SUPPLEMENTARY DATA

**METHODS**

***MR scoring***

The scoring protocol was identical for all patients and participants as described in previous studies[1-3]. BMO and synovitis were scored in line with the Outcome Measures in Rheumatology Clinical Trials (OMERACT) rheumatoid arthritis MRI scoring system (RAMRIS)[4]. Although BMO was originally scored on T2fatsat, it was shown in several settings among which early arthritis and RA that scoring BMO on post-contrast T1 can be assessed equally well [5-8]. Tenosynovitis in the MCP and wrist was scored as described by Haavardsholm et al [9]. Although RAMRIS was not developed to score MTP-joints, others have previously adapted the RAMRIS to score MTP-joints as well [9]. BMO, tenosynovitis and synovitis were scored from grade 0-3. Mean scores of two readers were calculated and in case of disagreement the lower score was used.

Mangnus et al have calculated percentages of each feature of inflammation, on each location that is present in symptom-free individuals within each age group [10]. These percentages were used to determine the cut-off of 5% corrected definition and 1% corrected definition.

Thus, for the uncorrected definition we calculated for each location that was positive for inflammation on MRI per age group, location and feature how it predicted progression to RA. For the 5% corrected definition we applied a cut-off of <5% of findings in controls on each patient. We determined if the inflammation found on MRI of a patient, for a specific feature on a specific location within each age category, was still positive with the use of the cut-off. For example, grade 1 synovitis in the MCP-4 of a person of 65 years old was indicated as positive for both the 5% corrected definition and the uncorrected definition, as it was seen in 4% of controls in this age category on this location. For the 1% corrected definition this would have been indicated negative. Another example, grade 1 synovitis in MCP-3 in a person of 65 years old was indicated as negative for the 5% corrected definition and positive for the uncorrected definition, as it was seen in 17% of controls in this age category on this location. For the 1% corrected definition it would also have been indicated as negative. Also for the definitions with a cut-off, we calculated per age group, location and feature how it predicted progression to RA.

***MR readers***

Scoring was performed by independent and trained readers, blinded to clinical data. For the CSA cohort and the reference group the within-reader intraclass correlation coefficients (ICC) for the total MRI inflammation score were 0.99 (reader 1) and 0.98 (reader 2); the between-reader ICC was 0.96. For the EAC cohort within-reader ICC for the total MRI inflammation scores, were 0.98 (reader 3) and 0.93 (reader 4) respectively and the between-reader ICC, based on all scans was 0.95. In addition, between-reader ICC were calculated for total MRI inflammation scores and were for reader 1 and 3 as well as reader 2 and 3, 0.96, based on 40 randomly chosen MRI scans.

Supplementary Table S1. Baseline characteristics of patients with undifferentiated arthritis and clinically suspect arthralgia

|  |  |  |
| --- | --- | --- |
|  | **CSA**  **(n=225)** | **UA**  **(n=201)** |
| Age, mean (SD) | 44 (13) | 54 (16) |
| Female, n (%) | 174 (77) | 123 (61) |
| Tender joint count, median (IQR) | 6 (3–10) | 3 (1–6) |
| Swollen joint count, median (IQR) | 0 (0–0) | 2 (1–4) |
| CRP, mg/L, median (IQR) | 3 (3–5) | 4 (3–10) |
| RF positive, n (%) | 46 (20) | 19 (10) |
| ACPA positive, n (%) | 28 (12) | 8 (4) |
| Total MRI-inflammation score, median (IQR) | 3 (1–6) | 7 (3–15) |

UA: Undifferentiated Arthritis not fulfilling 2010 RA criteria as described previously[9]; CSA: clinically suspect arthralgia.

**Supplementary Figure S1. Clinically identifiable stages of RA-development and flowchart of patients studied**

Symptom-free in general population

gene

Clinically Suspect Arthralgia

Undifferentiated Arthritis

Rheumatoid Arthritis

Flowchart of patients studied. First, a symptom-free control group of 193 participants; second, 225 patients with arthralgia and without clinical arthritis from clinically suspect arthralgia cohort (MRI at baseline) were followed on the development of clinical arthritis within 1 year; third, 201 patients with UA from early arthritis cohort (MRI at baseline) were followed on progression of RA within 1 year.

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