DNA-methyltransferase promoter methylation. CONCLUSION: FET PET seems to be a powerful tool for identifying responders to lomustine-based chemotherapy early after treatment initiation.

P15.06.B. INFLUENCE OF ARTERIAL TRANSIT TIME DELAYS ON THE DIFFERENTIATION BETWEEN TUMOR PROGRESSION AND PSEUDO-PROGRESSION IN GLOBLASTOMA BY ARTERIAL SPIN LABELING MRI

D. van Dorth1, J. Jiang2, B. Schmitz-Abecasis3, R. J. I. Croese4,5, M. J. B. Taphoorn2, M. Smits6, L. Dirven1,7, J. de Bresser1,
M. J. P. van Osch1, J. A. F. Koekkoek3,5,1, Leiden University Medical Center, Leiden, Netherlands, 2HagaZiekenhuis, Den Haag, Netherlands, 3Haaglanden Medical Center, Den Haag, Netherlands, 4Erasmus MC, University Medical Center, Rotterdam, Netherlands.

BACKGROUND: Perfusion MRI by Arterial Spin Labeling (ASL) and Dynamic Susceptibility Contrast (DSC) has shown its potential for differentiating tumor progression from pseudo-progression in glioblastoma patients. The ASL scans can be affected by arterial transit time (ATT) delays, which could be caused by treatment effects due to concomitant radiochemotherapy. A prolonged ATT is present as apparent signal increase in the large arteries due to labeled spins still residing within the vasculature, leading to underestimation of tissue perfusion and thus potentially affecting clinical decision-making. The research questions were: 1) Do delayed ATTs lead to a difference in the visual assessment of ASL perfusion (normal/increased) maps compared to DSC-MRI? 2) Does the radiological evaluation (progression vs. pseudo-progression) of ASL and DSC perfusion maps differ when ATT artifacts are present? 3) Do delayed ATTs affect the predictive value of ASL-MRI scans 3 months post-radiotherapy for detecting true disease progression? MATERIAL AND METHODS: This retrospective, single-center study included 68 adult patients with histologically confirmed glioblastoma who received postoperative radiochemotherapy. ASL and DSC scans were acquired 3 months post-radiotherapy as part of routine clinical follow-up. The perfusion data were visually scored by a neuroradiologist who determined presence/absence of ATT artifacts and their severity (%), perfusion of tumor, and tumor necrosis. The radiological evaluation of tumor progression versus pseudo-progression. Presence of true disease progression was determined by follow-up of clinical data until 9 months post-radiotherapy available for 49/68 patients. Logistic regression was performed with ATT artifacts, age and pre-operative lesion size as covariates to assess the predictive value of ASL. RESULTS: In 78% of the patients ATT artifacts were present. No statistically significant association between the agreement of the perfusion maps and presence of ATT artifacts was found; however, presence of ATT artifacts lowered the agreement between the DSC and ASL radiological evaluation. The logistic regression analysis showed that the ASL-based radiological score could not predict true disease progression, whereas higher age and unmethylated MGMT gene were associated with progression. Presence of ATT artifacts was not associated with tumor progression. CONCLUSION: ATT artifacts are common in glioblastoma patients. The presence of delayed ATTs seems to impact the radiological evaluation of ASL data, steering interpretation towards tumor progression (as compared to the DSC evaluation), whereas in patients without ATT artifacts ASL and DSC provide more similar radiological criteria for tumor progression versus pseudo-progression. The transferability of the histological criteria from standard histology to confocal imaging. MATERIAL AND METHODS: The potential role of CLE in neurosurgery in comparison to other techniques for intraoperative tumor assessment was determined by analyzing common intraoperative neuropathological workflows and identifying unaddressed opportunities. The transferability of the histological criteria from standard histology to confocal imaging was achieved by analyzing matched image pairs (standard histology and CLE) from several common tumor entities. RESULTS: We identified the time gap between specimen resection and the availability of the histological report as a challenging factor for the CLE in neurosurgery. Importantly, neuropathologists could assess tissue in near real time in an unlimited number of digital biopsies prior to resection, which adds a potent new tool to the neurosurgical armamentarium. CLE enables the rapid assessment of the histological criteria to confirm imaging. CONCLUSION: Widespread and prospective application of CLE may have a major impact on neuropathologists’ role in intraoperative diagnosis and bring along both opportunities and challenges. For broad clinical adoption, strategies for histological criteria validation as well as for determination of diagnostic accuracy need to be developed.

P15.07.A. PREDICTING SITES OF LOCAL TUMOUR PROGRESSION - WHAT SHOULD BE OUR IMAGING BIOMARKER?

R. C. Mayrand1, Y. Wei1, C. Li1, R. Perry Mayrand1, Y. Wan1, N. Simon1, R. Sinha1, S. Sravanam1, S. J. Price1, University of Cambridge, Cambridge, United Kingdom, 2Florida International University, Miami, FL, United States, 3Cambridge University Hospitals NHS Foundation Trust, Cambridge, United Kingdom.

BACKGROUND: Glioblastoma is the most aggressive primary brain tumour diagnosed in adults. Despite intensive treatment of maximal safe resection and chemoradiotherapy, the prognosis remains grim due to in-field and peritumoral infiltrating tumour cells. A significant proportion of infiltrating cells are difficult to visualize in the tumor periphery. The latter is currently limited by the fact that typically not all potential regions of interest can be sampled for frozen sections and the turnaround times of frozen sections usually do not permit multiple repetitive assessments. The commercial availability of a clinical-grade in vivo laser endomicroscope for neurosurgical applications may have the potential to change this and to permit a microscopic analysis in near-real time, which in turn may have a significant impact on resection strategies for brain tumors. In this work, we investigate the potential role of confocal laser endomicroscopy in neurosurgery in comparison to other techniques for intraoperative tumor progression. In this work, we investigate the potential role of confocal laser endomicroscopy in neurosurgery in comparison to other techniques for intraoperative tumor progression.

P15.08.B. INTRAOPERATIVE CONFocal LASER ENDOMICROSCOPY OF BRAIN TUMORS - POTENTIAL AND CHALLENGES FROM A NEUROPATHOLOGICAL PERSPECTIVE

T. Maragou1, K. Quent1, B. Pollo1, E. Hewer1, Institute of Pathology, University of Bern, Berne, Switzerland, 2Simon Center, Leiden, Netherlands, 3Fondazione IRCCS Istituto Neurologico Carlo Besta, Milano, Italy, 4Institut Universitaire de Pathologie, Lausanne, Switzerland.

BACKGROUND: Intraoperative consultation, usually in the form of a frozen section, is an integral part of current neuropathology practice. Typical indications include determination of specimen adequacy, intraoperative diagnosis and distinction between tumoral and non-tumoral tissue in diffuse infiltrating gliomas. The clinical applicability of CLE in neurosurgery is hampered by the fact that the imaging criteria have not been standardised. Therefore, it is highly recommended to consider these artifacts when interpreting ASL perfusion MRI to differentiate between tumor progression (as compared to the DSC evaluation), whereas presence of ATT artifacts ASL and DSC provide more similar radiological criteria to confocal imaging. MATERIAL AND METHODS: The potential role of CLE in neurosurgery in comparison to other techniques for intraoperative tumor assessment was determined by analyzing common intraoperative neuropathological workflows and identifying unaddressed opportunities. The transferability of the histological criteria from standard histology to confocal imaging was achieved by analyzing matched image pairs (standard histology and CLE) from several common tumor entities. RESULTS: We identified the time gap between specimen resection and the availability of the histological report as a challenging factor for the CLE in neurosurgery. Importantly, neuropathologists could assess tissue in near real time in an unlimited number of digital biopsies prior to resection, which adds a potent new tool to the neurosurgical armamentarium. CLE enables the rapid assessment of the histological criteria to confirm imaging. CONCLUSION: Widespread and prospective application of CLE may have a major impact on neuropathologists’ role in intraoperative diagnosis and bring along both opportunities and challenges. For broad clinical adoption, strategies for histological criteria validation as well as for determination of diagnostic accuracy need to be developed.

P15.09.A. CANNY EDGE DETECTION ALGORITHM FOR QUANTITATIVE DIFFERENTIATION BETWEEN DIFFUSE AND CIRCUMSCRIBED GLIOMA GROWTH PATTERNS ON MRI

E. Thiele, J. Weller, S. Katzenbolzler, C. Trumm, N. Thon, J. Tonn, University Hospital Munich, Munich, Germany.

BACKGROUND: Lower grade gliomas show heterogeneous appearance on T2-weighted MRI. Some tumors grow diffusely along axonal structures whereas others distort adjacent brain tissue through local mass effect. The diagnostic therapeutic and prognostic implication of different growth patterns on MRI remain unknown and are difficult to assess quantitatively. MATERIAL AND METHODS: A web-based application allowing for image preprocessing and providing a comprehensive edge detection tool based on the canny edge detection algorithm was developed. Sigma value between 1 and 100 determined the threshold where tumor borders where detected by the algorithm anymore, with 1 equating to the lowest threshold and thus detection of all edges contained in the image. Two experienced faculty members assigned sigma values to axial T2 images of a random sample
of 20 WHO grade 2 astrocytomas, IDH-mutant and 1p/19q-non-codleted. The sigma values were then compared with a binary, subjective rating by the same faculty staff according to the perceived predominant growth pattern (diffuse or circumscribed) of each glioma lesion. When subjects categorizing tumors binarily (diffuse versus circumscribed), there was moderate interrater variability between observers (kohens kappa=0.6). Raters agreed in 16 of 20 cases, terting 7 gliomas unanimously diffuse and 9 generally circumscribed. In 4 cases, the rater's interpretations diverged significantly between diffuse and circumscribed tumors in both raters (rater 1, p=0.002; rater 2, p=0.018). For rater 1, the mean sigma difference between diffuse and circumscribed 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 RADIATION THERAPY (REVEALTE)

S. T. Chau1, A. Chagliassini2, N. Tainer1, 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 likelihood of recurrence. The current follow-up sinterm (CT1-weighted and FLAIR/T2-weighted MRI) have poor specificite, meaning that differentiation of true disease from treatment-related changes such as radiation necrosis can be difficult. Recent pilot studies have reported amino acid PET radiopharmaceutical, 18F-fluciclovine, to be potentially useful in discriminating brain tumor recurrence from treatment-related changes. This may potentially help physicians to make confident diagnoses and inform subsequent treatment plans.

METHODS: MIRACLE study (NCT04410133) will evaluate the diagnostic performance of 18F-fluciclovine PET (read with conventional MRI for anatomical reference) for the detection of recurrent brain metastases in patients for whom MRI is equivocal. This multicenter, phase 3, prospective, open-label trial aims to enroll approximately 150 subjects from across 19 US sites with solid tumor brain metastases who have undergone radiation therapy, if they have a lesion considered equivocal on MRI that requires further confirmation.

CONCLUSION: This ongoing phase 3 study will provide efficacy and safety data for the use of 18F-fluciclovine for the detection of recurrent brain metastases. Enrollment began in October 2020 and the trial is active but not recruiting at the time of submission.

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

M. C. Tomi1, F. DiFilippo1, T. Smilc1, S. E. Jones1, J. H. Suh2, E. S. Murphy2, J. S. Yl1, A. M. Mohammadi1, G. H. Barnet2, L. Angelov1, S. S. Huang1, G. Wu1, S. Johnson1, N. Obuchowski1, M. Ahiwala1, D. Peereboom1, S. Stevens1, S. Chang1, 2Baptist Health South Florida, Miami, FL, United States, 3Cleveland Clinic, Cleveland, OH, United States.

BACKGROUND: Amino acid PET radiopharmaceutical, 18F-fluciclovine, showed high accuracy in brain tumors relative to normal brain 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 tumour progression among patients with brain metastases treated with stereotactic radiosurgery (SRS).

METHODS: The primary objective was to estimate the accuracy of 18F-fluciclovine PET/CT in distinguishing radiation necrosis from tumour progression among patients with brain metastases treated with stereotactic radiosurgery (SRS). The secondary objectives included: determination of lesion SUVmax, using SUVmax/normal ratio and post-processing, including corrections for B. Anding, specifically when evaluating treatment response. No clear consensus has been established on its use, therefore we wanted to preliminarily investigate the presence of amino 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 tumors.

RESULTS: 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 radiotherapy. All patients gave informed consent. CEST images were post-processed, including corrections for B. Anding, homogeneities. The CEST Z-spectra and magnetization transfer ratio (MTR) asymmetry were calculated per voxel. To retrieve the CEST values within the tumor lesions, we determined contrast enhancement values manually delineated on the cortical FLAIR or post contrast 3D-T1.

CONCLUSION: Overall we observed a relative increase of amine CEST contrast in the CE (MTRmax: Mean ± SD = 1.32 ± 0.28) compared to the relative decrease (MTRmax: Mean ± SD = 1.11 ± 0.302) in the NE lesion. When evaluating the results from the CE and NE lesions for treated and treatment naïve groups individually, we observed a slightly different trend. In the treatment group, the CE lesions showed a higher amine CEST contrast (MTRmax: x ± 1.38 ± 0.30) than the NE (MTRmax: x ± 1.13 ± 0.302). In contrast, in the treatment naïve group, the CE lesion showed a slightly lower CEST contrast (MTRmax: x = 1.23 ± 0.21) than the NE group (MTRmax: x = 1.29 ± 0.38). CONCLUSION: Our results show different amine CEST contrast trends between treated and treatment naïve groups when comparing CE and NE lesions. This suggests that treatment may have an effect on tumor tissue bioenergetics affecting the concentration of creatine. Nevertheless, further work is necessary to verify our results in a larger group of patients.

P15.11.B. ROLE AND ACCURACY OF PET-FET IN GLIOMAS, AND ITS SIGNIFICANCE IN THE DIFFERENTIAL DIAGNOSIS AMONG PROGRESSION, PSEUDOPROGRESSION, AND RESPONSE TO TREATMENTS

M. Caffo1, F. La Torre2, F. Minutoli1, F. F. Angeli1, G. Caruso1, S. Baldari2, 1Oncologia Medica, 2AO Policlinico G. Martino,Unit of Neuroradiology, Messina, Italy.

BACKGROUND: Lack of effective treatments for patients affected by gliomas emphasizes the need for innovative therapeutic approaches. Surgical resection plays a pivotal role in glioma treatment by improving both,