Horiguchi et al. investigated the relationship between metabolic activity and histological features of gliomas using fluorine-18α-methyltyrosine (18F-FAMT) positron emission tomography (PET) compared with fluorine-18 fluorodeoxyglucose (18F-FDG) PET in 38 consecutive glioma patients. The tumor to normal brain ratios (T/N ratios) were calculated, and the relationships between T/N ratio and World Health Organization tumor grade or MIB-1 labeling index were evaluated. The diagnostic values of T/N ratios were assessed using receiver operating characteristic (ROC) curve analyses to differentiate between high-grade gliomas (HGGs) and low-grade gliomas (LGGs).

Median T/N ratio of 18F-FAMT PET was 2.85, 4.65, and 4.09 for grade II, III, and IV gliomas, respectively, with significant differences between HGGs and LGGs ($p = 0.006$). Both T/N ratio ($p = 0.016$) and maximum standardized uptake value ($p = 0.033$) of 18F-FDG PET showed significant differences between HGGs and LGGs. ROC analysis yielded an optimal cut-off of 3.37 for the T/N ratio of 18F-FAMT PET to differentiate between HGGs and LGGs (sensitivity 81%, specificity 67%, accuracy 76%, area under the ROC curve 0.776). Positive predictive value was 84%, and negative predictive value was 62%. T/N ratio of 18F-FAMT PET was not correlated with MIB-1 labeling index in all gliomas, whereas T/N ratio of 18F-FDG PET was positively correlated ($r_s = 0.400$, $p = 0.013$). Significant positive correlation was observed between T/N ratios of 18F-FDG and 18F-FAMT ($r_s = 0.454$, $p = 0.004$), but median T/N ratio of 18F-FAMT PET was significantly higher than that of 18F-FDG PET in all grades of glioma.

The T/N ratio of 18F-FAMT uptake has high positive predictive value for detection of HGGs. 18F-FAMT PET had higher T/N ratio, with better tumor-normal brain contrast, compared to 18F-FDG PET in both LGGs and HGGs. Therefore, 18F-FAMT is a useful radiotracer for the preoperative visualization of gliomas [1].

1)
Horiguchi K, Tosaka M, Higuchi T, Arisaka Y, Sugawara K, Hirato J, Yokoo H, Tsushima Y, Yoshimoto Y. Clinical value of fluorine-18α-methyltyrosine PET in patients with gliomas: comparison with fluorine-18 fluorodeoxyglucose PET. EJNMMI Res. 2017 Dec;7(1):50. doi: 10.1186/s13550-017-0298-8. Epub 2017 May 31. PubMed PMID: 28567708.