

## Abstract

**Background:** Rheumatoid arthritis (RA) is a common chronic autoimmune disorder characterised by persistent synovitis, typically manifested as symmetric polyarthritis of small hand joints with various extra-articular manifestations. Accurate disease activity measurement is a key component of RA management that facilitates therapeutic optimization in order to slow down the disease progression and to prevent an irreversible joint damage. The aim of this work was to study the role of candidate serum inflammatory markers and their associations with the disease activity in patients with RA presented by traditional variables of disease activity as well as by musculoskeletal ultrasonography.

**Results:** The first part of our work pointed out relationship between serum calprotectin and clinical as well as ultrasound activity in RA. We have revealed that serum calprotectin is an independent predictor of ultrasound synovitis. Moreover, we have demonstrated the potential of calprotectin to identify patients with residual activity in spite of achieving clinical remission.

In the second part, we have provided a detailed analysis of 20 candidate serum markers and found out a tight associations between IL-6, IL-7, IL-22, IL-34, YKL-40, CXCL-13, MMP-3, resistin and visfatin with clinical and ultrasound activity. Correlations between IL1 $\beta$ , IFN $\gamma$  and VEGF with parameters of disease activity were less significant. Contrary, we did not find any associations between IL-8, IL-12p70, IL-17A, IL-33, adiponectin, leptin nor VCAM and disease activity.

Finally, we have developed a model “*Molecular Disease Activity*” covering underlying pathophysiological processes composed of 8 serum markers: calprotectin, CRP, IL-6, MMP-3, VEGF, resistin, IL-22 and IL-7 that optimally reflects inflammatory activity in RA.

**Conclusion:** Our results enabled further characterisation of joint inflammatory markers in relation to disease activity. We believe that our work may contribute to more accurate measurement of inflammatory activity in RA and improvement of patients' outcomes.

**Key words:** rheumatoid arthritis, markers of joint inflammation, disease activity, ultrasonography