

[F-18]FDG PET METABOLIC INDICES FOR THE EVALUATION OF GLIOMA.

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[F-18]FDG PET brain imaging is an accurate predictor of primary brain tumor grading and prognosis. The purpose of this study was to evaluate simplified [F-18]FDG PET metabolic indices as indicators of proliferative activity of brain tumor cells. Twenty-five patients with glioma were studied with [F-18]FDG PET. From the tissue radioactivity ratios, following tumor metabolic indices were calculated: 1) the tumor-to-whole brain ratio (T/WB), 2) the ratio of tumor-to-contralateral gray matter at the level of centrum semiovale (T/GM), 3) the ratio of tumor-to-contralateral white matter at the level of centrum semiovale (T/WM), 4) the tumor-to-ipsilateral cerebellar ratio (T/iCB) and 5) the tumor-to-contralateral cerebellar ratio (T/cCB). A standardized threshold method was used to define ROIs in the tumor areas having representative metabolic activities. Correlations of the tumor metabolic indices with histologic grade, Ki-67 labeling index (Ki-67 LI), p53, DNA ploidy, DNA index, cytometric proliferating index and cytometric S-phase fraction were examined. There were significant correlations among the five tumor metabolic indices ($r=0.948-0.990$, $p<0.0001$). All of the indices were significantly correlated with histologic grade and Ki-67 LI (Table 1); the T/GM and T/WB provided a better indication of histologic grade and Ki-67 LI, respectively. None of the indices had a significant correlation with either p53, DNA ploidy, DNA index, cytometric proliferating index or cytometric S-phase fraction

Table 1. (* $p<0.005$, † $p<0.001$, ‡ $p<0.01$, § $p<0.05$)

	T/WB	T/GM	T/WM	T/iCB	T/cCB
Histologic grade	0.591*	0.636†	0.526‡	0.590*	0.567*
Ki-67 LI	0.579§	0.536§	0.569§	0.578§	0.538§

The results indicate that simplified [F-18]FDG PET metabolic indices may be clinically useful for assessing tumor biology and monitoring metabolic changes in glioma. The indices, T/WB and T/GM appear to be more adequate parameters. In addition, [F-18]FDG PET metabolism in glioma may predict cell proliferative activities more closely related to the Ki-67 labeling index.