chemoradiation (60 Gy, 2 Gy per fraction). Ipsilateral (iSVZ), contralateral (cSVZ), and bilateral (bSVZ) SVZs were retrospectively segmented following two delineation methods: with (TH+) and without (TH-) temporal horns. Dose-volume histograms were retrospectively generated on the original plans. Progression was defined according to the RANO criteria. Multivariate analysis using the Cox proportional hazards model including significant covariates in univariate analysis was assessed to examine the relationship between prognostic factors and time to progression (TTP).

**Results:** Median age was 59 years (range: 25-85). Median follow-up, OS and TTP were 52.8 months (95% CI 43.4-61.1), 26.2 months (95% CI 20.3-34.2) and 6.4 months (95% CI 4.4-9.3), respectively. On univariate analysis, initial contact to SVZ was a poor prognostic factor for OS (20.5 vs 56.4 months, \( p = 0.011 \)) and TTP (4.6 vs 12.9 months, \( p = 0.002 \)). With TH-method, patients receiving mean dose to bSVZ greater than 40 Gy had a significantly improved TTP, as well as patients whose V20 Gy to bSVZ was greater than 84% (17.7 months vs 5.2 months, \( p = 0.017 \)). On multivariate analysis, initial contact to SVZ and V20 Gy to bSVZ lesser than 84% remained poor prognostic factors for TTP (HR = 3.07, \( p = 0.012 \) and HR 2.67, \( p = 0.047 \), respectively).

**Conclusion:** Our results suggest that contact to SVZ, as well as insufficient bSVZ coverage such as a V20 Gy lower than 84%, are independent poor prognostic factors for TTP. Therefore, targeting SVZ is of crucial interest for optimizing glioblastoma treatment.

**PO-0648**

**Pilot study in the assessment of contouring variability in stereotactic radiosurgery**

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**Purpose or Objective:** The accuracy in contouring the target is one of the key factors for the success of stereotactic radiosurgery (SRS). This is particularly important when delivering one large fraction of radiation with small or no margins, since the consequence of not defining the correct clinical target volume can be that intended treatment results are not achieved. Furthermore, accurate contouring of the relevant Organs-at-Risk (OARs) is essential to minimize any normal tissue toxicity. The aim of this study was to analyze and quantify the variability of target and OAR contouring for two lesions in the brain.

**Material and Methods:** A multicenter analysis of the variability in contouring the target and the OARs for two typical cases of brain disorders, a cavernous sinus meningioma and a vestibular schwannoma was performed. Twelve Gamma Knife centers from around the world have participated in the study by contouring the targets and the OARs. The resulting treatment plans were analyzed with respect to the agreement in target and OARs contouring. The 50 %-agreement volume, AV50, and the common volume, AV100, together with the encompassing volume, AV100/4, were determined based on a binary analysis method. A novel metric for the variability in delineation defined as the Agreement-Volume-Index was introduced and additionally calculated. The variability of the contoured structures was also analyzed with respect to the position of their centers of mass (COMs).

**Results:** Substantial disagreement in target delineation was observed with an Agreement-Volume-Index of 0.22 for the meningioma case and 0.50 for the vestibular schwannoma case, respectively. Very high disagreement was also observed for the delineation as OARs of the optic apparatus and cochlea with an Agreement-Volume-Index ranging from 0 to 0.13. The disagreement was observed with respect to the shape, size and position of the contoured volumes. The resulting disagreement in target volumes was highest for the meningioma (range 5.29-7.80 cm³) while a lower disparity was observed for the schwannoma (range 3.56-4.48 cm³). The majority of structures analyzed displayed the highest disagreement of the COM in longitudinal direction. An illustration of the displacement of the COMs together with the common volume and encompassing volume is shown in Figure 1 for the cavernous sinus meningioma case.

**PO-0649**

**Evaluation of distant brain failure among patients undergoing SRS for lung cancer brain metastases**

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**Purpose or Objective:** The latency, overall extent, and rate, of distant brain failure for non-small cell lung cancer patients undergoing SRS for brain metastases is not well characterized. We evaluated the impact of multiple pre-treatment parameters including age, KPS, extracranial disease status (ECD), initial number of metastases, initial aggregate tumor volume, and histological/molecular subtypes, on distant brain failure. We also evaluated the impact of WBRT performed before, combined with, or after SRS.

**Material and Methods:** The retrospective study population included 118 NSCLC patients with brain metastases treated with SRS between 11/2008 and 01/2014. The distant brain metastasis-free survival (DBMFS) was defined as latency in months from initial SRS to first subsequent radiographic evidence of new brain metastasis. The extent of overall distant brain failure (ODBF) was defined as the total number of new metastases that developed following initial SRS treatment. The distant brain failure rate (DBFR) was defined as the ODBF/RFI where RFI was defined as the maximum radiographic follow-up interval in months. Kaplan Meir analysis was used to evaluate DBMFS and Log Rank test was used to determine the significance (\( p \)-value <0.05 was considered significant). For ODBF and DBFR, Independent...
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 DBFBR (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 calculated as the intersection of each GTV and RV. Differences were assessed using Wilcoxon signed rank test.

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.