follow-up was 7.9 mos. HA-WBRT-M was associated with lower NCF failure risk (adjusted HR=0.74, p=0.02) due to lower risk of deterioration in executive function at 4 mos. (p<0.01); and encoding (p=0.049) and conversion (p=0.06) at 6 mos. Age<60 pred for lower NCF risk (HR=0.60, p=0.0002); non-significant test for interaction indicated independent effects of HA and age. Patient-reported fatigue (p=0.036); difficulty speaking (p=0.049); and problems remembering things (p=0.013) at 6 mos. favored the WBRT-M arm. Imputation models accounting for missing data also favored the HA-WBRT-M arm for patient-reported cognition (p=0.011) and symptom interference (p=0.008) at 6 mos. Treatment arms did not significantly differ in toxicity; intracranial progression or overall survival. CONCLUSIONS: While achieving similar immediate survival and survival; Hippocampal Avoidance during WBRT-M for brain metastases better preserves NCF and patient-reported symptoms. Supported by UGICA189867 (NCORP) and DCP from the NCI.

RADI-12. LEPTOMENINGEAL FAILURE AFTER PREOPERATIVE VERSUS POSTOPERATIVE RADIOSURGERY
John PreCash, Kirsten Riley, James Markert, Bert Guthrie, Paul Foreman, Richard Popple, Sam Margolin, Scott Sneedker, Christopher Williams, Andrew McDonald, Evan Thomas, John Stewart, and Markus Bredel

INTRODUCTION: Postoperative stereotactic radiosurgery (postop SRS) is potentially complicated by difficulty in the target volume of leptomeningeal seeding at the time of surgery. It is hypothesized that preop SRS may render cells less viable to disseminate in the leptomeningeal space. This retrospective study compares the leptomeningeal dissemination of BM and postop versus preop stereotactic radiosurgery (SRS) with the CITV-ds-GPA model for melanoma patients. We identified 140 patients with brain metastases who underwent resection and radiosurgery at the University of Alabama at Birmingham including 91 postop patients (2005–2015) and 49 preop patients (2011–2018). The preop group included 19 patients enrolled in a phase I trial of preoperative radiosurgery (12–15 Gy) for tumors 2–6 cm in diameter. In that study 15 Gy was found to be safe in the preop setting but further escalation was not attempted. An additional 30 patients received preop SRS off-study (surgery dose 15 Gy). The median postop dose was 16 Gy. LMD recurrence was defined as focal pachymeningeal or diffuse leptomeningeal enhancement of the brain, spinal cord, or cauda equina, dural enhancement beyond 5 mm from the index metastasis, subependymal enhancement, or enhancement of cranial nerves. This definition is not limited to carcinomatosis. All events were categorized and confirmed by at least two physicians. RESULTS: 40/140 (29%) patients developed new focal or diffuse LMD. Preop SRS was associated with a higher freedom from leptomeningeal recurrence (84% vs 60% at one year) and lower LMD compared to postop SRS. Conclusions: Preoperative SRS is associated with a reduction in the risk of LMD compared to postop SRS. Focal pachymeningeal dissemination may not always be recognized as related to surgery. A randomized trial of preop vs postop SRS is warranted.

RADI-13. IMPACT OF CITV AND BRAF MUTATION ON MELANOMA METASTASIS RESPONSE TO STEREOTACTIC RADIOSURGERY
Ali Alattar, Rushkesh Joshi, Brian Hrshman, Kate Carroll, Osamu Nagano, Hiroshi Aiyama, Toru Serizawa, Masaaki Yamamoto, and Clark Chen

INTRODUCTION: Survival prognostication is an important aspect of personalizing oncologic care for patients with melanoma brain metastasis (BM). We previously demonstrated the utility of a cumulative intracranial tumor volume modified diagnosis-specific graded prognostic assessment score (CITV-dGPA) for SRS-treated melanoma BM patients. Pertinent prognostic variables in this model included age, Karnofsky performance status (KPS), and CITV. Here we determined whether the incorporation of BRAF mutation status into this CITV-modified scale further enhanced its prognostic accuracy. METHODS: We collated the survival pattern of 331 melanoma BM patients with known BRAF mutation status treated with stereotactic radiosurgery (SRS) and validated our findings in an independent cohort of 174 patients. All patients with BRAF mutation were treated with BRAF inhibitors. The prognostic utility of the model with and without BRAF mutation information was compared using the net reclassification index (NRI >0) and integrated discrimination improvement (IDI) metric. RESULTS: Presence of the BRAF mutation was associated with a reduced hazard of death in univariate Cox proportional hazards survival analysis (HR=0.69, p=0.074, ps<0.01). This effect persisted in a model that controlled for age, KPS, and CITV (HR=0.72, p<0.001). Addition of BRAF mutation status to the CITV-ds-GPA model for melanoma significantly improved its prognostic value, with NRI >0 of 0.294 (p=0.01) and IDI of 0.017 (p=0.02). We validated these findings in an independent cohort of 174 melanoma patients. CONCLUSIONS: Optimal survival prognostication for SRS-treated patients with melanoma BM requires an integrated assessment of age, KPS, CITV, and BRAF mutation status.

RADI-14. FRAMELESS STEREOTACTIC RADIOSURGERY ON THE GAMMA KNIFE ICON: EARLY EXPERIENCE FROM 42 PATIENTS WITH BRAIN METASTASES
Horia Valuing, Akshay Save, Yuanuang Xu, Carl Elliston, Matthew Garrett, Cheng-Chi Wu, Simon Cheng, Ashish Jani, Jeffrey Bruce, Guy McKhann, Michael Sisti, and Tony Wang

BACKGROUND: The Gamma Knife (GK) Icon uses a Cone-Beam CT (CBCT) scanner and an infrared camera system to support the delivery of frameless radiosurgery. There are limited data on patients treated with frameless GK radiosurgery (GKRS) for brain metastases. OBJECTIVE: To describe the early experience, process, technical details, and short-term outcomes with frameless GKRS for brain metastases at our institution. METHODS: We describe our patient selection and workflow for frameless GKRS in detail. Because of the short interval of follow-up, we provide crude rates of local control. RESULTS: 42 patients had 96 lesions in 90 metastases. Median age was 69. 77 intact lesions were treated definitively, 18 cavities postoperatively, and 1 had GKRS for recurrence after resection. 11 patients underwent repeat GKRS to the same area. Median dose was 20 Gy in 15 fractions (range: 13–21), 24 Gy in 3 fractions (range: 19–25), and 25 Gy in 5 fractions (Range: 25–30). Median treatment time was 23.7 minutes (Range: 7.3 – 85.5). 29 patients had a follow-up MRI in our records after completing GKRS. Median follow-up time was 105 days (Range: 16 – 314). 16 local recurrences (LR) were identified in 9 patients. An additional 6 patients had distant brain recurrence without LR. Crude mean time between GKRS and LR was 101 days (range 44–161 days). There were 6 patients with grade 1, 3 with grade 2, 2 with grade 3, and 1 with grade 4 toxicity. We found no improvement in workflow compared with the CI Series for GKRS due to the ability to fractionate treatments. CONCLUSION: We report a large cohort of consecutive patients with brain metastases treated with frameless GKRS. We look forward to studies with longer follow-up to provide valuable data on clinical outcomes and to further our understanding of the radiobiology of hypofractionation in the brain.

RADI-15. CLUSTERING AND GROUPING OF BRAIN METS IN RADIOSURGERY TREATMENTS
Khaled Salih, John McKenna, Gabor Jozsef, and Jonathan Knisely

INTRODUCTION: Radiosurgical treatment of numerous lesions in the brain with ‘single-isocenter’ radiosurgery on a linac often requires using multiple isocenters. With our TPS (Elements, Brainlab) multiple plans need to be generated for each set of lesions, and a sum plan calculated. We investigated how to distribute multiple lesions into two groups for two isocenters to achieve a good summed dose distribution. METHODS: The DICOM RS file is exported and the PTV data is extracted by a MATLAB program that calculates the convex hulls, estimated radii, and the centers of mass for each lesion. The distance to the isocenter is used to group the lesions. The distances are calculated for each set of lesions, and a sum plan calculated. We investigated how to distribute multiple lesions into two groups for two isocenters to achieve a good summed dose distribution. RESULTS: The average number of lesions per plan was 10.9 (range 4 – 27). The average target volume was 18.4 cm3 (range: 2.3 – 375.2). The average sum PTV was 36.9 cm3 (range: 1 – 153). The average target to planning target volume ratio was 1.2 (range: 1 – 1.9). We calculated the conformity index (CI) and the heterogeneity index (HI) of the two isocenter plans. The average CI was 0.51 (range: 0.35 – 0.77) and the average HI was 0.49 (range: 0.23 – 0.83). CONCLUSION: Two isocenter plans are feasible for distributing multiple lesions in radiosurgery. We describe a method to generate two isocenter plans with a good summed dose distribution.

RADI-16. ECONOMIC IMPLICATIONS OF PREOPERATIVE VERSUS POSTOPERATIVE STEREOTACTIC RADIOSURGERY FOR BRAIN METASTASES
Matthew Ward, Roshan Prabhu, Anthony Asher, Scott Wait, Ashley Sumrall, Chrag Shah, and Stuart Burri

OBJECTIVE: Retrospective data suggests preoperative stereotactic radiosurgery (preSRS) reduces radiation necrosis (RN) and leptomeningeal disease (LMD) failure after resection of brain metastases (BM) as compared to postoperative SRS (postSRS). We evaluated the potential financial impact