

### RADI-35. AN ANALYSIS OF RESPONSE ENDPOINTS FOR BRAIN METASTASIS PATIENTS TREATED WITH STEREOTACTIC RADIOSURGERY AND PD(L)-1 INHIBITORS

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**PURPOSE:** Recent trials have evaluated the role of anti-PD(L)-1 inhibitors alone in patients with newly diagnosed brain metastasis, resulting in a suggested paradigm shift. In the absence of randomized comparisons, an evaluation of outcomes for similar patients treated with radiotherapy are needed to provide baseline comparative data. **METHODS:** This retrospective cohort study included patients diagnosed with brain metastasis from 2010–2017 at a single tertiary care institution who received SRS and at least one anti-PD(L)-1 inhibitor. Primary endpoints included the rate of best intracranial response (either a complete [CR] or partial response [PR]), rate of intracranial benefit (percentage of patients with stable disease [SD] for at least 6 months), and overall objective response rates. **RESULTS:** 150 patients met the eligibility criteria for this study and the median follow-up time was 10 months (Range: 1–130 months). Only a minority of patients from this cohort would have been eligible for comparative systemic therapy alone trials: 8 (CheckMate 204, CM), 8 (ABC), and 50 patients (Yale Institutional trial, YI). Best intracranial objective response rates for these trial eligible patients were 64% (CM), 64% (ABC), and 72% (YI), respectively. The 6-month rates of intracranial benefit across patients were 75% (CM), 75% (ABC), and 93% (YI), respectively. The rates of either a CR, PR, or SD across trial eligible patients were 100% (CM), 100% (ABC), and 94% (YI), respectively. More than 50% of patients experienced out-of-field progression in each of the patient subgroups. **CONCLUSIONS:** Over a seven year period, very few patients treated with SRS and anti-PD(L)-1 inhibitor therapy in a busy academic practice would have been eligible for systemic therapy alone per trial eligibility criteria. In these highly favorable subgroups, patients experience high rates of objective response, best intracranial response, and intracranial benefit after SRS and anti-PD(L)-1 therapy, representing optimal brain metastasis management.

### RADI-36. FRAME-BASED VERSUS FRAMELESS GAMMA KNIFE RADIOSURGERY FOR BRAIN METASTASES

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**INTRODUCTION:** Brain metastases occur in 10 to 40% of cancer patients. In an effort to avoid the neurocognitive toxicities of whole brain radiation therapy, stereotactic radiosurgery (SRS) has become the preferred treatment option for most brain metastases. Many cancer patients will require several rounds of SRS during the course of their disease. Frame-based radiosurgery causes physical discomfort with each treatment session. We present our experience with frameless Gamma Knife radiosurgery (GKRS) and compare the clinical outcomes to frame-based treatments in the same patient cohort. **METHODS:** We evaluated all patients with brain metastases who underwent both frame-based and frameless SRS, using the Gamma Knife ICON, between January 2017 and November 2018. 11 patients with 110 unique lesions were included in this analysis. Clinical outcomes, including local control, were compared between the two treatment modalities. **RESULTS:** Mean patient age was 60.0 (range: 41 – 76) years. Median follow-up was 7.9 (range: 0 – 22.1) months. Median number of metastases treated was 4 (range: 1 – 9) per frame-based treatment and 3 (range: 1 – 10) per frameless treatment. Median number of frame-based and frameless procedures, per patient, was 1 (range: 1 – 3) and 1 (range: 1 – 2), respectively. Median tumor volume was 0.06 (range: 0.01 – 11.49) cm<sup>3</sup> in the frame-based treatments and 0.14 (range: 0.01 – 4.22) cm<sup>3</sup> in the frameless treatments. Median margin dose was 18 Gy for both the frame-based and frameless treatments. Local control was 86.5 and 91.5% at 6 and 9 months post-treatment, respectively in the frame-based treatments and 82.8 and 87.5% at 6 and 9 months post-treatment, respectively in the frameless treatments. **CONCLUSIONS:** Frameless GKRS results in similar rates of local control compared to frame-based GKRS. This treatment option should be considered in patients undergoing GKRS, as it balances clinical outcomes with patient comfort.

### RADI-37. CLINICAL RISK FACTORS FOR INTRACRANIAL HEMORRHAGE OF SOLID MELANOMA BRAIN METASTASES AFTER RADIOSURGERY

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**PURPOSE:** Melanoma brain metastases (MBM) are among the most common solid tumors associated with intracranial hemorrhage (ICH). Our objective is to investigate risk factors for post-radiosurgery intracranial

hemorrhage (PRH). **METHODS:** We collected demographic, clinical, treatment, toxicity, survival, and imaging data for patients with solid MBM who underwent SRS between 2000 and 2016 at our institution. Bleed free survival (BFS) and overall survival (OS) analyses were performed using Kaplan-Meier methods. Logistic regression was used to identify PRH risk factors. **RESULTS:** From 2000 to 2016, 107 patients with a total of 548 solid MBM received SRS. Median patient age at time of SRS was 63.2 years. Median MBM volume was 2.8 cm<sup>3</sup> (range 0.01–21.3 cm<sup>3</sup>). MBM were in the cortex (n = 431), cerebellum (n = 85), basal ganglia (n = 23), and brain stem (n = 9). MBM were treated to a median dose of 20 Gy (range 14–20 Gy). Seventeen patients received immunotherapy (IT) within 1 year of SRS, 7 patients received concurrent immunotherapy (XR-IT). Median follow-up and OS was 13.5 months and 10.8 months, respectively. Median BFS was 8.3 months. PRH occurred in 123 MBM (22%). MBM volume (p = 0.0001), total MBM volume (p = 0.0006), IT (p = 0.04), and XR-IT (p = 0.03) were associated with increased PRH. PRH cumulative incidence within 24 mo of SRS was increased in MBM > 2.8 cm<sup>3</sup> compared with patients with smaller MBM: 27.5% versus 5.3%, respectively. Age, sex, hypertension, MBM location, total MBM number, and marginal dose (p > 0.05) did not significantly impact risk of PRH. No significant difference in 6, 12, or 24 mo actuarial OS rates were observed in patients with PRH (p > 0.05). **CONCLUSIONS:** Patients with larger MBM volume and IT within 1 year of SRS have the greatest risk of PRH. PRH did not significantly impact OS in this study.

### RADI-39. EFFECT OF RIND-BASED DOSIMETRIC TECHNIQUES FOR SCALP DOSE REDUCTION IN BRAIN IRRADIATION

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**OBJECTIVE:** Radiation-induced alopecia is an unwanted side effect causing permanent cosmetic distress if hair regrowth does not occur. Rind-based techniques can effectively control dosimetric spread. We evaluated this technique to reduce scalp dose and alopecia while maintaining tumor coverage. **METHODS:** Ten consecutive brain tumor plans were retrospectively evaluated. All planning tumor volume (PTV) margins were ≤ 15.0mm from the skin surface. Departmental guidelines for fractionation were followed, with minimum 95% PTV coverage receiving 100% dose. Fractionation variation was accounted for with biologically effective dose calculation (alpha/beta=2). Rind structures encompassed 5mm depth from scalp surface; upper dose limits were customized to minimum values without PTV coverage compromise. Standard comparative plans using identical criteria, without rind structures, were calculated. Scalp dose evaluation was defined for tissue from skin to 5mm depth. Paired T-tests were used for comparative evaluation. **RESULTS:** Median age: 58 (range 27–85); 70% female (n=7). Histologies included gliomas (n=7) and meningiomas (n=3). Median PTV distance to skin surface: 13.5mm (range 8.0–15.0). Median PTV minimum and mean dose for rind-based plans: 88.63% (range 73.14–95.2) and 104.39% (range 102.07–107.38) of prescription and 90.90% (range 68.64–98.21) and 103.02% (range 101.91–107.04) for standard plans, respectively. Statistically significant reduction in scalp maximum and mean dose of 19.65% (p=2.72E-06) and 0.48% (p=0.007), respectively, was seen with rind-based planning. Scalp volume receiving 1000cGy-equivalent increased 6.7cc using rind-based techniques, although insignificant (p=0.33). Volume receiving 1500cGy-equivalent was significantly reduced 3.88cc (p=0.03) using rind-based techniques. With median 28.5 day follow-up, of 5 patients treated using rind-based techniques, 40% (n=2) exhibited acute alopecia compared to 100% of those treated with standard plans. **CONCLUSION:** Rind-based dosimetric techniques exhibit significant reduction of scalp dose in brain irradiation. 60% of patients treated using this technique experienced no alopecia, versus 0% receiving standard treatment. Further investigation is warranted to better evaluate correlation.

### RADI-40. STEREOTACTIC RADIOSURGERY FOR BRAINSTEM METASTASES: AN ANALYSIS OF SINGLE FRACTION AND MULTI FRACTION TECHNIQUES

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**PURPOSE:** Utilization of stereotactic radiosurgery (SRS) for brainstem metastases (BSM) is increasing. Multi-fraction SRS (MF-SRS) is a potential means of obtaining therapeutic gain while limiting toxicity. However, most available data assesses only single-fraction SRS (SF-SRS). This study aims to evaluate the efficacy and safety of SF-SRS and MF-SRS for BSM. **METHODS:** Data was retrospectively collected for patients with BSM treated with SRS between 2003–2018 at a single institution. Kaplan-Meier method was used to evaluate overall survival (OS) and local control (LC).