Editorial paper

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Position of magnetic resonance in the imaging of inflammatory rheumatic diseases

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Conventional X-ray radiography has been, and still is, the basic imaging technique for the diagnosis and monitoring of rheumatic diseases. Recent years have seen a new addition to the arsenal of diagnostic methods available for these diseases: magnetic resonance imaging (MRI). MRI is a noninvasive medical test which provides insights into tissue pathology that are impossible to obtain by X-ray analysis.

X-ray imaging in rheumatoid arthritis (RA) is based on the detection of cortical bone erosions, and in spondyloarthropathies (SpAs) – erosions and sclerotization in the sacroiliac joints and syndesmophytes within the vertebral bodies. An erosion located in the cortical bone is often a *sine qua non* precondition for RA diagnosis and, from the viewpoint of a rheumatologist and radiologist, the subchondral and trabecular bones are not so important. Analogously, important X-ray findings in spondyloarthropathies are lesions on the "surface" of bones in the sacroiliac joints and vertebrae.

Over the past decade, the views have changed because of MRI application, and rheumatologists have taken an interest in the trabecular bone in joints and vertebral bodies. A direct impulse was the fact that MRI makes it possible to identify bone marrow oedema (BME), i.e. a concentrated inflammatory reaction in the trabecular bone which is undetectable by X-ray. From the histological point of view, it is an area of the so-called osteitis containing activated osteoclasts, T- and B-cells, macrophages and plasma cells.

Relationships existing between BME and changes in the synovial membrane, cortical bone and attachments are the field of study of osteoimmunology. It is progress in this discipline that has enhanced the status of MRI in the imaging of inflammatory rheumatic diseases, and particularly in BME detection. In this sense, MRI can be seen as a specific type of bone biopsy.

In addition to providing "on-off" information about a progressing inflammation, BME also has a prognostic value. In RA, BME is a biomarker of the erosive form of the disease. BME detection in early RA is related to an unfavourable course of the disease – not only within the bone affected by erosions [1], but also the cartilage and tendons invaded by pannus – and correlates with deteriorated physical function. In spondyloarthropathies, BME detection within the sacroiliac joints points to the diagnosis of the so-called non-radiographic axial spondyloarthropathy (nr-axSpA) which, according to new classification criteria, is one of two forms of axial SpA (axSpA) apart from ankylosing spondylitis (AS). BME can bring forward by a couple of years the diagnosis of inflammation, and in fact already structural damage seen on radiograms. In the vertebrae, syndesmophytes most typically form in sites of previously diagnosed BME.

Following publications addressing the use of MRI in rheumatology, the European League Against Rheumatism (EULAR) developed recommendations for the application of imaging methods, MRI included, which were published in the *Annals of the Rheumatic Diseases* – for RA in 2013 [2], and for SpA in 2015 [3].

Although from the viewpoint of pathophysiology of rheumatic inflammatory diseases and osteoimmunology – which monitor interactions between the immune system and bone tissue – BME is *per se* a symptom of inflammation, translating that symptom into clinical practice came up against a range of difficulties. First of all, evidence pointing to a range of falsely positive MRI results was published. For example, erosions in RA can be canals of blood vessels feeding the bones or tendon and ligament attachments. Similarly, syndesmophytes did not form in all BME sites in vertebral bodies, and the presence of BME in MRI failed to translate into further "growth" of already formed syndesmophytes [4]. Finally,

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a study was published which questioned the presence of BME in vertebral bodies as a symptom sufficient for diagnosing nr-axSpA [5]. BME-like lesions in the sacroiliac joints have also been found in healthy people pursuing endurance sports (e.g. long-distance running) on an amateur level.

It is also worthwhile to note that in SpA treatment the presence of BME is a predictor of good response to TNF inhibitor therapy – both in AS and nr-axSpA (ABILITY, RAPID-axSpA, ESTHER, GO-RAISE and GO-AHEAD trials). The studied TNF inhibitors suppress inflammatory lesions, primarily BME, in the sacroiliac joints and vertebral bodies. The application of these drugs in nr-axSpA gives rise to the question about the window of opportunity, i.e. whether early inhibition of the inflammation affects the natural course of axial SpA, perhaps inhibiting osteogenesis and preventing the patient from developing AS.

The cooperation between rheumatologists and radiologists in MRI, however, leaves a lot to be desired. Despite a few rare exceptions to the contrary, radiology centres lack MRI specialists in inflammatory diseases of the musculoskeletal system, and interpretations of MRI scans fail to come up to the expectations of the referring rheumatologist. On the other hand, rheumatologists have a limited knowledge and experience in interpreting MRI scans and integrating them with practice. Poland does not have any radiology centre that would train rheumatologists in this area. Therefore, the attempt undertaken by a group of radiologists and rheumatologists to develop a consensus on MRI in RA and SpA which was published in this issue of Reumatologia, and before that in a leading radiology journal [6], systematizes common efforts towards making a better use of MRI in rheumatology. The first move has already been made. The second will be a session devoted to MRI in RA and SpA during this year's 5th National Rheumatology Meetings in Lublin. Owing to the favourable attitude of the organizers, the session will be included in the plenary agenda. In addition to that session, the imaging diagnostics section of the Polish Society of Rheumatology will hold a less formal meeting for discussing the proposed recommendations – including a universal template for a referral to a MRI scan in RA and SpA cases. What will be the expectations of rheumatological and radiological circles on this matter? Perhaps the next step will involve the organization of courses for rheumatologists and radiologists conducted by a team of experts in both medical fields? The time will show.

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References

1. McQueen FM, Benton N, Perry D, et al. Bone edema scored on magnetic resonance imaging scans of the dominant carpus at presentation predicts radiographic joint damage of the hands and feet six years later in patients with rheumatoid arthritis. Arthritis Rheum 2003; 48: 1814-1827.
2. Colebatch AN, Edwards CJ, Ostergaard M, et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. Ann Rheum Dis 2013; 72: 804-814.
3. Mandl P, Navarro-Compan V, Terslev L, et al. EULAR recommendations for the use of imaging in the diagnosis and management of spondyloarthritis in clinical practice. Ann Rheum Dis 2015; 74: 1327-1339.
4. van der Heijde D, Machado P, Braun J, et al. MRI inflammation at the vertebral unit only marginally predicts new syndesmophyte formation: a multilevel analysis in patients with ankylosing spondylitis. Ann Rheum Dis 2012; 71: 369-373.
5. Weber U, Zhao Z, Rufibach K, et al. Diagnostic utility of candidate definitions for demonstrating axial spondyloarthritis on magnetic resonance imaging of the spine. Arthritis Rheumatol 2015; 67: 924-933.
6. Sudol-Szopinska I, Urbanik A, Wojciechowski W, et al. Polish Medical Society of Radiology and Polish Society of Rheumatology Recommendations for Magnetic Resonance Imaging of Musculoskeletal Disorders in Rheumatology. Pol J Radiol 2015; 80: 259-265.