Assessment of extent and activity of musculoskeletal involvement in systemic sclerosis using hybrid [18F]-FDG-PET/MRI

Marius Stefan Horger[1], Nina Schwenzer[1], Sergios Gatidis[1], Christian la Fougere[2], Konstantin Nikolaou[1], and Alexander Walter Sauter[1,3]
[1]Radiology, Eberhard-Karls-University Tuebingen, Tuebingen, Germany, [2]Nuclear Medicine, Eberhard-Karls-University Tuebingen, Tuebingen, Germany, [3]Radiology and Nuclear Medicine, University Hospital Basel, Tuebingen, Germany

Target audience: Practicing radiologists

Objective: To define musculoskeletal MRI findings and FDG uptake patterns in patients with systemic sclerosis (SSc) focusing on disease activity.

Material and Methods: Between 11/2013 – 11/2014, 14 patients with progressive clinical SSc-signs were prospectively enrolled and underwent whole-body PET/MRI (Siemens Biograph mMR). PET/MRI imaging was started 60 min after injection of 345.5 ± 32.2 MBq [18F]-FDG. 3T-MRI acquisition included T1- (pre- and post-contrast), STIR and EPI diffusion-weighted sequences. A score of 0 (none), 1 (mild) or 2 (marked) was assigned to MRI-findings. FDG uptake was expressed as maximal standardized uptake value (SUVmax). Sum scores were generated for clinical, serological and imaging markers.

Results: The mean clinical sum score (including organ-involvement) was 4.3 ± 1.3, while a mRss (modified Rodnan skin score) of 18.8 ± 13.8 could be documented. MRI abnormalities reflecting inflammation and/or collagen tissue involvement of subcutaneous fatty tissue (n=4), muscle fasciae (n=12)(Fig. 1a[T1w-fs postcontrast] and b[FDG-PET/MRI], myositis (n=6) and synovitis (n=12), resulted in a mean MRI sum score of 6 ± 3. Fascial SUVmax was 1.3 ± 1.1 and the corresponding ADCmean 1.5 ± 0.4. Interestingly, positive correlations could be found for mRss & MRI sum score (r=0.5), mRss & SUVmax (r=0.4), MRI sum score & SUVmax (r=0.7), but not for mRss & ADCmean (r=-0.1).

Conclusion: PET/MRI as a combined morphologic and functional technique offers valuable data with respect to disease extent and activity in SSc and results correlate positively with clinical and laboratory scores. Interestingly, FDG-PET and MRI seem to assess the inflammatory processes from different points of view and thus providing complementary information.