NI-29. DIAGNOSIS OF PSEUDOPROGRESSION IN PATIENTS WITH GLIOBLASTOMA USING AMINO ACID PET

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BACKGROUND: The follow-up of glioblastoma patients may be difficult with conventional MRI since reactive blood-brain barrier alterations with contrast enhancement can mimic tumor progression (“pseudoprogression”), especially early after completion of radiochemotherapy. METHODS: Twenty-six glioblastoma patients with newly appearance or an increase of enhancing lesions (≥25%) on standard MRI with gadolinium-based contrast agents within the first 12 weeks after completion of radiochemotherapy with concomitant temozolomide (median time, 7 weeks) were additionally examined by amino acid PET using O-(2-[18F]fluoroethyl)-L-tyrosine (18F-FET) (n = 22) or 11C-methyl-L-methionine (11C-MET) (n = 4). Median duration between MR and amino acid PET imaging was 7 d. Maximum and mean tumor/brain ratios (TBRmax/mean) of 18F-FET and 11C-MET uptake were determined. Furthermore, 18F-FET uptake kinetic parameters (i.e., time-to-peak and patterns of the time-activity curves (TAC)) were evaluated. The presence of pseudoprogression / early tumor progression was based on the clinical course (progression-free survival (PFS) ≤ 6 mo) and/or histopathological findings. Imaging results were also related to overall survival (OS). RESULTS: Pseudoprogression was confirmed in 14 of 26 patients. TBRmax and TBRmean of 18F-FET / 11C-MET uptake were significantly higher in patients with early tumor progression (n = 12) than in patients with pseudoprogression (TBRmax, 3.6 ± 0.8 vs. 2.4 ± 0.4; TBRmean, 2.5 ± 0.3 vs. 1.8 ± 0.2; both P < 0.001). Furthermore, patterns of TAC were significantly different in both groups (P = 0.04) and presence of MGMT promoter methylation was significantly higher in patients with pseudoprogression (P = 0.02). Receiver-operating-characteristic analysis yielded a TBRmax of 2.9 as an optimal cut-off to identify early tumor progression (sensitivity, 92%; specificity, 93%; accuracy, 92%; AUC, 0.96 ± 0.04; P < 0.001). Univariate survival analyses revealed that a TBRmax < 2.9 predicted both a significantly longer PFS (median PFS, 21 vs. 5 months; P < 0.001) and OS (median OS, 33 vs. 12 months; P = 0.007). CONCLUSIONS: Amino acid PET contributes significantly in diagnosing pseudoprogression.