PET SCAN USING DIFFERENT TRACERS TO DETECT BRAIN LESIONS

CHRISTIE DIB

UNIVERSITY OF BALAMAND, LEBANON

As nuclear medicine techniques are evolving to obtain a higher accuracy in detecting wide ranges of brain tumors, this study was conducted to assess Positron Emission Tomography (PET) using various tracers to detect and distinguish various types of brain lesions. Such methods aim for a clearer diagnosis and better monitoring of therapy.

The first method used is PET using 18F-Fluorodeoxyglucose which allows the detection of cerebral metabolism. The quantification of FDG uptake is done by measuring Tumor standard uptake values (SUV) which are reported in conjunction with CT or MRI scans as normal brain glucose uptake makes tumor delineation more difficult.

The second method used is PET and Single-Photon Emission Computed Tomography (SPECT) using radiolabeled amino acid tracers such as 11C-methionine, 18F-fluoroethyltyrosine, and l-3[123I]iodo-α-methyl tyrosine.

FDG was shown to be an efficient diagnostic tool to distinguish between brain lymphomas and nonmalignant lesions as the SUV ratio was significantly higher in patients with lymphoma compared to those with cerebral infections (P<0.05 ; ranges 1.7-3.1 VS 0.3-0.7)

The increased uptake of amino acid tracers by brain tumors via specific transporters gives this technique an advantage over FDG as normal brain is not able to undergo such a process of transport. This provided a higher sensitivity and specificity (70%-90%) to contrast between low grade gliomas, non-neoplastic lesions and normal tissue.

This study was able to test the efficiency of PET scan using multiple distinct tracers to compare between different brain lesions. Further research is being conducted using PET and SPECT involving vascular proliferation, hypoxia, membrane and receptor properties of tumors, in addition to using 18 F-FLT to demonstrate BBB integrity or impairment in various cases.