The Journal of Rheumatology

The Journal of Rheumatology Volume 38, no. 9

Update on Research and Future Directions of the OMERACT MRI Inflammatory Arthritis Group

PHILIP G. CONAGHAN, FIONA M. McQUEEN, PAUL BIRD, CHARLES G. PETERFY, ESPEN A. HAAVARDSHOLM, FRÉDÉRIQUE GANDJBAKHCH, PERNILLE BØYESEN, LAURA COATES, BO EJBJERG, IRIS ESHED, VIOLAINE FOLTZ, KAY-GEERT HERMANN, JANE FREESTON, SIRI LILLEGRAVEN, MARISSA LASSERE, CHARLOTTE WIELL, ALLEN ANANDARAJAH, ANNE DUER-JENSEN, PHILIP O'CONNOR, HARRY K. GENANT, PAUL EMERY and MIKKEL ØSTERGAARD

J Rheumatol 2011;38;2031-2033
http://www.jrheum.org/content/38/9/2031

Update on Research and Future Directions of the OMERACT MRI Inflammatory Arthritis Group

PHILIP G. CONAGHAN, FIONA M. McQUEEN, PAUL BIRD, CHARLES G. PETERFY, ESPEN A. HAAVARDSHOLM, FRÉDÉRIQUE GANDJBAKHCH, PERNILLE BØYESEN, LAURA COATES, BO EJBJERG, IRIS ESHED, VIOLAINE FOLTZ, KAY-GEERT HERMANN, JANE FREESTON, SIRI LILLEGRAVEN, MARISSA LASSERE, CHARLOTTE WIELL, ALLEN ANANDARAJAH, ANNE DUER-JENSEN, PHILIP O'CONNOR, HARRY K. GENANT, PAUL EMERY, and MIKKEL ØSTERGAARD

ABSTRACT. The OMERACT Magnetic Resonance Imaging (MRI) Task Force has developed and evolved the psoriatic arthritis MRI score (PsAMRIS) over the last few years, and at OMERACT 10, presented longitudinal evaluation by multiple readers, using PsA datasets obtained from extremity MRI magnets. Further evaluation of this score will require more PsA imaging datasets. As well, due to improved image resolution since the development of the original rheumatoid arthritis MRI scoring system (RAMRIS), the Task Force has worked on semiquantitative assessment of joint space narrowing, and developed a reliable method as a potential RAMRIS addendum, although responsiveness will need to be evaluated. One of the strengths of MRI is the ability to detect subclinical synovitis, so the group worked on obtaining low disease activity/clinical remission datasets from a number of international centers and presented cross-sectional findings. Subsequent longitudinal evaluation of this unique resource will be a major continuing focus for the group. (J Rheumatol 2011;38:2031–3; doi:10.3899/jrheum.110419)

Key Indexing Terms:
MAGNETIC RESONANCE IMAGING JOINT SPACE NARROWING PSORIATIC ARTHRITIS

In rheumatoid arthritis (RA) clinical trials, magnetic resonance imaging (MRI) is now frequently used as an outcome measure. Given the difficulties with demonstrating structural radiographic change with modern trial designs, there is increasing need for MRI to provide a more sensitive tool for assessing outcomes in proof of concept and dose-finding Phase II and III trials. The Outcome Measures in Rheumatology Clinical Trials (OMERACT) MRI Task Force has been instrumental in supporting MRI advances, with its RA MRI score (RAMRIS, evaluating bone erosions, bone

From the Department of Rheumatology, Pitié Salpetrière Hospital, APHP, Université Paris 6-UPMC, Paris, France; Department of Rheumatology, Diakonhjemmet Hospital, Oslo, Norway; Section of Musculoskeletal Disease and NIHR Leeds Musculoskeletal Biomedical Research Unit, University of Leeds, Leeds, UK; Department of Rheumatology, Slagelse Hospital, Slagelse, Denmark; Sheba Medical Center, Tel Aviv University, Tel Aviv, Israel; Department of Radiology, Charité University Hospital, Berlin, Germany; Department of Rheumatology, St. George Hospital, University of NSW, Sydney, Australia; Department of Rheumatology, Copenhagen University Hospital at Gentofte, Copenhagen, Denmark; University of Rochester School of Medicine and Dentistry, Rochester, New York, USA; Department of Radiology, Copenhagen University Hospital at Glostrup, Glostrup, Denmark; Department of Radiology, Chapel Allerton Hospital, Leeds; University of California San Francisco; and Synarc, Inc., San Francisco, CA, USA.

P.G. Conaghan MB, BS, PhD, FRACP, FRCP, Professor of Musculoskeletal Medicine, Section of Musculoskeletal Disease, University of Leeds and NIHR Leeds Musculoskeletal Biomedical Research Unit; F.M. McQueen, MBChB, MD, FRACP, Professor of Rheumatology, Department of Molecular Medicine and Pathology, Faculty of Medicine and Health Sciences, University of Auckland; P. Bird, BMed (Hons), FRACP, PhD, Grad Dip MRI, Senior Lecturer, University of NSW; C.G. Peterfy, MD, PhD, FRCP, Chief Executive Officer, Spire Sciences, LLC; E.A. Haavardsholm, MD, PhD, Department of Rheumatology, Diakonhjemmet Hospital; F. Gandjbakhch, MD, Practising Rheumatologist, Department of Rheumatology, Pitié Salpetrière Hospital, APHP, Université Paris 6-UPMC; P. Bøyesen, MD, PhD, Department of Rheumatology, Diakonhjemmet Hospital; L. Coates, MB, BCh, MRCP, Section of Musculoskeletal Disease, University of Leeds; B. Ejbjerg, MD, PhD, Consultant Rheumatologist, Department of Rheumatology, Slagelse Hospital; I. Eshed, MD, Consultant Radiologist, Sheba Medical Center, Tel Aviv University; V. Foltz, MD, Practising Rheumatologist, Department of Rheumatology, Pitié Salpetrière Hospital, APHP, Université Paris 6-UPMC; K-G. Hermann, MD, PhD, Consultant Radiologist, Department of Radiology, Charité University Hospital; J. Freeston, MA, MD, MRCP, Section of Musculoskeletal Disease, University of Leeds and NIHR Leeds Musculoskeletal Biomedical Research Unit; S. Lillegraven, MD, Research Fellow, Department of Rheumatology, Diakonhjemmet Hospital, University of Oslo; M. Lassere, MB, BS, Grad Dip Epi, PhD, FRACP, FAFPHM, Associate Professor in Medicine, Department of Rheumatology, St. George Hospital, University of NSW; C. Wiell, MD, PhD, Senior Registrar, Department of Rheumatology, Copenhagen University Hospital at Gentofte; A. Anandarajah, MD, Assistant Professor of Medicine, University of Rochester School of Medicine and Dentistry; A. Duer-Jensen, MD, PhD, Registrar, Department of Radiology, Copenhagen University Hospital at Glostrup; P. O'Connor, MB, BS, MRCP, FRCR, Consultant Skeletal Radiologist, Department of Radiology, Chapel Allerton Hospital, Leeds and NIHR Leeds Musculoskeletal Biomedical Research Unit; H.K. Genant, MD, FACR, FRCR, Professor Emeritus of Radiology, Medicine and Orthopaedics, University of California San Francisco, and Synarc, Inc.; P. Emery, MA, MD, FRCP, ARC Professor in Rheumatology, Section of Musculoskeletal Disease, University of Leeds and NIHR Leeds Musculoskeletal Biomedical Research Unit; M. Østergaard, MD, PhD, DMSc, Professor of Rheumatology, Department of Rheumatology, Copenhagen University Hospitals at Hvidovre and Glostrup.

Address correspondence to Prof. Conaghan; E-mail: p.conaghan@leeds.ac.uk

edema, and synovitis) becoming the standard outcome for trials involving MRI. After OMERACT 9 and feedback received from audience participation at that meeting, the group focused on developing some novel areas in RA and improving the performance of the psoriatic arthritis MRI score (PsAMRIS)[1].

Joint Space Narrowing Assessment in RA

There is a long history of assessing damage in RA with radiographic erosion and joint space narrowing (JSN, a surrogate measure of cartilage loss) scores integral to the various modifications of Sharp. Evaluation of JSN was left out in the early phase of developing the RAMRIS (late 1990s), because image quality at this time was insufficient to allow acceptable levels of interreader reliability[2]. At OMERACT 9, it was suggested to revisit the assessment of JSN, and that this may improve the regulatory view of the usefulness of MRI. We subsequently devised a number of exercises to iteratively develop a reliable JSN score, and these were presented at OMERACT 10[3].

Understanding the "MRI Acceptable Disease Activity State" in RA

Previous reports have shown a high frequency of MRI signs of inflammation in patients with RA in clinical remission, and a recent study showed that MRI findings in such patients are predictive of progressive radiographic joint destruction[4,5]. This suggests that modern imaging is critical for future remission criteria. However, it is not yet clarified if there is an amount of MRI inflammation (synovitis and/or bone edema) below which patients will not show progressive joint destruction. We therefore undertook the initial steps to explore whether a "MRI acceptable disease activity state" can be defined. By gathering datasets with MRI and clinical information from a number of collaborating centers internationally, we have initiated an OMERACT dataset in which to explore the importance of so-called "subclinical" inflammation. After the considerable effort to gather these datasets of patients in low disease activity [Disease Activity Score 28 (DAS28) < 3.2] and clinical remission, an initial exercise was undertaken involving a cross-sectional analysis to determine if the extent of subclinical disease was as prevalent as previously reported in both low disease activity states and clinical remission[6].

Ongoing Development of a PsAMRIS

The use of MRI in clinical trials of other inflammatory arthritides has also grown. Although the MRI features of peripheral joint pathology in PsA have been described (including synovitis, tenosynovitis, entheseal abnormalities, bone erosions and proliferations, and periarticular inflammation), until now there has been no well-accepted MRI scoring system for outcome assessment. Our group has worked on this over the previous 3 years. At OMERACT 9, we provided MRI definitions of important pathologies in peripheral PsA and suggestions concerning appropriate MRI sequences for use in PsA hands[7]. We also proposed a preliminary OMERACT PsAMRIS for evaluation of inflammatory and destructive changes in PsA hands, developed through an iterative process as was used for the RAMRIS. Following on from work and suggestions for development, at OMERACT 10 we were able to present the results of longitudinal analyses of a reliable PsAMRIS[8].

Future Research Directions

Clearly, the areas discussed above all require further work in order to meet the standards of the OMERACT filter. The JSN score will require evaluation in longitudinal cohorts to determine its sensitivity to change and its advantages over radiographic JSN evaluation in clinical trials, although it is increasingly likely to be used in studies with MRI acquisition where inflammatory measures (synovitis and bone edema) are the key outcomes. Understanding the role of persistent imaging inflammation in RA patients achieving low clinical levels of disease activity remains a critical question for clinical practice and trials, especially in times of target-driven treatment. The compiling of an OMERACT database with imaging and clinical data provides a valuable resource for exploring definitions of acceptable disease activity levels, and audience feedback at OMERACT 10 supported ongoing analyses in this area, especially on longitudinal data. This will be a major focus for our group in the next couple of years. As well, some novel areas for research were suggested, including, given the extensive experience of the group in small-joint evaluation, development of MRI scoring for hand osteoarthritis.

REFERENCES

1. Conaghan PG, Bird P, McQueen F, Peterfy C, Bøyesen P, Gandjbakhch F, et al. The OMERACT MRI Inflammatory Arthritis Group: Advances and future research priorities. J Rheumatol 2009;36:1803-5.
2. Østergaard M, Klarlund M, Lassere M, Conaghan P, McQueen F, Peterfy C, et al. Interreader agreement in the assessment of magnetic resonance images of rheumatoid arthritis wrist and finger joints — an international multicenter study. J Rheumatol 2001;28:1143-50.
3. Østergaard M, Bøyesen P, Eshed I, Gandjbakhch F, Lillegraven S, Bird P, et al. Development and preliminary validation of an MRI joint space narrowing score for use in rheumatoid arthritis: potential adjunct to the OMERACT RA MRI scoring system. J Rheumatol 2011;38:2045-50.
4. Brown AK, Quinn MA, Karim Z, Conaghan PG, Peterfy CG, Hensor E, et al. Presence of significant synovitis in rheumatoid arthritis patients with disease-modifying antirheumatic drug-induced clinical remission. Evidence from an imaging study may explain structural progression. Arthritis Rheum 2006;54:3761-73.
5. Brown AK, Conaghan PG, Karim Z, Quinn MA, Ikeda K, Peterfy CG, et al. An explanation for the apparent dissociation between clinical remission and continued structural deterioration in rheumatoid arthritis. Arthritis Rheum 2008;58:2958-67.
6. Gandjbakhch F, Conaghan PG, Ejbjerg B, Haavardsholm E, Foltz V, Brown A, et al. Synovitis and osteitis are very frequent in rheumatoid arthritis clinical remission: results from an MRI study of 294 patients in clinical remission or low disease activity state. J Rheumatol 2011;38:2039-44.

7. Østergaard M, McQueen F, Wiell C, Bird P, Bøyesen P, Ejbjerg B, et al. The OMERACT Psoriatic Arthritis Magnetic Resonance Imaging Scoring system (PsAMRIS): definitions of key pathologies, suggested MRI sequences, and preliminary scoring system for PsA hands. J Rheumatol 2009;36:1816-24.

8. Bøyesen P, McQueen FM, Gandjbakhch F, Lillegraven S, Coates L, Wiell C, et al. The OMERACT Psoriatic Arthritis Magnetic Resonance Imaging Score (PsAMRIS) is reliable and sensitive to change: results from an OMERACT workshop. J Rheumatol 2011;38:2034-8.