

Supplementary material for Gasic D, et al. A treatment planning and delivery comparison of volumetric modulated arc therapy with or without flattening filter for gliomas, brain metastases, prostate, head/neck and early stage lung cancer. Acta Oncol 2014;53:1005–11.

Supplementary Table 1: Metrics used for treatment planning and optimization as well as target normalization values and objectives

	Brain	H&N	SRS* Lung	Prostate	SRS* Multiple Met.	SRS* Single Met.
# of Arcs	2	2	2	1	2	2
# of degrees / arc (°)	358	358	160	358	358	358
PTV [†] (cm ³)	329 (139-553)	548 (322-873)	40 (11-101)	144 (62-177)	7 (2-20)	18 (2-33)
Coplanar	yes	yes	yes	N/A	yes	yes
Collimator angles	10° & 350° / 30° & 330°	10° & 350°	10° & 350°	30°	10° & 350°	mostly 100° & 260°
Prescribed dose (Gy)	60	66 / 60 / 54	45	78	18	18
# of fractions	30	33	3	39	1	1
Normalization	PTV _{mean} =100% Covered by 95% PD [‡]	PTV 66 Gy _{mean} =100% Covered by 95% PD [‡]	PTV _{mean} =100% Covered by 95% PD [‡]	PTV _{mean} =100% Covered by 95% PD [‡]	GTV _{min} = 100% Covered by 100% PD [‡]	GTV _{min} = 100% Covered by 100% PD [‡]
Target objective						

* SRS - stereotactic radiosurgery

† PTV- Planning target volume (N.B. PTV equals GTV for brain metastases and equals low-risk elective PTV for H&N). Data presented as median and range

‡ PD - Prescribed dose

Supplementary Table 2: Planning objectives and dose constraints used during treatment planning and optimization for the different cohorts and their OARs

	Brain	H&N	SRS* Lung	Prostate	SRS* Multiple Met.	SRS* Single Met.
Brainstem	Max 54 Gy	Max 54 Gy			Max 13 Gy	Max 13 Gy
Whole brain	V _{50Gy} < 50%				No constraint	No constraint
Hippocampus (L/R)	Mean < 5 Gy				Mean < 5 Gy	Mean < 5 Gy
Chiasm	Max 54 Gy				Max 13 Gy	Max 13 Gy
Eye (L/R)	Max 5 Gy				Max < 1 Gy	Max < 1 Gy
Lens (L/R)	Max 2 Gy				Max < 1 Gy	Max < 1 Gy
Inner ear (L/R)	Max 40 Gy	Mean < 45 Gy D _{95%} < 55 Gy			Max 13 Gy	Max 13 Gy
Medulla		Max 45 Gy	Max 15 Gy			
Parotid Glands (L/R)		Mean < 26 Gy				
Larynx		V _{50Gy} < 33%		Max 74 Gy V _{70Gy} < 10% V _{60Gy} < 40% V _{50Gy} < 50% Max 75 Gy V _{74Gy} < 5% V _{50Gy} < 50% Max 50 Gy		
Rectum						
Bladder						
Hip (L/R)						
Esophagus			Max 27 Gy			
Bilateral lung			V _{15Gy} < 20%			
Heart			Max 30 Gy			
Primary Bronchi			Max 30 Gy			
Trachea			Max 30 Gy			
Body	Max 105% of PD†	Max 105% of PD†	No constraint	Max 105% of PD†	No constraint	No constraint

* SRS - stereotactic radiosurgery

† PD - Prescribed dose

Supplementary Table 3: Results for PTV coverage (PTV $V_{95\%}$), homogeneity index (HI), conformity index (CI), organs at risk (OARs) and healthy tissue, beam delivery time (Time) and number of monitor units per prescribed Gy for the high grade glioma patients. Bold type indicates significant difference ($p < 0.05$) of STD vs. FFF with the same photon energy

PTV $V_{95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	98.6 / 97.9	1.1	96.3-100	0.001	2.2
FFF 6X	97.6 / 96.8	2.2	91.7-100		
STD 10X	98.7 / 98.1	1.2	96.4-100	0.001	2.6
FFF 10X	97.1 / 96.7	2.7	90.2-100		
HI	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	98.6 / 97.9	1.2	96.3-100	0.001	2.2
FFF 6X	97.5 / 96.6	2.2	91.7-100		
STD 10X	98.6 / 98.1	1.2	96.4-100	0.001	2.6
FFF 10X	97.1 / 96.6	2.6	90.2-100		
CI	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	88.8 / 89.5	4.1	80.3-94.9	0.296	4.0
FFF 6X	88.6 / 89.3	4.1	80.6-95.0		
STD 10X	89.6 / 90.3	3.8	81.4-95.6	0.412	3.8
FFF 10X	89.8 / 90.6	3.9	82.7-95.5		
Brainstem (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	38.0 / 33.8	18.8	3.1-54.3	0.365	11.1
FFF 6X	37.9 / 33.6	18.7	3.3-54.1		
STD 10X	38.3 / 34.9	18.8	2.9-54.5	0.117	11.2
FFF 10X	38.1 / 34.2	18.8	2.8-54.1		
Brain V_{50Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	24.4 / 26.6	10.3	8.6-44.8	0.048	8.7
FFF 6X	23.8 / 26.5	9.6	8.6-38.6		
STD 10X	24.5 / 26.7	10.5	8.7-45.3	0.002	8.7
FFF 10X	23.6 / 26.4	9.6	8.7-38.6		
Time (s)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	119 / 119	0.3	119-120	0.500	0
FFF 6X	119 / 119	0	119-119		
STD 10X	119 / 119	0.3	119-120	0.500	0
FFF 10X	119 / 119	0	119-119		
MU/Gy	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	212 / 217	34.0	159-280	0.001	28.0
FFF 6X	224 / 222	32.0	176-293		
STD 10X	195 / 204	32.3	144-251	0.001	31.4
FFF 10X	216 / 213	28.6	176-272		

Abbreviations: STD 6X = 6 MV conventional RapidArc, FFF 6X = 6 MV RapidArc without flattening filter, STD 10X = 10 MV conventional RapidArc, FFF 10X = 10 MV RapidArc without flattening filter

* P-value corresponds to a signed Wilcoxon test used to compare standard with flattening filter free beams

Supplementary Table 4: Results for PTV coverage (PTV-T, PTVE-L and PTVE-H $V_{95\%}$), homogeneity index (HI), conformity index (CI), organs at risk (OARs), beam delivery time (Time) and number of monitor units per prescribed Gy for the head and neck patients with oropharyngeal cancer. Bold type indicates significant difference ($p < 0.05$) of STD vs. FFF with the same photon energy

PTV-T $V_{95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	98.7 / 98.5	1.3	95.5-100	0.001	2.5
FFF 6X	97.6 / 95.4	2.6	93.9-99.9		
STD 10X	98.0 / 97.9	1.6	96.1-100	0.001	3.6
FFF 10X	95.9 / 92.6	3.7	88.2-99.8		
PTVE-H $V_{95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	99.3 / 99.4	0.4	94.6-99.9	0.001	0.7
FFF 6X	99.2 / 99.2	0.7	96.3-99.9		
STD 10X	98.6 / 99.1	0.8	93.5-99.8	0.145	1.3
FFF 10X	98.4 / 98.1	1.3	95.3-99.9		
PTVE-L $V_{95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	99.4 / 99.6	0.4	98.0-100	0.001	0.5
FFF 6X	99.1 / 99.0	0.5	97.7-100		
STD 10X	98.8 / 99.4	0.7	96.4-100	0.009	1.3
FFF 10X	98.3 / 98.0	1.3	96.0-100		
HI_{PTVE-L}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	92.2 / 93.5	8.9	62.3-99.8	0.003	7.4
FFF 6X	89.8 / 87.6	8.1	69.2-99.4		
STD 10X	90.0 / 92.7	8.0	73.4-99.4	0.001	10.5
FFF 10X	84.6 / 83.6	11.2	57.1-99.3		
CI_{PTVE-L}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	72.7 / 72.9	4.0	61.1-77.1	0.001	4.0
FFF 6X	71.4 / 71.1	4.2	61.4-77.7		
STD 10X	72.8 / 73.2	4.0	63.9-77.4	0.001	4.1
FFF 10X	70.9 / 72.4	4.3	59.4-76.7		
Medulla (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	42.5 / 42.8	0.9	40.3-43.7	0.001	1.2
FFF 6X	42.9 / 43.8	1.2	40.0-43.9		
STD 10X	42.5 / 42.8	0.9	39.6-43.9	0.001	1.1
FFF 10X	43.2 / 43.6	1.1	41.1-44.9		
Time (s)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	119 / 119	0.2	119-120	0.999	0.2
FFF 6X	119 / 119	0.2	119-120		
STD 10X	119 / 119	0.0	119-119	0.999	0.0
FFF 10X	119 / 119	0.0	119-119		
MU/Gy	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	217 / 227	35.8	174-328	0.003	18.5
FFF 6X	234 / 239	18.9	199-263		
STD 10X	197 / 209	24.3	154-236	0.001	16.0
FFF 10X	235 / 245	16.3	208-266		

Abbreviations: STD 6X = 6 MV conventional RapidArc, FFF 6X = 6 MV RapidArc without flattening filter, STD 10X = 10 MV conventional RapidArc, FFF 10X = 10 MV RapidArc without flattening filter

* P-value corresponds to a signed Wilcoxon test used to compare standard with flattening filter free beams

Supplementary Table 5: Results for PTV coverage (PTV $V_{95\%}$), homogeneity index (HI), conformity index (CI), organs at risk (OARs), beam delivery time (Time) and number of monitor units per prescribed Gy for the patients with prostate cancer. Bold type indicates significant difference ($p < 0.05$) of STD vs. FFF with the same photon energy

PTV $V_{95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	95.0 / 93.9	3.3	85.9-98.9	0.601	3.2
FFF 6X	94.8 / 94.6	3.3	85.8-99.1		
STD 10X	94.2 / 93.0	3.6	84.9-98.4	0.970	3.3
FFF 10X	94.2 / 93.1	3.4	85.4-98.8		
HI$_{V95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	94.9 / 93.9	3.3	85.8-98.9	0.502	3.2
FFF 6X	94.8 / 94.5	3.3	85.7-99.1		
STD 10X	94.2 / 93.0	3.6	84.9-98.4	0.999	3.3
FFF 10X	94.2 / 93.1	3.4	85.4-98.8		
CI$_{V95\%}$	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	88.0 / 90.2	3.7	79.7-93.2	0.576	3.4
FFF 6X	88.3 / 90.5	3.5	81.0-92.3		
STD 10X	89.3 / 91.5	3.8	79.1-93.6	0.204	3.7
FFF 10X	89.6 / 91.9	3.8	81.2-94.4		
Rectum V_{70Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	6.6 / 6.2	2.6	3.6-12.7	0.478	2.4
FFF 6X	6.6 / 6.3	2.3	4.1-11.6		
STD 10X	6.5 / 5.8	2.7	3.0-13.3	0.010	2.8
FFF 10X	7.0 / 6.8	2.7	3.2-12.9		
Rectum V_{60Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	15.6 / 13.7	5.4	10.6-29.6	0.737	4.3
FFF 6X	15.3 / 13.3	4.3	9.9-23.2		
STD 10X	15.2 / 13.1	4.7	10.1-28.1	0.030	4.8
FFF 10X	15.8 / 15.0	4.6	10.2-26.5		
Rectum V_{50Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	25.8 / 23.3	9.4	15.8-45.4	0.526	7.4
FFF 6X	25.3 / 21.4	7.7	14.2-41.6		
STD 10X	25.3 / 22.4	8.2	14.5-48.3	0.126	7.4
FFF 10X	26.0 / 25.0	7.3	16.4-43.2		
Time (s)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	63 / 62	2.7	60-69	0.002	1.3
FFF 6X	60 / 60	1.3	60-66		
STD 10X	61 / 61	1.2	60-64	0.001	0.0
FFF 10X	60 / 60	0.0	60-60		
MU/Gy	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	275 / 268	34.6	207-339	0.001	37.0
FFF 6X	310 / 302	37.8	243-384		
STD 10X	239 / 231	25.6	195-298	0.001	32.5
FFF 10X	267 / 253	33.3	204-331		

Abbreviations: STD 6X = 6 MV conventional RapidArc, FFF 6X = 6 MV RapidArc without flattening filter, STD 10X = 10 MV conventional RapidArc, FFF 10X = 10 MV RapidArc without flattening filter

* P-value corresponds to a signed Wilcoxon test used to compare standard with flattening filter free beams

Supplementary Table 6: Results for PTV coverage (PTV D_{Min}), GTV coverage (mean dose) conformity index (CI), organs at risk (OARs) and healthy tissue, beam delivery time (Time) and number of monitorunits per prescribed Gy for patients with early stage lung cancer. Bold type indicates significant difference (p<0.05) of STD vs. FFF with the same photon energy

PTV D_{min} (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	41.7 / 42.1	3.1	29.1-43.7	0.490	2.6
FFF 6X	41.7 / 42.5	3.2	28.8-43.7		
STD 10X	41.8 / 42.1	2.9	29.9-43.6	0.881	2.2
FFF 10X	41.8 / 41.9	2.6	31.3-43.6		
GTV_{Mean} (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	49.9 / 48.7	1.9	47.6-54.6	0.067	1.9
FFF 6X	49.7 / 48.1	2.0	47.1-55.9		
STD 10X	49.7 / 48.8	1.6	47.4-54.1	0.911	2.2
FFF 10X	49.9 / 48.7	2.2	47.5-57.7		
CI_{V95%}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	74.1 / 71.1	7.4	59.7-86.4	0.314	7.3
FFF 6X	74.2 / 72.0	7.5	60.7-87.7		
STD 10X	73.3 / 69.4	8.0	56.6-85.4	0.167	7.7
FFF 10X	73.3 / 69.9	8.0	58.7-86.2		
Medulla (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	8.7 / 8.4	2.7	4.7-14.6	0.036	2.9
FFF 6X	8.3 / 8.0	2.9	4.2-15.6		
STD 10X	9.2 / 9.3	2.7	5.6-15.7	0.010	3.7
FFF 10X	8.9 / 9.1	3.5	4.7-19.0		
Lungs_{V20Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	4.1 / 4.2	2.1	1.7-9.3	0.070	2.2
FFF 6X	4.1 / 4.0	2.0	1.6-9.1		
STD 10X	4.2 / 4.2	2.2	1.7-10.0	0.398	2.2
FFF 10X	4.2 / 4.2	2.1	1.7-9.6		
Time (s)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	296 / 273	32.8	240-375	0.001	30.9
FFF 6X	133 / 124	30.9	108-248		
STD 10X	289 / 274	34.9	241-374	0.001	7.5
FFF 10X	74 / 73	7.3	66-89		
MU/Gy	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	199 / 189	20.7	174-250	0.086	25.6
FFF 6X	203 / 199	25.7	169-248		
STD 10X	193 / 183	22.8	161-249	0.412	27.6
FFF 10X	196 / 186	27.5	166-248		

Abbreviations: STD 6X = 6 MV conventional RapidArc, FFF 6X = 6 MV RapidArc without flattening filter, STD 10X = 10 MV conventional RapidArc, FFF 10X = 10 MV RapidArc without flattening filter

* P-value corresponds to a signed Wilcoxon test used to compare standard with flattening filter free beams

Supplementary Table 7: Results for GTV coverage (mean dose), conformity index (CI), organs at risk (OARs) and healthy tissue, beam delivery time (Time) and number of monitor units prescribed Gy for the patients with intra-cranial metastatic cancer (single target). Bold type indicates significant difference ($p < 0.05$) of STD vs. FFF with the same photon energy

GTV_{Mean} (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	19.8 / 19.7	0.5	18.9-20.8	0.6542	0.5
FFF 6X	19.8 / 19.9	0.5	18.9-20.7		
STD 10X	19.9 / 19.9	0.4	19.1-20.9	0.5755	0.5
FFF 10X	19.8 / 19.8	0.5	19.0-20.9		
CI_{GTV}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	61.4 / 69.2	9.8	28.5-77.1	0.654	7.6
FFF 6X	61.8 / 67.7	9.3	31.2-75.7		
STD 10X	60.7 / 68.8	9.2	31.4-76.8	0.681	7.7
FFF 10X	60.6 / 67.3	9.3	28.9-75.8		
Brainstem (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	2.6 / 0.7	3.6	0.01-14.0	0.477	4.2
FFF 6X	2.6 / 0.7	3.6	0.01-14.0		
STD 10X	2.6 / 0.8	3.7	0.01-14.4	0.401	4.3
FFF 10X	2.6 / 0.7	3.7	0.01-14.4		
Hippocampus dx	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	0.9 / 0.9	1.4	0.01-4.7	0.511	1.4
FFF 6X	0.9 / 0.9	1.4	0.0-4.5		
STD 10X	0.9 / 1.0	1.4	0.01-4.5	0.748	1.4
FFF 10X	0.9 / 1.0	1.4	0.01-4.6		
Hippocampus sin	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	1.8 / 0.3	4.6	0.01-20.3	0.510	8.2
FFF 6X	1.8 / 0.3	4.5	0.01-20.1		
STD 10X	1.8 / 0.3	4.5	0.01-20.3	0.438	8.2
FFF 10X	1.8 / 0.2	4.5	0.0-20.1		
Brain V_{10-16Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	1.3 / 1.8	0.7	0.3-3.2	0.145	0.8
FFF 6X	1.3 / 1.8	0.7	0.3-3.2		
STD 10X	1.4 / 1.9	0.8	0.4-3.3	0.001	0.8
FFF 10X	1.4 / 1.9	0.8	0.4-3.4		
Time (s)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	391 / 359	31.6	349-453	0.001	11.4
FFF 6X	172 / 160	11.6	155-193		
STD 10X	368 / 338	31.6	324-426	0.001	1.2
FFF 10X	119 / 119	1.1	119-124		
MU/Gy	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	218 / 200	19.1	194-260	0.005	16.8
FFF 6X	224 / 207	16.9	201-262		
STD 10X	206 / 188	19.2	180-250	0.093	16.7
FFF 10X	202 / 182	16.9	177-234		

Abbreviations: STD 6X = 6 MV conventional RapidArc, FFF 6X = 6 MV RapidArc without flattening filter, STD 10X = 10 MV conventional RapidArc, FFF 10X = 10 MV RapidArc without flattening filter

* P-value corresponds to a signed Wilcoxon test used to compare standard with flattening filter free beams

Supplementary Table 8: Results for GTV coverage (mean dose), conformity index (CI), organs at risk (OARs) and healthy tissue, beam delivery time (Time) and number of monitor units per prescribed Gy for patients with intra-cranial metastatic cancer (multiple targets). Bold type indicate significant difference ($p < 0.05$) of STD vs. FFF with the same photon energy

GTV_{Mean} (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	19.9 / 19.4	1.0	19.1-22.6	0.108	1.1
FFF 6X	20.0 / 19.5	1.0	19.1-23.3		
STD 10X	19.9 / 19.3	1.0	19.1-22.9	0.601	1.0
FFF 10X	19.9 / 19.5	1.0	19.1-22.8		
CI_{GTV}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	53.8 / 57.2	8.1	41.4-66.8	0.351	7.9
FFF 6X	53.5 / 57.6	8.4	40.8-67.6		
STD 10X	53.0 / 58.4	8.2	40.9-65.8	0.627	7.8
FFF 10X	52.9 / 56.8	8.2	37.4-66.5		
Brainstem (Gy)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	3.8 / 2.5	3.3	0.1-10.8	0.444	2.6
FFF 6X	3.8 / 2.4	3.1	0.1-9.4		
STD 10X	3.9 / 2.7	3.4	0.1-10.6	0.498	3.0
FFF 10X	4.0 / 2.6	3.4	0.1-10.3		
Hippocampus dx	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	2.4 / 1.4	2.3	0.1-7.5	0.449	2.2
FFF 6X	2.3 / 1.4	2.2	0.1-7.7		
STD 10X	2.4 / 1.6	2.3	0.1-8.1	0.424	2.6
FFF 10X	2.5 / 1.6	2.5	0.1-8.1		
Hippocampus sin	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	2.6 / 3.4	2.6	0.1-10.2	0.924	3.2
FFF 6X	2.6 / 3.2	2.7	0.1-10.4		
STD 10X	2.6 / 3.2	2.7	0.1-10.9	0.127	3.5
FFF 10X	2.8 / 3.4	2.9	0.1-11.6		
Brain V_{10-16Gy}	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	2.7 / 1.7	2.0	0.5-7.9	0.433	2.5
FFF 6X	2.8 / 1.7	2.1	0.5-8.1		
STD 10X	2.9 / 1.9	2.0	0.6-7.5	0.794	2.6
FFF 10X	2.9 / 2.0	2.2	0.6-8.3		
Time (s)	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	407 / 469	54.2	307-548	0.001	24.8
FFF 6X	195 / 208	24.3	164-253		
STD 10X	382 / 436	51.0	275-515	0.001	6.0
FFF 10X	124 / 129	6.4	119-145		
MU/Gy	Mean/Median	SD	Range	P-value*	SD of STD-FFF
STD 6X	234 / 261	31.6	192-305	0.001	40.8
FFF 6X	262 / 270	39.6	215-365		
STD 10X	220 / 243	28.3	185-287	0.001	30.3
FFF 10X	248 / 271	29.4	201-324		

Abbreviations: STD 6X = 6 MV conventional RapidArc, FFF 6X = 6 MV RapidArc without flattening filter, STD 10X = 10 MV conventional RapidArc, FFF 10X = 10 MV RapidArc without flattening filter

* P-value corresponds to a signed Wilcoxon test used to compare standard with flattening filter free beams