Fluorescence-aided tomographic imaging of synovitis in the human finger.

To propose and evaluate indocyanine green (ICG)-enhanced tomographic optical imaging for detection and characterization of synovitis in affected finger joints of patients with rheumatoid arthritis and differentiation from healthy joints in comparison to 3-T magnetic resonance (MR) imaging. This prospective pilot study was approved by the institutional ethics committee. Six arthritic proximal interphalangeal (PIP) joints in six patients (five women and one man; mean age ± standard deviation, 62.6 years ± 13.3) with clinically determined rheumatoid arthritis and six healthy PIP joints from six volunteers (four women and two men; mean age, 41.5 years ± 20.2) were examined with an ICG-enhanced fluorescence molecular tomography (FMT) system and 3-T MR imaging as the standard of reference. The degree of inflammation was graded semiquantitatively on a four-point ordinate scale according to the Outcome Measures in Rheumatology Clinical Trials Rheumatoid Arthritis MR Imaging Score, or OMERACT RAMRIS. FMT reconstructions were coregistered with the MR images. Groups were compared by using a two-sided t test, and a weighted $\kappa$ coefficient was used for comparing FMT and MR imaging semiquantitative scores, as well as assessing intrareader agreement. FMT was used to detect synovitis in all arthritic joints. The reconstructed FMT signal correlated with MR imaging...
findings in intensity and spatial, transverse profile. Semiquantitative scoring of FMT correlated well with MR imaging findings (weighted ? coefficient = 0.90). The reconstructed quantitative FMT signal, denoting synovial hyperperfusion, was used to differentiate between synovitis and healthy joints (healthy joints, 1.25 ± 0.59; arthritic joints, 3.13 ± 1.03; P< .001). FMT enhanced with ICG provided depth-resolved imaging of synovitis in PIP joints. FMT may help detect synovitis in patients with rheumatoid arthritis.