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## UC Irvine Previously Published Works

### Title

Dosimetric Comparison and Clinical Implications of Dose Calculation Algorithms for Stereotactic Body Radiation Therapy in Spine Metastases

### Permalink

<https://escholarship.org/uc/item/699503vg>

### Journal

International Journal of Radiation Oncology • Biology • Physics, 111(3)

### ISSN

0360-3016

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### Publication Date

2021-11-01

### DOI

10.1016/j.ijrobp.2021.07.1624

Peer reviewed

Yeboa: Research Grant; Brockman Foundation, MD Anderson Shirley Stein Award, MD Anderson Cancer Center. member for reviewing abstracts; ASTRO.M. McAleer: Honoraria; PREX S. p. A., AOSpine, Osler Institute. Speaker's Bureau; Osler Institute. Travel Expenses; Osler Institute. C. Tatsui: None. L.D. Rhines: None. A.J. Ghia: None.

### 3285

#### Radiotherapy in Grade 2 Ependymoma — Do or Do Not?

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**Purpose/Objective(s):** The debate of whether radiotherapy (RT) is essential part of primary treatment in patients (pts) with grade 2 ependymoma is still on and this study aims to evaluate its role.

**Materials/Methods:** Study inclusion criteria: histopathologically confirmed ependymoma grade II, at least 2 months of follow-up (FU) from the date of diagnosis. A retrospective analysis of all consecutive pts treated in years 1985 – 2019 was performed. In statistical analysis Kaplan - Meier method, log rank test and multivariate Cox regression model were used. A *P* value of  $\leq 0.05$  was regarded as being statistically significant. Inclusion criteria were met by 119 pts with median age of 35 (range 2-82), small predominance of woman (55% vs 45%) and brain location of the tumor (58% vs 42%). All had surgery as primary treatment with 47% R0 resection. RT was applied in 84 pts among whom 81 received radical treatment. In majority of cases (89%) pts received local irradiation. In case of pts with brain lesions total dose ranged from 30 to 60 Gy (median 54) and from 9 to 56 Gy (median 45) in case of spinal tumors. Recurrence of the disease was observed in 34 cases. Among them 18 had surgery combined with RT (7 pts), chemotherapy (2 pts) or both (4 pts). RT as sole treatment of recurrence was applied in 9 pts.

**Results:** Median follow-up was 66.7 months and during that time 17 pts died. Two-, 5- and 10-years overall survival (OS) of the whole group was 96%, 87% and 83%. Radical surgery (R0 vs R1/2) improved OS (*P*=0.004), but looking at the location of the tumor the difference was observed only in pts with brain lesions (*P*=0.01). RT, applied in case of R1/2 pts, did not improve OS irrespective of primary tumor location. Two-, 5- and 10-years progression free survival (PFS) was 85%, 68% and 51%, respectively. Looking at the treatment of recurrence, those who received RT as part of the treatment of the recurrent tumor had better OS (*P*=0.048) – 5- and 10- year OS of 85% and 78% vs 66% and 57%. In multivariate analysis radical surgery (R0 vs R1/2) and the use of radiotherapy in primary treatment improved PFS (*P*=0.018 and 0.007). Based on the location of the tumor positive influence of RT on PFS was observed only in case of pts with brain tumors (*P*=0.01) with no difference in case of spine lesions (*P*=0.2). Also, comparing those who had R1/2 surgery with R0 resection – the benefit of radiotherapy was only observed in R1/2 group (0.02).

**Conclusion:** RT in case of pts with grade 2 ependymoma is valuable treatment of recurrent disease. Patients with brain lesions after non-radical surgery might benefit from local irradiation in terms of progression free survival.

Author Disclosure: A.Napieralska: None. L.Miszczkyk: None.

### 3286

#### Dosimetric Comparison and Clinical Implications of Dose Calculation Algorithms for Stereotactic Body Radiation Therapy in Spine Metastases

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**Purpose/Objective(s):** Dose calculation algorithms for radiotherapy differ in their ability to handle patient-specific anatomy, tissue heterogeneity, and artificial implants, which is crucial in spine stereotactic body radiation therapy (SBRT), where a large dose gradient exists between normal organs and the tumor. We evaluate the dosimetric differences in 3 calculation algorithms: Collapsed Cone Convolution (CCC), Anisotropic Analytic Algorithm (AAA), and Acuros XB (AXB) for spine SBRT with and without metal implants. We hypothesize that clinical outcomes can be correlated with the accuracy of the algorithm and will show this through 3 clinical scenarios.

**Materials/Methods:** We retrospectively analyzed 41 spine SBRT plans from 27 patients, 15 with metal hardware. CCC plans (17) were recalculated with AAA and AXB and AXB plans (24) were recalculated with AAA. Planning target volume (PTV) coverage and maximum dose (Dmax) for spinal cord were compared with AXB as the standard, as it is the most accurate in accounting for tissue heterogeneity of the three algorithms. Chart review was completed to determine clinical correlations.

**Results:** Tumors of various histologies including Lung (22.0%), breast (19.5%), head & neck (17.1%), Renal Cell (14.6%) were studied. Treatments were delivered in 1-5 fractions (median 3) with Rx dose of 16-40 Gy (median 27), corresponding to BED<sub>10</sub> of 37.5-60 Gy (median 51.3). Overall (see Table), AAA tended to overestimate Dmax while CCC underestimated. Both algorithms overestimated the dose to 95% of PTV (D95). Those with metal near the target had a larger dose discrepancy, especially with CCC. With median follow up of 14.7 mo, poor local control was noted in 14 (34%) plans. Compared to plans with local control, these were more likely to have metal implants near the PTV (50%), with a larger degree of overestimation of PTV coverage compared to AXB, especially in plans calculated using CCC (Avg. 7.3% overestimation of D95).

**Conclusion:** AAA tends to overestimate both Dmax to spinal cord and PTV coverage compared to AXB. CCC tends to underestimate Dmax to the cord while also overestimating coverage. The differences were larger in the presence of metal implants. Larger dose differences were also noted in lesions that showed poor local control, especially with CCC. The clinical use of more accurate calculation algorithms such as AXB may result in improved outcomes of spine SBRT, especially in the post-operative setting.

Abstract 3286 — Table 1

	Dmax to Cord (Avg%, [range])	Dmax to target	D95 PTV
AAA vs. AXB	+ 2.5 [-8.7, +12.1]	+0.1 [-44.6, +5.9]	+2.5 [-2.5, +8.7]
Metal	+2.6 [-1.8, +12.1]	+1.0 [-4.9, +5.9]	+3.7 [-0.2, +8.7]
Nonmetal	+ 2.5 [-8.7, +10.1]	- 0.3 [-44.6, +5.1]	+1.8 [-2.5, +4.1]
CCC vs. AXB	-1.2 [-31.6, +9.4]	-5.9 [-32.5, +1.3]	+1.4 [-27.3, +9.1]
Metal	-3.5 [-31.6, +9.4]	-10.6 [-32.5, -5.3]	+1.5 [-27.3, +9.1]
Nonmetal	+0.2 [-5.6, +7.6]	-2.8 [-4.7, +11.0]	+1.4 [-6.3, +3.8]

Author Disclosure: A.S. Rao: None. M.P. Reilly: None. E.L. Chang: Honoraria; AbbVie; ASCO.J.C. Ye: Advisory Board; Novocure.

### 3287

#### Toxicity Related Patients Factors and Bevasizumab Use in Patients With Locally Advanced Cervical Cancer Treated With Definitive Chemoradiation and HDR Brachytherapy Boost

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**Purpose/Objective(s):** The purpose of this study is to identify factors associated with severe late toxicity and prognosis in women with locally