2b

FDG-PET in the diagnosis and staging of lymphoma

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It happens that the distribution of abnormal foci of FDG uptake is evocative of lymphoma, e.g. in patients referred for fever of unknown origin or for another malignancy. However, as a consequence of its lack of specificity, the role of FDG imaging for the positive diagnosis of that disease is in most cases limited to biopsy guidance and histology remains mandatory. In one particular indication, FDG-PET appeared to be helpful for initial characterisation : cerebral masses of AIDS patients [1-3]. Uptake of FDG by opportunistic infections was reported to be similar to that of white matter, while lymphoma masses showed a higher uptake similar to or higher than that of grey matter. In contrast to this effectiveness of FDG-PET in brain lesions, the characterisation of lymphoma lesions in the whole body was not possible in febrile AIDS patients without central nervous system masses. Castelman's disease, Kaposi sarcoma, carcinoma and opportunistic infection manifested with increased FDG uptake as did lymphoma. Nevertheless, FDG allowed sensitive detection of foci which needed to be treated, whatever their nature.

The 3rd German consensus conference [4] considered differentiation of cerebral lymphoma and toxoplasmosis to be of "probable clinical use".

FDG uptake in the staging of lymphoma

FDG-PET is able to stage efficiently Hodgkin's disease, including in children [5], and high-grade non-Hodgkin's lymphoma (NHL). Compared with classical staging methods, FDG-PET achieves important incremental data. In a single whole-body investigation, it has the capacity of providing information otherwise only available using invasive procedures, and of demonstrating lymphomatous involvement not shown by conventional methods. Imaging techniques including MRI and CT have a good specificity, but sensitivity is often close to 50 %. Gallium scintigraphy can be used for whole body studies but has the same low sensitivity (50-60 %).

Concerning the diagnostic performances of FDG-PET for initial staging, the summary of Gambhir [6] including 2227 examinations indicates a 90 % Se for FDG-PET versus 81 % for CT, Sp 93 % for PET versus 69 % for CT and accuracy 88 % for PET versus 64 % for CT. Many reports demonstrate the superiority of FDG-PET over gallium-67 scintigraphy [7, 8] or CT.

FDG-PET diagnostic performances according to the grade

Uneven results have been reported about its ability to detect low grade NHL. Jérusalem [9] observed that FDG-PET was very efficient in low-grade NHL of the follicular type, being able to detect 40 % more nodal metastases than conventional imaging. Its role remains to be discussed in other histological subtypes. In MALT lymphoma, the utility of FDG PET have been reported in small series, showing a more extensive local and distant involvement than endoscopy and CT [10] ; we have also the same experience, FDG-PET being useful to detect locations at the whole-body level even when the primary MALT lymphoma is not visualised in the stomach or the digestive tract. In contrast, Hoffman reported deceiving results for MALT lymphoma and for follicular lymphoma of the duodenum [11].

FDG-PET diagnostic performances according to the site

For the detection of lymph node involvement, FDG is significantly superior to CT. For example, in 29 lymph node sites with discrepant PET and CT results that were verified histologically, FDG-PET results were 22 true positive and 7 true negative sites [12].

For bone marrow involvement in lymphoma of all types, FDG-PET yields a significant but non-perfect sensitivity (80-90 %), but specificity is almost 100 %. PET is a useful tool to guide bone marrow biopsy to focal lesions that take-up FDG [12]. However, in low grade NHL, Najjar [13] observed a lower sensitivity (50 %). FDG-PET is useful to guide the bone marrow biopsy, but microscopic bone marrow invasion cannot be ruled out in case of negative FDG uptake.

For liver and spleen involvement, FDG-PET has a clear advantage over conventional imaging based most frequently on an enlargement of those organs or over gallium-67 with its physiologic uptake

Clinical impact of FDG-PET at staging

Even at an early stage of Hodgkin's lymphoma, FDG-PET has a substantial impact on the therapy decision. In a prospective study where no decision was taken on basis of FDG-PET, Naumann [14] considered that management would have been changed by PET in 16 of 88 patients (18 %) : intensification in 9 patients and minimisation in 7. Among the 44 patients with early disease (stage IA-IIB), treatment would have been intensified in 9 (20 %).

This setting has been rated 1a in the 3rd German Consensus Conference ("established clinical use"), "standard" in the French SOR and accepted for reimbursement by HCFA in USA.

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