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ERAMRS: A NEW MR SCORING SYSTEM FOR EARLY RHEUMATOID ARTHRITIS

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Background: Early rheumatoid arthritis (ERA) is defined as having symptoms for less than 24 months and MRI allows quantification of several inflammatory features of ERA. Due to inclusion of some less relevant MR features and non-inclusion of other more relevant features, three MRI scoring systems currently employed are not ideally suited for use in ERA. We therefore devised a new more inclusive system suited for ERA, known as the ERA MR score ('ERAMRS'). The clinical relevance of this new ERAMRS system over the other MR scoring systems can be gauged by seeing how well these MR scoring systems correlate with clinical scoring systems.

Objectives: To (a) introduce a new scoring system (ERAMRS) for measuring the degree of inflammation on MR in early rheumatoid arthritis (RA) and (b) to see how well this ERAMRS system correlates with clinical scoring systems and serological parameters compared to currently used MR scoring systems.

Methods: 106 patients (81 females, 25 males, age, 53±12 years) with early (i.e. symptoms<24 months) untreated RA underwent clinical/serological testing as well as 3T MRI of the most symptomatic wrist. Clinical assessment included Patient Global Assessment (PtGA), Physician Global Assessment (PGA) and Simple Disease Activity Index (SDAI). Erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) were also measured. ERAMRS (Early Rheumatoid Arthritis Magnetic Resonance Score) was semi-quantitatively assesses wrist joints synovitis (no=0, mild=1, moderate=2, severe=3) and enhancement (no=0, mild=1, moderate=2, severe=3), tenosynovitis (no=0, mild=1, moderate=2, severe=3) and enhancement (no=0, mild=1, moderate=2, severe=3) as well as bone marrow oedema (no=0,<50% of the whole bone=1,>50% of the whole bone=2). Seven wrist joints, nine wrist tendons as well as 15 wrist bones were assessed. This ERAMRS method was compared to currently used methods of scoring inflammation on wrist MRI ('RAMRIS' [1], 'McQueen' [2] and 'MRI detected inflammation score' [3]).

Results: Synovitis was present in 104 (98%), bone marrow oedema in 77 (73%), and tenosynovitis in 82 (77%) of the 106 wrists at presentation. RAMRIS system had the lowest correlation (PtGA, PGA, SDAI, CRP) or no correlation (ESR) while the ERAMRS system had the highest correlation with clinical disease activity level scoring systems ($r=0.44$, $p<0.001$) and serological parameters ($r=0.41$, $p<0.001$) among these four scoring systems.

Conclusions: The ERAMRS system, designed to grade inflammation on wrist MRI in early RA, provided the best correlation with clinical scoring systems and serological parameters indicating its improved clinical relevance over other MR scoring systems.

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OEDEMA-FIBROSIS IN SYSTEMIC SCLEROSIS: COMPARISON OF A PARAMETRIC CARDIOVASCULAR MAGNETIC RESONANCE MODEL TO THE LAKE LOUISE CRITERIA

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Background: Myocardial disease is a major cause of death in systemic sclerosis (SSc). We hypothesised that the in SSc patients with suspected myocarditis, the Lake Louise criteria underdiagnose myocarditis compared to diagnostic models that incorporate parametric cardiovascular magnetic resonance (CMR) indices (extracellular volume fraction [ECV], native T1- and T2-mapping).

Methods: 32 patients with diffuse SSc (dSSc) and a clinical suspicion of myocarditis were prospectively evaluated with a 1.5 T scanner using the Lake Louise criteria, and the aforementioned parametric indices were determined. The Lake Louise criteria were compared with parametric indices individually and in two models (with and without taking late gadolinium enhancement [LGE] into account), with regard to diagnostic agreement.

Results: Native T1-mapping and ECV individually had the greatest discordance with the Lake Louise criteria. The presence or absence of LGE in the proposed parametric models did not lead to changes in identified patient proportions. Native T1-mapping led to the same proportion of diagnosis of myocarditis as either parametric model, with the exception of 2 patients. Most importantly, patients identified only by parametric models, had a significantly subtler presentation than those identified by the Lake Louise criteria, as exemplified by significantly lower T2 ratio, early gadolinium enhancement and T2-mapping values.

Conclusions: In dSSc patients with a clinical suspicion of myocarditis, novel parametric models including native T1-mapping, T2-mapping and ECV, identified a significantly greater proportion of patients with myocarditis compared to those identified by the Lake Louise criteria, and native T1 mapping had the greatest utility in this cohort.

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THE DIAGNOSTIC VALUE OF AUTOANTIBODY ISOTYPES IN RHEUMATOID ARTHRITIS

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Background: Anti-citrullinated protein antibodies (ACPA) and rheumatoid factor (RF) are the most specific diagnostic markers of rheumatoid arthritis (RA). These antibodies are predominantly of the IgG (ACPA) or IgM (RF) isotype. Other subtypes of both antibodies – such as IgA – and other autoantibodies like RA33 have been repeatedly reported but their diagnostic value has still not been fully elucidated.

Objectives: To investigate the diagnostic value of IgA, IgG and IgM subtypes of RF, ACPA and RA33 antibodies in patients with RA and their potential predictive value regarding therapeutic response to methotrexate (MTX).

Methods: To determine the diagnostic specificity and sensitivity, sera from 290 RA patients (including 165 MTX starter), 261 disease controls and 100 healthy subjects were tested for the presence of IgA, IgG and IgM isotypes of RF, ACPA and RA33 by EliATM (Thermo Fisher Scientific). Cut-offs for prototype anti-RA33 (IgA, IgG and IgM) and the IgM-ACPA EliATM were calculated by Receiver Operating Characteristic (ROC) curve analysis against disease controls and healthy subjects. In addition, RF and ACPA had been routinely measured by nephelometry and the anti-CCP EliATM, respectively.

Results: The most specific antibodies were IgG and IgA-ACPA as well as IgG-RF, closely followed by IgG- and IgA-RA33 while IgM isotypes were found to be less specific. However, IgM-RF was the most sensitive isotype (65%) followed by IgG-ACPA (59.5%) and IgA-RF (50.7%). Other subtypes were less prevalent ranging from 35% (IgA-ACPA) to 6% (IgA-RA33). Concerning RA33 antibodies, 14 patients were positive for IgA- and 18 for IgG-RA33. Interestingly, the major RA33 subtype was IgM which was detected in 43 patients. However, in contrast to RF and ACPA the overlap between the RA33 isotypes was marginal. RA33 antibodies as well as IgA-RF and IgA-ACPA were found to increase the diagnostic sensitivity of serological testing since they were found also in 22% of seronegative patients. Moreover, analysing IgM-RF by EliATM proved more sensitive than RF measured by nephelometry which further reduced the number of seronegative patients. Thus, additional antibodies were detected in 30% of the seronegative population and, importantly, most patients had several antibodies, in contrast to disease controls which generally showed only one antibody species. The majority of antibody positive RA patients was found to be triple positive for RF, ACPA and either IgA-RF or IgA-ACPA. Among the 64 RA33 positive patients 48 were also positive for IgA-RF and/or IgA-ACPA (figure 1).

Interestingly, we found high levels of IgM-RF (>124 IU/ml) to be associated with achieving a SDAI50 response to MTX (17 of 24 cases). Furthermore, also the presence of RA33 antibodies was associated with a MTX response as 50% of RA33 positive patients (n=32) achieved a SDAI50 response compared to 34% in the RA33 negative population ($p=0.034$).