Characterization of Enthesitis Burden in Psoriatic Arthritis using Total-Body PET/CT Imaging with the ^{18}F-FDG radiotracer

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INTRODUCTION: Inflammation at sites of tendon and ligament attachment (enthesitis) could represent a disease hallmark in psoriatic arthritis (PsA) patients. We explored utility of high-sensitivity Total-Body (TB) 18F-FDG PET/CT imaging for the characterization of enthesitis burden in PsA patients.

METHODS: This ongoing work prospectively recruited 15 participants (14 male, 1 female; mean age of 56.8±16.3 years), with established diagnosis of PsA. All subjects underwent full rheumatological evaluation including Leeds enthesitis index (LEI) and TB-PET/CT with 77.7±4.7 MBq of ^{18}F-FDG. Qualitative and quantitative findings of 38 entheses per participant (38x15=570) were assessed. The evaluated entheses were derived from 6 different enthesitis outcome measures (LEI, San Francisco, MASES, MAJOR, SPARCC, and 4-Point enthesitis measures). Each enthesis was visually and quantitatively evaluated (rSUVmax=SUVmax/blood pool SUVmean).

RESULTS: PET/CT was positive in 127/543 evaluable enthesis (23.4%) from 14 out of the 15 participants. On rheumatologic examination and PET/CT, respectively, 7 and 21 out of 82 evaluable LEI entheses were positive. PET/CT was positive in 5/7 tender entheses and detected inflammation in 16 more LEI entheses. Components of SPARCC and San Francisco measures demonstrated the highest absolute number of positive entheses (66 and 59, respectively). However, components of LEI were the most active **(Figure 1)** with summed rSUVmax of 14.1±9.8 compared to 8.0±5.1and 7.0±4.8 for SPARCC and San Francisco measures, respectively.

DISCUSSION: Current clinical measures of enthesitis, based on clinical examination, are driven by anatomical site accessibility rather than actual disease burden. The mismatch between clinical and ^{18}F-FDG findings substantiates that PET could detect subclinical entheseal inflammation. On the other hand, tenderness alone might not be always indicative of active inflammation. Accurate quantification of systemic burden of enthesitis could be useful for better stratification of disease extent and severity.

CONCLUSION: Evaluation of enthesitis burden on total-body 18F-FDG PET/CT scans is feasible in patients with psoriatic arthritis.

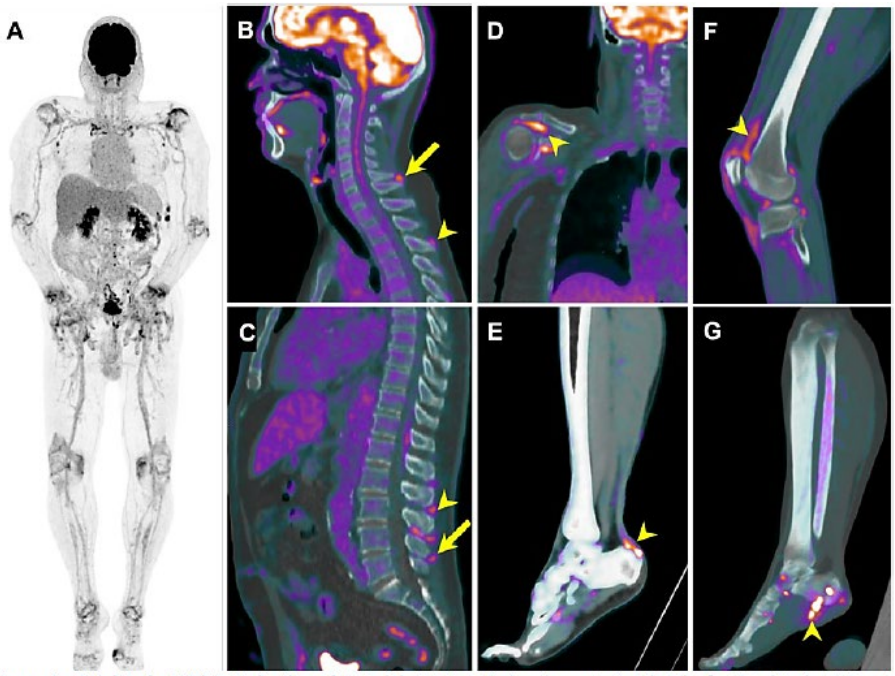

Figure 1 . Total-Body PET/CT Evaluation of PsA: (A) Maximum-intensity projection (MIP) of a Total-Body PET scan demonstrating multiple active joints (shoulders, sternoclavicular joints, elbows, wrists, knees, ankles, left first MTP). Fused PET/CT images from different participants demonstrating enthesitis patterns throughout the body (B-G). The spine entheses are involved at the cervical (B, arrow at C7 and arrowhead at T3), and lumbar regions (C, arrow at L5 and arrowhead at L3/L4/L5 inter/supra-spinous ligaments). Other inflamed entheses include right supraspinatus (D), Achilles (E), and patellar tendons (F), and plantar fascia (G).