

Dose Volume Histogram Limits

Conventional Fractionation

Structure Name	Type	Volume	Dose	Notes
Brachial plexus	Max Dose	None	<66 Gy	1
Brachial plexus	Volume (%)	5%	<60 Gy	1
Brainstem	Max Dose	None	<54 Gy	2
Brainstem	Volume (%)	1%	<60 Gy	2 (1% of PTV)
Cochlea	Volume (%)	5%	<55 Gy	3
Ears (inner/middle)	Mean Dose	None	<50 Gy	4
Eyes	Max Dose	None	<50 Gy	3
Eyes	Mean Dose	None	<35 Gy	4
Glottic larynx	Mean Dose	None	<45 Gy	4
Lens	Max Dose	None	<25 Gy	5
Mandible	Max Dose	None	<70 Gy	2
Mandible	Volume (cc)	<1cc	75 Gy	2
Optic nerves	Max Dose	None	<54 Gy	2
Optic nerves	Volume (%)	1%	<60 Gy	2 (1% of PTV)
Oral cavity	Mean Dose	None	<40 Gy	3 (excluding PTV)
Parotid gland (one)	Mean Dose	None	<26 Gy	6 (if sparing one)
Parotid gland (one)	Volume (%)	50%	<30 Gy	6 (if sparing one)
Parotid gland (both)	Volume (cc)	<20cc	20 Gy	6 (if sparing both)
Temporal lobes	Max Dose	None	<60 Gy	2
Temporal lobes	Volume (%)	1%	<65 Gy	2 (1% of PTV)
T-M joint	Max Dose	None	<70 Gy	2
T-M joint	Volume (cc)	<1cc	75 Gy	2
Tongue	Max Dose	None	<55 Gy	2
Tongue	Volume (%)	1%	<65 Gy	2 (1% of PTV)
Esophagus	Mean Dose	None	<35 Gy	7 (45 Gy if necessary)
Esophagus	Volume (%)	15%	<54 Gy	7 (65 Gy if necessary)
Esophagus	Volume (%)	33%	<45 Gy	7 (50 Gy if necessary)
Heart	Volume (%)	33%	<60 Gy	8
Heart	Volume (%)	67%	<45 Gy	8
Heart	Volume (%)	100%	<40 Gy	8
Lung (right and left)	Mean Dose	None	<20 Gy	9 (lung minus GTV)
Lung (right and left)	Volume (%)	37%	<20 Gy	9 (lung minus GTV)
Pharyngeal constrictor	Mean Dose	None	<54 Gy	10
Pharyngeal constrictor	Volume (%)	51%	<50 Gy	10
Pharyngeal constrictor	Volume (%)	60%	<52 Gy	10
Duodenum	Max Dose	None	<60 Gy	11
Duodenum	Volume (%)	33%	<45 Gy	11
Kidney	Volume (%)	33%	<50 Gy	12
Kidney	Volume (%)	67%	<30 Gy	12
Kidney	Volume (%)	100%	<23 Gy	12
Liver	Volume (%)	50%	<35 Gy	13
Liver	Volume (%)	100%	<30 Gy	13
Small intestine	Max Dose	None	<50 Gy	14
Small intestine	Volume (cc)	<100cc	40 Gy	14
Small intestine	Volume (cc)	<180cc	35 Gy	14
Small intestine	Volume (cc)	<65cc	45 Gy	14
Stomach	Max Dose	None	<54 Gy	11
Stomach	Volume (%)	2%	<50 Gy	11
Stomach	Volume (%)	25%	<45 Gy	11
Bladder	Volume (%)	15%	<80 Gy	15
Bladder	Volume (%)	25%	<75 Gy	15
Bladder	Volume (%)	35%	<70 Gy	15
Bladder	Volume (%)	50%	<65 Gy	15
Femoral heads	Max Dose	None	<50 Gy	14
Femoral heads	Volume (%)	25%	<45 Gy	14
Femoral heads	Volume (%)	40%	<40 Gy	14
Penile bulb	Mean Dose	None	<52.5 Gy	15
Rectum	Volume (%)	15%	<75 Gy	15
Rectum	Volume (%)	25%	<70 Gy	15
Rectum	Volume (%)	35%	<65 Gy	15
Rectum	Volume (%)	50%	<60 Gy	15
Spinal cord	Max Dose	None	<45 Gy	16

1 Fraction SRS

Structure Name	Type	Volume	Dose	Notes
Brachial plexus	Max Dose	None	<17.5 Gy	17
Brachial plexus	Volume (cc)	<3cc	14 Gy	17
Brain	Volume (cc)	<10cc	10 Gy	18
Brainstem	Max Dose	None	<15 Gy	19
Brainstem	Volume (cc)	<0.5cc	10 Gy	19
Cochlea	Max Dose	None	<9 Gy	20
Optic nerves	Max Dose	None	<10 Gy	21
Optic nerves	Volume (cc)	<0.2cc	8 Gy	21
Bronchus	Max Dose	None	<13.3 Gy	22
Bronchus	Volume (cc)	<0.5cc	12.4 Gy	22
Esophagus	Max Dose	None	<15.4 Gy	23
Esophagus	Volume (cc)	<5cc	11.9 Gy	23
Great vessels	Max Dose	None	<37 Gy	24
Great vessels	Volume (cc)	<10cc	31 Gy	24
Heart	Max Dose	None	<22 Gy	25
Heart	Volume (cc)	<15cc	16 Gy	25
Lung (right and left)	Vol. to Spare	>1000cc	7.4 Gy	26
Lung (right and left)	Vol. to Spare	>1500cc	7 Gy	27
Rib	Max Dose	None	<30 Gy	28
Rib	Volume (cc)	<1cc	22 Gy	28
Trachea	Max Dose	None	<20.2 Gy	23
Trachea	Volume (cc)	<4cc	10.5 Gy	23
Colon	Max Dose	None	<18.4 Gy	29
Colon	Volume (cc)	<20cc	14.3 Gy	29
Duodenum	Max Dose	None	<12.4 Gy	30
Duodenum	Volume (cc)	<10cc	9 Gy	30
Duodenum	Volume (cc)	<5cc	11.2 Gy	30
Jejunum/ileum	Max Dose	None	<15.4 Gy	31
Jejunum/ileum	Volume (cc)	<5cc	11.9 Gy	31
Liver	Vol. to Spare	>700cc	9.1 Gy	32
Renal cortex (right and left)	Vol. to Spare	>200cc	8.4 Gy	33
Renal hilum/ vascular trunk	Volume (%)	66%	<10.6 Gy	34
Stomach	Max Dose	None	<12.4 Gy	35
Stomach	Volume (cc)	<10cc	11.2 Gy	35
Bladder wall	Max Dose	None	<18.4 Gy	36
Bladder wall	Volume (cc)	<15cc	11.4 Gy	36
Cauda equina	Max Dose	None	<16 Gy	21
Cauda equina	Volume (cc)	<5cc	14 Gy	21
Femoral heads	Volume (cc)	<10cc	14 Gy	37
Penile bulb	Max Dose	None	<34 Gy	38
Penile bulb	Volume (cc)	<3cc	14 Gy	38
Rectum	Max Dose	None	<18.4 Gy	39
Rectum	Volume (cc)	<20cc	14.3 Gy	39
Sacral plexus	Max Dose	None	<16 Gy	17
Sacral plexus	Volume (cc)	<5cc	14.4 Gy	17
Skin	Max Dose	None	<26 Gy	30
Skin	Volume (cc)	<10cc	23 Gy	30
Spinal cord	Max Dose	None	<14 Gy	40
Spinal cord	Volume (cc)	<0.35cc	10 Gy	40
Spinal cord	Volume (cc)	<1.2cc	7 Gy	40

3 Fraction SBRT

Structure Name	Type	Volume	Dose	Notes
Brachial plexus	Max Dose	None	<24 Gy	17
Brachial plexus	Volume (cc)	<3cc	20.4 Gy	17
Brainstem	Max Dose	None	<23.1 Gy	19
Brainstem	Volume (cc)	<0.5cc	18 Gy	19
Cochlea	Max Dose	None	<17.1 Gy	20
Optic nerves	Max Dose	None	<17.4 Gy	21
Optic nerves	Volume (cc)	<0.2cc	15.3 Gy	21
Bronchus	Max Dose	None	<23.1 Gy	22
Bronchus	Volume (cc)	<0.5cc	18.9 Gy	22
Esophagus	Max Dose	None	<25.2 Gy	23
Esophagus	Volume (cc)	<5cc	17.7 Gy	23
Great vessels	Max Dose	None	<45 Gy	24
Great vessels	Volume (cc)	<10cc	39 Gy	24
Heart	Max Dose	None	<30 Gy	25
Heart	Volume (cc)	<15cc	24 Gy	25
Lung (right and left)	Vol. to Spare	>1000cc	12.4 Gy	26
Lung (right and left)	Vol. to Spare	>1500cc	11.6 Gy	27
Rib	Max Dose	None	<36.9 Gy	28
Rib	Volume (cc)	<1cc	28.8 Gy	28
Rib	Volume (cc)	<30cc	30 Gy	28
Trachea	Max Dose	None	<30 Gy	23
Trachea	Volume (cc)	<4cc	15 Gy	23
Colon	Max Dose	None	<28.2 Gy	29
Colon	Volume (cc)	<20cc	24 Gy	29
Duodenum	Max Dose	None	<22.2 Gy	30
Duodenum	Volume (cc)	<10cc	11.4 Gy	30
Duodenum	Volume (cc)	<5cc	16.5 Gy	30
Jejunum/ileum	Max Dose	None	<25.2 Gy	31
Jejunum/ileum	Volume (cc)	<5cc	17.7 Gy	31
Liver	Vol. to Spare	>700cc	19.2 Gy	32
Renal cortex (right and left)	Vol. to Spare	>200cc	16 Gy	33
Renal hilum/ vascular trunk	Volume (%)	66%	<18.6 Gy	34
Stomach	Max Dose	None	<22.2 Gy	35
Stomach	Volume (cc)	<10cc	16.5 Gy	35
Bladder wall	Max Dose	None	<28.2 Gy	36
Bladder wall	Volume (cc)	<15cc	16.8 Gy	36
Cauda equina	Max Dose	None	<24 Gy	21
Cauda equina	Volume (cc)	<5cc	21.9 Gy	21
Femoral heads	Volume (cc)	<10cc	21.9 Gy	37
Penile bulb	Max Dose	None	<42 Gy	38
Penile bulb	Volume (cc)	<3cc	21.9 Gy	38
Rectum	Max Dose	None	<28.2 Gy	39
Rectum	Volume (cc)	<20cc	24 Gy	39
Sacral plexus	Max Dose	None	<24 Gy	17
Sacral plexus	Volume (cc)	<5cc	22.5 Gy	17
Skin	Max Dose	None	<33 Gy	30
Skin	Volume (cc)	<10cc	30 Gy	30
Spinal cord	Max Dose	None	<21.9 Gy	40
Spinal cord	Volume (cc)	<0.35cc	18 Gy	40
Spinal cord	Volume (cc)	<1.2cc	12.3 Gy	40

5 Fraction SBRT

Structure Name	Type	Volume	Dose	Notes
Brachial plexus	Max Dose	None	<30.5 Gy	17
Brachial plexus	Volume (cc)	<3cc	27 Gy	17
Brainstem	Max Dose	None	<31 Gy	19
Brainstem	Volume (cc)	<0.5cc	23 Gy	19
Cochlea	Max Dose	None	<25 Gy	20
Optic nerves	Max Dose	None	<25 Gy	21
Optic nerves	Volume (cc)	<0.2cc	23 Gy	21
Bronchus	Max Dose	None	<33 Gy	22
Bronchus	Volume (cc)	<0.5cc	21 Gy	22
Esophagus	Max Dose	None	<35 Gy	23
Esophagus	Volume (cc)	<5cc	19.5 Gy	23
Great vessels	Max Dose	None	<53 Gy	24
Great vessels	Volume (cc)	<10cc	47 Gy	24
Heart	Max Dose	None	<38 Gy	25
Heart	Volume (cc)	<15cc	32 Gy	25
Lung (right and left)	Vol. to Spare	>1000cc	13.5 Gy	26
Lung (right and left)	Vol. to Spare	>1500cc	12.5 Gy	27
Rib	Max Dose	None	<43 Gy	28
Rib	Volume (cc)	<1cc	35 Gy	28
Trachea	Max Dose	None	<40 Gy	23
Trachea	Volume (cc)	<4cc	16.5 Gy	23
Colon	Max Dose	None	<38 Gy	29
Colon	Volume (cc)	<20cc	25 Gy	29
Duodenum	Max Dose	None	<32 Gy	30
Duodenum	Volume (cc)	<10cc	12.5 Gy	30
Duodenum	Volume (cc)	<5cc	18 Gy	30
Jejunum/ileum	Max Dose	None	<35 Gy	31
Jejunum/ileum	Volume (cc)	<5cc	19.5 Gy	31
Liver	Vol. to Spare	>700cc	21 Gy	32
Renal cortex (right and left)	Vol. to Spare	>200cc	17.5 Gy	33
Renal hilum/ vascular trunk	Volume (%)	66%	<23 Gy	34
Stomach	Max Dose	None	<32 Gy	35
Stomach	Volume (cc)	<10cc	18 Gy	35
Bladder wall	Max Dose	None	<38 Gy	36
Bladder wall	Volume (cc)	<15cc	18.3 Gy	36
Cauda equina	Max Dose	None	<32 Gy	21
Cauda equina	Volume (cc)	<5cc	30 Gy	21
Femoral heads	Volume (cc)	<10cc	30 Gy	37
Penile bulb	Max Dose	None	<50 Gy	38
Penile bulb	Volume (cc)	<3cc	30 Gy	38
Rectum	Max Dose	None	<38 Gy	39
Rectum	Volume (cc)	<20cc	25 Gy	39
Sacral plexus	Max Dose	None	<32 Gy	17
Sacral plexus	Volume (cc)	<5cc	30 Gy	17
Skin	Max Dose	None	<39.5 Gy	30
Skin	Volume (cc)	<10cc	36.5 Gy	30
Spinal cord	Max Dose	None	<30 Gy	40
Spinal cord	Volume (cc)	<0.35cc	23 Gy	40
Spinal cord	Volume (cc)	<1.2cc	14.5 Gy	40

Notes and Sources

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|--|--|---------------------------------------|------------------------------------|
| 1: RTOG 0619 | 11: Spalding et al., Med Phys 34, 521-529 (2007) | 21: TG-101, neuritis | 31: TG-101, enteritis/obstruction |
| 2: RTOG 0225, use either max dose or volume | 12: RTOG 0436, renal insufficiency | 22: TG-101, stenosis with atelectasis | 32: TG-101, basic liver function |
| 3: RTOG 0615 | 13: RTOG 0436, clinical hepatitis | 23: TG-101, stenosis/fistula | 33: TG-101, basic renal function |
| 4: RTOG 0225 | 14: RTOG 0822 | 24: TG-101, aneurysm | 34: TG-101, malignant hypertension |
| 5: RTOG 0615, cataracts | 15: RTOG 0126 | 25: TG-101, pericarditis | 35: TG-101, ulceration/fistula |
| 6: RTOG 0912, xerostomia | 16: RTOG 0623, myelitis | 26: TG-101, pneumonitis | 36: TG-101, cystitis/fistula |
| 7: RTOG 0920 | 17: TG-101, neuropathy | 27: TG-101, basic lung function | 37: TG-101, necrosis |
| 8: RTOG 0623 | 18: Chin et al., J Neurosurg 94, 899-904 (2001) | 28: TG-101, pain or fracture | 38: TG-101, impotence |
| 9: RTOG 0623, clinical pneumonitis | 19: TG-101, cranial neuropathy | 29: TG-101, colitis/fistula | 39: TG-101, proctitis/fistula |
| 10: Caglar et al., IJROBP 72, 1110-1118 (2008) | 20: TG-101, hearing loss | 30: TG-101, ulceration | 40: TG-101, myelitis |



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