Imaging in Myeloma: Fcholine PET

6th International Workshop on PET in lymphoma
September 20-21 2016
Menton

F Montravers and L Garderet
Médecine Nucléaire Hôpital Tenon, Hématologie Hôpital Saint Antoine, Paris
Dec 2014, the patient was on lenalidomide maintenance. Mild low back pain
M Spike = 5 g/L, stable FDG and FCH PET: relapse
Bone marrow aspiration: 51% plasmocytes

78 years old male
IgA kappa Myeloma
Diagnosis in 2002
1st line: VAD + 2 ASCT in 2003
2nd line: VTD in 2006
3rd line: lenalidomide in 2010

In Dec 2014, the patient was on lenalidomide maintenance.
Mild low back pain
M Spike = 5 g/L, stable
FDG and FCH PET: relapse
Bone marrow aspiration: 51% plasmocytes

4th line: Pomalidomide + DXM
- March 2015, complete metabolic response, FDG and FCH PET
- June 2015, treatment was stopped because of a severe lung infection
- Oct 2015, still in metabolic CR (FDG PET)

Mar 2015

Oct 2015
- Aug 2016, one year after end of treatment,
Patient was barely symptomatic
M Spike: 3.5 g/L
Standard check up with FDG and FCH PET: relapse
Bone marrow aspiration failed
5th line: Pomalidomide-Bortezomib-DXM
18F-fluorocholine versus 18F-fluorodeoxyglucose for PET/CT imaging in patients with suspected relapsing or progressive multiple myeloma: a pilot study

Thibaut Cassou-Mounat¹,²,³ • Sona Balogova¹,⁴ • Valérie Nataf¹,⁵ • Marie Calzada¹,² • Virginie Huchet¹ • Khaldoun Kerrou¹ • Jean-Yves Devaux²,³,⁷ • Mohamad Mohty³,⁶,⁷ • Jean-Noël Talbot¹,³ • Laurent Garderet³,⁶,⁷

Hematology, hôpital Saint-Antoine & Nuclear Medicine, hôpital Tenon, Paris
Patients and methods

• 21 patients with clinical and/or biochemical suspicion of relapse or progression

• mean interval between FCH and FDG PET/CT: 10.4 days (median 7, range 3-35)

• 2 readers:
  • on site reader
  • masked external reader

High interobserver agreement
k = 0.89 (FCH)
k = 0.81 (FDG)
RESULTS

- 2 patients FDG- and FCH-: 2 true negative results

- 4 patients with FDG and FCH **innumerable** bone foci:
  4 true positive results (with confirmed bone marrow infiltration)
  (in one patient, a clear mismatch between FCH and FDG uptake of some foci was observed)

- 15 patients with **countable** bone foci:
  75% more bone foci were detected with FCH than with FDG in the matched foci, higher intensity of uptake for FCH vs FDG
One patient with innumerable bone foci on both FDG and FCH PET/CT

The majority of foci are matched (white arrows). However, some foci appear more intense with FDG (black full arrow) and other with FCH (black dotted arrow). Furthermore, some lesions visible on CT take-up neither FDG nor FCH (white dashed arrow), probably as a consequence of the previous treatment.
Two patients with numerable bone foci on both FDG and FCH PET/CT.

FCH shows much more foci than FDG in patient A.
FCH and FDG show the same foci in patient B.
Coronal slices of the same patient. Negative FDG PET/CT (A), small lytic lesions in the skull on CT (B) and positive FCH PET/CT (C)
Discussion

• The good performance of FCH PET can be explained by the increase of serum lysophospholipid levels in MM patients compared to healthy subjects, illustrating the increased lipid metabolism
  
  Sasagawa T. et al, Lipids, 1999

• In accordance with previous studies with other tracers of lipid metabolism, either $^{11}$C-choline or $^{11}$C-acetate
  
  Ho C. et al, J Nucl Med, 2014 ($^{11}$C-acetate)
  Nanni C. et al, World J Surg Oncol, 2007 ($^{11}$C-choline)
The better detection of bone foci using FCH than FDG in this pilot study requires confirmation:

• in large prospective series,
• in other settings (initial staging, assessment of treatment response including after stem cell transplantation),
• with evaluation of the impact of FCH PET/CT on patient management and of the adequacy of changes.
• with evaluation of the significance of mismatched foci which can be sometimes observed
In conclusion, FCH PET/CT, now widely available in several countries, might constitute a promising imaging modality in multiple myeloma.