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### DIAGNOSIS AND MANAGEMENT

## Rheumatoid Arthritis: MRI's Role in Diagnosis and Management

Development of sensitive biomarkers for disease surveillance is crucial in clinical trial studies. MRI affords such a window into the disease activity of rheumatoid arthritis (RA). It allows the disease to be monitored when RA is below the threshold for patient symptomatic complaint, but still at a level that can cause joint destruction. MRI therefore provides a barometer of drug response, one that holds utility in establishing a pharmaceutical trial's ability to make quiescent the destructive inflammatory cascade of RA. This issue of *The WCC Note* addresses MRI's place in the diagnosis and management of RA.

As researchers mine innovative science to understand and optimally combat rheumatoid arthritis (RA), perhaps the best way to view the cornerstone role MRI plays in its diagnosis and management is to first step back and see how it fits into the larger foundation of disease knowledge.

In recent years, molecular (1), microenvironmental, genetic, and epigenetic research on RA joined growing immunological advances to further elucidate the origin and inflammatory erosive events accompanying the disease. These investigations provided new tools in the form of biological agents (**disease-modifying antirheumatic drugs**, or **DMARDs**) to halt RA progression.

The following questions and answers outline larger scientific inquiries into RA and summarize some of the recent reports regarding MRI's relationship to them.

### DIAGNOSIS WITHOUT MRI

### 1. How is rheumatoid arthritis diagnosed without benefit of MRI?

Historically, a combination of factors coalesced to identify a patient's arthritis as rheumatoid. Twenty-two years ago, in 1987, these included a set of revised criteria from the American Rheumatism Association. (2, 3) At that time, a diagnosis warranted consideration if four criteria were met, or the first three were present for at least six weeks' duration:

- a. Morning stiffness lasting at least one hour
- b. Soft-tissue swelling or fluid in at least three simultaneous joint areas, at least one in a wrist, MCP, or PIP joint
- c. Symmetric arthritis
- d. Rheumatoid nodules
- e. Abnormal serum rheumatoid factor (RF)
- f. Erosions or bone decalcification on hand/wrist radiographs.



*Joint swelling in early rheumatoid*

**Rheumatoid factor** is an antibody directed against IgG and may or may not be present in rheumatoid arthritis patients. (3, 4) It is not specific, and may also be found in healthy elderly individuals, as well as in people with other autoimmune and infectious diseases.

A more recently discovered autoantibody called **cyclic citrullinated peptide antibody (anti-CCP)** has been reported as more specific than RF for diagnosing RA (4) and predicting erosive disease (5) Combined RF and anti-CCP may be better than either alone for diagnosing very early RA. (6)

## DIAGNOSIS WITH MRI

### 2. How does MRI help in RA diagnosis, especially early on in the disease?

- a. Currently, MRI factors into the diagnosis because it can help establish an RA diagnosis in people with negative anti-CCP and normal radiographs, according to research at Lille University Hospital in Lille, France. The authors followed 30 outpatients for one year and found MRI of the hands (T1 fat saturation with contrast) to show MCP erosions in RA patients with 70% specificity, 64% sensitivity. (7)
- b. In individuals in whom RA was clinically suspected but who lacked RF and radiographic erosions, a comparison of contrast-enhanced MRI of the hand versus anti-CCP revealed assessment of imaging synovitis with bone erosions or bone marrow edema provided a sensitivity of 100% for RA with one false positive (psoriatic arthritis), and a 78% specificity. This compared to an anti-CCP sensitivity of 23%, specificity of 100%. The 2008 study of 40 patients was performed by authors from the Department of Rheumatology in Barcelona, Spain. (8)
- c. Unclassified arthritis (despite biochemical and radiograph testing) can be classified as RA with the help of contrast-enhanced MRI of the wrist and MCP joints of the symptomatic hand and whole-body bone scan, according to Department of Rheumatology at Copenhagen University Hospital at Hvidovre (Denmark). Danish researchers examined patients with unclassified arthritis and, at two-year follow-up, noted a correct classification as RA or non-RA in 39 of the 41 subjects using such imaging. (9)
- d. Noting that the 1987 American College of Rheumatology criteria have limited utility in clinical practice due particularly to early diagnostic insensitivity, coupled with the need to institute prompt therapy to prevent detrimental outcome, Keen, *et al.* (10) reviewed the literature supporting the ability of MRI to detect:
  1. Bone erosions many months prior to plain films,
  2. More erosions than radiography,
  3. Bone edema as a forerunner to erosion development,
  4. Synovitis and tenosynovitis.



**MRI of the hand showing both bone marrow edema and bone erosion.**

**Conclusion: MRI may afford early rheumatoid arthritis diagnosis, even when serology proves negative, which is important because early disease modification therapy better protects long-term joint function. ■**

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## Next issue: The MRI Appearance of Rheumatoid Arthritis



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