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DOI 10.3174/ajnr.A1008**BRAIN**

Metabolic Assessment of Gliomas Using ¹¹C-Methionine, [¹⁸F] Fluorodeoxyglucose, and ¹¹C-Choline Positron-Emission Tomography

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BACKGROUND AND PURPOSE: Positron-emission tomography (PET) is a useful tool in oncology. The aim of this study was to assess the metabolic activity of gliomas using ¹¹C-methionine (MET), [¹⁸F] fluorodeoxyglucose (FDG), and ¹¹C-choline (CHO) PET and to explore the correlation between the metabolic activity and histopathologic features.

MATERIALS AND METHODS: PET examinations were performed for 95 primary gliomas (37 grade II, 37 grade III, and 21 grade IV). We measured the tumor/normal brain uptake ratio (T/N ratio) on each PET and investigated the correlations among the tracer uptake, tumor grade, tumor type, and tumor proliferation activity. In addition, we compared the ease of visual evaluation for tumor detection.

RESULTS: All 3 of the tracers showed positive correlations with astrocytic tumor (AT) grades (II/IV and III/IV). The MET T/N ratio of oligodendroglial tumors (OTs) was significantly higher than that of ATs of the same grade. The CHO T/N ratio showed a significant positive correlation with histopathologic grade in OTs. Tumor grade and type influenced MET uptake only. MET T/N ratios of more than 2.0 were seen in 87% of all of the gliomas. All of the tracers showed significantly positive correlations with Mib-1 labeling index in ATs but not in OTs and oligoastrocytic tumors.

CONCLUSION: MET PET appears to be useful in evaluating grade, type, and proliferative activity of ATs. CHO PET may be useful in evaluating the potential malignancy of OTs. In terms of visual evaluation of tumor localization, MET PET is superior to FDG and CHO PET in all of the gliomas, due to its straightforward detection of "hot lesions".

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