

High-resolution peripheral quantitative CT in rheumatology

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We read with interest the Perspectives article by Filippucci *et al.* ([Progress in imaging in rheumatology](#). *Nat. Rev. Rheumatol.* **10**, 628–634; 2014).¹ This article is a very informative concise paper on MRI and musculoskeletal ultrasonography. However, we were surprised that no mention was made of high-resolution peripheral quantitative CT (HR-pQCT), previously highlighted in a Review in this journal,² and we would like to call attention to its emerging potential in the field of advanced diagnostic imaging.

HR-pQCT was initially developed to study bone diseases such as osteoporosis, and has contributed to a better understanding of the separate behavior of trabecular and cortical bone structures and the different cortical envelopes during ageing, in metabolic bone diseases and during fracture healing;² moreover, it allows for calculation of bone strength *in vivo* using finite-element analysis.³ Due to its ability to evaluate bone in 3D at a high resolution (82 µm) and with minimal irradiation (5 µSv to image a 0.9 cm region of interest), HR-pQCT is being intensely investigated in the evaluation of bone architecture in the small joints of the hands in rheumatoid arthritis,^{4–6} psoriatic arthritis,⁷ and hand osteoarthritis.⁸ To what degree can this method now be rated as “progress in imaging” in rheumatology?

Firstly, an increased number of, and earlier stages of, erosions are visible with HR-pQCT than on plain radiography, as evidenced by the work of Stach *et al.*⁴ Secondly, quantification of erosions in terms of size (width, depth and volume) together with changes in trabecular bone is possible, and has been studied in cross-sectional and longitudinal studies^{5,9–11} and in comparison with MRI.⁶ Thirdly, a 3D assessment of joint space is described using quantitative analysis algorithms.^{12,13} Fourthly, 3D measurement of bone microarchitecture in rheumatoid arthritis patients showed altered results with disease

activity.¹⁴ None of these 3D parameters can currently be evaluated by other imaging techniques at such high resolution.

In conclusion, HR-pQCT is, besides MRI and musculoskeletal ultrasonography, also promising “progress in imaging” for clinical research in rheumatic disease of the hand joints. SPECTRA (Study Group for X-treme CT in Rheumatoid Arthritis)¹⁵ is an international collaboration between rheumatologists, radiologists, biomedical engineers, physicists and clinical researchers in bone metabolism and osteoimmunology that has provided fertile ground for cross-disciplinary research, united by the desire to certify the validity of the research findings from the application of this technology to the assessment of inflammatory arthritis.

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Competing interests

The authors declare no competing interests.

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