of 20 WHO grade 2 astrocytomas, IDH-mutant and 1p/19q-non-codelleted. The sigma values were then compared with a binary, subjective rating by the same faculty staff according to the perceived predominant growth pattern (diffuse versus circumscribed) of each glioma. When classifying tumors binarily (diffuse versus circumscribed), there was moderate interrater variability between observers (cohen’s kappa=0.6). Rates agreed in 16 of 20 cases, terting 7 gliomas unanimously diffuse and 9 grade circumscribed. In 4 cases, the raters disagreed. Sigma values differed significantly between diffuse and circumscribe tumors in both raters (rater 1, p=0.002; rater 2, p=0.018). For rater 1, the mean sigma difference between diffuse and circumscribe tumors was 10.7 and 9.3 for rater 2.

CONCLUSION: Edge detection algorithms can be efficiently applied on MRI scans and are highly accurate in differentiating diffuse from circumscribed gliomas. Objectification demands defining imaging criteria for diffuse and circumscribed appearance of lower grade gliomas on MRI.

P15.10.B. A MULTICENTER PHASE 1 TRIAL IN PROGRESS: DIAGNOSTIC PERFORMANCE OF 18F-FLUCICLOVINE PET FOR THE DETECTION OF RECURRENT BRAIN METASTASES AFTER RADIOTHERAPY (REVELATE) RELEVATE, P. T. Chao1, A. Chaglassian2, N. Tainer2, E. J. Teoh1; Cleveland Clinic, Cleveland, OH, United States; 2Blue Earth Diagnostics Inc, Burlington, MA, United States; 3Blue Earth Diagnostics Ltd, Oxford, United Kingdom.

BACKGROUND: Following treatment of brain metastases, which can affect up to 40% of patients with cancer, patients will typically be closely monitored with serial brain magnetic resonance imaging (MRI) owing to the high likelihood of recurrence. The recommended follow-up interval (CT or MRI) for recurrence is variable. Imaging techniques that are sensitive to amino acid uptake in tumors may be useful for detecting recurrent metastases. Here we report the results of a prospective pilot study of 18F-Fluciclovine PET/CT demonstrated promising accuracy to distinguish radiation necrosis from tumor progression among patients with brain metastases previously treated with SRS. Using SUVmax, a cutoff of 4.3 provided a sensitivity of 1.0 and specificity of 0.63.

RESULTS: Of 16 patients enrolled between 7/2019-11/2020, 1 patient died prior to diagnosis. Follow-up imaging was available for 15 evaluable subjects with 27 lesions. Primary histology was NSCLC in 9 (45%) lesions, breast in 7 (35%), melanoma in 3 (15%), and endometrial in 1 (5%). The final diagnosis was radiation necrosis in 16 (80%) lesions and tumor progression in 4 (20%). SUVmax was a statistically significant predictor of tumor progression with a >0.2 difference in SUVmax indicative of tumor progression. The area under the ROC curve was 0.833 (95% CI: 0.590, 1.0). A cutoff of 4.3 provided a sensitivity to identify tumour progression of 1.0 (4/4) and specificity to rule out tumor progression of 0.63 (10/16). SUVpeak (P = 0.038), SUVpeak/normal (P = 0.007), and SUVpeak/normal (P = 0.002) also reached statistical significance as predictors of tumor progression, with higher SUVmax values indicative of tumor progression. SUVmax (normal > 0.1) and SUVmax/normal (P = 0.5) were not statistically significant. The AUC for SUVmax was not significantly higher than the other SUV measures (P-values > 0.2).

CONCLUSION: In this prospective pilot study, 18F Fluciclovine PET/CT demonstrated promising accuracy to distinguish radiation necrosis from tumor progression among patients with brain metastases previously treated with SRS. Using SUVmax, a cutoff of 4.3 provided a sensitivity of 1.0 and specificity of 0.63. Confirmatory phase II and III studies are ongoing.

P15.11.A. 18F-FLUCICLOVINE PET/CT TO DISTINGUISH RADIATION NECROSIS FROM TUMOR PROGRESSION IN BRAIN METASTASES TREATED WITH STEREOTACTIC RADIOSURGERY: RESULTS OF A PROSPECTIVE PILOT STUDY

M. C. Torroni1, F. DiFilippo1, T. Smile2, S. E. Jones3, J. H. Suh1, E. S. Murphy2, J. S. Yu2, A. M. Mohammadi2, G. H. Barnett4, L. Angelov5, S. S. Huang1, G. Wu1, S. Johnson2, N. Obuchowski5, M. A. Shulwai9, P. Reeder9, E. J. Koekkoek1, S. Chug1, Baptist Health South Florida, Miami, FL, United States; 2Cleveland Clinic, Cleveland, OH, United States.

BACKGROUND: Amino acid PET radioopharmaceuticals, 18F-Fluciclovine, show improved localization in brain tumors relative to normal tissue and may be a useful tool for detecting recurrent brain metastases. Here, we report results from a prospective pilot study evaluating the use of 18F-Fluciclovine PET/CT to distinguish radiation necrosis from tumor progression among patients with brain metastases treated with stereotactic radiosurgery (SRS). MATERIAL AND METHODS: The primary objective was to estimate the accuracy of 18F-Fluciclovine PET/CT in distinguishing radiation necrosis from tumor progression. The trial included adults with brain metastases with a known primary diagnosis and presented with (with or without MR perfusion) which was equivocal for radiation necrosis versus tumor progression. Within 30 days of equivocal MRI brain, patients underwent an 18F-Fluciclovine PET/CT (Siemens mCT) acquired 5-15 min post-injection with images generated by PSF reconstruction. Quantitative metrics for each lesion were documented and lesion to normal brain SUV/mean rations were calculated. The reference standard for diagnosis of radiation necrosis vs tumor progression was clinical follow up with MRI brain every 2-4 months until multidisciplinary consensus or tissue confirmation. RESULTS: Of 16 patients enrolled between 7/2019-11/2020, 1 patient died prior to diagnosis. Follow-up imaging was available for 15 evaluable subjects with 27 lesions. Primary histology was NSCLC in 9 (45%) lesions, breast in 7 (35%), melanoma in 3 (15%), and endometrial in 1 (5%). The final diagnosis was radiation necrosis in 16 (80%) lesions and tumor progression in 4 (20%). SUVmax was a statistically significant predictor of tumor progression with a >0.2 difference in SUVmax indicative of tumor progression. The area under the ROC curve was 0.833 (95% CI: 0.590, 1.0). A cutoff of 4.3 provided a sensitivity to identify tumour progression of 1.0 (4/4) and specificity to rule out tumor progression of 0.63 (10/16). SUVpeak (P = 0.038), SUVpeak/normal (P = 0.007), and SUVpeak/normal (P = 0.002) also reached statistical significance as predictors of tumor progression, with higher SUVmax values indicative of tumor progression. SUVmax (normal > 0.1) and SUVmax/normal (P = 0.5) were not statistically significant. The AUC for SUVmax was not significantly higher than the other SUV measures (P-values > 0.2).

CONCLUSION: In this prospective pilot study, 18F Fluciclovine PET/CT demonstrated promising accuracy to distinguish radiation necrosis from tumor progression among patients with brain metastases previously treated with SRS. Using SUVmax, a cutoff of 4.3 provided a sensitivity of 1.0 and specificity of 0.63. Confirmatory phase II and III studies are ongoing.

P15.12.A. AMINE CEST CONTRAST IN GLIOMAS TO MEASURE METABOLIC TREATMENT EFFECT AT 7T

B. Abecasis Schmig2, E. E. Jellinek3, A. J. de Bresser1, L. van der Ven1, M. J. T. Bahlouli1, M. P. van Osch1, J. A. F. Koekoek5,6; 1Department of Radiology, Leiden University Medical Center, Leiden, Netherlands; 2Department of Radiology, Leiden University Medical Center, Leiden, Netherlands; 3Department of Neurology, Leiden University Medical Center, Leiden, Netherlands; 4Department of Neurology, Haaglanden Medical Center, The Hague, Netherlands.

BACKGROUND: Chemical exchange saturation transfer (CEST) is an imaging technique that generates contrast based on proton exchange between water and a solute pool of interest. CEST is sensitive to molecules containing amine groups such as glutamate and creatine. Since creatine is a crucial metabolite in cellular metabolism and deregulation in cellular bioenergetics is a hallmark of cancer, CEST could be relevant for glioma imaging. We investigated if treatment response, which has been established on its use, therefore we wanted to preliminarily investigate the presence of amine CEST contrast in the contrast enhanced (CE) and non-enhanced (NE) lesions of gliomas, and to assess whether treated tumors would display different CEST contrast compared to treatment naïve groups. MATERIAL AND METHODS: We prospectively scanned 12 glioma patients on a whole-body 7 Tesla Philips Achieva MRI scanner (7 treated glioblastomas; 4 treatment naïve glioblastomas; 1 treatment naïve low-grade astrocytoma). Treatment included surgical resection, chemotherapy, and/or radiotherapy. All patients gave informed consent. CEST images were manually post-processed, including corrections for B0 and B1 inhomogeneities. The CEST Z-spectra and magnetization transfer ratio (MTR) asymmetry were calculated per voxel. To retrieve the CEST values within the tumor lesions, we performed a contralateral white matter voxel to calculate the CEST contrast. Owing to the high likelihood of recurrence. The recommended follow-up interval (CT or MRI) for recurrence is variable. Imaging techniques that are sensitive to amino acid uptake in tumors may be useful for detecting recurrent metastases. Here we report the results of a prospective pilot study of 18F-Fluciclovine PET/CT demonstrated promising accuracy to distinguish radiation necrosis from tumor progression among patients with brain metastases previously treated with SRS. Using SUVmax, a cutoff of 4.3 provided a sensitivity of 1.0 and specificity of 0.63. Confirmatory phase II and III studies are ongoing.