

ONLINE DATA SUPPLEMENT

Supplementary Table 1. Individual scores for each of the domains in the standardised quality scoring tool used to grade the included studies

Author/Year of publication	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q10	Q11	Q12	QUALITY SCORING
Cross sectional studies													
Fournie 1997	1	0	1	0	0	0	0	0	0	0	0	0	2
McGonagle 2002	1	1	1	1	1	0	0	1	0	1	1	1	9
Olivieri 2002	1	0	1	0	1	0	0	0	0	1	1	1	6
Tan 2006	1	1	1	1	0	0	0	0	0	1	1	1	7
McQueen 2007	1	0	1	1	1	0	1	1	0	0	1	1	8
Tan 2007	1	0	1	0	0	0	0	0	0	1	1	1	5
Marzo-Ortega 2009	1	1	1	0	0	0	0	1	0	1	1	1	7
Maksymowicz 2010	1	0	1	0	1	1	0	0	0	0	1	1	6
Althoff 2013	1	1	1	1	0	0	1	0	0	0	1	1	7
Aydin 2013	1	1	1	1	0	1	0	0	0	1	1	1	8
Braum 2013	1	0	1	1	0	1	0	0	0	1	1	1	7
Ramirez 2014	1	1	1	1	0	0	0	1	0	1	1	1	8
Paramarta 2014	1	1	1	1	0	0	0	0	0	1	1	1	7
Poggenborg 2015	1	1	1	1	1	0	1	1	0	1	1	1	10
Tan 2015	1	1	1	1	0	0	0	0	0	1	1	1	7
Giraud 2016	1	0	1	1	0	1	0	0	0	1	1	1	7
Agten 2016	1	0	1	1	0	1	0	1	0	1	1	1	8
Maldonado 2017	1	0	1	1	0	1	0	0	0	1	1	1	7

Aivazoglou 2017	1	1	1	1	0	0	0	0	0	1	1	1	7
Case control studies													
Olivieri 1998	1	0	1	1	0	1	0	0	0	0	1	1	6
Lambert 2004	1	1	1	1	0	0	0	0	0	0	1	1	6
Erdem 2005	1	0	1	1	0	0	0	0	0	0	1	1	5
Wiell 2007	1	1	1	0	0	1	0	1	0	1	1	1	8
Emad 2010	1	1	1	0	0	0	0	0	0	1	1	1	6
Weckbach 2011	1	0	1	1	0	1	0	0	0	1	1	1	7
Feydy 2012	1	1	1	1	0	0	0	1	0	1	1	1	8
Wiell 2013	1	1	1	1	0	1	0	1	0	1	1	1	9
Chen 2018	1	0	1	1	0	1	0	0	0	0	1	1	6
Cohort studies													
Godfrin 2004	1	1	1	0	0	1	0	0	0	0	1	1	6
Eshed 2008	1	1	1	1	0	0	0	0	0	0	1	1	6
Huang 2013	1	1	1	1	0	1	0	1	0	1	1	1	9
Karpitschka 2013	1	1	1	1	0	0	0	1	1	1	1	1	9
Althoff 2016	1	1	1	1	0	1	0	0	0	1	1	1	8
Marzo-Ortega 2001	1	1	1	1	0	0	0	0	1	1	1	1	8
Tan 2004	1	1	1	1	1	0	0	0	1	0	1	1	8
de Hooge 2013	1	1	1	1	0	1	0	0	1	1	1	1	9
Randomised controlled trials													
Dougados 2010	1	1	1	0	0	0	1	0	0	1	1	1	7
Song 2011	1	1	1	1	0	0	0	1	1	1	1	1	9
Krabbe 2018	1	1	1	1	1	0	1	1	1	1	1	1	11

All questions (Qs) were scored 0-3; with a possible total range of 0-36 for the for the 12 questions. The questions were as follows: Q1: Recruitment of patients well-defined in the methods section; Q2: Sufficient description of baseline characteristics – should include confounding factors that might influence the outcome; Q3: Description of the imaging? (e.g. Ultrasound or MRI scanning technique); Q4: Imaging enthesitis assessed using a standardized definition and not a subjective opinion of the scorer; Q5: Semi-quantitative or quantitative scoring method used to define enthesitis; Q6: Choice of comparator adequately explained and results completely given; Q7: Correlation of clinical enthesitis using a validated scoring system (e.g. LEI, SPARCC enthesitis index, MASES) and MRI enthesitis; Q8: Outcomes were assessed reproducibly (intraclass correlation coefficient > 0.81 with a standardised assessment). If multiple outcomes were measured the mean reproducibility score was used; Q9: Longitudinal study design used to monitor MRI enthesitis; Q10: Description on attempted blinding of MRI readers; Q11: The frequency of most important outcomes was given; Q12: Appropriate analysis techniques used (statistical or comparative techniques)

References

1. Fournié B, Boutes A, Dromer C, Sixou L, Le Guennec P, Granel J, et al. Prospective study of anterior chest wall involvement in ankylosing spondylitis and psoriatic arthritis. *Rev Rhum Engl Ed* 1997;64:22-5.
2. McGonagle D, Marzo-Ortega H, O'Connor P, Gibbon W, Pease C, Reece R, et al. The role of biomechanical factors and HLA-B27 in magnetic resonance imaging-determined bone changes in plantar fascia enthesopathy. *Arthritis Rheum* 2002;46:489-93.
3. Olivieri I, Salvarani C, Cantini F, Scarano E, Padula A, Niccoli L, et al. Fast spin echo-T2-weighted sequences with fat saturation in dactylitis of spondylarthritis. No evidence of enthesal involvement of the flexor digitorum tendons. *Arthritis Rheum* 2002;46:2964-7.
4. Tan AL, Grainger AJ, Tanner SF, Emery P, McGonagle D. A high-resolution magnetic resonance imaging study of distal interphalangeal joint arthropathy in psoriatic arthritis and osteoarthritis: are they the same? *Arthritis Rheum* 2006;54:1328-33.
5. McQueen F, Lassere M, Bird P, Haavardsholm EA, Peterfy C, Conaghan PG, et al. Developing a magnetic resonance imaging scoring system for peripheral psoriatic arthritis. *J Rheumatol* 2007;34:859-61.
6. Tan AL, Benjamin M, Toumi H, Grainger AJ, Tanner SF, Emery P, et al. The relationship between the extensor tendon entheses and the nail in distal

interphalangeal joint disease in psoriatic arthritis--a high-resolution MRI and histological study. *Rheumatology* 2007;46:253-56.

7. Marzo-Ortega H, Tanner SF, Rhodes LA, Tan AL, Conaghan PG, Hensor EM, et al. Magnetic resonance imaging in the assessment of metacarpophalangeal joint disease in early psoriatic and rheumatoid arthritis. *Scand J Rheumatol* 2009;38:79-83.

8. Maksymowicz H, Kowalewski K, Lubkowska K, Zołud W, Szaśiadek M. Diagnostic value of gadolinium-enhanced MR imaging of active sacroiliitis in seronegative spondyloarthropathy. *Pol J Radiol* 2010;75:58-65.

9. Althoff CE, Seiper J, Song IH, Haibel H, Weiß A, Diekhoff T, et al. Active inflammation and structural change in early active axial spondyloarthritis as detected by whole-body MRI. *Ann Rheum Dis* 2013;72:967-73.

10. Aydin SZ, Tan AL, Hodsgon R, Grainger A, Emery P, Wakefield RJ, et al. Comparison of ultrasonography and magnetic resonance imaging for the assessment of clinically defined knee enthesitis in spondyloarthritis. *Clin Exp Rheumatol* 2013;31:933-6.

11. Braum LS, McGonagle D, Bruns A, Philipp S, Hermann S, Aupperle K, et al. Characterisation of hand small joints arthropathy using high-resolution MRI--limited discrimination between osteoarthritis and psoriatic arthritis. *Eur Radiol* 2013;23:1686-93.

12. Ramírez J, Pomés I, Sobrino-Guijarro B, Pomés J, Sanmartí R, Cañete JD. Ultrasound evaluation of greater trochanter pain syndrome in patients with spondyloarthritis: are there any specific features? *Rheumatol Int* 2014;34:947-52.

13. Paramarta JE, van der Leij C, Gofita I, Yeremenko N, van de Sande MG, de Hair MJ, et al. Peripheral joint inflammation in early onset spondyloarthritis is not specifically related to enthesitis. *Ann Rheum Dis* 2014;73:735-40.

14. Poggenborg RP, Eshed I, Østergaard M, Sørensen IJ, Møller JM, Madsen OR, et al. Enthesitis in patients with psoriatic arthritis, axial spondyloarthritis and healthy subjects assessed by 'head-to-toe' whole-body MRI and clinical examination. *Ann Rheum Dis* 2015;74:823-9.

15. Tan AL, Fukuba E, Halliday NA, Tanner SF, Emery P, McGonagle D. High-resolution MRI assessment of dactylitis in psoriatic arthritis shows flexor tendon pulley and sheath-related enthesitis. *Ann Rheum Dis* 2015;74:185-89.

16. Giraudo C, Magnaldi S, Weber M, Puchner A, Platzgummer H, Kainberger F, et al. Optimizing the MRI protocol of the sacroiliac joints in

Spondyloarthritis: which para-axial sequence should be used? *Eur Radiol* 2016;26:122-9.

17. Agten CA, Zubler V, Roskopf AB, Weiss B, Pfirrmann CWA. Enthesitis of lumbar spinal ligaments in clinically suspected spondyloarthritis: value of gadolinium-enhanced MR images in comparison to STIR. *Skeletal Radiol* 2016;45:187-95.

18. Aguila Maldonado R, Ruta S, Valuntas ML, Garcia M. Ultrasonography assessment of heel entheses in patients with spondyloarthritis: a comparative study with magnetic resonance imaging and conventional radiography. *Clin Rheumatol* 2017;36:1811-17.

19. Aivazoglou LU, Zotti OR, Pinheiro MM, Junior MRC, Puchnick A, Fernandes ADRC, et al. Topographic MRI evaluation of the sacroiliac joints in patients with axial spondyloarthritis. *Rev Bras Reumatol Engl Ed* 2017;57:378-84.

20. Olivieri I, Barozzi L, Padula A, De Matteis M, Pierro A, Cantini F, et al. Retrocalcaneal bursitis in spondyloarthropathy: assessment by ultrasonography and magnetic resonance imaging. *J Rheumatol* 1998;25:1352-7.

21. Lambert RG, Dhillon SS, Jhangri GS, Sacks J, Sacks H, Wong B, et al. High prevalence of symptomatic enthesopathy of the shoulder in ankylosing spondylitis: deltoid origin involvement constitutes a hallmark of disease. *Arthritis Rheum* 2004;51:681-90.

22. Erdem CZ, Sarikaya S, Erdem LO, Ozdolap S, Gundogdu S. MR imaging features of foot involvement in ankylosing spondylitis. *Eur J Radiol* 2005;53:110-9.

23. Wiell C, Szkudlarek M, Hasselquist M, Møller JM, Vestergaard A, Nørregaard J, et al. Ultrasonography, magnetic resonance imaging, radiography, and clinical assessment of inflammatory and destructive changes in fingers and toes of patients with psoriatic arthritis. *Arthritis Res Ther* 2007;9:R119.

24. Emad Y, Ragab Y, Bassyouni I, Moawayh O, Fawzy M, Saad A, et al. Enthesitis and related changes in the knees in seronegative spondyloarthropathies and skin psoriasis: magnetic resonance imaging case-control study. *J Rheumatol* 2010;37:1709-17.

25. Weckbach S, Schewe S, Michaely HF, Steffinger D, Reiser MF, Glaser C. Whole-body MR imaging in psoriatic arthritis: additional value for therapeutic decision making. *Eur J Radiol* 2011;77:149-55.

26. Feydy A, Lavie-Brion MC, Gossec L, Lavie F, Guerini H, Nguyen C, et al. Comparative study of MRI and power Doppler ultrasonography of the heel in

patients with spondyloarthritis with and without heel pain and in controls. *Ann Rheum Dis* 2012;71:498-503.

27. Wiell C, Szkudlarek M, Hasselquist M, Møller JM, Nørregaard J, Terslev L, et al. Power Doppler ultrasonography of painful Achilles tendons and entheses in patients with and without spondyloarthropathy: a comparison with clinical examination and contrast-enhanced MRI. *Clin Rheumatol* 2013;32:301-8.

28. Chen B, Zhao Y, Cheng X, Ma Y, Chang EY, Kavanaugh A, et al. Three-dimensional ultrashort echo time cones (3D UTE-Cones) magnetic resonance imaging of entheses and tendons. *Magn Reson Imaging* 2018;49:4-9.

29. Godfrin B, Zabraniecki L, Lamboley V, Bertrand-Latour F, Sans N, Fournie B. Spondyloarthropathy with enthesal pain. A prospective study in 33 patients. *Joint Bone Spine* 2004;71:557-62.

30. Eshed I, Althoff CE, Feist E, Minden K, Schink T, Hamm B, et al. Magnetic resonance imaging of hindfoot involvement in patients with spondyloarthritides: comparison of low-field and high-field strength units. *Eur J Radiol* 2008;65:140-7.

31. Huang ZG, Zhang XZ, Hong W, Wang GC, Zhou HQ, Lu X, et al. The application of MR imaging in the detection of hip involvement in patients with ankylosing spondylitis. *Eur J Radiol* 2013;82:1487-93.

32. Karpitschka M, Godau-Kellner P, Kellner H, Horng A, Theisen D, Glaser C, et al. Assessment of therapeutic response in ankylosing spondylitis patients undergoing anti-tumour necrosis factor therapy by whole-body magnetic resonance imaging. *Eur Radiol* 2013;23:1773-84.

33. Althoff CE, Sieper J, Song IH, Weiß A, Deikhoff T, Haibel H, et al. Comparison of clinical examination versus whole-body magnetic resonance imaging of enthesitis in patients with early axial spondyloarthritis during 3 years of continuous etanercept. *J Rheumatol* 2016;43:618-24.

34. Marzo-Ortega H, McGonagle D, O'Connor P, Emery P. Efficacy of etanercept in the treatment of the enthesal pathology in resistant spondylarthropathy: a clinical and magnetic resonance imaging study. *Arthritis Rheum* 2001;44:2112-7.

35. Tan AL, Marzo-Ortega H, O'Connor P, Fraser A, Emery P, McGonagle D. Efficacy of anakinra in active ankylosing spondylitis: a clinical and magnetic resonance imaging study. *Ann Rheum Dis* 2004;63:1041-5.

36. de Hooge M, van den Berg R, Navarro-Compan V, van Gaalen F, van der Heijde D, Huizinga T, et al. Magnetic resonance imaging of the sacroiliac joints in

the early detection of spondyloarthritis: no added value of gadolinium compared with short tau inversion recovery sequence. *Rheumatology* 2013;52:1220-4.

37. Dougados M, Combe B, Braun J, Landewé R, Sibilia J, Cantagrel A, et al. A randomised, multicentre, double-blind, placebo-controlled trial of etanercept in adults with refractory heel enthesitis in spondyloarthritis: the HEEL trial. *Ann Rheum Dis* 2010;69:1430-5.

38. Song IH, Hermann K, Haibel H, Althoff CE, Listing J, Burmester G, et al. Effects of etanercept versus sulfasalazine in early axial spondyloarthritis on active inflammatory lesions as detected by whole-body MRI (ESTHER): a 48-week randomised controlled trial. *Ann Rheum Dis* 2011;70:590-6.

39. Krabbe S, Østergaard M, Eshsed I, Sørensen IJ, Jensen B, Møller JM, et al. Whole-body magnetic resonance imaging in axial spondyloarthritis: reduction of sacroiliac, spinal, and enthesal inflammation in a placebo-controlled trial of adalimumab. *J Rheumatol* 2018;45:621-9.