Abstract:

Histopathological examination is the standard for grading and determination of diagnosis in intrinsic brain tumors though the possibility of malignization and tumor heterogeneity always bears the possibility of tumor under-grading or misjudgement regarding the estimation of prognosis. The aim of the present study was to evaluate the use of (18)F-FET-PET (FET-PET) for the grading and estimation of prognosis in newly diagnosed patients with intracranial gliomas in a clinical setting. Patients who were treated for a newly diagnosed intracranial glioma between January 2007 and May 2012, and had a preoperative FET-PET and MRI scan between were included. The ratio of counts in a tumor VOI (volume of interest) with maximum uptake to the respective counts in a background VOI was calculated to provide the tumor-to-normal (T/N) ratio. The clinical and histopathological data (tumor grading, pre- and postoperative neurological status, Karnofsky Performance Status Scale scores, and overall survival rates) were recorded. One hundred fifty-two patients (39 WHO II, 26 WHO III, 87 WHO IV) were included. The median T/N ratio was 2.81 (1.1-8.1). The median T/N ratio of low-grade glioma patients was 1.65 (1.1-3.7), and 3.14 (1.61-8.1, p3, median survival was 14.0 months (95% CI: 11.7-16.2%).
The test of the maximally selected log-rank statistic resulted in a T/N ratio of 1.88 as the cut-off value, with the greatest difference in overall survival between patients with longer and shorter survival. The ROC curve for differentiation of low- vs. high-grade tumors with regard to the T/N ratio showed an area under the curve (AUC) of 0.903. Regarding the prognostic validity for overall survival ROC-curves for 12-month, 24-month and 48-month survival display a higher validity for the WHO-classification than for the imaging modalities though with an AUC of 0.847 for the 48-month survival T/N ratio and MRI contrast-enhancement have a high prognostic value as well. Our study suggests that FET-PET can predict prognosis and survival in patients harboring intracranial gliomas and serves as a valuable tool to supplement the established clinical and histopathological parameters.