DAS28. The remaining 13 (34.2%) patients changed their status: 11 (28.9%) patients moved from low activity to remission while 2 (5.3%) patients moved from low activity to moderate activity. Figure 1 and 2 demonstrate some of the ultrasound findings observed in our patient group.

Figure 1-. Biceps tenosynovitis in a. transverse and b. longitudinal views.

Figure 2-. Subacromial-subdeltoid (SASD) bursitis in a. transverse and b. longitudinal views.

Conclusion: This study showed that patients improved their disease activity scores and status after an US assessment of their shoulders. A low percentage increased their disease status after shoulder US which can be also important for local or systemic therapeutic decisions. Based on this study, we suggest that shoulder US can provide valuable additional information to the DAS28 when evaluating disease activity in CIA patients.

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FRI0628

DIAGNOSTIC VALUE OF OPTICAL SPECTRAL TRANSMISSION IN PATIENTS WITH RHEUMATOID ARTHRITIS: CORRELATIONS WITH DISEASE ACTIVITY, EPIDEMIOLOGIC AND ANTHROPOMETRIC PARAMETERS

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Background: Valid assessment of disease activity leads to improvement of long-term outcomes in patients with rheumatoid arthritis (RA) (1). Clinical disease activity assessment tools such as the Disease Activity Score

28 (DAS28) are partially subjective and do not always depict the real inflammatory burden. Ultrasound (US) and Hand-MRI are important diagnostic modalities which can nevertheless be time consuming (US, MRI), expensive (MRI) or usually performed unilaterally (MRI). Thus, further diagnostic tools are needed. Optical spectral transmission (OST) is a new modality able to assess the blood-specific absorption of light transmitted through a tissue promising quantification of inflammation in the finger and wrist joints of RA patients (commercial device: HandScan - Hemics, The Netherlands)(2).

Objectives: To examine the diagnostic value of OST in detecting inflammation in patients with RA and to evaluate for the first time its relationship with disease activity markers and various anthropometric and epidemiologic patient characteristics.

Methods: OST-Measurements were performed in 168 RA-patients and 114 healthy controls. The difference between OST in the two groups was statistically examined and subsequently controlled for the effect of possible confounding factors. Moreover, association of OST with clinical, ultrasound and serological RA activity markers was evaluated. Finally, relationship of OST with radiographic joint pathology and various anthropometric and epidemiologic parameters (BMI, hand-size, gender, age) was examined.

Results: OST was significantly higher in the patients group in comparison to the control group, even after adjustment for the effects of various confounding factors ($p_{adj} < 0.001$). OST correlated in both groups significantly with gender, hand-size and Body Mass Index (all; $p < 0.001$). In the patients group, OST correlated significantly with all examined disease activity markers (DAS28, ESR, counts of tender/swollen joints, VAS; all, $p_{adj} < 0.05$) and with age ($p < 0.001$). OST showed significant correlations with a power Doppler ultrasound-Score ($p = 0.001$) and with a combined power Doppler/grey scale ultrasound-Score ($p < 0.001$). Finally, receiver operating characteristic showed the best OST performance at the level of metacarpophalangeal joints level (AUC=0.75; 95%CI=0.686-0.821).

Conclusion: OST correlated with serological and clinical disease activity markers as well as with different anthropometric and epidemiological parameters of RA-patients. OST could therefore prove to be a good non-interventional complementary tool to assess RA activity next to well established diagnostic methods such as the US or MRI.

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Figure 1. Correlations between optical spectral transmission (OST) and A. Disease Activity Score 28-erythrocyte sedimentation rate (DAS28-ESR) ($p < 0.001$), B. DAS28-C-reactive protein (DAS28-CRP) ($p < 0.001$), C. power Doppler ultrasound (PDU) score ($p = 0.001$) and D. combined power Doppler/grey scale ultrasound (PDU/GSUS) score ($p < 0.001$).

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FRI0629

APPLICATION OF AN ADVANCED NOISE REDUCTION ALGORITHM FOR IMAGING OF HANDS IN RHEUMATIC DISEASES – EVALUATION OF IMAGE QUALITY COMPARED TO STANDARD DOSE IMAGES

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Background: X-ray is the fundamental imaging technique in diagnosis and follow up of rheumatic diseases. As patients often require sequential X-rays, dose reduction is of great importance. New advanced noise reduction algorithms allow for a dose reduction of up to 50%.

Objectives: The aim of this study was to evaluate, whether the application of an advanced noise reduction algorithms is feasible in the context of imaging of rheumatic diseases.

Methods: A total of 298 patients were enrolled prospectively into three tiers: 80%, 64% and 50% dose reduction groups. All patients received imaging of one hand (laterality randomly assigned) with low-dose technique and of the contralateral side with standard protocol. All images were evaluated by two blinded independent readers who scored (on a scale of 1 to 5) the visualisation of bony cortex, trabeculae and joint spaces of fingers and wrist separately as well as soft tissue and overall contrast. Score values were analysed using T-tests for paired samples.

Results: Overall image quality (expressed by mean sum scores out of 40) of the 50% low-dose images was 31.52 (SD 1.94) vs. 31.66 (SD 1.82) for standard images ($p=0.217$). Bony contours as well as trabeculae was equally well visualized in both image sets. An image example is given in Fig. 1 (Left hand: 50%-dose image; right hand: standard-dose image). Soft tissue visualization was slightly lower for low-dose compared to standard images (mean score of 3.81 vs. 3.88; $p=0.001$).

Conclusion: Overall image quality of low dose images was not inferior to standard dose images. Therefore, application of low-dose technology based on advanced noise estimation algorithms in the context of imaging of rheumatic diseases is feasible.

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FRI0630

DIAGNOSTIC UTILITY OF FLUORESCENCE OPTICAL IMAGING IN INDIVIDUALS WITH SUSPECTED ARTHRITIS – A PROBABILISTIC APPROACH

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Background: In the arsenal of available techniques used for arthritis prediction and diagnosis¹, fluorescence optical imaging (FOI) has been proven useful in detecting clinically manifest and silent synovitis of the hands and wrists of patients with various rheumatic diseases, particularly rheumatoid arthritis (RA)².

Objectives: To assess the diagnostic utility of FOI in individuals with joint symptoms referred for further rheumatologic investigation, using a probabilistic approach.

Methods: Those with increased suspicion of inflammatory arthritis were referred to the rheumatology unit and clinic of Karolinska University Hospital. On acquiring informed consent and medical history, the standard clinical examination coupled with ultrasound findings of fingers, wrists and feet were assessed. Laboratory results included ESR, CRP, RF, and ACPA tests. Using the above information, a diagnostic probability assessment was completed by the responsible rheumatologist, where the probability of a) any inflammatory joint disease and b) rheumatoid/RA was given on a 5-point scale – ranging from unlikely (0-20%) to very likely (80-100%) probability. Subsequently, an FOI examination was performed. After reviewing the image reports in consensus, post-FOI diagnostic probabilities were again scored, using the same scale. If no score change in probability resulted, the rheumatologist was asked to mark whether FOI was still helpful in the diagnostic decision-making. Proportions of individuals with maximal and minimal diagnostic certainty pre- and post-test were compared using Fisher exact tests, and one-sample binomial tests for assessing the helpfulness of FOI in the absence of pre- and post-test probability score changes.

Results: Of 24 individuals screened, 21 without prior rheumatic diagnosis were included (66.7% female, 11 RF (+), 10 ACPA (+), with age average and symptom duration (SD) of 55.6 (± 18.1) years and 13.9 (± 15.3) months respectively). The final diagnoses were: early RA (n=17), other inflammatory joint disease (n=3), and non-inflammatory joint disease (n=1). Regarding diagnosis of any inflammatory arthritis, where the proportion of patients for whom diagnostic certainty was maximal – namely, combining <20% (lowest probability) or >80% (highest probability) of diagnostic likelihood – there was an increase from 52.4% (n=11/21) maximal certainty before FOI to 80.1% (17/21) maximal certainty after FOI ($p=0.035$). Regarding early RA, the maximal diagnostic certainty increased from 57.1% (12/21) to 71.4% (15/21) ($p=0.002$), respectively. In the event that diagnostic certainty scores didn't change pre- vs. post-test (15/21 cases, any inflammatory joint disease; 13/21 cases, early RA), the diagnosing rheumatologist indicated that FOI was still helpful in setting a final diagnosis for most cases (86.7% (13/15) $p=0.007$; 84.6% (11/13), $p=0.022$, respectively).

Conclusion: FOI significantly increased the diagnostic certainty and confidence of rheumatologists in establishing the presence and absence of inflammation in individuals suspected of inflammatory arthritis. The changes from pre- to post-test quantify the diagnostic utility of FOI in probabilistic terms.

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