

Evaluation of treatment effects in brain abscess with positron emission tomography: Comparison of fluorine-18-fluorodeoxyglucose and carbon-11-methionine

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Positron emission tomography (PET) imaging is in common use preoperatively to clinically evaluate patients who present with central nervous system mass lesions. The usefulness of PET is also recognized as a method to detect intracranial tumorous lesions. A number of papers report that some inflammatory processes also showed the uptake of Fluorine-18-Fluorodeoxyglucose (FDG) and Carbon-11-Methionine (Met) tracers. We performed two PET studies before and after treatment in 4 patients with brain abscess. PET showed the uptake of both tracers to the brain abscess before treatment. The area showing an increased uptake of Met corresponded closely to the enhanced area on both CT and MR images. FDG-PET visually showed an uptake of FDG in a small area corresponding to an enhanced lesion within the CT and MR images. After treatment the area of lesions became small on enhancement CT or MRI and both PET studies showed reduced lesion and decreased uptake. The mechanism of Met uptake in the inflammatory area may be related to the higher metabolic rate and the active transport of amino acids as well as disruption of the blood brain barrier. Furthermore, it appears that the mechanism of FDG uptake is also related to a higher metabolic rate and, in addition, is related to the increased density of inflammatory cells. PET studies, more directly, reflect the degree of inflammatory response in brain abscess than enhancement CT or MRI. Therefore, PET is useful in detecting the inflammatory lesion and assessing the clinical effects of antibiotics treatment on brain abscesses.

Key words: positron emission tomography, methionine, FDG, abscess, brain