health services and expertise at MUSC.
  - As part of an academic medical center, MUSC's Radiation Oncologists are set apart from community oncologists because they offer unique cancer care not available anywhere in the region.
  - MUSC has the ability to manage the most complex cases and offers specialized, focused care not offered by other providers.
  - MUSC has an extensive offering of clinical trials, giving patients access to treatment opportunities that are on the frontier of medicine.
- Individuals seek care within MUSC Health because of this. As part of MUSC, the proposed project will benefit from these differentiating factors.



Distribution (Accessibility)

- As previously mentioned, the proposed project is solely based on MUSC's existing patient base, projected patients due to population growth, and capacity constraints on the existing linear accelerators.
- The proposed location is in a county that doesn't currently have radiation therapy services. As such, the project will fill a need for such service without impacting existing providers.
- Berkeley and Dorchester Counties had that 10th and 13th highest number of new cancer cases, respectively, in SC in 2013 and growth is expected to continue.
- A small portion of treatments will be shifted from the MUSC downtown and Mount Pleasant campuses. These patients are currently served by MUSC and referral patterns won't change.
- No negative impact is expected for providers within the service area.



Financial Feasibility

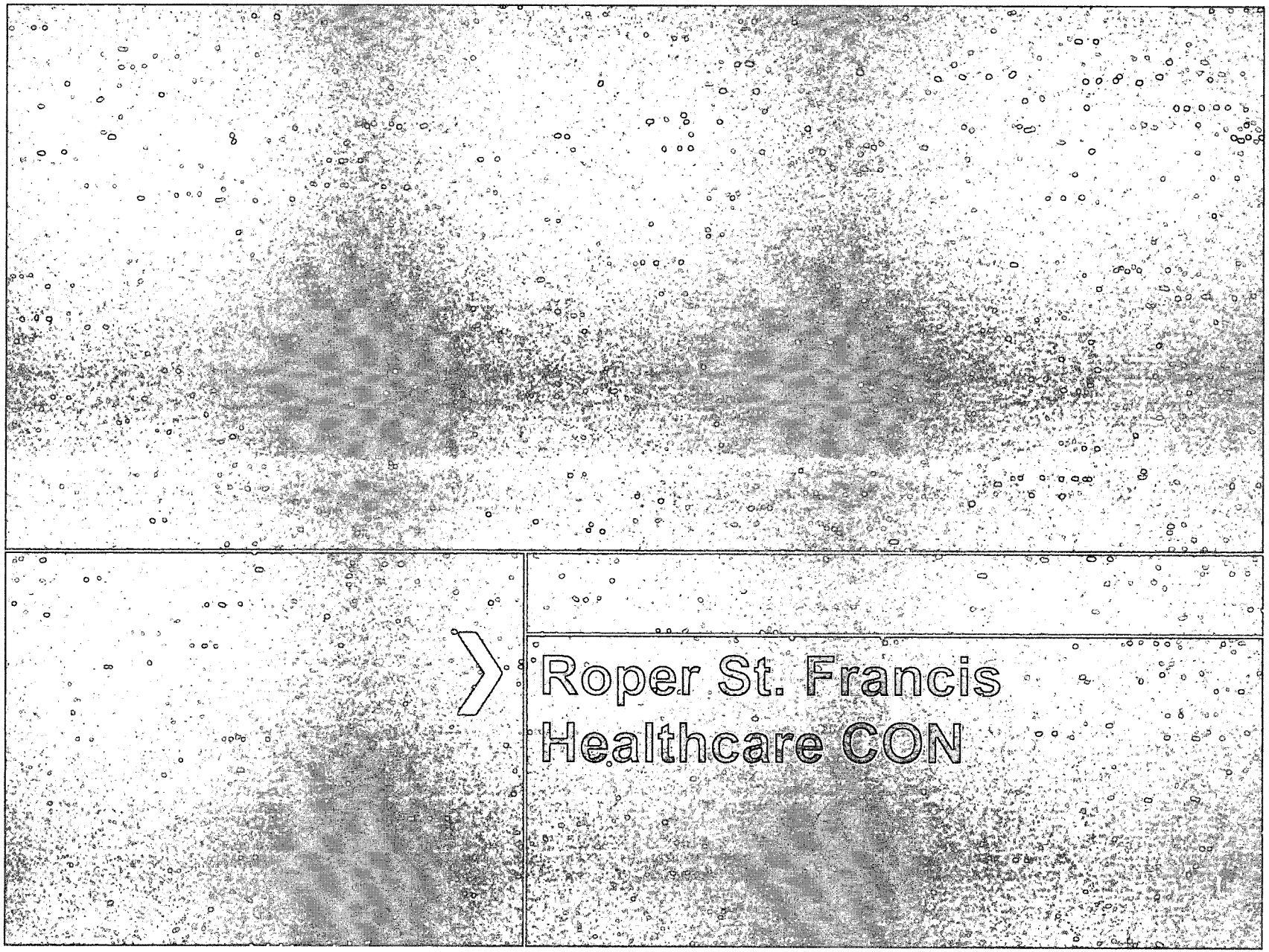
- The proposed project is the most cost effective and financially feasible alternative to address volume growth and capacity challenges.
- Renovation or redesign on-site was not a viable alternative:
  - Aging building and infrastructure.
  - Lack of space/land.
  - Disruption and displacement of services.
  - Cost efficiencies of renovation versus new construction.
  - Space inefficiencies and access/flow issues with separate but connected buildings at the downtown location.
  - Does not improve access to majority of patients seeking care at MUSC.
  - Other capacity needs and challenges.
- Capacity and land constraints will also continue to exist at MUSC Downtown campus.



Conclusion

- Projected utilization, project costs, financial feasibility and overall need for the project are reasonable and justified.
- The proposed project will relieve existing capacity constraints for MUSC's radiation therapy services.
- The existing and projected patient population will be served and existing providers will not be adversely impacted.
- MUSC strives to provide an optimal environment for high quality radiation therapy care, and the proposed project will significantly enhance the care provided to this patient population.
- Additionally, the proposal will enhance the delivery of care to residents in the area.




Roper St. Francis
Healthcare CON

Roper St. Francis Capacity

- While MUSC's proposed project is based on MUSC's utilization and capacity, should DHEC determine the applications to be competing, MUSC has the superior application.

- Roper St. Francis Healthcare submitted an application (#2470) to add a linear accelerator at the future Roper St. Francis – Berkeley campus.

- Currently, the system has four linear accelerators, including two each at Roper Hospital and Bon Secours St. Francis Xavier Hospital. Roper Hospital's equipment includes one linear accelerator and one Cyberknife.

- Capacity for the system was **22,000 treatments**, with three linear accelerators with a capacity of 7,000 treatments each plus one Cyberknife with a capacity of 1,000 treatments.

- However, in a letter dated December 30, 2016, Roper stated that the three linear accelerators provide IMRT/IGRT and should be adjusted to a capacity of 5,000 treatments, bringing the system's capacity to **16,000 treatments**.



Roper St. Francis Capacity

- The letter was extremely general and lacked details. No supporting documents were provided.
  - According to the letter, Roper Hospital upgraded its equipment "over the years" and **20 percent** of volume is IMRT/IGRT.
  - Even less information was provided for St. Francis' equipment. No timing was provided, and according to the letter **25 percent** of volume is IMRT/IGRT.
    - These number are lower than the national average and do not justify lowering the capacity.
- The letter is dated Friday, December 30, 2016 and requests that the next health plan (2017-2018) reflect the updated capacity.
  - Updated capacity is reflected in the 2017-2018 health plan, reducing the system's capacity from 22,000 to 16,000 treatments.
  - However, there's no indication on that the capacity revision is retroactive.
    - Since the letter was emailed on the last business day of 2016, it's reasonable to assume that the capacity revision started in 2017.

MUSC Changing What's Possible | MUSC.edu

Roper St. Francis Capacity

- Based on historical utilization, 80 percent capacity would not be exceeded for the most recent two years.

Facility	2015 Capacity Units	Capacity/Unit	Total Capacity	2016 Capacity Units	Capacity/Unit	Total Capacity	Treatments 2015	2016
Roper St. Francis Healthcare	3	7,000	21,000	3	7,000	21,000	14,233	16,106
	1	1,000	1,000	1	1,000	1,000		
Total	**4**		**22,000**	**4**		**22,000**	**14,233**	**16,106**
Capacity							**64.7%**	**73.2%**

Source: Roper St. Francis-Berkeley CON Application #2470 (7/6/2017); Roper St. Francis Letter to DHEC Dated 12/30/2016; Joint Annual Reports.

- Assuming capacity was reduced in 2016 (the year they filed their letter), 80 percent capacity would still not be exceeded for the most recent two years.

Facility	2015 Capacity Units	Capacity/Unit	Total Capacity	2016 Capacity Units	Capacity/Unit	Total Capacity	Treatments 2015	2016
Roper St. Francis Healthcare	3	7,000	21,000	3	5,000	15,000	14,233	16,106
	1	1,000	1,000	1	1,000	1,000		
Total	**4**		**22,000**	**4**		**16,000**	**14,233**	**16,106**
Capacity							**64.7%**	**100.7%**

Source: Roper St. Francis-Berkeley CON Application #2470 (7/6/2017); Roper St. Francis Letter to DHEC Dated 12/30/2016; Joint Annual Reports.

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Roper St. Francis Capacity

- Roper incorrectly assumed in their application that the letter would automatically apply to capacity for previous years in order to meet the 80 percent capacity requirement.

Facility	Capacity			Treatments	
	Units	Capacity/Unit	Total Capacity	2015	2016
Roper St. Francis Healthcare	3	5,000	15,000	14,233	16,106
	1	1,000	1,000		
Total	**4**		**16,000**	**14,233**	**16,106**
Capacity				**89.0%**	**100.7%**

- Roper plans on further reducing capacity by introducing stereotactic procedures on one linear accelerator, continuing to lower their capacity to get approved for additional linear accelerators.

Source: Roper St. Francis-Berkeley CON Application #2470 (7/6/2017); Roper St. Francis Letter to DHEC Dated 12/30/2016; Joint Annual Reports.

MUSC Changing What's Possible. | MUSC.edu

Roper St. Francis-Other

Additional points to consider include:

- **Methods of Financing and Ability to Obtain Necessary Capital** – Roper failed to identify/document the third party who will finance, construct, own the medical office building. Per Roper's application, a third party will construct and own the medical office building and said party should be determined by December 2017. As such, Roper failed to demonstrate ability to successfully develop the project.

- **Ability to Complete Project** – Without the important information and documentation mentioned above, the applicant didn't demonstrate ability to successfully develop and implement the project.

- **Indigent/Charity Care** – Roper failed to provide indigent/charity care detail in their pro forma, thus neglecting to show access for medically underserved populations.

Roper St. Francis-Other

- **Projection Utilization** – Components of the need methodology are overly aggressive, including the following:
  - Projections assume 55 percent of cancer patients receive radiation therapy treatment.
    - No detail was included to support this figure, other than that it's a "commonly accepted…assumption…"
  - Roper projects almost 5,000 treatments by PY1. Considering Roper Hospital's existing program had approximately 5,900 treatments in the most recent year, this projection is extremely high for the first year of operation.
  - Furthermore, the proposed Berkeley linear accelerator would exceed 80 percent capacity within the first year of operation. This is unlikely for a start-up radiation oncology program at a new hospital.
    - In fact, according to Roper's calculations, all linear accelerators within the system will exceed capacity for all projected years (with the exception of Roper Hospital in 2017).
    - This demonstrates their "reduced capacity" is unrealistic.
  - Exhibit 16 shows projected market share by Roper facility. While the majority of market share shifts within the system, the origins of a portion of market share (including 1.5 percent in the primary service area for PY1) is unaccounted for. It can only be assumed that this will come from non-Roper providers, resulting in negative impact.



Roper St. Francis-Other

- In fact, by PY3, the applicant projects an increase in the primary service area's market share of approximately 11 percent for both the proposed project as well as the system's two existing programs. The total service area's market share is also projected to increase to nine and four percent for the proposed project and system's two existing programs, respectively.
- Projected growth for Roper's application is also extremely high and inconsistent. Overall Roper project 35% growth in treatments from 2017-2022 vs MUSC's projection of 8.4%.
  - The following compares total projected growth for Roper St. Francis Healthcare and MUSC. While MUSC maintained a conservative, consistent projected growth based on historical data, Roper's projected growth is significantly higher and inconsistent.

	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
Roper St. Francis Healthcare	9.1%	6.7%	7.0%	4.2%	4.4%
MUSC	1.6%	1.6%	1.6%	1.6%	1.6%
Percent Variance	465%	317%	327%	158%	171%

Source: CON Applications.

  - A comparison of incremental growth furthers the issues with Roper's projections. (5,808 vs 1,643).

	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
Roper St. Francis Healthcare	1,483	1,190	1,333	860	942
MUSC	312	325	330	335	341
Percent Variance	375%	266%	304%	157%	176%

Source: CON Applications.



MUSC Radiation Therapy Center – Berkeley County

LICENSEE

MUHA
Medical University Hospital Authority

MANAGER

Alliance Oncology

MUSC Strategic Ventures

MUSC Cancer Care Network



Source: DHEC Record at CON 3, 5-6, 8-10

MUSC_03010

APPLICATION FOR CERTIFICATION OF NEED FOR A HEALTH FACILITY OR SERVICE

SCDHEC Received:
MAY 22 2017
Certificate of Need Program

Proposal Prepared By:

Name: Patrick J. Cawley, MD

Title: CEO, MUSC Health & Vice President of Health Affairs, University

Organization: Medical University Hospital Authority

Address: 169 Ashley Avenue

City: Charleston State: SC

Zip Code: 29425 Telephone Number: 843-792-4000

Email: cawleypj@musc.edu

The Applicant hereby certifies that the information contained in this Application, including all assurances and attachments, are correct to the best of his knowledge and belief.

Applicants Signature: _____

Date: 3/7/17

Please copy all correspondence related to this application for:

Sarah Bacik, MHA
Chief Strategy and Business Development Officer
261 Calhoun Street, Suite 100
Cannon Park Place, MSC 566
Charleston, SC 29425-3320
843-792-9917

Dan Westbrook, JD
Nelson Mullins
Meridian, 17th Floor
1320 Main Street
Columbia, SC 29201
803-255-9456

Forward to:
Bureau of Health Facilities and Services Development
S.C. Department of Health and Environmental Control
2600 Bull Street
Columbia, S.C. 29201

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    b. Total Project Cost & Equipment Quotes
    c. Site Plan
    d. Schematics of the Project
    e. Space Program
    f. Project Timeline
D. Officers of the Licensee
E. Organizational Chart of Licensee
F. Population and Patient Data
G. Project Funding Letter
H. Financial Projections & Manpower Budget
I. Indigent Care Commitment Letter
J. Medical Director CV
K. Letters of Support
L. Licensee Governing Body Approval

APPLICATION FOR CERTIFICATION OF NEED FOR A HEALTH FACILITY OR SERVICE

NOTE: A "complete" application shall include a written narrative report by the applicant (Regulation 61-15, Section 202).

PART A - QUESTIONNAIRE
1. Name of Facility MUSC Radiation Therapy Center- Berkeley County
2. Address, City, County, State, Zip Code **TMS 221-00-00-177 Plat included in Attachment B**

3. Type of Facility (Circle)		
A. Hospital	B. Nursing Home	C. Psychiatric Facility
D. Rehabilitation Facility	E. Substance Abuse Facility	F. Ambulatory Surgery Facility
F. Other (Specify) Radiation Therapy Center in Berkeley County		

4. Purpose of Review (Circle)		
A. New Facility	B. Change of Licensure	C. Addition to Existing Facility
D. Renovation of Existing Facility		E. Change of Services
F. Other (Specify)		

5. Management		
A. Name of Administrator Greg Spurlock, Managing Member of the Network	B. Address, City, State, Zip Code 100 Bayview Circle Suite 4 Newport Beach, CA 92660	
C. Telephone: 615-263-7888	D. Fax Number NA	E. Email aloehr@usradiosurgery.com

6. Licensee
A. Name of Licensee Medical University Hospital Authority
B. Address, City, State, Zip Code 169 Ashley Avenue Charleston, SC 29425

7. Ownership or Control of the Facility (Attach a list of names and addresses of the owners of the facility, indicating percent of ownership of each owner, the person responsible for the proposal, and the attorney(s) representing the proposal). Circle the appropriate information regarding ownership. Please see Part A Attachment.			
A. Individual	B. Partnership	C. Corporation	D. Proprietary
E. Non-Profit	F. Government- State		
G. Other: (Specify)			

8. Proposed Site of the Property	
A. Owned	B. Leased
C. Length of Site Lease	
D. Option	E. Length of Option
F. Name and Address of Owner(s) of Real Property Equity LLC 4653 Trueman Blvd, Suite 100 Hilliard, Ohio 43026	

9. Total Bed Capacity for Which Application is Made
Not Applicable, this application does not involve inpatient beds

	Existing Facilities			
	New Facility Only	Existing Beds	# Gained or Lost	Bed Total
Type of Beds				
A. Medical/Surgical				
B. Obstetrics				
C. Pediatrics				
D. Substance Abuse				
E. Psychiatric				
F. Rehabilitation				
G. Nursing Care				
H. RTFs				
I. ICU/CCU				
J. Other				
K. TOTAL				

10. Construction and Site	
A. Type of Construction Cast-in-place concreate vault for a new Varian TrueBeam Linear Accelerator	B. Number of Buildings Pertaining to Project One
C. Number of Stories Pertaining to	C. Size of the Site in Acres

Project One	29 Acres
E. Size of the Project Site in Acres 3.1 Acres	F. Square Footage of the Project Vault & Control: 2,000 Support Space: 6,500 Total: 8,500
G. Anticipated Date of Beginning Construction June 2018	H. Anticipated Date of Licensing or Project Completion March 2019
I. Anticipated Date for Submission of Final Completion Report March 2019	

11. Zoning of Construction Site General Business

12. Costs (Provide Estimated Signed Cost Statement from Either the Architect or Engineer)	
A. Land Cost NA	B. Construction Cost Site Construction: $1,266,000 (Radiation Therapy Share) Tenant Improvements: $1,936,505
C. Architect's/Engineer's Fee $96,075 (3% of construction)	D. Equipment Costs (to include taxes) 1) Fixed Equipment $5,302,612 (excludes CT options in equipment quote) 2) Movable Equipment $150,000 (Furniture and fixtures)
E. Financing Cost During Construction $128,100	F. Other Costs (Specify) IT & Physics (software)- $500,000 Contingency- $425,256
G. Total Project Cost $9,804,548	H. Construction and Equipment Cost 1) Per Square Foot- ~$1,000 (includes site construction, tenant improvements and clinical equipment per SF) 3)Per Bed- NA

Part A- Questionnaire (Attachment)

Attach a list of names and addresses of the owners of the facility, indicating percent of ownership of each owner, the person responsible for the proposal and the attorney(s) representing the proposal.

Medical University Hospital Authority is the licensee. MUSC Cancer Care Network, LLC is the management company and is a Delaware limited liability company licensed to do business in South

Carolina. Alliance Oncology, LLC is the majority owner of MUSC Cancer Care Network, LLC with a 51% membership interest. MUSC Strategic Ventures is the minority owner of MUSC Cancer Care Network, LLC with a 49% membership interest.

Alliance Oncology, LLC- 51% membership interest
100 Bayview Circle, Suite 400
Newport Beach, CA 92660

MUSC Strategic Ventures- 49% membership interest
169 Ashley Avenue, Suite 205
MSC 332
Charleston, SC 29425

The person responsible for preparing the proposal is:
Patrick J. Cawley
CEO, MUSC Health & Vice President of Health Affairs, University

Building Owner- 100%
Equity, LLC
4653 Trueman Blvd, Suite 100
Hilliard, Ohio 43026

The attorney representing the proposal is:
Dan Westbrook, Nelson Mullins

Part B.Additional Information

(1) Document that the applicant has published notification of this project in a local newspaper.

Response: The published notification of the intent to file this CON is provided in Attachment A.

(2) Describe the project setting forth the proposed change in services or facilities in as much detail as possible. State whether the project will change the existing licensed or survey bed capacity, will encompass the development of a new service, or result in the discontinuance of an existing service. If a new facility is proposed, list all services to be provided.

Introduction and Background

Alliance Oncology

As the nationwide leader in radiation oncology and radiosurgery programs, Alliance Oncology partners directly with hospitals, physicians and other healthcare providers to offer the latest oncology technologies to their patients.

Alliance Oncology's comprehensive solutions—including planning, market analysis, equipment and capital, staffing, billing, and operational management—help our partners stay on healthcare's cutting-edge through continuous innovations.

Alliance Oncology also share the strength and resources of our sister division, Alliance Radiology, the nation's largest provider of advanced outpatient diagnostic radiology, including MRI, PET/CT and CT services. Together, as part of Alliance HealthCare Services, we are able to address a wide array of needs for cancer centers — from early detection enabled by advanced diagnostic radiology to exciting new technologies in Intensity Modulated Radiation Therapy (IMRT), Image Guided Radiation Therapy (IGRT), and Stereotactic Radiosurgery (SRS).

MUSC

The Medical University of South Carolina (MUSC), founded in 1824, has a longstanding commitment to serving the citizens of South Carolina. MUSC, and its affiliates, Medical University Hospital Authority and University Medical Associate, collectively known as MUSC, is both a teaching hospital and referral center and is South Carolina's only academic medical center. Centrally located in downtown Charleston, MUSC has achieved international recognition and national acclaim as a premier biomedical research, educational, and clinical institution. MUSC's mission is "to provide excellence in patient care, teaching, and research in an environment that is respectful of others, adaptive to change, and accountable for outcomes."

As an academic medical center or teaching hospital, MUSC is at the forefront of the latest advances in medicine, with world-class physicians, groundbreaking research and technology that is often among the first of its kind in the world. Patients also benefit from a multidisciplinary team approach to care that involves the close collaboration of specialists from many different areas. MUSC and its affiliates offer a wide range of services to a large population base residing primarily in South Carolina and extending across the state and beyond. Among the services provided on the hospital's campus is a full range of emergency, maternity, pediatric, medical/surgical and diagnostic services. MUSC serves as an academic training facility for numerous medical residency programs. With 54 different medical specialty residency training programs, the hospital serves as a valuable resource for educating and preparing future physicians.

Included in the wide array of facilities, services and programs offered by MUSC is the MUSC Children's Hospital, a facility planned, designed, equipped and staffed with children in mind, which provides comprehensive services for children from birth to 18 years of age. Pediatric specialists in nearly every discipline ensure that every child receives the most effective age-specific care. As the premier children's hospital in South Carolina, MUSC Children's Hospital offers patients and their families exceptional medical care, cutting-edge procedures and research, state-of-the-art technologies and facilities unparalleled specialty and subspecialty care, and outreach programs and resources for patients, families, and the community at-large.

MUSC annually records more than one million patient encounters, and is highly regarded in many disease areas including neurosciences, cancer care, rheumatology, digestive disorders, heart and vascular care, transplant, women's health, pediatric medicine, musculoskeletal disorders, psychiatry, eye care, otolaryngology, and respiratory medicine. MUSC has been recognized for top-quality care by the National Research Corporation, Leapfrog, and U.S. News and World Report. In 2016, U.S. News and World Report recognized MUSC has the number one hospital in South Carolina. Furthermore, in 2016, MUSC was nationally ranked by the U.S. News and World Report in five Adult Specialties: Cancer, Ear, Nose and Throat, Gynecology, Nephrology, and Urology, and six Children's Specialties: Cardiology and Heart Surgery, Nephrology, Urology, Cancer, Gastroenterology and GI Surgery, and Diabetes and Endocrinology. Additionally, in 2016, Doximity (a partner of U.S. News and World Report) named MUSC has having four of the top

residency training program in the Southern region: Otolaryngology, Psychiatry, Obstetrics and Gynecology and Pediatrics. Other milestones include National Cancer Institute (NCI) designation for MUSC Hollings Cancer Center, the Digestive Disease Center's Center of Excellence designation from the National Pancreas Foundation, Safe Surgery 2015 designation from the South Carolina Hospital Association, designation as one of the 100 Safe Care hospitals, and the American Nurses Credentialing Center's Magnet recognition. MUSC is currently the third hospital in South Carolina with Magnet status and the only academic medical center in the state with this level of nursing excellence. Magnet status is the ultimate credential for high quality nursing and the leading example of successful nursing practices and strategies worldwide.

MUSC Hollings Cancer Center

Included in the wide array of facilities, services and programs offered by MUSC Health is the MUSC Hollings Cancer Center. As one of the leading cancer treatment centers in the Southeast, Hollings Cancer Center combines the full range of cancer specialties – including medical oncology, radiation oncology, surgical oncology, chemotherapy, and reconstructive surgery – to deliver a higher level of care to patients. The team of more than 60 super-specialists, each concentrating on a specific discipline of cancer treatment and care, works with individual patients to develop customized treatment programs that target a broad range of conditions. Often in just one day and under one roof, patients receive individualized attention from several specialists and complete the diagnostic procedures needed for a confident assessment of type and stage. MUSC complements that care with funded research programs for specific diseases and multidisciplinary tumor boards where physicians share their collective expertise to explore the best treatments for individual patients. Unique care and service offerings at Hollings Cancer Center include:

- Hollings Cancer Center offers patients state-of-the-art therapies, treatments and technologies, including Tomotherapy, the Leksell Gamma Knife Perfexion and the da Vinci Surgical System.
- MUSC is one of a small number of health care centers in the nation offering orthopaedic oncology care.
- MUSC offers South Carolina's first, largest and most comprehensive adult blood and bone marrow transplant program and the only pediatric blood and marrow transplants.
- MUSC Health is a Blue Distinction Center+ for bone marrow transplants (BMTs), one of only five centers nationwide with the Center+ distinction and the only center awarded this distinction for both Adult and Pediatric BMTs. According to BlueCross BlueShield, Blue Distinction Centers+ are hospitals recognized for their expertise and efficiency in delivering specialty care.
- MUSC is one of only a few centers in the Southeast using the video-assisted thoracic surgery (VATS) technique in a large percentage of cases.
- MUSC's Advanced Breast Reconstruction Program uses the revolutionary DIEP (Deep Inferior Epigastric Perforation) technique.
- Hollings Cancer Center is the only center in South Carolina able to perform surgery on prostate tumors in four different ways: robotic, perineal, retopubic and laparoscopic.
- Hollings Cancer Center has one of the world's most renowned Endoscopic Ultrasound (EUS) facilities.
- MUSC offers the only program for advance melanoma care in South Carolina.
- In collaboration with MUSC's Children's Hospital, we treat a large percentage of all South Carolina children battling cancer.

Awards, recognitions and accreditations for Hollings Cancer Center include:

- Hollings Cancer Center is one of fewer than 70 cancer centers in the nation - and the only one in South Carolina - to receive a designation from the National Cancer Institute (NCI).
- 2014 – 2015: Recognized by *U.S. News & World Report* as being among the top 25 percent in cancer care in the U.S.
- 2011 – 2012: Top Doctors award by *U.S. News & World Report* recognized 15 members of MUSC's cancer care team.
- 2013: Hollings was awarded a Three-Year Accreditation with Commendation by the Commission on Cancer (CoC) of the American College of Surgeons (continuously accredited since 1936).
- MUSC's Comprehensive Breast Care Program is accredited by the National Accreditation Program for Breast Centers (NAPBC).
- MUSC's breast imaging staff was awarded a Breast Imaging Center of Excellence designation by the American College of Radiology (ACR).
- 2011: The Jenny Sullivan Sanford Melanoma & Skin Cancer Program was named a Melanoma Center of Excellence (MCE) by the Melanoma Hope Network.

MUSC strives to provide the highest level of treatment and care for all cancer patients throughout the region.

MUSC Strategic Ventures

MUSC Strategic Ventures (MUSC SV) was incorporated as a non-membership South Carolina nonprofit corporation in September 2015 recognized under 501(c)(3)(approval of application pending). MUSC SV has been established at the direction, and for the support and benefit, of The Medical University of South Carolina ("MUSC"), an agency and political subdivision, and public university, of the State of South Carolina that works in close collaboration with Medical University Hospital Authority ("MUHA"), also an agency and political subdivision of the State of South Carolina. The purpose of MUSC SV is to support the missions and activities of MUSC and University Medical Associates of the Medical University of South Carolina d/b/a MUSC Physicians (UMA). MUSC, together with UMA, controls MUSC SV. More specifically, MUSC SV is governed under the auspices of its eight-member Board of Directors, with five members of the Board appointed by MUSC, two members appointed by UMA, and an eighth, independent "Community Director" who is elected by the vote of the seven other members of the Applicant Board.

MUSC established MUSC SV to help accomplish certain strategic objectives. The goal of MUSC SV is to utilize resources to provide expertise and management services to advance, nurture, and support the various charitable, educational and scientific missions and programs of MUSC, including the development of strategies and plans to achieve desired goals. In particular, MUSC SV provides MUSC, MUSC Physicians and MUHA with infrastructure that is integral and needed to support the delivery of high quality evidenced based care, advancement of knowledge, fostering of innovation, and promotion of healthy communities. The relevant infrastructure involves, among others, performance of existing or needed substantive functions of MUSC and MUSC Physicians, such as financial management, information technology and analytics, human resources, quality and performance improvement, and other administrative services. In doing so, MUSC SV endeavors to determine and implement strategies that enable MUSC and MUSC Physicians (along with MUHA)

to collectively collaborate with high quality affiliated health care providers; provide education with respect to health care to communities and providers; improve the access to high quality health care for the citizenry of South Carolina; establish and deepen relationships with MUSC and MUSC Physicians affiliates; optimize state-of-the-art information technology and communication systems to leverage expertise; utilize performance improvement methodologies to achieve optimal outcomes for populations; and generally drive other initiatives to promote the shared mission of MUSC, MUHA and MUSC Physicians. Thus, MUSC SV functions for charitable, scientific and educational purposes in support of MUSC (including MUHA) and MUSC Physicians, and to lessen their burdens, by conducting activities that otherwise would be conducted by one or more of such entities. In this way, MUSC SV better enables its supported organizations to operate agilely in the rapidly changing health care environment, including by engaging in collaborative efforts with non-MUSC related parties – and in so doing, better advances the collective efforts of MUSC, MUSC Physicians and MUHA to operate an academically-affiliated, integrated health care system that will help achieve the academic, research and clinical purposes of such supported organizations.

MUSC Cancer Care Network, LLC

The MUSC Cancer Care Network, LLC (The Network), a Delaware Limited Liability Company authorized to do business in South Carolina, was formed on January 22, 2016. The Network is the management company for the proposed radiation therapy center and The Medical University Hospital Authority is the licensee. Alliance Oncology, LLC strategically partnered with MUSC Strategic Ventures, a support organization for The Medical University of South Carolina, to create a Joint Venture to operate The Network. MUSC Health was the ideal partner because it has achieved international recognition and national acclaim as a premier biomedical research, educational, and clinical institution. MUSC Health's mission is "to provide excellence in patient care, teaching, and research in an environment that is respectful of others, adaptive to change, and accountable for outcomes." The Network is committed to providing the highest quality of care for its patients at the most affordable cost, creating a value proposition currently not available in Berkeley County. As the management company, the Network will bring state-of-the-art technology and best-in-class patient care close to home.

Project Overview

MUHA proposes to increase the capacity of MUSC Health's radiation therapy services by adding a sixth linear accelerator. The radiation therapy facility will be located in a freestanding medical office building to be located in the Nexton development in Berkeley County, South Carolina. The radiation therapy center will include a 2,000 square foot vault and 6,500 square feet of support space. The radiation therapy center will encompass 8,500 square feet of a 30,000 square foot medical office building. In addition to the linear accelerator, the facility will include a CT scanner, treatment planning space, exam rooms, nursing support, offices and storage space.

The proposed project is intended to benefit the residents of the service area by providing increased access to radiation therapy. The outpatient setting is the optimal setting for radiation therapy, as it enhances scheduling and operational efficiencies and promotes cost containment. The project will allow MUHA to provide radiation therapy services in a patient friendly, outpatient environment in a cost effective manner. Increased accessibility in this type of environment translates to increased patient satisfaction.

Additionally, the project will promote operational efficiency, as the radiation therapy facility will

be designed to enhance the productivity and efficiency of the providers of care, as well as the systems supporting them. This, in turn, translates into design economies, increased patient comfort and convenience, and ultimately better care.

The proposed project will allow MUHA to upgrade the technology and improve the delivery of radiation therapy services to our patients while also increasing access. MUHA strives to provide an optimal environment for high quality care, and the proposed project will significantly enhance the care provided to patients. Additionally, this proposal will enhance the delivery of care to residents in the area without any impact on existing providers.

(3) Provide the total cost of the project, indicating design fees, land cost, interest cost, construction cost, equipment cost, and any other cost involved in the project. Provide an estimate of the construction cost from a licensed architect or engineer; in the case of equipment, valid/current estimate from a vendor is acceptable.

Response: Please see Attachment C for the construction costs as provided by the Architects. The equipment quotes from the Vendors are included in Attachment C. Total project costs are included in Figure 1 below:

Figure 1
Total Project Costs

Estimated Construction Costs	
Site (Radiation Therapy portion 28.3%)	$ 252,000
Core & Shell (Radiation Therapy Portion)	$ 1,014,000
Site Construction Total (Radiation Therapy Potion)	**$ 1,266,000**
Building Construction for Tenant Improvements for the Radiation Therapy Center	
Construction	$ 1,594,586
Design	$ 231,919
Contingency (6%)	$ 110,000
Tenant Improvements Total	**$ 1,936,505**
Equipment Costs (Including Tax)	
Standard Imaging Software	$ 30,152
Sun Nuclear	$ 150,300
PTW Dosimetry	$ 130,363
CNMC	$ 17,973
Siemens Somatom	$ 676,557
Linear Accelerator	$ 4,297,267
Subtotal, Equipment	**$ 5,302,612**
IT and Physics	**$ 500,000**
Furniture and Fixtures	**$ 150,000**
Financing Costs (4% of construction)	**$ 128,100**
Professional and Permit Fees (3% of Construction)	**$ 96,075**
Contingency (5% construction & Equipment)	**$ 425,256**
Total	**$ 9,804,548**

Note: Siemens Somatom CT line item excludes CT options presented in equipment quote in Attachment C.

(4) State the specific location of the facility or service and/or equipment, including, where applicable, specific areas of an existing facility to be affected by the project. Provide room numbers of all patient rooms affected. Sufficient detail should be provided to allow the Department to visually inspect the site. The number of private and semi-private patient rooms shall be identified.

Response: The proposed project will be located in an future 30,000 SF medical office building, Owned by Equity,LLC on the Nexton Campus in Berkeley County. The radiation therapy center will encompass 8,500 SF with the space break out provided in Figure 2 below.

Figure 2

Entrance / Lobby / Reception	1500
4 Offices	500
Conference / Consult	250
Nurse Station & Support	400
4 Exam Rooms	250
Dosimetry / Physics	250
Patient Sub-Wait + Dressing	200
Patient & Staff Restrooms	350
CT/Simulator + Control	500
Accelerator + Control	2,000
Equipment, Electrical, IT & Janitor	350
Break Room	150
Storage	200
Circulation	1,600
TOTAL	**8,500 sq.ft.**

(5) Provide details regarding any proposed construction and/or renovations. Discuss alternatives to new construction and why these alternatives were rejected. For a multi-floor project, construction and/or renovation must be described, by floor, to include any additions and/or deletions made to each floor. Provide evidence that the applicant has adequately planned for any temporary move or relocation of any department, facility, or services, which may be necessary during the construction period. Document that plans exist to assure adequate protection (from fire, noise, dust, etc.) and continuation of all services during the proposed construction period.

Response: This project is for an incremental Varian TrueBeam linear accelerator due to increasing volumes and utilization of the current linear accelerators at MUHA. The incremental linear accelerator will be located on the Nexton campus in Berkeley County rather than downtown for multiple reasons. First, the size of the existing vaults on MUHA's main campus are 438 square feet and will not be able to accommodate the modern equipment and necessary shielding required for the Varian TrueBeam.

The proposed project is intended to benefit the residents of Berkeley county by providing increased access to radiation therapy. The outpatient setting is the optimal setting for radiation therapy as it enhances scheduling and operational efficiencies and promotes cost containment. This project will allow MUSC to provide radiation therapy services in a patient friendly, outpatient environment in a cost effective manner. Increased accessibility in this area will lead to increased patient satisfaction.

Second, due to the age of the existing facilities, most of the patient care buildings being undersized and requiring replacement or significant upgrading, placing the incremental Varian TrueBeam linear accelerator downtown is not an alternative. Much of the current infrastructure and buildings are reflective of the codes at the time the buildings were constructed, but may not have been upgraded to current needs and standards. Renovation to add a new linear accelerator would result in significant cost expenditures.

The incremental Varian TrueBeam linear accelerator will be located in a new building. As such, there will not be a need for temporary plans for the provision of patient care during construction.

(6) If a replacement facility or ancillary service is being constructed, describe plans for disposition of the existing facility or ancillary service area upon completion of the project.

Response: Not Applicable.

(7) Provide a timetable for development and completion of the project to include, at a minimum, the date of site acquisition, date of architectural contract, architectural design schedule, date of closing for financing, date of valid construction contract, date that all necessary permits (grading, building, sewer, etc.) will be obtained, and date of start of construction. The timetable shall be presented in one-month increments commencing with the month following receipt of the Certificate of Need and ending with the execution of a contract or purchase order for equipment only projects.

Response: The timetable, developed by the project architect, is included in Attachment B. The construction is expected to begin in June 2018 and the project is expected to be finished in March 2019 as displayed in Figure 3 below.

Figure 3

Stage of Work	Schedule
Design & Permitting	September 2017-June 2018
Nexton Design Approval	October 2017- April 2018
Site Plan Approval	October 2017
Closing for Financing	April 2018
Building Permit Process	May 2018- June 2018
Construction Contract	June 2018-March 2019
Licensing	March 2019
Project Completion	March 2019

(8) Provide the following ownership information:

a) Proposed name of facility: MUSC Hollings Cancer Center, Berkley County

b) Name and address of licensee or prospective licensee. (Note: The licensee is defined as the legal entity who, or whose governing body, has the ultimate responsibility and authority for the conduct of the facility or service; the owner of the business. The licensee must be the entity to whom the Certificate of Need is issued.)

Licensee:
Medical University Hospital Authority
PO Box 250332
169 Ashley Avenue
Charleston, SC 29425

Building Owner:
Equity, LLC
4653 Trueman Blvd, Suite 100
Hilliard, Ohio 43026

c) Complete title of the licensee's governing body.
Licensee:
Medical University Hospital Authority Board of Trustees

Building Owner:
Privately held company, solely owned by Steve Wathen without a board of managers.

d) Name, title and mailing address of presiding officer of the governing body.

Licensee:
Donald R. Johnson, II, MD

Building Owner:
Steven P. Wathen
4653 Trueman Blvd, Suite 100
Hilliard, Ohio 43026

e) Name and mailing address of all persons and/or legal entities having any ownership interest or owner's equity of the licensee to include a schedule of percent and type ownership claim of each.

Licensee:
Medical University Hospital Authority
PO Box 250332
169 Ashley Avenue
Charleston, SC 29425

Building Owner:
Privately held company, solely owned by Steven Wathen
Sole member of the company is Equity Consolidated Holdings, LLC, An Ohio Limited Liability Company

f) Name and mailing address of all persons and/or legal entities claiming liabilities of the licensee or of the facility or service for which this Certificate of Need is requested to include a schedule of percent and type of claim of each.

Same as (e)

g) Provide a listing which identifies all officers of the licensee.

Licensee:
Please see Attachment D for a listing of the officers of the licensee.

Building Owner:
Steven p. Wathen, Equity LLC

h) Is the land and/or building on/in which the proposed facility or service is to be conducted owned by the applicant. YES [NO]. If no, provide information on the land and building similar to that required in (b) through (g) above.
Please see Attachment B for the letter of intent for the lease.

i) Has the licensee engaged an entity other than an employee of the licensee to manage or operate the facility or service? [YES] NO. If yes, provide information similar to that required in (b) through (g) above.

Management Entity:
MUSC Health Cancer Care Network, LLC
100 Bayview Circle, Suite 400
Newport Beach, CA 92660

Title of governing body: Board of Managers

Presiding Officer of Governing Body:
Greg Spurlock, Managing Member
MUSC Health Cancer Care Network, LLC
100 Bayview Circle, Suite 400
Newport Beach, CA 92660

Ownership Interests, Name and Mailing Addresses:
Alliance Oncology, LLC –51% membership interest
100 Bayview Circle, Suite 400
Newport Beach, CA 92660

MUSC Strategic Ventures—49% membership interest
169 Ashley Avenue, Suite 205
MSC 332
Charleston, SC 29425-3320

Name and mailing addresses of all persons and/or legal entities claiming liabilities of the facility: Same as Ownership Interests above.

Officers of Management Entity:
Board Members (no officers have been formally named):
Greg Spurlock, Alliance Oncology

Elizabeth Pace, Alliance Oncology
Marianne Krease, Alliance Oncology
Dr. Pat Cawley, MUSC Health
Steve Hargett, MUSC Health

j) Is there any agreement, contract, option, understanding, intent or other arrangement that will effect a change in any of the information requested and/or provided in (b) through (g) above. YES NO. If yes, provide information similar to that required in (b) through (g) above.

k) Provide a complete listing of all existing licensed health care facilities and/or services and Certificates of Need in which the proposed licensee currently has an ownership interest, to include names and addresses of each facility or service. In the cases of Certificates of Need for undeveloped facilities and services, provide the name, address, and telephone number of a contact person representing the authority which issued the Certificate of Need. **None**

l) Should the licensee be a subsidiary corporation, provide a diagram of the licensee's relationship to the parent corporation and list the name and address of the parent corporation as well as the corporation which has ultimate control. In addition, please provide the name and mailing address of all persons and/or legal entities having ownership interest of five percent or more or any person with any agreement, contract, option, arrangement, or intent to acquire ownership interest of five percent or more, of all corporations in the corporate organizational structure which have ultimate control of the licensee. **Not applicable**

(9) Provide documentation that the applicant has sought cooperative agreements such as transfer agreements with other facilities, as applicable.

Response: MUSC is a regional referral center and currently holds transfer agreements with numerous facilities in the region. The proposed project does not affect any of these transfer agreements already in place.

The following facilities have engaged with the MUSC Medical Center regarding transfer agreements:

1. Alston Wilkes Society
2. Barnwell County
3. Beaufort Memorial Hospital
4. Bishop Gadsden Retirement Centers
5. Bon Secours St. Francis
6. Carolina Pines Regional Medical Center
7. Carolinas Medical Center
8. Charleston Surgery Center
9. Charlotte-Mecklenburg Hospital Authority
10. Children's Hospital of The King's Daughter
11. Coastal Carolina Medical Center
12. Conway Dialysis Center
13. East Cooper Community Hospital
14. East Cooper Regional Medical Center

15. Gambro Healthcare Santee
16. Tidelands Georgetown Hospital
17. Grand Strand Regional Medical Center d/b/a South Strand Ambulatory Care Center
18. Greenville Hospital System
19. Greenville Memorial Hospital
20. Harvest Health
21. HealthSouth Rehabilitation Hospital of Charleston
22. Hilton Head Regional Medical Center
23. Integrated Health Services at Driftwood, Inc.
24. Island Oaks Living Center
25. Marion County Medical Center
26. Mary Black Health System
27. MCG Health System
28. Palmetto Health Richland Hospital
29. Palmetto Kidney Center, Inc.
30. Piedmont Medical Center
31. Providence Hospital
32. Regional Medical Center of Orangeburg
33. Renal Advantage, Inc.
34. Riverside Health and Rehab
35. Roper Hospital
36. Roper St. Francis Healthcare
37. Second Chance Senior Care Center
38. Sisters of Providence Charity Hospital
39. Spartanburg Regional Medical Center
40. THI of SC at Charleston, LLC d/b/a Driftwood Rehabilitation & Nursing Center
41. Trident Medical Center, LLC
42. Palmetto Health Tuomey
43. White Oak Manor – Charleston
44. McLeod Regional Medical Center
45. Vibra Hospital of Charleston
46. Tidelands Waccamaw Community Hospital

(10) Indicate the means by which a person will have access to the facility's services (i.e. physician referral, self admission, etc). Identify the specific facilities or agencies the applicant expects to receive referrals from (i.e. hospitals, home health agencies, etc). Describe any limitations placed on admissions.

Response: Patients have access to the Radiation Therapy Center by self-referral and by internal and external physician referral. Referrals derive from private physician practices, public clinics and other hospitals. Access to the facility also comes from physicians affiliated with MUSC Health. There are no limitations placed on admissions.

Please refer to MUHA's Patient Rights and Responsibilities documentation on file with the Department. The Radiation Therapy Center will adopt these policies.

(11) Demonstrate that the proposed project is needed or projected as necessary to meet an identified need of the public. This shall address at a minimum: identification of the target

population; the degree of unmet need; projected utilization of the proposed facility or service; utilization of existing facilities and services; past utilization of existing similar services within the facility; and justification that the proposed project will not unnecessarily duplicate existing entities. The applicant must show all assumptions, data sources, and methodologies used. The applicant must use population statistics consistent with those generated by the State Demographer, State Budget and Control Board.

Project Overview

MUHA proposes to increase the capacity of its radiation therapy services by adding a sixth linear accelerator. The radiation therapy facility will be located in a freestanding medical office building to be located in the Nexton development in Berkeley County, South Carolina. The building will include a 2,000 square foot vault and 6,500 square feet of support space. The radiation therapy center will encompass 8,500 square feet of a 30,000 square foot medical office building. In addition to the linear accelerator, the facility will include a CT scanner, treatment planning space, exam rooms, nursing support, offices and storage space.

The proposed project is intended to benefit the residents of the service area by providing increased access to radiation therapy. The outpatient setting is the optimal setting for radiation therapy, as it enhances scheduling and operational efficiencies and promotes cost containment. The project will allow MUSC to provide radiation therapy services in a patient friendly, outpatient environment in a cost effective manner. Increased accessibility in this type of environment translates to increased patient satisfaction.

Additionally, the project will promote operational efficiency, as the radiation therapy facility will be designed to enhance the productivity and efficiency of the providers of care, as well as the systems supporting them. This, in turn, translates into design economies, increased patient comfort and convenience, and ultimately better care.

The most recent JAR, shown in Figure 4, demonstrates MUHA's current five linear accelerators have been at 80% capacity of above over the past two years, supporting the need for an additional linear accelerator at MUSC.

Figure 4
MUSC Radiation Therapy
Capacity by Fiscal Year

		Capacity			JAR	Internal
Facility	County	Units	Capacity/Unit	Total Capacity	FY 2015	FY 2016
MUSC	Charleston	3	5,000	15,000		
		2	4,500	9,000		
Total				24,000	19,823	19,221
Capacity					82.6%	80.1%

Source: FY15 - MUSC Joint Annual Report of Hospitals; FY16 - MUHA Internal Data

The proposed project will allow MUHA to upgrade the technology and improve the delivery of radiation therapy services to our patients while also increasing access. MUSC strives to provide an optimal environment for high quality care, and the proposed project will significantly enhance the care provided to patients. Additionally, this proposal will enhance the delivery of care to residents

in the area without any impact on existing providers as demonstrated in the utilization section below.

Service Area

The Radiation Therapy Center will adopt the service area of MUHA. As the oldest medical institution in the southern United States, MUHA serves a very wide population base and is regionally recognized as providing excellence in patient care, teaching, and research. Hollings Cancer Center is one of only 69 cancer centers in the United States and the only one in South Carolina to achieve NCI Cancer Center Designation. As a result, patients travel from all over the state and even the region to receive cancer care at MUHA. The majority of MUHA's patients originate from the southeastern region of South Carolina. MUHA's radiation therapy service area is defined by the South Carolina State Health Plan as Charleston, Dorchester, Berkeley and Colleton Counties. As shown in **Figure 5**, in FY 2016, approximately 58 percent of radiation therapy patients originate from this service area. The table is broken out by the primary service area, which includes Charleston, Dorchester and Berkeley counties, and the secondary service area which includes Horry, Beaufort, Orangeburg, Georgetown, Colleton, and Florence counties. The primary service area is further subdivided into MUHA's seven Tri-County submarkets of North Charleston, Summerville, East Cooper, West Ashley, Sea Islands, Moncks Corner, and Peninsula Charleston. Approximately 16% of MUHA radiation therapy patients, the largest distribution of patients from the Tri-County, reside in the Moncks Corner and Summerville submarkets. The new location will be more convenient for these patients. This project brings a radiation therapy facility into the community the health system serves, and into a county which does not currently have any radiation therapy services available within the county boundaries.

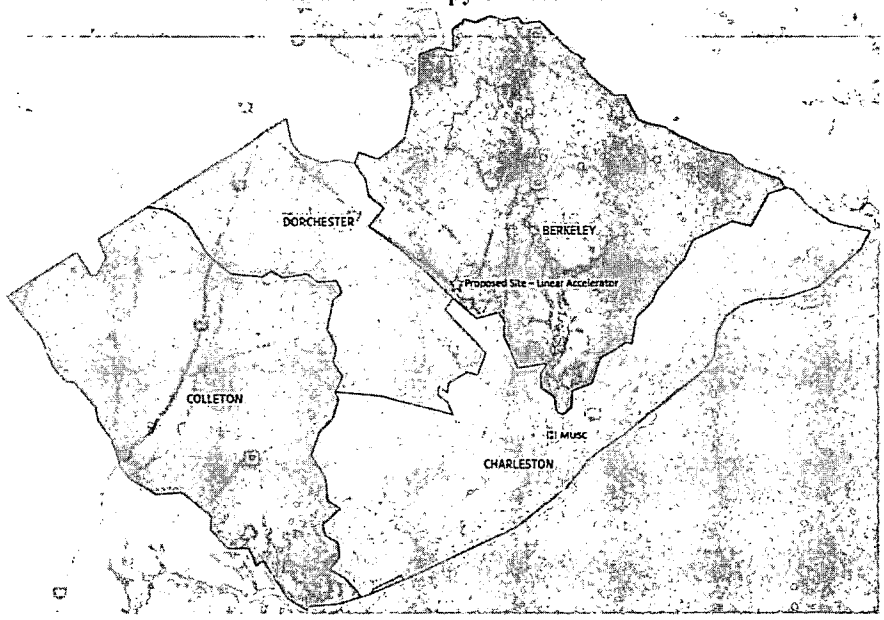
Figure 5
MUSC Linac Patient Origin FY 15 & FY 16

	FY15	FY16
Tri-County	62%	58%
East Cooper	12%	12%
Moncks Corner	3%	5%
North Charleston	16%	15%
Peninsula Charleston	4%	3%
Sea Islands	7%	7%
Summerville	10%	11%
West Ashley	9%	6%
Secondary	19%	24%
Beaufort	5%	6%
Colleton	3%	3%
Florence	1%	2%
Georgetown	3%	3%
Horry	5%	7%
Orangeburg	2%	2%
Tertiary	17%	16%
Outside SC	2%	2%

Notes: Volumes represent distinct patients.
Source: MUSC Internal Data

Figure 6 is a map of the radiation therapy service area and the location of the project.

Figure 6
MUHA
Radiation Therapy Service Area



MUHA aims to provide high quality, accessible services to patients throughout the service area, and the proposed project will allow MUHA to achieve this goal.

Demographics

As shown in **Figure 7,** the population in the service area is projected to grow approximately 8.1% between 2016 and 2021. This projected growth represents approximately 63,382 residents over the five-year time period. The projected population growth for the total service area is higher than that for South Carolina overall (5.4%). Population growth for the service area has been consistently strong, and is expected to continue in the future.

In addition, the service area is expected to experience an increase in the 65-and-older age group between 2016 and 2021; this population is projected to grow approximately 25.1%, representing almost 28,000 residents over the five-year time period. The projected growth for the total service area is higher than that for South Carolina overall (approximately 19.7%). **Figure 7** details the projected growth in the 65-and-older population in the service area.

Figure 7

MUHA
Service Area Population Projections
All Ages and Age 65+

	Total		Age 65+		Percent Change	
County	**2016**	**2021**	**2016**	**2021**	**Total**	**Age 65+**
Berkeley County	158,622	173,046	21,132	26,700	9.1%	26.3%
Charleston County	383,738	414,813	58,977	73,288	8.1%	24.3%
Colleton County	35,107	34,943	6,572	7,371	-0.5%	12.2%
Dorchester County	209,194	227,241	25,232	32,622	8.6%	29.3%
Service Area Total	**786,661**	**850,043**	**111,913**	**139,981**	**8.1%**	**25.1%**
South Carolina	4,891,954	5,153,835	799,964	957,412	5.4%	19.7%

Source: The Nielson Company (2016)

As stated in question B.11, population statistics used in all analyses must be consistent with those generated by the State Demographer of the State Budget and Control Board. The Nielson Company is the source for all population projections presented for the primary and secondary service area. A comparison of the area county-wide population projections for all ages from The Nielson Company and the South Carolina State Demographer is included in **Attachment F**. Also, included in **Attachment F** is the Nielson Company's methodology for the data provided. The population projections calculated by The Nielson Company are consistent with those of the South Carolina State Demographer and are therefore reasonable population data.

The demographic analysis reveals MUSC's service area has a strong population base and projected growth over the next five years. The demand for healthcare services is already high in Berkeley County and will continue to grow in the coming years. The proposed project will not only address the increasing demand for healthcare in the radiation therapy service area, but also fulfill the current demand. MUSC is prepared to continue providing high quality, accessible outpatient care to the residents of the area it serves.

The highest percentage of MUHA's radiation therapy patients originated from the combined Moncks Corner and Summerville submarkets in 2016 (approximately 16%), as shown in **Figure 5**. Another 15% originate from the North Charleston submarket, for a total of nearly one-third of all radiation therapy patients. More than half of linear accelerator patients originate from areas of the Tri-County service area that would be more accessible to the new location. This emphasizes the importance and benefit of the proposed location. This does not factor in the increased access and convenience for residents from other parts of the state (such as Orangeburg and Colleton Counties). Access to the proposed Berkeley County location would also be more convenient for these patients, versus traveling to the MUSC downtown or Mount Pleasant campus.

To further emphasize the increased accessibility provided by the proposed project, the estimated time to access services was calculated from MUSC's service areas for the proposed Berkeley County location versus the downtown main campus and the Mount Pleasant location. The location of the highest concentration of patients in each submarket was utilized as the starting point. As shown in **Figure 8**, access to the proposed Berkeley County location would be more convenient for a significant number of patients, versus traveling to the MUSC downtown campus or to the Mount Pleasant location.

Figure 8

Drive Time Analysis

MUSC Submarkets

Departure Location	Proposed Site		MUSC				Hollings Cancer Center East Cooper		Total Time Difference Range (Downtown - Proposed Site)**	Total Time Difference (Mt. Pleasant - Proposed Site)
	Miles	Driving Time (Min.)	Miles	Driving Time (Min.)	Total MUSC Time with Parking/ Wayfinding Time of 10 minutes	Total MUSC Time with Parking/ Wayfinding Time of 20 minutes	Miles	Driving Time (Min.)		
MUSC Hollings/Peninsula	23.3	26	0	0	10	20	6.9	10	(6) - (16)	(16)
Sea Islands	30.3	34	5.5	9	19	29	15.9	28	(5) - (15)	(6)
East Cooper	26.4	26	3.4	11	21	31	1.7	6	(5) - 5	(20)
West Ashley	21.8	24	4.2	9	19	29	12.1	18	(3) - 7	(6)
Summerville	2.3	3	25.2	28	38	48	31	38	35 - 45	35
Moncks Corner	14.5	17	32.3	39	49	59	32.4	36	32 - 42	19
North Charleston	15.1	16	21.1	34	44	54	20.2	29	28 - 38	13
Orangeburg	53.7	50	75.7	73	83	93	79.4	73	33 - 43	23
Colleton	35.2	45	46.9	57	67	77	59.3	75	32 - 42	30
Georgetown	78.3	93	74.4	87	97	107	66.7	76	15 - 25	(17)
Beaufort	98.8	104	93.2	110	120	130	102	125	16 - 26	21
Horry	106.7	125	104	118	128	138	97.1	112	(7) - 3	(13)
Florence	116.5	108	130.9	121	131	141	145.2	137	30 - 40	29

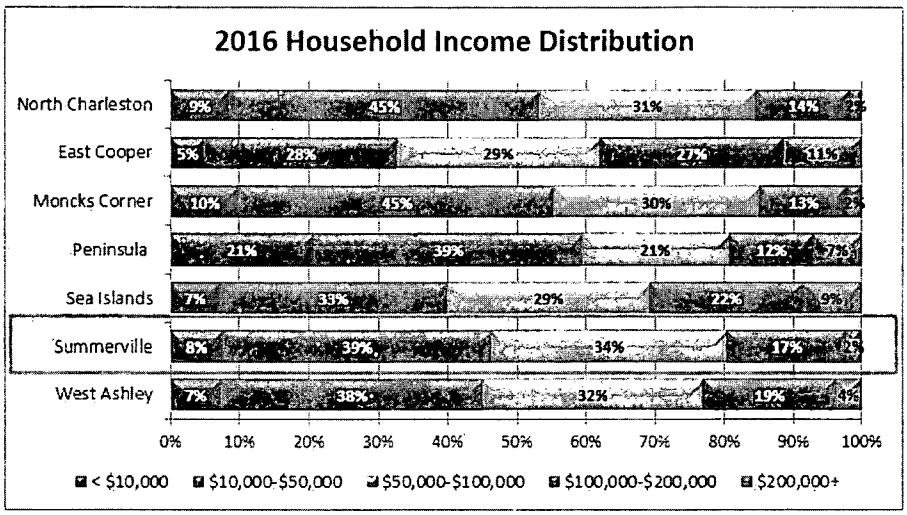
Notes:
* Assumes an average range of 10-20 additional minutes for parking/way-finding at MUSC downtown. Refer to attached maps with locations identified.
Submarket and County addresses are mapped from the zip code with the highest Linac volume in the area
** Sorted by Smallest to Largest Total Difference in Drive Time from Downtown to the Proposed Site in Berkeley County
Source: Microsoft MapPoint

As indicated in **Figure 8**, patients from North Charleston, Summerville, and Moncks Corner would have improved access by 28 to 45 minutes versus traveling to MUSC's downtown campus and 13 to 35 minutes versus traveling to the Mount Pleasant location. Residents of Orangeburg, Colleton, and Florence would have increased accessibility by 30 to 43 minutes versus traveling to MUSC's downtown location and 23 to 30 minutes versus traveling to the Mount Pleasant location. Therefore, we believe our patients would be best served if we offered an additional radiation therapy site in Berkeley County. This is a very ill patient population who visit our facilities daily for radiation therapy and treatments can last a month or longer. By locating our services in a more accessible location, we are able to better meet our patients' radiation therapy needs.

Finally, MUHA proposes to locate the radiation therapy facility in the Summerville submarket, which crosses into both Dorchester and Berkeley counties, and which has a lower socioeconomic status as shown in **Figure 9.** Approximately 48% of the households in the Summerville submarket have an average household income less than $50,000. The project will increase accessibility to low income persons and allow MUSC to fulfill its mission to improve health and maximize quality of life through education, research and patient care.

Figure 9

Median Household Income Analysis by Tri-County Submarket



Source: Nielson Demographic Data.

Utilization

According to data from the South Carolina Central Cancer Registry, the total number of new cancer cases in the radiation therapy service area grew by approximately 23 percent between 2008 and 2013. 2013 is the most recent year for which cancer incidence data is available. **Figure 10** summarizes the new cancer cases within each county. The data used in this analysis was obtained through the South Carolina Community Assessment Network (SCAN), which presents data from the South Carolina Central Cancer Registry.

Figure 10
2008-2013 Service Area Cancer Incidence

County	2008	2009	2010	2011	2012	2013	2008-2013 % Growth	2008-2013 CAGR
Berkeley	727	771	790	826	886	905	24%	4.5%
Charleston	1,562	1,767	1,852	1,866	1,980	1,933	24%	4.4%
Colleton	196	259	235	244	244	225	15%	2.8%
Dorchester	592	614	635	643	700	666	13%	2.4%
Total	3,077	3,411	3,512	3,579	3,810	3,729	21%	3.9%

Source: South Carolina Central Cancer Registry

There has been a strong growth trend in cancer incidence in MUSC's service area. The new cancer cases applied to the corresponding service area population results in the following cancer incidence rates per 1,000 population (**Figure 11**).

Figure 11
2008-2013 Service Area Incidence Rates
Cases per 1,000 Population

County	2008	2009	2010	2011	2012	2013	2008-2013 % Growth	2008-2013 CAGR
Berkeley	4.29	4.44	4.44	4.50	4.67	4.66	9%	1.7%
Charleston	4.49	4.97	5.29	5.22	5.42	5.19	16%	2.9%
Colleton	5.02	6.60	6.04	6.32	6.40	5.95	19%	3.5%
Dorchester	4.66	4.71	4.65	4.56	4.91	4.58	-2%	-0.3%
Total	4.50	4.88	4.99	4.97	5.18	4.97	10%	2.0%

Source: South Carolina Central Cancer Registry, South Carolina DHEC Population Estimates

The total cancer incidence rate, for all age groups, was 4.5 per 1,000 population in 2008 as compared to 4.97 per 1,000 population in 2013. This represents an average annual growth of approximately 2 percent.

The DHEC SCAN Cancer Incidence statistical file indicates that Berkeley County had 905 new cancer cases and Dorchester County had 666 new cancer cases in 2013. By applying annual population growth rates from Nielsen Demographics to the 2013 new cancer cases, estimates for new cancer cases for 2019 from Berkeley and Dorchester counties were calculated at 1,005 and 736, respectively, for a total of 1,740 new cancer cases in 2019. Because neither Berkeley nor Dorchester County currently has a linear accelerator, MUSC expects that the proposed linear accelerator could serve a portion of the new cancer cases from these counties to allow patients ease of access to radiation therapy closer to home.

In order to project the number of projected radiation therapy cases expected in the service area in 2019, the percent of total cancer cases that require radiation therapy was determined to be 50 percent. According to the National Cancer Institute, approximately half of all cancer patients will receive some type of radiation therapy during their course of treatment. More particularly, the American College of Radiation Oncology (ACRO) states that radiation therapy is used as part of the initial treatment in approximately one third of newly diagnosed cancer cases. Additionally, approximately 25 percent of patients will receive further radiation therapy treatment during the course of their cancer treatment. Taking both the newly diagnosed and re-treated patient populations into account, the 50 percent utilized in this projection is a conservative figure. This percentage was applied to the 2019 projected cases to determine the number of projected radiation therapy cases.

Therefore, of the 1,740 new cancer cases estimated for 2019, 870 (50%) would require radiation therapy. MUSC has historically captured 46% of unduplicated radiation therapy patients (based on 2013 to 2015 JARs) for linear accelerators in the service area, and by applying this 46% capture to the 870 cancer cases needing radiation therapy, MUSC estimates serving 400 of the new cancer cases from Berkeley and Dorchester in 2019. MUSC projects that 25%, or 100, of these new cancer cases could be treated by the proposed linear accelerator, while existing MUSC linear accelerators would serve the remaining 300 cases. MUSC also expects a slight shift of existing radiation therapy patients who originate from Moncks Corner, Summerville and North Charleston to the proposed linear accelerator in Berkeley County due to the increased access to radiation therapy closer to home that will be offered by the proposed linear accelerator. **Figure 12** illustrates the calculation of these projected volumes.

Figure 12

Estimated MUSC Capture of New Cancer Patients from Berkeley & Dorchester

Counties

Estimated MUSC Capture of New Patients from Berkeley & Dorchester Counties			
	Patients	Treatments (18/pt)	Treatments/Day
2019 Proj New Cancer Cases in Berkeley & Dorchester[1]	1,740		
% Receiving Radiation Therapy[2]	50%		
New Cancer Cases w/ RT	870	15,661	63
Historic MUSC Market Capture of Undup Pts (JAR)[3]	46%		
Estimated MUSC Market Capture at all MUSC sites	400	7,204	29

New Site Estimates	Patients	Treatments (18/pt)	Treatments/Day
Estimated Shift from other MUSC	110	1,985	8
Estimated MUSC Capture of New Cases at New Site	100	1,801	7
Total	210	3,786	15.1

Assumptions:

1) 2019 New Cancer Cases projected from applying county population growth to 2013 South Carolina Cancer Registry volumes for new cancer cases from Berkeley and Dorchester counties.

2) National Cancer Institute states that approximately half of all cancer patients will receive radiation therapy at some point in treatment.

3) Assumes average MUSC capture of unduplicated patients receiving treatment in the service area from 2013, 2014, and 2015 JARs.

Because the proposed linear accelerator and radiation therapy services will be located in a county within the service area that does not currently have such services, MUSC projects that the linear accelerator will fill a need for such service without impacting existing providers in the service area. Berkeley and Dorchester counties had the 10th and 13th highest number of new cancer cases in South Carolina in 2013 and new cancer cases are projected to grow in these counties and throughout the state. MUSC proposes to locate this service in a county not currently offering radiation therapy services to fulfill a need to serve new cancer cases and projects minimal shift from its existing linear accelerators, based on patient preference. MUSC projects no impact to existing providers of radiation therapy services within the service area with the implementation of the proposed location of an incremental linear accelerator in Berkeley County and expects to help fulfill a community need for radiation therapy services closer to home for residents of Berkeley and Dorchester counties.

The proposed linear accelerator in Berkeley County projects 3,911 treatments by year three. As mentioned above, 16% of MUSC current radiation therapy patients reside in Moncks Corner and Summerville. New cancer patients living in these two submarkets will be closest to the proposed radiation therapy site and will most likely receive care at this location. The year one projections also assume 40% of the patients from Moncks Corner and 40% from Summerville will be redirected from MUSC's downtown and Mount Pleasant campuses to the Berkeley location for care. The proposed location will be more convenient to this very sick patient population who visit our facilities daily for radiation therapy and treatments can last a month or longer. The projections shown in **Figure 13** assume population growth rates. The Berkeley Linac treatments applies the Tri-County population growth rate with a Compounded Annual Growth Rate of 1.6% and the other four linear accelerators also assume the Tri-County population growth rate of 1.6%. The baseline volumes represent the most recent fiscal year of data, from July 2015 to June 2016.

Figure 13
MUSC Linac Projected Volumes

Linear Accelerator Description	Historical Volumes	Interim Volumes		Project Years 1-4			
	FY16	2017	2018	2019	2020	2021	2022
Berkeley Linac	0	0	0	3,786	3,848	3,911	3,975
Berkeley Linac % of Capacity (5,000)				*76%*	*77%*	*78%*	*80%*
Other MUSC Linacs (5)	19,221	19,529	19,841	16,379	16,647	16,920	17,197
Total MUSC Linacs (6 as of 2019)	19,221	19,529	19,841	20,166	20,496	20,831	21,172

Source: Population growth from the Nielson Demographic data, please refer to **Attachment F**. Historical volumes from MUSC Internal Data, applied patient origin percentages provided in Figure 2.

Impact on Existing Facilities

The proposed project will not represent unnecessary duplication of services and will not adversely affect existing facilities in the services area. As described above, the proposed linear accelerator is expected to serve mainly new cancer cases originating in Berkeley and Dorchester counties, neither of which currently has radiation therapy services within the county. A small portion of radiation therapy treatments will be shifted from the downtown and Mount Pleasant campuses to the proposed radiation therapy treatment center in Berkeley County. As such, these patients are currently being served by MUSC Radiation Oncologists and referral patterns will not change. MUSC Radiation Oncologists are set apart from the community oncologists and are able to maintain their patient base because they are part of an Academic Medical Center offering unique cancer care not available anywhere else in the region. MUSC's Hollings Cancer Center offers patients access to more clinical trials than other institutions in the state which is why patients choose to receive care at an MUSC radiation therapy center. The extensive offering of MUSC's clinical trials gives patients access to treatment opportunities that are on the frontier of medicine—to possibly extend their survival and improve their quality of life. There will be additional cases generated due to the organic population growth for the services area, and the existing and projected population can fully support the proposed project.

Certificate of Need Standards for Radiotherapy

The proposed project satisfies each of the following applicable criteria for the expansion of an existing radiation therapy service, as outlined in the 2015 South Carolina Health Plan (enacted August 13, 2015).

1. The capacity of a conventional linear accelerator, either with or without EPID, is 7,000 treatments per year.

Response: Not applicable. This linac will have a capacity of 5,000 treatments/year due to its ability to provide IMRT or IGRT.

2. Linear accelerators providing IMRT or IGRT have a capacity of 5,000 treatments per year. A facility must document that it is providing or will provide these specialized treatments in sufficient volume to justify why it should be held to this planning capacity.

Response: The proposed linear accelerator will provide IMRT and IGRT with a capacity of 5,000

treatments per year. The TrueBeam platform is a fully-integrated system for image-guided radiotherapy. The carefully guided, automated workflow on the TrueBeam system uses intuitive visual cues to enhance safety and reduce operation times so patient throughput can be optimized. The accelerator has the capability to be upgraded to provide stereotactic treatments, but these upgrades will not be purchased initially. That capability may be added in the future. Based on MUSC's historical radiation therapy volumes and applying organic population growth, MUSC's existing five linear accelerators, plus the incremental linear accelerator, are projected to provide treatments of 20,166; 20,496 and 20,831 in the first three years of operation (2019, 2020 and 2021).

In the most recent twelve months 60% of radiation therapy patients received IMRT or IGRT. MUSC currently has three (3) linear accelerators that provide IMRT or IGRT and have capacity for 5,000 treatments per year and two (2) linear accelerators that perform stereotactic procedures and have capacity of 4,500 treatments per year, for a total capacity of 24,000 treatments per year.

3. IMRT/IGRT linear accelerators performing stereotactic procedures have a capacity of 4,500 treatments per year. A facility must document that it is providing or will provide these specialized treatments in sufficient volume to justify why it should be held to this planning capacity.

Response: Not applicable. The proposed linear accelerator will have a treatment capacity of 5,000.

4. Linear Accelerators designed strictly to provide Stereotactic Radiotherapy have a capacity of 1,500 treatments per year. A facility must document that it is providing or will provide these specialized treatments in sufficient volume to justify why it should be held to this planning capacity.

Response: Not applicable. The proposed equipment is not for a linear accelerator designed strictly to provide Stereotactic Radiotherapy.

5. There are 13 service areas established for Radiotherapy units.

Response: The applicant will be part of the service area comprised of Charleston, Dorchester, Berkeley and Colleton Counties.

6. New Radiotherapy services shall only be approved if the following conditions are met:

A. All existing units in the service area have performed at a combined use rate of 80 percent of capacity for the year immediately preceding the filing of the applicant's CON application; and

B. An applicant must project that the proposed service will perform a minimum number of treatments equal to 50 percent of capacity annually within three years of initiation of services, without reducing the utilization of

the existing machines in the service area below the 80 percent threshold. If the new equipment is a specialized radiotherapy unit as described in Standards 2, 3 or 4 above, then the applicant may propose an annual capacity based on the specialized use of the equipment by that applicant. If the applicant can justify this proposed annual capacity, then this capacity will be used in CON application calculations, as well as future capacity calculations, for that applicant. The applicant must document where the potential patients for this new service will come from and where they are currently being served, to include the expected shift in patient volume from existing providers.

Response: Not applicable. MUHA is an existing provider of radiation therapy services.

7. Expansion of an existing service, whether the expansion occurs at the existing site or at an alternate location in the service area, shall only be approved if the service has operated at a minimum use rate of 80 percent of capacity for each of the past two years and can project a minimum use rate of 50 percent of capacity per year on the additional equipment within three years of its implementation. If the additional equipment is a specialized radiotherapy unit as described in either Standards 2, 3 or 4 above, then the existing provider may propose an annual capacity for that additional equipment, based on the specialized use of the equipment by that applicant. If the applicant can justify this proposed annual capacity, then this capacity will be used in CON application calculations, as well as future capacity calculations, for that applicant.

Response: MUSC's existing fleet of five linear accelerators has operated at greater than 80% of the 24,000 treatment capacity for the past two years. In 2015, MUSC had 19,823 treatments, which is 83% of the fleet's capacity; and in 2016, MUSC had 19,221 treatments, which is 80.1% of the fleet's capacity.

The proposed linear accelerator will have a capacity of 5,000 treatments due to its ability to provide IMRT and IGRT treatments. As indicated above, the incremental linear accelerator is projected to perform at 76% of capacity in Year 1 of the project and will meet the requirement of performance at greater than 50% of capacity within three years of implementation.

MUSC projects that the proposed linear accelerator, which will provide IMRT or IGRT services, will perform at 76% of its 5,000 annual treatments capacity in Year 1 of operations; 77% of capacity in Year 2; and 78% of capacity in Year 3. Please refer to **Figure 14** below for reference.

Figure 14

Linear Accelerator Description	Historical Volumes	Interim Volumes		Project Years 1-4			
	FY16	2017	2018	2019	2020	2021	2022
Berkeley Linac	0	0	0	3,786	3,848	3,911	3,975
Berkeley Linac % of Capacity (5,000)				*76%*	*77%*	*78%*	*80%*
Other MUSC Linacs (5)	19,221	19,529	19,841	16,379	16,647	16,920	17,197
Total MUSC Linacs (6 as of 2019)	19,221	19,529	19,841	20,166	20,496	20,831	21,172
MUSC % of Capacity (24,000 as of 2015 JAR; 29,000 w/ incremental)	*80%*	*81%*	*83%*	*70%*	*71%*	*72%*	*73%*
Other Service Area Linacs 2015 Total = 26,726	27,163	27,608	28,060	28,519	28,986	29,460	29,942
Total Service Area Treatments 2015 Total = 46,549	46,384	47,136	47,901	48,685	49,482	50,291	51,114

Source: Baseline RT Treatment Volumes from 2015 JARs

The DHEC SCAN Cancer Incidence statistical file (http://scangis.dhec.sc.gov/scan/cancer2/statinput.aspx), indicates that Berkeley County had 905 new cancer cases and Dorchester County had 666 new cancer cases in 2013. By applying annual population growth rates from Nielsen Demographics to the 2013 new cancer cases, estimates for new cancer cases for 2019 from Berkeley and Dorchester counties were calculated at 1,005 and 736, respectively, for a total of 1,740 new cancer cases in 2019. Because neither Berkeley nor Dorchester County currently has a linear accelerator, MUSC expects that the proposed linear accelerator could serve a portion of the new cancer cases from these counties to allow patients ease of access to radiation therapy closer to home. The National Cancer Institute estimates that 50% of cancer patients will require radiation therapy during their cancer treatment. Therefore, of the 1,740 new cancer cases estimated for 2019, 870 (50%) would require radiation therapy. MUSC has historically captured 46% of unduplicated radiation therapy patients (based on 2013 to 2015 JARs) for linear accelerators in the service area, and by applying this 46% capture to the 870 cancer cases needing radiation therapy, MUSC estimates serving 400 of the new cancer cases from Berkeley and Dorchester in 2019. MUSC projects that 25%, or 100, of these new cancer cases could be treated by the proposed linear accelerator, while existing MUSC linear accelerators would serve the remaining 300 cases. MUSC also expects a slight shift of existing radiation therapy patients who originate from Moncks Corner, Summerville and North Charleston to the proposed linear accelerator in Berkeley County due to the increased access to radiation therapy closer to home that will be offered by the proposed linear accelerator. **Figure 15** illustrates the calculation of these projected volumes.

Figure 15

Estimated MUSC Capture of New Patients from Berkeley & Dorchester Counties			
	Patients	Treatments (18/pt)	Treatments/Day
2019 Proj New Cancer Cases in Berkeley & Dorchester[1]	1,740		
% Receiving Radiation Therapy[2]	50%		
New Cancer Cases w/ RT	870	15,661	63
Historic MUSC Market Capture of Undup Pts (JAR)[3]	46%		
Estimated MUSC Market Capture at all MUSC sites	400	7,204	29
New Site Estimates	Patients	Treatments (18/pt)	Treatments/Day
Estimated Shift from other MUSC	110	1,985	8
Estimated MUSC Capture of New Cases at New Site	100	1,801	7
Total	210	3,786	15.1

Assumptions:

1) 2019 New Cancer Cases projected from applying county population growth to 2013 South Carolina Cancer Registry volumes for new cancer cases from Berkeley and Dorchester counties.

2) National Cancer Institute states that approximately half of all cancer patients will receive radiation therapy at some point in treatment.

3) Assumes average MUSC capture of unduplicated patients receiving treatment in the service area from 2013, 2014, and 2015 JARs.

Because the proposed linear accelerator and radiation therapy services will be located in a county within the service area that does not currently have such services, MUSC projects that the linear accelerator will fill a need for such service without impacting existing providers in the service area. Berkeley and Dorchester counties had the 10th and 13th highest number of new cancer cases in South Carolina in 2013 and new cancer cases are projected to grow in these counties and throughout the state. MUSC proposes to locate this service in a county not currently offering radiation therapy services to fulfill a need to serve new cancer cases and projects minimal shift from its existing linear accelerators, based on patient preference. MUSC projects no impact to existing providers of radiation therapy services within the service area with the implementation of the proposed location of an incremental linear accelerator in Berkeley County and expects to help fulfill a community need for radiation therapy services closer to home for residents of Berkeley and Dorchester counties.

8. *The applicant shall project the utilization of the service and document referral sources for patients within its service area, including letters of support from physicians and health care facilities indicating a willingness to refer patients to the proposed service, with expected annual referral volumes.*

Response: The projected utilization is outlined above. Physician letters of support are included in **Attachment K**, indicating a willingness to refer patients to the proposed service with annual referral volumes are provided. It is assumed that volume will originate from new cancer cases originating from the service area and some shift of patients from MUSC's existing patient base due to patient preference. There will be additional cases generated due to the population growth for the radiation therapy service area. As such, referral patterns will not change.

9. *The applicant must affirm the following:*
   - A. *All treatments provided will be under the control of a board certified or board eligible radiation oncologist;*
   - B. *The applicant will have access to a radiation physicist certified or eligible for certification by the American Board of Radiology or its equivalent;*
   - C. *The applicant will have access to simulation equipment capable of precisely producing the geometric relationships of the equipment to be used for treatment of the patient;*
   - D. *The applicant will have access to a custom block design and cutting system; and*
   - E. *The institution shall operate its own tumor registry or actively participate in a central tumor registry.*

Response: As an existing provider of radiation therapy, the applicant currently complies with the above standards and will continue to do so through the proposed project.

Conclusion

The proposed project will locate a linear accelerator in a region of the designated planning area that has previously not had radiation therapy services to increase access in a cost effective manner. It is MUSC's intention to provide the highest quality healthcare services to the service area and with the proposed project, MUSC will be able to successfully achieve this goal.

(12) Discuss alternative facilities and/or services considered including the advantages and disadvantages of each alternative. Include a statement as to why this project alternative was adopted.

1. Maintain the status quo

First, maintaining the status quo was rejected as an alternative due to increasing volumes and utilization of MUSC's current linear accelerators as well as the current equipment being outdated, leading to decreased quality of care and workflow inefficiencies. The Varian TrueBeam linear accelerator provides leading edge cancer care through fast imaging and accurate dose delivery.

2. Renovate existing space to accommodate an incremental Varian TrueBeam Linear Accelerator

This alternative was rejected due to the limitations for expansion of the buildings on the downtown MUHA campus. MUHA's downtown campus is landlocked and there is not space for additional construction central to cancer services downtown. In order to accommodate the appropriate size vault for a TrueBeam linear accelerator, we would need to expand the concrete walls at least a foot into the room, thereby diminishing current space and losing the full couch rotation of the machine to treat patients as intended. Inpatient units are at capacity with growing volumes. In regards to patient origin, as discussed the response to **Question # 11** and shown below in **Figure 16**, the greatest percentage of MUSC's existing radiation therapy patients reside in the Moncks Corner and Summerville submarkets, in Berkeley and Dorchester Counties. Locating a linear accelerator closer to this concentration of patients will allow ease of access and convenience to radiation therapy.

Figure 16
MUSC Linac Patient Origin FY 15 & FY 16

	FY15	FY16
Tri-County	**62%**	**58%**
East Cooper	12%	12%
Moncks Corner	3%	5%
North Charleston	16%	15%
Peninsula Charleston	4%	3%
Sea Islands	7%	7%
Summerville	10%	11%
West Ashley	9%	6%
Secondary	**19%**	**24%**
Beaufort	5%	6%
Colleton	3%	3%
Florence	1%	2%
Georgetown	3%	3%
Horry	5%	7%
Orangeburg	2%	2%
Tertiary	**17%**	**16%**
Outside SC	**2%**	**2%**

Notes: Volumes represent distinct patients.
Source: MUSC Internal Data

3. Lease & Upfit the proposed facility

This alternative was selected because MUSC's current linear accelerators are at capacity as demonstrated in question 11 above and a large proportion of MUSC's patients originate in the Summerville and Moncks Corner submarkets. The proposed site will provide patients with a lower cost alternative closer to home.

(13) Discuss any serious problems, such as costs, availability, or accessibility in obtaining care of the type proposed, experienced by patients in the absence of this project

While the quality of care provided at MUSC is outstanding, the Hollings Cancer Center and University Hospital facilities, where MUSC currently houses cancer services, were each designed and constructed over 20 years ago. Updating these facilities to accommodate an additional TrueBeam linear accelerator in the existing space would be costly, disrupt current services, and ultimately be detrimental to patient care by reducing the size of the rooms that we currently have. Locating a new linear accelerator in Berkeley County will increase accessibility for the patient population served and bring these services closer to their home. In the absence of this project, with the projected population growth in the radiation therapy service area, the utilization of the current linear accelerators could increase beyond capacity and result in delays in patient care.

(14) Where a project affects an increase or decrease in bed capacity, provide annual occupancy rates for the facility based on licensed beds, for the past three years by category (i.e. general acute, psychiatric, obstetric, nursing home, etc.).

Response: Not Applicable. This project does not involve an increase or decrease in bed capacity.

(15) Identify the method of financing the cost of the project, including the start-up costs. Provide documentation that the applicant can obtain such financing. Alternative sources and/or methods of financing must be identified and the method chosen demonstrated to be the most feasible option.

Response: Depending on the interest rate environment at the time of loan application, the management company, The Network, will finance the capital cost of this project through and affiliate of MUSC Health Cancer Care Network, LLC or an external financing entity. See Attachment G for a letter from Greg Spurlock, Managing Member of the MUSC Health Cancer Care Network, LLC, verifying the source of funds for the project.

(16) For an addition to an existing facility or service, provide a current annual budget and at least a three fiscal year projected budget for both the overall facility and the proposed project. The projections must be developed by an accountant. For a new facility or service, provide a projected annual budget for not less than three fiscal years following the completion of the proposed project. The projections must be attested to by an accountant. These budgets must at a minimum include how proposed charges, proposed cost of service, utilization, depreciation, reimbursement rates and contractual adjustments were calculated. Any assumptions made in the application must be specifically noted shown.

Response: Attachment H contains the financial projections for the proposed project through the first three years of operation and the assumptions used in these calculations. The project will be financially feasible. Also included is a letter from John Cooper, MUHA Director of Finance, attesting to the accuracy of the assumptions and calculations used in these projections.

(17) Provide a list of proposed charges for the project. The charges provided may be used for comparison with the average charges in the final completion report as required in Section 607.3.b.

Response: The following **Figure 17** lists the proposed charges for the project. Charges are based on the FY 16 TrueBeam machine MUSC currently operates. The treatments which includes a professional fee require additional physician involvement resulting in added cost. These charges are evaluated on an annual basis.

Figure 17
Linac Charges by CPT Code

TrueBeam Treatment	CPT Code	Technical Fee	Professional Fee	Total
Simulation Simple	42172809	$948	$322	$1,270
IMRT Simple	4217385	$1,117		$1,117
IMRT Complex	4217386	$3,329		$3,329
IGRT w/ 3D or 2D	4217387	$538		$538
DTx Simple	42174022	$548		$548
DTx Complex	42174128	$970		$970
Port Film	42174177	$271		$271
MVCT CBCT profee	77014		$247	$247
2/2D Match profee	77421		$142	$142

Source: MUSC Internal Data

(18) Document that the proposed project is economically feasible, both immediately and long-term. In the case of existing facilities, indicate what impact the proposed project will have on patient charges and cost per unit of service.

Response: As evidenced by the financial projections included in **Attachment H**, the proposed project which includes the replacement and relocation of a linear accelerator will be financially feasible. The pro forma was developed based on Free-Standing reimbursement.

(19) State how the project will foster cost containment and improve quality of care through the promotion of such services as ambulatory and home health care, preventive health care, promotion of shared services, economies of scale, and design and construction economies.

Response: The proposed project will have a positive impact on quality of care for MUSC's oncology outpatient population. Adding an additional linear accelerator in Berkeley County is intended to benefit the residents of the service area by providing increased access to radiation therapy. The outpatient setting is the optimal setting for radiation therapy, as it enhances scheduling and operational efficiencies in a lower cost setting, promoting cost containment. The co-location of

oncology services in one facility will allow MUSC to share support staff, supplies, equipment, and increase care collaboration.

Additionally, the project will promote operational efficiency, as the radiation therapy facility will be designed to enhance the productivity and efficiency of the providers of care, as well as the systems supporting them. This, in turn, translates into design economies, increased patient comfort and convenience, and better care.

The proposed project will bring oncology services closer to the growing population in Berkeley County and allow patients the convenience of more timely access to MUSC's oncology services.

(20) In the case of projects involving additional long-term care beds, discuss how the plans of other agencies, organizations, or programs responsible for providing and financing long-term care have been considered.

Response: Not applicable. This project does not involve additional long-term care beds.

(21) Provide a three-year projected manpower budget in full-time equivalents (FTE's) detailing the existing and proposed nursing, other professional, and non-professional personnel required for the staffing of the new project.

Response: The three-year projected manpower budget is included along with the financial projections in **Attachment H**. There are a total of 8 FTEs associated with the proposed project. Since MUSC will be shifting current volumes there are no incremental FTEs. Furthermore, MUSC will not add incremental FTEs in the first three years of operation because the projected annual growth rate does not require additional staff. The Integrated Center of Clinical Excellence Chief for Oncology is Dr. David Mahvi. Please refer to **Attachment J** for his curriculum vitae.

(22) Provide the number of existing and proposed medical staff by specialty, to include physicians employed by, or with admission privileges to, the facility. Include the name of the Chief of the Medical Staff, if available.

Response: The Chief of Medical Officer of MUSC Health is Dr. Dan Handel.

Radiation Oncologists include:

- Dr. Joseph M. Jenrette
- Dr. David T. Marshall
- Dr. Anand K. Sharma
- Dr. Jennifer L. Harper
- Dr. Graham W. Warren
- Dr. Samuel Lewis Cooper
- Dr. Eva Marie Suarez
- Dr. Paul Goetowski

Medical Oncologists include:

- Dr. Daniel Aruch
- Dr. Frank J. Brescia
- Dr. Carolyn D. Britten
- Dr. Harry A Drabkin
- Dr. Robert M. Gemmill
- Dr. Antonio Giordano
- Dr. Sara B. Giordano
- Dr. Theodore S. Gourdin
- Dr. Charles S. Greenberg
- Dr. Brian Hess
- Dr. Zihai Li
- Dr. Michael B. Lilly
- Dr. Ming Y. Lim
- Dr. Amarendra Neppalli
- Dr. Paul E. O'Brien
- Dr. Daniel Y. Reuben
- Dr. Valeriy Sedov
- Dr. Carol A. Sherman
- Dr. Rinah L. Shopnick
- Dr. Robert K. Stuart
- Dr. Juan Carlos Varela
- Dr. John M. Wrangle
- Dr. Xue-Zhong Yu

(23) Indicate those physicians who have expressed a willingness to utilize the proposed services or to refer patients to the facility for the provision of services.

Response: Letters of Support are included in **Attachment K**.

(24) Discuss the availability of health manpower resources for the provision of the proposed services, including the contemplated program and plan for recruiting and training personnel.

Response: MUHA, as a teaching hospital with numerous educational affiliations, has access to multiple sources of trained and qualified personnel, as well as the capability to provide extensive training itself. If there is a need to hire additional staff in the future, recruitment is not foreseen to be a problem for MUHA.

(25) Describe the previous experience of the applicant in the proposed health care field. If the applicant has no prior experience, specify the anticipated sources of technical assistance, either from specific individuals or organizations.

Response: Founded in 1824 in Charleston, The Medical University of South Carolina (MUSC) is the oldest medical school in the South. Today, MUSC continues the tradition of excellence in education, research, and patient care. MUSC educates and trains more than 3,000 students and residents, and has nearly 10,000 employees, including 1,300 faculty members. MUSC operates a 709-bed medical center, which includes a nationally recognized Children's Hospital and a leading

Institute of Psychiatry. MUSC is nationally recognized for its tradition of excellence, and is accredited by the Joint Commission on Accreditation of Healthcare Organizations.

Included in the wide array of facilities, services and programs offered by MUHA is the MUSC Children's Hospital, a facility planned, designed, equipped, and staffed with children in mind. This facility provides comprehensive services for children from birth to 18 years of age. Pediatric specialists in nearly every discipline ensure that every child receives the most effective age-specific care. Individualized pediatric teams can be created instantly by combining the expertise of diversely trained staff pediatricians. The Pediatric Intensive Care Unit is staffed exclusively by trained pediatric critical care teams. The hospital is home to the South Carolina Children's Heart Center, an adjunct of the MUSC Heart & Vascular Center. CHILD magazine lists the MUSC Children's Hospital as one of the top 25 in the U.S. MUSC continues to be in the elite list for the Best Children's Hospitals survey. MUSC also recently received top awards from the U.S. News Media Group's 2013-2014 edition of America's Best Children's Hospitals, where the MUSC Children's Hospital was ranked among the top 50 programs for three specialties. For the fifth time, the heart and heart surgery programs attained this distinction. For the second time this year, the gastroenterology program was listed; and for the first time this year, its nephrology program also ranked as one of the top 50 in the nation.

In addition, the MUSC Children's Hospital neonatal intensive care unit (NICU) is named one of the country's top 10. Children's Hospital has one of the few Level III Neonatal Intensive Care Units in the state. The NICU is dedicated to excellence in the care of newborns and their families. MUSC believes that parents are active partners in the care of their infants and in the understanding and development of the science of newborn care. The compassionate treatment MUSC provides is a model of effective integration of evidence-based, interdisciplinary and family-centered approaches. As a result of this approach, MUSC Children's Hospital is recognized as the premier provider of care for high-risk newborns. MUSC is one of five Regional Perinatal Centers (RPCs) in South Carolina. In addition to providing comprehensive services for high-risk obstetric and complex neonatal conditions, RPCs provide consultative, outreach, educational and support services to other hospitals in the region.

(26) Discuss the impact of the project on the clinical training programs of health professional schools, particularly the extent to which these schools will have access to the services for training.

Response: The Medical University of South Carolina has extensive clinical training programs which involve the rotations of students from varying areas of clinical specialization including medical residents, student nurses, and radiology technicians. These training programs will continue and will be enhanced through the proposed project, which will foster an improved learning environment for students.

(27) Provide documentation of policies and procedures to assure the quality of healthcare services by addressing patient safety and quality indicators, as applicable. Documents may include, but are not limited to, measures of patient care, patient safety, healthcare-acquired infections and the following of best practices established by recognized organizations. Applicable quality standards in the South Carolina Health Plan must be addressed.

Response: The following provides detail regarding MUHA's quality and safety policies. The

Network will adopt these policies. The department has MUHA quality and patient safety policies on file for reference.

Accuracy of patient identification.
Upon arrival of alert and oriented patients, reception will request picture IDs to confirm patient identity. Medical records will be verified by asking patients to validate their SSN, date of birth, as well as the correct spelling of their name and address. Staff members will confirm the same patient data before procedures are started.

Effectiveness of communication among caregivers.
Consistency of care will be guaranteed with effective verbal and written policies. Documented clinical indications and protocols will be verbally communicated between the clinical staff to ensure accuracy of tests and quality patient care.

Safety of using medications.
Safes or locked areas will be provided for all high alert medications and access will be limited to Physicians, RNs, RTs and other appropriate and fully trained clinical staff. Clinical manuals will be provided listing all drugs in stock. The manual will list all drug side effects, contraindications, dosing, and reversal protocols. Daily logs will be documented for all drugs administered to include patient name, dosage and any clinically observed reactions.

Reduce risk of health-care associated infections.
Universal Precautions will be used by all staff for delivery of care. Training and monitoring of all staff will be conducted.

Accurately and completely reconcile medications across continuum of care.
Medication administration will be documented and monitored appropriately. Patients' charts will accurately reflect their medications to include date, medication prescribed, dosage, and the amount provided. All of this information is reviewed prior to administering medications.

Reduce the risk of patient harm resulting from falls.
All installed alarm systems will be tested for effectiveness and operational accuracy at least once a month by the monitoring company. An intercom system is available to alert designated on-site staff of the appropriate emergency code if needed. Staff will be trained in emergency protocols.

Reduce the risk of influenza and pneumococcal disease in institutionalized older adults.
All staff are encouraged to receive annual flu and pneumonia vaccines.

Reduce the risk of surgical fires.
Standard safety precautions will be used by all staff to reduce the risk of surgical fires. Training of all staff will be conducted.

Implementation of applicable National Patient Safety Goals and associated requirements by components and practitioner sites.
MUHA implements applicable National Patient Safety Goals and associated requirements as applicable.

Encourage patients' active involvement in their own care as a patient safety strategy.
All patients are encouraged to actively participate in their care.

Prevent health care-associated pressure ulcers (decubitus ulcers).
MUHA implements appropriate protocols to prevent health care-associated pressure ulcers.

The organization identifies safety risks inherent in its patient population.
Please see refer to MUHA's patient safety policies and procedures on file with the Department. These policies and procedures confirm MUHA's commitment to safety and quality of care issues. These same policies will apply to the proposed project.

Provide discussion of deficiencies related to any of the foregoing, including complaints, cited by the SCDHEC Bureau of Health Facilities Regulation and/or Bureau of Certification within the past year. The applicant may provide additional information and discuss additional time spans if desire

MUHA has no known citations by the SCDHEC Bureau of Health Facilities or the Bureau of Certification within the past year.

MUSC has addressed the JCAHO Patient Safety Goals regarding safety of patient care as outlined in the State Health Plan. The MUSC Medical Center Quality and Safety Framework demonstrates the organization's commitment to the quality and safety of patient care. It is an interdisciplinary structure that drives and coordinates the error reduction and performance improvement activities within the medical center. This structure represents a systematic organization-wide approach to planning for quality results.

The Quality and Safety Framework focuses on the patient and organizational functions that lead to safe, positive patient outcomes and provides for process standardization across the medical center. Through the committees and communication channels of the Quality and Safety Framework, improvement efforts and error reduction activities within these functions are identified, prioritized, and quantified. This framework represents a transition from an approach in which performance improvement is a distinct set of activities to one in which performance improvement is integrated into the operational structure of each service as well as the organization. This cross-organizational approach ensures that the monitoring and evaluation of important functions occur within existing operational and medical staff committees.

The MUSC Board of Trustees is responsible for the quality of patient care provided. The Board of Trustees requires the medical staff to implement and report on the activities and mechanisms for monitoring, assessing and evaluating patient safety practices and the quality of patient care, for identifying and resolving problems and for identifying opportunities to improve patient care and services or performance throughout the facility. The Board of Trustees delegates this responsibility to the MUSC Medical Center Medical Executive Committee. The purpose of the MEC is to ensure high quality, safe, patient-centered, cost-effective care throughout the MUSC's clinical enterprise.

The MUSC Medical Center Quality Council, made up of administrative and physician leaders, oversees and coordinates the performance assessment and improvement activities within the organization. This group will ensure that improvements are planned, designed, measured, analyzed, and sustained.

With designated responsibility from the Quality Council, the Patient Safety Committee will operate as a subcommittee of the Quality Council dedicated to the implementation and monitoring of the effectiveness of the Patient Safety Program.

Specific policies implemented to address patient safety include:

- Safety Management Plan
- Security Management Plan
- Hazardous Materials and Waste Management Plan
- Emergency Management Plan
- Fire Safety Management Plan
- Medical Equipment Management Plan
- Utility Systems Management Plan

In addition, a department was created several years ago to address these patient safety efforts. The Center for Clinical Effectiveness and Patient Safety is dedicated to ensuring that MUSC staff upholds high standards of patient health and safety with goals of:

- Providing a safe, healthy, and secure environment,
- Performing jobs carefully and competently,
- Using safe and effective practices,
- Responding promptly to any needs,
- Coordinating care between the patient and caregivers,
- Answering health care questions honestly and completely, and
- Keeping the patient informed of any changes in treatment plans.

Part C. Programmatic Documents

Provide adequate programmatic documents in support of the various elements of the proposed project. These documents will include as appropriate:

(1) An Indigent Care Plan as required by the Board of Health and Environmental Control. It shall address at a minimum, the following:

a) The existing and proposed admission and treatment policies of the facility or agency with regard to race, sex, creed, national origin, and ability to pay.

Response: The radiation therapy center will operate in accordance to other MUSC Health facilities. Patients are admitted to MUHA facilities without regard to race, sex, creed or national origin. The MUHA admission policy does require a financial analysis of all patients to be admitted in order to determine their ability and willingness to pay their hospital bill. Should a patient's financial coverage be deemed inadequate, the admission request is reviewed from a medical/clinical perspective. This review determines if the patient requires services only available at the MUHA facility. Emergency admissions are reviewed financially as soon as possible after admission with required documentation from the admitting physician explaining the nature of the emergency.

All patients admitted to MUHA facilities are financially counseled regarding their personal responsibility for the payment of their medical bills. A patient's family gross income and family size are benchmarked against the MUHA's Indigent Discount Chart. The discount chart is based on federal poverty guidelines and provides for 100 percent indigent discounts up to 150 percent of the poverty guidelines. The indigent determination is applied to patients unable to pay at the time of admission and to those whose benefits expire while in the care of the hospital.

Please see refer to the for the MUHA Medical Center's Patient Rights and Responsibilities documentation the department has on file.

b) The proposed admission and treatment policies of the facility or agency with respect to admission and care of indigent patients including those patients unable to pay at the time of admission and those whose benefits expire while in the care of the facility or agency.

Response: The level of indigent care provided by the MUHA reflects a tradition of commitment to helping the entire population of South Carolina and the Lowcountry. The MUHA will continue its historical tradition of working with all governmental levels to address the issues of indigent care and secure adequate funding for the future.

c) In existing facilities or agencies, provide the amount, in dollars and percent of gross revenues, that the facility or agency provided in indigent care during the past three fiscal years. NOTE: Indigent care does not include bad debt; contractual adjustments; or care which is reimbursed by a governmental program (Medicare, Medicaid, and county indigent program), church, or philanthropic organization.

Response: MUHA is committed to providing needed health care to all patients regardless of ability to pay. In order to demonstrate the organization's commitment to providing indigent and charity care, the indigent care expenditures from FY2011 through FY2015 are shown below in **Figure 18 and 19**:

Figure 18
2011-2016 MUHA Indigent Care

Fiscal Year	Indigent Care Dollars	Ind Care % of Gross Rev
2013	$94,592,095	3.34%
2014	$78,975,085	2.54%
2015	$63,010,515	1.87%
2016	$69,204,353	1.92%

Source: MUHA internal information.

d) Provide the proposed amount of indigent care the facility or agency projects to provide during the existing fiscal year and next fiscal year. This projection should be expressed in both dollars and a percent of gross revenues.

Response: The amount of indigent care MUHA projects to provide during the existing and next fiscal year is as follows:

Figure 19
2017-2020 Projected Indigent Care

Fiscal Year	Indigent Care Dollars	Ind Care % of Gross Rev
2017	$72,827,600	1.92%
2018	$76,980,938	1.92%
2019	$81,277,559	1.92%
2020	$85,811,201	1.92%

Source: MUHA Internal Information

e) A discussion of why the above figures are adequate or inadequate for the needs of the community; the need of indigent care within the proposed service area; and any solutions, remedial plans or proposals by the facility or agency to better address the indigent care problem in the service area. Include any initiatives or undertakings the facility or agency has begun to address the indigent care problem in the proposed service area.

Response: The MUHA is an operating and approved disproportionate share medical facility. Due to this funding, Medicaid contractual adjustments and indigent care costs are offset, allowing for the continued support of health care for all South Carolina citizens.

f) Describe any Board or Advisory Board established to implement or control the indigent problem at the facility or agency. Include the Board's functions, responsibilities, and limitations.

Response: Not applicable to this project.

(2) A map of sufficiently large scale to be meaningful, indicating the location of the project site and its geographical area.

Response: Refer to **Attachment C** for the site plan.

(3) A plot plan of the project site showing existing buildings, roads, parking areas, walks, service and entrance courts, existing utilities (electricity, telephone, water, railroads, sewer, gas, etc.) and other natural land features necessary for adequate analysis of site conditions.

Response: Please refer to **Attachment C** for a map of the proposed site.

(4) A legal description of the project site indicating its physical characteristics and existing easements.

Response: Please refer to **Attachment C** for a legal description of the project site.

(5) A square foot program of space and/or equipment elements, and scale drawings describing the existing space and proposed alterations and additions.

Response: Please see **Attachment C** for the schematic drawings associated with the proposed project.

(6) Evidence that the site will be properly zoned for the proposed project.

Response: The proposed project is located on an existing site which is appropriately zoned.

(7) Documentation from appropriate sources that utilities supplied to the site are adequate for the project to include electricity, gas, water, and sewerage.

Response: The proposed project is located on an existing site which has access to utilities that are capable of servicing the proposed projected to include electricity, gas, water, and sewerage.

(8) Endorsement from the community that the project is desirable. This may include but is not limited to members of the medical community, citizen's groups, and other health and social service disciplines in the community.

Response: Letters of support are included in **Attachment K.**

(9) Documentation that the proposed project has been approved by the health facility's planning committee and governing body.

Response: Please see **Attachment O** for the MUSC Cancer Care Network, LLC and MUHA's Board Minutes.

(10) For the facilities or services not licensed by the Department of Health and Environmental Control, provide documentation of coordination and support from the appropriate licensing agency.

Response: Not applicable to the project

PART D: ASSURANCES

The applicant must furnish written assurance of each of the following where applicable:

The applicant assures to the following:

(1) The applicant has a fee simple title to the proposed site which includes all necessary easements and rights of way sufficient to assure use and possession for the purpose of construction operation of the facility.

(2) Final drawings and specifications for the project will be prepared by an architect/and or engineer who is legally regulated and licensed under laws of the state of South Carolina and approval of the same will be obtained from the Department.

(3) The applicant will submit to the Department for prior approval, changes that substantially alter the scope of work, function, utilities, major items of equipment, safety or cost of the facility during the construction period.

(4) The applicant will ensure that the project will be completed in accordance with all the Certificate of Need application regulations and guidelines.

(5) The applicant will ensure that the project will be completed in accordance with approved plans and specifications by maintaining competent and adequate architectural and engineering services throughout the construction administration phase of the project. At the completion of the project, the architect of record will be required to issue a statement that to the best of his knowledge and belief, based upon available records, supplemental documents, and periodic observation of the work, the project was constructed according to those documents approved by the Department.

(6) The facility will be operated and maintained in accordance with the standards prescribed by law and regulations for the maintenance and operation of such facilities.

(7) The applicant understands the Certificate of Need shall become void at the end of the specified time period from the date of issuance unless otherwise extended under Chapter 6 of Department regulations.

(8) The Department of Health and Environmental Control or its authorized representatives may at any time during the course of construction and upon completion of the project make an on-site inspection to check for compliance of the construction in accordance with the application for which the Certificate of Need was issued.

(9) The controlling interest as specified shall not be sold or leased or otherwise disposed of without a Certificate of Need or exemption by the Department being received by the appropriate individual.

(10) The applicant will provide the Department with a certified letter stating that the contractual agreement has been completed.

(11) The applicant will provide the Department with written notice of the date that a new or expanded service has been implemented, completed or terminated.

(12) The applicant will provide the Department with monthly progress reports and a final completion report as indicated which contain information required by Section 607 of Department regulations.

Signature  **Date** 3/7/17

Attachment A: Published Notification of Project

CAROLINE COTTER, MHA OFFICE OF STRATEGIC PLANNING (MUSC)
169 ASHLEY AVENUE MSC 332
CHARLESTON SC 29425

AFFIDAVIT OF PUBLICATION

The Post and Courier

State of South Carolina
County of Charleston

Personally appeared before me the undersigned advertising clerk of the above indicated newspaper published in the city of Charleston, county and state aforesaid, who, being duly ı, says that the advertisement of

(copy attached)

appeared in the issues of said newspaper on the following day(s):

05/17/17 Wed PC
05/18/17 Thu PC
05/19/17 Fri PC
05/17/17 Wed CNW
05/18/17 Thu CNW
05/19/17 Fri CNW

GENERAL NOTICE: In accordance with the S.C. Department of Health and Environmental Control, Regulation 61-15 (Certificate of Need for Health Facilities and Services), the Medical University Hospital Authority hereby notifies the public of its planned submission of a Certificate of Need application (CON) for a linear accelerator in Berkeley County. The project will impact approximately 8,500 square feet of space and total project costs for CON purposes are approximately $9.8M. AD# 1580054

at a cost of **$121.80**
Account# **333693**
Order# **1580054**
P.O. Number:

Subscribed and sworn to before me this 19 day of May A.D. 2017

Stephanie Kruger
advertising clerk

NOTARY PUBLIC, SC
My commission expires

CON 45

Attachment B: Letter of Intent to Lease the Land

equity Experience Great Solutions®

March 9, 2017

Caroline Cotter
The Medical University of South Carolina
Office of Strategic Planning

Re: Lease of Space in Nexton Cancer Center Building

Dear Ms. Cotter:

This non-binding Letter of Intent sets forth the principal terms and conditions on which the Landlord would be willing to lease space in the approximately 30,000sf Nexton Cancer Center Building and will serve as the basis for the lease that will be prepared by Landlord's legal counsel.

Landlord:	ELIC Land Investments, LLC, an Ohio limited liability company
Tenant:	MUSC Health Cancer Care Network, LLC
Building Address:	Nexton, Front Street, Summerville, SC
Premises:	Approximately 8,500 rentable square feet, which number shall be conclusive for all purposes in the lease.
Use:	Radiation Therapy Cancer Treatment Center
Lease Term:	Ten (10) Lease Years
Lease Commencement:	Upon Substantial Completion of Landlord's Work and issuance of a Certificate of Occupancy.
Target Occupancy:	Within a reasonable period of time following Substantial Completion of Landlord's Work and issuance of a Certificate of Occupancy.
Base Rent:	$23.00 per rentable square foot with 2% annual increases
Option(s):	Two five-year options to renew
Option Rent:	$25.50 per rentable square foot with 2% annual increases
Security Deposit:	$17,000.00

Landlord's Work:	Landlord will deliver the Premises in "grey shell" condition in accordance with the Landlord's Work Letter to be agreed to by the parties and attached to the Lease.
Operating Costs:	Tenant shall pay its proportionate share of real estate taxes and Operating Costs using a methodology to be negotiated between the Parties prior to execution of the definitive documents. Landlord will provide an annual Operating Costs and Tax Statement.
Signage:	Landlord will have final approval of design and color. Signage to be maximized and in compliance with Nexton Design Standards.
Space Planning:	Landlord, at its expense, will provide one space planning session and one space plan revision prior to lease execution. Any additional space planning prior to lease execution will be at Tenant's expense. After lease execution, space planning will be charged against the Landlord's TI Allowance
Parking:	Building to be surface parked per building code
Brokerage:	No Brokers are involved in this transaction other than Equity, LLC representing Landlord.

This Letter of Intent is open for acceptance until 5:00 p.m. on March 15, 2017. This Letter of Intent is subject to Landlord's review and approval of Tenant's financials. If the terms and conditions contained herein are acceptable, please acknowledge below and we will prepare a lease for your review. Landlord and Tenant will only be legally bound upon full execution of the lease, however, Landlord and Tenant shall proceed in good faith towards the execution of a lease based on this Letter of Intent.

Sincerely,

Andrew Iohanni
Senior Vice President
Equity, Inc

Acknowledged and Accepted:
Tenant: MUSC Health Cancer Care Network, LLC

By:
Title: Managing Member
Date: March 10th, 2017

CON 48

Attachment C: Architectural Information

Letter from Architect

Total Project Cost & Equipment Quotes

Site Plan

Schematics of the Project

Space Program

Project Timeline

architection
Architecture & Construction for Oncology Facilities

MUSC Health / Alliance Oncology
Proposed MUSC Health Radiation Therapy Center
Front Street – Nexton Medical Campus
Summerville, South Carolina

Project Narrative
February 3, 2017

The proposed MUSC Health Radiation Therapy Center will be constructed within a new 30,000 sq.ft. MOB in the Nexton Medical Campus and will include a new cast-in-place concrete vault for a new Varian TrueBeam Linear Accelerator along with building out unfinished interior tenant space of 8,500 sq.ft. The interior build-out will consist of underfloor plumbing piping and electrical conduits, concrete floor slab, metal studs and drywall partitions, suspended acoustical 2 x 2 ceiling system, hollow metal frames, and solid core wood doors, plastic laminate cabinetry, carpet and vinyl flooring, new VAV boxes, controls and duct work connecting to existing building HVAC system, new plumbing fixtures, new lighting fixtures, devices, switches, outlets, panels and wiring plus all Mechanical and Electrical requirements for the new Varian Accelerator.

The Radiation Therapy Build-out will consist of the following spaces:

- Lobby / Wait
- Reception / Work Area
- Nurse Station
- 4 Exam Rooms
- Men's & Women's Sub-Waits
- Dressing Rooms
- 2 Offices
- CT Scanner
- Linear Accelerator
- 4 Restrooms
- Break Room
- Storage
- Treatment Planning
- Equipment Room

architection
Architecture & Construction for Oncology Facilities

February 3, 2017

Caroline R. Cotter, MHA
The Medical University of South Carolina
Office of Strategic Planning
169 Ashley Avenue
Charleston, South Carolina, 29425

RE: Proposed MUSC Health Radiation Therapy Center
Front Street – Nexton Medical Campus – Summerville, SC

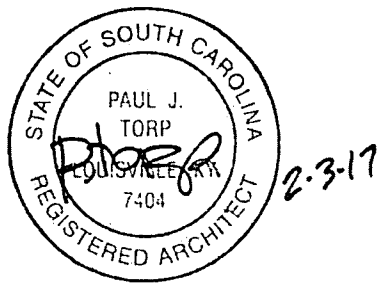
Dear Caroline:

Please accept this letter as confirmation of my review and the reasonability of the estimated Design & Construction costs for the proposed 8,500 sq.ft. Radiation Therapy Suite Build-Out including an Accelerator Vault in a new MOB at Front Street – Nexton Medical Campus – Summerville, SC per architection's and Equity's Cost Proposal dated February 3, 2017.

Please contact me at your convenience if you have any questions or comments.

Regards,

Paul J. Torp, aia
president, architection



425 West Market Street
Louisville, Kentucky 40202

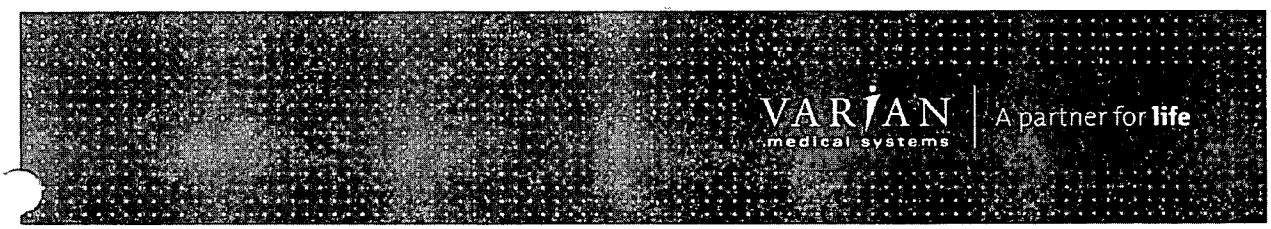
TEL 502-561-1024 ▪ FAX 502-561-1025 ▪ EMAIL ptorp@architection.com ▪ WWW.architection.com

CON 51

Custom System Proposal

Quotation Number - 2016-32051-2

Proposal for NEXTON



CON 52

ROA_1646

VARIAN
medical systems

Alliance Oncology, LLC ("Customer")
Allison Loehr, JD, MHA
40 BURTON HILLS BLVD, STE # 220
NASHVILLE, Tennessee 37215 United States
Tel : (615) 263 - 7888
Email : aloehr@usradiosurgery.com

VMS Inc, Oncology Systems
Eric Stewart
US Sr Mgr, Surgical Sciences Sales
3290 Northside Pkwy NW, Suite 400
Atlanta,GA 30327 US
Fax : 6782553850
Email : eric.stewart@varian.com



Quote Information

Quotation Number :	2016-32051-2
Quotation Valid Until :	September 13, 2017
Customer Requested Delivery Date :	2 Years ARO

Sales

Incoterms :	US1: FOB: Origin
Payment Terms :	30 days net
Down Payment :	10.00%
Shipment :	85.00%
Acceptance :	5.00%

For orders equal or less than $75K, 100% upon shipment, net 30.

Quotation Total

Quotation Total : US $4,297,267.00

Terms and Conditions

This quotation shall be governed by: (a) Terms and Conditions of Sale - Form RAD 1652U; (b) any terms and conditions contained within the quotation text related to the specific products or services identified on this quotation; and (c) any other Varian terms and conditions or separate agreements included along with this quotation; except that (a) to (c) shall not apply if and to the extent a separate, signed written agreement is in effect between the customer/purchaser and Varian that governs the purchase and sale of the products, software, support and/or services set forth in this quotation.

For and on behalf of Customer :

Name : Allison Loehr, JD, MHA

Date : May 16, 2017

Title : Senior Director, Contracts Implementation

For and on behalf of Varian Medical Systems :

Name : Eric Stewart

Date : May 16, 2017

Title : US Sr Mgr, Surgical Sciences Sales

Offered Products (Sales)	
TrueBeam	Included
TPS Eclipse	Included

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medical systems

Item	Description	Qty
Section 1	TrueBeam	

1.1	**TrueBeam Package**
	
	TrueBeam System optimized for high-precision and high-throughput IMRT with Advanced IGRT and Motion Management.
	
	The TrueBeam Premium Configuration delivers the latest generation of system capabilities, including the fully integrated PerfectPitch™ couch to achieve sub-millimeter target localization and both 6X and 10X High Intensity Mode energies that enable dose delivery at the highest rates in the industry.
	
	TrueBeam System 2.0 with the following features included:
	• Small Vault Configuration offers all the benefits and advanced application of TrueBeam in a compact footprint
	• Patient monitoring and safety with Motion View, LaserGuard II and Capacitive Collision Detection System on KV Imaging
	• PerfectPitch™ 6-Degree of Freedom Couch
	  ◦ Sub-millimeter accuracy in translations and rotations
	  ◦ Patient load capacity: 200 kg (440 lbs.)
	• Treatment Techniques including IMRT, SRS/SBRT High Total Dose, Total Body treatment delivery
	• KV Imaging with 2D planar kV and 3D CBCT Imaging
	• 43x43 MV Imaging including Advanced MV Radiographic Imaging, Port Film Graticule and Portal Dose Image Acquisition with High Intensity Mode support
	• Low-X Imaging at 2.5MV for reduced metal artifacts and improved soft tissue contrast
	• 6X and 10X High Intensity Mode for dose rate delivery at 1400MU/minute and 2400MU/minute respectively
	• Electron Applicator Set (if electron energies selected for system):
	  ◦ 6cm x6cm, 6cmx10cm, 10cmx10cm, 15cmx15cm, 20cmx20cm, 25cmx25cm Includes electron arc applicator and final defining aperture mold frame set
	• Customer selectable up to 5 Photon Energies
	• Customer selectable up to 8 Electron Energies
	• 6MeV and 9MeV High Dose Total Skin Electron Mode treatment technique
	• Motion Management Interface
	• Includes installation and one (1) year warranty
	Pre-Requisites:
	• New System Sales
	• ARIA Version 11 and higher, or Compatible 3rd party Oncology Information System
		1

1.2	**NLS: English**	1
1.3	**120 Multileaf Collimator** • Performance per RAD 10094 • High resolution leaf width of 5 mm (projected at isocenter) for central 20 cm • Leaf width of 10 mm (projected at isocenter) for outer 20 cm	1
1.4	**Integrated IGRT Couch Top** Carbon fiber treatment couch top, free of metal or other radiation-opaque materials, thereby reducing imaging artifacts FEATURES: - Clinically usable section of 120.0 cm - Supports patients up to 500 lbs (227 kg) - Indexed Immobilization® for compatible accessories - Head extension with interface for alternative patient immobilization and positioning device	1

Item	Description	Qty
1.5	**Rapid Arc Treatment Delivery License** Capability to simultaneously modulate aperture shape, dose rate, and gantry angle and speed continuously for up to 360 degrees of gantry rotation, with delivery as an arc beam. When coupled with RapidArc Planning and a RapidArc-compatible information system, provides the capability to generate IMRT-quality dose distributions in a single, optimized arc around the patient. When coupled with the Optical Imager, provides the capability for Gated RapidArc. FEATURES: • Simultaneous modulation of MLC aperture shape, beam dose rate, and gantry angle and rotation speed during beam delivery • Supports dynamic jaw tracking and collimator rotation with supporting treatment planning system • Provides IMRT-quality dose distributions in a single arc delivery in less than 2 minutes	1
1.6	**6/6 MV (BJR 11/17)** 40 cm x 40 cm maximum field size, dose rate range 0-600 MU/Min	1
1.7	**8/8 MV (BJR 11/17)** 40 cm x 40 cm maximum field size, dose rate range 0-600 MU/Min	1
1.8	**10/10 MV (BJR 11/17)** 40 cm x 40 cm maximum field size, dose rate range 0-600 MU/Min	1
1.9	**15/16 MV (BJR 11/17)** 40 cm x 40 cm maximum field size, dose rate range 0-600 MU/Min	1
1.10	**18/23 MV (BJR 11/17)** 40 cm x 40 cm maximum field size, dose rate range 0-600 MU/Min	1
1.11	**6 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.12	**9 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.13	**12 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1

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medical systems

Item	Description	Qty
1.14	**15 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.15	**16 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.16	**18 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.17	**20 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.18	**22 MeV, 0-1000 MU/min** 25 cm x 25 cm maximum field size, dose range rate 0-1000 MU/Min	1
1.19	**6X High Intensity Mode** 40cm x 40cm maximum field size, dose rate range 400-1400 MU/Min Note: Portal Dosimetry (purchasable option) for High Intensity Mode requires 43 x 43 MV Imager on TrueBeam s/n > 2000 ARIA v 13 or higher	1
1.20	**10X High Intensity Mode** 40cm x 40cm maximum field size, dose rate range 400-2400 MU/Min Note: Portal Dosimetry (purchasable option) for High Intensity Mode requires 43 x 43 MV Imager on TrueBeam s/n > 2000 ARIA v 13 or higher	1
1.21	**6 MeV HDTSE, 0-2500 MU/min**	1
1.22	**9 MeV HDTSE, 0-2500 MU/min**	1
1.23	**Low-X Imaging 2.5Mv**	1

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medical systems

Item	Description	Qty
1.24	**Advanced IGRT & Motion Package** The Advanced IGRT & Motion Package from Varian Medical Systems provides a comprehensive set of tools that can allow users to customize imaging and treatment protocols based on the unique needs of every patient. Using features included in the package, the user can have industry leading flexibility to image and deliver treatment based on target location, target motion or delivered dose considerations. Feature(s): • Imaging based on triggers determined by Delivered dose (MU), Elapsed time, Angular motion of the gantry • Instant imaging & 2D/3D Matching • Advanced Reconstructor including ▫ 4D CBCT (offline feature) ▫ Extended length CBCT (offline feature) • Planning structures on pre-treatment fluoroscopic trace • On-line Image Approval • Auto Beam-hold (Auto beam-hold validated to work with Gold Seed (cylindrical markers) for prostate and liver.) Prerequisite(s): • TrueBeam System 2.0 or higher • ARIA Version 11 or supported versions of MOSAIQ	1
1.25	**RPC Lung Phantom Voucher Option** For customers who purchase an Advanced IGRT and Motion Package, an MDADL service voucher will be provided to allow that customers to practice their end-to-end lung SBRT workflow and verify that they are able to deliver treatment according to their SBRT treatment plan onto a Lung phantom.	1
1.26	**Respiratory Motion Mgmt Package** Stereoscopic optical imaging system for monitoring patient respiratory motion and 3D patient position Performance per RAD 10094 Includes: - TrueBeam Optical Imager - Respiratory Gating License - Dynamic kV and MV Imaging Pre-Requisite: - kV Imaging	1
1.27	**INCL ED: CL222 Respiratory Gating** - Includes Tuition and materials for ONE person. - Attendees will be responsible for their own, airfare, hotel, rental car, meals and other travel incidentals. - Training is non-refundable and non-transferable. - Offer is valid for 18 months after installation of product. The RPM course provides training for physicists, or therapists, to obtain knowledge of the principles and practice of respiratory gating in radiation oncology for clinical implementation. Duration: 1 1/2 days	1
1.28	**New Universal Baseframe 52" Fixed Floor**	1

Item	Description	Qty
1.29	**STD TRNG: TrueBeam On-Site Support** - Includes support for TrueBeam/Edge - Support is non-refundable and non-transferable - Offer is valid for 18 months after purchase On site follow-up review of the TrueBeam/Edge components to include imaging and motion management for support of patient treatment. The emphasis of this support is to ensure that the therapists that attended the TrueBeam Operations (on-site) training are able to operate the TrueBeam in a safe and effective manner in the clinical environment. PREREQUISITES: TrueBeam/Edge Operations (on-site) training	1
1.30	**INCL ED: TB201 TrueBeam for Physicists** The following Education Course is included with the purchase of a TrueBeam/Edge. - Includes Tuition and Materials for ONE person - Customer is responsible for all travel expenses (airfare, hotel, rental car, meals and travel incidentals) - Training is non-refundable and non-transferable - Offer is valid for 18 months after installation of product TrueBeam Physics and Administration TrueBeam Physics and Administration course is designed for those personnel responsible for the acceptance, commissioning and QA program development of the TrueBeam in the clinical environment. It is directed primarily towards Medical Physicists. It is recommended that the student attend the TrueBeam Physics and Administration course shortly before the installation of the TrueBeam. The course provides instruction of the basic delivery components, basic imaging components and a general overview of the motion management system components. Machine commissioning, calibration, QA and the responsibilities of Customer Acceptance Procedure (CAP) of the machine are included. The course subject matter is presented from a clinical use perspective. The primary emphasis is on the overall commissioning, calibration, and QA of the TrueBeam and its components. Extensive hands-on laboratory exercises are included. PREREQUISITES: None Length:4 days	1
1.31	**INCL ED: TB101 TrueBeam Operations** The following Education Course is included with the purchase of a TrueBeam/Edge: - Includes Tuition and Materials for ONE person - Customer is responsible for all travel expenses (airfare, hotel, rental car, meals and travel incidentals) - Training is non-refundable and non-transferable - Offer is valid for 18 months after installation of product TrueBeam Operations is a course designed for those personnel responsible for the routine operation and clinical use of the TrueBeam. It is directed primarily towards Radiation Therapists. It is recommended that both students attend the TrueBeam Operations course shortly before clinical use and the commencement of patient treatments. The course provides instruction of the basic delivery components, basic imaging components and a general overview of the motion management system components. The course subject matter is presented from a clinical use perspective. The primary emphasis is on the overall understanding of the TrueBeam function and operation to include imaging and respiratory gating. Extensive hands-on laboratory exercises are included. The attendees of this class will be provided tools to allow them to instruct other clinical staff upon their return. PREREQUISITES: None	2

Item	Description	Qty
	Length:4 days	
1.32	**VVS Accessory Verification**	1
	Varian Verification System is an integrated system. It provides the capability to verify patient and accessory identification through use of a barcode scanning system. FEATURES: - One (1) Bar Code Scanner - One barcode label printer - One package of Labels for the Bar Code Printer - Patient and Accessory Verification license Pre-Requisite: ARIA 13 MR1 and higher TrueBeam version 1.5 or 2.0 and higher Note: TrueBeam Queue does not support patient check in with barcode scanning. TrueBeam 1.6 is not compatible with ARIA 13 MR1 and VVS	
1.33	**LAP Apollo Green Room Laser Kit**	1
	LAP Apollo Green Room Laser Kit FEATURES: - 1 Apollo Green Remote Controlled Ceiling Crosshair Laser - 2 Apollo Green Remote Controlled Lateral Crosshair Lasers - 1 Apollo Green Remote Controlled Sagittal Line Laser	
1.34	**Optical Surface Monitoring Sys -TrueBeam**	1
	Optical Surface Monitoring System for real-time tracking of external patient surface including: • System refresh rate optimized for tracking intracranial targets • Seamless integration with beam gating for out of threshold patient or target motion • SRS Phantom for QA Prerequisite(s): 1. TrueBeam System version 2.0 or higher 2. Motion Management Interface for TrueBeam	
1.35	**INCL ED:Varian Optical Surface Monitor**	1
	Varian Surface Monitoring Systems Training will be provided on this product. Recommended Participants: Radiation Therapist Pre-requisites: None Location: Course will be delivered in Ellicot City, MD or Las Vegas, NV. Location will be determined by Varian Clinical Operations Manager. Includes Tuition and Materials for TWO people. Customer is responsible for all travel expenses (airfare, hotel, rental car, meals and travel incidentals) Training is non-refundable and non-transferable Offer is valid for 18 months after installation of product	

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Item	Description	Qty
1.36	**STD TRNG:Varian Optical Surface Monitor** Training is included with the purchase of Varian Surface Monitoring Systems. Training plan details will be provided by the training management team as part of your product implementation process. - Offer is valid for 18 months after installation of product. - Training is not transferable with other products and services	1
1.37	**Additional MotionView CCTV Camera System** Additional CCTV Camera Kit FEATURES: - Two pan, tilt, zoom CCTV cameras - Two desktop, 81/4 inch LCD displays with built in camera controls - Adjustable viewing angle for patient privacy - Push button pan, tilt, zoom, and home position control Prerequisites: Motion View must be selected or installed	1
1.38	**Power Cond., 3phase 50KVA, TrueBeam** Transtector 50KVA, 3-phase power conditioning unit, providing transient protection, line power regulation, and Input and Output circuit breakers for over-current protection. UL and IEC/CE certified. Available in all voltage configurations from 208 to 600 VAC and in 50 or 60 Hz for US and ROW applications.	1
1.39	**Main Circuit Breaker Panel** General Electric Co. main circuit breaker panel, interfacing to a single power input feed from the facility Mains. Circuit breakers provide independent over-current protection for equipment at the console and in the treatment room. UL and IEC/CE certified.	1
1.40	**Enhanced Beam Conformance Specification** The Enhanced Beam Conformance Specifications provide tight tolerances for key X-ray and electron beam energy performance specifications. It guarantees point to point conformance of field intensity profiles to Varian-provided Representative Beam Data (formerly known as "gold beam data"), as available, and guarantees point to point conformance of field intensity profiles to within a specified tolerance in the case where Representative Beam Data is not available.	1
Section 2	TPS Eclipse	
2.1	**Eclipse Base for Multi-Site Configuratio** This configuration is for a site that will access the database remotely from another location.	1
2.2	**Eclipse Advanced Planner Desktop**	2

Item	Description	Qty
	The Eclipse Advanced Planner Desktop includes software optimized for IMRT, frameless IMRS, 4D, Conformal Arc for DMLC, Electron Monte Carlo and 3D BrachyVision. This desktop package also includes IMRT planning for TrueBeam using the leaf motion calculator. FEATURE(S): 1. For base treatment planning software which includes multi-modality image support including PET contouring, image registration and blending, clinical protocols, advanced segmentation, virtual simulation (Includes support of interfaces to all approved VSim systems), beam placement, plan evaluation, electronic plan approval, electronic chart and configurable printing of plan documentation; 2. 2D and 3D dose calculation on a distributed calculation framework including beam configuration, IRREG, 3D conformal and field in field planning using Anisotropic Analytical Algorithm (AAA) or pencil beam convolution, and electron calculation using Generalized Gaussian Pencil Beam; 3. 2D BrachyVision for film based brachytherapy planning; 4. IMRT Planning package including beam angle optimization, Interactive IMRT optimization, electronic surface compensation and planar compensation. Support either split carriages or large-field IMRT. Planning for frameless IMRS; 5. 4D Planning; 6. Electron Monte Carlo; 7. Conformal Arc Planning for DMLC; 8. 3D BrachyVision; 9. IMRT Planning support available with the Varian TrueBeam, includes leaf motion calculation algorithm integrated to the Eclipse Distributed Calculation Framework (DCF) to support both the sliding window (leaves move while radiation is ON) and multiple static segments (leaves move while radiation is paused and are static while radiation is ON). (This is available with a Varian TrueBeam). LICENSE(S): One (1) set of license of the above features PRE-REQUISITES: 1. An Eclipse Calculation Workstation must be on order with this desktop package (this workstation must be purchased from Varian Medical Systems). 2. In a Citrix environment, an Eclipse Calculation Workstation or a Framework Agent Server must be on order with this desktop package (and must be purchased from Varian Medical Systems).	
2.3	**Eclipse Physician's/Simulation Desktop** The Eclipse Physician's Desktop is optimized for the physician and includes tools for registration, contouring, 4D, beam placement and plan approvals. FEATURE(S): 1. Desktop package for ONE (1) base treatment planning software which includes multi-modality image support including PET contouring, image registration and blending, clinical protocols, advanced segmentation, virtual simulation (Includes support of interfaces to all approved VSim Systems), 4D Planning, beam placement, plan evaluation, electronic plan approval, electronic chart and configurable printing of plan documentation. LICENSE(S): One (1) set of license of the above features PRE-REQUISITES: 1. An Eclipse Non-Calculation Workstation must be on order along with this package (this workstation must be purchased from Varian Medical Systems). 2. In a Citrix environment, an Eclipse Calculation Workstation or a Framework Agent Server must be on order with this desktop package (and must be purchased from Varian Medical Systems).	1
2.4	**Eclipse RapidArc Planning License** Eclipse RapidArc Planning supports dynamic arc treatments produced through volumetric dose optimization using Dynamic MLC, variable dose rate and variable gantry speed to generate intensity modulated dose distributions in optimized arcs. Supports both coplanar and non-coplanar arcs. LICENSE(S): 1. ONE (1) Eclipse Dose Dynamic Arc software option and license 2. ONE (1) Conformal Arc for dMLC PRE-REQUISITE(S): 1. Eclipse version 10.0 or higher must be installed on all Eclipse workstations in the network	1

Item	Description	Qty
	2. Interactive IMRT Planning on Eclipse workstations 3. Varian Linear Accelerator with RapidArc Delivery 4. Minimum hardware requirements as per http://www.varian.com/us/oncology/services_and_support/hardware_specifications/	
2.5	**Eclipse RapidArc Planning Lic-Addl** Eclipse RapidArc Planning supports dynamic arc treatments produced through volumetric dose optimization using Dynamic MLC, variable dose rate and variable gantry speed to generate intensity modulated dose distributions in optimized arcs. Supports both coplanar and non-coplanar arcs. LICENSE(S): 1. ONE (1) Eclipse Dose Dynamic Arc software option and license 2. ONE (1) Conformal Arc for dMLC PRE-REQUISITE(S): 1. Eclipse version 10.0 or higher must be installed on all Eclipse workstations in the network 2. Interactive IMRT Planning on Eclipse workstations 3. Varian Linear Accelerator with RapidArc Delivery 4. Minimum hardware requirements as per http://www.varian.com/us/oncology/services_and_support/hardware_specifications/	1
2.6	**Portal Dosimetry Package** Portal Dosimetry provides the capability to perform pre-treatment IMRT QA using the PortalVision electronic imager. Dose prediction images are generated with Eclipse and can be viewed, compared and evaluated with the acquired images from the electronic imager. LICENSE(S): 1. One (1) Portal Dosimetry license (Varian Dosimetry Review license) 2. One (1) Eclipse Portal Dose Calculation license PRE-REQUISITES: 1. Eclipse 3D Treatment Planning System (not including Eclipse SV) 2. PortalVision amorphous silicon imaging system 3. Compatible version of Varian Information Management system, or 4. Compatible version of Varian Image Management system 5. Dedicated Varian Image management server hardware. 6. PVI aS1000 for Clinacs if RapidArc is used Max supported dose rate: maximum of 600 MU/min @ 100 cm source-to-imager distance 7. PVI aS500 or aS500-II on Clinacs if RapidArc is not used Max supported dose rate : maximum of 400 MU/min @ 100 cm source-to-imager distance 8. Higher dose rates can be achieved by imaging at extended distances *NOTE: Portal Dosimetry does not support HIM*	1
2.7	**Eclipse Calculation Workstation** Dell Precision Workstation with dual quad core processors, and flat panel monitor NOTE: Varian reserves the right to upgrade the hardware to the current model available at time of shipment.	2
2.8	**Eclipse Non-Calculation Workstation** Dell OptiPlex Workstation with single processor, and flat panel monitor NOTE: Varian reserves the right to upgrade the hardware to the current model available at time of shipment.	1

Item	Description	Qty
2.9	**INCL ED: EC112 Eclipse Inv Plng RA**	1

- Includes Tuition and materials for ONE person.
- Attendees will be responsible for their own, airfare, hotel, rental car, meals and other travel incidentals.
- Training is non-refundable and non-transferable.
- Offer is valid for 18 months after installation of product.

The Rapid Arc course provides instruction on Rapid Arc planning.

The target audience for the class is anyone involved with treatment planning, specifically Dosimetrists.

The course will provide instruction in the treatment planning principles and knowledge to support planning in Rapid Arc. The lab portion will provide hands-on Rapid Arc planning experience under the guidance of a Varian instructor.

Prerequisites:
- Must observe prerecorded Rapid Arc Operations Live Meeting prior to class attendance
- Experience with and knowledge of Eclipse IMRT treatment planning
- Basic knowledge of computers and the Windows Operating system

Length & Location:
1 1/2 days
Varian Education Center, Las Vegas, NV

2.10	**INCL ED: EC203 Portal Dosimetry**	1

Description:
INCL ED: EC203 Portal Dosimetry

Features:
The Portal Dosimetry course will cover commissioning, calibration and operation of Portal Dosimetry system. Course intended for the Physicist.

Topics covered include introduction to Portal Dosimetry system covering hardware and software, Portal Dosimetry calibration, acquisition of portal dose images for dynamic delivery, analysis of portal dose images and recommended QA tests. Course curriculum includes practical exercises with live beam using aSi1000 Portal imager.

Prerequisites:
User of Varian PortalVision system, basic knowledge of portal Vision system
Attendance in the Eclipse Administration and Physics course
Recommend attendance in the Eclipse IMRT Administration and Physics course
Clinical IMRT experience
Medical Physicist Education

Customer Responsibilities:
Customer is responsible for all travel expenses: airfare, hotel, rental car, meals and travel incidentals.

Notes:
Includes Tuition and Materials for ONE person.
Course is non-refundable and non-transferable.
Offer is valid for 18 months after installation of product.
Training must be taken at nearest Varian education center
Length – 2.5 days

For detailed course information and on-line registration, visit the Varian website at http://www.varian.com/index.html.

2.11	**Eclipse Conversion/Promotion**	1

Credit for the trade-in of a third party treatment planning system for an Eclipse Treatment Planning System.

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Item	Description	Qty

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Quotation Total

	Quotation Total	US $4,297,267.00

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Attachment 2

Labor Rates

	Standard Hours	Non-Standard Hours
Customer Support Representative* *(2-hour minimum)*	$385/hour	$580/hour
Product Support Engineer/Product Specialist* *(2-hour minimum)*	$580/hour	$870/hour
Applications & Clinical Help Desk Support* *(30-minute minimum)*	$385/hour	$580/hour
On-Site Applications Support *(2-day minimum, includes travel)*	$5,000/day	$10,000/day

*On-site, remote (off-site) support or travel

Any involvement of a Product Support Engineer or Product Specialist requires the presence of the local Customer Support Representative and will be invoiced accordingly, unless previous arrangements are made between the local District Customer Support Manager and Customer Representative.

Unless a Non-standard hours or Extended Hours coverage option is included in the selected Service Level Agreement, Customers may request that service be performed during Non-Standard hours and authorization to approve Customer's request lies solely with the respective District Service Manager. Where such requests are approved, Customer will be invoiced at the Standard Hours rate with a 20% discount. The billing rates for Non-Standard hours service for Customers with a Varian Service Agreement is $308/hour for a Customer Support Representative and $464 per hour for a Product Support Engineer/Product Specialist.

All rates are subject to change without prior notification All prices are quoted in US Dollars.

Working Hours

"Standard Hours" (formerly "Normal Hours") are from 8 A.M. to 5 P.M. on Mondays through Fridays, not including Varian holidays

"Non-Standard Hours" (formerly "Non-Normal Hours") are from 5 P.M. to 8 A.M. (following day), Sunday through Saturday, including Varian holidays

"Extended Hours" 5 P. M. to 9 P.M. on Mondays through Fridays, not including Varian holidays

List of U.S. Holidays

1. New Year's Day
2. Presidents' Day
3. Good Friday
4. Memorial Day
5. Independence Day
6. Labor Day
7. Thanksgiving Day
8. Day after Thanksgiving
9. Christmas Holiday 1
10. Christmas Holiday 2

Form MGM 1582J 02/2017
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VARIAN MEDICAL SYSTEMS, INC.
3100 Hansen Way, Palo Alto, CA 94304
("Varian")

Terms and Conditions of Sale

Form RAD 1652U 12/11

VARIAN MEDICAL SYSTEMS, INC. ("Varian")

GENERAL TERMS

These General Terms shall apply to all Products and Services sold by Varian to Customer under this Agreement.

1. Applicable Terms and Conditions

These Terms and Conditions of Sale, including any exhibits, schedules, addenda, and other attachments (collectively, the "**Agreement**"), shall govern Varian's furnishing of all products ("**Products**"), including hardware products manufactured by Varian ("**Varian Hardware**"), third party hardware products that are integrated into a Varian Product ("**Non-Varian Hardware**") (Varian Hardware and Non-Varian Hardware are collectively referred to as "**Hardware Products**"), application software products created or licensed by Varian under the Software Section or provided to Customer by Varian under the terms of the Support Section ("**Varian Software**"), third party software products that are not integrated into a Varian Product ("**Non-Varian Software**") (Varian Software and Non-Varian Software are collectively referred to as "**Software Products**"), Varian warranty work and services provided under the datasheet accompanying the Quotation ("**Datasheet**") and the Support Section and interface development and other customized service work provided under the Professional Services Section ("**Varian Services**"), and third party services ("**Non-Varian Services**") (Varian Services and Non-Varian Services are collectively referred to as "**Services**"), each identified in the applicable Varian quotation ("**Quotation**") issued to the customer identified in such Quotation ("**Customer**"). While Varian may acknowledge receipt of a purchase order issued by Customer by signing and returning it, any Customer terms and conditions in any specific order documentation, preprinted or otherwise, shall be inapplicable and shall not modify this Agreement. If an earlier revision of a Quotation is signed, subsequent unsigned corrections of the Quotation shall apply upon agreement of the parties.

2. Quotations and Prices

(a) A Quotation shall expire at the end of the period identified in the Quotation, or if none is stated in the Quotation, the Quotation shall expire sixty (60) days from the date of issuance. A Quotation to a non-U.S. Customer shall be considered a solicitation for an offer to purchase. (b) Varian's prices exclude, and Customer shall be responsible for, all taxes or levies of whatever nature arising out of or in connection with this Agreement, including the sale, delivery, ownership, or use of the Products or performance of the Services, but excluding taxes based on Varian's net income and the Medical Device Excise Tax, if applicable. If Customer asserts that any transaction under this Agreement is tax exempt, Customer shall provide to Varian a tax or levy exemption certificate acceptable to the taxing or levying authority. (c) Varian's acceptance of any order and Varian's performance are expressly conditioned upon Customer's compliance with all applicable codes, regulations, and recommendations of competent health or radiation-protection authorities affecting Products or installation and use of the Products, including obtaining all required permits, and Varian's approval of Customer's credit. Where applicable, Customer acknowledges that Varian has notified Customer that there are regulatory requirements associated with possession and use of radiation-generating devices. Prior to installation of a radiation-generating device Customer must apply for and obtain approval for installation of the device from the appropriate local and/or state radiological regulatory agency and must provide Varian with a copy of the approval form to verify that the required authorization has been obtained prior to the transfer of the radiation-generating device. (d) Customer shall disclose the dollar value of any discounts or reductions in price for the Products and Services furnished by Varian in Customer's costs claimed or charges made to Medicare, Medicaid, and any other federal, state, or local program providing reimbursement to Customer.

3. Payment

3.1. **Product Orders.** The payment schedule and payment terms are set forth in the Quotation, provided, however, that if a Product is not installed within six (6) months after delivery to Customer and such delay is not due to the fault of Varian, then all remaining unpaid balances shall become immediately due regardless of the payment schedule in such Quotation. Varian may charge interest for past due balances at a rate of the lesser of one percent (1%) per month or the maximum amount permitted by applicable law. For partial shipments, Products will be billed when shipped (for example, if Customer orders two linear accelerators on one Quotation to be installed on different dates, then Varian may bill as set forth in the Quotation when the first accelerator and accessories are installed). Except as set forth in the Quotation or otherwise agreed upon by the parties, all reasonably undisputed amounts invoiced shall be due and payable within thirty (30) days of the date of invoice. Varian may cancel or delay delivery of Products when Customer's payments are late under any orders with Varian. Varian shall retain a purchase money security interest in all Products and the proceeds thereof until Customer has made payment in full to Varian of all sums due, including late fees and collection costs. Customer agrees to execute any financing statements or other documents requested by Varian, which may be reasonably necessary to perfect such security interest.

3.2. **Service Orders.** Services fees for work not covered by warranty or support will be invoiced periodically in advance, as set forth in the Quotation. If Customer is paying for Services on a time and materials basis, labor charges and expenses, including travel expenses, will be invoiced as such Services are rendered or expenses are incurred, at the rates specified in the Quotation or as set forth in Form MGM 1582 (Labor Rates and Working Hours). Except as set forth in the Quotation or otherwise agreed upon by the parties, all reasonably

undisputed amounts invoiced shall be due and payable within thirty (30) days of the date of invoice. On delinquent accounts, Varian shall be entitled to withhold performance of any Services or distribution of any Maintenance Releases, Upgrade Releases, or Purchase Options, or discounts on the purchase of the same until all outstanding amounts are paid in full.

4. Cancellations, Modifications, and Termination

4.1. **Product Orders.** Either party may terminate any Product order for material breach upon thirty (30) days written notice to the other if such material breach has not been cured. Except for termination for material breach, deposits or down payments, if any, are non-refundable. No Product order accepted by Varian may be terminated, canceled, or modified by Customer except by prior mutual agreement in writing. Where Customer breaches this clause, Customer shall forfeit its deposit or down payment, or if no deposit or down payment was made, shall pay to Varian all damages reasonably incurred by Varian. This Section shall not limit, and Varian shall be entitled to pursue, any other remedies that it may have under the law or in equity.

4.2. **Service Orders.**

4.2.1. **Generally.** Either party may terminate any Services agreement for material breach upon thirty (30) days written notice to the other if such material breach has not been cured. Customer may terminate any Services agreement for any reason upon ninety (90) days written notice to Varian and receive a refund of any prepaid fees for Services not received or to be received. However, that Customer shall be responsible for the costs of upgrades, updates, installation, and training provided by Varian to Customer during the twelve (12) months prior to termination, if any, plus twenty-five percent (25%) of the remaining annual Service fees for the year in which the Agreement is terminated.

4.2.2. **Termination of Service Agreements in Which Product Costs Are Included and Amortized.** Customers, who prematurely terminate a Service Level Agreement which include and have amortized the cost of any additional Products, such as delivery system upgrades, software licenses, or any other purchasable options, into the cost of the Service Level Agreement will be liable and invoiced for the unpaid portion of these additional Products at the current list price. Payment is due within thirty (30) days of termination.

4.2.3. **Failure to Maintain.** There may be instances where Customer requests Varian to issue a quotation for Varian Services prior to examining the Products covered by the Services (for example, Customer may need to spend allocated budget before a fiscal year end.). Varian reserves the right to terminate Services and refund any payments for such Services to Customer immediately upon written notice to Customer for any Covered Product which in Varian's sole opinion, has not been properly maintained except for agreement renewals and instances where such Product has been under continuous support by Varian. If Varian has not had an opportunity to inspect a Covered Product prior to the issuance or signing of a Quotation, Varian shall have the right to inspect the Product to determine whether it meets a level of operation acceptable to Varian and, at its option, revoke the Quotation before its signing, or terminate the Agreement earlier in this Section after the Quotation is signed. Varian's agreement to provide Services for Covered Products may be further contingent upon the completion of repairs or maintenance indicated as required by such inspection. Except as agreed by the parties Customer must purchase all labor and parts from Varian to maintain the Covered Product, Varian reserves the right to terminate the Agreement where Customer fails to comply.

5. Use Restrictions

Customer shall not decompile, disassemble, or reverse engineer any part of a Product except to the extent such prohibition is void under applicable law. Customer must ensure that anyone with authorized access to the Products will comply with the provisions of this Agreement.

The following shall apply to all Firmware and Operating Systems (as defined below) and Software Products licensed to Customer under this Agreement. Nothing in this Section shall prohibit Customer from allowing hospitals and healthcare workers affiliated with Customer from using the Products if they have the requisite training or experience to do so. Without the written consent of Varian, Customer may not (i) sublicense, sell, lease, rent, timeshare, distribute, or otherwise attempt to transfer its license to such software and/or Documentation to any other person or entity; or (ii) use the such software in a facility management or Service Bureau manner or permit third parties to access the such software over the internet or through an application service provider model. "**Service Bureau**" means an arrangement pursuant to which (i) third parties are permitted to access and use such software, directly or indirectly, by any means to process their own data or (ii) Customer uses such software to process the data of any third party. Except to the extent that these restrictions are void under applicable law, Customer shall not (i) copy (except as expressly set forth in Section 2 of the Software Section below and except for transitory copies created as part of the normal use of the Product), print, alter, or translate such software, (ii) circumvent any usage or other restrictions imposed by any license manager, (iii) create any derivative work based on such software, or (iv) use such software for application development purposes. Customer agrees that these provisions shall also apply to any copies of such software that Customer acquires from third parties. Customer agrees that it shall not use any part of such software apart from the hardware or software Product with which it was intended to operate.

6. Firmware and Operating Systems

The Product may contain internal system code that executes below the external user interface and which is integral to the operation of the Product ("**Firmware**"), as well as operating system software ("**Operating Systems**"). Varian or its licensors own all Firmware and Operating Systems. Except where such Firmware or Operating System is owned by a third party which licenses it directly to Customer, Varian hereby grants Customer, only for so long as Customer shall own the Product, a limited, personal, non-transferable, non-exclusive license to use the applicable Firmware and Operating System as part of the normal operation and maintenance of the Product.

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7. Proprietary Notices, Trademarks, Logos, and Trade Names

Varian or Varian's suppliers or licensors own all right, title, and interest (including without limitation all intellectual property rights) in and to all drawings, designs, specifications, manuals, and software furnished by Varian to the Customer. Customer shall not remove, alter, or obscure any copyright, trademark, trade secret, government restricted rights, or other proprietary or confidentiality notices or legends from any copy of such materials and software that are (i) placed or embedded by Varian or its suppliers or licensors in the software, (ii) are displayed when the software is run, or (iii) are applied to the Products, their packaging, labels, or any other materials provided under this Agreement. All trademarks, logos, and trade names displayed on the Products and any related documentation are the property of Varian or third parties, and Customer shall not use them without the prior written consent of Varian or the third party that owns them.

8. Confidential Information

Each party ("**Recipient**") may be exposed to certain information of the other party ("**Discloser**") which is confidential to the Discloser and is valuable to Discloser and not generally known to the public ("**Confidential Information**"). Notwithstanding the foregoing, information shall not be Confidential Information unless, if disclosed in writing, it is conspicuously marked "**Confidential**" or bears some similar marking, or, if disclosed orally or by observation, its confidential nature is stated by the Discloser at the time of disclosure and confirmed in writing to the Recipient within fourteen (14) days after the disclosure. Except as expressly and unambiguously allowed in this Section, Recipient will hold Discloser's Confidential Information in confidence and will treat Discloser's Confidential Information with the same degree of care taken to protect its own similar confidential information but in no event with less than reasonable care. Recipient further agrees to limit disclosure of such information to those of its directors, employees, contractors, and agents who have a need for such information to effect the use permitted under this Agreement and who are bound under a written agreement or legal obligation to keep such information confidential. For purposes of this Agreement each party's standard director or employee agreement covering confidential information issues will satisfy this requirement with respect to such directors or employees. Recipient will not be required to protect or hold in confidence any information which: (1) becomes publicly known through no wrongful act or omission of Recipient; (2) was previously disclosed by Discloser to Recipient without indication of confidentiality; (3) becomes known to Recipient, without confidential restriction from a third party unless Recipient had or should have had knowledge of its confidentiality; (4) is approved by Discloser for disclosure without restriction in a written document which is signed by a duly authorized officer of the Discloser; or (5) is independently developed by Recipient without use of Discloser's Confidential Information. Disclosure of Confidential Information will not be precluded by this Section if such disclosure is: (a) necessary to establish rights under this Agreement (subject to Recipient's obligation at its expense to make a good faith attempt to obtain a protective order prior to such disclosure); or (b) required by law or regulation or in response to a valid order of a court or request of other governmental body of a country or political subdivision thereof, provided that Recipient notifies Discloser of such order on a timely basis and if possible prior to such disclosure. All Confidential Information, including copies made by Recipient, will remain the property of Discloser. The obligations of confidentiality imposed by this Agreement shall survive any termination of this Agreement. This Section shall not apply to any Confidential Information covered by a separate Business Associate Agreement between the parties.

9. Warranty

9.1. **Warranty for Hardware Products.** See the Hardware Section.

9.2. **Warranty Remedies.** See the Hardware Section.

9.3. **Warranty for Software Products and Services.** See the Software Section and Support Section, respectively.

9.4. **Exclusions from Coverage:** Any warranty claim, support claim, or liability is excluded where such claim or liability is not caused by Varian and arises out of (1) accident, theft, misuse, or neglect; (2) use of the Products outside of normal operating conditions, specifications, or environment or in a manner not authorized by Varian as set forth in the applicable Product documentation or written instructions from Varian; (3) user modification of any Product not authorized by Varian in the applicable Product documentation or other writing; (4) computer viruses and other changes to the operating system or environment which adversely affect the Product; (5) defects, problems, or failures created by third party products (except those comprising parts or components of Varian Products) or their interface with Varian Products; or (6) acts of God, electrical power surges, or other causes external to the Products.

9.5. **Third Party Product Terms and Warranties.** Except as otherwise set forth in this Agreement, a third party product that is integrated into a Varian Product and not separately identified in the Quotation as a third party product shall be covered by the warranty or support obligations applicable to the Varian Product into which it is integrated. All other third party products, including, without limitation, equipment, accessories, or software that are separately identified in the Quotation as third party products ("**Separate Third Party Products**") shall be governed by that third party's terms and conditions, including, but not limited to, usage guidelines and restrictions, software licenses, warranties, and any other terms; Customer must agree to those third party terms and conditions unless it negotiates otherwise directly with the manufacturer (or authorized distributor) of those Separate Third Party Products. Varian makes no representation or warranty with respect to the compatibility of Separate Third Party Products with Varian Products, nor that the Separate Third Party Products are designed or offered to work with Varian Products as a single system that has received regulatory clearance or approval. Varian remains the manufacturer or record of its products, and the Separate Third Party Product manufacturer remains the manufacturer of record of its products. Varian is reselling the Separate Third Party Products on its Quotation for the Customer's convenience. In no event shall Varian have any liability with respect to Separate Third Party Products, nor shall Varian have any liability for failure of the third parties to perform on their warranties. Customer agrees to seek any remedies with respect to the Separate Third Party Products from the third party manufacturer (or authorized distributor as the case may be).

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9.6. EXCLUSIONS OF IMPLIED WARRANTIES. THESE LIMITED WARRANTIES ARE EXPRESSLY IN LIEU OF AND EXCLUDE ALL OTHER EXPRESS OR IMPLIED WARRANTIES, REPRESENTATIONS, OR CONDITIONS, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE.

10. Intellectual Property Infringement

Varian shall defend, at its expense, any third party claim brought against Customer that the design or manufacture of any Varian Hardware or Varian Software furnished by Varian to Customer under this Agreement infringes any patents or other intellectual property rights of (1) the country where Customer takes delivery of the Product if such country is the United States, Canada, Japan, Switzerland, or any of the fifteen (15) original members of the European Union (namely, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom), or (2) the United States where Customer takes delivery of the Varian Hardware or Varian Software in a country not listed earlier in (1) ("Claim"), and shall pay any settlement and any damages, costs, and attorneys' fees finally awarded against Customer arising out of a Claim. The foregoing is conditioned upon Customer (a) notifying Varian promptly in writing of the Claim; (b) giving Varian sole control of the defense, management, and settlement of the Claim, provided that Customer may participate in such defense at its own cost with counsel of its choice if it gives Varian such control; and, (c) upon request, at Varian's cost, reasonably cooperating with Varian in such defense. Varian shall not enter into any settlement imposing liability on Customer for which Customer is not indemnified without Customer's written consent. If (1) such Product's use is enjoined as a result of any Claim, or (2) in Varian's opinion, such Product is likely to become subject to a Claim, Varian may, at its expense and sole option; (a) modify the Product so that it becomes non-infringing; (b) procure for Customer the right to continue to use the Product; (c) substitute for the infringing Product another product having a functionality substantially equivalent to the Product; or (d) accept return of the Product and refund its purchase price, less reasonable depreciation. Varian EXPRESSLY EXCLUDES from liability and Customer shall indemnify and hold Varian harmless from: (1) settlements and their related costs and expenses where Customer settles Claims without Varian's prior written consent; and (2) any Claims arising out of (a) use of the Product in a manner not authorized by Varian, as set forth in the applicable documentation for the Product or written instructions by Varian; (b) modification of the Product except modifications performed by Varian or pursuant to Varian's instructions; (c) combination of the Product with any other equipment, apparatus, software, processes, or materials not furnished by Varian except as requested or performed by Varian; (d) compliance by Varian with Customer's designs, specifications, or instructions; or (e) methods of use of a Product, unless the Product has no substantial non-infringing use; where such infringement would not have occurred but for such use, modification, combination, or compliance. This Section states Varian's entire liability for any claim based upon or related to any alleged infringement of any patent or other intellectual property rights.

11. Bodily Injury

With respect to bodily injury liability to third parties, each party shall be responsible in such proportion as reflects its relative fault for damages arising from or in any way related to the use or operation of any Product. Varian shall have no responsibility whatsoever for, and Customer shall indemnify, defend, and hold Varian harmless from, any and all damage or injury which arises from or relates to (1) any use, operation, or service of any Product by anyone other than Varian personnel prior to completion of applicable acceptance tests by Varian and the radiation survey by Customer, or (2) any use, operation, or service of any Product contrary to any written warning or instruction given by Varian with respect to such Product, including but not limited to unauthorized use and/or modification of any equipment, components, software, or accessories by any user, or their use on or with any explosive or incendiary materials, or (3) claims or damages associated with any non-Varian design, manufacture, or installation of any product or any custom design, manufacture, or installation by Varian that is performed pursuant to Customer's specifications, designs, or plans. This Section states each party's entire liability for bodily injury.

12. LIMITATIONS OF LIABILITY

IN NO EVENT SHALL VARIAN OR ITS SUPPLIERS OR LICENSORS OR CUSTOMER BE LIABLE UNDER CONTRACT, TORT, OR ANY OTHER LEGAL THEORY FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, PUNITIVE, OR SPECIAL LOSSES OR DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO LOST BUSINESS, LOST PROFITS, LOSS OF USE, OR LOSS OF OR DAMAGE TO DATA, HOWEVER CAUSED, WHETHER FORESEEABLE OR NOT, EVEN IF THE OTHER PARTY IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. VARIAN AND ITS SUPPLIERS AND LICENSORS' AND CUSTOMER'S TOTAL LIABILITY IN DAMAGES OR OTHERWISE SHALL NOT EXCEED THE TOTAL AMOUNTS PAID OR PAYABLE UNDER THE AGREEMENT. THESE LIMITATIONS SHALL APPLY NOTWITHSTANDING THE FAILURE OF THE ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. THE PARTIES ACKNOWLEDGE THAT THESE LIMITATIONS OF LIABILITY ARE MATERIAL PARTS OF THE BARGAIN BETWEEN THE PARTIES AND THAT PRICES FOR THE PRODUCTS WOULD BE HIGHER WITHOUT THEM. (1) Liability to third parties for bodily injury, including death, resulting from Varian Hardware or Varian Software or its use, (2) liability for breach of confidentiality, and (3) obligations related to intellectual property shall not be affected by the liability limitations stated above in this Section.

13. Export Compliance

Customer acknowledges and agrees that the Products and related technology subject to this Agreement are subject to the export control laws and regulations of the United States, European Union, and Switzerland, and Customer agrees to comply with such laws and regulations. Customer agrees that it shall use its best efforts to ensure that the Products and related technology are not (1) sold, transferred or diverted to any U.S. or E.U. sanctioned or embargoed country (including, but not limited to, Cuba, Iran, Sudan and Syria), unless authorized by U.S. export license or regulation; (2) sold, transferred, or diverted to any person, firm, or other entity listed in the U.S. Department of Commerce Denied Persons List or Entity List, the U.S. Department of Treasury's Specially Designated Nationals List, the U.S. Department of State's Debarred Parties listing, or any E.U. or local country listing of sanctioned persons; (3) sold, transferred, or diverted to any nuclear weapons,

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nuclear power, nuclear research, chemical/biological weapons, or missile/rocket technology end-user or end-use; or (4) sold, transferred, or diverted in violation of any other applicable import/export laws, regulations, licenses, or government orders. Customer shall promptly advise Varian in writing of any known or suspected sale, transfer, or diversion in violation of the foregoing. Customer understands that Varian's performance under this Agreement is subject to Varian's receipt of all necessary licenses, permits, or approval from all relevant governments or their agencies for the import or export of the Products and that Varian shall be free from all liabilities for deficient performance under this Agreement if such deficiency is caused by the non-receipt or late receipt of such licenses, permits, or approval. The obligations of this Section as to these laws shall survive any termination of this Agreement.

14. Force Majeure

Neither party shall be liable for any delay in performance which is due to causes beyond its control. Performance shall be deemed suspended during the event causing such delay plus a reasonable period of time after such event, and the other party shall accept such delayed performance. Either party may terminate any Quotations not yet completed if such performance is delayed more than thirty (30) days under this Section.

15. Disputes, Mediation, Arbitration, and Applicable Law

The parties shall endeavor to settle any dispute arising out of this Agreement, except those pertaining to intellectual property issues, by mediation under the Mediation Rules of the American Arbitration Association ("AAA"). The parties will attempt to agree on a mediator. Failing such agreement, the mediator will be appointed by the AAA Vice President in charge of Mediation. Any dispute arising out of or relating to this Agreement, including the breach, termination, or validity thereof, which has not been resolved by mediation as provided herein within thirty (30) days after appointment of a mediator or such time period as the parties may otherwise agree, shall be finally resolved by binding arbitration in accordance with the AAA Commercial Rules, by three (3) independent and impartial arbitrators, all of whom shall be appointed by AAA, provided, however, that if one party fails to participate in the mediation as agreed in this Section, the other party can commence arbitration prior to the expiration of the time periods set forth above. The arbitration shall be governed by the Federal Arbitration Act, 9 U.S.C. §§1 et seq., and judgment upon the award rendered by the arbitrators may be entered by any court having jurisdiction thereof. The place of arbitration shall be Palo Alto, California. The governing law of the substance of this Agreement shall be the commercial law of the state of California, and the United Nations Convention for the International Sale of Goods shall not apply. The procedural law shall be the law of the place where arbitration is conducted. Arbitral proceedings shall be conducted in English. The arbitration tribunal shall not award punitive damages. The expenses of the arbitration, including the arbitrator's fees, expert witness fees, and attorney's fees, may be apportioned between the parties in any manner deemed appropriate by the arbitrator; however, in the absence of any formal ruling by the arbitrator each party shall share equally in the payment of the arbitrator's fees and bear its own costs, expert witness fees, and attorney's fees. The arbitration award shall be final and binding, shall be the sole and exclusive remedy regarding any and all claims and counterclaims presented, and may not be reviewed by or appealed to any court except for enforcement. Nothing in this Agreement shall prohibit either party from seeking to prevent any unauthorized copying, disclosure, use, retention, or distribution of its Confidential Information or intellectual or other property by injunctive relief or otherwise in a court of law. Varian shall have the exclusive right to bring legal action for failure to pay for Products or Services furnished in the courts of Varian's corporate domicile or any other place.

16. Limitation of Claims

No claims, regardless of form, arising out of, or in any way connected with this Agreement or the Products or Services may be brought by Customer more than one year after the cause of action has accrued or performance under this Agreement has been completed or terminated, whichever is earlier.

17. Notices

Any notices required or permitted to be given pursuant to this Agreement shall be in writing, delivered (1) in person, (2) by international courier, (3) by first class certified mail, return receipt requested, or its international equivalent, or (4) by facsimile with confirmation of delivery and an extra copy mailed. All such notices shall be addressed to Varian at Legal Department, Varian Medical Systems, Inc., 3100 Hansen Way, M/S E-250, Palo Alto, CA 94304, fax 650-424-5998, and to Customer at the address and/or fax numbers set forth in the Quotation or to such other address as may be specified from time to time by notice in writing to the other party. Notice shall be deemed to have been given when received.

18. Headings

Headings used in this Agreement are for ease of reference only and will not be used to interpret any part of this Agreement.

19. Entire Agreement, Amendments, Illegality, and Priority of Documents

This Agreement contains the complete and exclusive statement of the terms of agreement of the parties with respect to this subject matter, and supersedes all prior and contemporaneous understandings, representations, and warranties, written and oral. This Agreement may be amended or modified only in a writing signed by both parties. If a court or arbitrator holds any part of this Agreement to be illegal, unenforceable, or invalid in whole or in part for any reason, the validity or enforceability of the remaining provisions, or portions of them, will not be affected, and such provisions will be changed and interpreted so as to best accomplish the objectives of such provisions within the limits of applicable law or court decisions. In the event of a conflict, the documents shall be interpreted to give priority in the following order: (1) amendments or addenda to this Agreement, if any, with highest priority given to the most recent amendment or addendum, (2) Quotation, and (3) Terms and Conditions of Sale.

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20. Waiver

No term or provision of this Agreement shall be deemed waived by either party, and no breach excused by either party, unless the waiver or consent shall be in writing signed by an authorized representative of the party granting such waiver or consent.

21. Assignment

Except as to rigging, neither party may assign its rights nor delegate its duties under this Agreement without the written consent of the other, and any attempted assignment without such consent will be void. However, either party may assign or otherwise transfer its rights or delegate its duties under this Agreement, in whole or in part and subject to the terms of this Agreement, to a subsidiary or affiliate, or a purchaser or transferee of substantially all of the assets used by such party in its business to which this Agreement relates or in the event of a merger, acquisition, corporate restructuring, or change in control upon written notice to the other party.

22. Relationship of the Parties

This Agreement does not create a relationship such as a partnership, franchise, joint venture, agency, master/servant, or employment relationship. Neither party may act in a manner which expresses or implies a relationship other than that of independent contractor, nor bind the other party.

23. Counterparts

This Agreement may be executed in two counterparts, each of which will be an original and together which will constitute one and the same instrument.

24. Sales to United States Government Agencies

Varian Products that are sold or distributed by Varian to an agency of the United States government (the "Government") shall be subject to the Government's rights in commercial items and commercial software.

HARDWARE SECTION

(Formerly Form RAD 9905 OS Schedule and Form RAD 9906 BT Schedule)

This Hardware Section applies to all Hardware Products provided by Varian to the Customer under this Agreement.

1. Transportation and Risk of Loss

All shipments are per the Incoterms (Incoterms 2010) set forth in the Quotation with Varian selecting the transportation company. Title shall pass at the same time that risk of loss shifts. Unless otherwise expressly agreed in writing, Varian will ship linear accelerator, simulator Products, and any other Products that Varian determines such transportation is advisable, as well as any other items that it determines would be efficiently transported by inclusion with such Products, to Customer's site in "air ride" vans, and Varian shall insure to full value of Products shipped at Customer's expense or shall declare full value of the Products to the transportation company at time of shipment. Within three (3) days of delivery, Customer shall examine fully the packaging of the Product delivered for damage and make all applicable complaints and claims arising out of such delivery to the carrier in writing, and shall provide a copy to Varian.

2. Bill and Hold

This Section shall apply only to linear accelerators, simulators, and HDR BrachyTherapy afterloaders. If shipment is delayed due to unavailability of Customer facilities or any other cause, Customer may request and authorize Varian to hold the Product(s) in storage upon completion of manufacturing. Varian shall invoice Customer for, and Customer shall pay, eighty percent (80%) of the purchase price for such Product(s), which shall include any down payments or deposits. Varian will select a suitable storage facility and pay for the costs of storage and insurance for up to ninety (90) days. Title to the Product(s) shall pass when the Product(s) are placed into storage. The Product(s) shall be insured in Customer's name. If Customer has not requested shipment of the Product(s) within such ninety (90)-day period, then Varian shall ship the Product(s) to the site designated in the applicable Quotation(s). When storage is required, the provisions of this Section shall prevail over any inconsistent provisions of this Agreement.

3. Architecture

Varian will have no approval or other responsibility for any matter affecting or related to the adequacy of Customer's operating permit, architectural design, the radiation protection walls and barriers, patient viewing devices, compliance with all facility personnel safety devices and related inspections, utility service design and location, and other details pertaining to Customer's site. Customer may purchase architectural and construction services, if available, under a separate agreement with Varian's Site Solutions group.

4. Installation

A linear accelerator is delivered in three (3) or four (4) separate sections which Varian will assemble in Customer's vault. Varian also will provide standard installation of the pieces and final positioning for the linear accelerator and setting. Customer will be responsible for the grouting of the subbase frame and the connection of such Products to the utilities and for any non-standard installation services (such as the shoring of floors, the widening of doorways, and second floor delivery), and Varian will notify Customer approximately ninety (90) days prior to scheduled Products shipment to allow Customer to provide for and coordinate such services. Except as otherwise agreed by the parties, Customer will be responsible for having the building, utilities, lighting, ventilation, air conditioning, mounting facilities, all necessary radiation shielding, and access to the room completed on the estimated delivery date and ready for installation of the Products. Upon agreement of the parties Varian may review quotes from and pays the subcontractor directly for connection to utilities, power, air, and grouting of the base frame. Where Varian is installing a Product for Customer, Customer will reimburse Varian at Varian's standard service rates for any extra time and/or

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travel by Varian made necessary by any delays not caused by Varian. Varian shall have no obligation to operate Products to complete installation or testing unless Customer has provided adequate radiation shielding protection and other site preparations for the safety and protection of Customer's and Varian's personnel and Products. Upon completion of installation, Varian's representatives will demonstrate proper Product operation by performing the applicable Varian Customer Acceptance Procedure ("VCAP"). Customer shall provide a representative who shall be present at all times during installation (including interfaces) and be capable of assisting where necessary or waiving installation of interfaces to the exrent that Customer has decided not to install products requiring such interfaces. When no representative is present or assistance from Customer is not available when required by Varian, Varian may discontinue installation and shall charge Customer for any additional costs incurred including Varian's standard service rates. If union action or influence requires union labor to complete any installation of Products, then such installation shall be completed at Customer's expense under the engineering supervision of Varian.

5. Acceptance of Hardware Product

For Non-Varian Hardware Varian shall invoice when such Product is shipped. For Varian Hardware, acceptance shall occur upon the earlier of (1) Customer's execution of Varian's acceptance form, which is the final step in the VCAP for each Product, (2) completion of the applicable VCAP, (3) use of any such Product by Customer, its agents, employees, or licensees, for any purpose other than testing after its receipt, or (4) six months after delivery of the Product. Prior to acceptance Varian may repair or, at its option, replace defective or nonconforming parts after receipt of notice of defect or nonconformity. After acceptance Customer's remedies shall be solely as provided in the warranty. After six (6) months after delivery of the Product Varian shall no longer be required to provide installation services.

6. Calibration and Radiation Surveys

For linear accelerator and simulator Products and treatment planning software, Customer shall be responsible for all Product calibration. For non-BrachyTherapy products the dose rate and integrated dose measured by the accelerator transmission ionization chamber and dosimetry electronics must be calibrated by a qualified radiological physicist prior to use of the Product for patient treatment. For BrachyTherapy products, the radioactive source must be calibrated by a qualified radiological physicist prior to use of the Product for patient treatment. Customer shall be responsible for testing and calibrating the Product on a regular basis. Customer also shall be responsible for any radiation surveys required by applicable law or regulation or necessary to establish that radiation does not exceed safe levels. For simulator and BrachyTherapy Products, Varian's obligation to calibrate shall be limited to that required by local law. In the United States calibration shall be limited to those certified components that are required under 21 C.F.R. 1020.30(d) (U.S. Code of Federal Regulations) to be calibrated by the installer where Varian is the installer. Customer shall be responsible for all other calibrations of simulator Products.

7. Warranty

7.1. **Warranty for Varian Hardware.** Unless otherwise provided in this Agreement or the Quotation, Varian warrants that Varian Hardware and any Firmware and Operating System loaded on such Varian Hardware, except where such Firmware or Operating System is owned by a third party which licenses it directly to Customer, to be free from defects in material and workmanship and in substantial compliance with operational features of Varian's published specifications for the applicable Product at the time of sale ("**Specifications**"). This warranty shall begin upon completion of installation and continue for a period of one year from such date, but not to exceed two (2) years from date of shipment from Varian to Customer. In lieu of the foregoing periods, specific components of Varian Hardware may have different warranty periods, prorated replacement credits, and return policies, as stated on the applicable Varian warranty forms supplied by Varian to Customer with this Agreement. Weights and dimensions in the Specifications are approximations. Clerical and typographical errors are subject to correction. Occasionally, upon agreement of the parties, Varian may substitute remanufactured parts and components that meet the same quality standards as new materials and are covered by the same warranty. Parts for which Varian has provided replacements shall, at Varian's option, become the property of Varian.

7.2. **Parts Warranty.** Varian warrants parts to be free from defects in material and workmanship for a period of the greater of ninety (90) days from the date of shipment to Customer or, if applicable, the unexpired portion of the original warranty period for the Product. All warranty repair or replacement of parts shall be limited to product malfunctions which are, as determined by Varian, due and traceable to defects in original material and workmanship. Components that carry separate warranties based upon use are not covered by this warranty. Parts that are expendable in normal use and service are not covered by this warranty. Parts for third party products, such as computer hardware provided with software products, are not covered by this warranty, except when applicable option has been purchased. . Unused parts returned to Varian are subject to a restocking fee of fifteen percent (15%), and, if applicable, an additional retesting fee.

7.3. **Disclaimer for Parts Not Supplied by Varian.** If Customer requests Varian to install parts not purchased from Varian, then: (i) Varian reserves the discretionary right to refuse to install any part; (ii) if Varian agrees to install the part, no warranty, expressed or implied, is provided for the part or installation Services, nor does installation by Varian imply that Varian certifies such part or vendor from whom such part is obtained; (iii) labor to install the part will be provided on an hourly basis as set forth in Form MGM 1582 (Labor Rates and Working Hours); and (iv) if additional damage is caused by such part, Varian assumes no responsibility for such damage. If the Varian Product is under any level Varian Service agreement, Varian will not be obligated to repair such damage under such Service agreement, and such repairs will be performed under Form MGM 1582.

7.4. **Warranty Remedies.** Customer's sole and exclusive remedy for any failure of Varian Hardware or Firmware or Operating System under this Section to perform shall be repair or, at Varian's option, replacement of such defective Products in whole or in part during Varian's normal business hours. If in Varian's sole opinion such repair or replacement is not feasible, or if such remedy fails of its essential purpose, Varian shall refund or credit a portion of any sums paid by Customer for the defective Product less reasonable depreciation. In-warranty repair or replacement parts are warranted only for the unexpired portion of the original warranty period.

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SOFTWARE SECTION

(Formerly Form RAD 2750 Software Schedule)

This Software Section shall apply to all Varian Software licensed by Varian to Customer under this Agreement, excluding Firmware and Operating Systems, which are shall be governed by General Terms, Section 6 (Firmware and Operating Systems) and Hardware Section, Section 7 (Warranty).

1. Additional Definitions

1.1. "Access" means use of Software Products installed on a workstation or use at a workstation through remote connection to a server via a single Local Area Network ("LAN") or a single Wide Area Network ("WAN"), but not from outside the designated LAN or WAN, except that remote administrative viewing of certain designated Software Products installed on a server will not be outside the scope of the permitted use.

1.2. "Documentation" means the user manual for Software Products which describes the software and provides information specific to that Software Product.

2. License Grant

Subject to and for so long as Customer is in compliance with the terms and conditions of this Agreement, Varian grants to Customer a limited, personal, non-exclusive, non-transferable (subject to General Terms Section 21 [Assignment]) license for:

(a) server modules of Software Products, as follows:

(i) for server components of a server module of a Software Product, to install and use a single copy of the object code version of such server module on a single server (or single database server and single imaging server for imaging applications) and to Access the server modules from a workstation; and

(ii) for workstation components of a server module of a Software Product, if any, to install and use copies of the object code version of such workstation components on such workstations as necessary;

(b) workstation applications of Software Products, as follows:

(i) for a workstation application of a Software Product intended for installation on a workstation for which no license manager is used or for which a fixed license manager is used, to install and use the object code version of such workstation application on the number of workstations for which licenses have been purchased;

(ii) for a workstation application of a Software Product pre-installed by Varian on a workstation (such as a console) prior to its delivery to Customer, to use the object code version of such workstation application on the workstation on which such application is installed;

(iii) for a workstation application of a Software Product intended for a floating license, to install the object code version of such workstation application on any number of workstations and to permit concurrent users up to the number of licenses purchased to use such workstation application; and

(iv) for a workstation application of a Software Product intended for a site license, to install and use the object code version of such workstation application on any number of workstations at the Customer site(s) identified in the Quotation as to such Software Product; and

(c) to copy the Software Products for back up and archival purposes only, except to the extent that such restriction on copying is void under applicable law; and

(d) to use (but not make copies of) the Documentation to assist in Customer's use of the Software Products pursuant to the terms of this Agreement except that Customer may make an electronic copy on each workstation of the Documentation applicable to the Software Products installed or used on such workstation.

Each such license shall be valid until termination under this Agreement or expiration. Software Products may be licensed as server modules or as workstation applications as may be indicated in the applicable Quotation or Documentation. Unless otherwise indicated, Maintenance Releases, Mandatory Safety Releases, Upgrades, and Purchase Options (as defined in the Datasheet) are hereby licensed in the same way that their underlying Products are licensed under this Section. Customer shall not be entitled to receive or use any source code of the Software Products under this Agreement except as otherwise stated in this Agreement. Varian shall have the right to conduct and/or direct an independent accounting firm to conduct, during normal business hours, an audit of the appropriate records of Customer to verify Customer's compliance with the licenses granted under this Software Section.

3. Title

Title to all copies of the Software Products and Documentation will remain in Varian or its licensors. No license, right, title, or interest in the Software Products or Documentation, or any intellectual property of Varian or any Varian third party licensor, is granted to Customer except as expressly granted in this Software Section.

4. Integration

Customer acknowledges that the import of data into and the export of data out of certain Software Products require an interface between the Software Products and external programs or information systems, whether such programs or information systems are supplied by Varian or a third party.

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5. Acceptance

Where Varian will be installing the Software Product, Customer will make its site available to Varian personnel to install the Software Product no later than thirty (30) days after delivery of the applicable Software Product to Customer. Customer shall provide a representative who shall be present at all times during installation (including interfaces) and be capable of assisting where necessary or waiving installation of interfaces to the extent that Customer has decided not to install products requiring such interfaces. When no representative is present or assistance from Customer is not available when required by Varian, Varian may discontinue installation and shall charge Customer for any additional costs incurred including Varian's standard service rates. Customer will have thirty (30) days from the installation date, or where Customer will perform the installation, thirty (30) days from delivery of the Software Product, to review the Software Product. Customer may reject Software Product only if it does not substantially conform to the Documentation. Customer's rejection must be in writing, must describe the nonconformity in detail, and must be provided to Varian within such thirty (30)-day period. Varian will have a reasonable period of time in which to correct or provide a workaround for any such nonconformity. Customer will be deemed to have accepted the Software Product after thirty (30) days from the installation date or delivery date, as applicable, unless Varian has received written notice of rejection within the thirty (30)-day period. Notwithstanding the foregoing, Customer's productive use of the Software Product in Customer's business will be deemed to be acceptance of the Software Product.

6. Support and Warranties

6.1. Support in Lieu of Warranty & Limited Warranty.

Varian agrees as follows:

(a) for Software Products licensed to Customer for the first time, as opposed to expansions of pre-existing configurations, in lieu of any warranty Varian will provide Customer with technical support Services for a period of one year from the date of installation of the Software Product by Varian (or the date of delivery where the Software Product will be installed by Customer), or such other period set forth in the Quotation, under the terms of the Datasheet and Support Section, at no additional charge to Customer;

(b) for Software Products licensed to Customer that adds a module to, upgrades, or increases the number of licenses purchased under a pre-existing configuration

(i) for which the Support Section of a service agreement, or a service agreement is then in effect between Customer and Varian and is not scheduled to expire within thirty (30) days of the execution of this Agreement, upon expiration of the applicable warranty period for such additional licenses, Varian will provide Customer with technical support Services for the balance of the then-current one-year support period, at a pro-rated charge that will be calculated and invoiced based on the number of months remaining until the anniversary (or renewal) date for support on the pre-existing configuration, to Customer under the terms of the Datasheet, Support Section, or agreement for such pre-existing configuration; and

(ii) for which Support Section of a service agreement, or a service agreement is then in effect between Customer and Varian but is scheduled to expire within thirty (30) days of the execution of this Agreement or for which no Support Section or service agreement is then in effect between Customer and Varian, excluding BrachyTherapy products, Varian warrants, for a period of thirty (30) days from the date of installation of the Varian Software by Varian (or the date of delivery where the Varian Software will be installed by Customer), that the Software Product, will, when used in accordance with the Documentation, substantially conform to the Documentation. Where Customer reports a nonconformity to Varian during the warranty period, Varian will provide workarounds, patches, bug fixes, or other corrections or will replace the affected Software Products, at Varian's option, and such remedy will be Customer's sole and exclusive remedy for breach of this warranty. If in Varian's sole and exclusive opinion any such workaround, patch, bug fix, correction, or replacement is not commercially reasonable, or if any such remedy fails of its essential purpose, Varian shall negotiate with Customer with respect to a refund of any equitable portion of any sums paid by Customer for the affected Software Products.

Varian's provision of Mandatory Safety Releases, Maintenance Releases, and, if applicable, Upgrade Releases, under the warranty or support in lieu of warranty in this Section and pursuant to the Datasheet and/or the Support Section shall not extend the original period for such warranty or support.

6.2. Disclaimer.

EXCEPT AS PROVIDED IN THIS AGREEMENT, VARIAN DISCLAIMS ALL EXPRESS OR IMPLIED WARRANTIES, REPRESENTATIONS, AND CONDITIONS (EITHER IN FACT OR BY OPERATION OF LAW) INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS. VARIAN MAKES NO WARRANTY THAT THE OPERATION OF ANY SOFTWARE PRODUCT WILL BE UNINTERRUPTED OR ERROR FREE. THE EXCLUSIVE REMEDY FOR INFRINGEMENT OF THIRD PARTY RIGHTS IS SET FORTH IN GENERAL TERMS, SECTION 10 (Intellectual Property Infringement).

6.3. Limitations.

Except as specifically stated in the Documentation, Varian does not make any representations or warranty regarding the compatibility of the Software Products with software or hardware not supplied by Varian. Varian will in its sole and exclusive discretion, use reasonable efforts to assist Customer with the use of Software Products with third party products. Such assistance is limited to telephone and service support regarding compatibility or interface questions. Varian does not make any representation or warranty

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regarding the clinical use of the Software Products and/or Varian beam data by Customer for the treatment of patients in performing any medical procedure. Customer acknowledges that the Software Products and Varian beam data are tools to assist Customer to determine the proper course of treatment that may be needed by a particular patient, and Customer assumes all risks associated with such treatment. Import, export, or distribution of any data or information Customer may develop or use in cooperation with the Software Products ("**Data Related Activities**") is Customer's sole responsibility, and Customer agrees to defend, indemnify, and hold Varian harmless from any and all claims by Customer and/or third parties, regardless of the nature of such claims, arising either directly or indirectly out of Data Related Activities. The foregoing sentence shall not be construed to limit Varian's obligation to provide warranty work or support under Section 6.1.

7. [Intentionally Omitted. Formerly Government Rights. Now covered in General Terms, new Section 24.]

PROFESSIONAL SERVICES SECTION

(Formerly Form RAD 10080 Professional Services Schedule)

This Professional Services Section shall apply only to development of interfaces for Varian medical oncology software installation and any customized services provided under an SOW.

1. Additional Definitions

1.1. "**Change Order**" shall mean any proposed change to the SOW requested by Customer and agreed to in writing by Varian.

1.2. "**Professional Services**" shall mean the services identified in each individual SOW, including, but not be limited to, analysis and performance of integration of Varian's standard software applications with Customer's information systems and business practices, development of interfaces between Varian's standard software applications and Customer's computer systems, customized training, and other services available from Varian.

1.3. "**Schedule**" shall mean any timetable or milestones for the Professional Services that is set forth in the SOW.

1.4. "**SOW**" shall mean a statement of work or work order agreement, either in the Quotation or as separately agreed upon by the Parties describing the Professional Services to be performed by Varian for Customer.

2. Term

The term for the Professional Services portion of this Agreement shall be from the signing of this Agreement until completion of the Professional Services or termination.

3. Professional Services

3.1. **Generally.** In consideration of Customer's timely payment, Varian shall perform the Professional Services set forth in each SOW attached to or referencing this Agreement.

3.2. **Software.** Where Varian provides Customer with other software under an SOW to this Professional Services Section, including but not limited to interface engines and interfaces, then such software shall be governed by the Software Section. The interface engine, interface, or other software will be licensed under the Software Section in the same manner as the underlying application software which requires such interface engine, interface, or other software.

3.3. **Actual and Potential Delays.** Varian shall use commercially reasonable efforts to perform the Professional Services according to the Schedule. Whenever any event delays or threatens the timely performance of the Professional Services, Varian will make commercially reasonable efforts to notify Customer of such event and furnish all relevant details. If Varian is unable to meet the Schedule for any Professional Services, Varian and Customer shall meet in good faith to discuss possible solutions including revising the Schedule at no additional cost to Customer, provided that such revision does not add new Professional Services to the SOW.

3.4. **[Intentionally Omitted. Formerly Customer Hours, Holidays, and Site Rules. Now covered in Datasheet.]**

3.5. **[Intentionally Omitted. Formerly Office Space, Services, and Equipment. Now covered in Datasheet.]**

3.6. **Exclusions from Professional Services.** Except to the extent expressly set forth in an SOW, Professional Services shall not include, and Varian will have no approval or other responsibility for, any matter affecting or related to the adequacy of Customer's operating permit, architectural design, the radiation protection walls and barriers, patient viewing devices, compliance with all facility personnel safety devices and related inspections, utility service design and location, Customer's obligations to comply with applicable laws, and other details pertaining to Customer's site.

4. Rates, Expenses, Invoices, and Payment

4.1. Rates.

4.1.1. **Time and Materials Rates.** Varian shall bill Customer for Professional Services at the time and materials rates set forth in the applicable Quotation or, if no rate is set forth in the Quotation, at Varian's then-current standard rates for such Professional Services. Varian shall bill for actual time expended and materials used in providing the Professional Services, and any preliminary estimate of time and materials provided by Varian to Customer for the Professional Services is for budgetary purposes only and shall not be binding on either party. Varian's standard work day is eight (8) hours. Varian shall bill Customer in units of billable hours, with minimum billable increments of eight (8) hours for Professional Services being performed at Customer's site or one

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hour for Professional Services being provided off-site. Where Varian can perform any portion of the Professional Services remotely rather than on Customer's site, Varian shall bill for such off-site Professional Services in accordance with the terms of this Agreement as if such Professional Services were performed at Customer's site.

4.1.2. **Firm Fixed Price Rates.** Varian may also provide Customer with some pre-packaged Professional Services or other specially negotiated Professional Services on a firm fixed price basis, provided that such Professional Services will be clearly identified as being offered on a fixed price basis. Where the parties agree upon a firm fixed price, the Professional Services included within such price shall be limited to those specifically identified as being covered by such price, and Customer agrees to make payments according to the Schedule, including any applicable milestones. Where Professional Services are not expressly identified as being covered by a firm fixed price, they shall be provided on a time and materials basis.

4.2. **Expenses.** Varian shall submit a monthly time and expense summary to Customer by letter, fax, e-mail, or in person for the Professional Services performed during the prior month. Varian may shall bill Customer for its reasonable expenses, including, but not limited to, travel, lodging, and meals, required to perform the Professional Services for Customer.

4.3. **Invoices.** For Professional Services performed on a time and materials basis, Varian shall submit invoices to Customer for labor, materials, and expenses in providing the Professional Services in the immediately preceding month. For Professional Services performed on a firm fixed price basis, Varian shall submit invoices to Customer pursuant to the Schedule set forth in the SOW. Upon request by Customer, Varian shall provide receipts or other documentation supporting reimbursable expenses to Customer.

4.4. **Payment.** Except to the extent that a special payment arrangement has been agreed to by the parties in the Quotation or SOW, Customer shall pay each invoice within thirty (30) days from the date of the invoice.

5. Change Orders

If Customer desires a change to any SOW, then upon mutual agreement of the parties Varian shall issue a written Change Order in the form of a revised Quotation or revised SOW to Customer. If any Change Order causes a change to the cost of, the time required for, performance, or Schedule of the Professional Services, the appropriate modifications to the SOW shall be reflected in the Change Order.

6. Warranty

Varian warrants that its performance of the Professional Services will be performed in a professional and workman-like manner and substantially conform to the SOW. This warranty shall begin upon completion of the Professional Services and continue for a period of ninety (90) days from such date. In the event that Varian's performance of the Professional Services fails to conform to the SOW, Varian's sole obligation under this Agreement will be to promptly bring the Professional Services into conformity with the SOW at no additional cost to Customer. Where this is not possible, Varian shall be entitled to retain, and Customer shall be liable for payment of, a proportionate share of the total payments set forth in the SOW reflecting Varian's percentage of completion of the work in conformity with the SOW, and Varian shall grant Customer a refund of any additional compensation paid by Customer.

7. Insurance

During the terms of this Agreement Varian agrees to maintain at least the following insurance coverage and provide certificates of insurance evidencing such coverage to Customer upon request:

7.1. **Commercial General Liability** – including products/completed operations, broad form property damage, contractor's protective liability, blanket contractual, advertising injury, and personal injury liability. Minimum limits – $1,000,000 per occurrence and $2,000,000 general aggregate.

7.2. **Business Auto Liability** – including coverage for all owned, non-owned, and hired vehicles. Minimum limits – $500,000 combined single limit per accident for bodily injury and property damage.

7.3. **Worker's Compensation Insurance and Employer's Liability Insurance** – including a waiver of subrogation on behalf of Customer, its shareholders, employees, and agents. Minimum limits – statutory limits and $500,000 employer's liability applicable in jurisdictions of contract performance.

8. Intellectual Property

Except as expressly stated in this Agreement or an SOW, neither party is granted any right, title, or interest in the pre-existing intellectual property of the other. With the exception of any data created for Customer, Varian shall own all right, title, and interest in all inventions and discoveries newly developed in performing the Professional Services.

SUPPORT SECTION

(Formerly Form MGM 1580 Support Schedule)

This Support Section applies to all initial warranty and support for the Varian Products provided by Varian to the Customer under this Agreement, as well as support services agreed to by the parties for periods after such initial warranty or support.

1. **[Intentionally Omitted. Formerly Additional Definitions. This information now resides in the Datasheet accompanying the quotation.]**
2. **[Intentionally Omitted. Formerly Invoicing and Additional Payment Terms, now covered in General Terms Section 3 (Payment).]**
3. **[Intentionally Omitted. Formerly Mandatory Safety Releases. Now covered in Datasheet.]**

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4. **[Intentionally Omitted. Formerly Maintenance Releases. Now covered in Datasheet.]**
5. **[Intentionally Omitted. Formerly Upgrade Releases and Purchase Options. Now covered in Datasheet.]**
6. **[Intentionally Omitted. Formerly Telephone Support. Now covered in Datasheet.]**
7. **[Intentionally Omitted. Formerly Remote Diagnostic and Remedial Support. Now covered in Datasheet.]**
8. **[Intentionally Omitted. Formerly On Site Support. Now covered in Datasheet.]**
9. **[Intentionally Omitted. Formerly Periodic Maintenance Inspections. Now covered in Datasheet.]**
10. **[Intentionally Omitted. Formerly Severity Levels and Response Times. Now covered in Datasheet.]**
11. **[Intentionally Omitted. Formerly Training. Now covered in Datasheet.]**
12. **Customer Responsibilities**

12.1. Authorized Representatives. Customer shall request Varian Services on a time and materials basis and order parts only through its authorized representatives and will provide a list of such authorized personnel upon request by Varian.

12.2. Access to Premises. Customer shall provide Varian with sufficient access to the Covered Products and Customer's premises and personnel to perform its obligations and to install all Mandatory Safety Releases, including access for both remote diagnostics and onsite Services.

12.3. Qualified Operator and Equipment. Customer shall arrange for a qualified operator to be present, when, in the opinion of the Varian Customer Support Representative, the situation requires two (2) persons for safety. To fulfill its Service responsibility, Varian will supply normal hand tools, test equipment, and other specialized fixtures. Customer shall provide other assistance and equipment reasonably required to perform Service responsibilities.

13. **[Intentionally Omitted. Formerly Failure to Maintain. Now covered in General Terms, Section 4.2.3 (Cancellations, Modifications, and Termination).]**
14. **[Intentionally Omitted. Formerly Parts. 14.1-14.3 are now covered in Datasheet. 14.4 and 14.5 are now covered in Hardware Section, Section 7 (Warranty).]**
15. **Software Provided Pursuant to Services**

Any firmware and operating systems provided by Varian pursuant to Services is provided pursuant to General Terms, Section 6 ("Firmware and Operating Systems"), and any Varian Software provided pursuant to Services is provided pursuant to the terms set forth in the Software Section; provided, however, that Varian's provision of such software shall not extend existing warranty periods, if any, nor create any new ones.

16. **Limitations and Exclusions. [Former last two paragraphs regarding system requirements and delays are now covered in Datasheet.]**

Exclusions from Services. The Services provided shall be limited to support of Covered Products. Products not covered include without limitation Customer's network, any hardware upon which a software Covered Product is loaded, any interfaces between Covered Products and other products (other than interfaces between Varian Products), and any products with which the Covered Products interface; however, these restrictions shall not apply to the extent that such network, hardware, interfaces, or products are included as Covered Products. In addition, Varian shall not be required to provide Services for any Products if, in Varian's reasonable opinion, they are required because of Customer's failure to install Mandatory Safety Releases or Maintenance Releases made available to Customer or because of causes other than defects or errors in the Covered Products.

Varian shall not be required to render Services at locations other than the Customer site(s) listed in the Quotation.

17. **[Intentionally Omitted. Formerly Termination. Now covered in General Terms, Section 4.2.1 (Cancellations, Modifications, and Termination).]**

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VARIAN MEDICAL SYSTEMS, INC.
3100 Hansen Way, Palo Alto, CA 94304
("Varian")

Service Support Datasheet

Form RAD 10203 12/11

1. Definitions

1.1. "Covered Product" means a Varian Product for which the parties have agreed in writing to provide Services under warranty or service agreement.

1.2. "Maintenance Releases" means bug fixes, patches, and other error corrections to a software Covered Product designed to enable the software to conform to its documentation and that are made generally available by Varian at no additional cost to the licensees of such Covered Product.

1.3. "Mandatory Safety Release" means updates, error corrections, or modifications to a Software Product that Varian will require licensees of such Product to install and that are made available by Varian at no additional cost to licensees of such Product.

1.4. "Purchase Options" means software applications or modules not included in the software Product or releases of the Software Product that include new features or functionality and that are released and marketed by Varian as Purchase Options.

1.5. "Upgrade Release" means upgrades, enhancements, and improvements to the features or functionality of Software Product that are released and marketed by Varian as Upgrade Releases.

The terms "Covered Product" and "Software Product" shall include all Maintenance Releases and Mandatory Safety Releases, as well as Purchase Options and Upgrade Releases, if any, licensed by Varian to Customer.

2. Mandatory Safety Releases

Varian shall provide Customer with and install Mandatory Safety Releases at no additional cost until the later of (1) the end of life of the Product specified in a notice by Varian, or (2) such later date as required by any regulatory agency.

3. Maintenance Releases

Varian shall provide Customer with and install Maintenance Releases for Covered Products at no additional cost. Varian may, at its election, install Maintenance releases remotely if applicable.

4. Upgrade Releases and Purchase Options

Varian shall offer Upgrade Releases and Purchase Options for Covered Products, along with associated installation and training, to Customer at the prices and upon the terms set forth in the Quotation.

5. Telephone Support

Varian shall provide telephone support Services for Covered at no additional cost through (1) help desk telephone support and (2) technical telephone support.

5.1. Help Desk Telephone Support. Varian shall provide application help desk support for Covered Products at no additional cost during standard hours.

5.2. Technical Telephone Support. Varian shall provide technical telephone support for Covered Products at no additional cost during standard hours.

6. Remote Diagnostic and Remedial Support

Where available and elected by Customer, Varian may provide diagnostic and remedial support Services for Covered Products remotely during standard hours through SmartConnect™ technology or other remote access program at no additional cost.

7. On-Site Support

Where an issue cannot be resolved by telephone or remote support Services, Varian shall provide on-site support Services for Covered Products during standard hours at no additional cost. Where Varian can offer on-site support outside of Varian's standard hours and such support is requested by Customer during such hours, Customer agrees to pay for non-standard hours coverage at the hourly rates set forth in Form 1582 (Labor Rates and Working Hours); provided, however, that such after-hours coverage shall be at no additional cost to Customers who have purchased a non-standard hours coverage option as part of their Service agreement.

8. Periodic Maintenance Inspections

Varian shall provide Periodic Maintenance Inspections ("PMI's") for hardware Covered at mutually agreed upon times with the understanding that unless the parties make other arrangements, Customer shall be expected to give access to Varian to begin performing PMI's before 1:00 p.m. (local time) to enable the PMI's to be completed during standard hours. Where Varian can offer to perform PMI's outside of Varian's standard hours and Customer can give access to Varian to begin performing PMI's before 5:00 p.m. (local time),

Customer agrees to pay for non-standard hours PMI coverage at the hourly rates set forth in Form 1582 (Labor Rates and Working Hours); provided, however, that such after-hours PMI's shall be at no additional cost to Customers who have purchased a non-standard hours coverage option as part of their Service agreement.

9. Severity Levels and Response Times

"Severity Level 1" means an issue which prevents the performance of any mission critical program functions, and which cannot be circumvented or avoided on a temporary basis by Customer.

"Severity Level 2" means an issue which significantly impairs the performance of any mission critical program functions, and which cannot be circumvented or avoided on a temporary basis by Customer.

"Severity Level 3" means an issue which does not prevent or significantly impair the performance of any mission critical program functions, or where such prevention or impairment can be circumvented or avoided on a temporary basis by Customer.

"Severity Level 4" means a low impact issue or documentation issue.

Varian shall give preference to Customers with Covered Products Varian shall respond to Severity Level 1 and 2 issues within thirty (30) minutes and Severity Level 3 and 4 issues by the next business day. Varian shall continue working Severity Level 1 and 2 issues until a solution or acceptable workaround is provided. For extended downtime of a Covered Product Varian's customer support manager shall notify Varian's senior service and sales management, including, when required, product and design engineers. Workarounds do not constitute a resolution of an issue but may result in the issue being reassigned to Severity Level 3. The permanent resolution of Severity Level 3 and Severity Level 4 issues may appear in future product releases. Varian issue resolution efforts may be suspended by agreement of Customer or during such period Customer assistance is required to continue effective work and is not available. Varian will provide contact persons to respond to the different severity level issues. Varian will notify Customer promptly if it is unable to resolve any issue.

10. Training and Professional Services – General Guidelines

10.1. Entitled Training.

a. Classroom training must be attended at the nearest Varian education location, where the class is offered.

b. The suitable delivery mode of "Associated Training" for an upgrade will be determined by Varian. This may include web based digital streaming media or Microsoft® Office Live Meeting.

c. The standard mode of delivering training and training material will be via electronic media.

10.2. Purchased Classroom Training.

a. Where applicable, travel allowance package that is purchased as part of the Service Level Agreement ("SLA"), is applicable only to the "Pre-packaged Training Credits" or the "Technical Maintenance Training." This package must be used within the contract period. No refunds are allowed for unused portions of this package. Travel and lodging must be booked via a Varian authorized travel agent and must comply with Varian's travel and lodging policy.

b. A training event that is part of an SLA or purchased separately will be forfeited if it is scheduled and then cancelled by the Customer within two (2) weeks of the training event date. It cannot be reinstated or rescheduled, except when this training is associated with a software upgrade.

c. Annual flex credits, purchased as a part of SLA, expire at the end of each SLA year, and unused credits do not roll over. Flex credits purchased separately expire after a year if unused. It is recommended to schedule Flex credit classes eight (8) to twelve (12) weeks in advance.

10.3. On-Site Training at Customer's Facility.

a. Each day of on-site training or professional services is defined as eight (8) hours – between 8 a.m. to 5 p.m. local time, normal working days, excluding holidays. Time over eight (8) hours per day will be deducted from remaining balance of the on-site training entitlement.

b. Varian employees and agents shall observe the statutory holiday schedules for both Varian and the Customer, and Customer's site rules while working on the Customer's premises. The Customer shall provide, in advance, a copy of the schedule and rules to Varian.

c. On-site training or professional services requires that the equipment or software to be used for training is available and in good working order. Customer shall provide, at no cost to Varian, the use of office space, services and equipment (such as copiers, fax, machines, modems, and Internet access) as Varian reasonably requires to perform the training or professional services. The customer staff that is to be trained shall be available during the scheduled time of the training event.

d. On-site training, when part of a Service Level Agreement, is in lieu of the "Associated Training" defined in the context of upgrades to the system, and it is not a separate or additional training entitlement. "On-site" applies to the mode of training being on-site as opposed to being delivered by other means, such as via digital media.

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11. Parts

11.1. **Provision of Parts.** Varian shall provide to Customer all parts required in connection with Support Services for Covered Products at no additional cost. Parts provided pursuant to Services shall be included within the definition of "**Products**" for all purposes within Form 1652 except for the length of the warranty period. The Quotation may contain additional terms regarding parts depending on the support level selected by Customer. This section shall not cover parts ordered for spare or stock.

11.2. **Spare Parts Kit.** During the support period for a Covered Product, Customer shall maintain a spare-parts kit including all of the spare parts listed in the Varian standard spare parts list for such Covered Product.

11.3. **Parts Inventory.** Spare parts that the Customer has on hand shall be available to the Varian Customer Support Representative. If the Covered Product is under warranty or under a service agreement, the part will be replaced by Varian at no additional cost. If the Covered Product is not under warranty or under a service agreement, it is the responsibility of the Customer to replenish the spare parts stock.

12. Customer Responsibilities

Customer is responsible for purchasing any additional hardware, network capacity, or other system components required to operate any Upgrade Releases or Purchase Options. Varian shall not be required to provide or support any Upgrade Release or Purchase Option under warranty or an agreement to provide Services if Customer has not obtained the required hardware, network capacity, or other system components.

Varian shall have no responsibility or liability for delays caused by Customer.

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Supplemental Terms and Conditions

Notwithstanding anything to the contrary set forth in Form RAD 1652 (Terms and Conditions of Sale), the Quotation shall be governed by the following supplemental terms and conditions. To the extent there is a conflict between Form RAD 1652 and these Supplemental Terms and Conditions (**"Supplemental Terms"**), these Supplemental Terms will prevail.

Term and Termination of Services Agreements

If Customer is ordering post-warranty maintenance Services (**"PW Services"**) before the expiration of: the hardware warranty; the initial software support or warranty period; or a prior agreement for maintenance Services (collectively, the **"Prior Support Agreements"**); then the initial term for the PW Services (**"Initial Term"**) shall begin immediately upon the expiration or termination of the support obligations under the Prior Support Agreement. If Customer is ordering PW Services for Products that are not currently covered under Prior Support Agreements, then the Initial Term shall begin when Customer signs the PW Services Quotation for those Products or issues a purchase order referencing it.

PW Services agreements shall automatically renew for successive periods of one year (**"PW Renewal Agreements"**), unless either party provides the other with a written notice of its intention not to renew sixty (60) days prior to the time that the PW Services agreement expires. The PW Renewal Agreement price shall be adjusted based on the increase in the Consumer Price Index table published by the U.S. Bureau of Labor Statistics for all Urban Consumers (**"CPI"**) for the most recently published percentage change for the twelve (12)-month period preceding the PW Services Agreement anniversary date.

Customer may terminate any PW Services agreement for convenience by: (1) notifying Varian of its intention to terminate in writing one hundred twenty (120) days prior to expiration of the then current term; and (2) paying Varian: (a) the amount that the costs of upgrades, updates, installation, and training provided by Varian to Customer for the time period measured retroactively from the termination date to the start of Service coverage under the PW Services agreement, up to a maximum of twelve (12) months, exceeds the amount of PW Service fees paid for that period for such costs; plus (b) an early termination fee of fifty percent (50%) of the PW Service fees that would have been due to Varian, if the PW Services agreement had not been terminated and had instead continued for the remainder of its then current term. Customer must pay the compensation and early termination fee invoice within thirty (30) days of its receipt of an invoice from Varian.

Invoices

Varian may invoice Customer thirty (30) days prior to the start of Services coverage for the Products and Services shown on a Services agreement or, if the agreement states that the Services will be billed in increments (such as annual or quarterly payments), then Varian may invoice Customer thirty (30) days prior to the start of the increment identified on the Services agreement.

Customer Changes Prior to Installation

The Products, Services, and prices listed on the Quotation are based on Customer's software, hardware, and information technology infrastructure (*e.g.*, servers, networks, and workstations) that either (a) exist at Customer's facility at the time the Quotation is prepared, or (b) will exist on the Product installation date as communicated by Customer to Varian at that time the Quotation is prepared (**"Customer IT Environment"**). If Customer changes its Customer IT Environment prior to Product installation or delivery of the Services, the Products, Services, and prices listed on the Quotation may no longer be valid. Customer agrees that if it changes its Customer IT Environment prior to installation of a Product on the Quotation, then Customer must pay: (1) any price difference between the Product version or model listed on the Quotation and the version or model available at the time of actual installation (**"Current Version"**); (2) the price of any new hardware or software prerequisites then necessary for the Current Version of the Product to operate in the changed Customer IT Environment; and (3) any price difference between the Services listed on the Quotation and the Services needed to fully install the Current Version.

Hardware Prerequisites for Software Upgrades and Updates
If Customer has purchased upgrades or updates to Varian Software Products or is otherwise entitled to them under a Quotation, Customer is responsible for purchasing any additional hardware, software or information technology infrastructure products that are necessary in order to operate those upgrades or updates, unless Customer has also purchased a hardware refresh option for that Varian Software from Varian.

Third Party Products and Services
The combination or use of Varian Products with products or services that Customer has created or purchased from third parties ("**Third Party Purchases**") may: cause adulteration of those Varian Products which are medical devices; degrade the performance of Varian Products; create new cybersecurity risks for Customer's facility; or otherwise impair the safe, effective, and efficient use of Varian Products. Varian shall have no responsibility for any service or warranty work required due to Third Party Purchases, and Customer shall remain wholly responsible for any negative consequences to it or to others that result from those Third Party Purchases.

Varian Hardware Removal Service
Varian has a no-charge removal service for Varian hardware products that complies with all disposal procedures and regulations that apply to the electrical and electronic components contained in Varian's hardware products. Whenever Customer decides that it will no longer use a Varian hardware product at its facility, Customer must notify Varian promptly and in writing, so that Varian may evaluate whether or not to remove the Varian hardware product under Varian's removal service at no charge to Customer. The no-charge removal shall be subject to the availability of personnel of Varian and, if applicable, its riggers or other subcontractors. If Varian approves the no-cost removal, Varian will make arrangements with Customer to pick-up the Varian hardware product at a time that is convenient to Customer and to Varian. Varian shall have no obligation for environmental or radiation safety issues already existing at the location where the Varian hardware product is installed. Varian shall not compensate Customer in cash, credit, or any other means for the removed Varian hardware products. This service shall not apply to non-Varian hardware products.

Siemens Medical Solutions USA, Inc.
40 Liberty Boulevard, Malvern, PA 19355

SIEMENS Healthineers

SIEMENS REPRESENTATIVE
Emily Hale - (484) 683-1008

PRELIMINARY PROPOSAL

Customer Number: 0000241107

Date: 2/6/2017

ALLIANCE ONCOLOGY
1801 WEST END AVE STE 700
NASHVILLE, TN 37203

POS required
Valid until 3/30/2017

Quote Nr: **1-CL5ESL Rev. 2**

SOMATOM Definition AS - New Scalable Configuration

All items listed below are included for this system: *(See Detailed Technical Specifications at end of Proposal.)*

Qty	Part No.	Item Description
1	14444269	**SOMATOM Definition AS(Open 20 RT)** Start the RT Challenge with an advantage The SOMATOM Definition AS (AS Open, 20-slice configuration) is especially designed for the specific needs of radiation therapy planning. The large bore of 80cm and the accurate table alignment allow for high precise patient positioning in typical treatment positions. In the HD Field of View outside the scan Fieid of View, objects are visualized with an image quality suited for radiation therapy planning. Besides advanced routine CT examinations the SOMATOM Definition AS (AS Open, 20-slice configuration) offers a number of dedicated RTP functionalities making it the first high-end CT system to cover the needs of both, diagnostic radiology and radiation therapy customers. The scanner comes with the future built in and can be upgraded to enhance your clinical practice including 64 slices, 4D motion management, CT perfusion or interventional procedures. Using Siemensâ€(tm) unique STRATON tube the SOMATOM Definition AS has neither warm-up nor cooling delays and can provide fast sub-millimeter volume coverage and a high rotation time for excellent temporal resolution. Additionally, its large bore of 80 cm and a table load capacity of up to 307 kg (optional) opens CT to all patients, meaning that virtually no patient is excluded and even clinically challenging cases like in the ED or bariatric patients can be imaged rapidly from head to toe without difficulty.
1	14433619	**RT Pro edition** The RT Pro edition of SOMATOM Definition (AS Open x-slice configuration) has been specifically designed with the needs of Radiation Therapy Professionals in mind and expand further the capabilities of the scanner. New features such as MARIS (Metal Artifact Reduction in Image Space) and the HD FoV Pro improve visualization so that images are even better suited for treatment planning. Motion management capabilities have been extended - supporting prospective, retrospective scanning and the creation of AverageCT and temporal MIPs images for easy assessment of tumor motion. Finally, this edition supports the use of Dual Energy as the basis for promising new avenues in Radiation Therapy.
1	14420773	**FAST CARE Platform** Siemens' unique FAST CARE platform is set to raise the standard of patient-centric productivity. Utilizing FAST - Fully Assisting Scanner Technologies -, typically time-consuming and complex procedures during the scan process are extremely simplified and automated, not only improving workflow efficiency, but optimizing the overall clinical outcome by creating reproducible results, making diagnosis more reliable and reducing patient burden through streamlined examinations. Siemens' desire for as little radiation exposure as possible lies at the heart of the CARE -

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PRELIMINARY PROPOSAL

Qty	Part No.	Item Description
		Combined Applications to Reduce Exposure - research and development philosophy offering a unique portfolio of dose saving features, many of them being introduced as industry's first.
1	14420771	**CARE Child** Dedicated pediatric CT imaging, including 70 kV scan modes and specific CARE Dose4D curves and protocols
1	14433993	**FAST Planning #AWP** Direct, organ-based setting of scan and recon ranges for a faster and more standardized workflow
1	14433820	**DoseMAP** DoseMAP - Siemens CT Dose Management Program - creates transparency in dose values and makes it possible to assess the dose situation. It improves security by setting dose alerts. DoseMAP has three components for complete and comprehensive dose management: Report, Analyze, and Protect.
1	14444245	**syngo DE Scan for Single Source#AWP** The syngo Dual Energy Scan for Single Source option offers the possibility to acquire two spiral data sets in sequence at different energies. The results are two data sets with diverse information.
1	14444246	**FAST DE Results #AWP** With FAST DE Results you can select Dual Energy applications at the AWP and the results will be sent directly to the PACS for a straight forward Dual Energy workflow.
1	14408032	**Rear cover incl. gantry panels** Rear Cover including gantry control panels with control functionality from the backside.
1	14408022	**Cooling System Air** Air cooling for the dissipation of heat generated in the gantry.
1	14447066	**Multi-purpose table & RTP Table Top** Multi-purpose table designed for RTP including the Siemens RT table top Fully compliant with TG-66 guidelines with a deflection of <2mm. Patient table to support up to 200 cm scan range or up to 165 cm scan range with RT table top. Motor-driven table height adjustment from min. 55 cm to max. 92 cm, longitudinal movement of the tabletop 200 cm in increments of 0.5 mm, positioning accuracy (horizontal) is +/- 0.5 mm. The accuracy of the repositioning (horizontal) is specified as +/- 0.25 mm. Table height can be controlled alternatively by means of foot switch (2 each on both sides of the patient table). In the case of emergency stop or power failure, the tabletop can also be moved manually in horizontal direction. Max. table load: 227 kg/500 lbs (with bariatric table top up to 307 kg/676 lbs); table feed speed: 1-200 mm/s; distance between gantry front and table base 40 cm. Items included: • RTP table Top • Belt Set • RTP Phantom • Phantom holder • Phantom tool
1	14420779	**RTP Excellence Package** The RTP excellence kit contains a high accuracy installation and adjustment procedure utilizing additional installation tools and a special laser phantom including the required laser system (both part of the package that remains at the customer site) to optimize the accuracy of the system. The RTP excellence kit also contains two index bars.
1	14444261	**Respiratory Gating & Triggering#AWP** The Respiratory Gating and Triggering option is comprised of software components that allow for the capture and

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		storage of a signal representing a patient's respiratory cycle during a spiral or sequence CT acquisition. With the Respiratory Gating feature, the respiratory data is synchronized with the CT acquisition data so that a user can freely select the point at which images are retrospectively reconstructed based on the corresponding respiration amplitude. With the Respiration Triggering feature, the user prospectively selects a point in the respiratory cycle at which sequence images will be acquired.
1	14444254	**Extended Lung Scan** For slow breathers, extended lung scan allows a full 4D lung scan.
1	CT_PM	**CT Project Management** A Siemens Project Manager (PM) will be the single point of contact for the implementation of your Siemen's equipment. The assigned PM will work with the customer's facilities management, architect or building contractor to assist you in ensuring that your site is ready for installation. Your PM will provide initial and final drawings and will coordinate the scheduling of the equipment, installation, and rigging, as well as the initiation of on-site clinical education.
1	CT_STD_RIG_INST	**CT Standard Rigging and Installation** This quotation includes standard rigging and installation of your CT new system. Standard rigging into a room with reasonable access, as determined by Siemens Project Management, during standard working hours (Mon. - Fri./ 8 a.m. to 5 p.m.) It remains the responsibility of the Customer to prepare the room in accordance with the SIEMENS planning documents. Any special rigging requirements (Crane, stairs, etc.) and/or special site requirements (e.g. removal of existing systems, etc.) is an incremental cost and the responsibility of the Customer. All other "out of scope" charges (not covered by the standard rigging and installation) will be identified during the site assessment and remain the responsibility of the Customer.
1	CT_CROSS_TL	**CT Cross Trainer (Printed Self Study)** The CT CrossTrainer Program is a printed self-study course provided and administered by MIC and is intended for (1) imaging professional. StudyModules(tm) present CT in an easy to learn, interactive format with a comprehensive scope including physical principles, hardware and software, image parameters selection, image formation, safety, contrast administration, artifact prevention, patient handling, routine and advanced imaging techniques, and an abundance of images and illustrations. - Target audience: Any technologist seeking to learn CT imaging. Prior CT experience is not required. - Specs: 6 StudyModules, 15 hours of study time, 17 Cat A CE credits - Time limited: A 6 month term of enrollment provides an opportunity to earn the associated CE credits starting on the date the course materials are shipped. Upon expiration of enrollment, unearned credits are forfeited without refund.
1	SY_PR_TEAMPLAY	**teamplay Welcome & Registration Package** teamplay is a cloud-based network that brings together your imaging modality users, the systems' dose and utilization data, and the users' expertise to help you improve the delivery of care to your patients. Basic features are provided free of charge. Premium features (benchmarking, non-Siemens devices) are provided on a trial basis for three months at no charge, and may be used thereafter on a subscription fee basis. To register: http://teamplay.siemens.com/#/institutionRegistration/1
1	CT_EDUOPTION1	**Clinical Education & Training: Option 1** Siemens offers multiple options for clinical education and training on your new system. These options enable a more personalized approach to the introduction to system operation, features, and benefits and will help ensure that your technologists and physicians have the opportunity to engage in the level and type of training that best meets your current clinical needs and business objectives. The following items are the training and education modules essential for the operation of your new Siemens system and are recommended for technologists and/or physicians with some knowledge and experience on the same or similar Siemens' system and performing routine procedures.
1	CT_INITIAL_24	**Initial onsite training 24 hrs** Up to (24) hours of on-site clinical education training, scheduled consecutively (Monday - Friday) during standard

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Qty	Part No.	Item Description
		business hours for a maximum of (4) imaging professionals. Training will cover agenda items on the ASRT approved checklist. Uptime Clinical Education phone support is provided during the warranty period for specified posted hours. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	CT_CTTHRPYCL	**CT for the Therapy Professional, w/Trave** Tuition for (1) imaging professional to attend Siemens class at Siemens Training Center or designated training facility. This course is designed to introduce the Radiation Therapist to CT (Computed Tomography) as it is used in the Oncology environment. Through the use of lectures, presentations, system- and simulator-based hands-on, participants will review diagnostic CT basics and physics, Siemens' proprietary imaging software syngo(r), scan acquisition and reconstruction parameters, and dose optimization techniques as they pertain to oncology. Additionally, learners will be introduced to Siemens' virtual simulation software VSim and will alsc gain valuable information regarding Respiratory-Gated imaging. This class includes lunch, economy airfare, and lodging for (1) imaging professional. All arrangements must be arranged through Siemens designated travel agency. This educational offering must be completed by the later of (12) months from purchase or install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	CT_FOLLOWUP_16	**Follow-up training 16 hrs** Up to (16) hours of follow-up on-site clinical education training, scheduled consecutively (Monday - Friday) during standard business hours for a maximum of (4) imaging professionals. Uptime Clinical Education phone support is provided during the warranty period for specified posted hours. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	CT_ELEARN	**e.learning CEU subscription (12 mths)** This (12) month multi-modality e.learning subscription will provide access for (10) imaging professionals at the customer site to utilize up to (50 CEUs). This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
4	CT_ECLASS	**e.class Virtual Instructor Led (1hr)** Tuition for up to (4) imaging professionals to participate in a Siemens instructor led virtual class. The virtual setting allows the participant to benefit from classroom training without the need to travel to a Siemens training center. This educational offering must be completed (12) months from install end date. If training is not completed within the applicable time period, Siemens obligation to provide the training will expire without refund.
1	LAPDORNAVGRWALL	**LAP Dorado/Green/CARINAnav/Wall** Includes: Three movable solid state red crosshair lasers on a computerized rails. CARINAnav Virtual Simulation Patient Laser Marking System compatible with all DORADO laser systems. Each laser rail contains two Class II 532nm green diode lasers. Six axes adjustment. Final adjustment without removing the cover. Positioning and travel accuracy < 0.3 mm. Each rail contains a microcomputer, an absolute encoder for dual feedback position verification. Auto calibration. On-rail function processing. Variable speed laser movement. Brackets for angular installation. Bi-directional data communication between control software and the laser rails. Wilke laser alignment installation and quality assurance phantom with calibrated level and leveling plate. The CARINAnav system is LAP's state of the art tablet wireless access control unit with a modern graphical touchscreen user interface. The CARINAnav software intuitively displays three point isocenters, skin markers, MLC points, and reference points in an easy to read tabular format. Data is imported via the LAP proprietary file format interface. Key Features: In CT Room Touchscreen Tablet PC LAP Proprietary File Format Interface

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Qty	Part No.	Item Description
		Wireless BT Communication Medical Grade Touchscreen Tablet Computer 10" Touchscreen Interface Docking Charger Station w/ Wall Mount Bracket Operating System: Windows 8 One year warranty through LAP Installation by LAP must be included and is sold as a separate line item (LAPLI3).
1	LAPLI3	**Installation, LAP Laser System**
1	4SPAS014	**Low Contrast CT Phantom & Holder**
1	CT_UPS_DEF_AS	**Standard UPS for Definition AS** The standard partial system uninterruptible power system (UPS) is built directly into the power distribution cabinet (PDC) and supports the critical circuits for table and gantry electronics, console computer, image reconstruction system, and the internal Ethernet switch (to ensure connectivity). This enables safe removal of patient if outage occurs during scanning. The UPS allows for a safe shutdown of the CT scanner in the event of power interruption. The UPS provides 5-7 minutes of power, during which the user is prompted and guided through the process to perform a safe shutdown of the system. This safe shutdown ensures that no data is lost.
1	CT_LUNGIMAGASPL	**Lung Imaging** For well over a decade, CT has been recognized and used as the standard of care for lung nodule detection and sizing. This is due to CT's spatial resolution, geometric accuracy, and ability to create various reconstructions and 3D views. The high contrast environment in the chest between the lungs and the nodules makes for a relatively easy detection task for clinicians using CT images. Recent advances in CT technology have allowed these scans to be effectively performed at lower doses, higher resolutions, and faster scan times. The SOMATOM Definition AS+ CT is indicated for use in low dose lung cancer screening for high risk populations*. The AS+ is delivered with two specific scan protocols to provide low dose lung cancer screening exams at approximately 1.3 mGy CTDI for a standard size adult. These default protocols utilize Siemens proprietary dose reducing features such as CARE Dose4D(tm), automatic exposure control technology that modulates and adapts dose for every patient, for high image quality at low dose. *As defined by professional medical societies.
1	ACCESS_PROTECT	**Access Protection** Scan Protocols are password protected allowing only authorized staff members to access and permanently change protocols
1	ADAPT_DOSE_SHIELD	**Adaptive Dose Shield** Adaptive Dose Shield for spiral acquisition to eliminate pre- and post-spiral over-radiation.
1	CARE_ANALYTICS	**CARE Analytics** Stand-alone tool, for installation in any PC in the hospital network, allowing evaluation of DICOM dose Structured Reports (DICOM SR)
1	CARE_DASHBOARD	**CARE Dashboard** Visualization of activated dose reduction features and technologies for each scan range of an examination to analyze and manage the dose to be applied in the scan
1	CARE_DOSE4D	**CARE Dose4D** CARE Dose4D delivers the highest possible image quality at the lowest possible dose for patients - maximum detail, minimum dose. Adaptive dose modulation for up to 60% dose reduction
1	CARE_DOSE_CONFIG	**CARE Dose Configurator** CARE Dose Configurator: Enhancement of Siemens' renowned real-time dose modulation CARE Dose4D, introducing new reference curves for each body region and for each body habitus allowing to adjust the

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Qty	Part No.	Item Description
		configuration even more precisely to the patient's anatomy.
1	CARE_KV	**CARE kV** CARE kV: First automated, organ-sensitive voltage setting to improve image quality and contrast-to-noise-ratio while optimizing dose and potentially reducing it by up to 60%.
1	CARE_PROFILE	**CARE Profile** CARE Profile: Visualization of the dose distribution along the topogram prior to the scan
1	DICOM_SR	**DICOM SR Dose Reports** DICOM structured file allows for the extraction of dose values (CDTIvol, DLP)
1	DOSELOGS	**DoseLogs** Whenever a limit exceeds of the set up reference dose levels (Dose Notification and Dose Alert) automatically a report is created on the system
1	DOSE_ALERT	**Dose Alert** Dose Alert: As requested by the new release of the standard IEC 60601 3rd edition, the SOMATOM Definition automatically adds up CTDIvol and DLP depending on z-position (scan axis). The Dose Alert window appears, if either of these cumulative values exceeds a user-defined threshold.
1	DOSE_NOTIFICATION	**Dose Notification** Dose Notification: As requested by the new release of the standard IEC 60601 3rd edition, the SOMATOM Definition AS provides the ability to set dose reference values (CTDIvol, DLP) for each scan range. If these reference values are exceeded the Dose Notification window informs the user.
1	FAST_ADJUST	**FAST Adjust** FAST Adjust: assists the user to handle system settings in a fast and easy way by automatically solving of conflicts within user defined limits by one single click on the FAST Adjust button. The limits for scan time and tube current per scan are defined via the Scan Protocol Assistant. FAST Adjust offers an undo functionality to return to previously set values.
1	FAST_SCAN_ASSIST	**FAST Scan Assistant** FAST Scan Assistant: An intuitive user interface for solving conflicts by changing the scan time, resp. the pitch and/or the maximum tube current manually.
1	NEMA_XR-29	**NEMA_XR-29 Standard** This system is in compliance with NEMA XR-29 Standard Attributes on CT Equipment Related to Dose Optimization and Management, also known as Smart Dose.
1	SURE_VIEW	**SureView** Provides exceptional image quality at any pitch setting, enabling you to scan faster because you can scan at any pitch without degrading image quality
1	UFC_DETECTOR	**UFC Detector** Ultra Fast Ceramics (UFC) technology is a unique type of scintillation technology material that quickly and efficiently transforms radiation from the X-ray tube into light signals. Its superb overall quantum efficiency and unique short afterglow enable time-critical X-ray detection at low doses and extremely fast data collection.
1	PSPD250480Y3K	**Surge Protective Device (SPD)**
1	MSCT321	**Stellant D Dual Pedestal w/Certegra WS** New Stellant D Dual Pedestal with Certegra Workstation NO Informatics, but is Informatics ready. Includes Dual Flow as standard. Includes Stellant D, Dual Head, pedestal mounted injector; Certegra workstation; installation and warranty through Medrad.
1	14444255	**Varian RGSC online interface** Cable to connect to Varian RGSC device.

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Qty	Part No.	Item Description
1	14444257	**syngo TrueD - 4D Viewer #AWP** syngo TrueD - 4D Viewer optimizes 4D image assessment by providing the ability to visualize cine loops of respiratory gated studies directly at the acquisition workstation.
1	14444259	**VSim #AWP** syngo VSim provides tools for localization, reference point management, and beam placement. Advanced and model-based segmentation tools are included.

System Total: $676,557

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PRELIMINARY PROPOSAL

OPTIONS on Quote Nr: **1-CL5ESL Rev. 2**

OPTIONS for SOMATOM Definition AS - New Scalable Configuration

All items listed below are OPTIONS:

Qty	Part No.	Item Description	Extended Price
1	14444243	**iMAR #AWP** The iMAR metal artifact reduction algorithm combines three successful approaches (beam hardening correction, normalized sinogram inpainting and frequency split). This allows to reduce metal artifacts caused by metal implants such as coils, metal screws and plates, dental fillings or implants. iMAR is compatible with extended FoV, the extended CT scale as well as the newest dose reduction feature. Along with the new algorithm comes the simple user interface of iMAR enabling easy reconstruction of clinical images with reduced metal artifacts.	+ $32,000
1	14408023	**Cooling System Water** Water heat exchanger for the dissipation of heat loss generated in the gantry to an environmentally friendly cooling water circulation system. This optimizes system availability independently of the cooling water flow rate and temperature. System operation temperature 4 - 16 degrees C and 500 - 2500 l/h flow rate.	+ $0
1	14408027	**Cooling System Water/Air #split** Water-to-air heat exchanger for the dissipation (to the air outside) of heat, generated in the gantry.	+ $15,000
1	14410140	**Trafo for Cooling system Water/Air** The Trafo powers the Cooling System Water/Air	+ $1,800
1	14410248	**Service Switch** Service switch to shut off the outdoor cooling unit for maintenance or in case of emergency	+ $1,800
1	14433611	**Computer Desk, height adjust 110V** The height adjustable table (710 mm to 1100 mm) supports optimal ergonomic working positions at the CT consoles. It allows users to switch between the dynamism of a standing desk and the comfort of a traditional desk.	+ $3,600

FINANCING: The equipment listed above may be financed through Siemens. Ask us about our full range of financial products that can be tailored to meet your business and cash flow requirements. For further information, please contact your local Sales Representative.

Siemens Healthcare is pleased to submit this Preliminary Pricing Proposal. A Preliminary Pricing Proposal is provided for planning purposes only; it is not contractually binding. To receive a contractually binding proposal for the Products listed above, inclusive of Terms, Conditions, and Warranty coverage, please contact your Siemens Healthcare Sales Representative.

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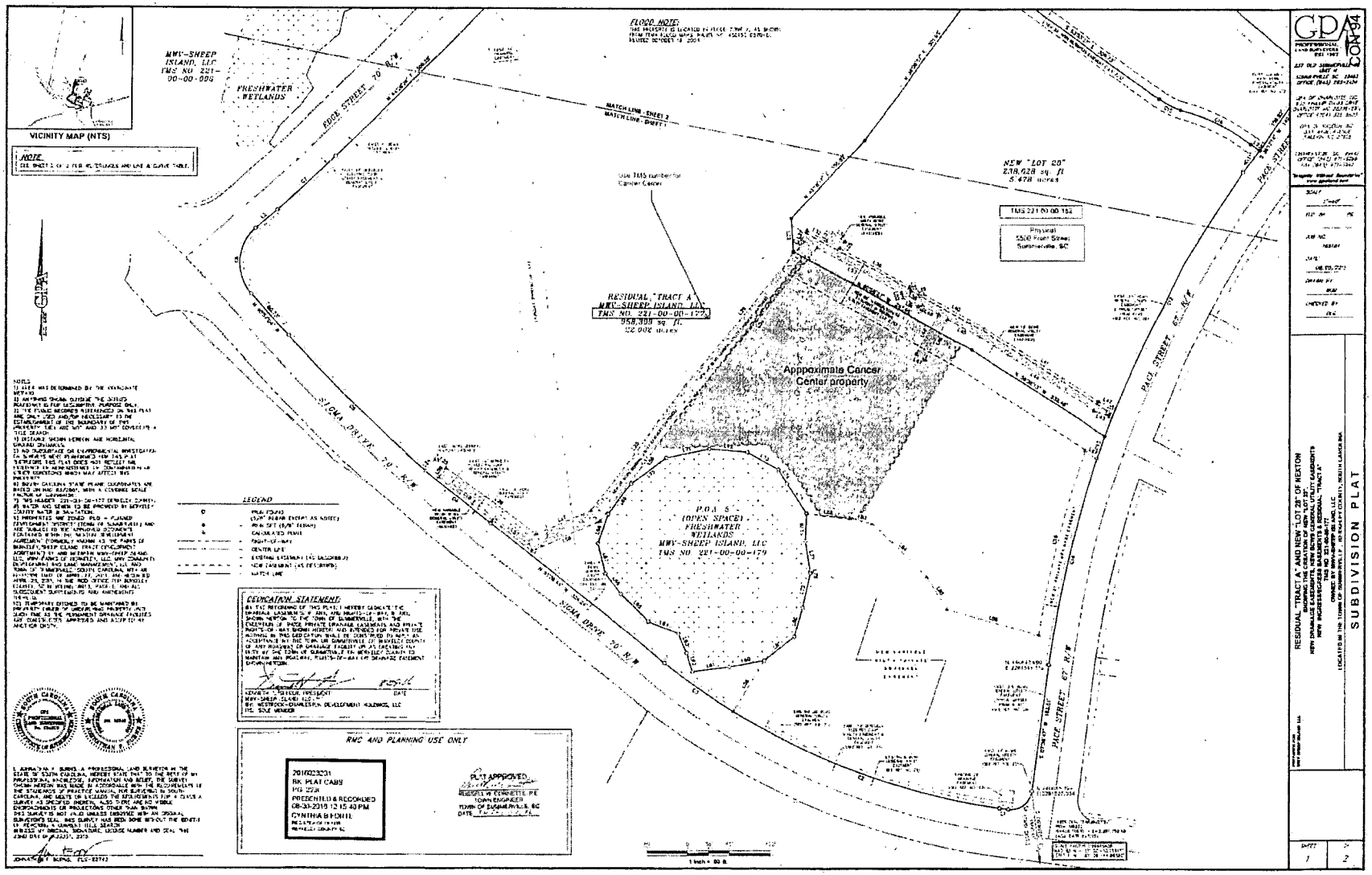
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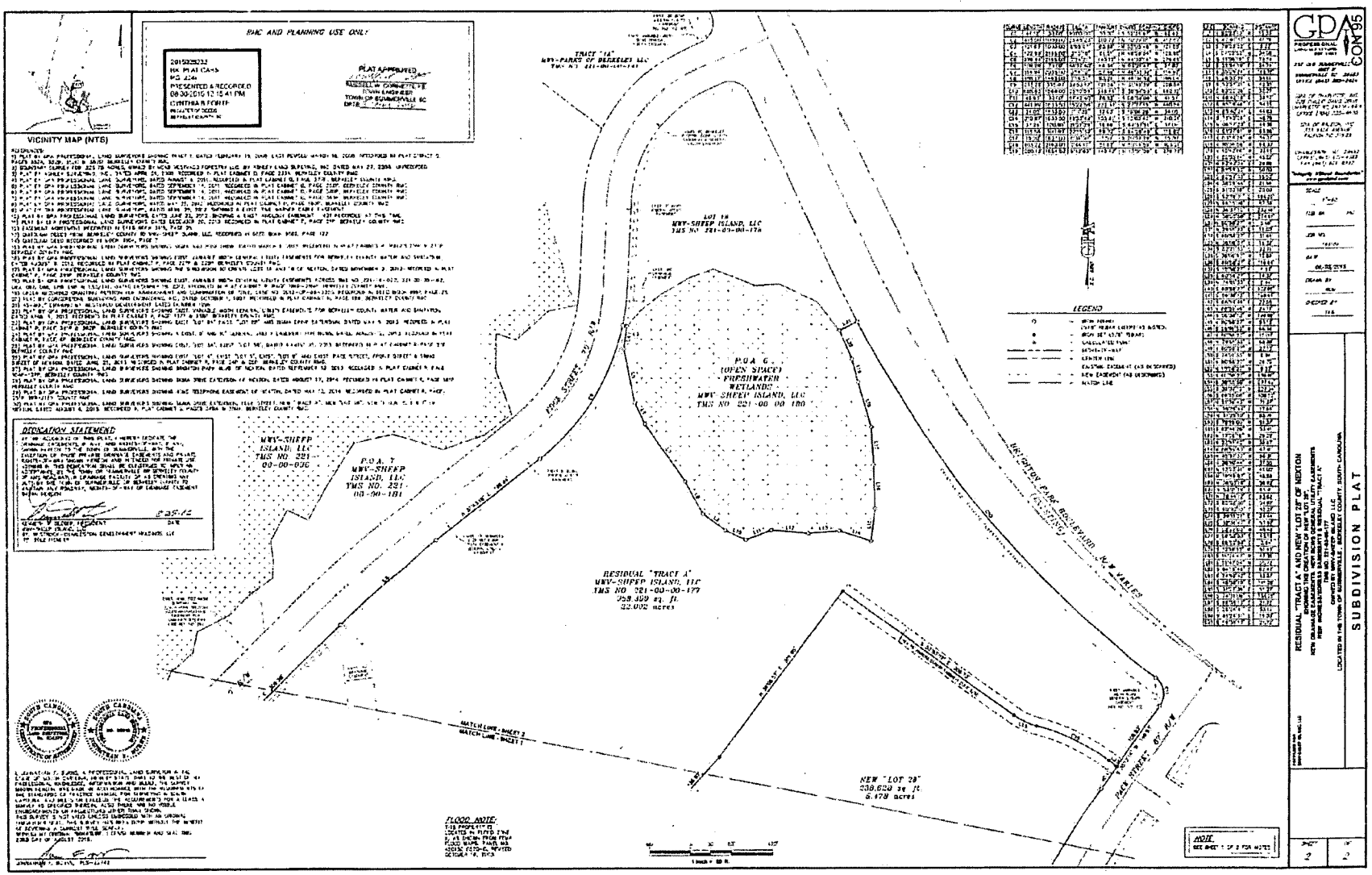
PRELIMINARY PROPOSAL

Siemens Healthcare

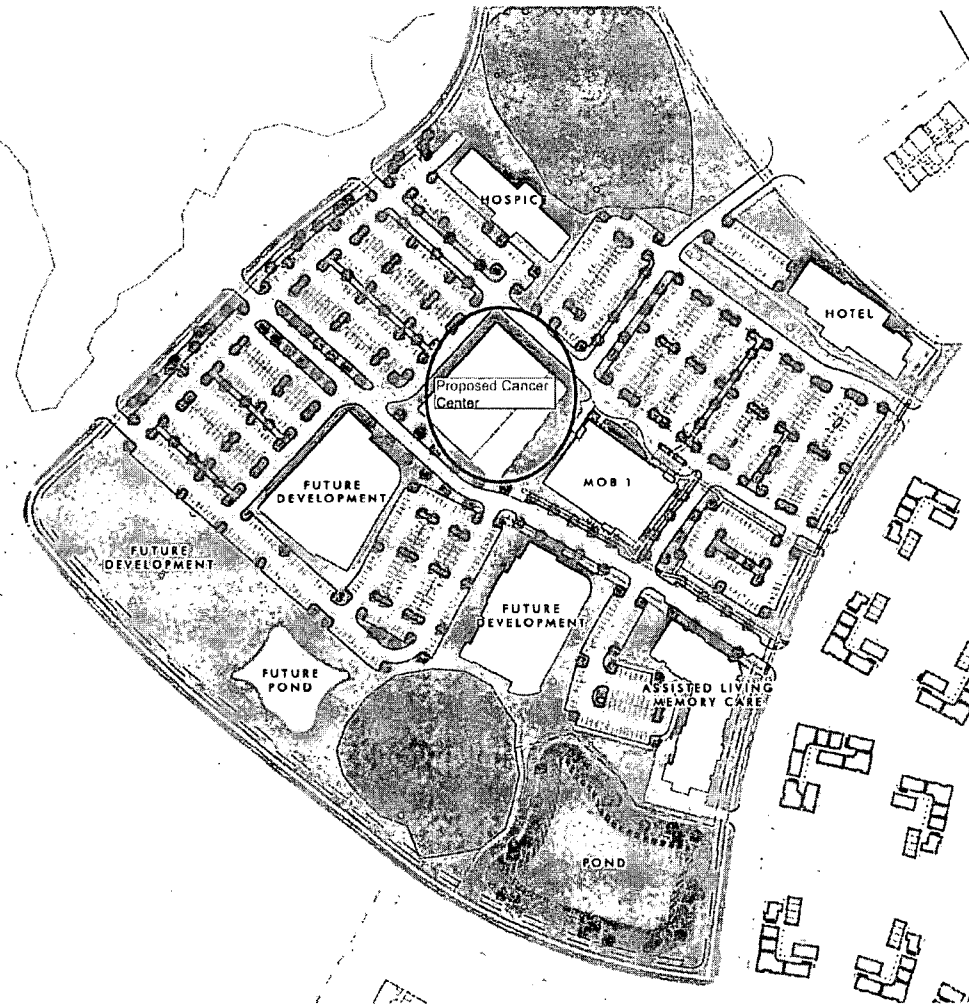
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emily.hale@siemens-healthineers.com


VICINITY MAP (NTS)
NOTE
SEE SHEET 2 OF 2 FOR RESIDUAL AND LINE & CURVE TABLE
MWV-SHEEP ISLAND, LLC TMS NO. 221-00-00-006
FRESHWATER WETLANDS
FLOOD NOTE:
FLOOD STREET 70' R/W
MATCH LINE - SHEET 2
MATCH LINE - SHEET 1
NEW "LOT 28" 238,628 sq. ft. 5.478 acres
TMS 221 00 00 152
Physical 4568 Front Street Summerville, SC
RESIDUAL "TRACT A" MWV-SHEEP ISLAND, LLC TMS NO. 221-00-00-177 958,309 sq. ft. 22.002 acres
Approximate Cancer Center property
SIGMA DRIVE 70' R/W
P.O.S. (OPEN SPACE) FRESHWATER WETLANDS MWV-SHEEP ISLAND, LLC TMS NO. 221-00-00-179
PACE STREET 67' R/W
LEGEND
DEDICATION STATEMENT:
RMC AND PLANNING USE ONLY
20160023231
RK PLAT CABS
PG 272A
PRESENTED & RECORDED
08-30-2016 12:15:40 PM
CYNTHIA B HOYLE
PLAT APPROVED
TOWN ENGINEER
TOWN OF SUMMERVILLE, SC
DATE
1 inch = 80 ft.
GPA CONSULTANTS
RESIDUAL "TRACT A" AND NEW "LOT 28" OF HEXTON
SUBDIVISION PLAT
SHEET 1 2

ROA_1688

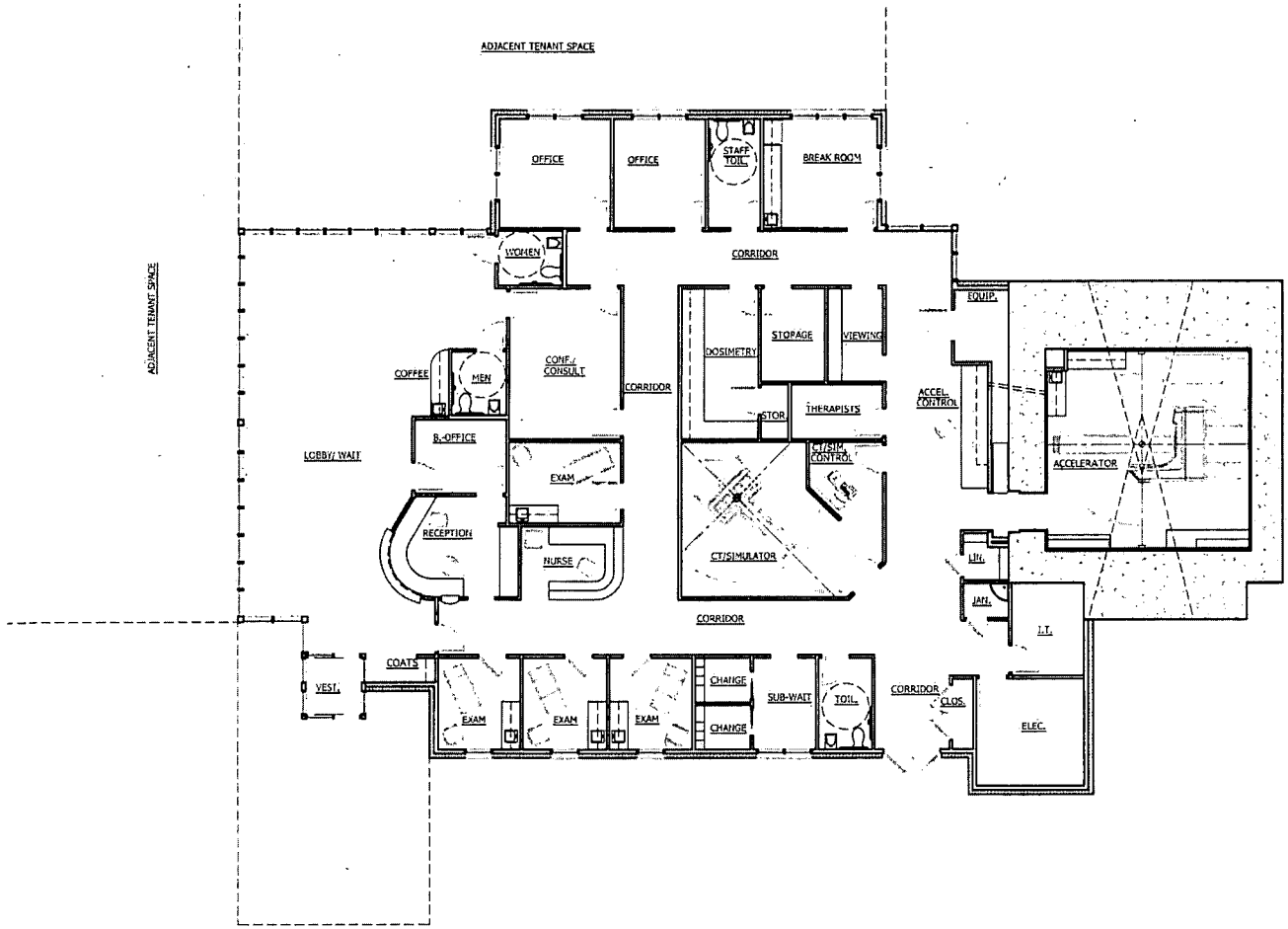

BMC AND PLANNING USE ONLY
PLAT APPROVED
TOWN OF SUMMERVILLE SC
VICINITY MAP (NTS)
DEDICATION STATEMENT
TRACT "1A"
MWV-PARKS OF BERKELEY, LLC
LOT 1A
MWV-SHEEP ISLAND, LLC
P.O.A. 6
(OPEN SPACE)
FRESHWATER
WETLANDS
MWV-SHEEP ISLAND, LLC
MWV-SHEEP
ISLAND, LLC
P.O.A. 7
MWV-SHEEP
ISLAND, LLC
RESIDUAL "TRACT A"
MWV-SHEEP ISLAND, LLC
NEW "LOT 29"
LEGEND
MATCH LINE - SHEET 1
FLOOD NOTE:
NOTE
SUBDIVISION PLAT

ROA_1689



PPCP MEDICAL OFFICE BUILDING
NEXTON, SC

CON 96



FLOOR PLAN

3/32" = 1'-0"

© 02-13-17

architection

MUSC Health

ALLIANCE ONCOLOGY HEALTHCARE

Proposed MUSC Health Radiation Therapy Center
Front Street - Nexton Medical Campus, Summerville, South Carolina

CON 97

architection
Architecture & Construction for Oncology Facilities

MUSC Health / Alliance Oncology
Proposed MUSC Health Radiation Therapy Center
Nexton Medical Campus
Summerville, South Carolina

Radiation Oncology Suite Space Program

February 15, 2017

Entrance / Lobby / Reception	1500	
4 Offices	500	
Conference / Consult	250	
Nurse Station & Support	400	
4 Exam Rooms @ 100 sq.ft	250	
Dosimetry / Physics	250	
Patient Sub-Wait + Dressing	200	
Patient & Staff Restrooms	350	
CT/Simulator + Control	500	
Accelerator + Control	2,000	
Equipment, Electrical, IT & Janitor	350	
Break Room	150	
Storage	200	
Circulation	1,600	
TOTAL	**8,500 sq.ft.**	

CON 98

2/3/2017
MUSC - Cancer Center
Radiation Therapy - Conceptual Cost Estimate

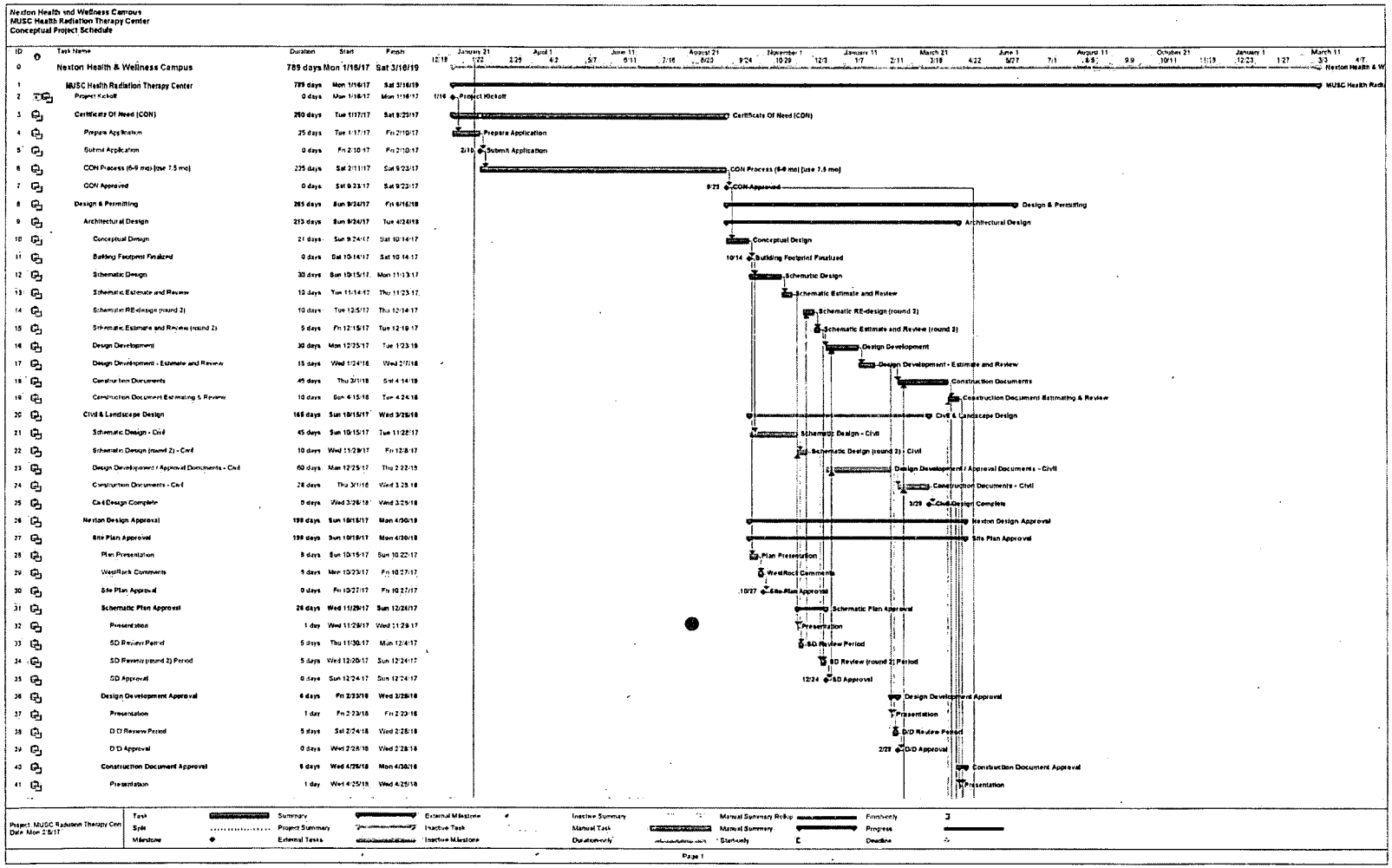
equity healthcare

Description				Total	Cost/SF
Site					
Site Construction				732,427	24.41
Design				75,000	2.50
Contingency	10%			80,743	2.69
Total				**888,170**	**29.61**
Radiation Therapy share	***8,500***	***sf***	***28.3%***	***252,000***	***8.40***
Core & Shell					
Construction	30,000	sf		3,180,000	106.00
Design				195,000	6.50
Contingency	6%			202,500	6.75
Total				**3,577,500**	**119.25**
Radiation Therapy share	***8,500***	***sf***	***28.3%***	***1,014,000***	***33.80***
Tenant Interior Upfit					
Construction				1,594,586	187.60
Design				231,919	27.28
Contingency	6%			110,000	12.94
Total				**1,936,505**	**227.82**

Summary

	Total	*RadTher %*
Site	***888,170***	***252,000***
Core & Shell	***3,577,500***	***1,014,000***
Tenant Interior Upfit	***1,936,505***	***1,937,000***
Total	***6,402,175***	***3,203,000***

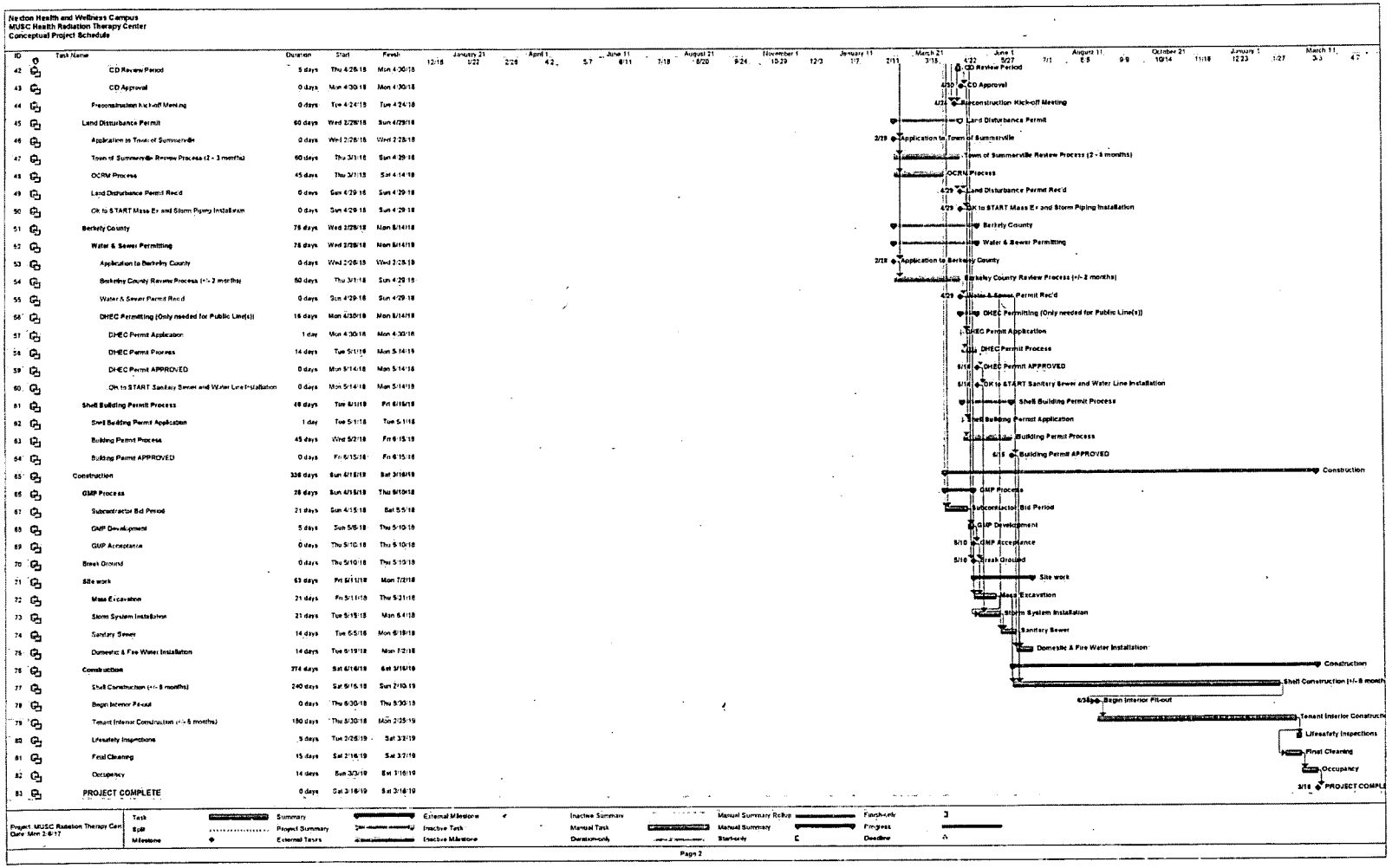
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CON 99


Nexton Health and Wellness Campus
MUSC Health Radiation Therapy Center
Conceptual Project Schedule
Nexton Health & Wellness Campus
MUSC Health Radiation Therapy Center
Project Kickoff
Certificate Of Need (CON)
Prepare Application
Submit Application
CON Process (6-9 mo) [use 7.5 mo]
CON Approved
Design & Permitting
Architectural Design
Conceptual Design
Building Footprint Finalized
Schematic Design
Schematic Estimate and Review
Schematic RE-design (round 2)
Schematic Estimate and Review (round 2)
Design Development
Design Development - Estimate and Review
Construction Documents
Construction Document Estimating & Review
Civil & Landscape Design
Schematic Design - Civil
Schematic Design (round 2) - Civil
Design Development / Approval Documents - Civil
Construction Documents - Civil
Civil Design Complete
Nexton Design Approval
Site Plan Approval
Plan Presentation
WestRock Comments
Site Plan Approval
Schematic Plan Approval
Presentation
SD Review Period
SD Review (round 2) Period
SD Approval
Design Development Approval
Presentation
DD Review Period
DD Approval
Construction Document Approval
Presentation
Page 1

CON 100

Nexton Health and Wellness Campus
MUSC Health Radiation Therapy Center
Conceptual Project Schedule

ID	Task Name	Duration	Start	Finish
42	CD Review Period	5 days	Thu 4/26/18	Mon 4/30/18
43	CD Approval	0 days	Mon 4/30/18	Mon 4/30/18
44	Preconstruction kick-off Meeting	0 days	Tue 4/24/18	Tue 4/24/18
45	Land Disturbance Permit	60 days	Wed 2/28/18	Sun 4/29/18
46	Application to Town of Summerville	0 days	Wed 2/28/18	Wed 2/28/18
47	Town of Summerville Review Process (2 - 3 months)	60 days	Thu 3/1/18	Sun 4/29/18
48	OCRM Process	45 days	Thu 3/1/18	Sat 4/14/18
49	Land Disturbance Permit Rec'd	0 days	Sun 4/29/18	Sun 4/29/18
50	Ok to START Mass Er and Storm Pipny Installation	0 days	Sun 4/29/18	Sun 4/29/18
51	Berkely County	76 days	Wed 2/28/18	Mon 5/14/18
52	Water & Sewer Permitting	76 days	Wed 2/28/18	Mon 5/14/18
53	Application to Berkeley County	0 days	Wed 2/28/18	Wed 2/28/18
54	Berkeley County Review Process (+/- 2 months)	60 days	Thu 3/1/18	Sun 4/29/18
55	Water & Sewer Permit Rec'd	0 days	Sun 4/29/18	Sun 4/29/18
56	DHEC Permitting (Only needed for Public Line(s))	16 days	Mon 4/30/18	Mon 5/14/18
57	DHEC Permit Application	1 day	Mon 4/30/18	Mon 4/30/18
58	DHEC Permit Process	14 days	Tue 5/1/18	Mon 5/14/18
59	DHEC Permit APPROVED	0 days	Mon 5/14/18	Mon 5/14/18
60	Ok to START Sanitary Sewer and Water Line Installation	0 days	Mon 5/14/18	Mon 5/14/18
61	Shell Building Permit Process	48 days	Tue 5/1/18	Fri 6/15/18
62	Shell Bedding Permit Application	1 day	Tue 5/1/18	Tue 5/1/18
63	Building Permit Process	45 days	Wed 5/2/18	Fri 6/15/18
64	Building Permit APPROVED	0 days	Fri 6/15/18	Fri 6/15/18
65	Construction	336 days	Sun 4/15/18	Sat 3/16/19
66	GMP Process	28 days	Sun 4/15/18	Thu 5/10/18
67	Subcontractor Bid Period	21 days	Sun 4/15/18	Sat 5/5/18
68	GMP Development	5 days	Sun 5/6/18	Thu 5/10/18
69	GMP Acceptance	0 days	Thu 5/10/18	Thu 5/10/18
70	Break Ground	0 days	Thu 5/10/18	Thu 5/10/18
71	Site work	63 days	Fri 6/1/18	Mon 7/2/18
72	Mass Excavation	21 days	Fri 5/11/18	Thu 5/31/18
73	Storm System Installation	21 days	Tue 5/15/18	Mon 6/4/18
74	Sanitary Sewer	14 days	Tue 5/5/18	Mon 5/19/18
75	Domestic & Fire Water Installation	14 days	Tue 5/19/18	Mon 7/2/18
76	Construction	274 days	Sat 6/16/18	Sat 3/16/19
77	Shell Construction (+/- 8 months)	240 days	Sat 6/16/18	Sun 2/10/19
78	Begin Interior Fit-out	0 days	Thu 8/30/18	Thu 8/30/18
79	Tenant Interior Construction (+/- 6 months)	180 days	Thu 8/30/18	Mon 2/25/19
80	Lifesafety Inspections	5 days	Tue 2/26/19	Sat 3/2/19
81	Final Cleaning	15 days	Sat 2/16/19	Sat 3/2/19
82	Occupancy	14 days	Sun 3/3/19	Sat 3/16/19
83	PROJECT COMPLETE	0 days	Sat 3/16/19	Sat 3/16/19



CON 101

ROA_1695

Attachment D: Officer of the Licensee

Name	Service Began	Expiration of Terms
Members Representing Medical Profession		
Dr. Donald R. Johnson, II, *Chairman* (First District) Charleston	1994	2018
Dr. James Lemon (Second District) Columbia	2014	2018
Dr. Richard M. Christian, Jr. (Third District)	2017	2018
Dr. Charles B. Thomas, Jr. (Fourth District) Greenville	1996	2020
Dr. G. Murrell Smith, Sr. (Fifth District) Sumter	2013	2020
Dr. Robert C. Gordon (Sixth District)	2017	2018
Dr. E. Conyers O'Bryan, Jr. (Seventh District) Florence	1976	2020
Members, Lay or Non-Medical		
Mr. Michael E. Stavrinakis (First District) Charleston	2013	2020
Mr. William H. Bingham, Sr., *Vice Chairman* (Second District) Columbia	2002	2020
Mr. Charles W. Schulze (Third District) Greenwood	2002	2020
Thomas L. Stephenson, Esq. (Fourth District) Greenville	1998	2018
Ms. Terri R. Barnes (Fifth District) Rock Hill	2014	2018
Ms. Barbara Johnson-Williams (Sixth District) Orangeburg	2013	2020
The Honorable James A. Battle (Seventh District) Nichols	2013	2018

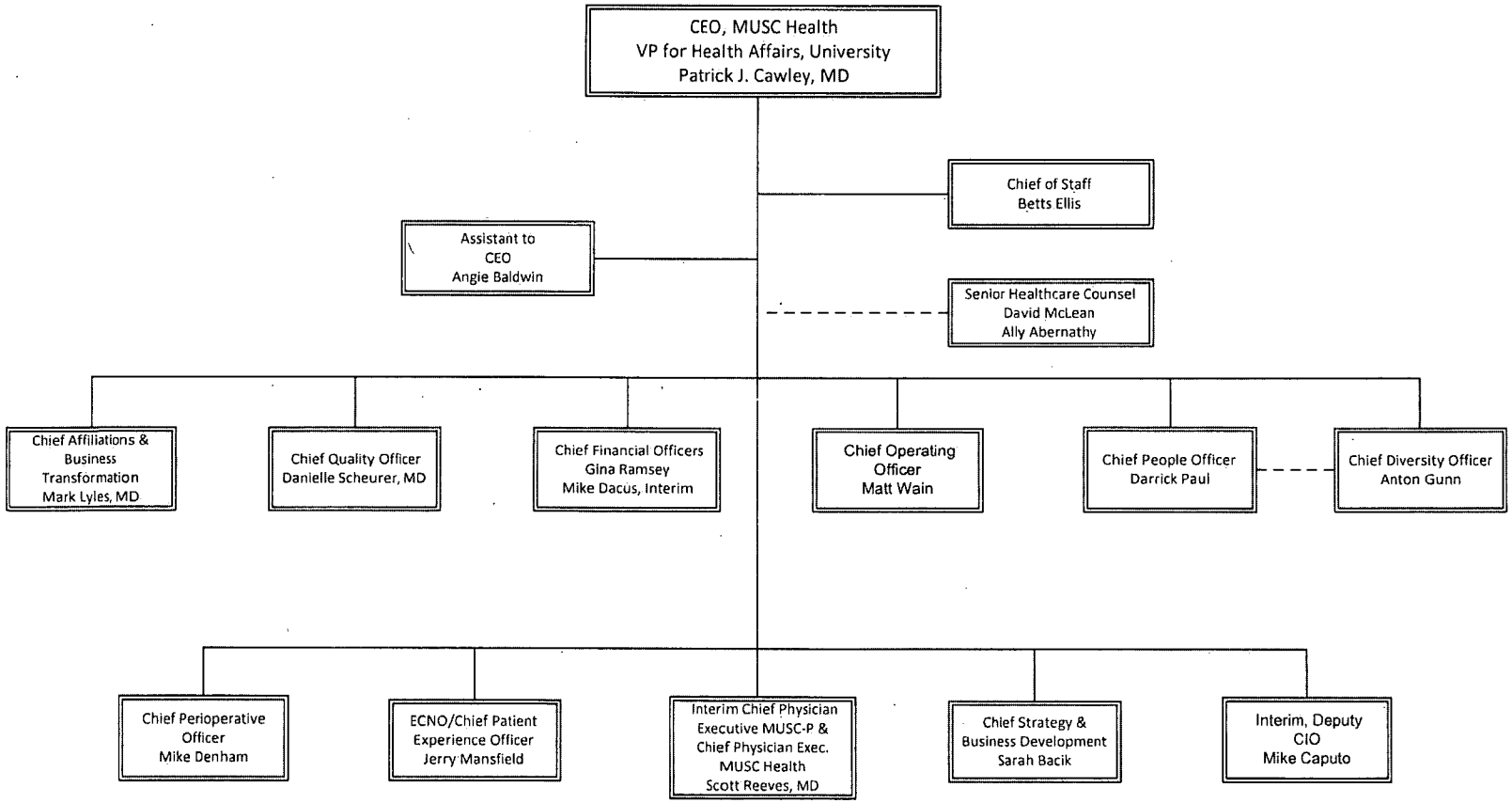
Mr. William A. Baker, Jr.* Charleston	2014***
Dr. C. Guy Castles III** Columbia	2017***

*At-Large Member
**Governor's Designee
***Serves at the pleasure of the Governor

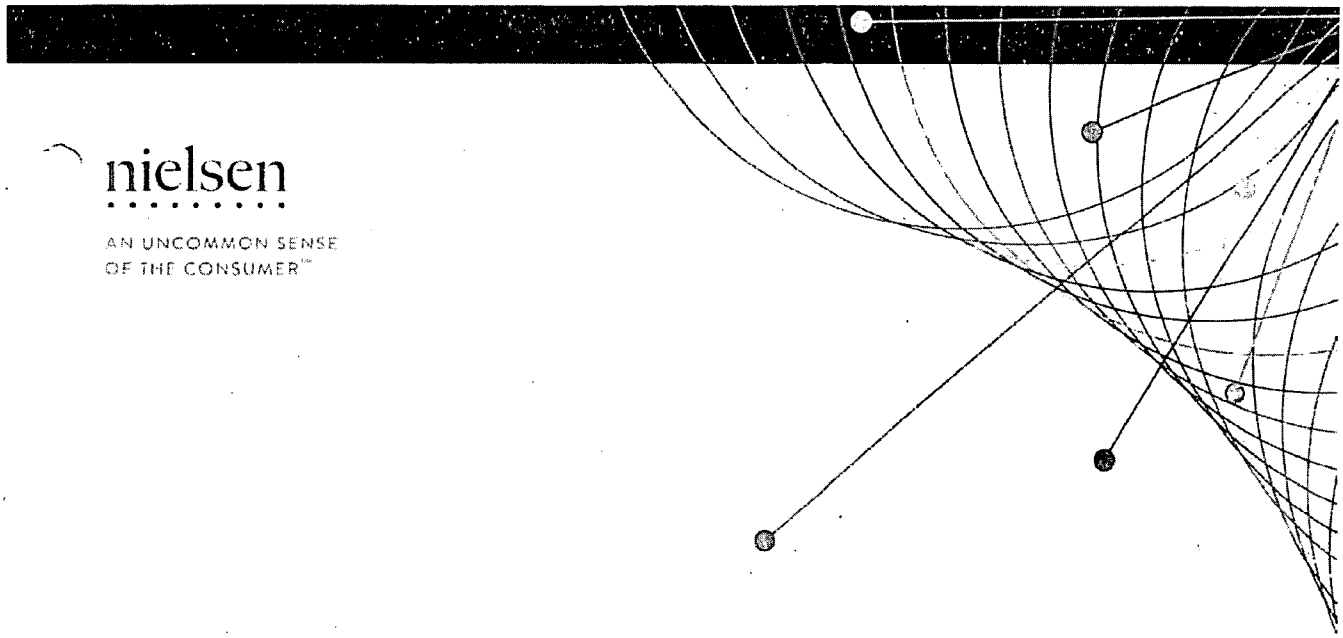
Attachment E: Organizational Chart of the Licensee

MUSC Health
Medical University of South Carolina

MUSC Health Organizational Chart



Attachment F: Population and Patient Data



nielsen

AN UNCOMMON SENSE OF THE CONSUMER™

Nielsen Demographic Update 2015.1 Methodology

August 2014

CON 108

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INTRODUCTION

This methodology document covers the 2015.1 Nielsen Demographic Update. With over 35 years of experience, Nielsen has a proven track record as an industry leader producing quality data. Nielsen maintains this position by continually innovating and improving upon the methodology used for the demographic update. Nielsen utilizes existing and new external data resources that can lead to increased value, and is continually looking to the future and to changes that may impact the demographic estimation process. One example of this has been the replacement of the census long form with the American Community Survey (ACS).

This document will outline the process for the development of the 2015.1 update. It includes household and population data covering more than 4,000 demographic variables from Census 2000, Census 2010, and the American Community Survey, as well as current year estimates and five-year projections.

EXPERIENCED LEADERSHIP

The Nielsen demographics team is headed by Dr. Ken Hodges, who brings a 30-year history of groundbreaking contributions to the field of applied demography. After earning his doctorate in Sociology and Demography from Cornell University, Dr. Hodges joined Nielsen in 1982. During his tenure, Dr. Hodges has developed and refined methods for using consumer database information as input to small area estimates, and adapted standard demographic methods for use in nationwide small area estimates.

In addition to his work at Nielsen, Dr. Hodges' professional involvements include the following:

- Author, A Compass for Understanding and Using American Community Survey Data: What the Business Community Needs to Know
- Board Member, Association of Public Data Users
- Board Member, Council of Professional Associations on Federal Statistics
- Member, Population Association of America Committee on Population Statistics

EVALUATION AND SUPPORT MATERIALS

The Nielsen demographic update is supported by extensive research and evaluation, with results often documented in professional papers. In addition to this methodology document, papers describing the following topics are available:

- Improving the accuracy of block group data from the American Community Survey
- ACS multi-year estimates as proxies for point in time data
- Evaluation of 2010 estimates against 2010 census results
- Evaluation of Nielsen Master Address File counts against 2010 census results
- Comparison of 1996 estimates and 2001 projections from alternative suppliers
- Evaluation of geometric data retrieval methods

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DEMOGRAPHIC UPDATE

The update is a shorthand term for the massive set of demographic estimates and projections produced for the Nielsen Pop-Facts products. ***Estimates*** consist of data prepared for the current year, and ***projections*** (sometimes called forecasts) prepared for dates five years in the future.

The update is brought up to date for many geographic levels including national, state, county, census tract, and block group. Data is also available for commonly-used areas such as metropolitan areas, cities/towns, ZIP Codes, and media areas such as DMAs. Because it is produced for small areas, the update can be easily aggregated to custom geographic areas specified by the user.

The update begins with the estimation and projection of base counts, including total population, household population, group quarters population, households, family households, and housing units. Characteristics related to these base counts are then estimated. Population characteristics include age, sex, race, and Hispanic ethnicity. Households are estimated by age of householder and income. Owner-occupied housing units are estimated by value.

CHANGES TO METHODOLOGY AND DATA SOURCES

Nielsen is always exploring and testing ways to innovate and improve on estimation techniques, to adapt to a changing demographic landscape, and to take advantage of new resources. In recent updates, the following changes were implemented:

The Nielsen Demographic Update continues to implement new ACS data as available from the U.S. Census Bureau. The 2015.1 update makes use of data from the 2012 releases of ACS data. Specifically, the update incorporates one-year ACS data for 2012, three-year data for 2010-2012, and five-year data for 2008-2012.

Since the 2010 update, the formerly ratio-adjusted data items have been significantly upgraded through the use of control totals based on the most recent one-year, three-year, and five-year estimates from the ACS. The 2015.1 Nielsen Demographic Update continues the use of control totals based on the one-year and three-year ACS data, and the use of five-year ACS data for these data items at the block group level. In block groups where the ACS sample is thin, the ACS data is augmented through the addition of responses from nearby neighborhoods.

In addition to the ratio-adjusted data items, the ACS data contributes to the estimates of household income and housing value.

TOP-DOWN VS. BOTTOM-UP METHODOLOGIES

Over the years, some descriptions of small-area estimation methods have emphasized a distinction between top-down and bottom-up methodologies. The distinction is overdone, as estimates produced with pure top-down or bottom-up methods are rare. A pure top-down method might produce estimates at the county level, and then distribute to tracts and block groups without reference to any post-census tract and block group data. This approach has obvious and severe limitations for small areas. On the other hand, a pure bottom-up method

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would use post-census block group data to produce estimates at that level, and then sum to all larger areas, without reference to independent estimates for larger areas such as cities, counties, and states. This approach has severe limitations for larger areas.

Nielsen estimates combine the strengths of top-down and bottom-up methods. Post-census data for tracts and block groups drive the estimates at those levels, while post-census data for counties and states drive the estimates at those levels. The small area estimates are then adjusted to conform with the independent estimates for larger areas. This approach is designed to achieve maximum detail at all levels. Thus it cannot be described as either top-down or bottom-up.

In a bottom-up approach Nielsen identifies growth trends using small area data sources such as USPS, new construction data, and the Nielsen Master Address File (MAF). The MAF contains over 116 million occupied unit records and is informed by various household level sources such as Epsilon, Valassis, and Infogroup.

Once the trends have been identified and estimates have been generated at the block group level, a top-down approach is taken in applying controls that will prevent the generation of unrealistic estimates at larger geographic levels such as county or state. Nielsen utilizes county level data provided annually by the Census Bureau and other federal agencies as control totals for the small area estimates.

TRENDING

To take full advantage of methodological refinements and new data resources, each set of updates begins not with the previous year's estimates, but with data from the most recent decennial census. For this reason, the difference between estimates for consecutive years is not an estimate of change from one year to the next. Change is estimated with reference to the previous census numbers – either from the decennial census or the ACS. It is not recommend to trend current year estimates from one year to the next. Changes in data values could be caused by differing methodologies, new data sources, and/or true change in data values.

ESTIMATION DATE

The target date for estimates and projections is January 1 of the relevant year.

VARIABLE CATEGORIES

The Nielsen Demographic Update includes the categories and data items listed in the sections below.

Population & Race

- Base Count Population, Households, Housing Units, Families, Group Quarters
- Population by Age, Sex, Race, Ethnicity
- Population by Ancestry/Origin
- Population by Language Spoken
- Population by Marital Status
- Means and Medians

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Housing & Household Composition

- Households by Age, Race, Ethnicity, and Tenure
- Owner Occupied Housing Units by Value
- Households by Size (number of persons) and Presence of Children
- Households by Sex of Unmarried Partners
- Housing Units by Year Built
- Housing Units by Number of Units
- Households by Year Householder Moved In
- Households by Vehicles Available
- Housing Units by Vacancy Status
- Means and Medians

Affluence & Education

- Households by Income, Age, Race and Ethnicity of Householder
- Effective Buying Income (EBI)
- Families by Poverty Status
- Population Educational Attainment by Sex and Ethnicity
- Population by Level of School Enrollment
- Means and Medians

Employment & Occupation

- Population by Employment Status and Sex
- Population by Transportation to Work
- Population by Travel Time to Work
- Population by Class of Worker
- Population by Industry and Occupation
- Means and Medians

GEOGRAPHY

The Nielsen demographic update is prepared for a wide range of geographic areas, summarized below.

STANDARD MACRO GEOGRAPHIES	STANDARD MICRO GEOGRAPHIES	INDUSTRY GEOGRAPHIES
Country* [1]	Place [25K+]	Cable [9K+]
State* [51]	Tract* [60K+]	Wire Centers [20K+]
County* [3K+]	Block Group* [200K+]	Yellow Pages Directory (YPD) [7K+]
Designated Market Area (DMA) [200+]	Block* [10M+]	Major & Basic Trading Area Wireless (MTA & BTA) [500 +]
Combined Statistical Area (CSA) [100+]	Zip Code [30K+]	Metro/Rural Service Area for Wireless (RSA) [700+]
Core-Based Statistical Area – Metropolitan/Micropolitan (CBSA) [900+]	Minor Civil Division (MCD) [Includes Census Civil Divisions (CCD)*] [35K+]	
Three-Digit Zip (TDZ) [800+]		

* Census geographies

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DATA OVERVIEW

Base Counts

Base counts are the basic totals for population, households, family households, group quarters population, and housing units. At the national, state, and county geography levels, base count updates are based on estimates from the Census Bureau. At the block group level, base count information is based on sources including trends in United States Postal Service (USPS) deliverable address counts, counts from the Nielsen Master Address File, and Valassis counts of new housing units.

Population Characteristics

Population is estimated for the following demographic characteristics:

- Age
- Sex
- Race
- Hispanic ethnicity
- Age by Sex by Race by Hispanic ethnicity

Population by Age/Sex

Age/sex distribution is estimated using a modified cohort survival method, which ages population based on age/sex specific survival probabilities, and estimates births over the estimation period. Group quarters and other populations that do not age in place are not aged. The method is applied first for counties, estimating forward from the Census Bureau's most recent estimates of population by age/sex at that level. Following the completion of the county age/sex estimates, block group age/sex estimates were produced and controlled to the county estimates.

Population by Race/Ethnicity

Race by Hispanic ethnicity is estimated for 14 categories reflecting single classification race. Estimates are produced first for counties, building from the Census Bureau's most recent estimates of population by race and ethnicity at that level. Block group estimates of race/ethnicity then are produced based on 2000-2010 census trends, identified through the Nielsen conversion of 2000 census race/Hispanic counts to the block groups defined for the 2010 census.

Household Characteristics

Households are estimated for the following characteristics:

- Household income
- Household size
- Age of householder
- Race and ethnicity
- Year householder moved into unit
- Household Income

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Income estimates and projections reflect the census/ACS money income definition, and are produced for current dollar values. Rates of change in median income are estimated first, and then ACS income distributions are advanced to reflect the estimated rate of change. Income estimates at the county level and above reflect income change indicated by the Bureau of Economic Analysis (BEA) income estimates, income statistics from the Internal Revenue Service (IRS), and income estimates from the ACS.

Income change at the block group level is estimated based on recent changes in median income in the ACS, and with reference to income change at the county level.

Distributions of ACS income are advanced to the estimated and projected target dates through a process that estimates the movement of households from one income category to the next based on the specific area's estimated rate of income growth.

Household Size

The distribution of households by size starts with Census 2010 distributions, and advances them to current year based on estimated change in persons per household (average household size). Iterative proportional fitting (IPF) is then used to provide consistency with previously estimated household totals and average household size. For more information about IPF, see the "Additional Terminology" section.

Income by Age of Householder

The income by age estimates are produced after those for population by age and households by income. The household by income estimates serve as totals for the income dimension, but persons by age estimates are converted to householders by age through the use of headship rates reflecting Census 2010 householder by age data. The households by income and householders by age estimates serve as income and age row and column totals for the estimated income by age table. Cell values (specific income by age categories) are estimated through iterative proportional fitting of recent ACS income by age data to the estimated income and age totals. This process yields income by age values that not only sum to the income and age estimates, but also preserve the statistical relationship between income and age for each area as measured by the ACS.

Housing Unit Characteristics

Housing units are estimated for the following characteristics:

- Total number of owner-occupied units
- Value of owner-occupied units
- Year structure built

Housing Value

Housing value is estimated for all owner-occupied housing units. As with income, the method begins with the estimation of a rate of change, which is then used to advance recent ACS distributions to current year and projection year.

At the national level, target rates of change in value are based on change in value estimated by the 2010 ACS, as well as change in the House Price Index from the Federal Housing Finance Agency (FHFA) and the Case-Shiller house price index.

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At the metropolitan area level, the FHFA data is combined with change in median sales price data from the National Association of Realtors (NAR) to estimate change. An additional data source contributing to estimated change at the county level is that containing the most recent estimates of median home value from the ACS. Block group rates of change are estimated based on recent trends in ACS median value estimates, with reference to rates of change at the county level.

As with income, estimated rates of change are used to advance recent ACS distributions to current year and the five-year projection date. The national rates serve only as targets (not control totals) for the county estimates, while the block group estimates are controlled to the county level.

Ratio-Adjusted Tables

In addition to the demographic estimates and projections, past updates provided a series of detailed Census 2000 tables that were ratio-adjusted to relevant current year totals. In recent updates, the formerly ratio-adjusted tables have been transitioned to build from five-year ACS data, and controlled to three-year and one-year ACS data for larger counties, as available.

Census Data Differences and Median Values

There are some instances where users may notice differences between the Nielsen published census data and values as published by the U.S. Census Bureau.

For example, users may see differences in the Nielsen published Census 2000 and Census 2010 data collections in two types of situations:

- Because it is not feasible for Nielsen to calculate true median values, the Nielsen Demographic Update makes use of calculations to estimate median values based on summarized census data. These calculations are also applied to produce specific summarized data. For this reason, users also may notice differing median values between Nielsen demographic products.
- Differences also may be observed due to varied geographic definitions. For example, because the update is now prepared for 2010 census geography, the 2000 census base counts will not always match those published on 2000 census data products.

BASE COUNTS

For this document, base counts include basic totals such as population, households (occupied housing units), family households (households with two or more related persons), group quarters population (persons in dormitories, military quarters, prisons, nursing homes, and other non-household living arrangements), and housing units (a house, apartment, or group of rooms intended to serve as separate living quarters).

Total U.S. Population

Total U.S. population is estimated using Census Bureau estimates of total United States resident population (all persons residing in the United States, regardless of citizenship). The 2015 estimate was a short projection beyond the Census Bureau's most recent post-2010 estimate (for July 2013). Total group quarters population is

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estimated in a similar manner, based on the Census Bureau's most recent estimates for group quarters population (in this case for July 2013).

Total estimated households are derived by subtracting the estimated group quarters population from the estimated total population to derive the total number of persons in households. This figure is then divided by the estimated average household size, or persons per household (PPH). Estimated average household size is based on change in PPH indicated by the Census Bureau's Current Population Survey and the ACS.

Five-year projections of the national base counts are produced by applying recent rates of change to the current year estimates described above. The Census Bureau produces national level projections of total population, but because they are produced infrequently, they serve only as a guideline for the population projections, not as control totals.

State

State population estimates are projections from the Census Bureau's most recent population estimates at the state level. (Census Bureau 2013 estimates were used for the 2015.1 update.) Household totals are estimated indirectly from the completed population estimates. Specifically, the Census Bureau's estimates of group quarters population are projected to 2015. This number is then subtracted from the estimated population to determine estimated household population. The result is divided by estimated average household size (based on inter-censal trends) to determine estimated households.

County

County population estimates are based on the most recent Census Bureau county population estimates, in combination with county population estimates produced by selected states. The Census Bureau estimates lag 18 months behind the Nielsen estimation date, so a series of long- and short-term projections is produced for the target date (in this case, January 1, 2015). The mean of these projections serves as the census-based county population estimate. Where state-produced estimates are available, and contributed to increased detail in the past, these estimates also are projected to current year, and averaged with the census-based estimates. The resulting estimates are then adjusted to conform with the state population estimates described above.

Group quarters population is estimated similarly based on the Census Bureau's county estimates of population in group quarters (in this case, Census Bureau estimates for July 2013). Estimated group quarters population is subtracted from estimated total population to produce estimates of persons in households. Then estimates of total households are derived by dividing estimated persons in households by estimated persons per household (PPH). The 2015 estimates of PPH are a conservative projection of inter-censal trends.

Housing units were derived by applying the 2010 census housing/household ratios to the 2015 household estimates. Family households were similarly derived by applying the 2010 census family household/household ratios to the 2015 household estimates.

Projections of county base counts to 2020 were based on moderated rates of change from 2010 census to the 2015 estimates. Persons in households and persons in group quarters were projected first, and summed to complete the projection of total population. The household projections were derived by dividing projected household population by projections of persons per household. Housing units were derived by applying the 2010

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census housing/household ratios to the 2020 household projections, and family households were derived by applying the family/household ratios from the 2010 census to the 2020 household projections.

Block Group

The estimation of block group base counts starts with households, followed by the estimation of persons in households and persons in group quarters (which sum to total population). Housing units and family households are then derived from the estimates of total households.

The major data resources tracking change in households since the 2010 census are the following:

- Counts of active residential addresses from the U.S. Postal Service.
- Counts from the Nielsen Master Address File (MAF).
- Valassis counts of new housing units.

Household estimates are the average of several alternatives. The first alternative, based on the 2000-2010 trend in total households, serves as a backup for areas where post-2010 data sources do not pass reliability checks. The other alternatives were based on change in USPS address counts, change in Nielsen MAF counts, and the Nielsen MAF count totals. Evaluations of the 2010 estimates confirmed the ability of Nielsen MAF counts to improve estimates in rapid change areas, so the MAF-based estimates were given additional weight in such areas – and served as the household estimate in selected areas, such as those where Valassis indicated rapid and recent growth. The preliminary household estimates were controlled to the county household estimates described above.

Next, household population was estimated as a weighted average of the 2000-2010 census trend and the 2010-2015 estimated rate of change in households. Group quarters population was similarly estimated for 2015 as the average of estimates based on 2000-2010 change and the rate of change in households. The household population and group quarters population estimates were controlled to the county level, and summed to provide the final estimates of total population for 2015. In this method, persons per household (PPH) is a byproduct of the estimates of households and household population, so the values are checked relative to 2010 census values.

Estimates of housing units and family households were produced by applying 2010 census housing/household and family/household ratios to the 2015 estimates of total households. Adjustments were not made to the county housing and family household estimates, but the county sums were checked to confirm that they were similar to the independent county estimates.

Five-year projections of block group base counts are produced as nonlinear projections from the 2010 census counts through the current year estimates. Rapid rates of growth and decline are moderated into the future to reflect the assumption that extreme rates of net migration are unlikely to be sustained over long periods of time. Household population and group quarters population are projected first, and adjusted to the county control total projections. Projected household population and group quarters population are then summed to establish the projection of total population. Persons per household (PPH) is projected to the five-year projection date based on a conservative projection of the 2000-2010 change in PPH. Household projections are then derived as the projection of household population divided by PPH. Housing units and family households are then

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projected by applying 2010 census housing/household and family/household ratios to the five-year projections of total households.

ZIP Code Estimates and Projections

Estimates and projections for ZIP Codes are aggregations of estimates already prepared for block groups. As such, there is not a distinct ZIP Code methodology. However, it is important to understand the process used to build ZIP Code estimates as well as the complications involved in analyzing ZIP Code data.

ZIP Code demographic data is widely used, but involves complications not encountered with other geographic areas. ZIP Codes are defined by the USPS for the delivery of mail, not for the presentation of data. They lack definitive boundaries, and change frequently at the determination of postal officials. In addition, ZIP Codes do not conform to the boundaries of other geographies such as counties, cities, census tracts, or census blocks.

Further complicating the specification of ZIP Code demographics is the imperfect relationship between where people live and where they get their mail. Some people live in rural areas where there is no mail delivery and pick up their mail at a specified location such as a post office in a nearby town. The boundaries of such general delivery and P.O. Box ZIP Codes (there are about 5,000 of them) are not formally defined. Also, some urban residents elect to pick up some or all of their mail at a P.O. Box—perhaps near their place of work. They reside in one ZIP Code, but receive mail in another. Such ZIP Codes often consist exclusively of P.O. boxes at a post office in a nonresidential area. They have no definable boundaries, as the people receiving mail there may reside in neighborhoods scattered across a wide area.

Census Data for ZIP Codes

Contrary to common belief, ZIP Codes have not been a standard geography for the reporting of census data. The Census Bureau did release 1980 and 1990 census ZIP Code products, but these products were non-standard and not widely used. Beginning with the 2000 census, the Census Bureau included data for what it calls ZIP Code tabulation areas (ZCTAs). ZCTAs approximate ZIP Code areas based on the allocation of whole census blocks. The Census Bureau points out that ZCTAs are not ZIP Codes, and users need to understand that ZCTA data does not constitute official ZIP Code estimates. Furthermore, because the Census Bureau updates ZCTA definitions only infrequently, these definitions often are out of date.

ZIP Code Data from the Nielsen Demographic Update

Nielsen ZIP Code estimates and projections are aggregations of Nielsen estimates for block groups. The process used is similar to that for retrieving data for circles and polygons. Census data, including estimates and projections, already exists for block groups, and is aggregated to the current roster of ZIP Codes reflecting current definitions. Data for all years (including Census 2000 and Census 2010) is aggregated the same way to maintain a consistent reference to current ZIP Code definitions.

All Nielsen products provide spatial definition ZIP Code data. Spatial definition ZIP Codes are based on a block group-to-ZIP Code correspondence, which is updated one or more times each year. This correspondence is based on the location of block centroids (latitude/longitude points) within current ZIP Code boundaries estimated by TomTom®. If a block's centroid falls within a ZIP Code boundary, it is allocated to that ZIP Code.

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These block-to-ZIP Code allocations determine the block groups that are included in a given ZIP Code. For block groups allocated to more than one ZIP Code, percent inclusion factors determine the percent of the block group allocated to each ZIP Code. Inclusion factors are updated annually based on the most recent distribution of addresses on the Nielsen Master Address File. For all spatial ZIP Codes, the resulting block group-to-ZIP Code relationship establishes a geographic definition that is used to aggregate block group data to current ZIP Codes.

Nielsen products do not provide demographic data for rural P.O. Box or general delivery ZIP Codes. These ZIP Codes serve residents in rural areas where there is no mail delivery; residents pick up their mail at a central location such as a post office. Although included in the roster, these ZIP Codes have no clearly defined spatial dimension, and therefore have no demographic data associated with them. Instead, the data for these ZIP Codes is included in the spatially defined ZIP Code (or multiple ZIP Codes) covering the area near the post office. These are sometimes known as parent ZIP Codes.

It is not unusual to find spatial definition ZIP Code data that appears to be discrepant with deliverable address counts. For example, spatial definition data might indicate no data for a rural P.O. Box ZIP Code for which the post office reports 600 residential deliveries. Furthermore, spatial definition estimates for parent ZIP Codes are often higher than delivery counts since they also include the populations served by P.O. Box ZIP Codes.

Enhanced Aggregation of Estimates to ZIP Codes

ZIP Code correspondence files, which define how block group data are aggregated to ZIP Codes, are highly accurate following a census, but they often need updating in areas where post-census population change has been substantial. When this happens, ZIP Code population growth can be underestimated even when the relevant block group estimates reflect the growth. For example, growth that should have been allocated to ZIP Code A might be allocated to adjacent ZIP Code B, thus underestimating growth in ZIP Code A. To guard against such estimation errors, Nielsen updates block group-to-ZIP Code correspondence files to reflect estimated redistribution of population at the census block level. This enhanced aggregation provides more up-to-date factors by which to identify the percent of block group growth in ZIP Code A versus ZIP Code B.

Note: This enhancement did not involve a change to the estimation method, but rather to the process used to aggregate block group estimates to ZIP Codes. For a more detailed discussion of how ZIP Code estimates are built, please see the "Zip Code Estimates and Projections" section.

POPULATION CHARACTERISTICS

Population by Age/Sex

Population by age/sex composition is estimated and projected using cohort survival methods. Cohort survival is a major factor in changing age structures, and is driven by the reality that, for example, persons age 35 in 2010 who survive another five years, will be age 40 in 2015. Accordingly, a population with a large proportion of 35 year olds in 2010 can expect to have large proportions of 40 year olds in 2015. It is this process that has swelled the U.S. age structure at progressively older age categories as the baby boom generation (or birth cohort) has aged.

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The Nielsen cohort survival method is executed first at the county level, and then for block groups, with the block group estimates controlled to the county level results. To enhance consistency with Census Bureau estimates, the county estimates begin with the most recent Census Bureau county age/sex estimates. The 2015 county age/sex estimates were built from the Census Bureau's county age/sex estimates for July 2012, which were the most recent available at the time. Block group age/sex estimates start with age/sex distributions from the 2010 census.

At all levels, the method starts with five-year age/sex categories—separating persons in households from those in group quarters. Where census data do not provide full age/sex detail for household versus group quarters populations, Nielsen estimates the detail required to execute the cohort survival method.

The cohort survival process is set into motion with the application of age/sex-specific five-year survival rates to the census age/sex data described above. Each round of cohort survival ages the population of each block group ahead five years. For example, the process projects the number of 30-34 year olds in a block group who will survive to become 35-39 years old (and so on for all five-year age categories) by 2015. The initial survival data from Census 2010 yields projections of age/sex composition for April 2015. Those results are then interpolated to the January 1, 2015 estimation date.

Accounting for Births

As part of each round of cohort survival, the population less than age five is survived to age 5-9, so an estimate of births is required to fill the vacated 0-4 category. Births are estimated using the child/woman ratio—defined as the population age 0-4 divided by females age 15-44 (childbearing age).

The child/woman ratio is an indirect measure of fertility specific to each area, but more important, it is sensitive to projected changes in the number of women of child bearing age—itself a byproduct of the cohort survival process. An increase in the number of child bearing women will result in an increased number of births even if fertility rates (or child-woman ratios) remain constant. The child/woman ratios applied in the Nielsen age/sex estimates and projections are derived from Census 2010, but modified slightly in some updates to increase consistency with national level Census Bureau projections of the population age 0-4.

Exceptions to Cohort Survival

The cohort survival process is at work in all areas, but in some areas its effects on age composition are overridden by migration. In the absence of authoritative age-specific migration data for small areas, the Nielsen method defaults to the assumption that the age/sex composition gained or lost through migration is similar to the area's "survived" population.

However, because of migration, the cohort survival process is often not applicable to populations living in group quarters facilities such as dormitories, military quarters, prisons, and nursing homes. These facilities have high turnover rates, resulting in age/sex compositions that tend to be stable as a reflection of the nature of the facility. For this reason, cohort survivals are applied only to the population living in households. Group quarters populations are estimated separately and their age/sex compositions held constant with those measured in the census.

Nielsen also identifies segments of the household population (such as concentrations of college students in off-campus housing) for which cohort survival is not applicable. Concentrations of these "hidden group

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quarters" populations are identified through their distinctive imprint on small area age compositions, and are similarly exempted from the cohort survival process.

Five-Year Projections

Five-year projections of age/sex composition are produced with the same method used for the current year estimates. In the 2015.1 update, the 2015 estimates of population by age/sex were the starting point for five-year survivals to 2020. As with the current year estimates, age/sex projections are produced first for counties, then for block groups, with the block group projections controlled to the county results.

Population by Race and Ethnicity

There are no universally accepted definitions of race and Hispanic ethnicity. The Census Bureau currently defines "Hispanic or Latino" as an ethnicity, not a race. Race and Hispanic ethnicity are separate census questions, so in census tabulations, persons of Hispanic ethnicity can be of any race. Hispanics are included in each race category, and the race categories alone sum to total population.

The census allows persons to mark "one or more" boxes when responding to the race question. For example, one person might mark only the box for "Black or African American," while another might mark that box and also the box for "Asian." In reporting data on race, one option is to indicate the number of persons identifying with each race category and no others (race alone), while another option is to report the number of persons identifying with that race either by itself or along with other categories (race alone or in combination). Census data and Nielsen estimates are reported for the "race alone" and "race alone or in combination" options.

For more information about Ethnic Classifications, see the "Additional Terminology" section.

Estimates and Projections of Race and Hispanic Ethnicity

Starting with "race alone" tabulations, estimates and projections of population by race and Hispanic ethnicity are produced first at the county level, and then for block groups, with the block group estimates and projections controlled to the county level totals. The method focuses on percent distribution of race and ethnicity, which are applied to previously established estimates and projections of total population.

County-level estimates of race and Hispanic ethnicity are based on the most recent Census Bureau estimates of population by race and ethnicity at that level. The most recent Census Bureau county race and ethnicity estimates available for the 2015 update were those for July 2012. And because the Census Bureau estimates reflect a "modified" definition of race, the method uses rates of change in these estimates as a way to estimate the 2010 census race and ethnicity data forward to the current year.

Race/ethnicity estimates for block groups are based on 2000-2010 census trends in the percent of population in each race/ethnicity category. The method focuses on the percent of population in each category, and controls to both total population for the block group and population by race and ethnicity at the county level.

Five-Year Projections

Five-year projections of race/ethnicity are produced with methods similar to those used for the current year estimates—projecting the current year estimates (of percent race/ethnicity) to the five-year projection date. Again, projections are made for percent race/ethnicity distributions, and applied to previously completed

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projections of population. Counties are projected first, followed by block groups, with adjustments encouraging consistency between geographic levels.

All-Inclusive Race

Estimates and projections for all-inclusive race/ethnicity (race alone or in combination) are produced as derivatives of the single-classification (race alone) estimates and projections. For each race/ethnicity category, the Census 2010 ratio of all-inclusive race/single-classification race is applied to the estimate or projection of single-classification race—with adjustments made in some areas to provide consistency with the number of persons estimated (or projected) to be of two or more races. Because the all-inclusive estimates and projections are derived from data already adjusted to county controls, the all-inclusive estimates and projections are produced only at the block group level, and summed to higher levels.

Population by Age/Sex by Race/Ethnicity

Estimates and projections also are provided for the cross-tabulation of population by age/sex by race/ethnicity. These estimates start with the completed estimates of population by age/sex and population by race/ethnicity at the block group level. Census-based seed values are adjusted to the age/sex and race/ethnicity estimates to produce estimates of the full cross-tabulation. Because the 2010 census did not provide age/sex by race/ethnicity detail at the block group level, age/sex by race/ethnicity distributions for census tracts are used as "seed values" for component block groups. This application of iterative proportional fitting (IPF) produces block group estimates consistent with estimated age/sex and race/ethnicity, as well as the statistical relationship between these characteristics observed for the census tract in Census 2010. The IPF is executed with age/sex data in the standard 5-year age breaks, and splits to single years of age are made as a final step.

HOUSEHOLD CHARACTERISTICS

Households by Income

All Nielsen income estimates are expressed in current year dollars using the money income definition reported in the American Community Survey. The estimates and projections reflect household income, which includes the income earned by all persons living in a housing unit (i.e., all household members). In contrast to the ACS, which reports income earned in the 12 months prior to ACS response, Nielsen income estimates are for the calendar year relevant to each set of estimates and projections. For example, the 2015 estimates reflect 2015 income for 2015 households.

The method starts by establishing ACS "launch distributions" – the distributions from which the income estimates are built. When income was reported by the census, the launch distributions all reflected the census year, but ACS data are not that simple. Depending on its population size, an area might have only 5-year ACS data, or it might also have 3-year and 1-year data. Always working with the most recent "vintage" of ACS data, the Nielsen method combines the multiple sources where relevant, and establishes an effective launch date for the ACS data. For block groups where the ACS sample is especially small, the data also are enhanced with data from neighboring block groups in a process described in the "American Community Survey Enhanced Data" section below.

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Once the ACS launch distributions are established, rates of change in median household income are estimated for each area. Based on these rates of change, the ACS income launch distributions are advanced to current (or projection) year.

Rates of change are produced first at the county level, and then for block groups. Aggregate, average, and median income numbers were derived from the resulting income distributions.

Nielsen standard household income ranges extend beyond the "$200,000 or more" category reported by ACS, to the following income ranges:

- $200,000 to $249,999
- $250,000 to $499,999
- $500,000 or more

The extended income categories were estimated for the ACS launch distributions, which are the starting point for the estimates and projections of income distribution. Pareto methods, which involve an assumption of exponential decay, were applied to the ACS launch distributions to estimate the number of households in each of the extended income categories. For more information about Pareto methods, see the "Additional Terminology" section.

Income Estimation Method

Income change at the national level is estimated based on national estimates of income change from the Current Population Survey (CPS) and the ACS. The final estimates reflect an average of estimates based on the two sources, projected to current year to reflect recent income change.

County income rates of change are based on recent rates of change in ACS income estimates, as well as rates of change in income data from the Bureau of Economic Analysis (BEA) and Internal Revenue Service (IRS). The final estimated rates of change reflect the average of rates based on IRS, BEA, and ACS data. These rates are modified, as needed, to produce estimated county income distributions that conform with the target median income estimate at the national level.

Income change at the block group level is estimated based on recent change in ACS median income estimates, enhanced to compensate for small samples, and projected to reflect the time from launch date to estimation date. Until usable post-census trends from consumer database estimates are once again available, the ACS-based rates are averaged with relevant county rates to establish estimated rates of change in median income for block groups.

At both the county and block group levels, the estimated rates of income change are used to advance, or shift, the ACS launch distributions of households by income forward to current year. This procedure involves the estimation of the number of households advancing from one income category to another—based on the area's estimated rate of income change.

The county level distributions are estimated first, followed by the block group distributions, and the block group distributions are adjusted to conform with the final county distributions.

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Five-Year Projections

Five-year projections of income are produced with a similar process. Rates of growth or decline based on change from ACS launch medians to current year estimated median income are used to advance the current year income distributions to the five-year projection date. As with the current year estimates, the five-year projections are produced first at the county level, and then for block groups, with the block group distributions adjusted to conform with the county level results.

Household Effective Buying Income

Effective Buying Income (EBI) reflects income after taxes. Because EBI is not provided by the ACS, the estimates are computed as derivatives of household income, based on the correspondence between before-tax and after-tax income identified for each state from the Census Bureau's Current Population Survey (CPS). For each state, three-year combinations of CPS data identify the mean before-tax income of households within the income in ranges estimated for the Nielsen Demographic Update. The CPS also identifies mean income for these same households after deductions for federal income taxes, state taxes, FICA, annual property taxes, and federal retirement payroll deductions. Where relevant, earned income credits were added to refine the measure of after-tax income.

The CPS data provides before-tax to after-tax income rates of change specific to households with before-tax income in selected income ranges—and specific to each state. These rates of change are applied to the current year-estimated and five-year-projected distributions of households by before-tax income (the standard Nielsen income estimates and projections) to estimate the movement of households to lower income ranges after deductions for taxes. The resulting distribution of households by after-tax income provides the basis for computing mean, median, and aggregate EBI.

Income by Age of Householder

The cross-tabulation of household income by age of householder is valuable because income and life cycle stage, when combined, are so strongly associated with consumer needs and behavior. The Nielsen income by age updates are produced after the estimates of population by age and households by income have been completed. The data constitutes a 128 cell table defined by 16 categories of household income and 8 categories of householder age. The row and column totals from these tables (the income and age totals) are commonly referred to as the marginal totals.

The estimates of households by income serve as the income marginals, but population by age estimates must be converted to householder by age for use as the age marginals. For each area estimated, 2010 census data is used to determine age-specific headship rates, or the percent of persons in specific age categories who are householders. These headship rates are then applied to estimated population by age to produce estimated householders by age. A final adjustment to total households provides consistency with that critical base count.

With the income and age (row and column) marginal totals estimated, the final step is to estimate the full cross-tabulation of income by age of householder. In other words, values must be determined for each of the 128 income by age categories, or cells. Block group level income by age cell values from the most recent ACS provide the initial input (or seed values). Because the ACS provides only four categories of householders by age.

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CPS separation factors are applied to expand to the eight age-of-householder categories in the estimated table. The ACS distributions also are enhanced in block groups with small numbers of ACS responses.

Within each age category, ACS income distributions are advanced to reflect the block group's (previously) estimated rate of income growth. This adjustment expresses ACS income by age distribution in current dollar values. The resulting table is then adjusted to conform with both the income and age of householder totals estimated for current year. These adjustments are accomplished through iterative proportional fitting, which adjusts the ACS table to conform simultaneously with the household income and householder by age estimates, while preserving the block group specific statistical relationship between income and age reflected in ACS income by age data.

Five-year projections are produced using similar methods. Projected households by income serve as the income marginal totals, and Census 2010 headship rates again are used to convert projected population by age to projected householders by age. The income by age table is then advanced to projection year dollar values, and iteratively adjusted to the projected income and age marginal totals.

Income by Race and Ethnicity of Householder

Estimates and projections of households by the race and ethnicity of the householder are produced by applying the estimated/projected rates of change in income for each area to the income distribution for each race/ethnicity group in the area. The rates of change are used to project each distribution forward to the current (or projected) year, and the resulting distributions are adjusted to conform with the householder by race/ethnicity estimates and projections described below.

Householders by Race and Ethnicity

Estimates and projections of householders by (single assignment) race and Hispanic ethnicity are based on the estimates and projections of population by race/ethnicity.

For each block group, the Census 2010 ratio of householders by race/Hispanic to population by race/ethnicity is identified, and applied to the current year estimate of population by race/ethnicity. This ratio indicates the percent of persons in each race/ethnicity category who were householders in Census 2010. The final ratio is modified somewhat through the adjustment of householders by race to total households for each area, and it is the final current year ratio that is applied to the five-year projections.

Households by Size

Working at the block group level, estimates of households by size (number of persons) are produced for the following categories:

- 1 person
- 2 persons
- 3 persons
- 4 persons
- 5 persons
- 6 persons
- 7 or more persons

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The distribution of households by size from Census 2010 serves as the base from which the current year estimates are derived. The 2010 distribution is advanced to current year based on estimated change in persons per household (average household size). Iterative proportional fitting is then used to provide consistency with estimated household totals and average household size.

Projections of households by size are based on the Census 2010 and current year estimated distribution of households by size. The current year distribution is shifted to reflect the growth or decline in average household size during the projection interval. Iterative proportional fitting is then used to provide consistency with projected household totals and average household size.

Households by Year Moved Into Unit

Survival probabilities for "Year moved in" are computed from 2010 and 2012 1-year ACS data (in this case reflecting the loss of residents of specific lengths of residence). These national level probabilities are applied to the most recent ACS distribution of households by "Year Moved In" to establish estimated and projected distributions. Households in excess of those surviving (staying in place) to longer lengths of residence are estimated to have moved in during the most recent time period launch date. Thus, areas with rapid household growth will show the greatest concentrations of new movers.

The method is executed at the block group level, and the results controlled to independent county level estimates that are based on 1-year, 3-year, and 5-year estimates from the ACS.

HOUSING UNIT CHARACTERISTICS

Housing Value

Housing value (often referred to as home value) is estimated and projected for all owner-occupied housing units, and is based on the ACS measure, which reflects census respondents' estimates of how much their dwellings would sell for, or the asking price of units currently for sale. Median value is estimated and projected, as is the distribution of units among the 24 categories of value reported by the ACS.

The total number of owner-occupied housing units is estimated by applying Census 2010 ownership percentages to the completed estimate of total occupied housing units for all block groups. The results are adjusted to county level census-based estimates of owner and renter-occupied housing.

Housing value estimates are produced first at county level (with adjustments to the national estimate of median value), and next at block group level, with the block group results adjusted to conform with the county level estimates.

The basic rate of change in value is estimated first, and is used to advance the ACS launch distribution of units by value to reflect this rate of change. At the national level, the rate of change in home value is estimated based on change in the House Price Index data from the Federal Housing Finance Agency (FHFA), the Case-Shiller Home Price Index, as well as home value estimates from the ACS.

County rates of change in home value are derived from two sources at the metropolitan area level. The first is data indicating the change in median sales price from the National Association of Realtors (NAR). Changes in

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sales price reflect only units sold during the time in question, but are strongly associated with overall change in home value. The second source is change in the FHFA House Price Index described above. The ACS is now contributing estimates of median home value for counties. ACS data provide input to housing value rates of change directly at the county level.

Housing value change at the block group level is estimated based on recent change in ACS median value estimates, enhanced to compensate for small samples, and projected to reflect the time from launch date to estimation date. Until post-census trends from consumer database estimates are once again available, the ACS-based rates are averaged with relevant county rates to establish estimated rates of change in median value for block groups.

Five-Year Projections

Five-year projections of value are based on rates of change derived from change in median value from ACS launch data to the current year estimate.

For each area, the estimated rate of change is used to advance the current year estimated distribution to the five-year projection date. Projections are produced first at county level (with rates adjusted to improve consistency with the national median value estimate), then at block group level, with the block group results adjusted to conform with the county level estimates.

Housing Units by Year Built

Estimates and projections of housing units by year built start with the most recent ACS launch distributions. These distributions are advanced to current year (and five-year) targets based on housing loss patterns exhibited between ACS 2010 and ACS 2012 data. For example, the number of units built between 1960 and 1969 surviving in 2012 is lower than the number of such units surviving in 2010, and suggests a survival probability for units of that age. The method establishes a set of such probabilities at the national level, and applies them to ACS launch housing data to generate the current year estimates and five-year projections. In most areas, surviving units are fewer than total units (estimated separately), and the excess units are assigned to the most recent year built period. Thus, areas with rapid housing growth will show the greatest concentrations of new housing.

The method is executed at the block group level, and the results controlled to independent county level estimates that are based on 1-year, 3-year and 5-year estimates from the ACS.

AMERICAN COMMUNITY SURVEY ENHANCED DATA

With the ACS now providing annual data down to the block group level, the Nielsen update no longer makes use of data from the 2000 census long form (SF3). In particular, the transition of the ratio-adjusted data items to an ACS base has been completed. These items formerly reflected static block group level decennial census data ratio-adjusted to current year base counts. Now these items benefit from annual ACS estimates with controls at county level – thus giving them an important element of update.

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For block groups where the ACS sample is small (and ACS data is at risk of substantial error), Nielsen produces enhanced distributions. The enhanced distribution blends the ACS distribution for the block group in question with the distribution of neighboring block groups – thus drawing from a larger number of ACS responses.

Note that this approach to enhancing ACS block group data is also applied to ACS data contributing to estimates including household income and housing value.

The data items that have been ACS-enhanced are:

- Hispanic or Latino population by specific origin
- Asian population by category of Asian
- Persons by ancestry
- Households by household size, household type, and presence of own children
- Households with unmarried-partners by sex of partner
- Households by presence of persons under 18 years and household type
- Persons 5+ by language spoken at home
- Population by age, language, and ability to speak English
- Hispanic population age 5+ by ability to speak English
- Persons 15+ by sex and marital status
- Females who gave birth in past year by marital status
- Working population 16+ by means of transportation to work
- Working population 16+ by travel time to work
- Population 25+ by educational attainment
- Hispanic or Latino population 25+ by educational attainment
- Population 3+ by type of school and enrollment level
- Persons 16+ by sex and employment status
- Employed civilian population 16+ by industry
- Employed civilian population 16+ by occupation
- Employed civilian population 16+ by class of worker
- Families by poverty status, family type, and presence of related children under age 18
- Housing units by units in structure
- Households by tenure, ethnicity and race
- Owner-occupied housing units by mortgage status
- Vacant housing units by vacancy status
- Occupied housing units by tenure and vehicles available

With the implementation of the ACS-Enhanced data development method, there may be situations where data values from independently built ACS-Enhanced tables are not consistent with each other. Because these tables are built independently of each other, the inconsistencies inherent in the independent Census ACS tables are occasionally propagated within our demographic updates.

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ADDITIONAL TERMINOLOGY

2000 Census Data

Nielsen products continue to provide data from the 2000 census, but the 2000 data have been converted to 2010 census geography. The 2000 census was the last to provide long form data – data now provided by the ACS. Because the 2000 long form data (from SF3) are weighted sample data, their population and household totals often differ by modest amounts from the complete count totals reported by SF1. For example, a census tract with 1,200 SF1 households might have SF3 tables summing to 1,206 or 1,197 households. Differences of this type also are observed in the 2000 census data converted to 2010 geography.

Adjustment Techniques

The adjustment process is essential to the production of estimates that use input data at various geographic levels, and are consistent across all levels of geography. The Nielsen updates are geographically consistent, meaning that for each data item, block group data always sums to tract totals, which always sums in turn to county, state, and national totals. Adjustment techniques also assure that characteristic distributions sum to base count totals (e.g., households by income always sums to total households). The simultaneous adjustment of characteristics to higher level control totals and to total persons or households within each smaller area is achieved with IPF. The basic techniques are described below.

Ratio Adjustment

Ratio adjustment is used to bring small area data into conformity with large area totals. For example, if preliminary block group population estimates sum to a tract total of 552, but the independent tract estimate is 561, the preliminary block group estimates are adjusted upward by 1.63% (561/552) to achieve the target tract total. Similar adjustments are made to bring preliminary distributions (such as age and race) into conformity with population totals for each geographic unit.

Iterative Proportional Fitting

IPF methods are an elaborate form of ratio-adjustment, and are used when estimates must be adjusted to conform simultaneously to two sets of marginal control totals—often referred to as the dimensions of a two-dimensional table. Income by age of householder is a good example. The estimates must sum to both households by income and householders by age.

IPF methods begin with a table with target row and column totals, referred to as the row and column marginal totals. For example, one might have 12 categories of households by income as the row totals and 11 categories of householders by age as the column totals established for a 132 cell (12 by 11) table. The objective is to produce estimates for the table's 132 cells that sum to both the row and column marginals.

The execution of IPF methods requires initial or seed cell values. In the case of income by age of householder, seed values are obtained from the census. This matrix of cell values reflects an intricate set of probabilities defining the relationship between income and age—as measured for the specific geography in the census. However, these census figures sum to neither estimated households by income nor estimated householders by age.

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Iterative proportional fitting achieves this conformity through a series of ratio adjustments to the row and column marginal totals. Each round (or iteration) of row and column adjustments brings the seed values closer to conformity with the marginal totals. The number of iterations required varies by area, but the values eventually converge on a result that sums, within rounding error, to the marginal totals. The resulting estimates not only sum to the desired marginal totals, but preserve the statistical relationship between the two variables (income and age) measured for the area by the census.

Ethnic Classifications

The race definitions used by Census 2010 and Nielsen estimates include the following basic categories:

- White
- Black or African American
- American Indian and Alaska Native
- Asian
- Native Hawaiian and Other Pacific Islander
- Some other race

However, because the current race standards permit respondents to mark one ***or more*** race categories, there are actually 63 categories—the six basic races plus 57 possible combinations of two or more races. When cross-tabulated by Hispanic/non-Hispanic, there are 126 race-by-Hispanic categories.

Short of presenting data for all 63 race categories, there are two basic tabulation options—single classification and all-inclusive.

Single Classification

The single classification option includes the following categories:

- White alone
- Black or African American alone
- American Indian and Alaska Native alone
- Asian alone
- Native Hawaiian and Other Pacific Islander alone
- Some other race alone
- Two or more races

This option identifies the number of persons marking each race category by itself, and then provides a seventh category identifying the number marking two or more races. The tabulation is similar to those used prior to Census 2000, and sums to total population. However, it provides no information about the race of persons in the "two or more" category, so it is not possible to determine the total number of persons identifying with a given race.

All-inclusive Classification

The total number of persons marking a given race category is revealed by the following all-inclusive categories:

- White alone or in combination
- Black or African American alone or in combination

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- American Indian and Alaska Native alone or in combination
- Asian alone or in combination
- Native Hawaiian and Other Pacific Islander alone or in combination
- Some other race alone or in combination

This option identifies the total number of persons marking each race category—either by itself or as part of a combination of two or more races. However, because persons marking two or more races are counted two or more times, the table sums to totals larger than total population.

Extended Income and Pareto Interpolation

Income tabulations from the ACS top out at the "$200,000 or more" category. However, higher income breaks are important in affluent areas, so Nielsen has extended ACS income distributions to include categories of "$200,000 to $249,999;" "$250,000 to $499,999;" and "$500,000 and over."

Vilfredo Pareto (1848-1923) is credited for creating a method used to approximate the upper end of an income distribution. Pareto's distribution is an exponential decay curve. The Pareto distribution is typically used to extend income ranges for very large areas, such as whole countries, where income distributions are smooth. The application of Pareto methods for small areas, where distributions can be irregular, requires some care.

The Pareto extensions are applied to the ACS income data. Estimated and projected income for the extended categories was produced with standard methods applied to the extended ACS data.

Inflation and Income

A common question is how the effect of inflation is accounted for in the Nielsen income estimates. Inflation, as commonly measured by the Consumer Price Index, reflects changing prices, and a corresponding change in the value of a dollar. For example, items that would have cost $100 in 1983, would have cost about $147 by 1993—a 47% inflation in prices. Thus, $100 was not the same in 1993 as it was in 1983.

Inflation is not a measure of income change, but the two are related. Some income sources (such as Social Security and some union contracts) are indexed by inflation, and workers typically require and demand more pay to cover the increased costs of living. Although income tends to follow inflation, it does not move at the same rate. There are periods when income growth outpaces inflation, and periods when it lags behind. These income changes relative to inflation are referred to as real income growth.

The Nielsen income estimates and projections are expressed in current dollar values, which reflect how many dollars are being received at the relevant year. As such, they reflect both real income growth (or decline) and the change due to the effect of inflation. Rather than estimating the effects separately, Nielsen measures the combined or net effect through input sources (such as the Bureau of Economic Analysis income estimates, IRS income data, and ACS income estimates), all of which reflect income change in current dollars. The inflation effect in these data sources is implicitly incorporated into the Nielsen estimates. Note that accounting for inflation in this manner is different from controlling for inflation, which requires removing the effect of inflation, to produce estimates in constant dollar values.

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KNOWN DISCREPENCY

For standard five-year age breaks (0 to 4, 5 to 9, and so on), the estimates of population by age/sex are consistent with the estimates of population by age/sex summed across race/Hispanic categories. However, users might find differences for single years of age or age ranges other than the standard five-year categories. For example, the estimate of males age 60 to 62 might be different from the estimate of males age 60 to 62 summed across all race/Hispanic categories.

The differences trace to the fact that the estimates of population by age/sex and population by age/sex/race/ethnicity are produced for the standard five-year categories, and then split to single years of age. For the 2015 Update, the split of age/sex to single year categories was enhanced by applying separate split factors for persons in households and those living in group quarters of various types. For example, the percent of persons age 20 to 24 who are age 20 can be different in areas with large college dormitory populations compared to those with persons living in households. The enhancement was applied to the estimates of total population by age/sex, where the method separates by household versus group quarters population, but the enhancement is not feasible for the estimates of population by age/sex/race/ethnicity, which are not produced separately for persons in households and group quarters.

CONTACT INFORMATION

For more information about Nielsen Demographic Methodology, please contact your Nielsen account representative.

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County	Population Projections: 2015 - 2030					
	April 1, 2000 Census	April 1, 2010 Census	July 1, 2015 Projection	July 1, 2020 Projection	July 1, 2025 Projection	July 1, 2030 Projection
Abbeville	26,167	25,417	25,300	25,100	25,000	24,900
Aiken	142,552	160,099	165,600	171,200	176,800	182,500
Allendale	11,211	10,419	10,300	10,100	10,000	9,900
Anderson	165,740	187,126	193,300	199,500	209,000	218,500
Bamberg	16,658	15,987	15,800	15,700	15,400	15,200
Barnwell	23,478	22,621	22,400	22,200	22,100	22,000
Beaufort	120,937	162,233	175,900	189,500	202,400	215,300
Berkeley	142,651	177,843	187,800	197,700	208,400	219,100
Calhoun	15,185	15,175	15,200	15,200	15,100	15,100
Charleston	309,969	350,209	360,600	370,900	383,800	396,700
Cherokee	52,537	55,342	56,100	56,800	57,000	57,300
Chester	34,068	33,140	32,900	32,700	32,500	32,400
Chesterfield	42,768	46,734	47,800	48,900	49,600	50,300
Clarendon	32,502	34,971	35,600	36,300	37,400	38,600
Colleton	38,264	38,892	39,000	39,200	39,300	39,500
Darlington	67,394	68,681	69,000	69,300	69,900	70,500
Dillon	30,722	32,062	32,400	32,800	33,100	33,400
Dorchester	96,413	136,555	152,000	167,400	178,800	190,200
Edgefield	24,595	26,985	27,600	28,300	29,200	30,100
Fairfield	23,454	23,956	24,100	24,200	24,300	24,500
Florence	125,761	136,885	140,000	143,100	147,000	150,900
Georgetown	55,797	60,158	61,300	62,500	63,800	65,100
Greenville	379,616	451,225	473,300	495,400	518,800	542,300
Greenwood	66,271	69,661	70,600	71,500	73,100	74,700
Hampton	21,386	21,090	21,000	20,900	20,800	20,700
Horry	196,629	269,291	294,600	319,900	345,800	371,700
Jasper	20,678	24,777	26,000	27,300	28,000	28,800
Kershaw	52,647	61,697	64,400	67,200	70,000	72,800
Lancaster	61,351	76,652	81,700	86,700	91,000	95,300
Laurens	69,567	66,537	65,800	65,100	65,000	65,000
Lee	20,119	19,220	19,000	18,800	18,700	18,600
Lexington	216,014	262,391	277,100	291,800	312,500	333,200
McCormick	9,958	10,233	10,300	10,400	10,600	10,900
Marion	35,466	33,062	32,500	32,000	31,900	31,800
Marlboro	28,818	28,933	29,000	29,000	29,100	29,200
Newberry	36,108	37,508	37,900	38,200	39,000	39,800
Oconee	66,215	74,273	76,600	78,900	84,000	89,100
Orangeburg	91,582	92,501	92,800	93,000	93,500	94,100
Pickens	110,757	119,224	121,600	123,800	128,300	132,900
Richland	320,677	384,504	404,400	424,300	440,100	456,000
Saluda	19,181	19,875	20,000	20,200	20,300	20,400
Spartanburg	253,791	284,307	295,100	305,800	318,500	331,200
Sumter	104,646	107,456	108,200	108,900	109,200	109,500
Union	29,881	28,961	28,700	28,500	28,300	28,100
Williamsburg	37,217	34,423	33,800	33,100	33,000	32,900
York	164,614	226,073	248,800	271,500	296,100	320,700
South Carol	**4,012,012**	**4,625,364**	**4,823,200**	**5,020,800**	**5,235,500**	**5,451,700**

Source: U.S. Census Bureau, S.C. Department of Health and Environmental Control, and S.C. Budget and Control Board - Office of Research & Statistics.

Nielson Demographic Update 2015.1

County	2015 Population	2020 Population
Primary Service Area	735,403	797,004
Charleston, SC	375,423	405,163
00-04	23,019	24,087
05-09	22,327	24,436
10-14	20,578	23,743
15-17	11,999	13,792
18-19	10,455	11,652
20	5,759	5,151
21	5,435	4,846
22-24	15,213	13,403
25-29	32,237	27,284
30-34	29,067	32,197
35-39	24,879	30,063
40-44	22,461	26,259
45-49	23,394	23,598
50-54	24,742	24,405
55-59	24,802	25,471
60-61	9,795	10,717
62-64	13,335	14,611
65-66	8,375	10,465
67-69	11,250	14,012
70-74	14,090	18,171
75-79	9,216	12,299
80-84	6,276	7,341
85-UP	6,719	7,160
rchester, SC	204,521	221,794
00-04	14,276	15,029
05-09	14,553	14,962
10-14	14,877	15,333
15-17	8,834	9,690
18-19	5,394	5,916
20	2,658	2,974
21	2,609	2,956
22-24	8,094	8,985
25-29	13,992	14,163
30-34	14,473	14,619
35-39	13,987	15,074
40-44	13,863	14,569
45-49	14,532	14,306
50-54	14,297	14,866
55-59	12,958	14,434
60-61	4,735	5,479
62-64	6,491	7,464
65-66	3,910	4,730
67-69	5,266	6,329
70-74	6,391	8,675
75-79	4,043	5,735
80-84	2,342	3,134
85-UP	1,946	2,372
Berkeley, SC	155,459	170,047
00-04	10,623	11,280
05-09	10,610	11,305
10-14	10,366	11,287

15-17	6,123	6,907
-19	4,450	4,889
20	2,349	2,413
21	2,328	2,365
22-24	6,864	7,074
25-29	11,051	10,829
30-34	11,062	11,573
35-39	10,178	11,593
40-44	10,004	10,712
45-49	10,339	10,508
50-54	10,451	10,784
55-59	10,004	10,807
60-61	3,674	4,336
62-64	5,030	5,885
65-66	3,139	3,733
67-69	4,206	4,942
70-74	5,509	7,127
75-79	3,460	4,971
80-84	1,996	2,708
85-UP	1,643	2,019
Secondary Service Area	818,573	864,392
Horry, SC	310,321	338,265
00-04	16,727	17,801
05-09	17,081	18,118
10-14	17,077	18,566
15-17	10,291	11,631
18-19	7,200	7,996
	3,710	3,614
21	3,695	3,533
22-24	11,182	10,763
25-29	20,014	20,027
30-34	18,622	21,571
35-39	18,108	20,092
40-44	18,476	19,479
45-49	19,449	19,792
50-54	20,500	20,679
55-59	21,201	21,577
60-61	10,197	11,013
62-64	13,978	14,970
65-66	10,205	12,953
67-69	13,624	17,345
70-74	16,334	20,389
75-79	10,619	12,368
80-84	6,518	7,177
85-UP	5,513	6,811
Beaufort, SC	181,198	195,661
00-04	11,203	12,025
05-09	10,950	11,917
10-14	10,194	11,705
15-17	5,739	6,799
18-19	5,110	5,619
20	2,454	2,443
21	2,404	2,435
-24	6,937	6,979
25-29	11,051	10,454

30-34	10,717	11,466
-39	9,874	11,359
40-44	9,477	10,436
45-49	9,496	9,975
50-54	9,958	9,925
55-59	10,656	10,332
60-61	5,379	5,183
62-64	7,316	7,007
65-66	6,642	8,055
67-69	8,860	10,728
70-74	11,103	13,379
75-79	7,263	8,238
80-84	4,433	4,671
85-UP	3,982	4,531
Florence, SC	147,569	151,300
00-04	9,546	9,575
05-09	9,781	9,558
10-14	10,034	9,824
15-17	5,985	6,277
18-19	3,796	4,024
20	2,305	2,402
21	2,172	2,257
22-24	5,955	6,185
25-29	9,088	9,345
30-34	8,994	9,064
35-39	9,021	8,900
40-44	9,201	8,986
-49	9,670	9,110
50-54	9,917	9,523
55-59	9,971	9,662
60-61	3,977	4,055
62-64	5,444	5,594
65-66	3,463	4,172
67-69	4,611	5,531
70-74	5,753	6,939
75-79	3,997	4,643
80-84	2,546	3,015
85-UP	2,342	2,659
Orangeburg, SC	92,002	91,740
00-04	5,930	5,863
05-09	5,882	5,785
10-14	5,698	5,746
15-17	3,507	3,504
18-19	3,116	3,122
20	1,745	1,628
21	1,576	1,483
22-24	4,162	3,754
25-29	5,969	6,017
30-34	5,147	5,764
35-39	4,717	4,998
40-44	4,749	4,576
45-49	5,499	4,594
50-54	6,085	5,275
-59	6,247	5,772
60-61	2,618	2,631

62-64	3,596	3,567
-66	2,368	2,787
67-69	3,205	3,741
70-74	3,930	4,541
75-79	2,682	2,847
80-84	1,827	1,895
85-UP	1,747	1,850
Georgetown, SC	52,563	53,219
00-04	2,816	2,871
05-09	2,986	2,831
10-14	3,311	3,011
15-17	2,034	2,080
18-19	1,240	1,282
20	587	660
21	601	652
22-24	1,838	2,001
25-29	2,658	3,022
30-34	2,530	2,680
35-39	2,667	2,528
40-44	2,753	2,649
45-49	3,131	2,737
50-54	3,426	3,092
55-59	3,937	3,480
60-61	1,842	1,932
62-64	2,516	2,638
65-66	1,823	2,118
67-69	2,442	2,818
-74	3,095	3,550
75-79	1,997	2,169
80-84	1,216	1,187
85-UP	1,117	1,231
Colleton, SC	34,920	34,207
00-04	2,254	2,185
05-09	2,225	2,156
10-14	2,290	2,141
15-17	1,444	1,373
18-19	863	827
20	439	446
21	424	431
22-24	1,306	1,345
25-29	1,972	2,076
30-34	1,901	1,889
35-39	1,896	1,810
40-44	1,977	1,811
45-49	2,239	1,875
50-54	2,467	2,110
55-59	2,465	2,287
60-61	1,028	1,037
62-64	1,407	1,393
65-66	981	1,115
67-69	1,301	1,495
70-74	1,582	1,785
75-79	1,091	1,139
-84	673	740
85-UP	695	741

Tertiary Service Area	3,293,880	3,428,642
Greenville, SC	525,135	560,166
00-04	35,210	36,375
05-09	35,200	36,706
10-14	34,682	36,777
15-17	20,459	22,609
18-19	14,793	16,094
20	7,765	8,459
21	7,265	7,983
22-24	20,047	21,871
25-29	32,727	32,600
30-34	34,640	33,889
35-39	34,153	35,856
40-44	35,148	35,393
45-49	36,441	36,124
50-54	36,376	37,291
55-59	34,417	36,726
60-61	12,875	14,488
62-64	17,571	19,694
65-66	11,031	13,033
67-69	14,723	17,448
70-74	19,220	24,368
75-79	13,172	16,699
80-84	8,687	10,241
85-UP	8,533	9,442
Richland, SC	390,658	412,110
00-04	23,887	24,471
05-09	24,397	24,616
10-14	24,300	25,194
15-17	14,949	16,035
18-19	17,350	18,017
20	8,239	7,654
21	7,733	7,140
22-24	20,712	18,876
25-29	31,620	30,648
30-34	28,513	30,915
35-39	25,091	28,538
40-44	23,667	25,515
45-49	24,205	23,996
50-54	24,735	24,468
55-59	24,061	24,742
60-61	8,989	10,036
62-64	12,229	13,725
65-66	7,044	8,770
67-69	9,518	11,790
70-74	11,338	15,478
75-79	7,636	10,000
80-84	5,230	5,835
85-UP	5,215	5,651
Lexington, SC	293,790	312,203
00-04	18,075	18,716
05-09	18,608	18,846
10-14	19,393	19,472
15-17	11,967	12,901
18-19	7,362	7,902

20	3,729	4,031
	3,682	4,002
22-24	11,282	12,154
25-29	18,907	19,533
30-34	19,248	19,771
35-39	19,038	19,744
40-44	20,135	19,710
45-49	20,929	20,617
50-54	21,138	21,205
55-59	20,366	21,254
60-61	7,619	8,552
62-64	10,432	11,669
65-66	6,444	7,927
67-69	8,609	10,612
70-74	10,783	13,678
75-79	7,025	9,365
80-84	4,553	5,536
85-UP	4,466	5,006
Spartanburg, SC	289,443	301,570
00-04	18,372	18,697
05-09	18,642	18,806
10-14	19,123	19,139
15-17	11,907	12,314
18-19	8,563	8,873
20	4,310	4,466
21	4,149	4,287
22-24	11,864	12,355
-29	17,933	19,210
30-34	16,937	18,263
35-39	17,022	17,164
40-44	18,401	17,234
45-49	19,809	18,579
50-54	19,958	19,799
55-59	19,290	19,756
60-61	7,629	8,047
62-64	10,363	10,954
65-66	6,581	7,927
67-69	8,855	10,664
70-74	11,615	14,184
75-79	8,051	9,275
80-84	5,178	6,117
85-UP	4,891	5,460
York, SC	245,731	264,551
00-04	15,779	16,392
05-09	16,525	16,594
10-14	17,369	17,461
15-17	10,313	11,399
18-19	7,440	8,113
20	3,414	3,928
21	3,254	3,721
22-24	9,447	10,851
25-29	14,224	15,756
30-34	14,638	14,884
-39	15,825	15,323
40-44	17,397	16,517

45-49	18,237	18,086
-54	17,840	18,810
55-59	16,621	18,258
60-61	6,121	7,064
62-64	8,345	9,702
65-66	5,079	6,103
67-69	6,730	8,211
70-74	8,563	11,286
75-79	5,764	7,736
80-84	3,567	4,528
85-UP	3,239	3,828
Anderson, SC	162,837	168,173
00-04	10,030	10,218
05-09	10,268	10,201
10-14	10,558	10,475
15-17	6,410	6,725
18-19	4,361	4,568
20	2,135	2,285
21	2,026	2,180
22-24	6,039	6,483
25-29	9,492	9,898
30-34	9,388	9,622
35-39	9,632	9,485
40-44	10,054	9,722
45-49	10,741	10,149
50-54	11,127	10,721
55-59	11,155	11,010
-61	4,407	4,636
62-64	6,020	6,343
65-66	4,199	5,036
67-69	5,582	6,753
70-74	7,145	8,529
75-79	5,249	5,706
80-84	3,533	3,735
85-UP	3,286	3,693
Aiken, SC	152,977	158,941
00-04	8,548	8,841
05-09	9,084	8,797
10-14	9,664	9,367
15-17	5,873	6,244
18-19	3,948	4,139
20	2,031	2,088
21	1,967	2,027
22-24	5,845	6,054
25-29	9,762	9,736
30-34	9,382	10,004
35-39	8,739	9,553
40-44	8,780	8,950
45-49	9,792	8,939
50-54	10,712	9,890
55-59	11,047	10,763
60-61	4,371	4,765
62-64	6,046	6,447
-66	4,135	5,159
67-69	5,518	6,928

70-74	6,786	8,225
75-79	4,662	5,185
80-84	3,315	3,436
85-UP	2,970	3,404
Pickens, SC	133,227	136,548
00-04	6,852	6,966
05-09	7,118	6,975
10-14	7,782	7,246
15-17	5,133	5,060
18-19	6,887	6,839
20	3,569	3,251
21	3,303	2,990
22-24	8,864	7,921
25-29	8,438	10,002
30-34	7,143	8,528
35-39	7,121	7,222
40-44	7,592	7,181
45-49	8,370	7,629
50-54	8,756	8,337
55-59	8,488	8,649
60-61	3,240	3,497
62-64	4,422	4,745
65-66	2,949	3,436
67-69	3,930	4,592
70-74	5,151	6,330
75-79	3,564	4,020
80-84	2,348	2,684
85-UP	2,207	2,448
Sumter, SC	109,962	112,274
00-04	7,728	7,790
05-09	7,610	7,654
10-14	7,465	7,539
15-17	4,524	4,616
18-19	3,074	3,190
20	1,807	1,766
21	1,736	1,723
22-24	5,073	4,912
25-29	7,887	7,631
30-34	7,104	7,699
35-39	6,278	6,954
40-44	6,210	6,163
45-49	6,822	6,082
50-54	7,305	6,611
55-59	7,137	7,032
60-61	2,660	2,872
62-64	3,648	3,888
65-66	2,206	2,493
67-69	2,956	3,386
70-74	4,028	4,754
75-79	2,984	3,335
80-84	1,930	2,188
85-UP	1,790	1,996
Lancaster, SC	85,138	90,802
00-04	5,150	5,360
05-09	5,321	5,412

10-14	5,369	5,615
17	3,152	3,509
18-19	1,893	2,153
20	981	1,103
21	969	1,074
22-24	3,014	3,309
25-29	4,901	5,327
30-34	4,988	5,096
35-39	5,314	5,128
40-44	5,692	5,531
45-49	5,751	5,867
50-54	5,655	5,904
55-59	5,542	5,710
60-61	2,421	2,475
62-64	3,286	3,350
65-66	2,538	3,120
67-69	3,409	4,178
70-74	4,081	4,991
75-79	2,573	2,949
80-84	1,675	1,892
85-UP	1,463	1,749
Oconee, SC	75,899	78,226
00-04	4,081	4,163
05-09	4,224	4,184
10-14	4,407	4,403
15-17	2,662	2,805
18-19	1,660	1,686
	911	896
21	917	881
22-24	2,770	2,653
25-29	4,349	4,652
30-34	3,934	4,457
35-39	4,003	3,985
40-44	4,298	4,102
45-49	4,649	4,350
50-54	5,115	4,667
55-59	5,534	5,097
60-61	2,496	2,668
62-64	3,396	3,671
65-66	2,526	3,030
67-69	3,372	4,046
70-74	4,318	5,052
75-79	3,050	3,327
80-84	1,712	1,746
85-UP	1,515	1,705
Kershaw, SC	68,800	71,585
00-04	4,381	4,498
05-09	4,502	4,465
10-14	4,807	4,601
15-17	2,866	3,032
18-19	1,782	1,904
20	827	932
21	796	913
24	2,448	2,746
25-29	3,831	4,122

30-34	4,029	3,979
35-39	4,120	4,135
40-44	4,315	4,175
45-49	4,769	4,350
50-54	5,011	4,771
55-59	4,988	4,950
60-61	1,959	2,152
62-64	2,680	2,945
65-66	1,648	2,029
67-69	2,210	2,732
70-74	2,728	3,401
75-79	1,859	2,148
80-84	1,204	1,400
85-UP	1,040	1,205
Greenwood, SC	67,953	68,944
00-04	4,443	4,420
05-09	4,399	4,439
10-14	4,352	4,406
15-17	2,736	2,765
18-19	2,167	2,221
20	1,040	1,020
21	1,000	954
22-24	2,782	2,739
25-29	4,455	4,455
30-34	4,076	4,417
35-39	3,899	4,020
40-44	4,069	3,834
45-49	4,389	4,012
50-54	4,414	4,253
55-59	4,300	4,221
60-61	1,692	1,727
62-64	2,338	2,375
65-66	1,577	1,780
67-69	2,079	2,413
70-74	2,788	3,297
75-79	1,944	2,111
80-84	1,507	1,439
85-UP	1,507	1,626
Darlington, SC	64,708	64,829
00-04	3,791	3,759
05-09	3,964	3,743
10-14	4,347	3,922
15-17	2,736	2,706
18-19	1,808	1,806
20	905	968
21	893	916
22-24	2,600	2,722
25-29	3,619	4,069
30-34	3,376	3,545
35-39	3,709	3,315
40-44	3,998	3,634
45-49	4,261	3,914
50-54	4,457	4,118
55-59	4,674	4,292
60-61	1,935	1,980

62-64	2,608	2,731
65-66	1,662	2,006
67-69	2,257	2,690
70-74	2,770	3,241
75-79	1,900	2,045
80-84	1,235	1,402
85-UP	1,203	1,305
Laurens, SC	59,619	60,115
00-04	3,601	3,574
05-09	3,648	3,575
10-14	3,734	3,675
15-17	2,333	2,371
18-19	1,766	1,794
20	943	948
21	870	876
22-24	2,414	2,450
25-29	3,434	3,537
30-34	3,094	3,408
35-39	3,134	3,054
40-44	3,547	3,113
45-49	3,893	3,491
50-54	4,225	3,809
55-59	4,250	4,077
60-61	1,717	1,767
62-64	2,340	2,400
65-66	1,581	1,895
67-69	2,105	2,568
70-74	2,552	2,993
75-79	1,774	1,899
80-84	1,267	1,353
85-UP	1,397	1,488
Cherokee, SC	50,763	51,927
00-04	3,227	3,226
05-09	3,261	3,234
10-14	3,434	3,273
15-17	2,114	2,160
18-19	1,408	1,417
20	708	715
21	688	690
22-24	2,121	2,099
25-29	3,204	3,414
30-34	2,826	3,189
35-39	2,972	2,831
40-44	3,283	2,961
45-49	3,497	3,267
50-54	3,464	3,451
55-59	3,387	3,365
60-61	1,315	1,374
62-64	1,830	1,871
65-66	1,223	1,412
67-69	1,608	1,915
70-74	1,985	2,398
75-79	1,407	1,613
80-84	912	1,061
85-UP	889	991

Chesterfield, SC	44,310	44,524
00-04	2,634	2,606
05-09	2,719	2,622
10-14	2,925	2,695
15-17	1,883	1,793
18-19	1,157	1,098
20	582	605
21	568	597
22-24	1,754	1,842
25-29	2,566	2,861
30-34	2,394	2,510
35-39	2,541	2,368
40-44	2,844	2,491
45-49	3,168	2,794
50-54	3,201	3,063
55-59	3,140	3,077
60-61	1,266	1,276
62-64	1,731	1,786
65-66	1,125	1,363
67-69	1,514	1,808
70-74	1,826	2,157
75-79	1,253	1,381
80-84	817	929
85-UP	702	802
Newberry, SC	39,783	40,382
00-04	2,454	2,475
05-09	2,410	2,453
10-14	2,498	2,421
15-17	1,559	1,587
18-19	1,212	1,246
20	598	608
21	563	583
22-24	1,571	1,615
25-29	2,279	2,357
30-34	2,144	2,255
35-39	2,169	2,147
40-44	2,311	2,154
45-49	2,538	2,286
50-54	2,727	2,485
55-59	2,806	2,658
60-61	1,186	1,211
62-64	1,605	1,678
65-66	1,073	1,296
67-69	1,424	1,711
70-74	1,799	2,118
75-79	1,165	1,277
80-84	825	862
85-UP	867	899
Edgefield, SC	33,492	34,061
00-04	1,493	1,520
05-09	1,731	1,518
10-14	2,074	1,761
15-17	1,360	1,373
18-19	828	817
20	433	490

21	440	491
22-24	1,370	1,505
25-29	2,004	2,292
30-34	2,308	2,189
35-39	2,254	2,272
40-44	2,154	2,075
45-49	2,440	2,181
50-54	2,539	2,330
55-59	2,535	2,517
60-61	959	1,093
62-64	1,305	1,460
65-66	834	981
67-69	1,109	1,341
70-74	1,305	1,605
75-79	832	928
80-84	579	652
85-UP	606	670
Chester, SC	33,064	33,028
00-04	2,033	1,989
05-09	2,099	2,002
10-14	2,124	2,069
15-17	1,309	1,294
18-19	790	805
20	416	419
21	413	410
22-24	1,289	1,250
25-29	1,949	2,081
30-34	1,770	1,907
35-39	1,772	1,737
40-44	1,983	1,720
45-49	2,337	1,932
50-54	2,422	2,254
55-59	2,442	2,321
60-61	985	1,019
62-64	1,329	1,410
65-66	872	1,034
67-69	1,151	1,385
70-74	1,390	1,634
75-79	957	1,028
80-84	629	685
85-UP	603	643
Clarendon, SC	32,884	32,943
00-04	1,762	1,786
05-09	1,816	1,752
10-14	1,963	1,810
15-17	1,358	1,329
18-19	879	846
20	520	518
21	496	517
22-24	1,549	1,600
25-29	1,954	2,152
30-34	1,657	1,793
35-39	1,580	1,596
40-44	1,715	1,557
45-49	1,954	1,639

50-54	2,256	1,921
55-59	2,401	2,224
60-61	1,075	1,099
62-64	1,465	1,530
65-66	1,016	1,189
67-69	1,363	1,581
70-74	1,718	1,957
75-79	1,166	1,240
80-84	663	671
85-UP	558	636
Dillon, SC	31,239	30,789
00-04	2,230	2,184
05-09	2,280	2,135
10-14	2,265	2,182
15-17	1,325	1,366
18-19	821	813
20	415	424
21	409	395
22-24	1,255	1,229
25-29	1,925	1,993
30-34	1,836	1,840
35-39	1,853	1,737
40-44	1,840	1,747
45-49	1,940	1,735
50-54	2,080	1,818
55-59	2,115	1,938
60-61	822	816
62-64	1,134	1,129
65-66	709	788
67-69	924	1,059
70-74	1,189	1,371
75-79	823	943
80-84	530	592
85-UP	519	555
Williamsburg, SC	30,333	29,320
00-04	1,731	1,662
05-09	1,780	1,652
10-14	1,945	1,706
15-17	1,291	1,168
18-19	770	698
20	386	417
21	388	392
22-24	1,187	1,246
25-29	1,802	2,002
30-34	1,775	1,767
35-39	1,754	1,645
40-44	1,783	1,595
45-49	1,949	1,669
50-54	2,023	1,755
55-59	2,276	1,967
60-61	950	970
62-64	1,319	1,330
65-66	794	912
67-69	1,067	1,216
70-74	1,264	1,416

75-79	900	945
84	613	603
85-UP	586	587
Marion, SC	29,611	28,988
00-04	1,941	1,867
05-09	1,970	1,861
10-14	1,960	1,891
15-17	1,188	1,172
18-19	721	706
20	380	374
21	368	353
22-24	1,146	1,103
25-29	1,718	1,815
30-34	1,636	1,634
35-39	1,679	1,560
40-44	1,704	1,599
45-49	1,764	1,613
50-54	1,909	1,663
55-59	2,194	1,855
60-61	949	949
62-64	1,306	1,290
65-66	771	894
67-69	1,027	1,205
70-74	1,272	1,454
75-79	885	925
80-84	590	619
85-UP	533	586
sper, SC	25,755	28,088
00-04	1,800	1,957
05-09	1,785	1,910
10-14	1,692	1,889
15-17	997	1,142
18-19	620	693
20	371	384
21	364	381
22-24	1,144	1,160
25-29	1,919	1,956
30-34	1,795	1,972
35-39	1,601	1,815
40-44	1,576	1,673
45-49	1,677	1,613
50-54	1,758	1,721
55-59	1,616	1,754
60-61	616	695
62-64	838	930
65-66	537	642
67-69	720	861
70-74	960	1,224
75-79	615	799
80-84	378	493
85-UP	376	424
Marlboro, SC	27,572	27,128
00-04	1,493	1,435
-09	1,499	1,446
10-14	1,603	1,456

15-17	1,031	970
18-19	644	583
20	362	382
21	359	365
22-24	1,121	1,166
25-29	2,005	2,112
30-34	2,035	2,035
35-39	1,852	1,774
40-44	1,799	1,657
45-49	1,891	1,651
50-54	1,969	1,722
55-59	1,867	1,786
60-61	753	761
62-64	1,022	1,056
65-66	680	780
67-69	904	1,040
70-74	1,087	1,245
75-79	705	753
80-84	451	501
85-UP	440	452
Union, SC	26,680	26,086
00-04	1,485	1,431
05-09	1,542	1,444
10-14	1,680	1,545
15-17	1,078	1,040
18-19	667	658
20	324	312
21	313	315
22-24	970	980
25-29	1,410	1,547
30-34	1,373	1,365
35-39	1,471	1,328
40-44	1,626	1,423
45-49	1,790	1,549
50-54	1,976	1,707
55-59	2,018	1,866
60-61	808	853
62-64	1,099	1,167
65-66	707	809
67-69	953	1,136
70-74	1,256	1,428
75-79	905	945
80-84	614	578
85-UP	615	660
Barnwell, SC	22,908	22,725
00-04	1,487	1,467
05-09	1,496	1,442
10-14	1,589	1,459
15-17	1,004	964
18-19	610	579
20	313	316
21	303	305
22-24	927	956
25-29	1,320	1,502
30-34	1,246	1,279

35-39	1,291	1,194
40-44	1,309	1,245
45-49	1,462	1,269
50-54	1,636	1,394
55-59	1,679	1,547
60-61	654	675
62-64	881	914
65-66	570	678
67-69	778	905
70-74	904	1,059
75-79	610	705
80-84	429	442
85-UP	410	429
Fairfield, SC	22,392	21,960
00-04	1,212	1,173
05-09	1,272	1,167
10-14	1,405	1,237
15-17	889	843
18-19	537	521
20	277	273
21	263	279
22-24	821	832
25-29	1,213	1,318
30-34	1,124	1,190
35-39	1,146	1,084
40-44	1,273	1,120
45-49	1,490	1,226
50-54	1,755	1,438
55-59	1,921	1,838
60-61	770	816
62-64	1,041	1,102
65-66	615	725
67-69	821	968
70-74	995	1,145
75-79	701	740
80-84	459	494
85-UP	392	431
Abbeville, SC	20,010	20,049
00-04	1,121	1,112
05-09	1,163	1,110
10-14	1,260	1,161
15-17	813	811
18-19	656	673
20	339	354
21	308	336
22-24	827	869
25-29	1,068	1,147
30-34	1,010	1,061
35-39	1,001	982
40-44	1,123	999
45-49	1,249	1,101
50-54	1,311	1,208
55-59	1,410	1,271
60-61	647	664
62-64	888	910

65-66	570	668
67-69	737	887
70-74	909	1,054
75-79	667	713
80-84	464	444
85-UP	469	514
Hampton, SC	18,997	18,478
00-04	1,099	1,052
05-09	1,110	1,042
10-14	1,189	1,060
15-17	777	710
18-19	468	427
20	263	263
21	259	255
22-24	792	792
25-29	1,208	1,325
30-34	1,230	1,278
35-39	1,235	1,157
40-44	1,212	1,113
45-49	1,251	1,065
50-54	1,294	1,176
55-59	1,323	1,148
60-61	520	521
62-64	708	699
65-66	473	542
67-69	625	722
70-74	778	872
75-79	540	574
80-84	350	368
85-UP	293	317
Saluda, SC	15,763	16,283
00-04	1,096	1,113
05-09	1,075	1,102
10-14	1,035	1,092
15-17	591	649
18-19	359	400
20	202	205
21	196	190
22-24	589	572
25-29	1,094	996
30-34	1,053	1,103
35-39	934	1,050
40-44	962	944
45-49	992	949
50-54	1,008	979
55-59	1,024	993
60-61	403	410
62-64	536	554
65-66	358	438
67-69	484	569
70-74	644	759
75-79	436	490
80-84	330	336
85-UP	362	390
Lee, SC	15,480	14,884

00-04	796	784
05-09	859	749
10-14	957	808
15-17	578	587
18-19	344	364
20	247	244
21	238	236
22-24	742	737
25-29	1,169	1,159
30-34	1,024	1,048
35-39	875	863
40-44	853	817
45-49	950	779
50-54	1,082	871
55-59	1,154	991
60-61	454	461
62-64	588	610
65-66	385	440
67-69	522	587
70-74	615	687
75-79	453	464
80-84	303	295
85-UP	292	303
Bamberg, SC	14,755	14,219
00-04	778	751
05-09	800	743
10-14	880	757
15-17	651	612
18-19	732	692
20	367	372
21	333	323
22-24	739	759
25-29	761	852
30-34	656	707
35-39	694	623
40-44	762	653
45-49	874	720
50-54	943	814
55-59	1,035	879
60-61	475	475
62-64	624	644
65-66	389	445
67-69	518	586
70-74	644	717
75-79	480	488
80-84	288	278
85-UP	332	329
Calhoun, SC	11,747	11,874
00-04	683	685
05-09	680	682
10-14	711	682
15-17	438	438
18-19	274	273
20	141	143
21	141	140

22-24	438	429
25-29	641	717
30-34	592	645
35-39	599	592
40-44	660	597
45-49	757	653
50-54	857	740
55-59	942	879
60-61	392	436
62-64	554	604
65-66	361	415
67-69	482	568
70-74	541	642
75-79	358	393
80-84	250	258
85-UP	255	263
McCormick, SC	10,679	10,560
00-04	377	365
05-09	399	371
10-14	448	422
15-17	283	266
18-19	169	170
20	113	111
21	101	103
22-24	314	308
25-29	586	627
30-34	585	615
35-39	525	507
40-44	591	495
45-49	666	572
50-54	783	654
55-59	858	760
60-61	423	449
62-64	560	614
65-66	489	532
67-69	646	720
70-74	825	911
75-79	492	518
80-84	265	264
85-UP	181	206
Allendale, SC	9,786	9,309
00-04	523	486
05-09	554	482
10-14	593	518
15-17	366	339
18-19	230	215
20	144	144
21	138	133
22-24	424	421
25-29	717	755
30-34	662	663
35-39	578	560
40-44	613	532
45-49	690	585
50-54	634	577

Nielson Demographics Update 2015.1

55-59	675	563
60-61	296	296
62-64	405	382
65-66	257	287
67-69	335	376
70-74	352	393
75-79	247	253
80-84	175	176
85-UP	178	173
Grand Total	4,847,856	5,090,038

Attachment G: Project Funding Letter

ALLIANCE ONCOLOGY

MUSC Health
Medical University of South Carolina

March 3, 2017

Mr. Louis Eubank
Director, Certificate of Need (C.O.N.) Program
South Carolina Dept. of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

Re: Preliminary indication of interest in providing financing for the Radiation Therapy Center in Berkeley County

Dear Mr. Eubank:

As a requirement of the Certificate of Need application process, I have been asked to document the availability of funds for the MUSC Health Cancer Care Network, LLC's Radiation Therapy Center Center to be located in Berkeley County.

As the President of MUSC Health Cancer Care Network, LLC I am responsible for the organization's financial operations and to secure funding for large capital projects. The total capital costs of the project for CON purposes is $9.8M. Depending on the interest rate environment at the time of the loan application, we will finance the capital costs of this project through an affiliate of MUSC Health Cancer Care Network, LLC or an external financing entity.

If any further information is necessary for this Certificate of Need relating to financial operations, please feel free to contact me.

Sincerely,

Greg Spurlock, Managing Member
MUSC Health Cancer Care Network, LLC
100 Bayview Circle, Suite 400
Newport Beach, CA 92660

Attachment H: Financial Projections & Manpower Budget

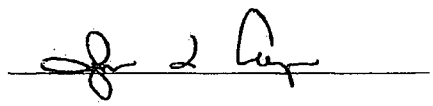
MUSC Health
MEDICAL UNIVERSITY of SOUTH CAROLINA

John L. Cooper
Hospital Finance
169 Ashley Avenue
MSC 332
Charleston SC 29425-3320
Tel 843 792 7068
Fax 843 792 6646
cooperj@musc.edu

March 14, 2017

The budget submitted for this Certificate of Need application has been prepared by Hospital Finance.

I attest that I, John Cooper, am an accountant and certify that all of the assumptions, calculations and information contained herein have been prepared accurately to the best of my knowledge.



MEDICAL UNIVERSITY HOSPITAL AUTHORITY
MEDICAL UNIVERSITY HOSPITAL AUTHORITY BUDGET w/out Berkeley Linac
JULY 1, 2018 - JUNE 30, 2022

	2019	2020	2021	2022
Inpatient Revenue	$2,353,881,536	$2,462,150,070	$2,576,118,343	$2,692,043,668
Outpatient Revenue	1,859,766,790	1,987,267,161	2,123,562,145	2,267,964,371
Total Revenue	$4,213,648,327	$4,449,417,232	$4,699,680,488	$4,960,008,039
Revenue Deductions:				
Contractual Adjustments	$2,506,156,829	$2,664,134,062	$2,831,839,267	$3,003,702,225
Indigent Care	80,940,971	85,468,856	90,277,058	95,277,740
Bad Debt	203,809,956	215,213,862	227,320,149	239,912,004
Total Revenue Deductions	$2,790,907,756	$2,964,816,780	$3,149,436,474	$3,338,891,969
Other Income	$28,822,382	$29,254,718	$29,692,734	$30,138,125
Net Operating Revenue	$1,451,562,953	$1,513,855,169	$1,579,936,748	$1,651,254,195
Expenses:				
Personnel	$615,598,045	$644,777,023	$679,649,325	$716,350,389
Supplies	326,212,362	342,692,349	360,118,936	378,485,002
Contractual Services & Other	405,158,059	422,213,321	433,832,021	446,846,982
Depreciation & Interest	78,959,233	105,186,308	104,722,113	104,261,336
Total Expenses	$1,425,927,699	$1,514,869,001	$1,578,322,395	$1,645,943,709
Non-Operating Revenues (Expenses):				
Investment Income	$5,970,855	$5,607,864	$5,724,273	$5,838,758
Capital Grants and Contributions	13,500,000	2,500,000	2,500,000	2,500,000
Non Capital Grants and Contributions	8,000,000	8,000,000	8,000,000	8,000,000
Costs of Issuance of Long Term Debt	-2,057,000	0	0	0
Total Non-Operating Revenues (Expenses):	$25,413,855	$16,107,864	$16,224,273	$16,338,758
Net Income	$51,049,109	$15,094,032	$17,838,626	$21,649,244

ASSUMPTIONS:

FY 2020 - 2021 : Based on Dixon Hughes Goodman MUSC Shawn Jenkins Children's Hospital feasibility study.
Expected opening is June, 2019.

Revenue: Annual activity increase of 1.5% - Inpatient and 3.8% - Outpatient with a 3% rate increase.
Revenue Deductions: Contractual Adj. increased from 59% to 60% while Charity/Bad Debt remained constant at 6.7%.

Personnel: Increase for inflation of 2.5% plus FTEs per Adjusted Occupied Bed remains at 5.5, Benefits at 31%;
Supplies: Increase for inflation of 3% plus changes in patient volumes.
Contractual Services & Other: Increase of 3%.
Depreciation & Interest: Current Depreciation and Interest Amortization schedule.

MEDICAL UNIVERSITY HOSPITAL AUTHORITY
MEDICAL UNIVERSITY HOSPITAL AUTHORITY BUDGET w Berkeley Linac
JULY 1, 2018 - JUNE 30, 2022

	2019	2020	2021	2022
Inpatient Revenue	$2,353,881,536	$2,462,150,070	$2,576,118,343	$2,692,043,668
Outpatient Revenue	1,876,853,008	2,004,633,185	2,141,212,488	2,285,903,546
Total Revenue	$4,230,734,545	$4,466,783,256	$4,717,330,831	$4,977,947,214
Revenue Deductions:				
Contractual Adjustments	$2,518,831,433	$2,677,016,227	$2,844,932,341	$3,017,009,555
Indigent Care	81,292,508	85,826,150	90,640,202	95,646,826
Bad Debt	204,621,885	216,039,087	228,158,885	240,764,465
Total Revenue Deductions	$2,804,745,826	$2,978,881,464	$3,163,731,428	$3,353,420,846
Other Income	$28,822,382	$29,254,718	$29,692,734	$30,138,125
Net Operating Revenue	$1,454,811,101	$1,517,156,509	$1,583,292,137	$1,654,664,493
Expenses:				
Personnel	$617,008,132	$646,202,558	$681,090,618	$717,807,614
Supplies	326,258,077	342,739,956	360,168,512	378,536,630
Contractual Services & Other	405,182,059	422,317,321	434,276,021	447,303,982
Depreciation & Interest	80,239,524	106,398,562	105,862,589	105,327,339
Total Expenses	$1,428,687,792	$1,517,658,397	$1,581,397,740	$1,648,975,565
Non-Operating Revenues (Expenses):				
Investment Income	$5,970,855	$5,607,864	$5,724,273	$5,838,758
Capital Grants and Contributions	13,500,000	2,500,000	2,500,000	2,500,000
Non Capital Grants and Contributions	8,000,000	8,000,000	8,000,000	8,000,000
Costs of Issuance of Long Term Debt	-2,057,000	0	0	0
Total Non-Operating Revenues (Expenses):	$25,413,855	$16,107,864	$16,224,273	$16,338,758
Net Income	$51,537,164	$15,605,976	$18,118,670	$22,027,686

ASSUMPTIONS:

FY 2019 - 2021 : Based on Dixon Hughes Goodman MUSC Shawn Jenkins Children's Hospital feasibility study.
Expected opening is June, 2019.

Revenue: Annual activity increase of 1.5% - Inpatient and 3.8% - Outpatient with a 3% rate increase.
Revenue Deductions: Contractual Adj. increased from 59% to 60% while Charity/Bad Debt remained constant at 6.7%.

Personnel: Increase for inflation of 2.5% plus FTEs per Adjusted Occupied Bed remains at 5.5, Benefits at 31%;
Supplies: Increase for inflation of 3% plus changes in patient volumes.
Contractual Services & Other: Increase of 3%.
Depreciation & Interest: Current Depreciation and Interest Amortization schedule.

MEDICAL UNIVERSITY HOSPITAL AUTHORITY
LINEAR ACCELERATOR AND CT SIMULATOR
JULY 1, 2018 - JUNE 30, 2022

	2019	2020	2021	2022
Outpatient Revenue	$17,086,218	$17,366,024	$17,650,343	$17,939,175
Total Revenue	$17,086,218	$17,366,024	$17,650,343	$17,939,175
Revenue Deductions:				
Contractual Adjustments	$12,674,604	$12,882,165	$13,093,074	$13,307,330
Indigent Care	351,537	357,294	363,144	369,086
Bad Debt	811,929	825,225	838,736	852,461
Total Revenue Deductions	$13,838,070	$14,064,684	$14,294,954	$14,528,877
Other Income	$0	$0	$0	$0
Net Operating Revenue	$3,248,148	$3,301,340	$3,355,389	$3,410,298
Expenditures:				
Personnel	$1,410,087	$1,425,535	$1,441,293	$1,457,225
Supplies	45,715	47,607	49,576	51,628
Contractual Services & Other	24,000	104,000	444,000	457,000
Depreciation & Interest	1,280,291	1,212,254	1,140,476	1,066,003
Total Expenditures	$2,760,093	$2,789,396	$3,075,345	$3,031,856
Net Income	$488,055	$511,944	$280,044	$378,442

ASSUMPTIONS:

FY 2019: Opening of Linear Accelerator and CT Simulator Center.

Revenue Volume: FY 2019 is 3,786 cases, FY 2020 is 3,848 cases,
FY 2021 is 3,911 cases, FY 2022 is 3,975 cases.

Expenses: Personnel increase of 2.5% and Benefits at 31%.
Supplies: Increase based on additional volume plus 2.5%.
Contractual Services & Other: Increase of 3%; FY 2021 includes first year maintenance.
Depreciation & Interest: New Project Depreciation and Interest Amortization schedule.

MEDICAL UNIVERSITY HOSPITAL AUTHORITY
LINEAR ACCELERATOR AND CT SIMULATOR
JULY 1, 2018 - JUNE 30, 2021

Receptionist	1
Center Administrator	1
Radiation Therapist	2
Physicist	1
Dosimetrist	1
Nurse (RN)	1
Physician	1
Total	8

Attachment I: Indigent Care Commitment Letters

May 2, 2017

Mr. Louis Eubank
Director, Certificate of Need (C.O.N.) Program
South Carolina Dept. of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

RE: Certificate of Need Application for the Radiation Therapy Center in Berkeley County

Dear Mr. Eubank:

MUHA, the applicant for the proposed Radiation Therapy Center in Berkeley County, commits that the facility will accept Medicare and Medicaid patients and the services that are not likely to be reimbursed for indigent and charity patients will be provided at a percentage that is comparable to all other existing outpatient services, if any in the services area.

For any questions or concerns, please feel free to contact me.

Sincerely,

Patrick J. Cawley, MD
CEO, MUSC Health
Vice President of Health Affairs, University

PART D: ASSURANCES

The applicant must furnish written assurance of each of the following where applicable:

The applicant assures to the following:

(1) The applicant has a fee simple title to the proposed site which includes all necessary easements and rights of way sufficient to assure use and possession for the purpose of construction operation of the facility.

(2) Final drawings and specifications for the project will be prepared by an architect/and or engineer who is legally regulated and licensed under laws of the state of South Carolina and approval of the same will be obtained from the Department.

(3) The applicant will submit to the Department for prior approval, changes that substantially alter the scope of work, function, utilities, major items of equipment, safety or cost of the facility during the construction period.

(4) The applicant will ensure that the project will be completed in accordance with all the Certificate of Need application regulations and guidelines.

(5) The applicant will ensure that the project will be completed in accordance with approved plans and specifications by maintaining competent and adequate architectural and engineering services throughout the construction administration phase of the project. At the completion of the project, the architect of record will be required to issue a statement that to the best of his knowledge and belief, based upon available records, supplemental documents, and periodic observation of the work, the project was constructed according to those documents approved by the Department.

(6) The facility will be operated and maintained in accordance with the standards prescribed by law and regulations for the maintenance and operation of such facilities.

(7) The applicant understands the Certificate of Need shall become void at the end of the specified time period from the date of issuance unless otherwise extended under Chapter 6 of Department regulations.

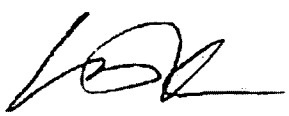
(8) The Department of Health and Environmental Control or its authorized representatives may at any time during the course of construction and upon completion of the project make an on-site inspection to check for compliance of the construction in accordance with the application for which the Certificate of Need was issued.

(9) The controlling interest as specified shall not be sold or leased or otherwise disposed of without a Certificate of Need or exemption by the Department being received by the appropriate individual.

(10) The applicant will provide the Department with a certified letter stating that the contractual agreement has been completed.

(11) The applicant will provide the Department with written notice of the date that a new or expanded service has been implemented, completed or terminated.

(12) The applicant will provide the Department with monthly progress reports and a final completion report as indicated which contain information required by Section 607 of Department regulations.

Signature  **Date** 5/7/13

Attachment J: Integrated Clinical Center of Excellence, Oncology
Dr. David Mahvi
CV
Radiation Oncologist
Dr. Joseph Jenrette
CV

CURRICULUM VITAE
David M. Mahvi, M.D.

1. PERSONAL

David M. Mahvi

Address:
114 Doughty St
MSC 295, suite 243
Charleston, SC 29425

Office Telephone and Email:
843 876 4420
mahvi@musc.edu

Citizenship:
United States

2. EDUCATION

1974-1977 – University of Oklahoma, Norman, Oklahoma - Microbiology and Pre-medicine

1977-1981 – Medical University of South Carolina, Charleston, South Carolina - M.D.

3. GRADUATE MEDICAL EDUCATION

1981-1989 – Duke University Medical Center, Durham, North Carolina - General Surgery
Chair- David C. Sabiston, Jr. MD

4. POSTDOCTURAL RESEARCH TRAINING

1983-1985 – Duke University Medical Center, Department of Microbiology and Immunology, Durham, North Carolina - Tumor Immunology, mentors- Olja J. Finn, Ph.D. and Richard S. Metzgar, Ph.D.

5. BOARD CERTIFICATION AND MEDICAL LICENSURE

Diplomat, National Board of Medical Examiners, 1981
Diplomat, American Board of Surgery, 1990, recertified 1998 and 2007

Medical license- State of Wisconsin, 1989 – #30313
- State of Illinois, 2008 -- #036.121086

6. MILITARY SERVICE

7. FACULTY APPOINTMENTS

1989-1997, **Assistant Professor**
University of Wisconsin
Madison, Wisconsin
Department of Surgery, Division of General Surgery, Section of Surgical Oncology

1997 - 2001, **Associate Professor**
University of Wisconsin
Madison, Wisconsin
Department of Surgery, Division of General Surgery, Section of Surgical Oncology

2001 - 2006, **Professor**
University of Wisconsin
Madison, Wisconsin
Department of Surgery, Division of General Surgery, Section of Surgical Oncology

2006 -2008, **Professor with Tenure**
University of Wisconsin
Madison, Wisconsin
Department of Surgery, Division of General Surgery, Section of Surgical Oncology

7/1/08-2016, **Professor with Tenure**
Northwestern University
Chicago, Illinois

2008-2014, **James R. Hines Professor of Surgery**
Northwestern University
Chicago, Illinois

2008- 2016, **Vice Chair, Clinical Affairs,**
Northwestern University
Chicago, IL
Department of Surgery

2013- Present, **Professor (by courtesy)**
Biomedical engineering
McCormick school of engineering
Northwestern University
Evanston, IL

2016- present, **Professor and Rose McKoy Chair**
Department of Surgery
Medical University of South Carolina
Charleston, SC

2016- present, **Chief- Division of Surgical Oncology**
Medical University of South Carolina
Charleston, SC

8. HOSPITAL APPOINTMENTS

1989-2008, **Staff physician**
University of Wisconsin Hospital
Madison, WI
Oncologic and General Surgery

1989-2008, **Staff Physician**
William S. Middleton Memorial Veterans Hospital
Madison, Wisconsin
Oncologic and General Surgery

2008- 2016, **Staff Surgeon**
Northwestern Memorial Hospital
Chicago, Illinois

2016- present, **Staff surgeon**
Medical University of South Carolina Hospital
Charleston, SC

9. ADMINISTRATIVE APPOINTMENTS

2000-2008, **General Surgery Residency Program Director**
University of Wisconsin
Madison, Wisconsin
Department of Surgery

2000-2008, **Chief- Section of Surgical Oncology**
University of Wisconsin
Madison, Wisconsin
Department of Surgery

7/1/08-12/31/2014, **Chief, Division of Gastrointestinal and Oncologic Surgery**
Northwestern University

Chicago, IL

9/1/08- present, **Vice Chair- clinical affairs**
Department of Surgery
Northwestern University
Chicago, IL

3/13- 7/13, **Interim Chair**
Department of Neurologic Surgery
Northwestern University
Chicago, IL

3/1/2013- 8/31/2014, **Interim CMO**
Northwestern Memorial Hospital
Chicago, IL

9/1/2013- 9/1/2015, **President**
Northwestern Medical Group
Chicago, IL

- Responsible for the finances, strategic planning, growth and development of the $900MM physician practice and ambulatory health care platform of Northwestern Medicine.
- Created an enterprise-wide management structure that integrated a community based physician group into a specialty based academic physician group.

2016 Chief- **Oncology Integrated center of clinical excellence**
Medical University of South Carolina
Charleston, SC

10. COMMITTEE SERVICE

1990-1999 - Residency Review Committee, University of Wisconsin School of Medicine

1991-1996 - Clinical Affairs Committee, University of Wisconsin Comprehensive Cancer Center

1994-2005 - Biologic Therapy Executive Committee, University of Wisconsin Comprehensive Cancer Center

1997-2003 - Tumor Registry Committee, University of Wisconsin Comprehensive Cancer Center

1998 - External Review Committee, Department of Surgical Sciences, University of Wisconsin School of Veterinary Medicine

1998 - Advisory Committee, Clinical Research Curriculum, University of Wisconsin School of Medicine

1999 - Academic Compensation for Clinical Faculty task force

1999-2008 University of Wisconsin Medical Foundation Compensation Committee, (Chair 2002- 2007)

2005-2008 OR Committee, University of Wisconsin

2000-2008 - Mentoring Committee (chair) - Sharon Weber MD, Tara Breslin MD, Charles Heise MD and Lee Faucher MD, University of Wisconsin

2006-2008 - Graduate Medical Education Oversight Committee, University of Wisconsin Hospital

2008- present- Surgical Services Executive Committee

2009- Search Committee for Chief of Surgical Services- Children's Memorial Hospital Chicago

2010- present- Northwestern Surgical Peer Review Committee (Chair)

2010- present- Northwestern Medical Faculty Foundation Board of Directors

2010- 2011 Northwestern University OB/GYN Chair Search Committee (Chair)

2010- 2014 Executive Management Committee Northwestern Center for Pelvic Health

2011- 2015- Northwestern University department of Surgery promotion and tenure committee (Chair)

2011- 2013- Northwestern Memorial Hospital capital allocation committee

2012- 2013- Northwestern University Neurosurgery Chair Search Committee (Chair)

2012- 2014- Surgical Quality Oversight Committee (Co-Chair)

11. AWARDS, HONORS, DISTICTIONS

1979-1980- President- American Medical Student Association Medical University of South Carolina

1983-1985- Recipient- NIH National Research Service Award in Immunology

1998 -University of Wisconsin Residency Teaching Award

2003 -University of Wisconsin Residency Teaching Award

2008- 2014 James R. Hines professor of surgery, Northwestern University Feinberg School of Medicine

Cited in, *The Best Doctors in America*, Woodward/White, Inc., Aiken, SC
Cited in, *The Best Doctors in Madison, (Surgical Oncology),* Madison magazine 2006
Cited in, *Marquis Who's who in science and engineering* 2007- present

Cited in, *Guide to America's top surgeons*, Consumers research council of America 2008
Cited in, *Strathmore's who's who* 2009
Cited in *Castle Connolly Best Doctors* 2011
Cited in *Chicago Magazine* (best doctors in Chicago) 2011-15
Cited in USN&WR Best Doctors 2013

2010- Northwestern Medical Faculty Foundation Award for Excellence in Collaboration

2009, 2010, 2011, 2012, 2013, 2014 Northwestern University Department of Surgery Excellence in Teaching Award

Farley Fellow- McCormick School of Engineering 2013- present

12. PROFESSIONAL SOCIETY SERVICE

American College of Surgeons,
- Executive member, ACS program committee 2008- 13
- Member- Committee on emerging surgical technology

Madison Surgical Society;
- Secretary 1994-1997
- President 1997-1998

Sabiston Surgical Society
Association for Academic Surgery
Societe Internationale de Chirurgie
Society of Surgical Oncology,
- Member- program committee 2001-2006

American Association for Cancer Research
Wisconsin Surgical Society, program committee 1997
Society for Surgery of the Alimentary Tract
- Chair, Program Committee, 2003 – 2007
- President, 2009- 2010
- Chair, Board of Trustees 2010- 2011
- Member- SSAT foundation board of directors 2010- 2013

Society of American Gastrointestinal Endoscopic Surgery
Society of University Surgeons
Central Surgical Association,
- Member-Program committee 2008-2010
- Chair- Program Committee 2010-2012
- Member- CSA foundation board of directors 2010- present

American Hepato-Pancreato-Biliary Association
Association of Program Directors in Surgery
Halsted Surgical Society
American Surgical Association
American Board of Surgery
- Director- 2007- 2013

Chair- Advanced surgical education Committee 2011- 2014
GI surgery advisory Committee 2007- 2014
Vice Chair 2013- 2014
Chair 2014-2015
Chicago Surgical Society
Recorder 2011- 2014

13. PROFESSIONAL AND SCIENTIFIC SERVICE

Member, Ad Hoc Study Section on Gene Therapy of Cancer, National Cancer Institute, National Institutes of Health, 1994

Member, Health Manpower Study Section, NIH, NCI (Ad Hoc) 1996-1998

Member, Subcommittee F Study Section (Manpower & Training), National Cancer Institute Initial Review Group, 1998-2002

Scientific Review Board Member- the National Gene Vector Laboratories, 2000-2002.

Eastern Cooperative Study Group (ECOG), Scientific Advisory Committee, 1990-1994

Editorial Board Member, Annals of Surgical Oncology, 2002 – 2006

Editorial Board Member, Annals of Surgery, 2003 – present.

Ad Hoc reviewer, NIH BMIT/MEDI study group 2008

Editorial Board Member, Journal of Interventional Oncology 2008- present

Editorial Board Member, Hepato-Pancreato-Biliary Surgery 2008- present

Editorial Board Member, Journal of Gastrointestinal Surgery 2009- present

Co-founder- Medical Engineering Innovations (Madison WI) 2009- present

Ad Hoc Reviewer NIH R01/R03 Special Emphasis Panel 2012

Medical Advisor- Brightseed Inc 2012- present

Medical Advisor- Innoblative designs 2014- present

14. TEACHING

UW Second Year Medical Students – Neoplasia Disease Course, 1990-2000

UW Weekly Hepatobiliary Conference, 1997-2008, Co-director

Northwestern University bi-weekly surgical decision making conference, 2009- 2013

Northwestern University- NUventions. Faculty 2008- 2014

- Course for teaching innovation in collaboration with the Northwestern schools of Medicine, Engineering, Law, and Business

Northwestern University- Center for Device development. Faculty and co- founder 2013- present

- Program for teaching entrepreneurship at the postdoctoral level to physicians and engineers

Trainees (pre and postdoctoral)

Trainee		Current Position
Sharon Weber, MD	1997-1998	Professor with tenure- Univ of Wisconsin, Madison
Charles Heise, MD	1998-1999	Professor- Univ of Wisconsin, Madison
Tyler Staelin, MD	1999-2000	Private practice Grand Rapids MI
Andrew Wright, MD	2000-2002	Associate Professor- Univ of Washington, Seattle
Ken Meredith, MD	2002-2003	Associate Professor- Moffitt Cancer Center, Tampa
Katsuhisa Oshikawa, MD	1998-2000	Associate professor, Jichi Medical school, Japan
Ann O'Rourke, MD	2004-2006	Associate professor- Univ of Wisconsin, Madison
Dieter Haemerich, PhD	1999-2000	Assistant Professor- Medical University of SC
Deshan Yang, PhD	2003- 2005	Instructor in Radiation Oncology- Washington University, St Louis
Cheoyung Kim, PhD	2003-2007	Assistant professor
Rachael Calcutt, MPH	2003-2005	Associate professor of Surgery- UC- San Francisco
Punit Prakesh	2004-2008	Instructor- University of California- San Francisco
Daniel McCarthy	2008-2012	Cardiothoracic surgery fellow- University of Washington

Trainees- GME

University of Wisconsin General Surgery Residency Program director 2000- 2008
Responsibilities include recruitment, advising, curriculum development, external regulatory compliance, a weekly resident clinical case conference and a weekly morbidity and mortality conference. Expanded the program to 6 residents per year (from 5), and increased the research focus such that there now are 4 residents per year in the lab for 2 years each (previously there was 1 resident for 1 year).

15. RESEARCH GRANTS/CONTRACTS

South Carolina Lung Association
"The Cellular Pathology of the Acutely Damaged Lung Utilizing Scanning Electron Microscopy"
Principal Investigator
Date of Award: 1976
$20,000

University of Wisconsin Surgical Associates
"The Generation of Colorectal Carcinoma Specific Cytotoxic T Cell Lines"
Principal Investigator
Dates of Award: October 1, 1989 thru September 31, 1991
$60,000

National Institutes of Health, PO1 CA20432-13
"The Biotherapeutic Treatment of Cancer –A Phase I/IB Trial of Adenocarcinoma Reactive Human Mouse Chimeric Monoclonal Antibody Plus IL-2 as Immune Activation in Patients With Adenocarcinoma of the Lung, Colon, or Breast"
(PI–Ernest Borden)
Co-Investigator (grant); Principal Investigator (Protocol)
Dates of Award: 1990-1993

National Institutes of Health, 5-PO1-CA20432-14
"Concepts to Clinics"
Co-Investigator
Dates of Award: January 1, 1990 thru August 31, 1993
$25,000 (Salary support for research specialist)

University of Wisconsin Foundation (University Surgical Associates)
"Function of Heat Shock Protein 27 in Breast Cancer"
Principal Investigator
Dates of Award: December 1, 1990 thru December 31, 1994
$131,000

National Institutes of Health, RFA CA-92-98 CATBRM
"The Treatment of Cancer with Biotherapy" (PI–Paul Sondel)
Co-Investigator
Dates of Award: September 30, 1994 thru October 1, 1996
$532,000

Agracetus
"The Therapy of Cancer by Particle Bombardment"
Principal Investigator
Dates of Award: January 1, 1995 thru January 1, 1998
$150,000

National Institutes of Health, CA95-017 CAT-BRM
"Systemic Immunity by Particle-mediated BRM Gene Transfer"
Co-Investigator and Protocol Chairman for Protocols A-1, A-2 and B
Dates of Award: September 1, 1996 thru August 31, 2000
$1,397,310

Auragen, Inc.
"Phase I GM-CSF Clinical Trial"

Principal Investigator
Dates of Award: October 1996 - August 1998
$170,000

University of Wisconsin Comprehensive Cancer Center
"In Vivo Cancer Gene Therapy with B7-1 and GM-CSF DNA"
Principal Investigator
Date of Award: June 1997
$15,000

National Institutes of Health #1 R01 DK05883901A1
"Hepatic RF Ablation: Development of More Effective Devices"
Principal Investigator
Date of Award: September 30/2001 – June 30, 2007
$345,895 Annual Direct Costs

"Surgical Oncology Research Training Program (T32)"
Co- Principal Investigator
June 2001-2004

National Cancer Institute/National Institutes of Health 2 T32 CA90217-06
"Surgical Oncology Research Training Program"
Principal Investigator
2004- 2008
$235,848 annual direct costs

Vivant Medical
"Microwave ablation of metastatic colorectal cancer- A phase II study"
Principal Investigator
2002- 2006

University of Wisconsin Comprehensive Cancer Center/NCI
"Treatment of Spontaneous Tumor Metastases with IL-12 DNA a Phase I/IB Trial"
Principal Investigator
1999-2007

Coulter Translational Partners Grant Program
"Thermoresponsive multifunctional drug delivery matrix for immunotherapy"
Co-Investigator, (PI: John Kao)
2007-2008
$20,000

National Institutes of Heath 1 R43 CA123989-01A1
"Electrode Array for Bloodless Liver Resection"
Subcontract with Medical Engineering Innovations, LLC (PI Jim Will)
2008- 2010

$18,036

Coulter Translational Partners Grant Program
"Multifunctional drug delivery matrix for immunotherapy"
Co-Investigator, (PI: John Kao)
2008-2009
$50,000

Cook Medical
"Development of Medical Device Entrepreneurs"
Principal Investigator
2011- 2013
$50,000

Philanthropy for research support from patient- 2011
$250,000

VentureWell Stage 2 SP0023072
"Development of an expandable radiofrequency ablation probe for breast cancer treatment"
Principal Investigator
2013
$25,000

CLINICAL TRIALS

National Cancer Institute, Protocol #B90-0009
"Augmentation of Interferon-Induced Proteins in Adenocarcinomas After Exogenous Interferon Therapy"
Principal Investigator
1990-1993

University of Wisconsin Comprehensive Cancer Center, #CO 9296
"A Phase I Clinical Trial of Intravenous L-Buthionine Sulfoximine (BSO) (NSC-326231) Administered as an Initial Intravenous Bolus Followed by a 24- to 48-Hour Continuous Infusion, Given with Intravenous Melphalan (L-PAM)"
Co-Investigator
1994-1998

University of Wisconsin Comprehensive Cancer Center
"Phase I/IB Study of Immunization with the GM-CSF Gene by Particle-Mediated Transfer in Patients with Melanoma with Sarcoma"
Principal Investigator
1996-1999

University of Wisconsin Comprehensive Cancer Center - NCI
"Phase I/IB Trial of Treatment with IL-12 DNA to Spontaneous Tumor Metastases"

Principal Investigator
1999-present

Vivant Medical
"Microwave ablation of hepatic tumors- A phase I study"
Principal Investigator
2001- 2008

Vivant Medical
"Microwave ablation of metastatic colorectal cancer- A phase II study"
Principal Investigator
2002- 2008

16. SCHOLARLY BIBLIOGRAPHY

a. Original, peer reviewed research articles

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122. Knab LM, Boller AM, **Mahvi DM**. Cholecystitis. Surg Clin North Am. 2014 Apr;94(2):455-70.

123. Surgical duration and risk of venous thromboembolism Kim JYS, Khavanin N, Rambachan A, McCarthy RJ, Mlodinow AS, De Oliveria GS, Stock MC, Gust MJ, **Mahvi DM.** JAMA Surgery. 2015 Feb;150(2):110-117.

124. Saadat L, **Mahvi DM**, Boller AM Should oral contrast be omitted in patients with suspected appendicitis? 2016 In press

125. **Mahvi DM.** Does Decreasing Variability Affect Quality? JAMA Surg. 2016 151(2):163.

126. Bilimoria KY, Chung JW, Hedges LV, Dahlke AR, Love R, Cohen ME, Tarpley J, Mellinger J, **Mahvi DM**, Kelz RR, Ko CY, Hoyt DB, Lewis FH. Development of the Flexibility in Duty Hour Requirements for Surgical Trainees (FIRST) Trial Protocol: A National Cluster-Randomized Trial of Resident Duty Hour Policies. JAMA Surg. 2015 [Epub ahead of print]

127. Billimoria K Chung J, Hedges L, Dahlke A, Love R, Cohen M, Hoyt D, Yang A, Tarpley J, Mellinger J, **Mahvi DM**, Kelz R, Ko C, Odell D, Stulberg J, Lewis F. National cluster-randomized trial of duty hour flexibility in surgical training. N Engl J Med. 2016 [Epub ahead of print]

128. Eschelbach E, Bentrem D, Komanduri S, **Mahvi D**, Keswani R. ERCP in Potentially Resectable Malignant Biliary Obstruction Is Frequently Unsuccessful When Performed Outside of a Comprehensive Pancreaticobiliary Center. J Surg Oncol. 2016 [Epub ahead of print]

b. Editorials, reviews, chapters, books, commentaries

1. **Mahvi DM.** Endocrine emergencies. In: Lyerly K, ed. *Handbook of Surgical Intensive Care.* Chicago, Ill: Yearbook Medical Publishers;1989:409-420.

2. Storm FK, **Mahvi DM**. Treatment of primary melanoma. In: Lejeune FJ, Chaudhuri PK, Das Gupta TK, eds. *Malignant Melanoma–Medical and Surgical Management*. New York, NY: McGraw-Hill; 1994:193-203.

3. Storm FK, **Mahvi DM**. Retroperitoneal masses, adenopathy, and adrenal glands. In: Wilhelm M, ed. *Surgical Oncology Clinics of North America: Appropriate Biopsy Techniques in Surgical Oncology*. Philadelphia, Pa: WB Saunders; 1995:175-184.

4. **Mahvi DM**. Treatment of primary melanoma. In: *Plastic Surgery (Skin Tumor; Melanoma), Selected Readings*. Waco, Tex: Baylor University Medical Center (Publ.); 1995:8(7).

5. Storm FK, **Mahvi DM**. Therapeutic heat and cold in GI malignancies. In: Wanebo H, ed. *Surgery of Gastrointestinal Cancer*. Philadelphia, Pa: JB Lippincott; 1996:551-575.

6. Schneider JD, **Mahvi DM**. How to approach benign breast complaints. *Intern Med*. 1996;17(10):75-88.

7. **Mahvi DM,** Lee FT Jr. Radiofrequency ablation of hepatic malignancies: is heat better than cold? In: *Annals of Surgery*. 1999:230(1);9-11.

8. Zdeblick RA, **Mahvi DM**. Endoscopic approaches to the lumbar spine. In: *Anterior approaches to the Spine*. St. Louis, Mo: Quality Medical Publishing Inc; 1999:243-255.

9. **Mahvi DM**, Rikkers LF. Liver. In: Corson J, Williamson R, eds. *Surgery*. London, England: Mosby International. 2001:3(11):11.1-11.24.

10. Turcotte JG, **Mahvi DM**, Helton WS, Rikkers LF, Lowy AM. Christians. Hepatocellular carcinoma: multimodality management – Discussion. *Surgery*. 2001;130(4):559-560.

11. Wright AS, **Mahvi DM**. Liver directed therapies for colorectal cancer. In: *Cancer Chemother Biol Response Modif*. 2003;21:831-43.

12. Wright AS, **Mahvi DM**. Liver Directed Therapies for Colorectal Cancer. In: *Chemotherapy & Biological Response Modifiers*. 2003:21;831-843.

13. O'Rourke AP, Haemmerich D, Prakash P, Converse MC, **Mahvi DM**, Webster JG. Current status of liver tumor ablation devices. In: *Expert Rev. Med. Devices* 2007; 4(4): 523-537

14. Krantz Seth, **Mahvi DM**. The Stomach In: *Sabiston's textbook of Surgery* 2010

15. **Mahvi DM**, Krantz, Seth. Ablative Therapies for Hepatic Neoplasms In: *Shackelford's Surgery of the Alimentary Tract*, 7th edition 2012

16. Sherman K, **Mahvi DM.** Liver metastases In: *Abeloff's clinical oncology 5th edition* 2012

17. Bilimoria KY, Minami CA, **Mahvi DM**. (book) *Comparative Effectiveness in Surgical Oncology- key questions and how to answer them*, 2015 - Springer

c. Case reports, technical notes, letters: Available on request

d. Proceedings and non-refereed papers: Available on request

f. patents

1. Multipolar electrode system for radiofrequency ablation- US patent office ref # 20020022864
2. Radio-frequency ablation system using multiple electrodes- US patent office ref # 20020156472
3. Multipolar electrode system for volumetric radiofrequency ablation- US patent office ref # 20040230187
4. Electrode array for tissue ablation- patent # 7,367,974 B2 US patent office ref # 20060064084
5. Floating sleeve microwave antenna for tumor ablation. Patent applied for.
6. New mechanically adjustable interstitial antenna for microwave ablation. Patent applied for.
7. Fan-beam microwave horn for bloodless resection. US20100312234.
8. Radiofrequency probe for circumferential ablation of a hollow cavity. US20140031810

g. abstracts: Available on request

VISITING PROFESSORSHIPS (last 2 years)

1. "Zen and the art of surgery" University of California, San Francisco Blaisdell Lecture 2012
2. "Surgical Innovation" University of Utah, Salt Lake City, Utah 2013
3. "How do we train the surgeon of the future" Rush University, Chicago 2015
4. "How do we train the surgeon of the future" Rikkers lectureship, University of Nebraska
5. " The impact of heath care reform on academic medical centers" Baker lecture. Virginia Mason Medical center Seattle 2015
6. "The impact of health care reform on academic medical centers" Duke University, Durham, NC 2015

PRESENTATIONS: Available on request

Joseph M. Jenrette III, M.D.

Curriculum Vitae

SCHOOL ADDRESS

Department of Radiation Oncology
College of Medicine
Medical University of SC 169 Ashley Ave. MSC 318
Charleston SC 29425

Work Email : jenretbm@musc.edu
Work Phone : (843)792-3271
Work Fax : (843)792-5498

EDUCATION

Year	Institution	Degree	Major
1973	University of North Carolina	B.A.	German Literature
1979	Medical University of South Carolina	M.D.	Medicine

POSTDOCTORAL EDUCATION

Year	Institution	Role
1981 - 1983	Medical University of South Carolina	Chief Resident
1980 - 1983	Medical University of South Carolina	Resident
1979 - 1980	Medical University of South Carolina	Intern

LICENSURE AND CERTIFICATION

Year	Description
	Certification - American Board of Radiology
	Certification - Therapeutic Radiology

FACULTY APPOINTMENTS

Year	Institution	Role
2011 - Present	Medical University of South Carolina, College of Graduate Studies	Associate Member
2010 - Present	Medical University of South Carolina, Neurosciences, Division of Neurology	Professor
2003 - Present	Medical University of South Carolina, Radiation Oncology	Professor
1990 - 2003	Medical University of South Carolina, Radiation Oncology	Associate Professor
1986 - 2002	Medical University of South Carolina, Health Professions	Assistant Professor
1986 - 1990	Medical University of South Carolina, Radiation Oncology	Assistant Professor
1983 - 1986	Medical University of South Carolina, Radiation Oncology	Instructor

PROFESSIONAL EXPERIENCE

Year	Title/Position	Institution/Organization	Comments
2005 - Present	Chairman	Medical University of South Carolina, Department of Radiation Oncology	
2003 - 2005	Interim Chair	Medical University of South Carolina, Department of Radiation Oncology	
2001 - 2005	Director	Medical University of South Carolina, Residency Program	
1989 - 1994	Acting Chairman	Medical University of South Carolina, Department of Radiation Oncology	
1986 - 1989	Medical Director	Medical University of South Carolina, Tumor Registry	
1984 - 1995	Director	Medical University of South Carolina, Residency Program	

HOSPITAL PRIVILEGES

Year	Title/Position	Institution/Organization	Comments
2010 - Present	Full-time staff	Medical University Hospital	
2010	Consulting Staff	Trident Regional Medical Center	
2010	Consulting Staff	Self Memorial Hospital	
2010	Consulting Staff	Georgetown Memorial Hospital	
2010	Consulting Staff	East Cooper Regional Medical Center	

PROFESSIONAL SOCIETIES/ASSOCIATIONS - INTERNATIONAL

Year	Society/Association	Role
	Radiological Society of North American	Member
	International Stereotactic Radiosurgery Society	Member

PROFESSIONAL SOCIETIES/ASSOCIATIONS - LOCAL

Year	Society/Association	Role
	Charleston County Medical Society	Member
1997 - Present	The College of Charleston	Board of Visitors
1996 - 1999	Charleston Community Foundation	Board of Directors
1995 - 1998	Ashley Hall School	Board of Trustees
1995 - 1996	Charleston Area Strategic Plan for the Arts	Commission Chairman
1990 - 1992	Charleston Symphony Orchestra	President
1989 - 1990	Charleston Symphony Orchestra	Vice President
1989 - 1990	Preservation Society of Charleston	Vice President
1989	Calhoun Street Corridor	Committee Member
1988 - 1989	Charleston Symphony Orchestra	Special Events Chairman
1987 - 1997	Charleston Symphony Orchestra	Board Member
1987 - 1993	Preservation Society of Charleston	Board Member
1987 - 1989	Preservation Society of Charleston, Planning & Zoning Committee	Chairman
1984 - 1987	Charleston Breast Cancer Screening Project	Chairman

PROFESSIONAL SOCIETIES/ASSOCIATIONS - NATIONAL

	Society/Association	Role
	American Medical Association	Member
	American Society of Therapeutic Radiologists and Oncologists	Member
	American Society of Clinical Oncology	Member
	Children's Oncology Group	Member
2004 - Present	RTOG	Principle Investigator for MUSC
2004 - Present	Society of Chairmen of Radiation Oncology Programs, Nominating Committee	Member
1993 - Present	American Classical Homes Preservation Trust	Board of Directors
1993 - Present	American Classical Homes Preservation Trust	Vice President
1989 - 1997	Over The Rainbow - An Arts Series for Children	Founder & Chairman of the Board
1989 - 1990	American Cancer Society - State Board	President of the Board
1988 - 1989	American Cancer Society - State Board	1st Vice President
1987 - 1988	American Cancer Society - State Board	Chairman of Professional Education Committee
1987 - 1988	American Cancer Society - State Board	2nd Vice President
1985 - 1992	American Cancer Society - State Board	Member of Board
1985 - 1987	American Cancer Society - State Board	Chairman of Service & Rehabilitation
1985 - 1987	Make a Wish Foundation	Medical Advisory Board
1985 - 1987	American Cancer Society - Charleston County Unit	President of Board
	Clergy Oncology Day - MUSC	Chairman
1985	Hemoccult Colorectal Cancer Detection Project	Member
1984 - 1987	American Cancer Society - Charleston County Unit	Vice President of Board
1984 - 1985	Make a Wish Foundation	Board of Director
1983 - 1991	American Cancer Society - Charleston County Unit	Member of Board
1983	Hemoccult Colorectal Cancer Detection Project	Member

PROFESSIONAL SOCIETIES/ASSOCIATIONS - REGIONAL

Year	Society/Association	Role
	Piedmont Oncology Association	Member
	Southwest Oncology Group	Member
	South Carolina Medical Association	Member
	Southern Medical Association	Member
2007 - 2008	General Alumni Association of University of North Carolina	Second Vice Chair
2004 - 2007	General Alumni Association of University of North Carolina	Board of Directors
1994	South Carolina Oncology Society	President

EDITORIAL REVIEW BOARD

Year	Society/Association	Role
	Journal of the American Academy of Dermatology	Reviewer
	American Journal of Clinical Oncology	Reviewer
	Federal Practitioner	Reviewer

1997 - 2001	The Journal of Radiosurgery	Editorial Board

CONTRACTS OR GRANTS

Year	Funding Source	Agency Award Number	Amount Funded	PI/CO-PI	% Effort	Grant Title
2009 - 2014	Radiation Therapy Oncology Group	4501/U10 CA021661	$100,000	Principal Investigator	1	Radiation Therapy Oncology Group (RTOG): Institutional Member Agreement
2005 - 2007	Amer. Coll. of Radiology	U10 CA21661	$65,000	Principal Investigator	1	Radiation Therapy Oncology Group Protocol: A Phase III Trial for Locally Recurrent, Previously Irradiated Head and Neck Cancer: Concurrent Re-Irradiation and Chemotherapy vs Chemotherapy Alone
2003 - 2013	Proxima Therapeutics		$11,188	Co-Investigator		Phase V GliaSite Radiation Therapy System (RTS) Registry Protocol for the Treatment of Resectable Malignant Brain Tumors
1998 - 2003	Techniclone Corp.	TNT9802	$1,470,697	Co-Investigator		Interstitial 131I-chTNT-1/B for the Treatment of Newly Diagnosed or Recurrent Anaplastic Astrocytoma and Glioblastoma Multiforme
1995 - 2001	Amer. Coll. of Radiology	CA21661	$12,220	Co-Investigator		Radiation Therapy Oncology Group (RTOG)

HONORS AND AWARDS

Year	Description
2006	Member of Alpha Omega Alpha
1999	Fellow of the American College of Radiation Oncology
1998 - Present	Best Doctors in America
1996 - Present	Who's Who in Medicine
1996 - Present	Who's Who in America
1996 - Present	Who's Who in Science
1996	Professor of the Day Hahneman University
1995	Best Doctors in the Southeast

HOSPITAL COMMITTEES

Year	Name of Committee	Role	Institution
2005 - 2006	Hospital Executive Committee	Member	Medical University of South Carolina
2003 - Present	Board of Directors of University Medical Associates	Member	Medical University of South Carolina

UNIVERSITY COMMITTEES

Year	Name of Committee	Role	Institution
2[illegible] - Present	Cancer Committee	Chairman	Medical University of South Carolina
2001 - 2005	Residency Program	Director	Medical University of South Carolina

2001 - 2004	Cancer Committee	Member	Medical University of South Carolina
- 2002	Search Committee	Chair	Medical University of South Carolina, Department of Radiology
1995 - Present	ACS Institutional Research Grant (IRS) Committee	Member	Medical University of South Carolina
1992 - Present	Hollings Oncology Center Internal Clinical Advisory Committee	Member	Medical University of South Carolina
1992 - Present	Hollings Oncology Center Executive Committee	Member	Medical University of South Carolina
1990 - 1995	Subcommittee for Development of the Hollings Oncology Center	Chairman	Medical University of South Carolina
1989 - 1996	Hollings Oncology Center Steering Committee	Member	Medical University of South Carolina
1986 - 1989	College of Medicine Admissions Committee	Member	Medical University of South Carolina
1984 - 1990	Admission Committee	Interviewer	Medical University of South Carolina
1983 - Present	Cancer Committee	Member	Medical University of South Carolina

TEACHING EXPERIENCE/CURRICULUM DEVELOPMENT

Year	Title/Description
1984 - Present	Clinical instruction of residents and medical students in Radiation Oncology.

MENTORING ACTIVITIES

Year	Student Name	Institution	
2000	Ph.D. Dissertation Committee	Medical University of South Carolina, Department of Biometry and Epidemiology	Member
	Ph.D. Dissertation Committee	Medical University of South Carolina, Department of Biometry and Epidemiology	Member

INVITED PRESENTATIONS

1. "Radiation Therapy in the Treatment of the Pancreas", Medical University of South Carolina, Cancer Conference.
2. "Role of Radiation Therapy in Cancer of the Pancreas", Medical University of South Carolina, Surgeons Cancer Conference.
3. "Primary Breast Irradiation", Medical University of South Carolina, Surgeons Cancer Conference.
4. "Radiation and Chemotherapy Combined with Conservative Surgery in Cancer of the Anus", Medical University of South Carolina, Surgeons Cancer Conference.
5. "Radiation Therapy in the Management of Hepatobiliary Carcinoma", Medical University of South Carolina, Surgeons Cancer Conference.
6. "Radiation Therapy in the Management of Malignant Lymphoma", Medical University of South Carolina, Residents in radiation Therapy.
7. "Pediatric Cancers-Series of Three Lectures", Medical university of South Carolina, Residents in Radiation Therapy.
8. "Brain Tumors-Series of Two Lectures", Medical University of South Carolina, Residents in Radiation Therapy.
9. "Leukemia", Medical University of South Carolina, Radiation Therapy Technology Students.
10. "Hodgkin's Disease", Medical University of South Carolina, Radiation Therapy Technology Students.
11. "Cancer of the Central Nervous System", Medical University of South Carolina, Radiation Therapy Technology Students.
12. "Radiation in Treatment of Thoracic Cancers" - Division of Cardiothoracic Surgery, Medical University of South Carolina
13. "Radiation in the Treatment of Head and Neck Cancers", Medical University of South Carolina School of Dentistry, November.
14. Ruppert BN, Welsh CT, Giglio P, Johnson I, Patel S, Fortney J, Jenrette JM, Przybylek M. Rosetted glioneuronal tumor of the spinal cord with diffuse leptomeningeal neuraxis dissemination. (Abstract) presented to the Society for neuro-Oncology's 13the Annual Meeting and Education Day, Las Vegas, NV, November, 2008.
15. Brady LW, Jenrette JM, Linna L, Yaeger TE: Experience with Anaplastic Astrocystoma ASTRO, Boston, (anticipated, Sept 2008)
16. Cooper L, Fortney J, Patel S, Jenrette JM: Gliasite Brachytherapy for Recurrent Malignant Gliomas presented and poster

presentation; American Brachytherapy Society Chicago. 2008.
Principles of RadiationOncology--- Pediatric Oncology Division,2008
18. Batchelor EM, Watkins JW, Jenrette JM: Definitive Radiation therapy for early stage medically inoperable serous and clear stage endometrial carcinoma. Presented at the RSNA, Chicago, November, 2007
19. Li L, Quang TS, Gracely EJ, Emrich JG, Kim J, Yaeger TE, Jenrette JM, Cohen C, Brady LW: Radioimmunotherapy and temozolomide in the Treatment of Glioblastoma Multiforme: A 20 year experience, ASTRO, Los Angeles, October, 2007.
20. Grand Rounds: Dept. of Ob-Gyn, MUSC- Principles of Radiation Oncology. 2007.
21. Dragun AE, Jenrette JM, Harper J: Cosmetic Outcomes after Mammosite Irradiation Platform Presentation at the ASTRO annual meeting, Philadelphia, November, 2006
22. Arthur D, Jenrette JM, et al. Recent Experiences with MammoSite Irradiation. Platform presentation at ASTRO annual meeting, Philadelphia, November, 2006
23. Lecture: Dept. of Dermatology—Radiation and Skin Cancers Watkins JM, Jenrette JM, Marshall DT: High Dose Conformal Radiotherapy to 78 Gy for high grade primary CNS neoplasms: toxicity, outcomes and prognostic factors. (Abstract) presented Radiological Society of North America, Chicago, Nov. 2006
24. Watkins JM, Gaffney DK, Creasman WR, Jenrette JM, Lee RD, Cardenes HR. Neuroendocrine small-cell cervix carcinoma: retrospective analysis of outcome and patters of failure. Twenty year experience from four institutions (Abstract) Presented International Gynecologic Cancer Society, Santa Monica, CA, October, 2006.
25. Dragun AE, Jenrette JM, Pope TL et al. Mammographic surveillance after MammoSite breast brachytherapy: architectural patterns and additional interventions. Poster Presentation. American Brachytherapy Society 27th Annual Meeting. May, 2006, Philadelphia
26. Dragun AE, Jenrette JM, Brackett NC et al. Three-year experience with MammoSite breast brachytherapy: Early results of cosmetic outcome, toxicity and complications. Poster Presentation. American College of Radiation Oncology 16th Annual Meeting, February, 2006, Orlando.
27. Dragun AE, Aguero EG, Jenrette, JM et al. Chest wall dose in MammoSite breast brancytherapy: radiobiologic estimations of late complication risk based on dose-volume considerations. Poster presentation. American Brachytherapy Society 26th Annual Meeting, June, 2005, San Francisco.
28. Gabayan A, Sanan A, Bastin K, Burri S, Green S, Jenrette J, Lustig R, Papagikos M, Patel A, Schultz C, Watson G, Stea Baldassarre: Gliasite Radiotherapy System for Treatment of Recurrent Malignant Glioma: A Multi-Institutional Analysis. Presented Congress of Neurological Surgeons, San Francisco, October, 2004
Neuro-Oncology Update, Charleston, SC "Radiation in Adults with Brain Tumors", "Brain Tumor Management in Pediatric Patients" October, 2004.
30. Dermatology Grand Rounds, August, 2004.
31. Gabayan A, Sanan A, Bastin K, Burri S, Green S, Jenrette J, Lustig R, Papagikos M, Patel A, Schultz C, Watson G, Stea Baldassarre: Gliasite Radiotherapy System for Treatment of Recurrent Malignant Glioma: A Multi-Institutional Analysis. Presented American Brachytherapy Society, May, 2004.
32. MammoSite Catheters: Innovative Treatment forbreast cancer—Oncology Nursing Society
33. Stereotactic Radiosurgery—Grand Rounds MUSC 1-30-03—Neurosciences Grand Rounds
34. MammoSite and its Applications to Breast Cancer - Hematology/Oncology Fellows
35. Radiation in Dermatologic Malignancies - Dept. of Dermatology MUSC
36. Radiation Oncology and Head/Neck Cancer School of Dental Medicine - MUSC
37. Radiation Overview - Seminars in Oncology HCC
38. Radiation Therapy Role in Oral Cancers - School of Dentistry
39. Jenrette JM, Haines SJ: Stereotactic Radiosurgery: Clinical Indications and Patient Considerations. Second Annual Neuroscience Symposium, MUSC, Charleston, SC (5/2000)
40. Jenrette, JM: Modern Imaging Updates Used in Oncology. Presented at the Premier Alliance Oncology Conference - St. Petersburg, FL (2/2000)
41. Radiation Therapy and its Role in Head and Neck Cancers - MUSC School of Dental Medicine
42. Nuyttens JJ, Jenrette JM, Prado K: The Pregnant Patient Treated with Radiotherapy: Two Cases and a Review of Literature for the Biological Effects, Presented at RSNA, Chicago (12/99)
43. "Radiation Oncology - Principles of Biology and Physics" Graduate Course - Biology of Neoplasia
44. "Introduction and Principles of Radiation Oncology - An Overview" MUSC Dental School of Medicine Pathology Course.
45. "Radiation Therapy in the Management of Dermal Malignancies" Department of Dermatology, MUSC.
46. "Review Basic Anatomy and Physiology of the Brain" ACMP, Williamsburg, VA (5/27/98)
47. "Diseases or Conditions Treated with Radiation Therapy in the Brain", ACMP, Williamsburg, VA (5/27/98)
48. "Oral Complications from XRT and the Rationale of Radiation Therapy in Head and Neck Cancers" MUSC - School of Dentistry
Worthington C, Jenrette JM, Collins WM, Starr CW Wise JD, Fenn JO, Rand JC: Stereotactically Directed Fractionated Radiation Therapy in the Treatment of High Grade Gliomas. Presented as a poster at the XII Meeting of the World Society for Stereotactic and

Functional Neurosurgery, Lyon, France (7/97)
Repasky MJ, Jenrette JM: Radiation Therapy-Sight Saver? Presented as a poster at the American Association of Medical Dosimetrists, Edmonton, Canada, 2nd Place Winner (6/97)

51. Worthington C, Jenrette JM, Collins WM, Starr CW, Wise JD, Fenn JO, Rand JC: Stereotactically Directed Fractionated Radiation Therapy in the Treatment of High-Grade Gliomas. Presented as a poster at the International Stereotactic Radiosurgery Society in Madrid, Spain (6/97)
52. McClay EF, Winski PJ, Jones JA, Jenrette JM, Gattoni-Celli S: ??12 Prostaglandin- J2 is Cytotoxic in Human Malignancies and Synergizes with both Cisplatin and Radiation-- Presented at the American Association of Cancer Research.1996.
53. "Radiation Oncology in Cancer Management-- scientific basis"-- lecture to the graduate class in Oncology in the Hollings Cancer Center.
54. "Dynamic Stereotactic Radiosurgery Basis and Treatment" lecture to the Board of Visitors MUSC, spring
55. "Radiation in the treatment of head and neck tumors" School of Dentistry, MUSC
56. "Introduction to Clinical Radiation Oncology" Graduate Course on Biology of Neoplasia, MUSC.
57. "Radiation in the Management of Oncology Patients" to the graduate course in Oncology- Hollings Cancer Center
58. "Radiation in the Management of Gyn Malignancies" lecture to the Dept of OB/Gyn
59. "Radiation Oncology Rationale and Therapy for Head and Neck Cancers" lecture to the pathology class in the Dental School.
60. Starr CW, Wise JD, Fenn JO, Jenrette JM, Worthington WC: Stereotactic Radiosurgery Information Exchange Through the Internet: Spinning a Stereotactic Web Site. Platform presentation, Scientific Program-- LINAC Radiosurgery, Lake Buena Vista, Florida (12/95)
61. Worthington WC, Jenrette JM, Fenn JO, Starr CW, Wise JD: Treatment of Metastatic Brain Tumors Using Dynamic Stereotactic Radiosurgery. Platform presentation at the Scientific Program-- LINAC Radiosurgery, Lake Buena Vista, Florida (12/95)
62. Jenrette JM, Worthington WC, Wise JD, Fenn JO, Starr CW: Stereotactically Directed Fractionated Radiation Therapy in the Treatment of High Grade Gliomas. Platform presentation at the Scientific Program-- LINAC Radiosurgery, Lake Buena Vista, Florida, (12/95)
63. Starr CW, Jenrette JM, Worthington WC, Wise JD, et al. Visualization Tools for Magnetic Resonance Angiograms Impact AVM Localization for Stereotactic Radiosurgery: poster presentation at the International Stereotactic Radiosurgery Society, Boston (6/95)
64. Jenrette JM, Lam CF, Fenn JO, Worthington WC: Optimal Treatment Planning for Stereotactic Radiosurgery Using a Linear Accelerator. Poster presentation at the International Stereotactic Radiosurgery Society Meeting, Boston (5/95)
Jenrette JM: The Role of Radiation Therapy in Malignant Melanoma. Platform presentation at the Southeastern Conference on Malignant Melanoma, The Omni Hotel, Charleston, SC (3/11/95)
66. Lam CF, Zhu JF, Jenrette JM, Fenn JO: Stereotactic Radiosurgery Treatment Dose Planning by Optimizing Collimator Size and the 3-D Coordinates of the Isocenter. Poster presentation at ASTRO, San Francisco (11/94)
67. Collins WA, Jenrette JM, Worthington WC, Fenn JO: Fractionated Stereotaxic Adjuvant Radiation Therapy for the Treatment of High Grade Gliomas: A Preliminary Report. platform presentation RSNA, Chicago (11/94)
68. Zhu JG, Wise JD, Fenn JO, Jenrette JM, Lam CF, Optimization of Treatment Dose Planning in Stereotactic Radiosurgery, Radiation Research Society, Nashville, Tenn (5/94)
69. Zhu JG, Wise JD, Fenn JO, Jenrette JM, LAM CF, Optimization of Treatment Dose Planning in Stereotactic Radiosurgery, MUSC Student Research Day 1993
70. Worthington C, Jenrette JM, Fenn JO, Treatment of Nonglial Tumors of the Brain Using Dynamic Stereotactic Radiosurgery. Congress of Internation Stereotactic Radiosurgery Society, Stockholm, Sweden. (6/93)
71. Jenrette JM, Worthington C, Fenn JO, Cuddy BG, Stereotactically Directed Fractionated Radiation Therapy in Treatment of High Grade Gliomas, Congress of International Stereotactic Radiosurgery Society, Stockholm, Sweden. (6/93)
72. "Development of a Linear Accelerator Based System for Dynamic Stereotactic Radiosurgery" Premier Hospital Alliance National Scientific Technology Conference - Jacksonville, Florida (4/93)
73. "Dynamic Stereotactic Radiosurgery- MUSC's Experience" Board of Hollings Oncology Center (2/93)
74. "Use of High Dose Rate Brachytherapy in Management of Malignancies" Society of Endoscopy Nurses (2/93)
75. Reed CE, Schiff RD, Thompson KA, Stuart RK, Lamb LS, Jenrette JM. Adjuvant Chemotherapy and Radiation Therapy for Non-Small Cell Lung Cancer Patients with Post-operative N, and N2 Disease. Presented Southern Thoracic Surgical Association, Wesley Chapel, Florida. (11/92)
76. "Role of Radiation in the Treatment of Colonrectal Cancers" Grand Rounds, Department of Surgery, Medical University of South Carolina (10/92)
77. "Stereotactic Radiosurgery - Use in Treatment of Intracranial Tumors" Department of Neurosurgery, Medical University of South Carolina (10/92)
78. "General Principles of Radiation Oncology and Gynecology" Department of Gynecology, Medical University of South Carolina (6/92)
79. Cuddy BG, Worthington C, Jenrette JM, Fenn JO, Preliminary Experience with Implanted Stereotactic Positioning System for

Fractionated Radiotherapy. American Association of Neurological Surgeons, San Francisco (4/92)
"A System of Dynamic Stereotactic Radiosurgery" South Carolina Radiological Technology Conference 1991
81. "Linac Based Dynamic Stereotactic Radiosurgery", Worthington WC Jenrette JM, Fenn JO. Presented in Pittsburgh at the organizational scientific congress of the International Society for Stereotactic Radiosurgery. (6/91)
82. "Intraperitoneal P-32 After Negative Second Look Laparotomy in Ovarian Carcinoma", American Radium Society (9/88)
83. "Treatment of Soft Tissue Sarcomas", Medical University of South Carolina Surgeons Conference, (2/87)
84. "Breast Presentation with Lumpectomy and Primary Radiation Therapy" Medical University of South Carolina Surgeons Conference, (2/87)
85. External Radiation Combined with 5FU and Mitomycin-C in Squamous Cell Carcinoma - Radiological Society of North America, Chicago, 1986.
86. "Radiation Therapy in the Management of Mediastinal Germ Cell Tumors", American Radium Society, San Francisco. 1986.
87. "New Perspectives in Radiation Therapy - Summary of Current Protocols", S.C. Radiology Technology Convention (3/86)
88. "Leiomyosarcomas" Medical University of South Carolina Cancer Conference, (1/86)
89. "Radiation Therapy for Asymptomatic Lung Cancer", Pulmonary Medicine, Medical University of South Carolina, (1/86)
90. "Intensive Hyperfractionation of Head and Neck Cancer - Report of a Pilot Study", American Academy of Otolaryngologists, Atlanta. 1985.
91. "Screening for Cancer in an Ambulatory Practice", Comprehensive Health Promotion and Disease Prevention in the Rural South - National Health Services, Charleston. 1985.
92. "Cancer of the Head and Neck - Introduction and Anatomy", Radiation Therapy Residents (7/85)
93. "Radiotherapy Potentiation by 5Fu and Mitomycin-C in Squamous Cell Carcinoma of the Esophagus. J.M. Jenrette, R.D. Marks, E.F. Parker, R.H. Fitzgerald. Presented at the S.C. Medical Association Annual Meeting (4/26/85)
94. "Radiotherapy in the Management of Pineal and Suprasellar Germ Cell Tumors. J.M. Jenrette, C.R. Kersh, T.A. Hazra, R.H. Fitzgerald, D.R. Eisert, J. Grayson. Presented to the S.C. Medical Association Annual Meeting, (4/26/85)
95. "Primary Malignant Mediastinal Germ Cell Tumors - A Southeastern Multi-Institutional Study. C.R. Kersh, D.R. Eisert, T.A. Hazra, R.H. Fitzgerald, J.M. Jenrette, J. Grayson, S.S. Hahn, W.C. Constable. Presented at the Mid-Atlantic Society of Radiation Oncology, Williamsburg, Virginia (3/85)
96. "Cancer of the Esophagus- Medical University of South Carolina Pilot Study. J.M. Jenrette, R.D. Marks, E.F. Parker, R.H. Fitzgerald. Presented at the Downstate Medical Center's Oncology Symposium, New York (3/22/85)
"Osteogenic Sarcoma in Previously Irradiated Port", Medical University of South Carolina, Surgeons Cancer Conference, (12/84).
98. "Breast Cancer with Lymphatic Invasion", Medical University of South Carolina, Surgeons Cancer Conference, (9/84)
99. Halstead Society, "Bowel Injury from Radiation Therapy", (9/20/84)
100. Southeastern Surgeons Conference, "Bowel Injury from Radiation Therapy", Kiawah Island (3/83)
101. "Elementary Radiation Physics", Medical University of South Carolina School of Pharmacy, (10/82)

PEER-REVIEWED PUBLICATIONS

1. McDonald D, Schuler J, Takacs I, Peng J, **Jenrette** J, Vanek K. Comparison of radiation dose spillage from the Gamma Knife Perfexion with that from volumetric modulated arc radiosurgery during treatment of multiple brain metastases in a single fraction. J Neurosurg. 2014 Dec;121 Suppl 2:51-9. doi: 10.3171/2014.7.GKS141358, PMID: 25434937
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Attachment K: Letters of Support

OFFICE ADDRESS:
414-A Blatt Building
Columbia, SC 29201
(803) 212-6930
syllestedavis@schouse.gov

Committee:
Agriculture, Natural Resources
and Environmental Affairs

HOME ADDRESS:
Post Office Box 1617
Moncks Corner, SC 29461
(843) 729-9243

REPRESENTATIVE SYLLESTE H. DAVIS
THE HOUSE OF REPRESENTATIVES
STATE OF SOUTH CAROLINA
District 100

March 13, 2017

Mr. Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29201-1708

Dear Mr. Eubank,

This letter serves as my support for The Medical University of South Carolina's (MUSC) Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500-acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

The Nexton community is located at the intersection of I-26 and Highway 17A and is in the heart of the I-26 growth corridor, increasing access for MUSC patients living in the northern tri-county and beyond. A large sector of the patient population seeking radiation therapy services at MUSC originates in the Summerville/Moncks Corner service area; therefore, the linear accelerator at Nexton will provide easier, more convenient access for this growing population. Radiation therapy patients need a more convenient location for services because they receive treatments at least three days a week for an extended period of time. The proposed expansion of radiation therapy services allows patients the flexibility to receive the highest quality radiation therapy care at a location closer to home.

As a general matter, I support the expansion and improvement of healthcare service options available to the residents of the Berkeley County area. This is best achieved by allowing healthcare service providers to determine what is needed to best serve their customers, limiting government regulations, and removing unnecessary hurdles to providing those services.

Once again, I support this application and encourage you to approve MUSC's request to ensure that patients in the community I serve and represent will continue to receive the care they need and desire. Please contact me at (803) 212-6930 if you have any questions.

Sincerely,

Sylleste H. Davis
Representative, SC House District 100

MUSC
MEDICAL UNIVERSITY
of SOUTH CAROLINA

Department of Neurosciences
Division of Neurosurgery
96 Jonathan Lucas Street
Suite 301 CSB
MSC 606
Charleston SC 29425
Tel 843 792 0[illegible]
Fax 843 876 1220

1/16/2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

The Nexton community is located at the intersection of I-26 and Highway 17A (exit 199) and is in the heart of the I-26 growth corridor, increasing access for MUSC patients living in the northern tri-county and beyond. This enhanced technology allows MUSC to treat patients with the most modern radiation treatments available, including conventional radiation, 3-D conformal beam radiation, intensity-modulated radiation therapy, and electron beam therapy in a more convenient location.

A large sector of the patient population seeking radiation therapy services at MUSC originates in the Summerville/Moncks Corner service area; therefore, the linear accelerator at Nexton will provide easier, more convenient access for this growing population. Furthermore, radiation therapy patients need a more convenient location for services because they receive treatments at least three days a week for an extended period of time. The proposed expansion of radiation therapy services allows patients the flexibility to receive the highest quality radiation therapy care at a location closer to home.

I believe the proposed project is crucial to supporting MUSC's mission in patient care, teaching and research and will benefit the community. MUSC must continue to expand its clinical capabilities in its role as a premier academic medical center and health leader for the state. Thank you very much for your consideration.

Please contact me at (843) 792-2568 if you have any questions.

Sincerely,

Scott M. Lindhorst, MD
Assistant Professor of Neuro-Oncology
Medical University of South Carolina

MUSC
HOLLINGS CANCER CENTER

86 Jonathan Lucas Street
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Charleston • SC 29425

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1/16/2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I am writing to support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton in Berkeley County, SC. My patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care. This facility would ease the burden of cancer care for my patients with lymphoma and myeloma, diseases commonly seen in the retirement-age population, for which radiation is often needed.

A large proportion of my patient population seeking radiation therapy services at MUSC resides in the Summerville/Moncks Corner service area; therefore, the linear accelerator at Nexton will provide easier, more convenient access for this growing population. Radiation therapy patients need a more convenient location for services because they receive treatments three-five days a week for an extended period of time, up to seven consecutive weeks. My patients frequently complain about the long, congested travel for radiation treatments.

I believe the proposed project is crucial to supporting MUSC's mission in patient care, teaching and research and will benefit the community. MUSC must continue to expand its clinical capabilities in its role as a premier academic medical center and health leader for the state. Thank you very much for your consideration.

Please contact me at (843) 792-4271 if you have any questions.

Sincerely,

Robert K. Stuart, MD
Professor of Medicine, Hematology/Oncology
Director, Hematological Malignancies and BMT Program
Medical Director, Clinical Trials, Hollings Cancer Center, *A National Cancer Institute Designated Cancer Center*
39 Walton Street, MSC 635
Charleston, SC 29425

MUSC Health
RADIATION ONCOLOGY
169 Ashley Avenue
MSC 318
Charleston, SC 29425

(843) 792-3271
Fax (843) 792-5498

S. Lewis Cooper, M.D
Jennifer L. Harper, M.D.
Joseph M. Jenrette, III, M.D.
David T. Marshall, M.D., M.S.
Anand K. Sharma, M.D
Eva Suarez, M.D.
Graham Warren, M.D., Ph.D.

April 11, 2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

The Nexton community is located at the intersection of I-26 and Highway 17A (exit 199) and is in the heart of the I-26 growth corridor, increasing access for MUSC patients living in the northern tri-county and beyond. This enhanced technology allows MUSC to treat patients with the most modern radiation treatments available, including intensity-modulated radiation therapy and stereotactic approaches.

A large sector of the patient population seeking radiation therapy services at MUSC originates in the Summerville/Moncks Corner service area; therefore, the linear accelerator at Nexton will provide easier, more convenient access for this growing population. Furthermore, radiation therapy patients need a more convenient location for services because they receive treatments 5 days a week for an extended period of time. The proposed expansion of radiation therapy services allows patients the flexibility to receive the highest quality radiation therapy care at a location closer to home.

I believe the proposed project is crucial to supporting MUSC's mission in patient care, teaching and research and will benefit the community. MUSC must continue to expand its

clinical capabilities in its role as a premier academic medical center and health leader for the state. Thank you very much for your consideration.

Please contact me at (843)792-3273 if you have any questions.

Sincerely yours,

David T. Marshall, M.D., M.S.
Professor of Radiation Oncology and Urology
Director – Radiation Oncology Resident Training Program
Deputy Associate Director of Clinical Investigations
Hollings Cancer Center – An NCI-Designated Cancer Center
Medical University of South Carolina

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Our purpose: Better health begins here.

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January 25, 2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29201-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

The Nexton community is located at the intersection of I-26 and Highway 17A (exit 199) and is in the heart of the I-26 growth corridor, increasing access for MUSC patients living in the northern tri-county and beyond. This enhanced technology allows MUSC to treat patients with the most modern radiation treatments available, including conventional radiation, 3-D conformal beam radiation, intensity-modulated radiation therapy, and electron beam therapy in a more convenient location.

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I believe the proposed project is crucial to supporting MUSC's mission in patient care, teaching and research and will benefit the community. MUSC must continue to expand its clinical capabilities in its role as a premier academic medical center and health leader for the state. Thank you very much for your consideration.

Please contact me at (843) 527-7100 if you have any questions.

Sincerely,

Bruce Bailey
President and CEO

CON 210

KershawHealth

January 27, 2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29201-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

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I believe the proposed project is crucial to supporting MUSC's mission in patient care, teaching and research and will benefit the community. MUSC must continue to expand its clinical capabilities in its role as a premier academic medical center and health leader for the state. Thank you very much for your consideration.

Please contact me at (803) 713-6227 if you have any questions.

Sincerely,

Terry Gunn, FACHE
KershawHealth CEO

KershawHealth 1315 Roberts Street Camden, S. C. 29020 P. O. Box 7003 Camden, S. C. 29021

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DEPARTMENT of MEDICINE

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1/30/2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

The Nexton community is located at the intersection of I-26 and Highway 17A (exit 199) and is in the heart of the I-26 growth corridor, increasing access for MUSC patients living in the northern tri-county and beyond. This enhanced technology allows MUSC to treat patients with the most modern radiation treatments available, including conventional radiation, 3-D conformal beam radiation, intensity-modulated radiation therapy, and electron beam therapy in a more convenient location.

A large sector of the patient population seeking radiation therapy services at MUSC originates in the Summerville/Moncks Corner service area; therefore, the linear accelerator at Nexton will provide easier, more convenient access for this growing population. Furthermore, radiation therapy patients need a more convenient location for services because they receive treatments at least three days a week for an extended period of time. The proposed expansion of radiation therapy services allows patients the flexibility to receive the highest quality radiation therapy care at a location closer to home.

I believe the proposed project is crucial to supporting MUSC's mission in patient care, teaching and research and will benefit the community. MUSC must continue to expand its clinical capabilities in its role as a premier academic medical center and health leader for the state. Thank you very much for your consideration.

Please contact me at (843) 792-4271 if you have any questions.

Sincerely,

Carolyn Britten

Carolyn Britten, MD FRCPC
Chief, Division of Hematology/Oncology

"An equal opportunity employer, promoting workplace diversity."

MUSC
MEDICAL UNIVERSITY
of SOUTH CAROLINA

David B. Adams, MD
Professor
Gastrointestinal & Laparoscopic Surgery
114 Doughty Street Suite 249
Charleston, SC 29425
office: (843) 792-9393
fax: (843) 876-4878

1/16/2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

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Please contact me at (843) 792-9393 if you have any questions.

Sincerely,

David B Adams

David B. Adams, MD, FACS
Professor of Surgery
Medical University of South Carolina

MUSC
MEDICAL UNIVERSITY
of SOUTH CAROLINA

Andrea M. Abbott, MD, MS
Assistant Professor

Department of Surgery
Division of Oncologic & Endocrine Surgery
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Phone 843 876-0179
Fax 843 876-3046

www.musc.edu/surgonc

1/16/2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

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Please contact me at (843) 876-0179 if you have any questions.

Sincerely,

Andrea M Abbott, MD

MUSC Health
Medical University of South Carolina

Department of Orthopaedics
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Administrative Office: 843-792-1792
Facsimile: 843-792-3674
http://www.muschealth.org/ortho

John A. Siegling Professor & Chair
Vincent D. Pellegrini, Jr., MD
Arthritis & Joint Reconstruction
Harry A. Demos, MD
Jacob M. Drew, MD
Richard J. Friedman, MD, FRCSC
Vincent D. Pellegrini, Jr., MD
Foot & Ankle
James F. Bethea, MD
Christopher E. Gross, MD
General Orthopaedics
James F. Bethea, MD
Hand, Wrist and Microvascular
Eric W. Angermeier, MD
Kyle P. Kokko, MD, PhD
Vincent D. Pellegrini, Jr., MD
Orthopaedic Oncology
Lee R. Leddy, MD
Zeke J. Walton, MD
Orthopaedic Trauma
Langdon A. Hartsock, MD, FACS
Kristoff R. Reid, MD
Zeke J. Walton, MD
Pediatric Orthopaedics
Pediatric Spinal Disorders & Scoliosis
Matthew A. Dow, MD
Robert F. Murphy, MD
Physical Medicine & Rehabilitation
Emily A. Darr, MD
Shoulder & Elbow
Josef K. Eichinger, MD
Richard J. Friedman, MD, FRCSC
Shane K. Woolf, MD
Spinal Disorders & Scoliosis
Emily A. Darr, MD
John A. Glaser, MD
Charles A. Reitman, MD
Barton L. Sachs, MD, MBA, FACS
Sports Medicine
Marc S. Haro, MD, MSPT
Harris S. Slone, MD
Shane K. Woolf, MD
Orthopaedic Research
& Clemson BioEngineering
William R. Barfield, PhD
Martine LaBerge, PhD
Jessica E. Thaxton, PhD
Yongren Wu, PhD
Hai Yao, PhD
PA's, NP's & Athletic Trainers
Jesica Archie, NP
Rebecca Leese, PA-C
Amy Musselman, ATC, OTC
Suzanne Pach, NP
Ann Peterson, NP
Stacey Rothwell, PA-C
Josh Whibley, PA-C
Barrett Willis, PA-C

January 16, 2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services, fueled by an aging tri-county population and increasing cancer survivorship, lies primarily in the outpatient setting. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

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Please contact me at (843) 876-1119 if you have any questions.

Sincerely,

Lee R. Leddy, MD, MSCR
Associate Professor
Residency Program Director
Department of Orthopaedics
Medical University of South Carolina

CON 215

MUSC
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of SOUTH CAROLINA

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Colon and Rectal Surgery
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1/16/2017

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

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Please contact me at (843)876-4857 if you have any questions.

Sincerely,

Virgilio George, MD, FACS, FASCRS
Section Head of Colon and Rectal Surgery

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Printed on 100% Post Consumer Recycled Paper



1/16/2017

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Michelle Hudspeth, M.D.
Sherron Jackson, M.D.
Jacqueline M. Kraveka, D.O
Shayla Bergmann, M.D.
Jennifer Jaroscak, M.D.
Amy-Lee Bredlau, M.D.
Julie Kanter Washko, M.D.

Louis Eubank
SC Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29291-1708

Dear Mr. Eubank,

I support The Medical University of South Carolina's Certificate of Need application for a Varian TrueBeam dual energy linear accelerator to be located at Nexton, a 4,500 acre master planned community, in Berkeley County. Growth in demand for cancer services lies primarily in the outpatient setting. Families with children and teenagers with cancer need convenient access to treatment as they are trying to work as well as care for their child with cancer and their siblings. Patients currently living in Berkeley County do not have convenient access to radiation therapy and are required to travel into Dorchester or Charleston County for care.

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Please contact me at (843) 792-0381 if you have any questions.

Sincerely,

Michelle Hudspeth, MD
Associate Professor, Pediatrics
Director, Pediatric Blood & Marrow Transplantation
Division Chief, Pediatric Hematology/Oncology
Medical University of South Carolina Children's Hospital/ Hollings Cancer Center
A NCI Designated Cancer Center
135 Rutledge Avenue MSC 558
Charleston, SC 29425
FAX: 843-792-8912
PHONE: 843-792-0381

Attachment L: Governing Body Approval

Medical University Hospital Authority
Hospital Operations, Finance and Quality Committee
December 11, 2014
Minutes

Attendees:

Dr. Stanley Baker, Chair
Mr. Bill Baker
Ms. Terri Barnes
Mr. Jim Battle
Mr. William Bingham, Sr.
Dr. Harold Jablon
Dr. Donald Johnson, II
Ms. Barbara Johnson-Williams
Dr. James Lemon
Dr. Ragin Monteith
Dr. Conyers O'Bryan
Dr. Thomas Rowland
Mr. Charles Schulze
Dr. Murrell Smith
Mr. Michael Stavrinakis
Thomas Stephenson, Esq.
Dr. Charles Thomas
Dr. Jim Wiseman
Dr. Thomas Rowland
Dr. David Cole
Dr. Patrick Cawley
Dr. Bruce Elliott
Mr. Jim Fisher
Dr. Deborah Deas
Ms. Lisa Montgomery
Dr. Mark Sothmann
Dr. Sabra Slaughter
Dr. Scott Reeves
Dr. Dan Handel
Dr. Danielle Scheurer
Dr. Mark Scheurer
Dr. Jill Mauldin
Ms. Darlene Shaw
Mr. Matt Wain
Mr. Dennis Frazier
Mr. Steve Hargett
Annette Drachman, Esq.
David McLean, Esq.
Mr. John Cooper
Mr. Mark Sweatman
Ms. Sarah King
Mr. Greg Weigle
Ms. Heather Woolwine
Mr. Steve Valerio
Ms. Gina Ramsey
Ms. Robin Mutz

The meeting was called to order at 8:05 am by Dr. Stanley Baker, Chair.

[redacted]

[redacted]

Action: Report received as information.

Certificate of Need (CON) Update:

Dr. Cawley requested Board approval to move forward with submitting applications for three (3) Certificates of Need for the following facilities to be located in North Charleston:

- Radiation Therapy Center
- Imaging Center
- Ambulatory Surgery Center

Action: Recommend approval.

[redacted]

MUSC Health Cancer Care Network

Board Meeting Minutes

Minutes of Meeting
3/7/2017

The meeting of the Board of Directors of MUSC Health Cancer Care Network, was held on March 7, 2017 at 1:00 pm, at MUSC, Conference Room 247 North Tower

Board Members Present: Patrick Cawley, MD, CEO MUSC Health
Greg Spurlock, President, Alliance Oncology (via conference line)
Elizabeth Pace, Sr. Vice President of Operations, Alliance Oncology
Marianne Krease, Sr. Site Administrator, Alliance Oncology
Stephen Hargett, CFO/ Controller, MUSC

Staff Present: Josh Eaves, Sr. Vice President, Strategic Partnerships, Alliance Oncology
Alan Edwards, Director of Finance, Oncology, MUSC
Mark Lyles, MD, MBA. Chief Affiliations and Business Transformation Officer
David Mahvi, MD, Chief of Oncology, Integrated Clinical Center for Excellence

Call to Order

Pat Cawley called the meeting to order at 1:04 pm. A quorum of directors was present, and the meeting, having been duly convened, proceeded with business.

Board Membership Updates

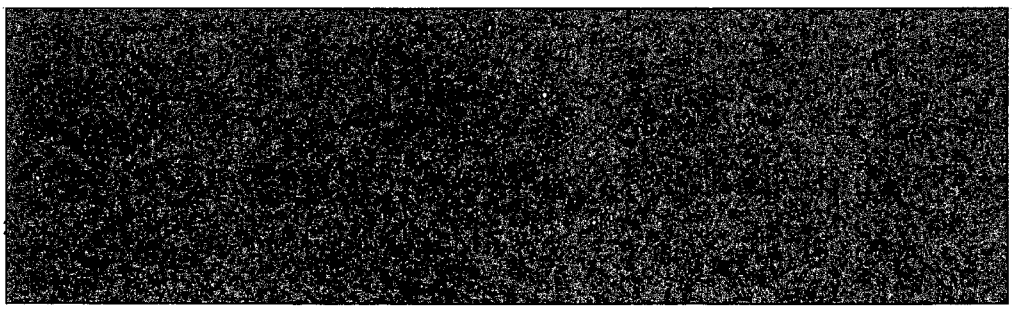
None

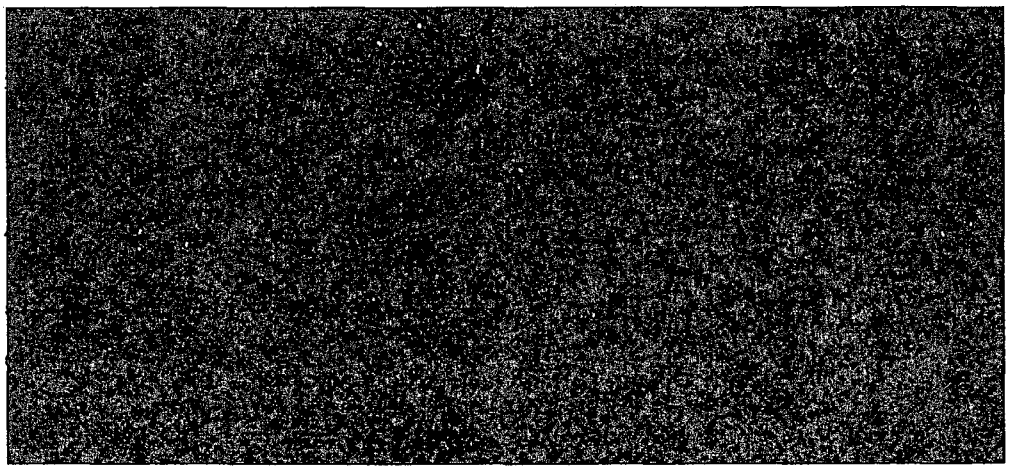
Approval of Minutes

The Board was presented the minutes of the previous board meeting on December 6, 2016 whereupon a motion was duly made and seconded by Elizabeth Pace and unanimously adopted by the Board.

2017 Network Updates

The majority of the meeting focused on a discussion of the status of active and potential deals.





NEW BUSINESS

A motion was duly made by Pat Cawley for approval to move forward with the CON application for the Berkeley County Linac project. It was seconded by Greg Spurlock and unanimously approved by the MUSC Health Cancer Care Network Board.

Board Meeting Dates

It was determined by the convened Board that a future discussion should take place during June, 2017 at the MUSC campus.

Adjournment

The meeting was adjourned at 1:33 pm.

Respectfully Submitted,

Marianne Krease
Sr. Site Administrator

Parker Poe

William R. Thomas
Partner
Telephone: 803.253.8658
Direct Fax: 803.255.8017
willthomas@parkerpoe.com

SCDHEC Received
JUN 07 2017
Certificate of Need Program

Atlanta, GA
Charleston, SC
Charlotte, NC
Columbia, SC
Greenville, SC
Raleigh, NC
Spartanburg, SC

June 7, 2017

VIA HAND DELIVERY AND EMAIL
Louis W. Eubank, MSW, MPH
Director, Certificate of Need Program
Bureau of Health Facilities and Services Development
SC Department of Health and Environmental Control
301 Gervais Street
Columbia, South Carolina 29201

Re: Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County
Certificate of Need Application for the expansion of radiation therapy services by adding a sixth linear accelerator at a total project cost of $9,804,548
DHEC Matter No. 2449

TRIDENT MEDICAL CENTER'S AFFECTED PERSON STATUS AND OPPOSITION

Dear Mr. Eubank:

Pursuant to S.C. Code Ann. §§44-7-130(1) and 44-7-210(C) and Regulation 61-15 §§103(1) and 305, I am writing on behalf of Trident Medical Center, LLC, d/b/a Trident Medical Center ("Trident"), an existing provider of similar services located in Charleston, South Carolina, which is in the same health service area and geographic area to be served by the applicant, to notify the Department that Trident is an "affected person" with respect to Medical University Hospital Authority's ("MUHA") CON application referenced above, and that it opposes the approval of MUHA's CON application. Trident is also requesting that a project review meeting be held by the Department prior to the Department making a decision on this CON application. More specifically, Trident opposes the above referenced CON application because, among other reasons, the project does not comport with the purposes of the CON Act; the project does not comply with the standards set forth in the 2015 *South Carolina Health Plan*; the project is not needed; the project will have an adverse impact on Trident's radiation therapy program; the project does not increase accessibility to catheterization services; and the project will not contain costs.

Please copy Matt Hasbrouck at Trident and myself on any future correspondence to or from the Department concerning this CON application. Thank you for your consideration of Trident's position, and please let me know if you have any questions or concerns.

Sincerely,

William R. Thomas

WRT/ccq

cc: Matt Hasbrouck, COO (*via email Matthew.Hasbrouck@hcahealthcare.com*)

dhec
Healthy People. Healthy Communities.

Certificate of Need
Berkeley County Radiation Therapy - Project Review
9/20/17

Name	Affiliation	Email
Dan Sullivan	Trident	
David Summer	"	
Cole Rich	"	
Shannon Caithamer	Roper St Francis	
Kathy Platt	"	
Caroline Colter	MUSC	
Lauren Young	MUSC	
George Demos	Trident	
Ralph Barber	Roper	
Scott Blanchette	Roper	
Dan Mahaffey	MUSC	
David Cannon	Palmetto Primary Care	
David Leith	MUSC	
Tori Tibshrany		

Arrived Late

CON 225

PRCM Response for Matter Nos. 2470 and 2449

Victoria Tibshrany <ttibshrany@platthmc.com>

Wed 10/4/2017 10:41 AM

To: Murdock, Margaret P. <murdocmp@dhec.sc.gov>;

Cc: Gerrald, Nic <GerralN@dhec.sc.gov>; Eubank, Louis W. <EUBANKLW@dhec.sc.gov>; rbarbier@nexsenpruet.com <rbarbier@nexsenpruet.com>; Shannon.Cantwell@RoperSaintFrancis.com <Shannon.Cantwell@RoperSaintFrancis.com>; 'Kathy Platt' <kplatt@platthmc.com>;

1 attachments (6 MB)

PRCM Response 10-4-17.pdf;

Hi Maggie,

On behalf of Roper St. Francis, our response to comments and issues discussed at the September 20, 2017 Project Review Meeting is attached. Please contact me if you have any questions.

Thanks,
Tori

Victoria R. Tibshrany
Independent Senior Consultant
Platt HMC, Inc.
1432 Berkeley Road
Columbia, SC 29205
(803) 261-2535 (direct)
(404) 728-1974 (office)
(404) 728-1975 (fax)

Platt HMC, Inc.
Health Management Consulting

881 Piedmont Avenue, Atlanta, Georgia 30309
Phone: 404-728-1974 • Fax: 404-728-1975

October 4, 2017

SCDHEC Received
OCT 04 2017
Certificate of Need Program

Maggie Murdoch, Director
Certificate of Need Program
SC Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Re: Roper St. Francis Hospital – Berkeley, Inc.
Establishment of radiation therapy services with the addition of a Varian True Beam LINAC at a total project cost of $11,608,014
Matter No. 2470

Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County
Expansion of radiation therapy services by adding a sixth linear accelerator at a total project cost of $9,804,458
Matter No: 2449

Dear Ms. Murdoch:

On behalf of our client, Care Alliance Health Services d/b/a Roper St. Francis Healthcare, Roper Hospital, Inc., Bon Secours St. Francis Xavier Hospital, Inc., Roper Mt. Pleasant Hospital, Inc. and Roper St. Francis - Berkeley Hospital, Inc. (collectively from time to time "Roper St. Francis" and "RSF"), an applicant and "affected person" for the above-referenced matters, we submit the following comments in response to the opposition presented at the September 20, 2017 Project Review Meeting. This letter will specifically address questions and issues raised by MUSC, Trident Medical Center, and the Department regarding the applications under review.

RSF Linac Capacity in the 2017-18 State Health Plan is Accurate and Appropriate

During the Project Review Meeting, MUSC suggested that RSF understated its capacity. This is clearly not the case. For many years, the linear accelerators utilized by Roper Hospital and St. Francis Hospital were assumed by the Department to have a default capacity of 7,000 treatments and were recorded as such in the State Health Plans prior to the 2017-2018 State Health Plan that was enacted earlier this year. During the State Health Planning process, Roper St. Francis requested a capacity change from the Department by letter from Jacqueline Diosis on December 30, 2016 to accurately reflect the capabilities of its units and their associated actual utilization in

the upcoming State Health Plan. This letter, included as **Attachment 1**, outlined the IMRT utilization of the units and was eventually utilized by the Department in calculating the service area capacity in the 2017-2018 State Health Plan. As shown in **Exhibit 1** below, the actual reported utilization of IMRT/IGRT treatments have been sufficient over time to justify a lower capacity for these units. First, as noted during the Project Review Committee Meeting, there is no established standard for what percentage of IMRT/IGRT treatments must be provided.[1] Second, the actual IMRT utilization presented below is well above the IMRT percentage suggested by MUSC at project review and is more than reasonable to justify the capacity associated with IMRT in the State Health Plan.

Exhibit 1
IMRT Utilization for Roper St. Francis Linear Accelerators

Total RSF	2015	2016
Conventional	8,042	8,478
IMRT	6,191	7,181
Total	14,233	15,659
% IMRT	43.5%	45.9%

Roper	2015	2016
Conventional	4,970	3,465
IMRT	1,935	2,003
Total	6,905	5,468
% IMRT	28.0%	36.6%

St. Francis	2015	2016
Conventional	3,072	5,013
IMRT	4,256	5,178
Total	7,328	10,191
% IMRT	58.1%	50.8%

Source: Joint Annual Reports

Based on these data and the technical capability of the linacs operated by RSF, the capacity of 5,000 for each existing linac recognized in the 2017-18 State Health Plan is appropriate. Roper St. Francis Hospital – Berkeley's use of this capacity during the time frame presented (2015-2016) is consistent with the capacity and time frame presented by the Department in the Radiation Therapy section of the 2017-2018 State Health Plan.

[1] Roper St. Francis suggests that DHEC solicit clinical input from existing providers on this issue during the next State Health Planning development process.

RSF's Existing Linacs are Highly Utilized

During the Project Review Meeting, it was suggested that RSF utilization in relation to capacity is not as high as suggested in the CON for RSFH-Berkeley. RSF utilization data and capacity is fully documented and clearly presented in the CON application for RSFH-Berkeley. As stated in the CON application and at project review, St. Francis Hospital actual operates extended hours to meet demand. The affected parties have no valid basis to suggest that RSF's utilization is not accurately presented in the application.

On pages 28-30 of its application, Roper presented three scenarios for calculating capacity. Each scenario utilizes the base capacities outlined and justified above. As previously explained:

- Scenario 1 is adapted to show actual use of the Roper and St. Francis units. Specifically, one unit was taken out of service at Roper Hospital in June 2015 for the remainder of the year (and was not relocated, replaced, or otherwise used in the calendar year). As a result, total capacity was reduced by 2,500 treatments to reflect the actual operation of linear accelerators and total number of units that were in use the entire year.
- Scenario 2 uses the capacities identified by the State Health Plan without any adaptation for actual use.
- Scenario 3 uses the capacity identified by the State Health Plan for year 2016 (which accurately corresponds with actual use of Roper St. Francis' units) and 2016 volumes from JARS, with the exception of MUSC, which had submitted volumes in its instant application for Matter No. 2449, but had not yet submitted a JAR at the time of Roper St. Francis Hospital - Berkeley's application.

In each of these scenarios, the Roper St. Francis affiliated hospitals, and the planning area overall, are operating above 80 percent of capacity. There is no question that Roper St. Francis Hospital – Berkeley meets all aspects of Criteria 6. In addition, it should also be noted that St. Francis Hospital was recently issued a CON (CON #2411) for the addition of SRS/SRBT capabilities/equipment on one of its existing IMRT/IGRT linear accelerators. With the implementation of this project, the Cyberknife at Roper Hospital will be decommissioned. Therefore, the overall Roper St. Francis capacity will decrease by 1,500 (1,000 from decommissioning of the Cyberknife and 500 with the addition of SRS capabilities) treatments in the coming year when this project is fully implemented. Neither affected party recognized or accounted for this approval in its presentation to the Department.

Trident's Utilization is Understated and Capacity is Likely Overstated

In the Department's consideration of capacity, it should also be noted that Trident acknowledged during the Project Review Meeting that it has taken one of its linear accelerators out of service and only utilizes it as a back-up when its other two units are being maintained or are temporarily out of service. Based on the model and description of the unit which is not being used, it is assumed that this unit was taken out of service due to age. It is questionable whether this unit

could even be used for full-time patient care or whether it is simply at end of life. If Trident does not wish to replace it and actively utilize three units, its capacity should be amended to reflect that, in reality, it only operates two linear accelerators. In fact, if Trident's capacity is calculated based on the two units it actually uses, its percentage of capacity would well exceed 80%.

Utilization Projections

Both MUSC and Trident identified several concerns regarding RSFH-Berkeley's utilization projections, suggesting that the projected market utilization projections are too high. These suggestions are unfounded. First, it should be noted that Trident did not provide any quantitative analysis to demonstrate that RSFH-Berkeley's utilization projections were too high and simply referenced historical treatment volumes for the planning area. MUSC's criticisms were made primarily as a comparison to its own very conservative projections.

First, MUSC questioned RSFH-Berkeley's use of a 55 percent factor to estimate/project the number of cancer patients that will receive radiation therapy. MUSC used 50 percent by contrast. This 5 percent variance makes very little difference in the ultimate projections. In spite of this minimal variance, there is substantial support to justify the use of 55 percent RT rate for cancer patients. Articles and information from the American Cancer Society and the NIH National Cancer Institute which support this rate are included in **Attachment 2**. In fact, the NIH article states that more than half (about 60%) of cancer patients are treated with radiation therapy.

Both Trident and MUSC suggest that the historical trend in utilization within the four-county service area does not support a growth in demand during the projection horizon. Trident's slide 7, in fact, shows a 4.5% compounded annual growth rate (CAGR) for radiation therapy patients in the service area between 2013 and 2016. MUSC's own CON shows that service area cancer patients have increased at a CAGR of 3.9% between 2008 and 2013. MUSC's CON also shows that the service area incidence rate has increased by 2.0% annually between 2008 and 2013. (See CON page 23.) These rates of growth are quite rapid and reflect, as RSFH-Berkeley demonstrates in its application, the impact of aging of the population.

Neither Trident in its opposition nor MUSC in its own application provide any actual calculation of overall market demand. Using the data in MUSC's own application, the historical CAGR of growth of cancer cases for the four-county service area would be 3.6%. On page 21, MUSC presents population projections that show an 8.1% total increase for the service area population from 2016 to 2021, which equates to a CAGR of 1.6%. On page 23, MUSC projects a CAGR increase of the service area cancer incidence rate of 2.0%. With a 1.6% increase in population and a 2.0% increase in incidence rate, the total rate increase of cancer cases would be 3.6% CAGR. Yet, MUSC ignores the aging of the population that results in the increasing cancer incidence rate and simply uses population growth of 1.6% CAGR to project its own volume.

National studies predict a rapid growth in demand for radiation therapy despite MUSC and Trident's arguments to the contrary. **Attachment 3** provides a peer-reviewed study from the Journal of Clinical Oncology that projects the demand for radiation therapy nationally will increase by 22 percent between 2010 and 2020.

By contrast, RSFH-Berkeley projects just a 2.5% annual increase in cancer cases using a detailed analysis using population and incidence rates by age group. This rate of growth is conservative compared to the 3.6% CAGR supported by the data in MUSC's application. While MUSC and Trident both suggest that RSFH-Berkeley's projections are too aggressive, in fact, RSFH-Berkeley's projections are very reasonable given the data in MUSC's application.

Again, neither MUSC nor Trident performed any area-wide projection taking into consideration the population growth, aging, and actual cancer incidence rates in the service area. RSFH-Berkeley's projections are both reasonable and well documented. MUSC takes a very simplistic approach, growing only MUSC's cases by 1.6% CAGR. If the same approach is used for Roper St. Francis Health as a system, it is clear that another unit is needed at RSFH-Berkeley to meet the overall demand of the system as shown in **Exhibit 2**. Even with the approval of RSFH-Berkeley and MUSC's conservative projection methodology, the Roper St. Francis Health System as a whole will operate at over 90 percent of capacity even with the approval of RSFH-Berkeley's proposed unit.

Exhibit 2

Application of MUSC Projection Methodology to Roper St. Francis Health Radiation Therapy Demand and Capacity

Facility	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022
Roper Hospital - CyberKnife*	1	1,000	1,000	1,000	1,000	1,000	-	-	-	-
Roper Hospital -Linac	1	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
St. Francis - SRS Approved*	1	5,000	5,000	5,000	5,000	4,500	4,500	4,500	4,500	4,500
St. Francis - Linac	1	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Total Existing/Approved Capacity	4	16,000	16,000	16,000	16,000	15,500	14,500	14,500	14,500	14,500
Capacity with RSFH-Berkeley	1							19,500	19,500	19,500

Treatments		2014	2015	2016	2017	2018	2019	2020	2021	2022
Roper Hospital		8,270	6,905	5,915						
St. Francis		6,557	7,328	10,191						
Total		**14,827**	**14,233**	**16,106**	**16,364**	**16,626**	**16,892**	**17,162**	**17,436**	**17,715**
Growth Rate**			-4.0%	13.2%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
% of Existing Capacity			92.7%	89.0%	100.7%	102.3%	107.3%	116.5%	118.4%	120.3%	122.2%
% of Capacity with RSFH-Berkeley									88.0%	89.4%	90.8%

** CON Application No. 2411 approved SRS/SBRT capability for one unit at St. Francis Hospital associated with the decommissioning of the CyberKnife at Roper Hospital*
*** MUSC CON application uses a 1.6% CAGR to project future radiation therapy treatment.*

It is clear under any reasonable set of projection assumptions that there is more than sufficient demand to document the need for a new radiation therapy unit at RSFH-Berkeley.

The Proposed RSFH-Berkeley Linac Will Increase Access

As documented in detail within the instant application, all existing radiation therapy providers in the four-county planning area are located in Charleston County. Most are located in downtown

Charleston or nearby in Mt. Pleasant or West Ashley. Roper St. Francis Hospital – Berkeley has documented that 35 percent of its existing radiation therapy patients originate from the primary service area for this project, which includes all of Berkeley County and select ZIP codes from Charleston and Dorchester Counties. This project will bring radiation therapy services closer to home for a substantial base of its existing patients that must currently travel downtown or to West Ashley for treatment. As stated in the application, St. Francis already operates extended hours as needed to meet the demand for and treat all patients in need of radiation therapy. In addition, as Roper Hospital's Cyberknife will be taken out of service in the coming year and its volumes continue to rise[2], it will require extended hours to meet the capacity increases that are projected in the coming years. Both hospitals currently exceed 80 percent of capacity and have experienced growth in recent years. With 35 percent of its patients originating from the primary service area for this project, it only makes sense to locate a new linear accelerator at Roper St. Francis Hospital – Berkeley in order to assuage the travel time and ease the burden of cancer patients who must travel downtown or to West Ashley for treatment.

Cancer patients receiving radiation therapy must travel daily to their provider for several weeks and often longer. The necessity of traveling well outside their home area (and for the patients being treated at Roper Hospital, then navigating the parking and way-finding associated with a downtown hospital) can lead to significant missed work, childcare hardships, and financial strain which can ultimately deter patients from getting life-saving treatment. This project aims to reduce the strain on a significant number of patients seeking radiation therapy treatment from Roper St. Francis healthcare.

RSFH- Berkeley is Appropriately a New Applicant Under Standard 6

MUSC asserted during Project Review that Roper St. Francis Hospital – Berkeley applied as a new provider because it does not have the volumes to meet the capacity threshold required by Standard 8 for the expansion of an existing provider. This assertion is not accurate. While operating as a system, all Roper St. Francis entities are licensed individually and each consistently applies under its individual licensee for CON review. Consistent with the structure used in past CON applications, Roper St. Francis Hospital – Berkeley applied under its future license with the hospital at which this facility will be located. Unlike MUSC, which applies under its system licensee, Medical University Hospital Authority, for all CON applications regardless of location, Roper St. Francis entities utilize an individual licensing structure. If the Department determines that Roper St. Francis Hospital – Berkeley's application represents an expansion versus a new provider, Roper St. Francis Hospital – Berkeley has already documented within its instant application that it meets Standard 8 and can be approved accordingly.

[2] See Application for Matter No. 2411

Indigent and Charity Care

During Project Review, MUSC asserted that Roper St. Francis did not specifically line-item charity care in its project budgets. Roper St. Francis does not routinely break out charity care by Department in its budgeting process. It is generally captured on a facility-wide or system-wide basis. That said, Roper St. Francis provided $516,340 and $433,151 in charity care specific to radiation therapy in 2015 and 2016, respectively. Like Roper Hospital and St. Francis Hospital, Roper St. Francis Hospital – Berkeley will provide charity care for radiation therapy patients in need. Roper St. Francis' history of charity care and community service was discussed in detail at Project Review. Roper St. Francis Hospital – Berkeley will continue to provide community programming and charity care in the same tradition of its affiliated hospitals.

Conclusion

In conclusion, Roper St. Francis Hospital – Berkeley will provide greater access to care for its patients that currently must travel downtown or to West Ashley for radiation therapy while alleviating the capacity constraints that already exist and are projected to grow at Roper Hospital, Inc. and St. Francis Hospital. We believe that the Roper St. Francis Hospital – Berkeley application and the MUSC application are not competing and are structured to provide more accessible care to each of its own patient bases. However, should the Department decide that only one provider is needed to serve Berkeley County, Roper St. Francis Hospital – Berkeley's application is superior for the following reasons:

- MUSC's existing linear accelerator volumes are not growing. Its capacity has hovered at exactly 80% for the past two years. This applicant just barely meets the Standard for expansion of an existing provider. As a result, MUSC has no documented wait times or capacity issues that the current application seeks to remedy. This application only seeks to expand access. In contrast, Roper St. Francis Hospital – Berkeley's application will both alleviate capacity constraints at Roper and St. Francis Hospitals, which are operating at over 100% of capacity while bringing treatment closer to at least 35 percent of its existing patient base.
- MUSC's projections are oversimplified. MUSC fails to conduct or demonstrate a full market analysis, and its projections do not reflect market growth, aging, and cancer incidence. Roper St. Francis Hospital – Berkeley's application provided a full market analysis and detailed projections based on age-adjusted population growth, geographically-specific incidence rates, and historical volumes.
- MUSC has a greater likelihood of adversely impacting Trident given the recent and documented affiliation of Palmetto Primary Care and MUSC. Palmetto Primary Care physicians practice at Trident and the new affiliation and co-location with MUSC at Nexton has the potential to shift referral volume away from Trident to MUSC.
- Roper St. Francis Hospital – Berkeley, unlike MUSC, will have the ability to treat inpatients. While inpatients will make up less than 5% of total projected patient volume, this ability is still significant for those in need of inpatient treatment in a geographical

area that currently has no inpatient options. Certain emergencies, like spinal cord compression, require hospital-based radiation therapy for treatment. In addition, a small but important subset of patients become too frail during the course of treatment to finish as outpatients and must receive the remaining treatments as inpatients. A hospital-based provider will meet the needs of a small but very relevant subset of patients that must be considered.

We appreciate your consideration of the information presented above. If you have any questions, please do not hesitate to contact me.

Sincerely,

Kathryn Platt

Kathryn Platt
President

Attachment 1

Letter Regarding Capacity

ROPER ST. FRANCIS

Cancer Center
2085 Henry Tecklenburg Drive, Suite 106 | Charleston, SC 29414
(843) 958-2550 P (843) 958-2599 F
www.rsfh.com/cancer

December 30, 2016

Mr. Louis Eubank, Director
DHEC Certificate of Need Program
2600 Bull Street
Columbia, South Carolina 29201

SENT VIA ELECTRONIC MAIL: EUBANKLW@dhec.sc.gov

Dear Mr. Eubank,

I recently reviewed the standards for radiotherapy outlined in the South Carolina Health Plan enacted August 13, 2015, and would like to request a reduction in capacity for each of the three linear accelerators Roper St. Francis Healthcare currently operates for the reasons I will outline below. One linear accelerator resides at Roper Hospital, and the other two are at Bon Secours St. Francis Xavier Hospital in the Cancer Center. The current capacity metric for each of these three devices reflects 7,000 annual treatments. Note that Roper Hospital also operates an Accuray Cyberknife, but a 1,000 annual treatment capacity is currently and accurately reflected for this device.

Roper Hospital has a Varian IX accelerator with on board imaging and rapid arc technology. As it has been upgraded over the years, this accelerator performs 2D, 3D, IMRT and IGRT. Presently 20% of the total volume on this device is IMRT/IGRT. It should reflect a 5,000 annual treatment capacity as indicated in the South Carolina Health Plan.

Bon Secours St. Francis Hospital also has a Varian IX accelerator with on board imaging and rapid arc technology, matched beams with the Roper Hospital accelerator. This accelerator performs 2D, 3D, IMRT and IGRT. Presently 25% of the total volume on this device is IMRT/IGRT. The State Health Plan Certificate of Need Standard indicates the capacity should reflect 5,000 treatments per year, and said reduction is also requested. A Varian True Beam accelerator with on board imaging and rapid arc technology is our newest addition that went Live at Bon Secours St. Francis Hospital in April of 2016. This accelerator performs, 2D, 3D, IMRT and IGRT. Presently 55% of the total volume on this device is IMRT/IGRT. The default capacity metric reflects 7,000 treatments; however, it should reflect 5,000 annual treatments. Please be advised that a CON application will be submitted next month for the addition of stereotactic radiosurgery and stereotactic body radiation therapy on this True Beam accelerator, and said application will seek to further reduce the 5,000 capacity to 4,500 to reflect the longer treatment times associated with these technologies.

Assuming approvals are granted, Roper Hospital's capacity reflected in the next draft South Carolina Health Plan will be revised to reflect 6,000 treatments (vs. 8,000), and a 10,000 treatment capacity reflected (vs. 14,000) for Bon Secours St. Francis Hospital. Please let me know if you require any additional information. I look forward to your response.

Sincerely,

Jacqueline Dioses

Jacqueline J Dioses, RSFH Director Radiation Oncology

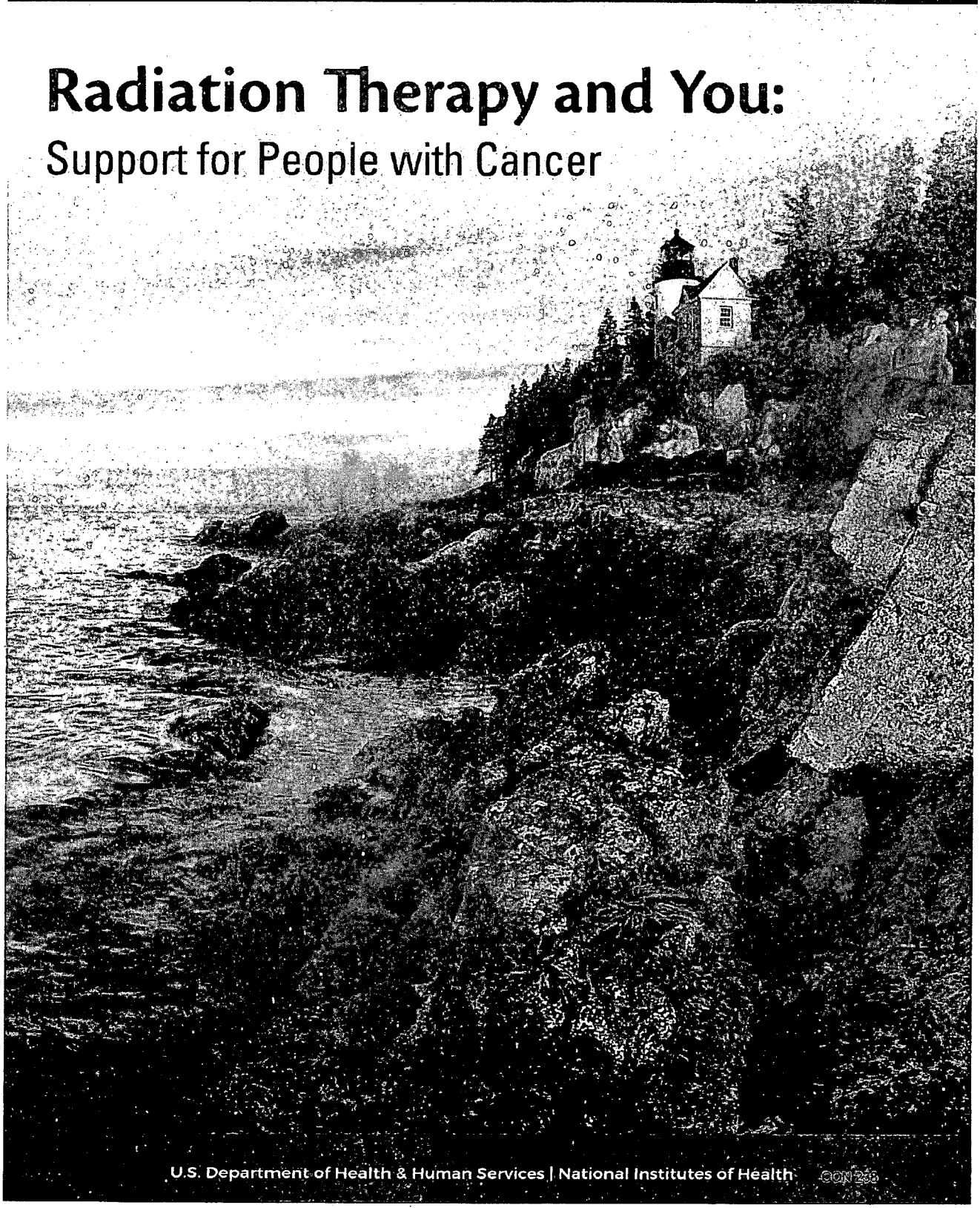
Attachment 2

Articles Regarding Percentage of Cancer Patients Receiving Radiation Therapy

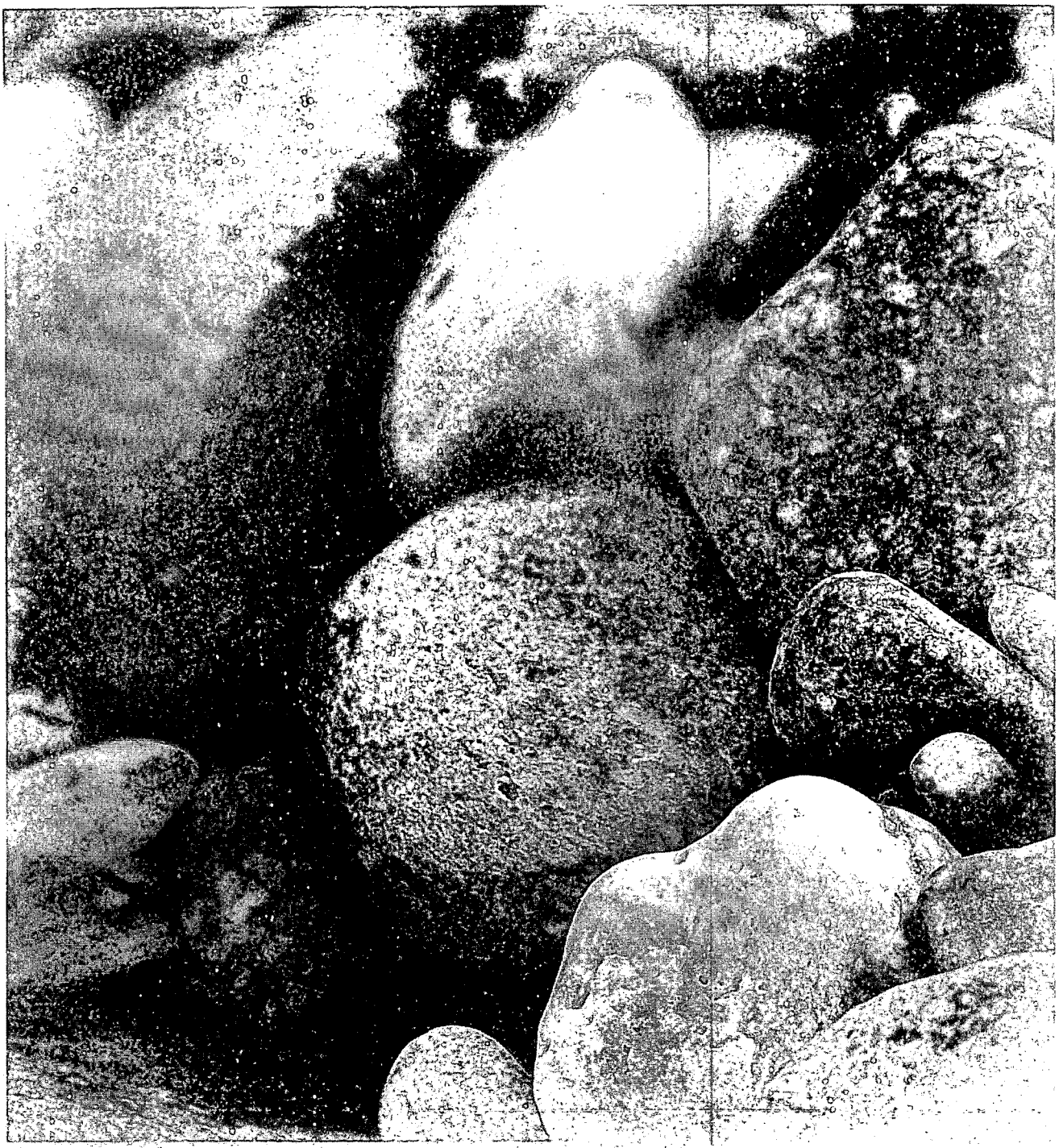
NIH NATIONAL CANCER INSTITUTE

Radiation Therapy and You:

Support for People with Cancer



U.S. Department of Health & Human Services | National Institutes of Health



The Use of Product or Brand Names

Product or brand names that appear in this booklet are for example only. The U.S. Government does not endorse any specific product or brand. If products or brands are not mentioned, it does not mean or imply that they are not satisfactory.

About this Booklet

Radiation Therapy and You is for you, if you are about to have or are now having radiation therapy for cancer. People who are close to you may also find this booklet helpful.

Rather than read this booklet from beginning to end, look at only those sections you need now. Later, you can always read more.

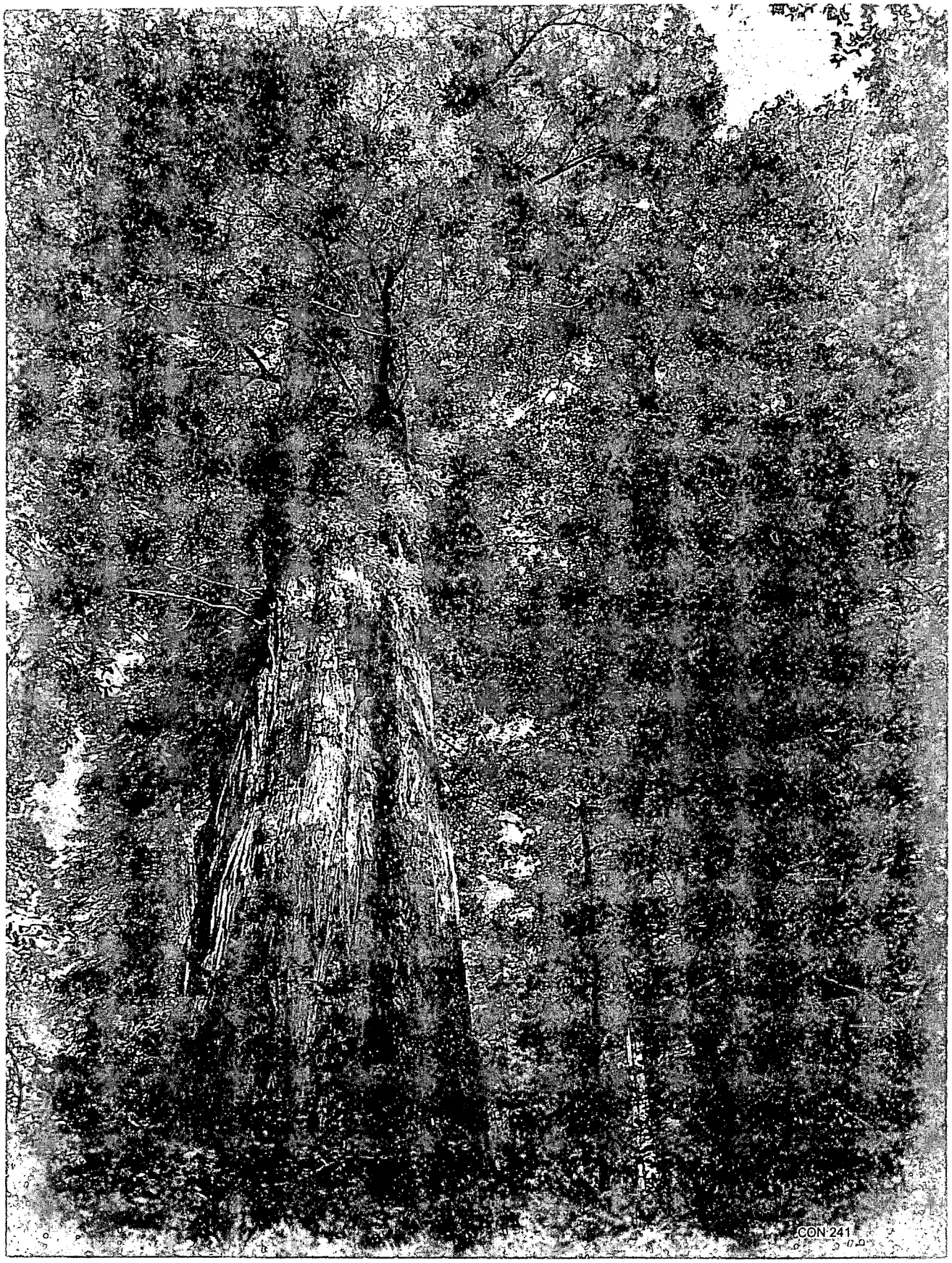
This booklet covers:

- **Questions and Answers about Radiation Therapy.** Answers to common questions, such as what radiation therapy is and how it affects cancer cells.
- **External Beam and Internal Radiation.** Information about the two main types of radiation therapy.
- **Side Effects and Ways to Manage Them.** Information about side effects that may occur, depending on the part of your body being treated, and ways you can manage them.
- **Questions to Ask.** Questions for you to think about and discuss with your doctor, nurse, and others involved in your treatment and care.
- **Lists of Foods and Liquids.** Suggestions for foods and drinks that can help with side effects.

Talk with your doctor and nurse about the information in this booklet. They may suggest that you read certain sections or follow specific tips. Because radiation therapy affects people in different ways, they may also tell you that some of the information in this booklet does not apply to you.

Rather than read this book from beginning to end—look at only those sections you need now. Later, you can always read more.

ROA_1834



ROA_1835

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Rather than read this book from beginning to end—look at only those sections you need now. Later, you can always read more.

ROA_1836



CON 243

Questions and Answers about Radiation Therapy

What is radiation therapy?

Radiation therapy (also called radiotherapy) is a cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumors. At low doses, radiation is used as an x-ray to see inside your body and take pictures, such as x-rays of your teeth or broken bones.

How is radiation therapy given?

Radiation therapy can be external beam or internal. External beam involves a machine outside your body that aims radiation at cancer cells. Internal radiation therapy involves placing radiation inside your body, in or near the cancer. Sometimes people get both forms of radiation therapy. To learn more about external beam radiation therapy, see page 9. To learn more about internal radiation therapy, see page 15.

Who gets radiation therapy?

Many people with cancer need treatment with radiation therapy. In fact, more than half (about 60%) of people with cancer have radiation therapy. Sometimes, radiation therapy is the only kind of cancer treatment people have.

What does radiation therapy do to cancer cells?

Given in high doses, radiation kills or slows the growth of cancer cells. Radiation therapy is used to:

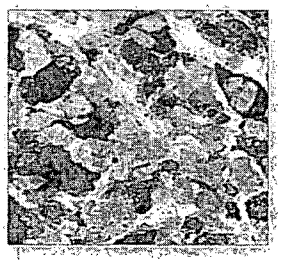
- **Treat cancer.** Radiation can be used to cure cancer, to prevent it from returning, or to stop or slow its growth.
- **Reduce symptoms.** When a cure is not possible, radiation may be used to treat pain and other problems caused by the cancer tumor. Or, it can prevent problems that may be caused by a growing tumor, such as blindness or loss of bowel and bladder control.

ROA_1838

How long does radiation therapy take to work?

Radiation therapy does not kill cancer cells right away. It takes days or weeks of treatment before cancer cells start to die. Then, cancer cells keep dying for weeks or months after radiation therapy ends.

What does radiation therapy do to healthy cells?



Radiation not only kills or slows the growth of cancer cells, it can also affect nearby healthy cells. The healthy cells almost always recover after treatment is over. But sometimes people may have side effects that are severe or do not get better. Other side effects may show up months or years after radiation therapy is over. These are called late side effects.

Doctors try to protect healthy cells during treatment by:

- **Using as low a dose of radiation as possible.** The radiation dose is balanced between being high enough to kill cancer cells, yet low enough to limit damage to healthy cells.
- **Spreading out treatment over time.** You may get radiation therapy once a day, or in smaller doses twice a day for several weeks. Spreading out the radiation dose allows normal cells to recover while cancer cells die.
- **Aiming radiation at a precise part of your body.** Some types of radiation therapy allow your doctor to aim high doses of radiation at your cancer while reducing radiation to nearby healthy tissue. These techniques use a computer to deliver precise radiation doses to a cancer tumor or to specific areas within the tumor.

Does radiation therapy hurt?

No, radiation therapy does not hurt while it is being given. But the side effects that people may get from radiation therapy can cause pain and discomfort. This booklet has a lot of information about ways that you and your doctor and nurse can help manage side effects.

ROA_1839

Is radiation therapy used with other types of cancer treatment?

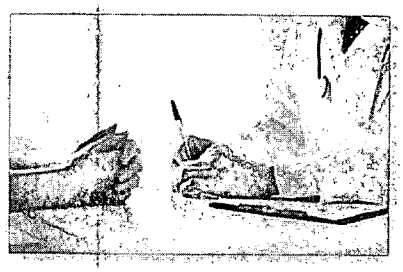
Yes, radiation therapy is often used with other cancer treatments. Here are some examples:

- **Radiation therapy and surgery.** Radiation may be given before, during, or after surgery. Doctors may use radiation to shrink the size of the cancer before surgery, or they may use radiation after surgery to kill any cancer cells that remain. Sometimes, radiation therapy is given during surgery, so that it goes straight to the cancer without passing through the skin. Radiation therapy given during surgery is called intraoperative radiation.
- **Radiation therapy and chemotherapy.** Radiation may be given before, during, or after chemotherapy. Before or during chemotherapy, radiation therapy can shrink the cancer so that chemotherapy works better. After chemotherapy, radiation therapy can be used to kill any cancer cells that remain.

Is radiation therapy expensive?

Yes, radiation therapy costs a lot of money. It uses complex machines and involves the services of many health care providers. The exact cost of your radiation therapy depends on the cost of health care where you live, what kind of radiation therapy you get, and how many treatments you need.

Talk with your health insurance company about what services it will pay for. Most insurance plans pay for radiation therapy. To learn more, talk with the business office of the clinic or hospital where you go for treatment. If you need financial assistance, there are organizations that may be able to help. To find such organizations, go to the National Cancer Institute database, Organizations that Offer Support Services at:
supportorgs.cancer.gov
and search "financial assistance."
Or call toll-free 1-800-4-CANCER (1-800-422-6237) to ask for information on organizations that may help.



ROA_1840

Should I follow a special diet while I am getting radiation therapy?

Your body uses a lot of energy to heal during radiation therapy. It is important that you eat enough calories and protein to keep your weight the same during this time. Ask your doctor or nurse if you need a special diet while you are receiving radiation therapy. You might also find it helpful to speak with a dietitian.

To learn more about foods and drinks that are high in calories or protein, see the chart on page 53. You might also read *Eating Hints: Before, During, and After Cancer Treatment*, a booklet from the National Cancer Institute, at: www.cancer.gov/publications/patient-education/eating-hints.



Can I continue to work during radiation therapy?

Some people are able to work full time during radiation therapy. Others can work only part time or not at all. How much you are able to work depends on how you feel. Ask your doctor or nurse what you may expect from the treatment you will have.

You are likely to feel well enough to work when you first start your radiation treatments. As time goes on, do not be surprised if you are more tired, have less energy, or feel weak. Once you have finished treatment, it may take a few weeks or many months for you to feel better.

You may get to a point during your radiation therapy when you feel too sick to work. Talk with your employer to find out if you can go on medical leave. Make sure that your health insurance will pay for treatment while you are on medical leave.

Ask your doctor, nurse, or dietitian if you need a special diet while you are getting radiation therapy.

ROA_1841

How can I cope with my feelings during radiation therapy?

Living with cancer and going through treatment can be very stressful. It is normal to feel anxious, depressed, afraid, angry, frustrated, helpless, or alone at some point during radiation therapy. But there are ways you can learn to cope with these feelings.

Many people find it helpful to talk with others who are going through the same thing. To meet others, think about joining a support group. These groups meet in-person and online. You might also try relaxation or meditation exercises. Some people find prayer helpful.

Exercise can also boost your mood. Try activities such as walking, biking, yoga, or water aerobics. Check with your doctor or nurse about types of exercise that you can safely do during treatment.

To learn more about coping with your feelings during cancer treatment:

- Visit the *Coping* section of the National Cancer Institute's website at: www.cancer.gov/about-cancer/coping
- Read *Taking Time: Support for People with Cancer* at: www.cancer.gov/publications/patient-education/taking-time

For relaxation exercises:

- Visit *Learning to Relax* on the National Cancer Institute's website at: www.cancer.gov/about-cancer/coping/feelings/relaxation
- See *Facing Forward: Life After Cancer Treatment* at: www.cancer.gov/publications/patient-education/facing-forward



ROA_1842

How do I make the most of radiation therapy?

You have an important role to play in your radiation therapy. To get the most from this treatment:

- Arrive on time for all radiation therapy sessions.
- Ask questions and talk about your concerns.
- Tell someone on your radiation therapy team when you have side effects and changes with eating or bowel habits.
- Tell your doctor or nurse if you are in pain.

Follow the advice of your doctors and nurses about how to care for yourself at home, such as:

- Taking care of your skin
- Drinking enough liquids
- Eating foods to help with side effects
- Maintaining your weight

Make a list of questions and problems you want to discuss with your doctor or nurse. Be sure to bring this list to your follow-up visits. See pages 49 and 50 for sample questions.

Be sure to arrive on time for ALL radiation therapy sessions.

ROA_1843

What happens when radiation therapy is over?

Once you have finished radiation therapy, you will need follow-up care for the rest of your life. Follow-up care refers to regular checkups once treatment is over. During these checkups, your doctor or nurse will see how well the radiation therapy worked, check for signs of cancer, talk with you about your treatment and care, and look for late side effects. Late side effects are those that occur six or more months after you have completed radiation therapy. During these checkups, your doctor or nurse will:

- **Examine you and review how you have been feeling.** Your doctor can prescribe medicine or suggest other ways to treat any side effects you may have.
- **Order lab and imaging tests,** which are tests that make pictures of areas inside the body. These tests may include blood tests, x-rays, or CT, MRI, or PET scans.
- **Discuss treatment.** Your doctor may suggest that you have more treatment, such as extra radiation treatments, chemotherapy, or other types of treatment.
- **Answer your questions and respond to your concerns.** It may be helpful to write down your questions ahead of time and bring them with you. You can find sample questions on pages 49 and 50.

For more information about late effects, visit the National Cancer Institute's website at www.cancer.gov/about-cancer/coping/survivorship/late-effects.

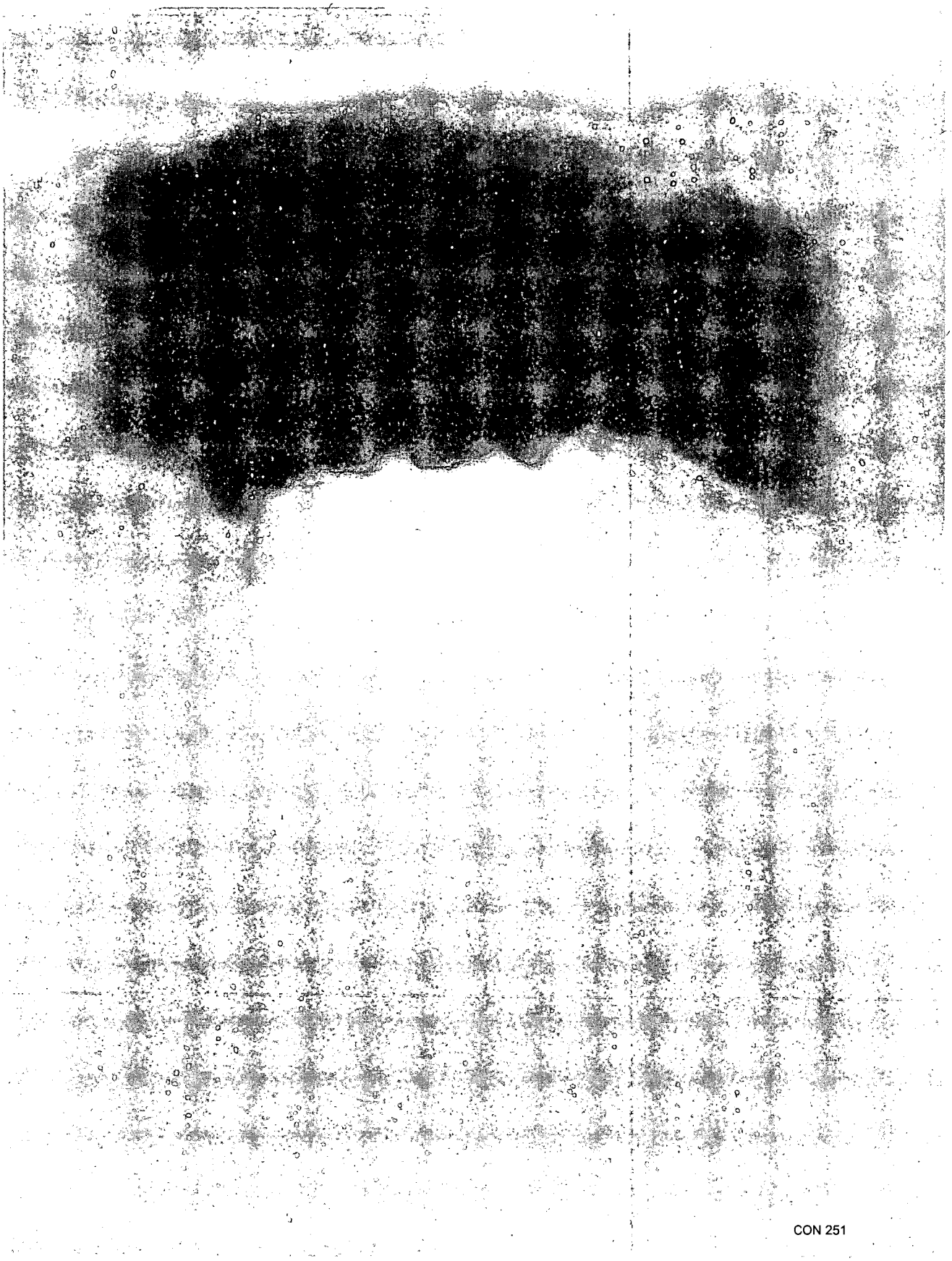
After I have finished radiation therapy, what symptoms should I look for?



You have gone through a lot with cancer and radiation therapy. Now you may be even more aware of your body and how you feel each day. Pay attention to changes in your body. Tell your doctor or nurse if you have:

- A pain that does not go away
- New lumps, bumps, swellings, rashes, bruises, or bleeding
- Appetite changes, nausea, vomiting, diarrhea, or constipation
- Weight loss that you cannot explain
- A fever, cough, or hoarseness that does not go away
- Any other symptoms that worry you

ROA_1844



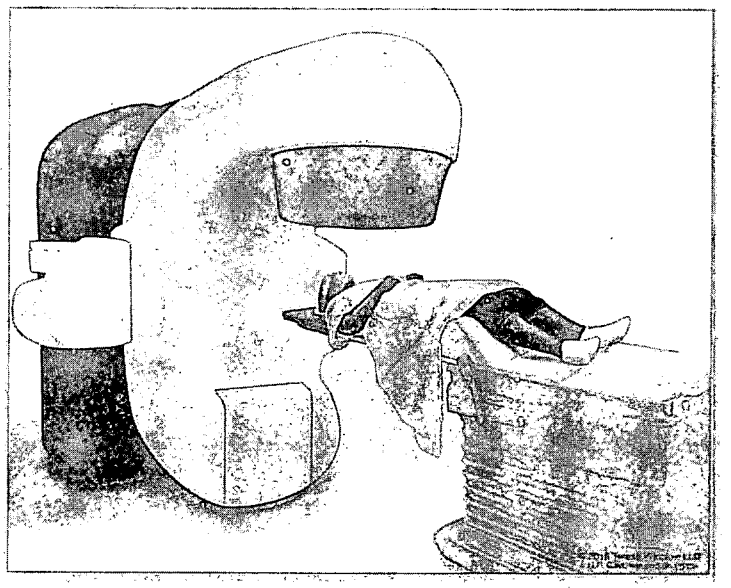
CON 251

External Beam Radiation Therapy

What is external beam radiation therapy?

External beam radiation therapy comes from a machine that aims radiation at your cancer. The machine is large and may be noisy. It does not touch you, but it can move around you, sending radiation to your body from many directions.

External beam radiation therapy is a local treatment, meaning that the radiation treats a specific part of your body. For example, if you have lung cancer, you will have radiation only to your chest, not to the rest of your body.



External beam radiation therapy comes from a machine that aims radiation at your cancer.

ROA_1846

How often will I have external beam radiation therapy?

Most people have external beam radiation therapy once a day, five days a week, Monday through Friday. Treatment lasts anywhere from 2 to 10 weeks, depending on the type of cancer you have and the goal of your treatment. This span of time is called a course of treatment.

Radiation therapy may also be given on other schedules. These schedules include:

- **Accelerated fractionation,** which is treatment given in larger daily or weekly doses to reduce the number of weeks of treatment
- **Hyperfractionation,** which is smaller doses of radiation given more than once a day
- **Hypofractionation,** which is larger doses given once a day (or less often) to reduce the number of treatments



Your doctor may prescribe one of these treatment schedules if he or she feels that it will work better for you.

Where do I go for external beam radiation therapy?

Most of the time, you will get external beam radiation therapy as an outpatient. This means that you will have treatment at a clinic or radiation therapy center and will not have to stay in the hospital.

ROA_1847

What happens before I begin external beam radiation treatment?

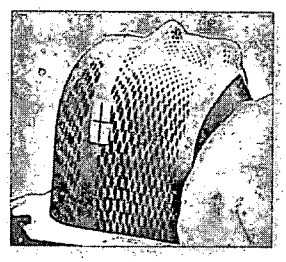
You will have a one- to two-hour meeting with your doctor or nurse before you begin radiation therapy. At this time, you will have a physical exam, talk about your medical history, and may have imaging tests. Your doctor or nurse will discuss external beam radiation therapy, its benefits and side effects, and ways you can care for yourself during and after treatment. You can then choose whether to have external beam radiation therapy.

If you decide to have external beam radiation therapy, you will be scheduled for a treatment planning session called a simulation. At this time:

- A radiation oncologist (a doctor who specializes in using radiation to treat cancer) and radiation therapist will define your treatment area. You may also hear the treatment area referred to as the treatment port or treatment field. These terms refer to the places in your body that will receive radiation. You will be asked to lie very still while x-rays or scans are taken.
- The radiation therapist will put small marks (either tattoos or dots of colored ink) on your skin to mark the treatment area. These marks are needed throughout your course of radiation therapy. The radiation therapist will use them each day to make sure you are in the correct position. Tattoos are about the size of a freckle and will remain on your skin for the rest of your life. Ink markings will fade over time. Be careful not to remove them and tell the radiation therapist if they have faded or lost color.

A body mold may be made of the part of the body that is being treated. This is a plastic or plaster form that keeps you from moving during treatment. It also helps make sure that you are in the exact same position each day of treatment.

You may be fitted for a mask, if you are getting radiation to the head and neck area. The mask has air holes. It attaches to the table where you will lie for your treatments. The mask helps keep your head from moving so that you are in the exact same position for each treatment.



If you are getting radiation to the head, you may need a mask.

If using the body mold or mask makes you feel anxious, see page 13 for ways to relax during treatment.

ROA_1848

What should I wear for external beam radiation therapy?

Wear clothes that are comfortable and made of soft fabric, such as fleece or cotton. Choose clothes that are easy to take off, because you may need to pull them away from the treatment area or change into a hospital gown. Do not wear clothes that are tight, such as close-fitting collars or waistbands, near your treatment area. Also, do not wear jewelry, adhesive bandages, or powder in the treatment area.

What happens during a treatment session?

- You may be asked to change into a hospital gown or robe.
- You will go to the treatment room where you will receive radiation.
- Depending on where your cancer is, you will either sit in a chair or lie down on a treatment table. The radiation therapist will use your skin marks and body mold or face mask, if you have one, to help you get into the correct position.
- You may see colored lights pointed at your skin marks. These lights are harmless and help the therapist position you for treatment each day.
- You will need to stay very still so the radiation goes to the exact same place each time. You will get radiation for one to five minutes. During this time, you can breathe normally and do not have to hold your breath.

The radiation therapist will leave the room just before your treatment begins. He or she will go to a nearby room to control the radiation machine. The therapist can watch you on a TV screen or through a window and talk with you through a speaker in the treatment room. Be sure to tell the therapist if you feel sick or are uncomfortable. He or she can stop the radiation machine at any time. You won't be able to feel, hear, see, or smell the radiation.

Your entire visit may last from 30 minutes to an hour. Most of that time is spent placing you in the correct position. Certain types of radiation may take longer. Your visit may also take longer if your treatment team needs to take and review x-rays.

ROA_1849

Will external beam radiation therapy make me radioactive?

No, external beam radiation therapy does not make people radioactive. You may safely be around other people, even pregnant women, babies, and young children.

How can I relax during my treatment sessions?

- Bring something to keep you busy in the waiting room, such as a book or magazine, crossword puzzles, or knitting.
- Use headphones to listen to music or recorded books.
- Meditate, breathe deeply, pray, use imagery, or find other ways to relax. For relaxation exercises:
  - Visit *Learning to Relax* on the National Cancer Institute's website at: www.cancer.gov/about-cancer/coping/feelings/relaxation
  - See *Facing Forward: Life After Cancer Treatment* at: www.cancer.gov/publications/patient-education/facing-forward

Your radiation therapist can see, hear, and talk with you at all times while you are receiving external beam radiation therapy.

ROA_1850



ROA_1851

Internal Radiation Therapy

What is internal radiation therapy?

Internal radiation therapy is a form of treatment in which a source of radiation is put inside your body. One form of internal radiation therapy is called brachytherapy. In brachytherapy, a solid radiation source, such as seeds, ribbons, or capsules, is placed in your body in or near the cancer.

Internal radiation can also be in liquid form. You receive liquid radiation by drinking it, swallowing a pill, or getting it through an IV line. Liquid radiation travels throughout your body, seeking out and killing cancer cells.

Brachytherapy may be used to treat many types of cancers, such as cancers of the head and neck, breast, uterus, cervix, prostate, gallbladder, esophagus, eye, and lung. Liquid forms of internal radiation are most often used to treat thyroid cancer or non-Hodgkin lymphoma.

What happens before I begin internal radiation therapy?

You will have a 1- to 2-hour meeting with your doctor or nurse to plan your treatment before you begin internal radiation therapy. At this time, you will have a physical exam, talk about your medical history, and may have imaging tests. Your doctor will discuss the type of internal radiation therapy that is best for you, its benefits and side effects, and ways you can care for yourself during and after treatment. You can then decide whether to have internal radiation therapy.

How is brachytherapy put in place?

Most brachytherapy is put in place through a catheter, which is a small, stretchy tube. Sometimes, brachytherapy is put in place through a larger device called an applicator. Your doctor will place the catheter or applicator into your body before you begin treatment.

Once the catheter or applicator is in place, the radiation source will be placed inside. The radiation source may be kept in place for a few minutes, for many days, or for the rest of your life. How long the radiation source remains in place depends on the type of brachytherapy you have, your type of cancer, where the cancer is in your body, your health, and other cancer treatments you have had.

ROA_1852

What are the types of brachytherapy?

There are three types of brachytherapy:

- **Low-dose rate (LDR) implants.** In this type of brachytherapy, the radiation source stays in place for one to seven days. You are likely to be in the hospital during this time. Once your treatment is finished, your doctor will remove the radiation source and the catheter or applicator.
- **High-dose rate (HDR) implants.** In this type of brachytherapy, the radiation source is left in place for just 10 to 20 minutes at a time and then taken out. You may have treatment twice a day for two to five days or once a week for two to five weeks. The schedule depends on your type of cancer. During the course of treatment, your catheter or applicator may stay in place, or it may be put in place before each treatment. You may be in the hospital during this time, or you may make daily trips to the hospital to have the radiation source put in place. As with LDR implants, your doctor will remove the catheter or applicator once you have finished treatment.
- **Permanent implants.** After the radiation source is put in place, the catheter is removed. The implants always stay in your body, but the radiation gets weaker each day. As time goes on, almost all radiation will go away. When the radiation is first put in place, you may need to limit your time around other people. Be extra careful not to spend time with children or pregnant women.

What happens while the radiation is in place?

With brachytherapy, your body fluids (urine, sweat, and saliva) will not give off radiation, but the radiation source will. With liquid radiation, your body fluids will give off radiation for a while.

If the radiation you receive is a very high dose, safety measures may include:

- Staying in a private hospital room to protect others from radiation coming from your body.
- Being treated quickly by nurses and other hospital staff. They will provide all the care you need, but they may stand at a distance and talk with you from the doorway to your room.

ROA_1853

Your visitors will also need to follow safety measures, which may include:



- Not being allowed to visit when the radiation is first put in
- Needing to check with the hospital staff before they go to your room
- Keeping visits short (30 minutes or less each day). The length of visits depends on the type of radiation being used and the part of your body being treated.
- Standing by the doorway rather than going into your hospital room
- Not having visits from pregnant women and children younger than a year old

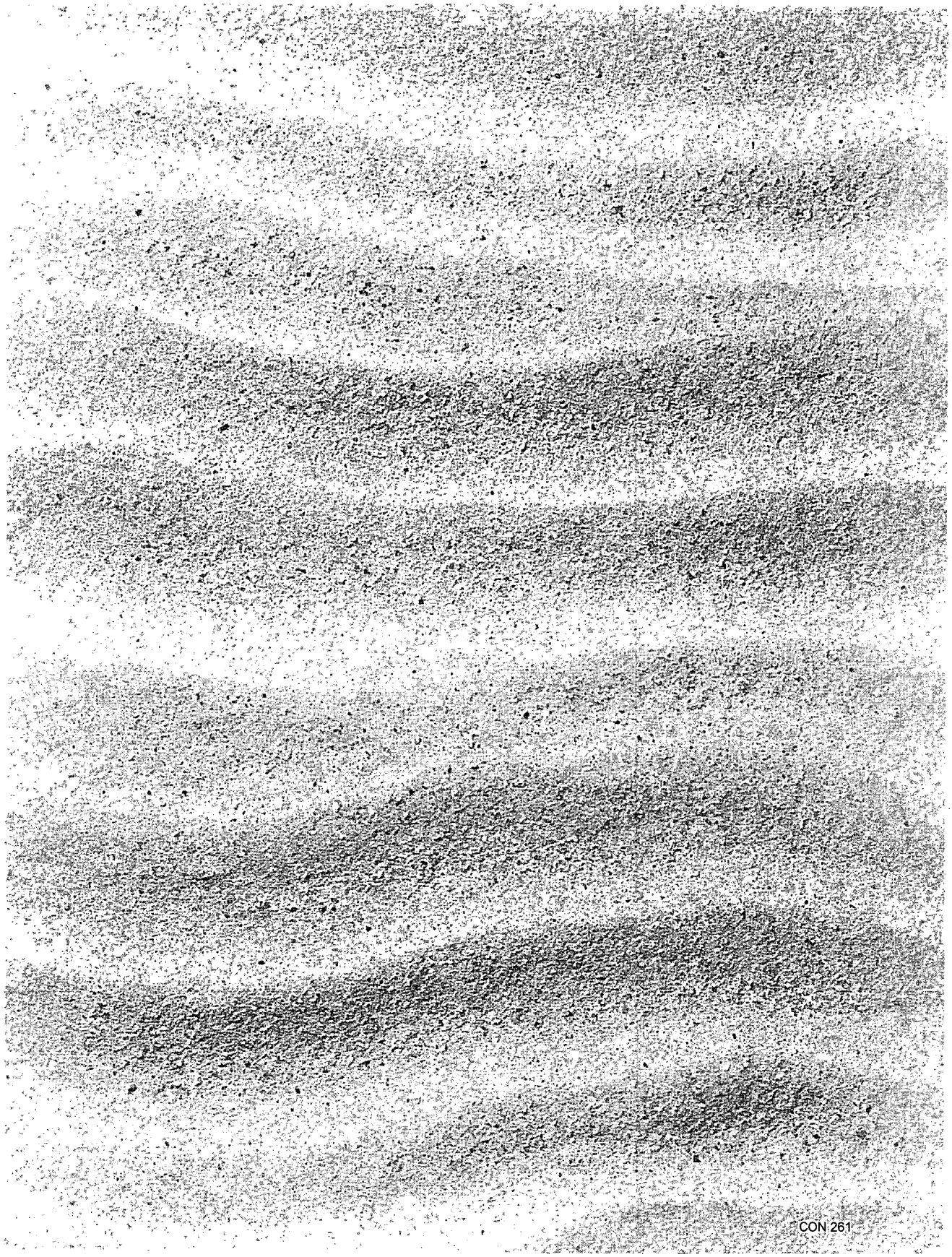
You may also need to follow safety measures once you leave the hospital, such as not spending much time with other people. Your doctor or nurse will talk with you about any safety measures you should follow when you go home.

What happens when the catheter is taken out after treatment with LDR or HDR implants?

- You will get medicine for pain before the catheter or applicator is removed.
- The area where the catheter or applicator was might be tender for a few months.
- There is no radiation in your body after the catheter or applicator is removed. It is safe for people to be near you—even young children and pregnant women.
- For a week or two, you may need to limit activities that take a lot of effort. Ask your doctor what kinds of activities are safe for you and which ones you should avoid.

Tell your doctor or nurse if you are in pain.

ROA_1854


CON 261

Radiation Therapy Side Effects

Side effects are problems that can occur as a result of treatment. They may occur with radiation therapy because the high doses of radiation that are used to kill cancer cells can also damage healthy cells in the treatment area. Side effects are different for each person. Some people have many side effects. Others have hardly any. Side effects may be more severe if you also receive chemotherapy before, during, or after your radiation therapy.

Talk with your doctor or nurse about your chances of having side effects. The team will watch you closely and ask if you notice any problems. If you do have side effects, your doctor or nurse will talk with you about ways to manage them.

Common Side Effects



Many people who get radiation therapy have skin changes and some fatigue. Other side effects depend on the part of your body being treated.

Skin changes may include dryness, itching, peeling, or blistering in the treatment area. These changes occur because radiation passes through the skin on its way to the cancer. You will need to take special care of your skin during radiation therapy. To learn more, see page 40.

Fatigue is often described as feeling weary or exhausted. There are many ways to manage fatigue. To learn more, see page 24.

Depending on the part of your body being treated, you may also have:

- Diarrhea
- Hair loss in treatment area
- Mouth problems
- Nausea and vomiting
- Sexual changes
- Swelling
- Trouble swallowing
- Urinary and bladder changes

Most of these side effects go away within two months after you have finished radiation therapy.

ROA_1856

Late side effects may occur six or more months after radiation therapy is over. They vary by the part of your body that was treated and the dose of radiation you received.

Late side effects may include infertility, joint problems, lymphedema, mouth problems, and, rarely, second primary cancers. Everyone is different, so talk with your doctor or nurse about whether you might have late side effects and what signs to look for. For more information about late side effects, visit the National Cancer Institute's website at www.cancer.gov/about-cancer/coping/survivorship/late-effects.

Ways to Manage Side Effects, starting on page 22, explains each side effect in more detail and includes ways you and your doctor or nurse can manage them.

Talk with your radiation therapy team about your chances of getting side effects. Show them the chart on the next page.

ROA_1857

Treatment Areas and Possible Side Effects

Which radiation therapy side effects you have may depend on the part of your body that is treated. The part of your body being treated is called the treatment area. To figure out which side effects you might expect, find the part of your body being treated in the following chart. Possible side effects are listed next to each treatment area. Ask your doctor or nurse about your chances of getting each side effect.

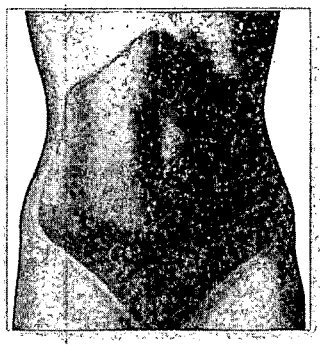
Part of the Body Being Treated	Possible Side Effects
Brain	• Fatigue, see page 24 • Hair loss, see page 27 • Nausea and vomiting, see page 34 • Skin changes, see page 40 • Headache • Blurry vision
Breast	• Fatigue, see page 24 • Hair loss, see page 27 • Skin changes, see page 40 • Tenderness • Swelling
Chest	• Fatigue, see page 24 • Hair loss, see page 27 • Skin changes, see page 40 • Throat changes, such as trouble swallowing, see page 43 • Cough • Shortness of breath
Head and Neck	• Fatigue, see page 24 • Hair loss, see page 27 • Mouth changes, see page 30 • Skin changes, see page 40 • Throat changes, such as trouble swallowing, see page 43 • Taste changes • Less active thyroid gland
Pelvis	• Diarrhea, see page 22 • Fatigue, see page 24 • Hair loss, see page 27 • Nausea and vomiting, see page 34 • Sexual and fertility changes, see page 36 • Skin changes, see page 40 • Urinary and bladder changes, page 45
Rectum	• Diarrhea, see page 22 • Fatigue, see page 24 • Hair loss, see page 27 • Sexual and fertility changes, see page 36 • Skin changes, see page 40 • Urinary and bladder changes, see page 45
Stomach and Abdomen	• Diarrhea, see page 22 • Fatigue, see page 24 • Hair loss, see page 27 • Nausea and vomiting, see page 34 • Skin changes, see page 40 • Urinary and bladder changes, see page 45

ROA_1858

Diarrhea

What it is

Diarrhea is frequent bowel movements, which may be soft, formed, loose, or watery. Diarrhea can occur at any time during radiation therapy.



Radiation to the shaded area may cause diarrhea.

Why it occurs

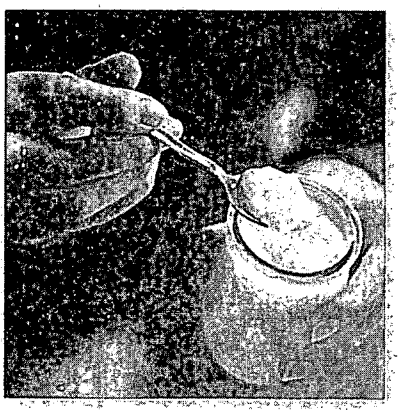
Radiation therapy to the pelvis, stomach, and abdomen can cause diarrhea. People get diarrhea because radiation harms the healthy cells that line the inside of the intestines. These areas are very sensitive to the amount of radiation needed to treat cancer.

Ways to manage

When you have diarrhea:

- **Drink 8 to 12 cups of clear liquid per day.** Severe diarrhea can cause you to become dehydrated, a problem that can become serious. This problem is caused by the loss of too much water from the body. Making sure you drink enough can help prevent it. See page 51 for drinks and foods that are clear liquids. If you drink liquids that are high in sugar (such as fruit juice, sweet iced tea, Kool-Aid®, or Hi-C®) ask your nurse or dietitian if you should mix them with extra water.
- **Eat small meals and snacks.** Many people find that they eat better if they eat five or six small meals and snacks each day, rather than three large meals.
- **Eat foods that are high in salts such as sodium and potassium.** Your body can lose these salts when you have diarrhea, and it is important to replace them. Foods that are high in sodium or potassium include bananas, oranges, peach and apricot nectar, and boiled or mashed potatoes.

ROA_1859



- **Eat low-fiber foods.** Foods that are high in fiber can make diarrhea worse. Low-fiber foods include bananas, white rice, white toast, and plain or vanilla yogurt. See page 52 for other low-fiber foods.
- **Take care of your rectal area.** Instead of toilet paper, use a baby wipe or squirt water from a spray bottle to clean yourself after bowel movements. Also, ask your nurse about taking sitz baths, which is a warm-water bath taken in a sitting position that covers only the hips and buttocks. Be sure to tell your doctor or nurse if your rectal area gets sore.
- **Avoid:**
  - Beer, wine, and other types of alcohol
  - Milk and dairy foods, such as ice cream, sour cream, and cheese
  - Spicy foods, such as hot sauce, salsa, chili, and curry dishes
  - Foods or drinks with caffeine, such as regular coffee, black tea, soda, and chocolate
  - Foods or drinks that cause gas, such as cooked dried beans, cabbage, broccoli, soy milk, and other soy products
  - Foods that are high in fiber, such as raw fruits and vegetables, cooked dried beans, and whole wheat breads and cereals
  - Fried or greasy foods
  - Food from fast-food restaurants
- **Talk with your doctor or nurse.** Tell him or her if you are having diarrhea. He or she will suggest ways to manage it. He or she may also suggest taking medicine, such as Imodium®.

Learn More

To learn more about dealing with diarrhea during cancer treatment:

- See *Eating Hints: Before, During, and After Cancer Treatment* at: www.cancer.gov/publications/patient-education/eating-hints

ROA_1860

Fatigue

What it is

Fatigue from radiation therapy can range from mild to extreme. Many people describe fatigue as feeling weak, weary, worn out, heavy, or slow.

Fatigue is a common side effect, and there is a good chance that you will feel some level of fatigue during treatment.

Why it occurs

Fatigue can be caused by many problems, such as:

- Anemia
- Appetite changes
- Anxiety
- Depression
- Infection
- Lack of activity
- Medicines
- Pain
- Trouble breathing
- Trouble sleeping
- Other medical problems

Fatigue can also come from the effort of going to radiation therapy each day or from stress. Most of the time, you will not know why you feel fatigue.

How long it lasts



When you will first feel fatigue depends on a few factors, such as your age, health, how active you are, and how you felt before radiation therapy started.

Fatigue can last from six weeks to a year after your last radiation therapy session. Some people may always feel fatigue and not have as much energy as they did before radiation therapy.

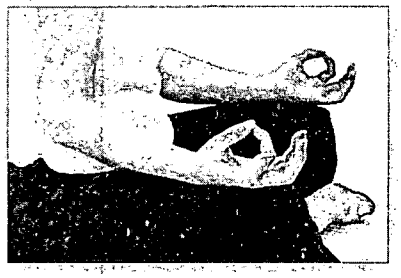
ROA_1861

Ways to manage

- **Try to sleep at least eight hours each night.** This may be more sleep than you needed before radiation therapy. One way to sleep better at night is to be active during the day. Another way is to relax right before going to bed. Do calming activities before bedtime, such as reading, working on a jigsaw puzzle, or listening to music.

- **Plan time to rest.** Take short naps or rest breaks between activities.

- **Try not to do too much.** With fatigue, you may not have enough energy to do all the things you want to do. Stay active, but choose the activities that are most important to you. Try to let go of things that don't matter as much now. For example, you might go to work but not do housework. You might watch your children's sports events but not cook dinner.



- **Exercise.** Research shows that most people feel better when they get some exercise each day. Go for a short walk, ride a bike, or do yoga. Talk with your doctor or nurse about types of exercise you can do while having radiation therapy.

- **Relax.** Meditation, prayer, gentle yoga, guided imagery, and visualization are ways you can learn to relax and decrease stress. For relaxation exercises:
  - Visit *Learning to Relax* on the National Cancer Institute's website at: www.cancer.gov/about-cancer/coping/feelings/relaxation
  - See *Facing Forward: Life After Cancer Treatment* at: www.cancer.gov/publications/patient-education/facing-forward

- **Eat and drink well.** It can be easier to eat if you have five or six small meals each day, rather than three large ones. Keep foods around that are easy to fix, such as canned soups, frozen meals, yogurt, and cottage cheese. Drink plenty of fluids each day—about eight cups of water or juice.

- **Plan a work schedule that is right for you.** Fatigue may affect the amount of energy you have for your job. You may feel well enough to work your full schedule, or you may need to work less—maybe just a few hours a day or a few days each week. You may want to talk with your boss about ways to work from home so you do not need to commute. If possible, you may want to think about going on medical leave while you have radiation therapy.

- **Plan a radiation therapy schedule that makes sense for you.** Think about how to schedule your radiation therapy around your work or family schedule. For example, you might want to have radiation therapy in the morning, so you can go to work in the afternoon.

ROA_1862

- **Let others help you.** Check with your insurance company to see whether it covers home care services. You can also ask family members and friends to help when you feel fatigue. Home care staff, family members, and friends can assist with household chores, running errands, or driving you to and from radiation therapy visits. They might also help by cooking meals for you to eat now or freeze for later.



- **Learn from others who have cancer.** People who have cancer can help each other by sharing ways to manage fatigue. One way to meet other people with cancer is by joining a support group—either in-person or online. Talk with your doctor or nurse to learn more about support groups.

- **Keep track of how you feel each day.** Keeping a record will help you plan how to best use your time. Share your record with your nurse. Let your doctor or nurse know if you notice changes in your energy level, such as whether you have lots of energy or are very tired.

- **Talk with your doctor or nurse.** He or she can suggest treatments for problems that may be causing your fatigue, such as anemia (a problem in which the number of red blood cells is below normal), depression, or trouble sleeping.

ROA_1863

Hair Loss

What it is

Hair loss is when some or all of your hair falls out. With radiation therapy, you will lose hair only on the part of your body being treated. Hair loss is also called alopecia.



Why it occurs

Radiation therapy can cause hair loss because it damages cells that grow quickly, such as those in your hair roots.

Hair loss from radiation therapy happens only on the part of your body being treated. This is not the same as hair loss from chemotherapy, which happens all over your body. For instance, you may lose some or all of the hair on your head when you get radiation to your brain. But if you get radiation to your hip, you may lose the hair between your legs but not the hair on your head.

How long it lasts

You may start losing hair in your treatment area two to three weeks after your first radiation therapy session. It takes about a week for all the hair in your treatment area to fall out. Your hair may grow back three to six months after treatment is over. Sometimes, though, the dose of radiation is so high that your hair never grows back.

Once your hair starts to grow back, it may not look or feel the way it did before. Your hair may be thinner, or curly instead of straight. Or, it may be darker or lighter in color than it was before.

ROA_1864

Ways to manage hair loss on your head

Before hair loss:

- **Decide whether to cut your hair or shave your head.** You may feel more in control of hair loss when you plan ahead. If you do decide to shave your head, use an electric razor to prevent nicking yourself.
- **If you plan to buy a wig, do so while you still have hair.** The best time to select your wig is before radiation therapy begins or soon after it starts. This way, the wig will match the color and style of your own hair. Some people take their wig to their hair stylist. You will want to have your wig fitted once you have lost your hair. Make sure to choose a wig that feels comfortable and does not hurt your scalp.
- **Check with your health insurance company to see whether it will pay for your wig.** If it does not, you may be able to deduct the cost of your wig as a medical expense on your income taxes. Check with your tax preparer. Some groups also sponsor free wig banks. Ask your doctor, nurse, or social worker if he or she can refer you to a free wig bank in your area.
- **Be gentle when you wash your hair.** Use a mild shampoo, such as a baby shampoo. Dry your hair by patting it with a soft towel, instead of rubbing it.
- **Do not use items that can hurt your scalp,** such as:
  - Straightening or curling irons
  - Brush rollers or curlers
  - Electric hair dryers
  - Hair bands and clips
  - Hairsprays
  - Hair dyes
  - Products to perm or relax your hair
- **Do not use products that are harsh on your hair.** Examples of products that can be harsh on your hair include hair colors, perms, gels, mousse, oil, grease, or pomade.

You will lose hair only on the part of your body being treated.

ROA_1865

After hair loss:

- **Protect your scalp.** Your scalp may feel tender after hair loss. Protect it from very cold air and sunburn by covering your head with a hat, turban, or scarf when you are outside.
- **Stay warm.** Your hair helps keep you warm, so you may feel colder once it is gone. Stay warmer and more comfortable by wearing a hat, turban, scarf, or wig.



Ways to Learn More

Contact these organizations for more information about coping with hair loss:

American Cancer Society

Toll-free: 1-800-ACS-2345 (1-800-227-2345)
Phone: 404-320-3333
Online: www.cancer.org

Look Good...Feel Better

Toll-free: 1-800-395-LOOK (1-800-395-5665)
Online: www.lookgoodfeelbetter.org

ROA_1866

Mouth Changes



Radiation to the shaded area may cause mouth changes.

What they are

Radiation therapy to the head or neck can cause mouth problems, such as:

- Mouth sores that are like little cuts or ulcers in your mouth
- Dry mouth (also called xerostomia) and throat
- Loss of taste
- Tooth decay
- Changes in taste, such as a metallic taste when you eat meat
- Infections of your gums, teeth, or tongue
- Jaw stiffness and bone changes
- Thick, rope-like saliva

Why they occur

Radiation therapy kills cancer cells and can also damage healthy cells such as those in the glands that make saliva and in the soft, moist lining of your mouth.

How long they last

Some problems, like mouth sores, may go away after treatment ends. Others, such as taste changes, may last for months or even years. Some problems, such as dry mouth, may improve, but never go away.

ROA_1867

Ways to manage

- **Visit a dentist.** Your mouth needs to be as healthy as possible before radiation therapy to the head and neck. So, it is important that you see a dentist several weeks before beginning treatment. Be sure to tell your dentist that you have cancer and that you will be having radiation therapy.

  The dentist will examine your teeth and mouth and do any needed dental work. If you do have dental work, you will need to heal before beginning radiation therapy.

- **Check your mouth every day.** This way, you can see or feel problems as soon as they start. Problems to look out for include mouth sores, white patches, or infection.

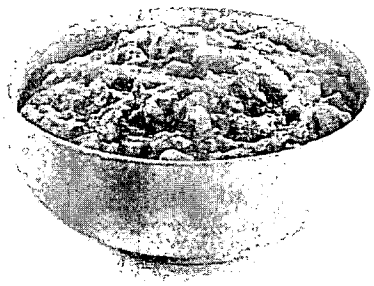
- **Keep your mouth moist.** Here are tips to help you:
  - Sip water often during the day.
  - Suck on ice chips.
  - Chew sugar-free gum.
  - Suck on sugar-free hard candy.
  - Use a saliva substitute.
  - Ask your doctor if medicine that helps increase saliva will help you.

- **Clean your mouth, teeth, gums, and tongue.**
  - Brush your teeth, gums, and tongue after every meal and at bedtime.
  - Use an extra-soft toothbrush. Make the bristles softer by running warm water over them just before you brush.
  - Use fluoride toothpaste.
  - Use a special fluoride gel that your dentist can prescribe.
  - Do not use mouthwashes that contain alcohol.
  - Gently floss your teeth every day. If your gums bleed or hurt, avoid those areas, but floss your other teeth.
  - Rinse your mouth every couple of hours with a salt water solution. There are many recipes for such a solution, but an example is to mix 1/4 teaspoon baking soda and 1/4 teaspoon salt with 1 quart (4 cups) of warm water.
  - If you have dentures, make sure they fit well and limit how long you wear them each day. If you lose weight, your dentist may need to adjust them.
  - Keep your dentures clean by soaking or brushing them each day.



ROA_1868

- **Be careful what you eat when your mouth is sore.**
  - Choose foods that are easy to chew and swallow.
  - Take small bites, chew slowly, and sip liquids with your meals.
  - Eat soft, moist foods, such as cooked cereals, mashed potatoes, and scrambled eggs.
  - Soften food by mixing it with gravy, sauce, broth, yogurt, or other liquids.
  - Eat foods that are warm or at room temperature.

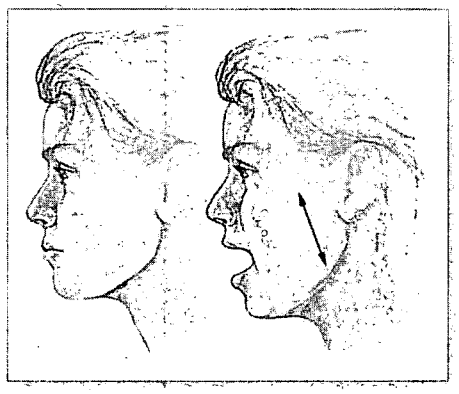


- **Avoid things that can hurt, scrape, or burn your mouth, such as:**
  - Sharp, crunchy foods, such as potato or corn chips
  - Hot foods
  - Spicy foods, such as hot sauce, curry dishes, salsa, and chili
  - Fruits and juices that are high in acid, such as tomatoes, oranges, lemons, and grapefruit
  - Toothpicks or other sharp objects
  - All tobacco products, including cigarettes, pipes, cigars, and chewing tobacco
  - Drinks that contain alcohol
- **Avoid foods and drinks that are high in sugar.** Foods and drinks that have a lot of sugar, such as regular soda, gum, and candy, can cause tooth decay.

Visit a dentist at least two weeks before starting radiation therapy to your head or neck.

ROA_1869

- **Exercise your jaw muscles.** Open and close your mouth 20 times as far as you can without causing pain. Do this exercise three times a day, even if your jaw isn't stiff.
- **Call your doctor or nurse when your mouth hurts.** There are medicines and other products, such as mouth gels, that can help control mouth pain.
- **You will need to take good care of your mouth for the rest of your life.** Ask your dentist how often you will need dental check-ups and how best to care for your teeth and mouth after you finish radiation therapy.



Exercise your jaw 3 times a day.

Ways to Learn More

Contact this organization for more information about coping with mouth problems:

National Institute of Dental and Craniofacial Research

Toll-free: 1-866-232-4528

Online: www.nidcr.nih.gov/OralHealth/Topics/CancerTreatment

For help quitting smoking, contact:

Smokefree.gov

Toll-free: 1-877-44U-QUIT (1-877-448-7848)

Online: www.smokefree.gov

Do not use tobacco or drink alcohol while you are getting radiation therapy to your head or neck.

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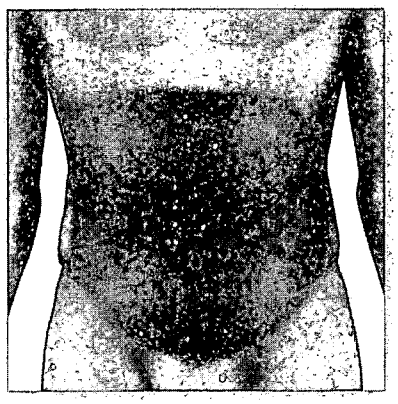
ROA_1870

Nausea and Vomiting

What they are

Radiation therapy can cause nausea, vomiting, or both.

Nausea is when you feel sick to your stomach and feel like you are going to throw up. Vomiting is when you throw up food and fluids. You may also have dry heaves, which happen when your body tries to vomit even though your stomach is empty.



Radiation to the shaded area may cause nausea and vomiting.

Why they occur

Nausea and vomiting can occur after radiation therapy to the stomach, small intestine, colon, or parts of the brain. Your risk for nausea and vomiting depends on how much radiation you are getting, how much of your body is in the treatment area, and whether you are also having chemotherapy.

How long they last

Nausea and vomiting may occur 30 minutes to many hours after your radiation therapy session. You are likely to feel better on days that you do not have radiation therapy.

Ways to manage

- **Prevent nausea.** The best way to keep from vomiting is to prevent nausea. One way to do this is by eating and drinking bland, easy-to-digest foods and drinks that do not upset your stomach. These include toast, gelatin, and apple juice. To learn more, see the list of foods and drinks that are easy on the stomach on page 54.

Eat five or six small meals and snacks each day instead of three large meals.

ROA_1871

- **Try to relax before treatment.** You may feel less nausea if you relax before each radiation therapy treatment. You can help yourself relax by spending time doing quiet activities you enjoy, such as reading a book or listening to music. For relaxation exercises:
  - Visit *Learning to Relax* on the National Cancer Institute's website at: www.cancer.gov/about-cancer/coping/feelings/relaxation
  - See *Facing Forward: Life After Cancer Treatment* at: www.cancer.gov/publications/patient-education/facing-forward



- **Plan when to eat and drink.** Some people feel better when they eat before getting radiation therapy, and others do not. Learn the best time for you to eat and drink. Try a light snack, such as crackers and apple juice one to two hours before radiation therapy. Or, you might feel better if you have treatment on an empty stomach, which means not eating two to three hours before treatment.
- **Eat small meals and snacks.** Many people find that they eat better if they eat five or six small meals and snacks each day, rather than three large meals. Make sure to eat slowly and do not rush.
- **Have foods and drinks that are at room temperature (not too hot and not too cold).** Before eating or drinking, give hot food and drinks a chance to cool down. Warm cold food and drinks in the microwave for a short time.
- **Talk with your doctor or nurse.** He or she may suggest a special diet or prescribe medicine to help prevent nausea. You might also ask your doctor or nurse about acupuncture, which may help relieve nausea and vomiting caused by cancer treatment. Acupuncture is a type of complementary and alternative medicine. It is a technique that involves inserting thin needles through the skin at specific points on the body.

Ways to Learn More

For more information about dealing with nausea and vomiting:

- Visit the *Side Effects* section of the National Cancer Institute's website at: www.cancer.gov/about-cancer/treatment/side-effects
- Read *Eating Hints: Before, During, and After Cancer Treatment* at: www.cancer.gov/publications/patient-education/eating-hints

ROA_1872

Sexual and Fertility Changes

What they are

Radiation therapy sometimes causes sexual changes, which can include hormone changes and loss of interest in or ability to have sex. It can also affect fertility, both while you are getting treatment and after it ends. Sexual and fertility changes are different for men and women.

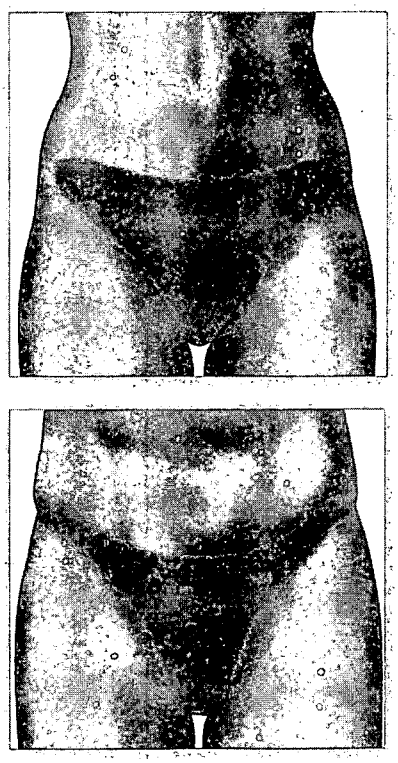
Be sure to tell your doctor if you are pregnant before you start radiation therapy.

Problems for women include:

- Pain or discomfort when having sex
- Vaginal itching, burning, dryness, or atrophy (when the muscles in the vagina become weak and the walls of the vagina become thin)
- Vaginal stenosis, when the vagina becomes less elastic, narrows, and gets shorter
- Symptoms of menopause for women not yet in menopause, such as hot flashes, vaginal dryness, and not having your period
- Loss of fertility, which means never being able to get pregnant

Problems for men include:

- Impotence, which means not being able to have or keep an erection. This problem is also called erectile dysfunction, or ED.
- Loss of fertility, which means never being able to father a child, due to having fewer or less effective sperm.



Radiation to the shaded area may cause sexual and fertility changes.

ROA_1873

Why they occur

Sexual and fertility changes can happen when people have radiation therapy to the pelvic area. For women, this includes radiation to the vagina, uterus, or ovaries. For men, this includes radiation to the testicles or prostate. Scar tissue from radiation therapy causes many sexual side effects. Other problems, such as fatigue, pain, anxiety, or depression, can affect your interest in having sex.

How long they last

After radiation therapy is over, most people want to have sex as much as they did before treatment. Many sexual side effects go away after treatment ends. But you may have problems with hormone changes and fertility for the rest of your life. If you do conceive a child after you have finished radiation therapy, the fact that you had this treatment should not affect the health of the baby.

Ways to manage

For both men and women, it is important to be open and honest with your spouse or partner about your feelings and concerns, and how you prefer to be intimate while you are having radiation therapy.

For women, issues to discuss with your doctor or nurse include:

- **Fertility.** Before radiation therapy starts, let your doctor or nurse know if you think you might want to get pregnant after your treatment ends. He or she can talk with you about ways to preserve your fertility, such as saving your eggs to use in the future.
- **Sexual problems.** You may or may not have sexual problems. Your doctor or nurse can tell you about side effects you can expect and suggest ways for coping with them.
- **Birth control.** It is very important that you do not get pregnant while having radiation therapy. Radiation therapy can hurt the fetus at all stages of pregnancy. If you have not yet gone through menopause, talk with your doctor or nurse about birth control and ways to keep from getting pregnant.
- **Pregnancy.** Make sure to tell your doctor or nurse if you are already pregnant.



ROA_1874

- **Stretching your vagina.** Vaginal stenosis is a common problem for women who have radiation therapy to the pelvis. This problem can make it painful to have sex. You can help by stretching your vagina using a dilator, which is a device that gently stretches the tissues of the vagina. Ask your doctor or nurse where to find a dilator and how to use it.

- **Lubrication.** Use a special lotion for your vagina, such as Replens®, once a day to keep it moist. When you have sex, use a water- or mineral oil-based lubricant, such as K-Y Jelly® or Astroglide®.

- **Sex.** Ask your doctor or nurse whether it is okay for you to have sex during radiation therapy. Most women can have sex, but it is a good idea to ask and be sure. If sex is painful due to vaginal dryness, you can use a water- or mineral oil-based lubricant.

Talk with your doctor or nurse if you want to have children in the future.

ROA_1875

For men, issues to discuss with your doctor or nurse include:

- **Fertility.** Before you start radiation therapy, let your doctor or nurse know if you think you might want to father children in the future. He or she will talk with you about options, such as banking your sperm. Your sperm will need to be collected before you begin radiation therapy.
- **Impotence.** Your doctor or nurse can let you know whether you are likely to become impotent and how long it might last. Your doctor can prescribe medicine or other treatments that may help.
- **Sex.** Ask if it is okay for you to have sex during radiation therapy. Most men can have sex, but it is a good idea to ask and be sure.



If you want to father children in the future, your sperm will need to be collected before you begin treatment.

Ways to Learn More

For more information about sexual and fertility problems, contact:

American Cancer Society

Toll-free: 1-800-ACS-2345 (1-800-227-2345)
Online: www.cancer.org

LIVESTRONG Fertility

Toll-free: 1-888-994-HOPE (1-888-994-4673)
Online: www.livestrong.org/we-can-help/fertility-services

CON282

ROA_1876

Skin Changes

What they are

Radiation therapy can cause skin changes in your treatment area. Here are some common skin changes:

- **Redness.** Your skin in the treatment area may look as if you have a mild to severe sunburn or tan.
- **Severe itching.** The skin in your treatment area may itch very badly. It is important to avoid scratching, which can cause skin breakdown and infection. Skin breakdown is a problem that happens when the skin in the treatment area peels off faster than it can grow back.
- **Dry and peeling skin.** The skin in your treatment area can get very dry. It may get so dry that it starts to peel, as if you have had a bad sunburn. If it peels off faster than it can grow back, you may develop sores or ulcers.
- **Moist reaction.** The skin in your treatment area can become wet, sore, and infected. This problem is more common where you have skin folds, such as your buttocks, behind your ears, and under your breasts. It may also occur where your skin is very thin, such as your neck.
- **Swollen skin.** The skin in your treatment area may be swollen and puffy.

Why they occur

Radiation kills healthy skin cells in the treatment area. When people get radiation therapy almost every day, their skin cells do not have enough time to grow back between treatments. Skin changes can happen anywhere on the body that gets radiation.

How long they last

Skin changes may start a few weeks after you begin radiation therapy. Many of these changes go away a few weeks after treatment is over. But even after radiation therapy ends, some skin changes may remain. Skin in the treatment area may always look darker and blotchy. It may feel very dry or thicker than before. And you will always burn quickly and be sensitive to the sun.

ROA_1877

Ways to manage

- **Skin care.** Take extra good care of your skin during radiation therapy. Be gentle and do not rub, scrub, or scratch in the treatment area. Use creams that your doctor or nurse suggests.
- **Do not put anything on your skin that is very hot or cold.** Do not use heating pads, ice packs, or other hot or cold items on the treatment area.
- **Be gentle when you shower or take a bath.** You can take a lukewarm shower every day. If you prefer to take a lukewarm bath, do so only every other day and don't soak for too long. Whether you take a shower or bath, make sure to use a mild soap. Dry yourself with a soft towel by patting, not rubbing, your skin. Be careful not to wash off the ink markings that you need for radiation therapy.



- **Use only those lotions and skin products that your doctor or nurse suggests.** If you are using a prescribed cream for a skin problem or acne, tell your doctor or nurse before you begin radiation treatment. Check with your doctor or nurse before using any of the following skin products:

  - Bubble bath
  - Cornstarch
  - Cream
  - Deodorant
  - Hair removers
  - Makeup
  - Oil
  - Ointment
  - Perfume
  - Powder
  - Soap
  - Sunscreen

- **Cool, humid places.** Your skin may feel much better when you are in cool, humid places. You can make rooms more humid by putting a bowl of water on the radiator or using a humidifier. If you use a humidifier, be sure to follow the directions about cleaning it to prevent bacteria.
- **Soft fabrics.** Wear clothes and use bed sheets that are made of very soft fabrics.
- **Do not wear clothes in your treatment area that are tight and do not breathe,** such as girdles, body shapers, and pantyhose.

Take extra good care of your skin during radiation therapy.
Be gentle and do not rub, scrub, or scratch.

ROA_1878

- **Protect your skin from the sun every day.** The sun can burn you even on cloudy days or when you are outside for just a few minutes. Do not go to the beach or sunbathe. Wear a broad-brimmed hat, long-sleeved shirt, and long pants when you are outside. Talk with your doctor or nurse about sunscreen lotions. He or she may suggest that you use a sunscreen with an SPF of 30 or higher. You will need to protect your skin from the sun, even after radiation therapy is over.

- **Do not use tanning beds.** Tanning beds expose you to the same harmful effects as the sun.

- **Adhesive tape.** Do not put adhesive bandages or other types of sticky tape on your skin in the treatment area. Talk with your doctor or nurse about ways to bandage without tape.

- **Shaving.** Ask your doctor or nurse if you can shave the treatment area. If you can shave, use an electric razor, but do not use a pre-shave liquid.

- **Rectal area.** If you have radiation therapy to the rectal area, you are likely to have skin problems. These problems are often worse after a bowel movement. Clean yourself with a baby wipe or squirt of water from a spray bottle. Ask your nurse if sitz baths might help you. Sitz baths are warm-water baths taken in a sitting position that covers only the hips and buttocks.

- **Talk with your doctor or nurse.** Some skin changes can be very serious. Your treatment team will check for skin changes each time you have radiation therapy. Make sure to report any skin changes that you notice.

- **Medicine.** Medicines can help with some skin changes. These include lotions for dry or itchy skin, antibiotics to treat infection, and drugs to reduce swelling or itching.

Be careful not to wash off the ink markings you need for radiation therapy.

ROA_1879

Throat Changes

What they are

Radiation therapy to the neck or chest can cause the lining of your throat to become swollen and sore. This problem is called esophagitis. You may feel as if you have a lump in your throat or burning in your chest or throat. You may also have trouble swallowing.



Radiation to the shaded area may cause throat changes.

Why they occur

Radiation therapy to the neck or chest can cause throat changes because it not only kills cancer cells but also can damage the healthy cells that line your throat. Your risk for throat changes depends on how much radiation you are getting, whether you are also having chemotherapy, and whether you use tobacco and alcohol while you are getting radiation therapy.

How long they last

You may notice throat changes two to three weeks after starting radiation. You will most likely feel better four to six weeks after you have finished radiation therapy.

Let your doctor or nurse know if you:

- Have trouble swallowing
- Feel as if you are choking
- Cough while you are eating or drinking

Ways to manage

- **Be careful what you eat when your throat is sore.**
  - Choose foods that are easy to swallow.
  - Cut, blend, or shred foods to make them easier to eat.
  - Eat moist, soft foods such as cooked cereals, mashed potatoes, and scrambled eggs.
  - Wet and soften food with gravy, sauce, broth, yogurt, or other liquids.
  - Drink cool drinks.
  - Sip drinks through a straw.
  - Eat foods that are cool or at room temperature.

ROA_1880

- **Eat small meals and snacks.** It may be easier to eat a small amount of food at one time. Instead of eating three large meals each day, eat five or six small meals and snacks.
- **Choose foods and drinks that are high in calories and protein.** When it hurts to swallow, you may eat less and lose weight. It is important to maintain your weight during radiation therapy. Having foods and drinks that are high in calories and protein can help you. See the chart on page 53 for ideas.
- **Sit upright and bend your head slightly forward when you are eating or drinking.** Remain sitting or standing upright for at least 30 minutes after eating.
- **Avoid things that can burn or scrape your throat,** such as:
  - Hot foods and drinks
  - Spicy foods
  - Foods and juices that are high in acid, such as tomatoes and oranges
  - Sharp, crunchy foods, such as potato or corn chips
  - All tobacco products, such as cigarettes, pipes, cigars, and chewing tobacco
  - Drinks that contain alcohol
- **Talk with a dietitian.** He or she can help make sure you eat enough to maintain your weight.
- **Talk with your doctor or nurse.** Let your doctor or nurse know if you notice throat changes, such as trouble swallowing, feeling as if you are choking, or coughing while eating or drinking. Also, let him or her know if you have throat pain or lose weight. Your doctor can prescribe medicines that may help relieve your symptoms, such as antacids, gels that coat your throat, and painkillers.

Ways to Learn More

To learn more about throat changes, read:

- *Eating Hints: Before, During, and After Cancer Treatment* at: www.cancer.gov/publications/patient-education/eating-hints
- *Pain Control: Support for People With Cancer* at: www.cancer.gov/publications/patient-education/pain-control

For help quitting smoking, contact:

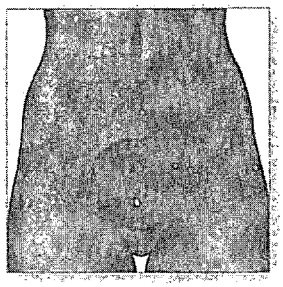
Smokefree.gov

Toll-free: 1-877-44U-QUIT (1-877-448-7848)
Online: www.smokefree.gov

ROA_1881

Urinary and Bladder Changes

What they are



Radiation to the shaded area may cause urinary and bladder changes.

Radiation therapy can cause urinary and bladder problems, which can include:

- Burning or pain when you begin to urinate or after you urinate (empty your bladder)
- Trouble starting to urinate
- Trouble emptying your bladder completely
- Frequent, urgent need to urinate
- Cystitis, a swelling (inflammation) in your urinary tract
- Incontinence, when you cannot control the flow of urine from your bladder, especially when coughing or sneezing
- Waking frequently to urinate
- Blood in your urine
- Bladder spasms, which are like painful muscle cramps

Why they occur

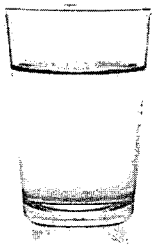
Urinary and bladder problems may occur when you have radiation therapy to the prostate or bladder. Radiation therapy can harm the healthy cells of the bladder wall and urinary tract, which can cause swelling, ulcers, and infection.

How long they last

Urinary and bladder problems often start three to five weeks after radiation therapy begins. Most problems go away two to eight weeks after treatment is over.

ROA_1882

Ways to manage



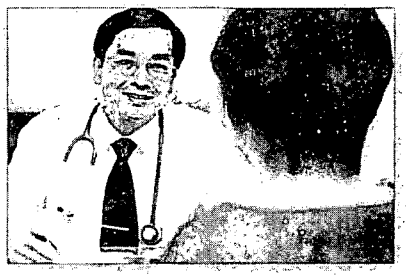
- **Drink lots of fluids.** Drink six to eight cups of fluids each day, enough so that your urine is clear to light yellow in color.
- **Avoid coffee, black tea, alcohol, spices, and all tobacco products.**
- **Talk with your doctor or nurse if you think you have urinary or bladder problems.** You may need to provide a urine sample to check whether you have an infection.
- **Talk with your doctor or nurse if you have incontinence.** He or she may refer you to a physical therapist who will assess your problem. The therapist can give you exercises to improve bladder control.
- **Medicine.** Your doctor may prescribe antibiotics if your problems are caused by an infection. Other medicines can help you urinate, reduce burning or pain, and ease bladder spasms.

Drink six to eight cups of fluids each day.

ROA_1883

Late Effects

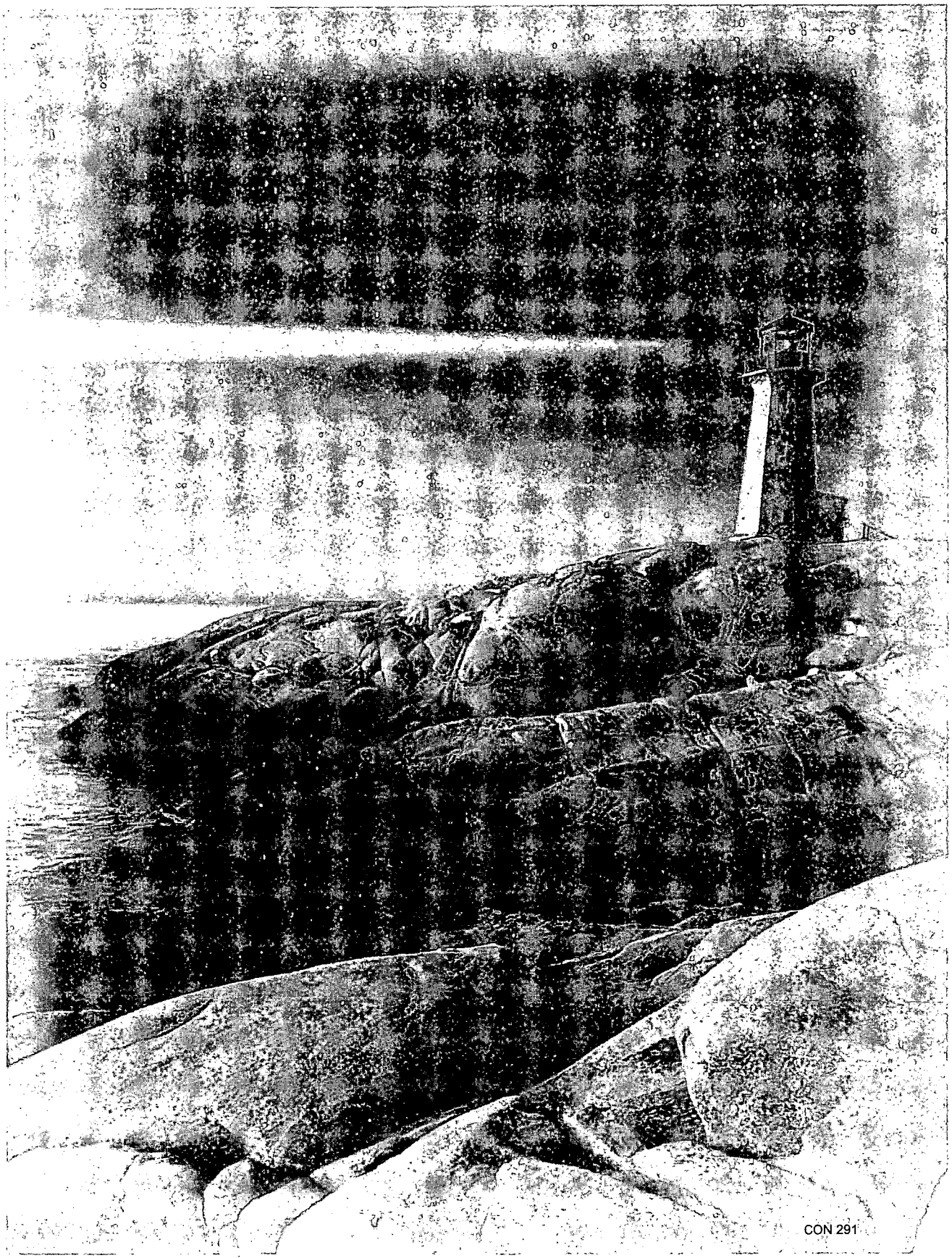
Radiation therapy can also cause health problems that may not show up for months or years after treatment has ended. Late effects are specific to the part of your body that was treated and the doses of radiation you received. Your doctor should talk with you about late effects when you discuss your follow-up care.



For more information about late effects and ways to manage them, see the *Late Effects* section of the National Cancer Institute's website at www.cancer.gov/about-cancer/coping/survivorship/late-effects.

CON290

ROA_1884


CON 291

Questions to Ask Your Doctor or Nurse

Here are some questions for you to ask your doctor or nurse. You may want to write down their answers so you can review them again later.

About Radiation Therapy

Why do I need radiation therapy?

What kind of radiation therapy will I receive?

How can radiation therapy help me?

How many weeks will my course of radiation therapy last?

How can I learn more about radiation therapy?

ROA_1886

About Side Effects

What kinds of side effects should I expect during my course of radiation therapy?

What will you do to help me manage these side effects?

Will these side effects go away after I finish radiation therapy?

What kinds of late side effects should I expect after I finish radiation therapy?

About this Booklet

Which sections in this booklet will be the most helpful to me?

ROA_1887

Lists of Foods and Liquids

Clear Liquids

This list may help if you have diarrhea. See page 22 for more information.

Soups

- Bouillon
- Clear, fat-free broth
- Consommé
- Strained vegetable broth

Drinks

- Apple juice
- Clear carbonated beverages
- Cranberry or grape juice
- Fruit-flavored drinks
- Fruit punch
- Sports drinks
- Tea
- Water

Sweets

- Fruit ices without fruit pieces
- Fruit ices without milk
- Honey
- Jelly
- Plain gelatin dessert
- Ice pops

ROA_1888

Low-Fiber Foods

This list may help if you have diarrhea. See page 22 for more information.

Main Meals

- Chicken and turkey, without the skin
- Cooked refined cereals
- Cottage cheese
- Eggs
- Fish
- Noodles
- Potatoes, baked or mashed without the skin
- White bread
- White rice

Fruits and Vegetables

- Asparagus
- Bananas
- Canned fruits, such as peaches, pears, and applesauce
- Clear fruit juice
- Vegetable juice

Snacks

- Angel food cake
- Gelatin
- Saltine crackers
- Sherbet or sorbet
- Yogurt, plain or vanilla

ROA_1889

Foods and Drinks that Are High in Calories or Protein

This list may help if you need ideas for maintaining your weight. See pages 4 and 43 for more information.

Soups

- Cream soups
- Soups with lentils, dried peas, or beans, such as pinto, black, red, or kidney

Drinks

- Instant breakfast shakes
- Milkshakes
- Smoothies
- Whole milk (instead of low-fat or skim)

Main Meals and Other Foods

- Legumes, such as lentils and pinto, kidney, and black beans
- Butter, margarine, or oil
- Cheese
- Chicken, fish, or beef
- Cottage cheese
- Cream cheese on crackers or celery
- Deviled ham
- Eggs, such as scrambled or deviled eggs
- Muffins
- Nuts, seeds, wheat germ
- Peanut butter

Desserts and Other Sweets

- Custards, soft or baked
- Frozen yogurt
- Ice cream
- Muffins
- Puddings
- Yogurt

Meal Replacements and Other Supplements

- Powdered milk added to foods, such as pudding, milkshakes, or scrambled eggs
- High-protein supplements, such as Ensure® and Carnation® Instant Breakfast®

ROA_1890

Foods and Drinks that Are Easy on the Stomach

This list may help if you have diarrhea or nausea and vomiting. See pages 22 and 34 for more information.

Soups and Drinks

- Clear broth, such as chicken or beef
- Drinks
- Clear carbonated beverages
- Cranberry or grape juice
- Fruit-flavored drinks
- Fruit punch
- Sports drinks
- Tea
- Water

Main Meals and Snacks

- Chicken, broiled or baked without skin
- Crackers
- Cream of Rice®
- Instant oatmeal
- Noodles
- Potatoes, boiled without skin
- Pretzels
- Saltine crackers
- White rice
- White toast

Sweets

- Angel food cake
- Canned fruit, such as applesauce, peaches, and pears
- Gelatin
- Ice pops
- Sherbet or sorbet
- Yogurt, plain or vanilla

ROA_1891



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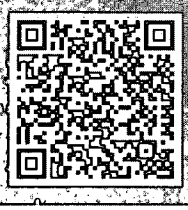
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www.cancer.gov/publications/patient-education

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Full text links

ELSEVIER FULL-TEXT ARTICLE

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Photon and Proton Radiation Therapy Utilization in a Population of More Than 100 Million Commercially Insured Patients.

Waddle MR[1], Sio TT[2], Van Houten HK[3], Foote RL[4], Keole SR[2], Schild SE[2], Laack N[4], Daniels TB[2], Crown W[5], Shah ND[3], Miller RC[6].

Author information

Abstract

PURPOSE: To characterize the changes in the use of radiation therapy (RT), specifically proton beam radiation therapy (PBRT), among adult and pediatric patients over a 11-year period in a very large population of insured patients.

METHODS AND MATERIALS: We conducted a retrospective analysis of the OptumLabs Data Warehouse claims database of more than 100 million insured US enrollees. Descriptive analyses were undertaken to evaluate the characteristics of patients receiving RT from 2002 to 2012.

RESULTS: There were 474,533 patients treated with RT from 2002 to 2012. The percentage of patients treated with 3-dimensional conformal radiation therapy, 2-dimensional RT/brachytherapy, intensity modulated radiation therapy (IMRT), stereotactic body radiation therapy (SBRT), and PBRT was 34.5%, 63.4%, 2.1%, 0.0%, and 0.1% and 40.4%, 36.0%, 21.9%, 1.1%, and 0.6% in 2002 and 2012, respectively. The greatest increase in utilization was of IMRT for prostate cancer, growing from 3.5% to 64.0%. For non-prostate cancer adults, IMRT use grew from 1.7% to 16.4%. For children, PBRT utilization increased from 0.3% to 9.7%. For prostate cancer patients, PBRT increased from 0.0% to 2.6%. For all patients, advanced technology (SBRT and PBRT) use was very low at <2%, versus 22% for IMRT.

CONCLUSIONS: This is the largest and most geographically diverse description of RT utilization. Proton beam RT utilization remains very low and has had little impact on overall RT utilization compared with IMRT. The largest shift has occurred in IMRT for prostate cancer. Our findings indicate that overall utilization of proton therapy has been low and that its use has likely had little impact on national expenditures on cancer care in the current environment.

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Radiation Therapy Basics

Radiation is one of the most common treatments for cancer. Other names for radiation treatment are radiation therapy, radiotherapy, irradiation, or x-ray therapy.

What is radiation therapy?

Radiation therapy uses high-energy particles or waves, such as x-rays, gamma rays, electron beams, or protons, to destroy or damage cancer cells.

Your cells normally grow and divide to form new cells. But cancer cells grow and divide faster than most normal cells. **Radiation works by making small breaks in the DNA inside cells. These breaks keep cancer cells from growing and dividing and cause them to die.** Nearby normal cells can also be affected by radiation, but most recover and go back to working the way they should.

Unlike chemotherapy (/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html), which usually exposes the whole body to cancer-fighting drugs, radiation therapy is usually a local treatment. In most cases, it's aimed at and affects only the part of the body being treated. Radiation treatment is planned to damage cancer cells, with as little harm as possible to nearby healthy cells.

Some radiation treatments (systemic radiation therapy) use radioactive substances that are given in a vein or by mouth. Even though this type of radiation does travel throughout the body, the radioactive substance mostly collects in the area of the tumor, so there's little effect on the rest of the body.

Who gets radiation therapy?

More than half of people with cancer get radiation therapy. Sometimes, radiation therapy is the only cancer treatment needed.

What are the goals of radiation therapy?

Most types of radiation therapy don't reach all parts of the body, which means they're not helpful in treating cancer that has spread to many places within the body. Still, radiation therapy can be used to

treat many types of cancer either alone or in combination with other treatments. Here are some of the reasons radiation therapy may be used:

To cure or shrink early-stage cancer

Some cancers are very sensitive to radiation. Radiation may be used by itself in these cases to make the cancer shrink or completely go away. In some cases, a few cycles of chemotherapy may be given first. For other cancers, radiation may be used before surgery to shrink the tumor (this is called **pre-operative therapy** or **neoadjuvant therapy**), or after surgery (/treatment/treatments-and-side-effects/treatment-types/surgery.html) to help keep the cancer from coming back (called **adjuvant therapy**).

For certain cancers that can be cured either by radiation or by surgery, radiation may be the preferred treatment. This is because radiation can cause less damage and the organ may be more likely to work the way it should after treatment.

For some types of cancer, radiation and chemotherapy might be used together. Certain chemo drugs (called radiosensitizers) help radiation work better by making cancer cells more sensitive to radiation. The drawback of getting chemo and radiation together is that side effects are often worse.

If you'll need more than one kind of cancer treatment, your cancer care team will work with you to plan your treatment.

To stop cancer from coming back (recurring) somewhere else

Cancer can spread from where it started to other body parts. Doctors often assume that a few cancer cells might already have spread even when they can't be seen on imaging scans like CT scans or MRIs. In some cases, the area where the cancer most often spreads to may be treated with radiation to kill any cancer cells before they grow into tumors. For instance, people with certain kinds of lung cancer may get preventive (prophylactic) radiation to the head because their type of lung cancer often spreads to the brain. Sometimes, radiation to prevent future cancer can be given at the same time radiation is given to treat existing cancer, especially if the area the cancer might spread is close to the tumor itself.

To treat symptoms caused by advanced cancer

Sometimes cancer has spread too much to be cured. But some of these tumors can still be treated to make them smaller so that the person can feel better. Radiation might help relieve problems like pain, trouble swallowing or breathing, or bowel blockages that can be caused by advanced cancer (/treatment/understanding-your-diagnosis/advanced-cancer.html). This is often called palliative radiation.

How is radiation therapy given?

Radiation therapy can be given in 3 ways:

- **External radiation (or external beam radiation) (/treatment/treatments-and-side-effects/treatment-types/radiation/external-beam-radiation-therapy.html):** uses a machine that directs high-energy rays from outside the body into the tumor. Most people get external radiation therapy over many weeks. It's done during outpatient visits to a hospital or treatment center.
- **Internal radiation (/treatment/treatments-and-side-effects/treatment-types/radiation/internal-radiation-therapy-brachytherapy.html):** Internal radiation is also called brachytherapy. A radioactive source is put inside the body into or near the tumor.
- **Systemic radiation (/treatment/treatments-and-side-effects/treatment-types/radiation/systemic-radiation-therapy.html):** Radioactive drugs given by mouth or put into a vein are used to treat certain types of cancer. These drugs then travel throughout the body.

The type of radiation you might get depends on the kind of cancer you have and where it is. In some cases, more than one type is used.

Who gives radiation therapy treatments?

During your radiation therapy, a team of highly trained medical professionals will care for you. Your team may include these people:

- **Radiation oncologist:** This doctor is specially trained to treat cancer with radiation. This person oversees your radiation treatment plan.
- **Radiation physicist:** This is the person who makes sure the radiation equipment is working as it should and that it gives you the exact dose prescribed by your radiation oncologist.
- **Dosimetrist:** This person is supervised by the radiation physicist and helps the radiation oncologist plan the treatment.
- **Radiation therapist or radiation therapy technologist:** This person operates the radiation equipment and positions you for each treatment.
- **Radiation therapy nurse:** This nurse has special training in cancer treatment and can give you information about radiation treatment and managing side effects.

You may also need the services of a dietitian, physical therapist, medical or clinical social worker, dentist or dental oncologist, or other health care providers.

Does radiation therapy cause cancer?

It has long been known that radiation therapy can slightly raise the risk of getting another cancer. It's one of the possible side effects of treatment that doctors have to think about when they weigh the benefits and risks of each treatment. For the most part, the risk of a second cancer from these treatments is small and is outweighed by the benefit of treating the cancer, but the risk is not zero. This is one of the many reasons each case is different and each person must be part of deciding which kind of treatment is right for them.

If your cancer care team recommends radiation treatment, it's because they believe that the benefits you'll get from it will outweigh the possible side effects. Still, this is your decision to make. Knowing as much as you can about the possible benefits and risks can help you be sure that radiation therapy is best for you.

Does radiation therapy affect pregnancy or fertility?

Women: It's important not to become pregnant while getting radiation – it can harm the growing baby. If there's a chance you might become pregnant, be sure to talk to your doctor about birth control options.

If you are or might be pregnant, let your doctor know right away.

Men: Not much is known about radiation's effect on the children conceived by men while getting radiation therapy. Because of this, doctors often advise men to not get a woman pregnant during and for some weeks after treatment. Talk to your doctor to find out more about this.

Questions to ask about radiation therapy

Before treatment, you'll be asked to sign a consent form saying that your doctor has explained how radiation therapy may help, the possible risks, the type of radiation to be used, and your other treatment options. Before signing the consent form, be sure that you have had a chance to get all your questions answered. Here are some of the things you may want to ask about:

- What's the purpose of radiation treatment for my type of cancer? To destroy or shrink the tumor? To prevent or stop cancer spread? To lower the chance the cancer may come back?
- If radiation is to be done after surgery, what are the chances it will kill any cancer cells left behind? Could radiation be used instead of surgery?
- What's the chance that the cancer will spread or come back if I do – or don't – get radiation therapy?
- What type of radiation therapy will I get?

- Are there other treatment options?
- What can I do to be ready for treatment?
- What will radiation treatment be like? How often is it given? How long will it take?
- How will the radiation affect the area near the cancer?
- How will I feel while I'm getting treatment? Will I be able to work? Go to school? Take care of my family?
- What side effects am I likely to have, when will they start, and how long will they last?
- Will any of these side effects affect how I do things, such as eat or drink, exercise, work, etc.?
- Will treatment and/or side effects change how I look?
- What long-term side effects might I have?
- Will I be at higher risk for any other health problems in the future?

Will I be radioactive during or after external radiation treatment?

External radiation therapy affects cells in your body only for a moment. Because there's no radiation source in your body, you are not radioactive at any time during or after treatment.

Written by References

The American Cancer Society medical and editorial content team

(/cancer/acs-medical-content-and-news-staff.html)Our team is made up of doctors and master's-prepared nurses with deep knowledge of cancer care as well as journalists, editors, and translators with extensive experience in medical writing.

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Attachment 3

Journal Article Regarding

The Future of Radiation Therapy

VOLUME 28 · NUMBER 35 · DECEMBER 10 2010

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

The Future of Radiation Oncology in the United States From 2010 to 2020: Will Supply Keep Pace With Demand?

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ABSTRACT

Purpose
Prior studies forecasted an incipient shortage of medical oncologists as a result of the aging US population, but the radiation oncology workforce has not been studied. Accordingly, we projected demand for radiation therapy and supply of radiation oncologists in 2010 and 2020 to determine whether a similar shortage may exist for this specialty.

Methods
Demand for radiation therapy in 2010 and 2020 was estimated by multiplying current radiation utilization rates (as calculated with Surveillance, Epidemiology, and End Results data) by population projections from the Census Bureau. Supply of radiation oncologists was projected using data from the American Board of Radiology inclusive of current radiation oncologists and active residents, accounting for variation in full-time equivalent status and expected survival by age and sex.

Results
Between 2010 and 2020, the total number of patients receiving radiation therapy during their initial treatment course is expected to increase by 22%, from 470,000 per year to 575,000 per year. In contrast, assuming that the current graduation rate of 140 residents per year remains constant, the number of full-time equivalent radiation oncologists is expected to increase by only 2%, from 3,943 to 4,022. The size of residency training classes for the years 2014 to 2019 would have to double to 280 residents per year in order for growth in supply of radiation oncologists to equal expected growth in demand.

Conclusion
Demand for radiation therapy is expected to grow 10 times faster than supply between 2010 and 2020. Research is needed to explore strategies to enhance capacity to deliver quality radiation therapy despite increased patient loads.

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INTRODUCTION

The United States is currently in the midst of a defining sociodemographic transformation, with marked increases anticipated in the numbers of older adults and minorities. For example, between 2010 through 2020, the number of adults age 65 years and older is expected to increase from 40 million to 55 million.[1] Similarly, the number of minorities is expected to increase from 109 million to 135 million.[1] Because many cancers occur more commonly in older adults and certain minority groups, ongoing demographic changes are expected to markedly increase the number of cancer diagnoses and, correspondingly, the demand for cancer therapy.[2] Although prior studies have concluded that future demand for cancer therapy will exceed the forecast supply of medical oncologists and gynecologic oncologists to provide cancer care,[3] to our knowledge, no prior studies have sought to project either future demand for radiation therapy or future supply of radiation oncologists. Such information is critical to define policy priorities for the field of radiation oncology to ensure sufficient access to radiation therapy for future patients with cancer.

To address this shortcoming in current knowledge, we first sought to forecast growth in demand for radiation therapy between 2010 through 2020 using currently available population-based data regarding utilization of radiation coupled with population projections from the US Census Bureau. We then sought to estimate growth in supply of radiation oncologists from 2010 through 2020 using data from the American Board of Radiology regarding the current radiation oncology workforce and trainees.

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METHODS

Demand for Radiation Therapy Analysis

In August 2008, the US Census Bureau released updated projections for population growth from 2000 to 2050,[1] which were derived from current data and projections regarding birth rates, death rates, and immigration patterns. The projections reported the forecast for number of individuals from age 0 through 100 years stratified by sex, race, and origin. Race categories are white, black, Asian, Pacific Islander, American Indian/Alaska Native, and multiracial; origin categories are non-Hispanic and Hispanic.

To estimate current use of radiation therapy, we used the population-based Surveillance, Epidemiology, and End Results (SEER) 17 database, which represents approximately 26% of the US population and includes the following regions: Connecticut, New Jersey, Atlanta, rural Georgia, Kentucky, Louisiana, Detroit, Iowa, New Mexico, Utah, Los Angeles, San Francisco-Oakland, San Jose-Monterey, Greater California, Seattle, Alaska Native Tumor Registry, and Hawaii.[4] SEER reports use of radiation therapy during the initial course of treatment for an incident malignancy. It does not report radiation therapy that may occur later in the course of a patient's illness or radiation therapy administered for benign conditions. We used SEER data to estimate age-, sex-, race-, and origin-specific radiotherapy utilization rates for specific cancers for the years 2003 through 2005, and we adjusted these rates for delayed reporting.[2,5]

We projected the total number of patients in the United States who will receive radiation therapy during their initial treatment course in 2010 and 2020 by multiplying the age-, sex-, race-, and origin-specific population projections for 2010 and 2020 by the age-, sex-, race-, and origin-specific radiotherapy utilization rates for the years 2003 through 2005, in accordance with our previously published methods.[2] Total radiotherapy utilization projections were calculated by adding the individual radiotherapy utilization projections for each common cancer site and for all other cancer sites combined. In reporting these results, we used the US Census Bureau definition of minority, which was defined as nonwhite race or Hispanic origin of any race.[1] Projections were modeled using SAS version 9.1.3 (SAS Institute, Cary, NC).

The primary outcome for the demand analysis was the relative increase in the number of patients projected to receive radiation therapy during their initial treatment course in the year 2020 compared with the year 2010. We assumed that the relative increase in use of radiotherapy during the initial treatment course would approximate the relative increase in total use of radiotherapy during this time period.

We conducted a sensitivity analysis to determine how changes in the utilization of radiation therapy and in the incidence of cancer would impact the relative increase in demand for radiation therapy between 2010 and 2020. To estimate appropriate parameters for the sensitivity analysis of radiation therapy utilization, we conducted a historical analysis using SEER data spanning 1990 to 2006 and found that, compared with the years 2003 to 2005, radiotherapy utilization rates generally varied no more than approximately ± 10% during this time period (Fig 1).[4] With regard to the cancer incidence sensitivity analysis, previously published historical data indicated that cancer incidence has both increased and decreased in a statistically significant manner between 1975 and 2006; recently however, cancer incidence has been slowly decreasing at a rate of 0.4% per year from 1997 to 2006, and this rate increases to 0.7% per year if only the years 2002 to 2006 are considered.[6]

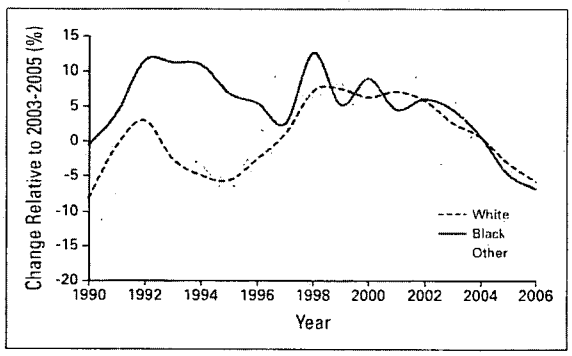


Fig 1. Age-adjusted use of radiation therapy from 1990 to 2006, by race, normalized to 2003 to 2005.

Supply of Radiation Oncologists Analysis

The American Board of Radiology provided data regarding the age and sex of all radiation oncologists who were board certified on January 1, 2010, radiation oncologists who completed their residency in 2009, and radiation oncology residents expected to complete residency in 2010, 2011, 2012, and 2013. Data from prior literature were used to estimate the age- and sex-stratified proportion of radiation oncologists practicing full time, practicing part time, and not practicing radiation oncology (Appendix Table A1, online only).[7] The number of full-time equivalent (FTE) radiation oncologists practicing in the United States on January 1, 2010 was calculated as follows: if x is equal to the number of living radiation oncologists board certified on January 1, 2010 in age group j and sex group k, y is equal to the fraction of radiation oncologists working full time in age group j and sex group k, z is equal to the fraction of radiation oncologists working part time in age group j and sex group k, q is equal to the number of 2009 residency graduates in age group j and sex group k, and 0.95 is the fraction

Table 1. Projected Estimates of Patients Receiving Radiation Therapy in 2010 and 2020

Tumor Site	No. of Patients Receiving Radiation Therapy		% Increase in Demand for Radiation Therapy From 2010 to 2020
	2010	2020	
Total	470,000	575,000	22
Breast (invasive)	103,000	119,000	15
Prostate	91,000	123,000	35
Lung	77,000	96,000	25
Oral cavity and pharynx	21,000	25,000	18
Breast (in situ)	20,000	23,000	15
Colorectum	19,000	23,000	22
Esophagus	19,000	23,000	22
Thyroid	15,000	16,000	10
CNS	12,000	14,000	16
Non-Hodgkin's lymphoma	11,000	13,000	18
Uterus	11,000	13,000	22
Larynx	9,300	12,000	24
Cervix	7,000	8,100	16
Pancreas	6,000	7,500	25
Stomach	5,300	6,800	27
Myeloma	4,700	5,800	25
Bladder	3,200	3,900	24
Hodgkin's lymphoma	3,200	3,300	6
Testis	3,000	3,000	2
Kidney	2,500	3,100	21
Melanoma	1,500	1,800	17
Leukemia	1,400	1,600	11
Liver	920	1,200	26
Ovary	380	440	16
All other sites	24,000	29,000	19

NOTE. Cells have been rounded to two significant digits. Percent increase was calculated with unrounded estimates. The total No. includes all invasive sites (excluding nonmelanoma skin cancers) and in situ breast cancers.

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Table 2. Sensitivity Analysis to Determine How Changes in Model Assumptions Will Impact Percent Increase in Demand for RT

Model	2010			2020			
	No. of Cancers Diagnosed	No. of Patients Receiving Radiation*	% of Patients Receiving Radiation	No. of Cancers Diagnosed	No. of Patients Receiving Radiation*	% of Patients Receiving Radiation	% Increase in Demand for RT From 2010 to 2020
Baseline model	1,598,648	469,820	29	1,956,916	574,593	29	22
Sensitivity analysis 1: change in RT utilization							
RT utilization decreases by 10%	1,598,648	469,820	29	1,956,916	517,134	26	10
RT utilization decreases by 5%	1,598,648	469,820	29	1,956,916	545,863	28	16
RT utilization increases by 5%	1,598,648	469,820	29	1,956,916	603,323	31	28
RT utilization increases by 10%	1,598,648	469,820	29	1,956,916	632,052	32	35
Sensitivity analysis 2: change in cancer incidence							
1% per year decrease	1,518,716	440,428	29	1,663,379	482,380	29	10
0.7% per year decrease	1,542,695	447,382	29	1,751,440	507,918	29	14
0.4% per year decrease	1,566,675	454,336	29	1,839,501	533,455	29	17
0.4% per year increase	1,630,621	472,880	29	2,074,331	601,556	29	27
0.7% per year increase	1,654,601	479,834	29	2,162,392	627,094	29	31
1% per year increase	1,678,580	486,788	29	2,250,453	652,631	29	34

NOTE. Unrounded estimates are reported for transparency. Estimates are not thought to be significant beyond the two significant digits.
Abbreviation: RT, radiation therapy.
* No. of patients receiving radiation during the initial course of cancer therapy.

of radiation oncologists who are board certified,[7] then the number of FTE radiation oncologists is equal to:

$$\sum_{\substack{j=1 \text{ to } 1 \\ k=1 \text{ to } 2}} \frac{x_{jk}}{0.95} \times (y_{jk} + 0.5 \times z_{jk}) + \sum_{\substack{j=1 \text{ to } 4 \\ k=1 \text{ to } 2}} q_{jk} \times (y_{jk} + 0.5 \times z_{jk})$$

Sex was considered because prior data indicated that female radiation oncologists were more likely to work part time than males.[7] Board-certified radiation oncologists older than age 70 years were excluded from the calculation because most were thought to be retired.

Forecasting the number of FTE radiation oncologists in 2020 required several steps. First, we used age-stratified (in 1-year increments) and sex-stratified life-tables from the US Census Bureau[8] to estimate the number of currently board-certified radiation oncologists, 2009 residency graduates, and residents expected to graduate in 2010 to 2013 who will be alive on January 1, 2020. Then, we simulated the age and sex composition and residency class size for the graduating years 2014 through 2019, assuming a similar profile to the residency classes of 2010 through 2013. We again applied life-table calculations to estimate the number of future residents who will be alive on January 1, 2020. The total number of FTE radiation oncologists on January 1, 2020 was calculated using the previously provided equation, with the exception that the future residency graduates were also included in the value q_{jk}. Finally, we conducted sensitivity analyses to determine how varying the class size and sex composition of future residency classes would impact the number of FTEs in 2020.

RESULTS

Demand Analysis

For the years 2003 to 2005, we estimated that 29% of patients with cancer (1.26 million patients of 4.30 million patients with cancer) received radiation therapy during their initial cancer treatment course. From 2010 to 2020, the demand for radiation therapy during the initial treatment course is expected to increase by 22% (from 470,000 patients receiving radiation therapy in 2010 to 575,000 patients receiving radiation therapy in 2020) as a result of the aging and diversification of the US population. The disease sites projected to be most commonly treated with radiation in 2010 and 2020 are invasive breast, prostate, lung, oral cavity and pharynx, in situ breast, colorectum, and esophagus (Table 1). The disease sites projected to have the most rapid relative increase in use of radiation between 2010 and 2020 are prostate (35% increase), stomach (27% increase), liver (26% increase), lung (26% increase), and pancreas (25% increase; Table 1).

Table 3. Current Full-Time Equivalent Radiation Oncologists As of January 1, 2010

Age (years)	No. of Board-Certified Radiation Oncologists		No. of 2009 Residency Graduates		No. of Full-Time Equivalents by Sex		Total No. of Full-Time Equivalents
	Women	Men	Women	Men	Women	Men	
< 35	51	117	32	66	73	188	261
35-44	319	746	13	37	299	817	1,116
45-54	368	1,061	2	6	331	1,071	1,402
55-64	244	827	0	0	192	766	958
≥ 65	65	438	0	0	27	179	206
Total	1,047	3,189	47	109	922	3,021	3,943

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Table 4. Projected Full-Time Equivalent Radiation Oncologists on January 1, 2020

Age (years)	No. of FTEs for Those Board Certified on January 1, 2010		No. of FTEs for 2009-2013 Residency Graduates		No. of Simulated FTEs for 2014-2019 Residency Graduates		Total No. of FTE by Sex		Overall Total No. of FTE
	Women	Men	Women	Men	Women	Men	Women	Men	
< 35	0	0	1	0	90	148	91	148	239
35-44	45	120	165	352	145	373	355	845	1,200
45-54	279	721	35	86	9	21	323	828	1,150
55-64	276	906	1	8	0	2	278	916	1,194
≥ 65	61	178	0	0	0	0	61	178	239
Total	662	1,925	202	446	243	543	1,107	2,914	4,022

NOTE. This table assumes a class size of 140 residents per year. The class of 2013 currently has a size of 141 residents.
Abbreviation: FTE, full-time equivalent.

Between 2010 and 2020, we project that the number of older adults age ≥ 65 years treated with radiation therapy during the initial treatment course will increase by 38% (from 282,000 to 388,000), compared with a 1.7% increase (from 188,000 to 191,000) for individuals younger than age 65 years treated with radiation therapy. The number of minorities treated with radiation therapy is projected to increase by 45% (from 101,000 to 147,000) from 2010 to 2020, compared with a 17% increase for non-Hispanic whites (from 369,000 to 432,000). The increase in radiation use varied substantially by minority group, with a 62% increase projected for Hispanics, 58% increase projected for Asians/Pacific Islanders, 36% increase projected for American Indians/Alaska Natives, and 32% increase projected for blacks.

In a sensitivity analysis (Table 2), we found that the relative increase in demand for radiation therapy between 2010 and 2020 will be only 10% if utilization rates of radiation therapy decrease by 10% between 2010 and 2020. Conversely, the relative increase in demand for radiation therapy will be 35% if utilization rates of radiation therapy increase by 10%. In addition, we found that if cancer incidence continues to decrease by 0.4% per year, the relative increase in demand for radiation therapy between 2010 and 2020 will be only 17%.

Supply Analysis

For currently board-certified radiation oncologists, the mean age is 51 years, and 25% are women. Using data on currently board-certified radiation oncologists and radiation oncologists who completed residency in 2009, we estimated that the number of FTE radiation oncologists practicing in the United States on January 1, 2010 was 3,943 (Table 3).

For the residency classes of 2009 through 2013, the mean class size was 151, with a class size of 141 for the most recent class (graduation in 2013). A total of 35% were women. If the residency class size remains at 140 entrants per year with 35% women, we forecast that the number of FTE radiation oncologists practicing in 2020 will be approximately 4,022, only a 2% increase compared with 2010 (Tables 4 and 5). If residency class size increases to 200 entrants per year, an 11% increase in FTEs is expected, and if class size increases to 280 entrants per year, a 22% increase in FTEs is expected (Table 5). Increasing the fraction of women residents in radiation oncology had minimal impact on these projections (Table 5).

DISCUSSION

We project that between 2010 and 2020, demand for radiation therapy will increase 10 times faster than supply of radiation oncologists. Although it is possible that demand for radiation therapy may increase by less than 22% if cancer incidence or radiation therapy utilization decreases, it is also entirely possible that demand for radiation therapy could increase by 30% or more if indications for radiation therapy expand over the next decade. In contrast, based on current trainee levels, we project only a 2% increase in the number of FTE practicing radiation oncologists between 2010 and 2020. The number of trainees in the residency classes of 2014 through 2019 would have to double, from 140 per year historically to 280 per year, for the growth in supply of radiation oncologists to meet anticipated growth in demand.

Addressing this projected discordance between growth in demand for radiation therapy and growth in supply of radiation oncologists is critically important to ensure that radiation therapy continues to be widely accessible with acceptable wait times for all patients with

Table 5. Sensitivity of Projected Total FTE Radiation Oncologists in 2020 to Variation in Residency Class Size and Sex Composition

Size of Residency Classes in 2014-2019 (No. of residents)	% of Women in Residency Classes in 2014-2019	Projected Total No. of FTE Radiation Oncologists in 2020	% Increase in Supply Compared With 2010
140	35	4,022	2
160	35	4,134	5
180	35	4,259	8
200	35	4,359	11
250	35	4,640	18
280	35	4,820	22
300	35	4,921	25
140	50	4,004	2
160	50	4,114	4
180	50	4,224	7
200	50	4,334	10
250	50	4,609	17
280	50	4,791	22
300	50	4,883	24

Abbreviation: FTE, full-time equivalent.

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cancer. As a first step, several avenues of research need to be pursued. First, it is not currently known to what extent the current supply of radiation oncologists can accommodate increased patient volume. A survey conducted in 2003 indicated that the average radiation oncologist would prefer a 4% increase in their workload,[7] suggesting that at least during that time period, there may have been unused capacity in the current radiation oncology workforce, although it should be noted that with the increased number of physician scientists entering radiation oncology, many recent and future graduates may prefer a lighter clinical workload to enable time for investigative careers.[9] Second, it is not known how modest changes in radiation therapy practice patterns could potentially increase patient throughput without compromising quality of patient care. For example, studies have demonstrated that the radiation therapy treatment course can often be shortened (hypofractionated) in a variety of clinical situations without compromising the therapeutic ratio or ultimate treatment outcome (ie, adjuvant radiation to the whole breast and palliative radiation for bony metastasis).[10,11] Third, it is not known how adoption of newer, time-intensive radiation therapy modalities such as intensity-modulated radiation therapy have increased physician planning time and, consequently, decreased capacity to provide radiation therapy care. Any analysis of the capacity of the future physician supply to accommodate a given patient load should therefore consider the time burdens of newer, more sophisticated technologies. Finally, models of patient care within the radiation therapy clinic that incorporate physician assistants and/or advanced practice registered nurses need to be explored to determine to what extent such midlevel practitioners could enhance supply without compromising quality of care.

At this time, the authors believe that it would be premature to dramatically increase residency class sizes until these research avenues are fully pursued. Nevertheless, it would be important to cautiously explore the potential ability of existing training programs to increase the number of trainees and perhaps consider a conservative, gradual increase in the number of approved residency positions while further research into the radiation oncology workforce is conducted.

Our study also raises important areas for future patient-oriented research in the field of radiation oncology. Although the overwhelming area of growth in demand for radiation therapy will occur among individuals ages 65 years and older, to date, little geriatrics training is integrated into radiation oncology, and radiation therapy for elderly patients is not often perceived as a high-impact area of research. Recently, the American Society of Clinical Oncology, in conjunction with the John A. Hartford Foundation, initiated support for 10 fellowship programs in geriatrics and oncology, which have already resulted in the successful training of 28 geriatric oncologists and the formation of the Cancer and Aging Research Group.[12] A similar initiative in the field of radiation oncology would be beneficial to help develop a body of research focused on the unique considerations required in the radiotherapeutic management of older patients with cancer.[13,14]

The demand projections of our study are based on current utilization of radiation therapy during the initial course of a cancer illness as reported by SEER and do not consider radiation therapy delivered for benign diseases or palliation outside of the first course or potential underreporting of radiation use by SEER.[15] As a result, the absolute number of patients projected to be treated with radiation during their first treatment course in 2010 and 2020 likely underestimates the total number of patients who will be treated with radiation in those years. To account for this, we chose for our primary demand outcome the relative increase in the number of patients receiving radiation therapy during their initial treatment course between 2010 and 2020 and assumed this to be a surrogate for the relative increase in total demand for radiation therapy. Another limitation is the inability to accurately predict how cancer incidence and utilization of radiation therapy will change in the future. Prior workforce studies have assumed a stable incidence of cancer projected into the future.[3] Although more recent studies suggest that cancer incidence may be decreasing by up to 0.7% per year as a result of improvements in screening and risk factor modification, it is unclear whether these decreases are self-limited[16-18] and will subsequently plateau or whether continued gains will be made in the future. A unique strength of our study is the comprehensive data regarding the demographics of current trainees and board-certified radiation oncologists. Because radiation therapy is rarely administered by nonradiation oncologists, our workforce projections should accurately reflect the available workforce in the United States to provide radiation therapy and thereby represent a unique addition to the literature and should be of great assistance in planning the future of the radiation oncology workforce.

In summary, demand for radiation therapy is expected to increase by approximately 22% over the next decade, whereas supply is expected to increase by only 2%. Research is needed to determine to what extent the current supply of radiation oncologists can accommodate this increase in demand and to explore novel strategies to enhance the ability to provide radiation therapy without sacrificing its quality.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

Although all authors completed the disclosure declaration, the following author(s) indicated a financial or other interest that is relevant to the subject matter under consideration in this article. Certain relationships marked with a "U" are those for which no compensation was received; those relationships marked with a "C" were compensated. For a detailed description of the disclosure categories, or for more information about ASCO's conflict of interest policy, please refer to the Author Disclosure Declaration and the Disclosures of Potential Conflicts of Interest section in Information for Contributors.

Employment or Leadership Position: Bruce G. Haffty, American Board of Radiology (U), American Society for Radiation Oncology (U) **Consultant or Advisory Role:** None **Stock Ownership:** None **Honoraria:** None **Research Funding:** Thomas A. Buchholz, Varian Medical Systems **Expert Testimony:** None **Other Remuneration:** None

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Administrative support: Benjamin D. Smith, Bruce G. Haffty
Provision of study materials or patients: Benjamin D. Smith
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Data analysis and interpretation: Benjamin D. Smith, Bruce G. Haffty, Lynn D. Wilson, Grace L. Smith
Manuscript writing: Benjamin D. Smith, Bruce G. Haffty, Lynn D. Wilson, Grace L. Smith, Akshar N. Patel, Thomas A. Buchholz
Final approval of manuscript: Benjamin D. Smith, Bruce G. Haffty, Lynn D. Wilson, Grace L. Smith, Akshar N. Patel, Thomas A. Buchholz

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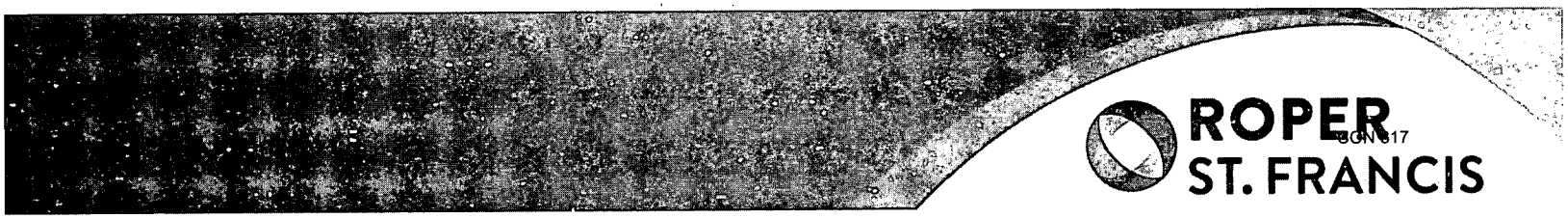
Roper St. Francis Hospital – Berkeley
Certificate of Need Application
To Initiate Radiation Therapy

DHEC Project Review Committee Meeting
September 20, 2017

CON 316

Project Overview

- Initiation of radiation therapy in conjunction with the hospital's planned opening in Fall 2019
- Equipment is a Varian TrueBeam system with IMRT and IGRT capabilities
- $11.6MM estimated project cost
- To be located in an adjacent Medical Office Building (to be constructed)



Project Objectives

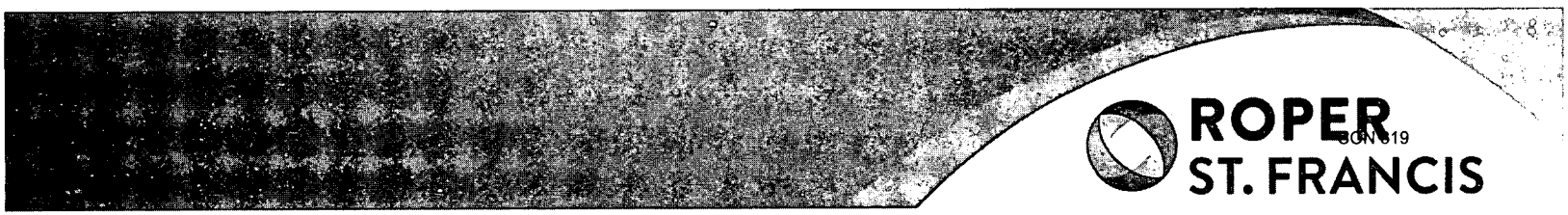
- Establish necessary cancer treatment resources in Berkeley County in response to significant population growth, as currently there is no service provider in Berkeley or Dorchester County

- Enhance access to cancer treatment for Roper St. Francis patients that live in Berkeley and Dorchester Counties

Experience and Accolades

- Radiation therapy is currently offered at both Roper Hospital and St. Francis Hospital

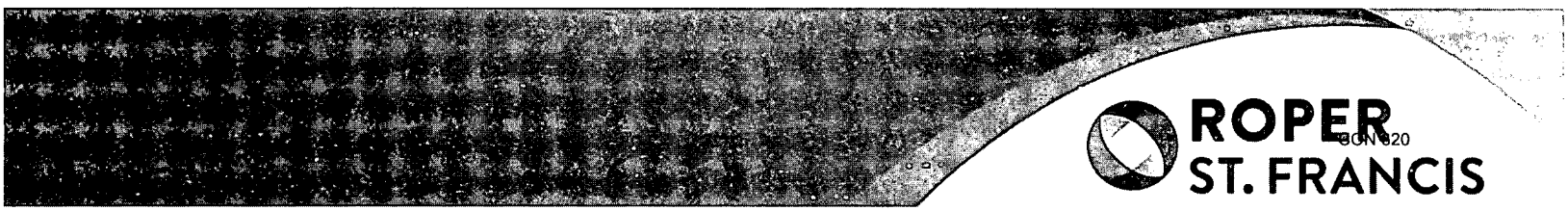
- Roper St. Francis Cancer Center is accredited by both the American College of Surgeons Commission on Cancer and the National Accreditation Program of Breast Centers



Experience and Accolades

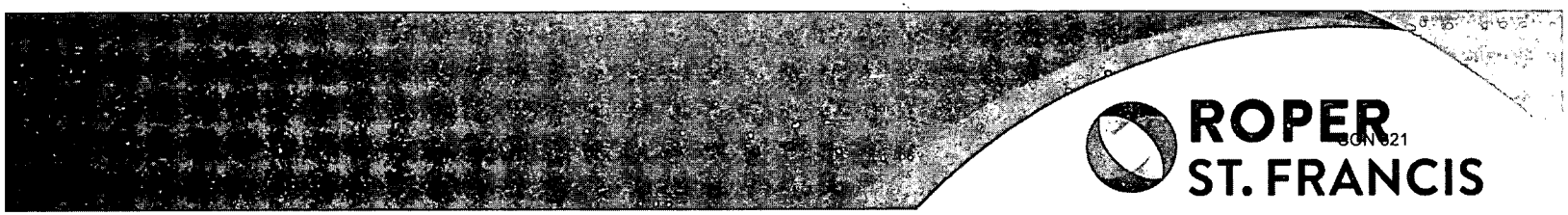
- The Tri-county leader for treatment of breast, colorectal, and prostate cancers in 2016
- Treated more breast and colorectal cancers than all other tri-county centers combined, with 69% of breast cancer patients and 66% of colorectal cancer patients seeking our expertise
- Treated 49% of all prostate cancer and 49% of the tri-county lung cancer patients

Source: South Carolina Community Assessment Network (SCAN) Cancer Incidence Module



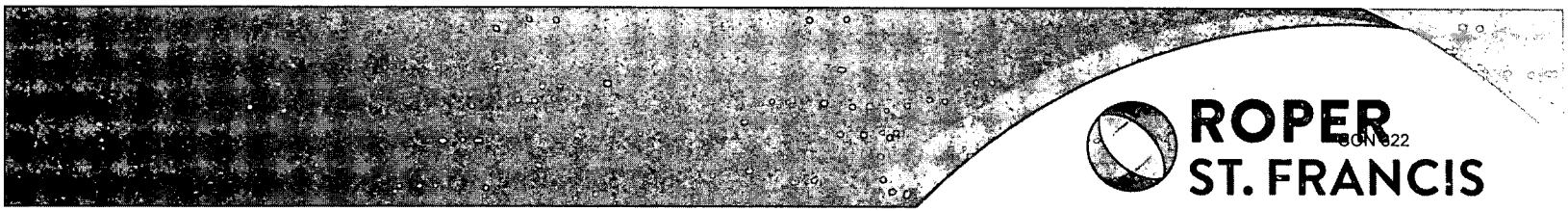
Service Demand Analysis

- Proposed Project is Needed to Increase Access to Current and Historic Service Offerings by RSFH System
- Overview of the Proposed Service Area
- Projected Utilization Methodology
- Project Will Not Unnecessarily Duplicate Existing Entities
- SHP Standards
- RSF Position on Competing Applications



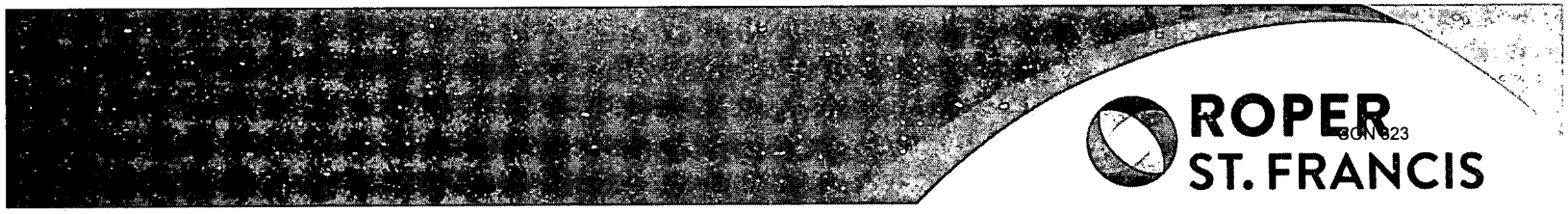
RSF is an Experienced and Highly Utilized Provider of Radiation Therapy Services

- RSFH has a history of relocating and upgrading RT equipment to serve its patient population from the location that will best meet the needs of its patients.
- The units servicing RSFH operated at a combined capacity that exceeded 100 percent for the past two years.
  - Capacity constraints will become an issue without additional capacity to the system
  - St. Francis Hospital utilizes extended hours to meet its demand



Recent History of and Plans for Radiation Therapy Within the System

2012-2013	Roper Hospital operates 3 linear accelerators ("Linacs") and 1 CyberKnife. Two of the 3 Linacs located at Roper Hospital, Inc. One Linac located at the Roper St. Francis Cancer Center located at St. Francis Hospital.
2014	Roper Hospital transfers ownership of the unit operated at the Roper St. Francis Cancer Center to St. Francis Hospital via (E-14-40). Unit is replaced via the same exemption. Roper Hospital continues to operate 2 Linacs and 1 CyberKnife unit.
2015	Roper Hospital owns and operates 2 Linacs and 1 CyberKnife. In June 2015, one Linac is permanently taken out of service due to end of life issues. After which, Roper Hospital operates 1 Linac and one CyberKnife. St. Francis Hospital owns and operates 1 Linac.
2016	In April 2016, Roper transfers its Linac that was decommissioned at Roper Hospital in June 2015 to St. Francis Hospital and St. Francis Hospital simultaneously replaces the unit (via E-14-40). Roper Hospital operates 1 Linac and 1 CyberKnife throughout 2016. St. Francis Hospital operates 1 Linac until April 11, 2016 when the second unit comes online.
2017	Roper Hospital operates one Linac and one CyberKnife. St. Francis Hospital operates two Linacs. St. Francis Hospital issued a CON to add SRS/SBRT capability to one existing Linacs in July of 2017 whereby SRS/SBRT will be transitioned from the CyberKnife at Roper Hospital to the SRS/SBRT capable unit at St. Francis.
2018-2019	It is anticipated by the end of 2019, Roper Hospital will operate one Linac and St. Francis will operate 2 Linacs including SRS/SBRT capability.



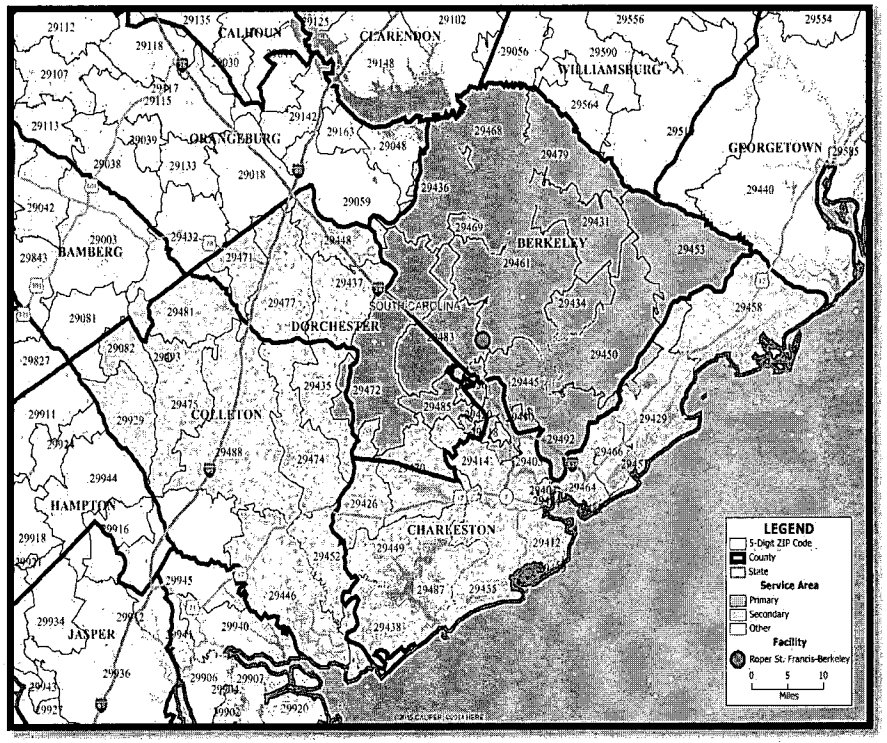
Recent History of and Plans for Radiation Therapy Within the System

	Roper Hospital		St. Francis Hospital	Total RSFH
	CK	Linac	Linac	Units
2012	1	3	-	4
2013	1	3	-	4
2014	1	2	1	4
2015	1	1	2	4
2016	1	1	2	4
2017	1	1	2	4
2019*	0	1	2	3

*Given CON Approval of Application No. 2411

Proposed Service Area for Radiation Therapy at RSFH - Berkeley

Primary Service Area
Berkeley County - All ZIP Codes
Dorchester County- 29420, 29472, 29483, 29485, 29456
Charleston County – 29406, 29410, 29418, 29420, 29456
Secondary Service Area
Remainder of Charleston County
Remainder of Dorchester County
Colleton County



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CON 625

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The Service Area is Growing Rapidly, Particularly Among the 65+ Population

Service Area Population Growth by County

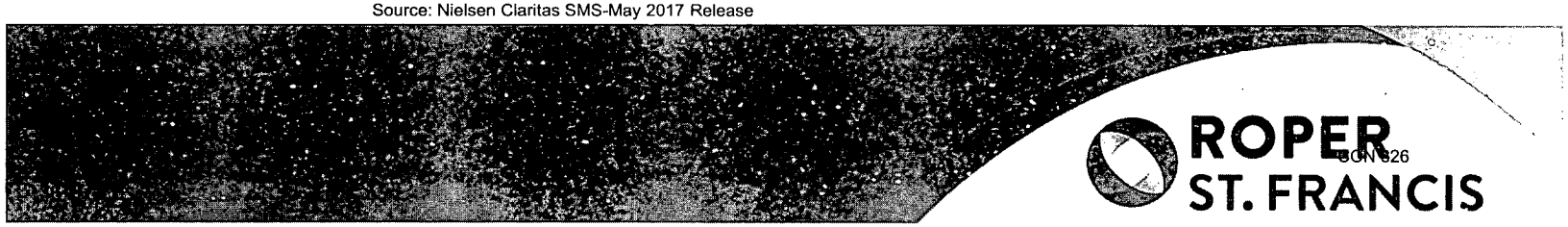
	July 1, 2015 Projection	July 1, 2020 Projection	% Change 2015-2020	July 1, 2025 Projection	% Change 2020-2025
Berkeley	187,800	197,700	5.3%	208,400	5.4%
Charleston	360,600	370,900	2.9%	383,800	3.5%
Colleton	39,000	39,200	0.5%	39,300	0.3%
Dorchester	152,000	167,400	10.1%	178,800	6.8%
Service Area	739,400	775,200	4.8%	810,300	4.5%
South Carolina	4,823,200	5,020,800	4.1%	5,235,500	4.3%

Source: U.S. Census Bureau, S.C. Department of Health and Environmental Control, and S.C. Budget and Control Board - Office of Research & Statistics

Service Area Population Growth by Age 2017-2022

County	0-17	18-44	45-64	65+	Total
Berkeley	7.09%	5.58%	6.28%	27.02%	9.00%
Charleston	10.82%	3.83%	3.55%	24.53%	8.44%
Colleton	-2.23%	1.55%	-7.66%	12.83%	0.40%
Dorchester	3.32%	7.05%	6.47%	28.69%	8.76%
Total	7.54%	4.80%	4.29%	25.10%	8.27%

Source: Nielsen Claritas SMS-May 2017 Release



35 Percent of 2016 Patients Originated from the Primary Service Area for this Project

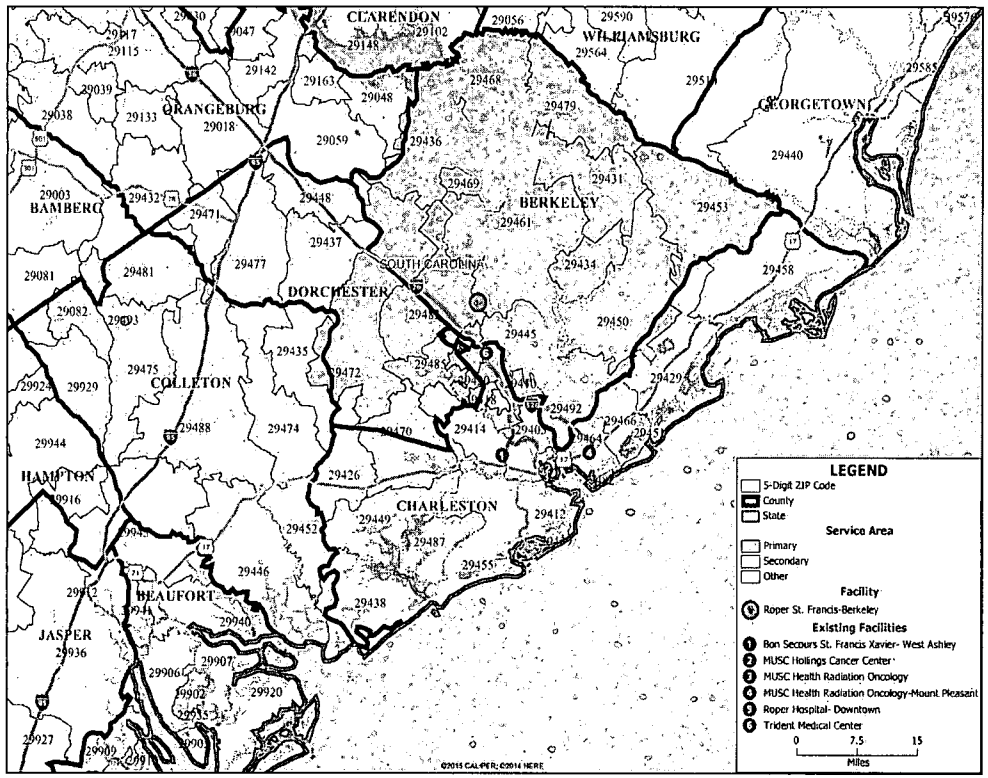
County	ZIP	RSFH Radiation Therapy Patients	% of Total RSF Patients
Berkeley	All	159	17.7%
Charleston	29406	28	
	29418	28	
	Total	56	6.3%
Dorchester	29420	15	
	29472	13	
	29483	32	
	29485	35	
	Total	95	10.6%
Total Primary Service Area		330	
RSF Total Patients - 2016		896	
Primary Service Area Percentage of Total		330	34.6%

Source: Internal Data

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SCN 827

Existing Providers of Radiation Therapy in the Service Area



Existing providers are largely clustered downtown

All existing providers in the SHP identified planning area are located in Charleston County

ROPER ST. FRANCIS

SCN 828

ROA_1922

Overview of Current Capacity and Utilization

Facility	Units	Capacity	Total Capacity
Roper Hospital (Cyberknife)	1	1,000	1,000
Roper Hospital	1	5,000	5,000
St. Francis Hospital	2	5,000	10,000
MUSC	3	5,000	15,000
MUSC	2	4,500	9,000
Trident Medical Center	1	7,000	7,000
Trident Medical Center	1	5,000	5,000
Trident Medical Center	1	4,500	4,500
Total	12		56,500

Source: 2017-2018 SC Health Plan, Internal Data, MUSC Application for Matter No. 2449

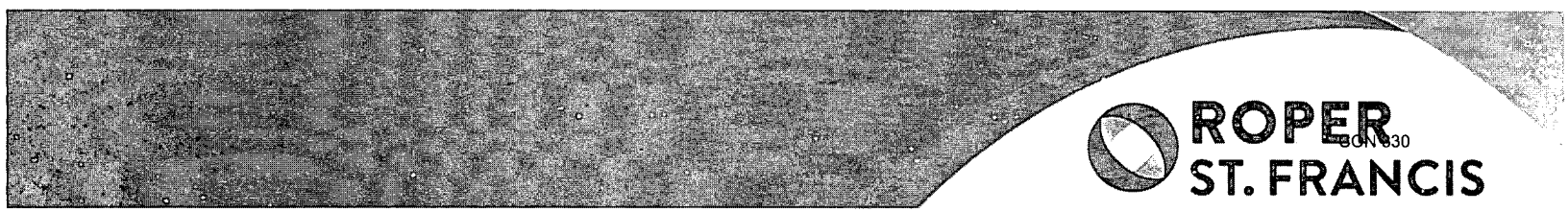
	2015 Capacity	2015 Treatments	2015 % Capacity	2016 Capacity	2016 Treatments	2016 % Capacity
Roper Hospital*	8,500	7,366	87%	6,000	5,915	99%
St. Francis Hospital**	5,000	7,328	147%	10,000	10,191	102%
RSH Total	13,500	14,694	109%	16,000	16,106	101%
MUSC	24,000	19,823	83%	24,000	19,221	80%
Trident	16,500	12,493	76%	16,500	10,422	63%
Total Service Area***	54,000	47,010	87%	56,500	45,749	81%

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SCDHEC 829

Berkeley and Dorchester Counties are the Most Populous Two Counties Without a Linear Accelerator

	County	July 1, 2016 Estimates	Total Linear Accelerators in County	Linacs per 10,000 Pop
1	Greenville	498,766	7	0.14
2	Richland	409,549	14	0.34
3	Charleston	396,484	12	0.30
4	Horry	322,342	5	0.16
5	Spartanburg	301,463	6	0.20
6	Lexington	286,196	3	0.10
7	York	258,526	2	0.08
8	**Berkeley**	**210,898**	**0**	**0.00**
9	Anderson	196,569	2	0.10
10	Beaufort	183,149	2	0.11
11	Aiken	167,458	2	0.12
12	**Dorchester**	**153,773**	**0**	**0.00**
13	Florence	138,742	5	0.36
14	Pickens	122,863	0	0.00
15	Sumter	107,396	2	0.19
16	Lancaster	89,594	1	0.11
17	Orangeburg	87,903	2	0.23
18	Oconee	76,355	1	0.13
19	Greenwood	70,133	2	0.29
20	Darlington	67,234	0	0.00
	South Carolina	**4,961,119**	**70**	**0.14**

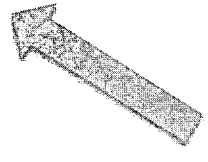


Projected Utilization

- RSFH-Berkeley projected its utilization based on the demand for RT services in the four county planning area defined by the SHP.
- Service area population growth was calculated by age cohort (under and over 65).
- Planning area cancer incidence rates were calculated by county and age cohort.
- Total cancer cases and RT cases (55 percent of total) were projected for the service area.
- Estimated market share for Roper and St. Francis for 2016 and 2017 was calculated.
- Shift in market share to RSF-Berkeley was estimated beginning in 2020.
- Applying the RSFH market share by hospital to the projected total service area cases results in the projected radiation therapy cases for RSFH – Berkeley and other RSFH hospitals.

Service Area Population By Age Group

	2017	2022	% Change
Under 65			
Primary Service Area	360,137	380,419	5.6%
Secondary Service Area	327,121	342,493	4.7%
Total	687,258	722,912	5.2%
65 and Over			
Primary Service Area	52,250	65,358	25.1%
Secondary Service Area	66,789	83,935	25.7%
Total	119,039	149,293	25.4%
All Ages			
Primary Service Area	412,387	445,777	8.1%
Secondary Service Area	393,910	426,428	8.3%
Total	806,297	872,205	8.2%



Source: Claritas, Inc., US Census Bureau

65 and over is projected to grow dramatically.

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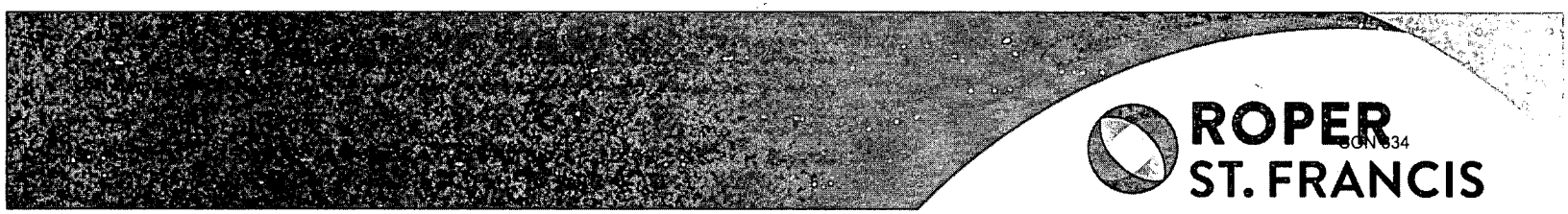
Planning Area Cancer Incidence Rates

Calculation of Incidence Rates By County and Age Group										
		Avg Annual Cases 2010-2014			Average Population 2010-2014			Non-Age Adjusted Incidence Rates		
Tri-County Area		<65	65+	Total	<65	65+	Total	<65	65+	Total
	Berkeley	450	412	862	169,578	21,193	190,771	2.65	19.44	4.52
	Charleston	876	1,018	1,894	315,387	49,879	365,266	2.78	20.41	5.19
	Colleton	106	125	231	31,696	6,543	38,240	3.34	19.10	6.04
	Dorchester	350	329	679	127,309	15,411	142,719	2.75	21.35	4.76
Total		**1,782**	**1,884**	**3,666**	**643,970**	**93,026**	**736,996**	**2.77**	**20.25**	**4.97**
Sources: statecancerprofiles.cancer.gov and U.S. Census Bureau										

Estimated and Projected Service Area Cancer Cases

	2017	2022	% Change
Under 65			
Primary Service Area	974	1,029	5.6%
Secondary Service Area	925	966	4.5%
Total	1,899	1,996	5.1%
65 and Over			
Primary Service Area	1,056	1,320	25.0%
Secondary Service Area	1,355	1,705	25.8%
Total	2,411	3,025	25.5%
All Ages			
Primary Service Area	2,030	2,349	15.7%
Secondary Service Area	2,280	2,671	17.2%
Total	4,310	5,020	16.5%

Source: Claritas, Inc., US Census Bureau



Projected Service Area
Radiation Therapy Cases

					Year 1	Year 2	Year 3
	2016	2017	2018	2019	2020	2021	2022
Primary Service Area	1,093	1,117	1,153	1,190	1,230	1,271	1,292
Secondary Service Area	1,232	1,254	1,290	1,327	1,366	1,406	1,469
Total	2,325	2,371	2,443	2,517	2,595	2,677	2,761

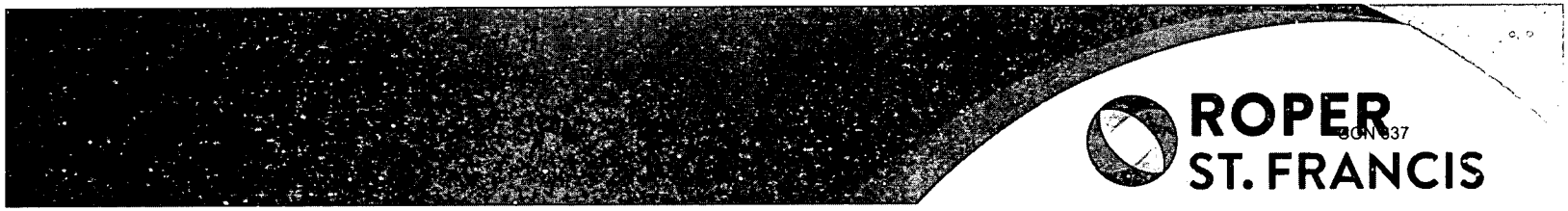
**Assumes 55 percent of cancer cases receive radiation therapy*

Estimated RSFH Service Area Market Share
2016 and Annualized 2017

	Cases		Market Share	
Total Market	**2016**	**2017**	**2016**	**2017**
Primary Service Area	1,093	1,117		
Secondary Service Area	1,232	1,254		
Total	2,325	2,371		
Roper Hospital				
Primary Service Area	113	94	10.3%	8.4%
Secondary Service Area	269	252	24.6%	22.6%
Total	382	346	16.4%	14.6%
St. Francis Hospital				
Primary Service Area	196	221	18.0%	19.8%
Secondary Service Area	267	324	24.4%	29.0%
Total	463	545	19.9%	23.0%
Total RSFH				
Primary Service Area	309	314	28.3%	28.2%
Secondary Service Area	536	576	49.0%	51.6%
Total	845	890	36.4%	37.6%

System-wide Market Share Projections for Radiation Therapy for 2018-2022

	2018	2019	2020	2021	2022
Roper Hospital					
Primary Service Area	6.8%	5.8%	1.5%	1.5%	1.5%
Secondary Service Area	18.1%	17.1%	15.8%	15.9%	15.7%
Total Service Area	12.8%	11.8%	9.0%	9.0%	9.0%
St. Francis Hospital					
Primary Service Area	21.8%	22.8%	13.6%	13.6%	13.6%
Secondary Service Area	27.8%	28.8%	26.8%	26.8%	26.8%
Total Service Area	25.0%	26.0%	20.6%	20.5%	20.6%
RSFH-Berkeley					
Primary Service Area			15.0%	15.8%	16.6%
Secondary Service Area			3.4%	3.5%	3.6%
Total Service Area			8.9%	9.3%	9.7%
In-migration					
Primary Service Area	28.6%	28.6%	30.1%	30.8%	31.7%
Secondary Service Area	46.0%	46.0%	46.1%	46.2%	46.1%
Total Service Area	37.8%	37.8%	38.5%	38.9%	39.4%



Projected RSFH-Berkeley and RSFH Radiation Therapy Cases

	2018	2019	2020	2021	2022
Roper Hospital					
Primary Service Area	79	69	18	19	19
Secondary Service Area	234	228	216	223	231
Total Service Area	312	297	234	242	250
In-migration	24	23	18	19	19
Total Cases	**337**	**320**	**252**	**260**	**269**
St. Francis Hospital					
Primary Service Area	251	271	167	173	175
Secondary Service Area	359	383	366	377	394
Total Service Area	610	654	533	550	569
In-migration	24	26	21	22	23
Total Cases	**634**	**680**	**555**	**572**	**592**
RSFH-Berkeley					
Primary Service Area	-	-	185	200	215
Secondary Service Area	-	-	47	49	53
Total Service Area	-	-	232	249	268
In-migration	-	-	12	12	13
Total Cases	**-**	**-**	**243**	**262**	**281**
Total RSFH					
Primary Service Area	330	340	370	392	409
Secondary Service Area	593	610	629	649	677
Total Service Area	922	951	999	1,041	1,087
In-migration	49	49	51	53	55
Total Cases	971	1,000	1,050	1,094	1,142

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SCN 638

Projected Treatments and Utilization as Percent of Capacity

	2017	2018	2019	2020	2021	2022
Roper Linacs	4,464	4,727	5,138	4,054	4,181	4,322
Roper CK	317	148	-	-	-	-
Total Roper	4,781	4,874	5,138	4,054	4,181	4,322
St. Francis	11,585	12,971	13,901	11,344	11,694	12,099
RSF-Berkeley	-	-	-	4,973	5,357	5,753
Total RSFH	16,366	17,846	19,039	20,372	21,232	22,174

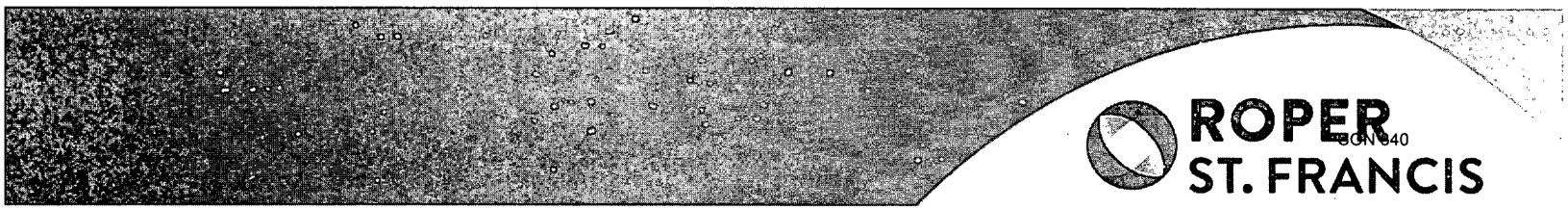
	2017	2018	2019	2020	2021	2022
Roper Linacs	89.3%	94.5%	102.8%	81.1%	83.6%	86.4%
Roper CK	31.7%	14.8%				
Total Roper	79.7%	81.2%	102.8%	81.1%	83.6%	86.4%
St. Francis Linac#1						
St. Francis Linac#2						
St. Francis Total	115.9%	136.5%	146.3%	119.4%	123.1%	127.4%
RSF-Berkeley				99.5%	107.1%	115.1%
Total RSFH	102.3%	115.1%	131.3%	104.5%	108.9%	113.7%

ROPER ST. FRANCIS

SCN 039

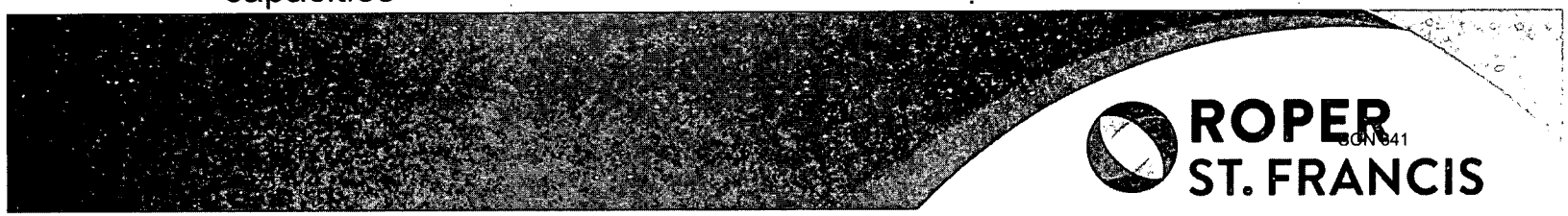
The Proposed Project Meets All State Health Plan Standards for Radiation Therapy

- Standards 1-4 define the various capacities of linear accelerators.
  - The applicant acknowledges and utilizes Standards 1-4 within its application.
- Standard 5: The proposed project is located in the service area composed of Berkeley, Charleston, Colleton, and Dorchester Counties.



6a - All existing units in the service area have performed at a combined use rate of 80 percent of capacity as evidenced in the most recent Joint Annual Reports preceding the filing of the applicant's Certificate of Need application

- Due to unit transfers, closures, variable capacities, and newly filed JARS becoming available for 2016, the Applicant provides an analysis of capacity three ways.
- In all three scenarios, the service area capacity has exceeded 80 percent in 2015 and 2016. As a result, the proposed project meets this portion of the Standard.
  - **Scenario 1** – Calculations that mirror the actual use of the service area units in 2015
  - **Scenario 2** – Calculations that mirror the 2015 JARS and the service area capacity utilized in the 2017-2018 SHP, but does not accurately reflect the actual use of the service area units.
  - **Scenario 3** – Utilizes 2016 JARS for all providers except MUSC, utilizes MUSC's 2449 application for 2016 volumes, utilizes SHP identified capacities



6a – Scenarios:

2015 Service Area Capacity – Scenario 1

	2015 Capacity - 1	2015 Treatments - 1	2015 % Capacity - 1
Roper Hospital	8,500	7,366	87%
St. Francis Hospital	5,000	7,328	147%
RSFH Total	13,500	14,694	109%
MUSC	24,000	19,823	83%
Trident	16,500	12,493	76%
Total Service Area	54,000	47,010	87%

2015 Service Area Capacity – Scenario 2

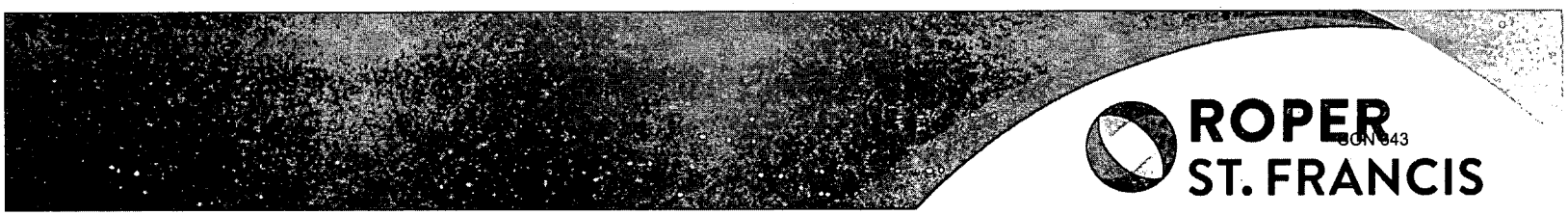
	2015 Capacity - 2	2015 Treatments - 2	2015 % Capacity - 2
Roper Hospital	11,000	6,905	63%
St. Francis Hospital	5,000	7,328	147%
RSFH Total	16,000	14,233	89%
MUSC	24,000	19,823	83%
Trident	16,500	12,493	76%
Total Service Area	56,500	46,549	82%

2016 Service Area Capacity - Scenario 3

	2016 Capacity	2016 Treatments	2016 % Capacity
Roper Hospital	6,000	5,915	99%
St. Francis Hospital	10,000	10,191	102%
RSFH Total	16,000	16,106	101%
MUSC	24,000	19,221	80%
Trident	16,500	10,422	63%
Total Service Area	56,500	45,749	81%

6b - An applicant must project that the proposed service will perform a minimum number of treatments equal to 50 percent of capacity annually within three years of initiation of services, without reducing the utilization of the existing machines in the service area below the 80 percent threshold. If the new equipment is a specialized radiotherapy unit as described in Standards 2, 3 or 4 above, then the applicant may propose an annual capacity based on the specialized use of the equipment by that applicant. If the applicant can justify this proposed annual capacity, then this capacity will be used in Certificate of Need application calculations, as well as future capacity calculations, for that applicant. The applicant must document where the potential patients for this new service will come from and where they are currently being served, to include the expected shift in patient volume from existing providers.

- RSFH-B's proposed RT unit exceeds 50 percent of capacity in its first year of operation.
- Existing RT units in the service area will not be reduced. In fact, growth in population will allow for continued growth among all providers.
- RSFH-B proposes an annual capacity of 5,000 due to the capabilities and proposed use of the equipment.
- The applicant documents in detail the shift in existing patient population from within the system and the projected incremental growth for the service area that will result in its proposed patient population.



6b – Planning Area Projected Capacity with the Addition of Radiation Therapy Services at RSFH -Berkeley

Projected Planning Area Utilization as a Percent of Capacity								
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Total Area Cancer Cases	4,074	4,227	4,310	4,441	4,577	4,719	4,866	5,020
Total Area Radiation Therapy Cases	2,241	2,325	2,371	2,443	2,517	2,595	2,677	2,761
Incremental Cases from 2016			46	118	192	270	352	436
Area Average Visits per Patient			18.5	18.5	18.5	18.5	18.5	18.5
Incremental Visits from 2016			848	2,176	3,560	5,002	6,505	8,071
Baseline Area Provider Visits (1)	47,010	45,749	45,749	45,749	45,749	45,749	45,749	45,749
Total Area Visits	47,010	45,749	46,597	47,925	49,309	50,751	52,254	53,820
Capacity								
Existing Capacity	54,000	56,500	56,500	56,500	56,500	56,500	56,500	56,500
Reduction (2)					(1,500)	(1,500)	(1,500)	(1,500)
Increase for RSFH-Berkeley						5,000	5,000	5,000
Net Area Capacity	54,000	56,500	56,500	56,500	55,000	60,000	60,000	60,000
Projected Visits as a % of Capacity	***87.1%***	***81.0%***	***82.5%***	***84.8%***	***89.7%***	***84.6%***	***87.1%***	***89.7%***

(1) Source: 2015 and 2016 JARs, and MUSC application showing 2016 utilization.

(2) In 2019, Roper Hospital will decomission its CyberKnife and reduce the capacity of one Linac at St. Francis based on SRS/SBRT capability as proposed in CON No. 2411.

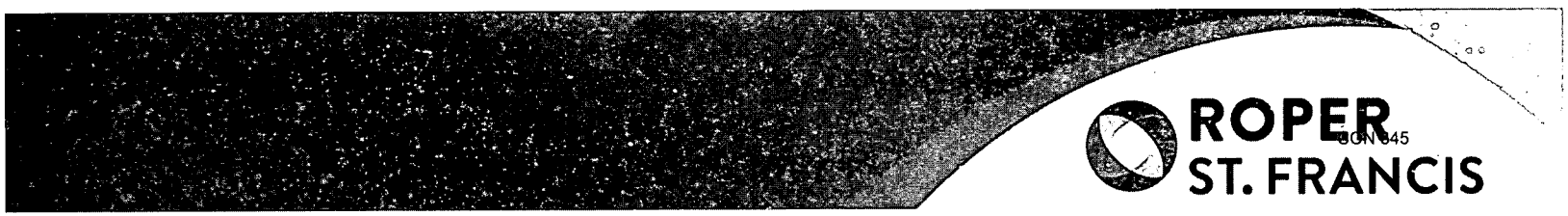
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CON 844

7 - Expansion of an existing service, whether the expansion occurs at the existing site or at an alternate location in the service area, shall only be approved if the service has operated at a minimum use rate of 80 percent of capacity for each of the past two years and can project a minimum use rate of 50 percent of capacity per year on the additional equipment within three years of its implementation.

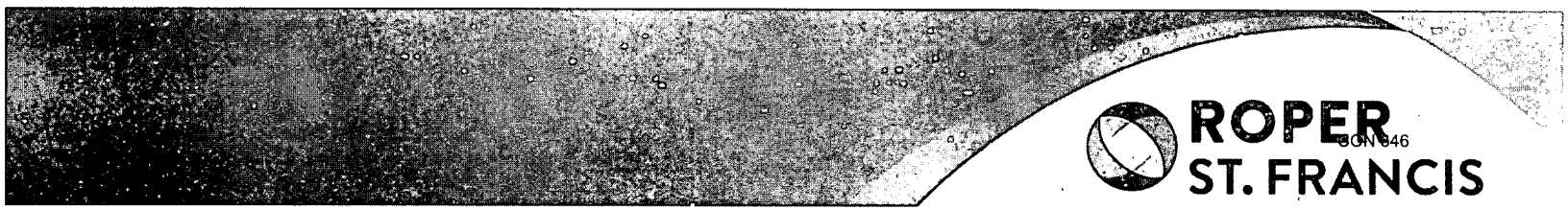
- The Applicant is not applying as an expansion.
- As an extension of the RSFH System, that each of its affiliated providers have operated at the minimum use rate of 80 percent of capacity for each of the past two years.

	2015 Capacity	2015 Treatments	2015 % Capacity	2016 Capacity	2016 Treatments	2016 % Capacity
Roper Hospital	8,500	7,366	87%	6,000	5,915	99%
St. Francis Hospital	5,000	7,328	147%	10,000	10,191	102%
RSFH (Combined)	13,500	14,694	109%	16,000	16,106	101%



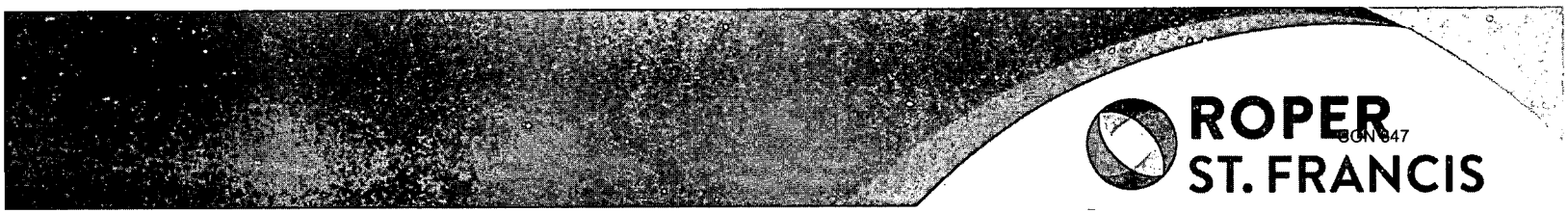
Standards 8 and 9

- The applicant projects the utilization of the service and documents referral sources for patients within its service area, including letters of support from physicians and health care facilities indicating a willingness to refer patients to the proposed service.
- The existing RSFH providers of radiation therapy, Roper Hospital and St. Francis Hospital, have an existing cadre of oncology providers that currently refer patients for radiation therapy. As an additional affiliated provider of radiation therapy, Roper St. Francis Hospital – Berkeley anticipates that many of its referrals will originate from Roper St. Francis' existing referral base and will result in a shift of existing patients originating from the identified primary and secondary service areas to Roper St. Francis Hospital – Berkeley.
- The applicant makes all service-specific affirmations required by Standard 9.



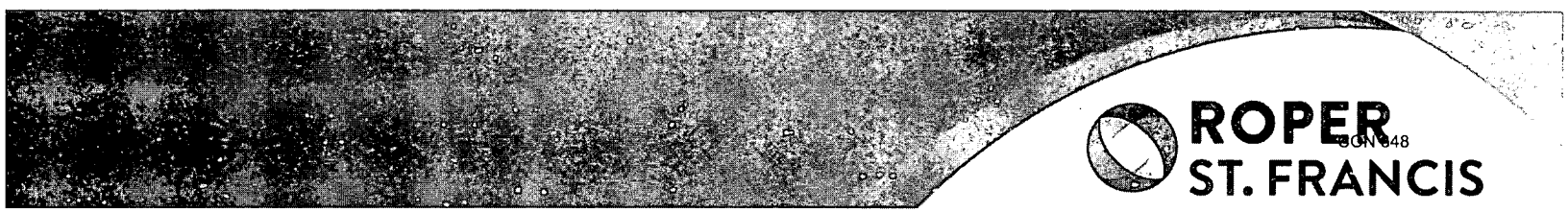
The Two Applications Under Review Are Not Competing

- MUSC is applying as an extension of its existing service; RSFH-Berkeley is applying as a new provider
- Each provider has unique referral pathways
- MUSC will continue to treat their patients while RSFH-Berkeley will treat RSFH patients originating from the proposed service area
- The SHP Standards allow for both of these projects to be simultaneously approved



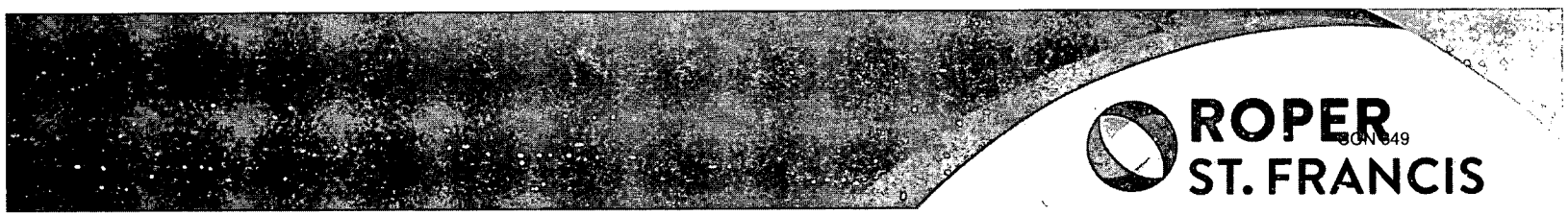
DHEC's Ranked Project Review Criteria

a. Compliance with the Need outlined in the South Carolina Health Plan
b. Community Need Documentation
c. Distribution (Accessibility)
d. Medically Underserved Groups; and
e. Financial Feasibility



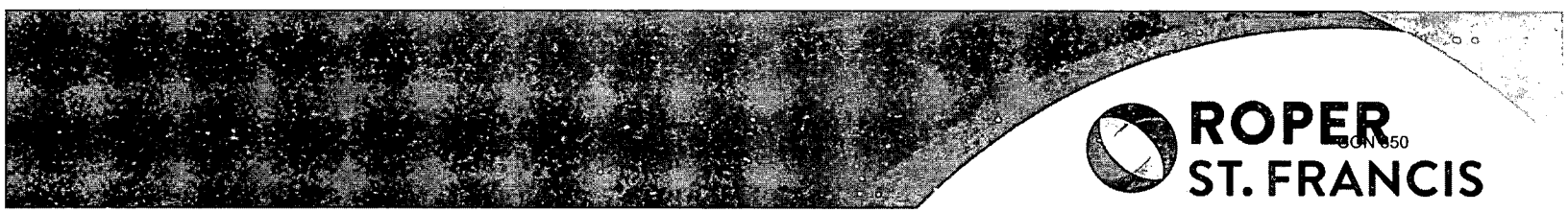
Compliance with the Need outlined in the South Carolina Health Plan

- Each of the nine standards for radiotherapy outlined in the South Carolina Health Plan were specifically addressed and RSFH-Berkeley is consistent with each
- Conditions met for new radiotherapy service
- Projected treatments exceed required minimum of 50% capacity within three years



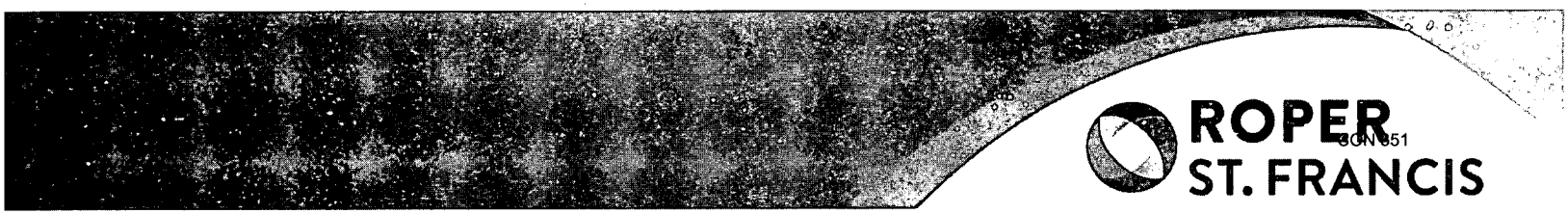
Community Need Documentation

- Target population clearly identified with projected growth statistics consistent with the State Demographer
- Both a current and projected target population need were clearly outlined
- Implementation justified based on current utilization and projected increases caused by population growth



Distribution (Accessibility)

- The quality of radiation therapy treatment is tightly linked to the timeliness of radiation access
- The largest concentration of linear accelerators are located downtown Charleston and this proposal will improve the distribution of radiation therapy service throughout the tri-county area

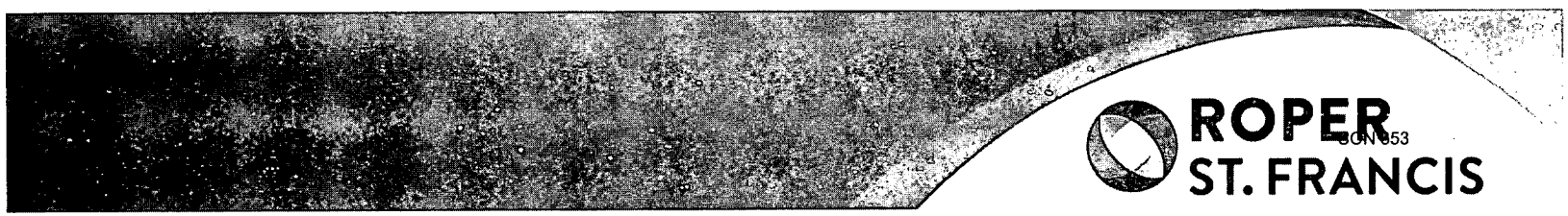


Distribution (Accessibility)

- Based on historical and projected utilization, the project will not result in an unnecessary duplication of services
- Documented charity care acts as assurance that individuals in need of treatment have access regardless of ability to pay

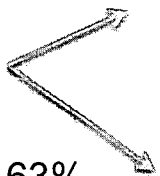
Distribution (Accessibility)

- Roper St. Francis Cancer Care participated in over 25 community events including various health fairs and prevention and wellness expos
- These events helped the Roper St. Francis Cancer Center reach more than 10,000 participants from Charleston, Dorchester, Berkeley, Hampton and Colleton Counties in 2016



Medically Underserved Groups

2016 Radiation Therapy Payor Mix



Commercial	37%
Medicare	54%
Medicaid	7%
Self-Pay / Charity	2%
Total	100%

*percentages rounded

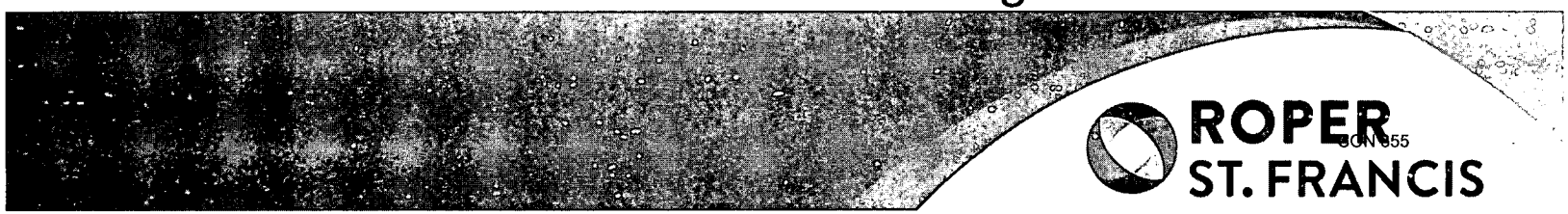
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SCN 854

ROA_1948

Medically Underserved Groups

- The system's Community Health Needs Assessment focuses on the following six priorities and includes implementation strategies for each:
  - Access to services and coverage for the uninsured and underinsured
  - Mental health
  - Maternal and child health
  - Prevention / wellness / outreach
  - High prevalence of chronic disease
  - Coordination of care across settings



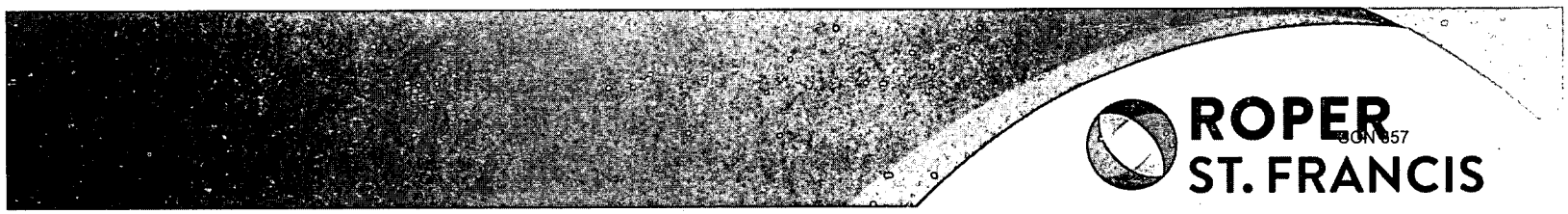
Medically Underserved Groups

- Roper St. Francis provided $68,312,584 in community benefit in 2016:

  - charity care at cost totaled $49,392,182
  - community outreach programs including grants totaled $5,818,290
  - community sponsorships totaled $623,337
  - unreimbursed Medicaid cost $12,478,775

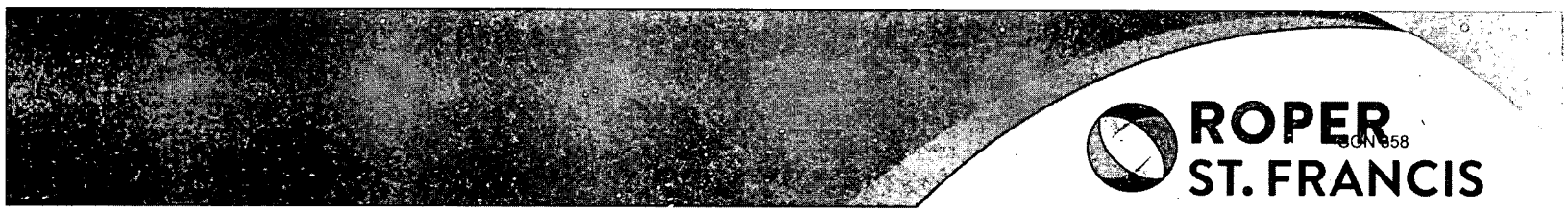
Financial Feasibility

- Reasonable budget assumptions
- Attested immediate and long-term economic feasibility of the project



Conclusion

- The project complies with all relevant project review criteria and SHP Standards for Radiation Therapy
- The project will address existing capacity constraints within the RSFH system
- Most importantly, the project will establish necessary cancer treatment resources in Berkeley County, the most populous county in the state currently without any cancer treatment options. It will directly address documented access issues for this planning area.



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Response to Project Review Comments - CON Applications 2449 and 2470

QC Quillen, Colleen C. <colleenquillen@parkerpoe.com>
Yesterday, 4:32 PM
Murdock, Margaret P.; rbarbier@nexsenpruet.com; +2 more

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Maggie,

Please see the attached, and please confirm receipt of same.

Thank you.

Colleen Quillen
Paralegal

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Sullivan Consulting Group, Inc.

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October 4, 2017

Margaret P. Murdock
Director, Certificate of Need Program
Bureau of Health Facilities and Services Development
SC Department of Health and Environmental Control
301 Gervais Street
Columbia, South Carolina 29201

Re: Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center - Berkeley
Matter No. 2449

Roper St. Francis – Berkeley d/b/a Roper St. Francis Hospital - Berkeley
Matter No. 2470

Dear Ms. Murdock:

On behalf of Trident Medical Center, LLC d/b/a Trident Medical Center ("Trident"), I am submitting this letter in response to the comments presented by the Medical University Hospital Authority ("MUHA") and Roper St. Francis ("RSF") at the Project Review Meeting held on September 20, 2017. RSF and MUHA seek to add new linear accelerators at facilities to be developed in southern Berkeley County, and Trident is opposed to both projects. Trident is an existing provider of radiation oncology services serving the area both applicants propose to serve, and Trident will be adversely impacted by the approval of either project.

We will first address the information presented by each applicant separately.

MUHA's Project

Trident opposes MUHA's project for several reasons as set forth in our Project Review presentation, which MUHA failed to rebut. These include:

- The is no need for additional linear accelerator capacity at MUHA. MUHA's radiation therapy treatments have not increased in recent years. During this period MUHA has upgraded its facilities and equipment, which allow it to treat patients more efficiently. MUHA failed to present any evidence that patients are experiencing delays in receiving treatment or that its hours of operation have been extended to accommodate the volume of patients. MUHA has no need to add capacity at this time.

- MUHA failed to demonstrate that there is a need for enhanced access to radiation therapy services in southern Berkeley County where it proposes to place its unit. Trident is less than

15 minutes from MUHA's proposed location and has available capacity with its linear accelerators. As discussed at the Project Review Meeting, only two of Trident's three linear accelerators are currently in use because of the lack of sufficient utilization. Trident can readily accommodate any patients MUHA would like to refer for radiation treatment if it desires to have its patients from Berkeley and Dorchester Counties served closer to their homes.

- MUHA's project will clearly have an adverse impact Trident. MUHA discusses the number of patients traveling to other facilities for radiation treatment from Berkeley and Dorchester Counties. The assumption that MUHA will be able to redirect most of these patients to its new radiation therapy facility is not supported by any evidence. The likelihood is that many of these patients are traveling to the Hollings Cancer Center because of its specialized services and many will continue to do so. MUHA will compete for patients with Trident, and to the extent it is successful in capturing new market share, the underutilization of Trident's radiation therapy program will be exacerbated.

For all of these reasons, MUHA's project does not comply with the relevant CON review criteria and should be denied.

RSF's Project

RSF's project suffers from even greater deficiencies than those of MUHA.

RSF has manipulated its radiation therapy capacities in an attempt to demonstrate compliance with the South Carolina Health Plan. As MUHA noted in its presentation, the capacity for the linear accelerators in its system was 22,000 treatments prior to 2017 (3 linear accelerators with a capacity of 7,000 treatments each plus one Cyberknife with a capacity of 1,000treatments). RSF submitted a letter to DHEC seeking to have its capacity modified by stating that its three linear accelerators provide IMRT/IGRT and should be adjusted to a capacity of 5,000 treatments, reducing the system's capacity to 16,000 treatments.

In its letter, RSF indicated that 20-25% of its treatments utilized IMRT/IGRT, which are low percentages relative to other providers. For example, 66% of Trident's radiation treatments in 2016 utilized IMRT/IGRT and 72% of MUHA's utilized these technologies. If RSF's capacity is 22,000 treatments annually, then its existing units operated at only 74% of capacity in 2016.

The 2017-2018 South Carolina Health Plan sets forth the following criterion:

6. *New Radiotherapy services shall only be approved if the following conditions are met:*

    a. *All existing units in the service area have performed at a combined use rate of 80 percent of capacity as evidenced in the most recent Joint Annual Reports preceding the filing of the applicant's Certificate of Need application; and*

b. *An applicant must project that the proposed service will perform a minimum number of treatments equal to 50 percent of capacity annually within three years of initiation of services, without reducing the utilization of the existing machines in the service area below the 80 percent threshold...*

RSF's project fails under both elements of this criterion. Correcting the treatment capacities in the table presented on p. 14 of RSF's Project Review presentation demonstrates that in 2016 the service area's overall utilization rate was only 73.2%, far below the Health Plan's 80% target.

BCCD Service Area Radiation Therapy Utilization
With Corrected Capacities for RSF

	2016 Capacity	2016 Treatments	2016 % Utilization
Roper Hospital	8,000	5,915	73.9%
St. Francis Hospital	14,000	10,191	72.8%
Trident	16,500	10,422	63.2%
MUHA	24,000	19,221	80.1%
Total Service Area	**62,500**	**45,749**	**73.2%**

RSF also cannot demonstrate that it will perform a minimum of 50% of capacity annually without reducing the utilization of existing machines in the service area below the 80% threshold. As a starting point, existing machines in the area are already operating below 80%, and as demonstrated in Trident's Project Review presentation, the volume of treatments in the area has not been increasing historically and there is no reason to expect significant growth in the future. Moreover, Trident is the provider that will be most directly impacted by RSF's proposed new unit, and it operated at only 63% utilization in 2016.

RSF also failed to produce any other evidence of the need for new linear accelerator capacity. There is no documentation of patient delays in receiving treatment or that RSF has extended hours of operation. RSF has been implementing a plan to reduce its radiation therapy capacity, which hardly supports expansion into Berkeley County. The project is simply intended to allow RSF to capture new market share by placing a linear accelerator in southern Berkeley County.

Placing the proposed linear accelerator at RSF Hospital – Berkeley does not comport with sound health planning. This new hospital will open simultaneously with the opening of the radiation therapy service. The new hospital will not have the range of specialists or adjunctive therapies that are available at existing radiation therapy providers in the service area.

For all of these reasons, RSF's project is not consistent with the relevant CON review criteria and should be denied.

We appreciate the opportunity to submit this response and would be happy to provide any additional information.

Sincerely,

Daniel J. Sullivan
President

Reply | Delete Junk | ...

RE: PRCM Response for Matter Nos. 2470 and 2449

BW

Barbier, Ralph W.
Yesterday, 5:07 PM
ttibshrany@platthmc.com; Murdock, Margaret P.; Gerrald, Nic; +3 more

Reply |

Inbox

donotreply@rsfh.com...
62 KB

Show all 1 attachments (62 KB) Download
Save to OneDrive - South Carolina Department of Health and Environmental Control

Maggie,

Roper St. Francis would also like to include with the post project review submission that was emailed to you earlier today by Tori the attached letter from Scott Broome.

Thank you. Ralph

Ralph W. Barbier
Member
Nexsen Pruet, LLC
1230 Main Street, Suite 700
Columbia, SC 29201
Post Office Box 2426 (29202)
T: 803.540.2004 F: 8037271404
RBarbier@nexsenpruet.com

www.nexsenpruet.com

-----Original Message-----
From: Victoria Tibshrany [mailto:ttibshrany@platthmc.com]
Sent: Wednesday, October 4, 2017 10:40 AM
To: Murdock, Margaret P. <murdocmp@dhec.sc.gov>
Cc: 'Gerrald, Nic' <GerralN@dhec.sc.gov>; 'Eubank, Louis W.' <EUBANKLW@dhec.sc.gov>; Barbier, Ralph W. <RBarbier@nexsenpruet.com>; 'Cantwell Shannon' <Shannon.Cantwell@RoperSaintFrancis.com>; 'Kathy Platt' <kplatt@platthmc.com>
Subject: PRCM Response for Matter Nos. 2470 and 2449

Hi Maggie,

On behalf of Roper St. Francis, our response to comments and issues discussed at the September 20, 2017 Project Review Meeting is attached. Please contact me if you have any questions.

Thanks,

Victoria R. Tibshrany

Independent Senior Consultant

Platt HMC, Inc.

1432 Berkeley Road

Columbia, SC 29205

(803) 261-2535 (direct)

(404) 728-1974 (office)

(404) 728-1975 (fax)

*** CONFIDENTIAL COMMUNICATION *** The information contained in this message may contain legally privileged and confidential information intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution or duplication of this transmission is strictly prohibited. If you have received this communication in error, please notify us by telephone or email immediately and return the original message to us or destroy all printed and electronic copies. Nothing in this transmission is intended to be an electronic signature nor to constitute an agreement of any kind under applicable law unless otherwise expressly indicated. Intentional interception or dissemination of electronic mail not belonging to you may violate federal or state law.

ROPER
ST FRANCIS
HEALTHCARE

October 4, 2014

Submitted Electronically via Email

Mr. Louis Eubank, MPH, MSW
Ms. Margaret "Maggie" Murdock
South Carolina Dept. of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

RE: Roper St. Francis Berkeley, Inc. d/b/a Roper St. Francis Berkeley – Radiation Therapy Service, Application No. 2470

Dear Ms. Murdock and Mr. Eubank:

This letter is written in response to comments raised by Medical University Hospital Authority d/b/a Radiation Therapy Center – Berkeley County ("MUSC") during a project review meeting on September 20, 2017.

The elimination of the Cyberknife presently at Roper Hospital was anticipated as part of the above referenced application (#2470). This will result in SRS/SBRT volume shifting from the Cyberknife platform to a linear accelerator platform presently located at Bon Secours St. Francis Hospital. The current overutilization problem cited by Roper St. Francis will increase significantly as SRS/SBRT treatments consume more machine time per patient than conventional or IMRT treatments. Thus, in addition to Roper St. Francis' overutilization demonstrated by its volume as compared to normative capacity guidelines outlined in the State Health Plan, this change in platform to SRS/SBRT procedures further supports the need for additional capacity.

Roper St. Francis' proportion of IMRT utilization is appropriate for its patient population, which is that of adult cancers. Were this rate higher, as MUSC's is, Roper St. Francis would be at risk of IMRT overutilization. Treatment and billing guidelines (as those per CMS) require that facilities use conventional as opposed for IMRT when possible as the cost for conventional forms of treatment is lower than the cost for IMRT. Facilities with disproportionately high IMRT mix as a percent of total are at risk for providing therapy outside of medical necessity indications. A quintessential example of this is right versus left breast IMRT. IMRT is routinely used in treatment of cancers of the left breast because it better enables reduction of dose to the heart, whereas conventional therapy is often used for right breast cancers because dose avoidance to the heart is less problematic. Roper St. Francis maintains the position that its practitioners are using appropriate judgment in their use of IMRT and responsibly withholding it when possible, as per CMS guidance. Please note that Roper St. Francis is not accusing MUSC of overuse of IMRT as their patient population is notably different. However, their accusation that Roper St. Francis is underutilizing it is as relates need for an additional device is not valid.

Additionally, a statement was made concerning Roper Hospital's IMRT utilization as "20 to 25 percent." As reflected below, Roper St. Francis' total program IMRT utilization is c.a.44% for years 2015-2016. The lower rate at Roper Hospital and higher rate at Bon Secours St. Francis Hospital is simply because somewhat newer equipment is available at Bon Secours St. Francis Hospital and treating physicians prefer to treat complex IMRT at that location. Further, it is expected that this mix will change when the Cyberknife is taken out of service at Roper Hospital, as SRS/SBRT will then occur at Bon Secours St. Francis Hospital, displacing some IMRT volume back to Roper Hospital.

Respectfully Submitted,

J. Scott Broome, FACHE
Service Line Director, Oncology
Roper St. Francis Healthcare
(843) 724-2052
scott.broome@rsfh.com

equity
Experience Great Solutions
4653 Trueman Boulevard, Suite 100
Hilliard, Ohio 43026
614.802.2900 I Fax 614.675.1705
www.equity.net

May 30, 2017

Mr. Louis Eubank, MPH, MSW
Director, Certificate of Need (C.O.N) Program
S.C Dept. of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Re: Certificate of Need Application for development MUSC Health Cancer Care Network

Dear Mr. Eubank:

This letter certifies that ELIC Land Investments, LLC ("ELIC") makes the commitment to ensure the availability of funding necessary for the development of the site and shell building of the proposed project.

ELIC intends to finance this project through the most appropriate and cost effective capital financing structure available, relative to a project of this size. ELIC may fund the project through a combination of debt and equity utilizing ELIC's extensive partnerships with institutional and private equity sources and banking relationships.

Sincerely,

Steven P. Wathen, Manager

Patrick Cawley Article #:
9214896900999790140890976 3

dhec
Healthy People. Healthy Communities

July 10, 2017

VIA CERTIFIED MAIL, RETURN RECEIPT REQUESTED
Patrick J. Cawley, MD
Medical University Hospital Authority
169 Ashley Avenue
Charleston, SC 29425

Re: Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County
Project: Expansion of radiation therapy services by adding a sixth linear accelerator at a total project cost of $9,804,548.
Matter No. 2449

Dear Dr. Cawley:

This is to notify you the South Carolina Department of Health and Environmental Control ("Department") has determined the above-referenced project to be complete for purposes of review by the Certificate of Need Program. Enclosed is an invoice for the required application fee. It may be paid by check made payable to the S.C. Department of Health and Environmental Control or by electronic check through the Department's website (www.scdhec.gov) using the "Pay Invoices" hyperlink at the bottom of each webpage. This is a secure website. If payment is not received within fifteen (15) days of your receipt of this invoice, the pending application will be considered withdrawn and this matter closed. Should this deadline fall on a weekend or State holiday, it will be extended to the next calendar day that is neither weekend nor holiday pursuant to S.C. Regulation 61-15, Section 303.

Should the Department receive your application fee within the fifteen (15) day deadline, the Department will render a decision no earlier than thirty (30) days, but no later than one-hundred (120) days from the date notice is provided to affected persons in the State Register, unless a public hearing is held pursuant to Regulation 61-15, Section 305.

The Department has determined the relative importance of the project review criteria, pursuant to Regulation 61-15, Section 304, which will be used to review your application. The

specific criteria to be used are set forth below and are ranked according to their relative importance, with the most important being listed first. All other relevant criteria will be given equal importance.

a. Compliance with the Need outlined in the South Carolina Health Plan
b. Community Need Documentation;
c. Distribution (Accessibility);
d. Medically Underserved Groups; and
e. Financial Feasibility.

The above criteria are set forth in Regulation 61-15, Section 802. Should you wish to submit any additional information to the Department in support of your application, you have thirty (30) days from the receipt of this correspondence to do so.

If you have any questions, please contact me at 803.545.4492.

Sincerely,

Maggie Parham Murdock
Director, Certificate of Need Program
South Carolina Department of Health and Environmental Control

Enclosures: Application Fee Invoice

Cc: William R. Thomas, Esquire
Matt Hasbrouck (Via Email: Matthew.Hasbrouck@hcahealthcare.com)
Sarah Bacik (Via Email: baciks@musc.com)
Daniel Westbrook, Esquire (Via Email: dan.westbrook@nelsonmullins.com)

dhec
Healthy People. Healthy Communities

Invoice for Services

Invoice No.

Bureau of Financial Management / Sims/Aycock Building
2600 Bull St, Columbia, South Carolina 29201

PC20458-6

Invoice To:
MEDICAL UNIVERSITY HOSPITAL AUTHORITY
PATRICK J. CAWLEY, MD
169 ASHLEY AVE
CHARLESTON, SC 29425-

Ship To:
S.C. DHEC
Attention: Bureau of Financial Management
2600 Bull Street
Columbia, South Carolina 29201

Date:	Terms:	Department Name	Order Filled By:
2017-07-10	**DUE UPON RECEIPT**	Planning and Programs	GERRALN

Description of Services: CERTIFICATE OF NEED APPLICATION FEE

Qnty	Unit Description	Loc	Organ.	Fund	Account	Analytical	Unit Price	Amount
1	CERTIFICATE OF NEED APPLICATION FEE (2449)	400	402011	428015	4486701	0000000	$7,000.00	$7,000.00
							Total:	$7,000.00

Payment can be made by credit card by completing the below form or by visiting www.scdhec.com and clicking on "Invoice Payment" under the Quick Links.

Name as it appears on credit card _____ Telephone Number _____

Mailing Address _____

Master Card / Visa / Discover
Type of card (circle one) _____ Credit card Number _____

Expiration Date _____ Signature _____

Note: Make checks payable to South Carolina Department of Health and Environmental Control, remit to above address to the Attention of: Bureau of Financial Management

CON 371

Reply | Delete Junk | ••• ✕

Re: 2449 - MUSC Radiation Therapy Center- Berkeley County; 2470 - Roper St. Francis Hospital - Berkeley (radiation therapy)

Murdock, Margaret P. Reply |
Yesterday, 4:58 PM
shannon.cantwell@rsfh.com; cawleypj@musc.edu; +7 more

Sent Items

All:

Pursuant to agreement by the applicants and affected parties, the Department will hold a Project Review Meeting regarding the above-referenced matters at 10:00 AM on **September 20, 2017**, at 301 Gervais St., Columbia, SC. Attendance at this meeting is not mandatory for any party. The Department will accept written submissions in lieu of, or in addition to, in-person presentations at the Project Review Meeting.

Please do not hesitate to contact me if you have any questions.

Warmest regards,

Maggie Parham Murdock
Director, Certificate of Need Program
S.C. Dept. of Health & Environmental Control
Office: (803) 545-4492
Mobile: (803) 360-5770
Connect: www.scdhec.gov Facebook Twitter



Reply | Delete Junk | ••• ✕

Re: 2449 - MUSC Radiation Therapy Center- Berkeley County; 2470 - Roper St. Francis Hospital - Berkeley (radiation therapy)

Murdock, Margaret P. Reply |
Tue 8/29, 4:58 PM
shannon.cantwell@rsfh.com; cawleypj@musc.edu; +7 more

Sent Items

All:

Pursuant to agreement by the applicants and affected parties, the Department will hold a Project Review Meeting regarding the above-referenced matters at 10:00 AM on **September 20, 2017**, at 301 Gervais St., Columbia, SC. Attendance at this meeting is not mandatory for any party. The Department will accept written submissions in lieu of, or in addition to, in-person presentations at the Project Review Meeting.

Please do not hesitate to contact me if you have any questions.

Warmest regards,

Maggie Parham Murdock
Director, Certificate of Need Program
S.C. Dept. of Health & Environmental Control
Office: (803) 545-4492
Mobile: (803) 360-5770
Connect: www.scdhec.gov Facebook Twitter



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November 22, 2017

VIA CERTIFIED MAIL, RETURN RECEIPT REQUESTED
Patrick J. Cawley, MD
Medical University Hospital Authority
169 Ashley Avenue
Charleston, SC 29425

Decision Granting Certificate of Need for:
Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County
Expansion of radiation therapy services by adding a sixth linear accelerator.
Total project cost: $9,804,548.
Matter No.: 2449
Berkeley County

Dear Dr. Cawley:

The South Carolina Department of Health and Environmental Control (Department) has reviewed the application of Medical University Hospital Authority d/b/a MUSC Radiation Therapy Center – Berkeley County (MUSC) to receive a Certificate of Need (CON) for the expansion of radiation therapy services by adding a sixth linear accelerator at a total project cost of $9,804,548 (Project). After consideration of the entire administrative record in this matter, the Department concludes MUSC has presented substantial evidence that the Project complies with the relevant project review criteria and with the *South Carolina Health Plan*, enacted August 13, 2015 (*Plan*). Accordingly, it is the decision of the Department that a Certificate of Need be issued for this Project. This decision is based on the following findings:

Pursuant to Regulation 61-15, Section 103.6, the following application is potentially competing with the above-referenced matter:

> 2470 - Roper St. Francis Hospital - Berkeley, Inc. d/b/a Roper St. Francis Hospital – Berkeley (RSFB); Establishment of radiation therapy services with the addition of a Varian True Beam LINAC at a total project cost of $11,608,014.

The Department concludes that the instant application and RSFB's application do not meet the definition of "[c]ompeting applicants" pursuant to Regulation 61-15, Section 103.6 because approval of both applications will not exceed the need for the service.

Trident Medical Center, LLC d/b/a Trident Medical Center (Trident) and CareAlliance Health Services d/b/a Roper St. Francis Healthcare, Roper Hospital, Inc., Bon Secours - St. Francis Xavier Hospital, Inc., Roper Mount Pleasant Hospital, and Roper St. Francis – Berkeley Hospital (collectively "Roper") are Affected Persons in this matter, pursuant to Regulation 61-15, Section 103.1, and both Trident and Roper oppose the Project. After considering documents and arguments submitted by the Affected Persons in opposition to the Project, including comments made at a project review meeting conducted by the Department in this matter on September 20, 2017, the Department finds that the opposition has not provided evidence sufficient to require denial of a CON for the Project.

Compliance with the Need outlined in the South Carolina Health Plan

Chapter IX of the *Plan* sets forth the CON Standards for the addition of a linear accelerator (LINAC) to a service area:

Standards 1 through 4 - MUSC stated in its application that the proposed LINAC would have a treatment capacity of 5,000. MUSC further provided sufficient documentation that it will provide IMRT and IGRT treatments in sufficient volume to justify this proposed planning capacity.

Standard 5 - The Project would be located in the service area comprised of Charleston, Dorchester, Berkeley, and Colleton Counties (Service Area).

Standard 6 - Not applicable to the Project.

Standard 7 - According to MUSC's 2015 and 2016 JARs, MUSC's existing LINACs have operated at a combined use rate that exceeded 80% in both years. In its application MUSC reasonably projected a use rate of over 50% capacity on the proposed unit within three years of the Project's implementation.

Standard 8 - MUSC projected utilization and submitted letters of support for the Project from MUSC-affiliated physicians.

Standard 9 - MUSC states in its application that "[a]s an existing provider, the applicant currently complies with the above standards and will continue to do so through the proposed project."

The Department finds that MUSC has sufficiently complied with 3 S.C. Code Reg. 61-15, Section 802.1.

Community Need Documentation
MUSC clearly identified its target population and, using population statistics consistent with those generated by the State Demographer, MUSC made reasonable projections of anticipated population changes, with assumptions and methodologies clearly outlined in the application. MUSC has sufficiently demonstrated that the proposed Project will meet an identified need and that the projected utilization of the Project is sufficient to justify its implementation.

The Department finds that MUSC has sufficiently complied with 3 S.C. Code Reg. 61-15, Section 802.2.

Distribution (Accessibility)
The Department finds that the Project will not result in unnecessary duplication or modernization of services based on MUSC's documentation regarding both need and accessibility. MUSC states that patients have access to the Project by self-referral and by internal and external physician referral; that referrals derive from private physician practices, public clinics and other hospitals; and that access to the facility also comes from physicians affiliated with MUSC Health. MUSC states that patients are admitted to MUSC facilities without regard to race, sex, creed, or national origin. MUSC referenced its Patient Rights and Responsibilities policy, its charity care and financial assistance policies, and its historical and projected amount of indigent care to demonstrate that it has established provisions to insure that individuals in need of treatment as determined by a physician have access to the Project, regardless of ability to pay.

The Department finds that MUSC has sufficiently complied with 3 S.C. Code Reg. 61-15, Section 802.3.

Medically Underserved Groups
MUSC addressed the contribution of the Project in meeting the health needs of members of medically underserved groups, particularly uninsured, low-income, and indigent patients. The Department considered MUSC's historical and projected indigent care in comparison with the percentage of population in the Project's service area which is medically underserved, and the extent to which the medically underserved populations are expected to use the Project if approved. The Department further considered MUSC's documented performance in meeting its obligation under applicable regulations requiring provision of uncompensated care, its indigent care plan, community service, and access by minorities and handicapped persons to programs receiving federal financial assistance. Finally, the Department considered the extent to which Medicare, Medicaid, and medically indigent patients are served by MUSC.

The Department finds that MUSC has sufficiently complied with 3 S.C. Code Reg. 61-15, Section 802.31.

Financial Feasibility

MUSC reasonably projected both the immediate and long-term financial feasibility of the Project using projected income statements that are based upon accepted accounting procedures. MUSC provided a letter from John Cooper, an accountant, stating that the information contained in the proforma was prepared by Hospital Finance, and certifying that all of the assumptions, calculations, and information contained in the projections were prepared accurately to the best of his knowledge.

The Department finds that MUSC has sufficiently complied with 3 S.C. Code Reg. 61-15, Section 802.15.

The Department has determined the findings required by 3 S.C. Code Reg. 61-15 § 501 are not applicable to this Project.

The issuance of a Certificate of Need does not constitute approval for any proposed construction, licensing, or certification changes. You should contact the following individuals for information concerning these related issues: Bureau of Radiological Health, Mr. Aaron Gantt, (803) 545-4400; Division of Health Facilities Construction, Mr. William McCallum, (803) 545-4211; Division of Health Licensing, Ms. Gwendolyn Thompson, (803) 545-4370; and Bureau of Certification, Ms. MaryJo Roué, (803) 545-4293.

A copy of the Guide to Board Review is enclosed for your convenience.

Written By:

Maggie Parham Murdock
Director
Certificate of Need Program

Reviewed By:

Louis Eubank
Chief, Bureau of Healthcare
Planning and Construction

Enclosure: Guide to Board Review

Cc: William Thomas, Esquire
Matt Hasbrouck (Via Email: Matthew.Hasbrouck@hcahealthcare.com)
Ralph Barbier, Esquire
Kathy Platt (Via Email: kplatt@platthmc.com)
Sarah Bacik (Via Email: baciks@musc.com)
Daniel Westbrook, Esquire (Via Email: dan.westbrook@nelsonmullins.com)

South Carolina Board of Health and Environmental Control

Guide to Board Review

Pursuant to S.C. Code Ann. § 44-1-60

The decision of the South Carolina Department of Health and Environmental Control (Department) becomes the final agency decision fifteen (15) calendar days after notice of the decision has been mailed to the applicant, permittee, licensee and affected persons who have requested in writing to be notified, unless a written request for final review accompanied by a filing fee in the amount of $100 is filed with Department by the applicant, permittee, licensee or affected person.

Applicants, permittees, licensees, and affected parties are encouraged to engage in mediation or settlement discussions during the final review process.

If the Board declines in writing to schedule a final review conference, the Department's decision becomes the final agency decision and an applicant, permittee, licensee, or affected person may request a contested case hearing before the Administrative Law Court within thirty (30) calendar days after notice is mailed that the Board declined to hold a final review conference. In matters pertaining to decisions under the South Carolina Mining Act, appeals should be made to the South Carolina Mining Council.

I. Filing of Request for Final Review

1. A written Request for Final Review (RFR) and the required filing fee of one hundred dollars ($100) must be received by Clerk of the Board within fifteen (15) calendar days after notice of the staff decision has been mailed to the applicant, permittee, licensee, or affected persons. If the 15th day occurs on a weekend or State holiday, the RFR must be received by the Clerk on the next working day. RFRs will not be accepted after 5:00 p.m.
2. RFRs shall be in writing and should include, at a minimum, the following information:
   - The grounds for amending, modifying, or rescinding the staff decision;
   - a statement of any significant issues or factors the Board should consider in deciding how to handle the matter;
   - the relief requested;
   - a copy of the decision for which review is requested; and
   - mailing address, email address, if applicable, and phone number(s) at which the requestor can be contacted.
3. RFRs should be filed in person or by mail at the following address:
   South Carolina Board of Health and Environmental Control
   Attention: Clerk of the Board
   2600 Bull Street
   Columbia, South Carolina 29201
   Alternatively, RFR's may be filed with the Clerk by facsimile (803-898-3393) or by electronic mail (boardclerk@dhec.sc.gov).
4. The filing fee may be paid by cash, check or credit card and must be received by the 15th day.
5. If there is any perceived discrepancy in compliance with this RFR filing procedure, the Clerk should consult with the Chairman or, if the Chairman is unavailable, the Vice-Chairman. The Chairman or the Vice-Chairman will determine whether the RFR is timely and properly filed and direct the Clerk to (1) process the RFR for consideration by the Board or (2) return the RFR and filing fee to the requestor with a cover letter explaining why the RFR was not timely or properly filed. Processing an RFR for consideration by the Board shall not be interpreted as a waiver of any claim or defense by the agency in subsequent proceedings concerning the RFR.
6. If the RFR will be processed for Board consideration, the Clerk will send an Acknowledgement of RFR to the Requestor and the applicant, permittee, or licensee, if other than the Requestor. All personal and financial identifying information will be redacted from the RFR and accompanying documentation before the RFR is released to the Board, Department staff or the public.
7. If an RFR pertains to an emergency order, the Clerk will, upon receipt, immediately provide a copy of the RFR to all Board members. The Chairman, or in his or her absence, the Vice-Chairman shall based on the circumstances, decide whether to refer the RFR to the RFR Committee for expedited review or to decline in writing to schedule a Final Review Conference. If the Chairman or Vice-Chairman determines review by the RFR Committee is appropriate, the Clerk will forward a copy of the RFR to Department staff and Office of General Counsel. A Department response and RFR Committee review will be provided on an expedited schedule defined by the Chairman or Vice-Chairman.
8. The Clerk will email the RFR to staff and Office of General Counsel and request a Department Response within eight (8) working days. Upon receipt of the Department Response, the Clerk will forward the RFR and Department Response to all Board members for review, and all Board members will confirm receipt of the RFR to the Clerk by email. If a Board member does not confirm receipt of the RFR within a twenty-four (24) hour period, the Clerk will contact the Board member and confirm receipt. If a Board member believes the RFR should be considered by the RFR Committee, he or she will

respond to the Clerk's email within forty-eight (48) hours and will request further review. If no Board member requests further review of the RFR within the forty-eight (48) hour period, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Final Review Conference. Contested case guidance will be included within the letter.
NOTE: If the time periods described above end on a weekend or State holiday, the time is automatically extended to 5:00 p.m. on the next business day.

9. If the RFR is to be considered by the RFR Committee, the Clerk will notify the Presiding Member of the RFR Committee and the Chairman that further review is requested by the Board. RFR Committee meetings are open to the public and will be public noticed at least 24 hours in advance.
10. Following RFR Committee or Board consideration of the RFR, if it is determined no Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Conference. Contested case guidance will be included within the letter.

II. Final Review Conference Scheduling

1. If a Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, informing the Requestor of the determination.
2. The Clerk will request Department staff provide the Administrative Record.
3. The Clerk will send Notice of Final Review Conference to the parties at least ten (10) days before the Conference. The Conference will be publically noticed and should:
   - include the place, date and time of the Conference;
   - state the presentation times allowed in the Conference;
   - state evidence may be presented at the Conference;
   - if the conference will be held by committee, include a copy of the Chairman's order appointing the committee; and
   - inform the Requestor of his or her right to request a transcript of the proceedings of the Conference prepared at Requestor's expense.
4. If a party requests a transcript of the proceedings of the Conference and agrees to pay all related costs in writing, including costs for the transcript, the Clerk will schedule a court reporter for the Conference.

III. Final Review Conference and Decision

1. The order of presentation in the Conference will, subject to the presiding officer's discretion, be as follows:
   - Department staff will provide an overview of the staff decision and the applicable law to include [10 minutes]:
     - Type of decision (permit, enforcement, etc.) and description of the program.
     - Parties
     - Description of facility/site
     - Applicable statutes and regulations
     - Decision and materials relied upon in the administrative record to support the staff decision.
   - Requestor(s) will state the reasons for protesting the staff decision and may provide evidence to support amending, modifying, or rescinding the staff decision. [15 minutes] *NOTE: The burden of proof is on the Requestor(s)*
   - Rebuttal by Department staff [15 minutes]
   - Rebuttal by Requestor(s) [10 minutes]

   Note: Times noted in brackets are for information only and are superseded by times stated in the Notice of Final Review Conference or by the presiding officer.
2. Parties may present evidence during the conference; however, the rules of evidence do not apply.
3. At any time during the conference, the officers conducting the Conference may request additional information and may question the Requestor, the staff, and anyone else providing information at the Conference.
4. The presiding officer, in his or her sole discretion, may allow additional time for presentations and may impose time limits on the Conference.
5. All Conferences are open to the public.
6. The officers may deliberate in closed session.
7. The officers may announce the decision at the conclusion of the Conference or it may be reserved for consideration.
8. The Clerk will mail the written final agency decision (FAD) to parties within 30 days after the Conference. The written decision must explain the basis for the decision and inform the parties of their right to request a contested case hearing before the Administrative Law Court or in matters pertaining to decisions under the South Carolina Mining Act, to request a hearing before the South Carolina Mining Council. The FAD will be sent by certified mail, return receipt requested.
9. Communications may also be sent by electronic mail, in addition to the forms stated herein, when electronic mail addresses are provided to the Clerk.

The above information is provided as a courtesy; parties are responsible for complying with all applicable legal requirements.

dhec
Healthy People. Healthy Communities

Invoice for Services

Invoice No.

Bureau of Financial Management / Sims/Aycock Building
2600 Bull St, Columbia, South Carolina 29201

PC20202-8

Invoice To:
MEDICAL UNIVERSITY HOSPITAL AUTHORITY
PATRICK J. CAWLEY, MD
169 ASHLEY AVE
CHARLESTON, SC 29425-

Ship To:
S.C. DHEC
Attention: Bureau of Financial Management
2600 Bull Street
Columbia, South Carolina 29201

Date:	Terms:	Department Name	Order Filled By:
2017-05-25	**DUE UPON RECEIPT**	Planning and Programs	GERRALN

Description of Services: CERTIFICATE OF NEED FILING FEE

Qnty	Unit Description	Loc	Organ.	Fund	Account	Analytical	Unit Price	Amount
1	CERTIFICATE OF NEED FILING FEE (2449)	400	402011	428015	4486701	0000000	$500.00	$500.00
							Total:	$500.00

Payment can be made by credit card by completing the below form or by visiting www.scdhec.com and clicking on "Invoice Payment" under the Quick Links.

Name as it appears on credit card

Telephone Number

Mailing Address

Master Card / Visa / Discover
Type of card (circle one)

Credit card Number

Expiration Date

Signature

Note: Make checks payable to South Carolina Department of Health and Environmental Control, remit to above address to the Attention of: Bureau of Financial Management

CON 381

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

NOTICE OF GENERAL PUBLIC INTEREST

In accordance with Section 44-7-200(D), Code of Laws of South Carolina, the public is hereby notified that a Certificate of Need application has been accepted for filing and publication May 26, 2017 for the following project(s). After the application is deemed complete, affected persons will be notified that the review cycle has begun. For further information, please contact Nic Gerrald, Certificate of Need Program, 2600 Bull Street, Columbia, SC 29201 at (803) 545-3495.

Affecting Beaufort County

Hilton Head Island System, L.P. d/b/a Hilton Head Hospital
Development of inpatient psychiatric services with the addition of 16 psychiatric beds at a total project cost of $2,195,355.

In accordance with Section 44-7-210(A), Code of Laws of South Carolina, and S.C. DHEC Regulation 61-15, the public and affected persons are hereby notified that for the following projects, applications have been deemed complete, and the review cycle has begun. A proposed decision will be made as early as 30 days, but no later than 120 days, from May 26, 2017. "Affected persons" have 30 days from the above date to submit requests for a public hearing to Nic Gerrald, Certificate of Need Program, 2600 Bull Street, Columbia, S.C. 29201. If a public hearing is timely requested, the Department's decision will be made after the public hearing, but no later than 150 days from the above date. For further information call (803) 545-3495.

Affecting Beaufort County

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Development of inpatient psychiatric services with the addition of 16 psychiatric beds at a total project cost of $2,195,355.

Affecting Berkeley County

Trident Medical Center, LLC d/b/a Summerville Freestanding ED
Construction of a freestanding emergency department in Berkeley County at a total project cost of $13,079,900.

Affecting Charleston County

Bishop Gadsden Episcopal Retirement Community
Conversion of 9 existing institutional beds to 9 non-institutional community nursing home beds for a total of 50 non-institutional beds at a total project cost of $0.00.

Affecting Chesterfield County

Liberty Home Care, LLC d/b/a Liberty Home Care – Bennettsville
Establishment of a Home Health Agency in Chesterfield County at a total project cost of $0.00.

Affecting Georgetown County

Liberty Home Care, LLC d/b/a Liberty Home Care - Myrtle Beach
Establishment of a Home Health Agency in Georgetown County at a total project cost of $0.00.

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