require any further treatments and was on observation with imaging only for 14 months until another area of progression was seen.

CONCLUSION: After treatment of a neoplasms, if unexpected clinical or imaging abnormalities occur is presently dealt by a foreign body reaction due to hemorrhagic material used during the initial surgery. The implications of this case lie in recognizing this entity to avoid unnecessary procedures. Given the technical variability of advanced MRI techniques, there are limits to the sensitivity and specificity of each. The standardization of advanced MRI is well recognized as a promising clinical and research need.

P07.10 INTEGRATIVE NETWORK-BASED ANALYSIS LINKS VESSEL-SIZE IMAGING (VSI) AND CEREBRAL BLOOD VOLUME (CBV) TO SPECIFIC MOLECULAR PATTERNS IN MALIGNANT GLIOMAS

D. H. Heiland, D. Pfeifer, I. Mader, A. Weyerbrock. 1Department of Neurosurgery, Freiburg, Germany, 2Department of Hematology, Oncology and Stem Cell Transplantation, Freiburg, Germany, 3Department of Neuropathology, Freiburg, Germany.

OBJECTIVE: Perfusion weighted imaging (estimating the cerebral blood volume, CBV) and its specialisation ‘vessel size imaging’ (VSI) are well-established MRI techniques to assess tumor vascularity. Currently, no studies exist which link these MRI-based parameters with genetic profiles in malignant gliomas. Furthermore, the background of both perfusion parameters is largely unknown and needs to be explored.

METHOD: We retrospectively analyzed 25 patients diagnosed with a primary glioblastoma between 2010 and 2014. In a presurgical MRI CBV and VSI were acquired. In addition to standard imaging, During the following surgery tumour samples were removed from a predefined contrast-enhancing tumour region controlled by neuronavigation. RNA was extracted and used for array based transcriptional analysis (Affymetrix). Integrative analysis was performed by individual designed pipelines based on bioconductor (www.bioconductor.org) available R-packages and Weighted Gene Co-Expression Network Analysis (WGCNA).RESULTS: Transcriptional data were analyzed by WGCNA and split into modules by their network-based affiliation, 10 modules were highly correlated to either VSI and/or CBV. One module was exclusively associated to VSI. This module is highly related to hypoxia (Gene Set Enrichment Analysis (GSEA) of intramodular connectivity (FDR<0.001))). Another module was exclusively associated to CBV and not to VSI and showed strong enrichments in the EGF pathway and Pathway-to-Mesenchymal-Transition (EMT).

CONCLUSION: We showed that CBV/VSI-based data may present surrogate imaging markers for specific genetic tumor subtypes. Further analysis with an increased number of patients should be done in the future.

P07.11 ADVANCED MRI INCREASES ACCURACY FOR GLOBLASTOMA RECURRENCE DIAGNOSIS: SINGLE INSTITUTION THRESHOLDS AND VALIDATION OF MR SPECTROSCOPY AND DIFFUSE WEIGHTED IMAGING R. Jancaik, T. Kazda, M. Bulik, P. Popsovi. 1St. Anne’s University Hospital, Brno, Czech Republic, 2Masaryk Memorial Cancer Institute, Brno, Czech Republic.

Accurate identification of glioblastoma progression remains unmet clinical need. The aim of this prospective single-institutional study is to determine and validate thresholds for metabolite concentrations at MR spectroscopy (MRS) and values of apparent diffusion coefficient (ADC) for distinguishing between tumor recurrence and pseudoprogression. Thirty-nine patients after standard treatment of glioblastoma underwent advanced imaging by MRS and ADC at the time of suspected recurrence at the median time to progression 6.7 months. The highest significant sensitivity and specificity to call glioblastoma recurrence was observed for the total choline (tCho) to total N-acetyl-laspartate (NAA) metabolite ratio with threshold ≥1.3 (sensitivity 100.0% and specificity 94.7%). ADCmean value higher than 1313±10E-6 mm²/s was associated with pseudoprogression (sensitivity 98.3% and specificity 100.0%). The combination of MRS focused on tCho/NAA metabolite ratio and ADC-mean value represents imaging methods applicable to non-invasive differentiation between glioblastoma recurrence and pseudoprogression. However, individual gliomas. The molecular backgrounds and different diagnostic tools are validated, a new methodological approach is needed for implementing these multimodal imaging techniques into clinical routine as well as clinical trials for elimination of setup errors.

P07.12 MULTIMODAL IMAGING OF THE INVASIVE MICROENVIRONMENT PREDICTS SURVIVAL IN GLOBLASTOMAS S. J. Price, N. R. Boozmater, J. Y. Yan, M. A. McLean. 1Neurosurgery Division, Dept. Clinical Neurosciences, University of Cambridge, Cambridge, United Kingdom, 2Wolfson Brain Imaging Centre, University of Cambridge, Cambridge, United Kingdom, 3Department of Neurosurgery, Chang Gung Memorial Hospital, Keelung, Taiwan, 4Cancer Research UK Cambridge Institute, University of Cambridge, Cambridge, United Kingdom.

INTRODUCTION: The appalling prognosis of glioblastomas is largely due to the failure of current treatments to provide local control. Maximal surgical resection and adjuvant chemotherapy can extend overall survival, but a large majority of the tumor volume, including areas of invasive tumor that is treated with radiotherapy and chemotherapy, Progression occurs mainly in this invasive region. This invasive tumor behaves differently to the main tumor bulk and cannot be identified with conventional imaging. As a result, virtually all studies exclude areas that will ultimately be resected with clinical outcome. Using tensor decomposion analysis of diffusion tensor MRI (DTI) can identify this invasive region. Study of this would seem a more valid approach. In this study we plan to use multimodal MRI to assess if the metabolic activity of this DTI-defined invasive region predicts tumour behaviour.

METHODS: 50 patients with glioblastomas were prospectively studied with imaging at 3T pre-operatively. All patients underwent planned maximal, safe resection using 5-ALA followed by radiotherapy with concomitant and adjuvant chemotherapy. Imaging involved anatomical, DTI, dynamic susceptibility contrast perfusion MRI and multivoxel short-echo proton spectroscopy sequences. Imaging data was processed and coregistered to the sequence used to plan spectroscopy. Invasive regions were identified using psq tensor decomposition of the DTI and rCBV and metabolite levels were measured in these regions. Progression free and overall survival was calculated in all patients. The ability of parameters to predict progression free at one year was explored with ROC curves. Survival was assessed with Kaplan-Meier survival curves and compared to a Cox multivariate regression model used to assess the impact of imaging and clinical parameters (including age, extent of resection, MGMT methylation status) on survival.

RESULTS: The AUC from ROC analysis showed that the Cho/NAA ratio, a known marker of cellular density, better predicted progression free survival than the ADC (0.6 vs. 0.4). The multivariate analysis showed that the highest significant association with progression free survival was Cho/NAA (P<0.002) and overall survival (P<0.03). This was a stronger predictor of survival than MGMT methylation status.

CONCLUSION: Multimodal MRI can study the invasive regions of tumours - the residual areas following surgery. More metabolically active microenvironment of the invasive region strongly correlates with good outcome. We hypothesise the more proliferative microenvironment responds better to cytotoxic therapies.

P07.13 ABBERRANT PARAMAGNETIC/DIAMAGNETIC MRI SIGNALS OUTSIDE THE TUMOR VOLUME ARE FREQUENT FINDINGS THAT EVOLVE OVERTIME IN ADULT PATIENTS SURVIVING TWO OR MORE YEARS AFTER BRAIN IRRADIATION S. Yust-Katz, E. Inbar, J. Lukman, N. Michel, D. Limoni, T. Siegel. 1Davidoff Cancer Center, Petach-Tikva, Israel, 2Tel-Aviv University, Tel-Aviv, Israel, 3Rabin Medical Center, Petach-Tikva, Israel.

BACKGROUND: Late complications of cerebral radiotherapy involve vascular injury that may lead to development of cavernoma malformation (CM), telangiectasias and damage to vascular walls. Radiation-induced CM is a recognized late complication in children but its incidence in adult patients is unknown. Typically, blood products, iron deposition and calcifications which accompany vascular injury/malformation create paramagnetic/diamagnetic effects on MRI. The aim of this study was to retrospectively investigate frequency of MRI paramagnetic lesions in adult patients surviving 2 years after cranial irradiation and compare the findings to non-irradiated brain tumour.

METHODS: MRI studies of 115 brain tumour patients were reviewed. 60 patients were followed for ≥ 2 years and 20 patients for one year after radiotherapy. A control group included 35 brain tumor patients who were followed for ≥ 2 years without previous cranial irradiation. Studies that did not have either susceptibility weighted images or gradient echo sequence or susceptibility weighted imaging, blood oxygenation level dependent imaging sequences were excluded. Lesions inside the tumor volume were not considered and validated for different diagnostic tools is needed for implementing these multimodal imaging methods into clinical routine as well as clinical trials for elimination of setup errors.