ABSTRACT

The role of optimal cut-off diagnosis in 11C-methionine PET for differentiation of intracranial brain tumor from non-neoplastic lesions before treatment.

Yamaki T(1), Higuchi Y(2), Yokota H(3), Iwadate Y(2), Matsutani T(2), Hirono S(2), Sasaki H(4), Sasao R(4), Toda M(4), Onodera S(5), Oka N(6), Kobayashi S(7).

Author information:
(1)Division of Neurosurgery, Rehabilitation Center for Traumatic Apallics Chiba, National Agency for Automotive Safety and Victims' Aid, Chiba, Japan; Division of PET imaging, Rehabilitation Center for Traumatic Apallics Chiba, National Agency for Automotive Safety and Victims' Aid, Chiba, Japan. Electronic address: t-yamaki@chiba-ryougo.jp.
(2)Department of Neurological Surgery, Chiba University Graduate School of Medicine, Chiba, Japan.
(3)Department of Diagnostic Radiology and Radiation Oncology, Chiba University Graduate School of Medicine, Chiba, Japan.
(4)Department of Neurosurgery, Keio University School of Medicine, Tokyo, Japan.
(5)Division of PET imaging, Rehabilitation Center for Traumatic Apallics Chiba, National Agency for Automotive Safety and Victims' Aid, Chiba, Japan.
(6)Division of Neurosurgery, Rehabilitation Center for Traumatic Apallics Chiba, National Agency for Automotive Safety and Victims' Aid, Chiba, Japan; Division of PET imaging, Rehabilitation Center for Traumatic Apallics Chiba, National Agency for Automotive Safety and Victims' Aid, Chiba, Japan.
(7)Division of Neurosurgery, Rehabilitation Center for Traumatic Apallics Chiba, National Agency for Automotive Safety and Victims' Aid, Chiba, Japan.

PURPOSE: Amino acid positron emission tomography (PET) may provide additional information to computed tomography and magnetic resonance imaging for detecting the pretreatment diagnosis of intracranial lesions. The purpose of this study was to investigate the role of cutoff values of 11C-METPET, an amino acid PET tracer, in the differentiation of pretreatment brain tumors from non-neoplastic lesions.

METHODS: This retrospective cohort study analyzed 101 pretreatment patients with a definitive diagnosis out of a total of 425 consecutive 11C-METPET imaging studies. The standardized uptake values (SUV) and the ratios of lesion to contralateral normal frontal-lobe gray matter uptake (L/N ratios) were measured. Cutoff values for the differential diagnosis of brain tumors from non-neoplastic lesions were determined using receiver operating characteristics curve (ROC) analysis.

RESULTS: Based on the ROC analyses, the cutoffs were 3.33 for maximum SUV, 2.54 for mean SUV, 2.33 for peak SUV, 2.04 for Lmax/Nmean, and 2.23 for Lmax/Nmax. The sensitivity and specificity of these cutoffs were 69.2% and 82.6%, respectively, for maximum SUV, 64.1% and 91.3% for mean SUV, 69.2% and 91.3% for peak SUV, 70.5% and 91.3% for Lmax/Nmax and 75.6% and 82.6% for Lmax/Nmean.

CONCLUSION: In differentiating intracranial brain tumor from non-neoplastic lesion with 11C-METPET, the use of optimal cutoff values indicates the high specificity, which means that positive result indicates the high likelihood of brain tumor. Considering the high specificity of 11C-METPET, more invasive examinations such as biopsy may be considered in positive cases.

PMID: 36374712 [Indexed for MEDLINE]