## $^{18}$F- fluoride PET/CT assessment in patients fulfilling the clinical arm of the ASAS criteria for axial spondyloarthritis. A comparative study with ankylosing spondylitis

Sirs,

Patients who fulfilled the ASAS criteria for axial spondyloarthritis but do not have radiographic sacroillitis are currently called non-radiographic Ax SpA (non Rx Ax SpA) (1, 2). In these patients, the demonstration of objective signs of inflammation on the skeleton might be useful for diagnosis. $^{18}$F-fluoro -2-deoxy-D-glucose (FDG) positron emission tomography-computed tomography (PET/CT) can detect synovitis and enthesitis in SpA (3, 4). $^{18}$F-fluoride is a bone radionuclide tracer of osteoblastic activity that is used for imaging malignant skeletal diseases (5). Since the pathological process in SpA mainly affects the entheseal structures that are attached to the bone, one may hypothesise that using a bone tracer with PET-CT imaging could be useful for the assessment of SpA. We evaluated the utility of $^{18}$F-fluoride PET-CT in patients with non Rx Ax SpA compared to patients with ankylosing spondylitis (AS).

Fifteen patients were evaluated: 10 with non Rx Ax SpA (8 F, age [mean ± SD, years] 35±11.1, disease duration 3.8±1.8, BASDAI 5.4±2.6, CRP 4±2.5 mg/L, all HLA-B27) and 5 with AS (5 M, age 40.8±9.6, disease duration 6.4±1.6, BASDAI 3.6±2.4, CRP 12.8±5.3 mg/L, 4 HLA-B27). All patients were under NSAIDs and none were taking DMARDs or biological agents. In the non Rx Ax SpA group, no patient had MRI bone marrow oedema in the sacroiliac joints (SIJ) while 1 patient had spinal inflammatory lesions at one discovertebral unit. In the AS group, 4 patients had active bilateral sacroiliitis (MRI SIJ score using a grading method previously described (6): 4.2±3.4). Three had inflammatory spinal lesions at 3 vertebral levels. $^{18}$F-fluoride PET/CT did not show increased radionuclide uptake in patients with non Rx Ax SpA. Conversely, 4 patients with AS had active lesions in at least one area of PET-CT scan: the SIJ with bilateral involvement for all 4 patients (Fig. 1), the spine in 3 patients (vertebral corners, costovertebral and costo-transverse joints, facet joints or interspinal ligaments), and the appendicular skeleton in 4 patients (sternoclavicular joints, acromioclavicular joints, pubic symphysis, ischial tuberosity, femoral condyle). One patient had disseminated lesions involving the costovertebral joints all along the spine. In AS patients, the number of areas with increased radionuclide uptake ranged from 2 to 33. The mean SIJ/sacrum standard uptake value (SIJ/S SUV) ratio was 2.02±0.6. For SIJ, there was a good concordance between active inflammatory areas depicted on $^{18}$F-fluoride PET-CT and MRI. Conversely, for spinal lesions, the number of fluoride lesions on PET-CT scans largely exceeded those detected by spinal MRI (33 v*s*. 4). There was also a relationship between SIJ MRI score and SIJ/S SUV ratio. Finally, the level of confidence of the clinicians for the diagnosis of non Rx Ax SpA using a visual analog scale (0–10) was 7.3±0.9 before and 5.8±1.3 after $^{18}$F- fluoride PET-CT analysis. Our results suggest that $^{18}$F-fluoride PET-CT is of limited value for the assessment of patients classified in the clinical arm of non Rx Ax SpA. Conversely, $^{18}$F-fluoride PET-CT accurately revealed active lesions in patients with established AS and active sacroiliitis on MRI (7, 8). Since the proposed pathological sequence in entheseal structures in SpA is inflammation that is followed by ossification, our finding of $^{18}$F-fluoride uptake only in patients with active sacroiliac MRI inflammation and radiographically advanced structural damage are coherent with this physiopathological sequence (9). The radionuclide uptake detected by this method probably reflects bone activity rather than inflammation in AS patients (8). Its utility for the prediction of progression of ankylosis/ossification should be investigated in future studies.

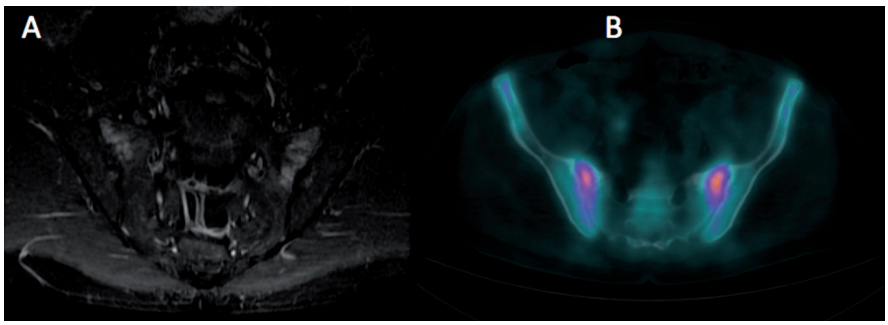


**Fig. 1.** Axial Short Tau Inversion Recovery (STIR) magnetic resonance imaging (MRI) showing bilateral periarticular marrow oedema on sacroiliac joints (**A**). Axial fused PET-CT scan image showing increased $^{18}$F-fluoride uptake on both sacroiliac joints (**B**). These data are consistent with active sacroiliitis associated with axial SpA.

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