sample t-test and one way ANOVA were used for statistical evaluation.

Results: The median overall DBMFS was 12.9 months. A significant difference in median DBMFS was observed for patients with squamous cell vs. adenocarcinoma primary histology (4.57 months vs. 15.9 months, respectively, p <0.015). The initial number of metastases, total initial metastasis volume, ECD status, KPS scores, EGFR mutation status, or ALK gene rearrangement status, made no significant difference on DBMFS. None of the analyzed parameters displayed significant impact on ODBF. WBRT had no significant effect on DBMFS or ODBF in the study population, but patients with history of WBRT prior to SRS had an increased DBFR (0.396 vs. 0.089) which was borderline significant (p=0.05). There was an insufficient number of patients receiving combined WBRT with SRS to determine an effect on distant brain failure vs. SRS alone.

Conclusion: Characterization of the risk of distant brain failure is important to treatment selection, prognosis and follow-up. Among lung cancer patients with brain metastases treated with SRS, our study found no impact from age, initial number/volume of metastases, EGFR/ALK status, or ECD status, on distant brain failure. However, this study did reveal a significantly shorter latency to appearance (DBMFS) of distant brain metastatic disease for patients with squamous vs. adenocarcinoma histology. The clinical prognostic significance of this histologic subtype-dependent difference on distant brain failure is the subject of further study.

PO-0650

Prognostic value of minimal time to peak in dynamic 18F-FET-PET for high-grade glioma re-irradiation

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Purpose or Objective: Most high-grade gliomas recur after initial multimodal therapy and re-irradiation has been shown to be a valuable re-treatment option in selected patients. We present the prognostic value of dynamic O-(2-18F-fluoroethyl)-l-tyrosine ([18F]-FET) PET for patients treated with re-irradiation ± concomitant bevacizumab. Dynamic [18F]-FET-PET provides useful information to individualize treatment decisions and personalize risk stratification of patients with high-grade glioma recurrence.

Material and Methods: We retrospectively analyzed 72 patients suffering from recurrent high-grade glioma. Static and dynamic [18F]-FET-PET was performed prior to re-irradiation. PET analysis revealed information about the maximal standardized uptake value (SUVmax) of the tumor corrected for the mean background (BG) (SUVmax/BG), the biologic tumor volume (BTV) and the mean tracer uptake within the BTV (SUVmean/BG). Dynamic parameters such as time-activity-curves (TACs) and minimal time-to-peak (TTPmin) were analyzed. Additional analysis was performed for gender, age, KPS, MGMT methylation status, IDH1 mutational status, WHO grading, concomitant bevacizumab therapy and the number of foci. The influence of PET derived and clinical parameters on post-recurrence survival (PRS) was investigated.

Results: TTPmin had a significant impact on PRS both on univariate (p=0.027) and multivariate analysis (p=0.008). Shorter TTPmin was related to shorter PRS after re-irradiation with 6 months for TTPmin <12.5 min, 7 months for TTPmin 12.5 – 25 min and 11 months for TTPmin >25 min (p=0.027). Other factors significantly related to PRS were number of foci (p=0.025), TAC classifications (p=0.019; G1-2 vs G3-5), and gender (p=0.028).

Conclusion: Dynamic [18F]-FET-PET with TTPmin is of high prognostic value for recurrent high-grade glioma and might help to personalize re-irradiation treatment regimens in future either through PET-guided dose escalation or by combination therapy with targeted agents.

PO-0651

Pattern of failure in glioblastoma patients after FET-PET and MRI-guided chemo-radiotherapy

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Purpose or Objective: The aim of this work is to investigate the pattern of failure for patients with glioblastoma, after FET-PET- and MRI-planned volumetric-modulated arc therapy (VMAT) with concomitant and adjuvant temozolomide (TMZ). Our hypothesis; FET-PET volume will better predict the pattern of failure and the inclusion of FET-PET in the radiation therapy target leads to a decrease in marginal failures.

Material and Methods: We analysed the first 66 consecutive patients with histologically confirmed glioblastoma (WHO grade IV), scanned with FET-PET and MRI for post-surgical radiotherapy planning. Residual tumor volume including the resection cavity, denoted GTV(MR), was manually contoured on contrast-enhanced T1-weighted MRI (cT1). Metabolic tumor volume (GTV(PET)) was semi-automatically delineated by including tissue with uptake exceeding 1.6 times the uptake in normal appearing grey matter and subsequently edited to exclude non-tumor tissue. The CTV was created by adding a uniform margin of up to 2 cm to GTV(MR) and if necessary modified to include GTV(PET) and exclude natural boundaries such as the skull. A dose of 60 Gy was prescribed to the PTV (CTV plus 0.2 cm) in 2 Gy fractions, five days a week, using VMAT. TMZ was administered daily with radiotherapy (75 mg/m2) and subsequently in 6 cycles in a 5 days schedule every 28 days (150-200 mg/m2). The recurrence volume (RV) was evaluated radiologically on follow-up cT1 according to the RANO-criteria. Patterns of failure were classified as central, in-field or marginal if >95%, 80-95% or 20-80% of the RV was located within the 95% isodose (D95%). In case of the appearance of any new lesion outside the D95% or if <20% of the RV was within D95%, the failure was defined as distant. The treatment failure overlap (TFO) for three pre-treatment tumor volumes; GTV(MR), GTV(PET) and the union of the two, denoted GTV(MRPET), were calculated as the intersection of each GTV and RV divided by RV. Differences were assessed using Willcoxon signed rank test.

Results: Sixteen patients were excluded due to; no follow-up imaging (n=6), incomplete RT (n=3), whole-brain irradiation (n=1), clinical deterioration but no sign of radiological progression (n=2) and four patients were progression-free at the time of analysis (median follow-up 38.5 months). All patients were FET-positive. The pattern of failure was central, in-field, marginal and distant in 82%, 10%, 2% and 6%, respectively. The TFO were in median 0.73, 0.34 and 0.87 for GTV(MR), GTV(PET) and GTV(MRPET), respectively. All TFO were significantly different (p<0.001).

Conclusion: The inclusion of FET in radiotherapy planning leads to fewer marginal failures compared to previously reported studies. FET-PET alone is not better than MRI to predict the pattern of failure in glioblastoma patients. However, the combination of the two appears better than either of the modalities alone.