«Κατανοώντας και αντιμετωπίζοντας την ενθεσίτιδα και τη δακτυλίτιδα»

Μηχανισμοί και συνέπειες

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ΠΑΝΕΠΙΣΤΗΜΙΑΚΟ ΝΟΣΟΚΟΜΕΙΟ
ΗΡΑΚΛΕΙΟΥ

Για την σημερινή παρουσίαση δεν υπάρχει σύγκρουση συμφερόντων

Presentation outlines

- ❑ Clarifying terminology , types of entheses
- ❑ Anatomy and the concept of SEC
- ❑ Pathophysiology of enthesitis
- ❑ Imaging of enthesitis and dactylitis
- ❑ The clinical impact of enthesitis and dactylitis
- ❑ Conclusions

Clarifying terminology

Entheses are essential structures for the transduction of mechanical forces from muscles to bones and also provide stability of MSK system

- **T**he enthesis is the pivotal connection point or attachment of a tendon, ligament, fascia, or joint capsule onto bone.
- The involvement of the enthesis, whether caused by trauma, degeneration, inflammation or metabolic disease, is termed an *enthesopathy.*
- The term enthesitis is restricted to inflammatory disease and, in general, refers to seronegative spondyloarthritis (SpA).

McGonagle D, et al. M. *J Anat* 2010

Types of enthesis

- Histologically, enthesis can be classified in two types:

❖ fibrous and fibrocartilaginous.

- Most of entheses with relevance for rheumatologists are fibrocartilaginous, characterized by the presence of a small plug of fibrocartilage at the attachment site itself.

Fibrocartilaginous:

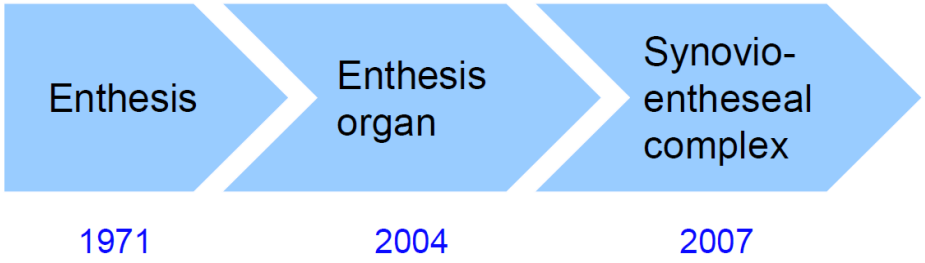
- Achilles enthesis
- Supraspinatus
- Collateral ligaments

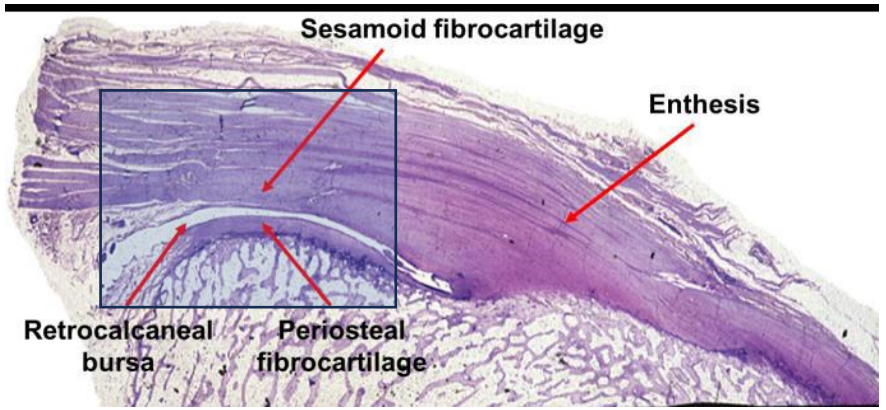
Fibrous: pure dense fibrous connective tissue that links the tendon or ligament to the bone.

- deltoid tendon insertion.

McGonagle D, et al. M. *J Anat* 2010

Synovio-entheseal complex





Structure of enthesis

- Interspersed fibroblasts and areas of chondrocytes with cartilaginous matrix
- This mixture of fibrous with cartilaginous tissue elements provides at the same time both stiffness and elasticity.
- In close vicinity to the bone surface, fibrocartilage is then mineralized before transitioning into bone.
- Bone at entheseal sites is thin and porous with blood vessels (communication between enthesis and bone marrow)

- Several tissues (fibrocartilage, trabecular bone, fat pad and synovial tissue of adjacent bursa/joint) contribute to mechanical stress dissipation

Hye Won Kim et al. J Rheum Dis Vol. 22, No. 2, April, 2015

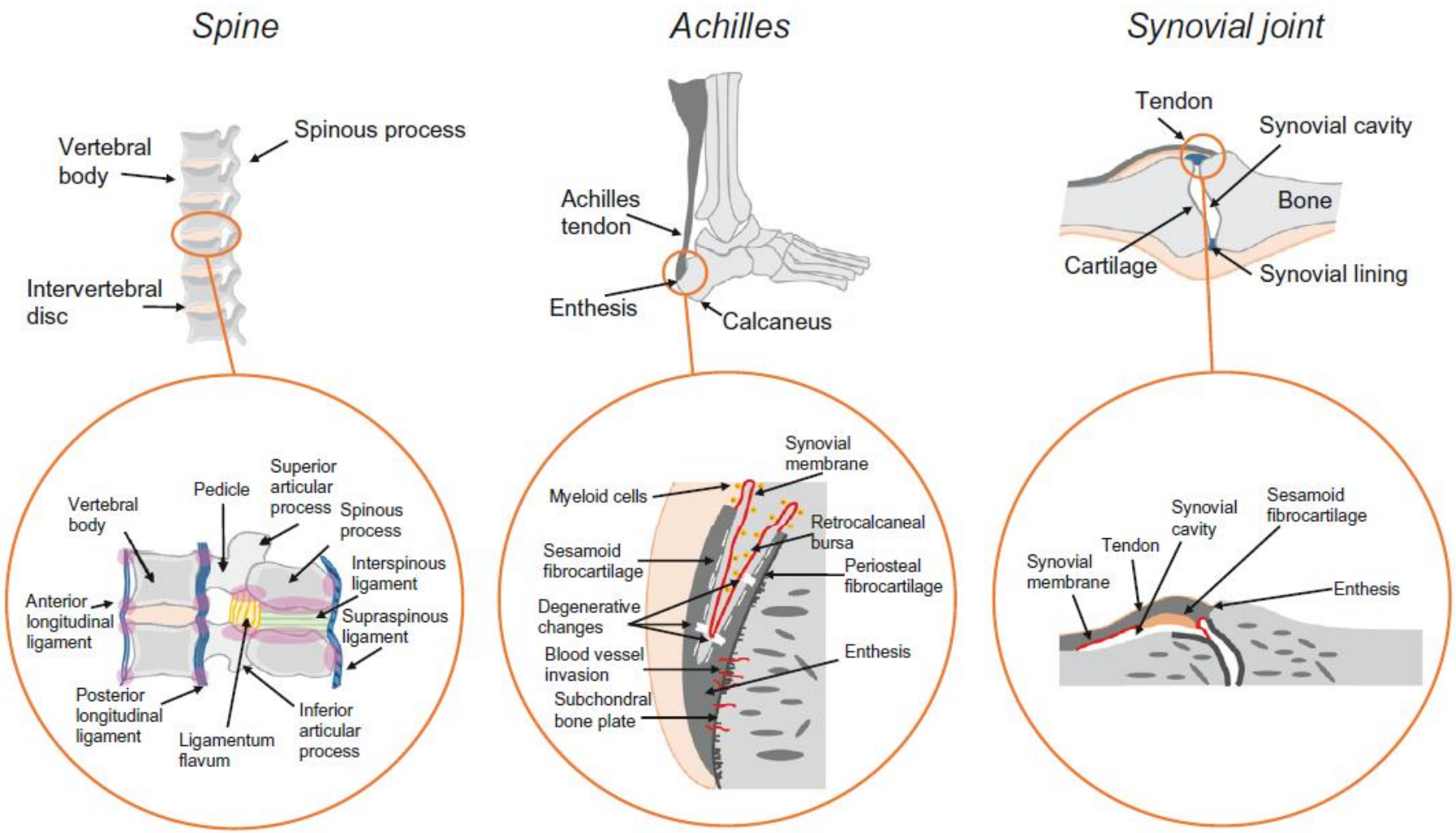


Fig. 1. Anatomy of entheses in the spine, at the Achilles tendon insertion and in synovial joints [4,5]. The numerous entheses in the spine are highlighted in purple.

Enthesitis: from pathophysiology to treatment

Georg Schett[1], Rik J. Lories[2], Maria-Antonietta D'Agostino[3], Dirk Elewaut[4], Bruce Kirkham[5], Enrique R. Soriano[6] and Dennis McGonagle[7]

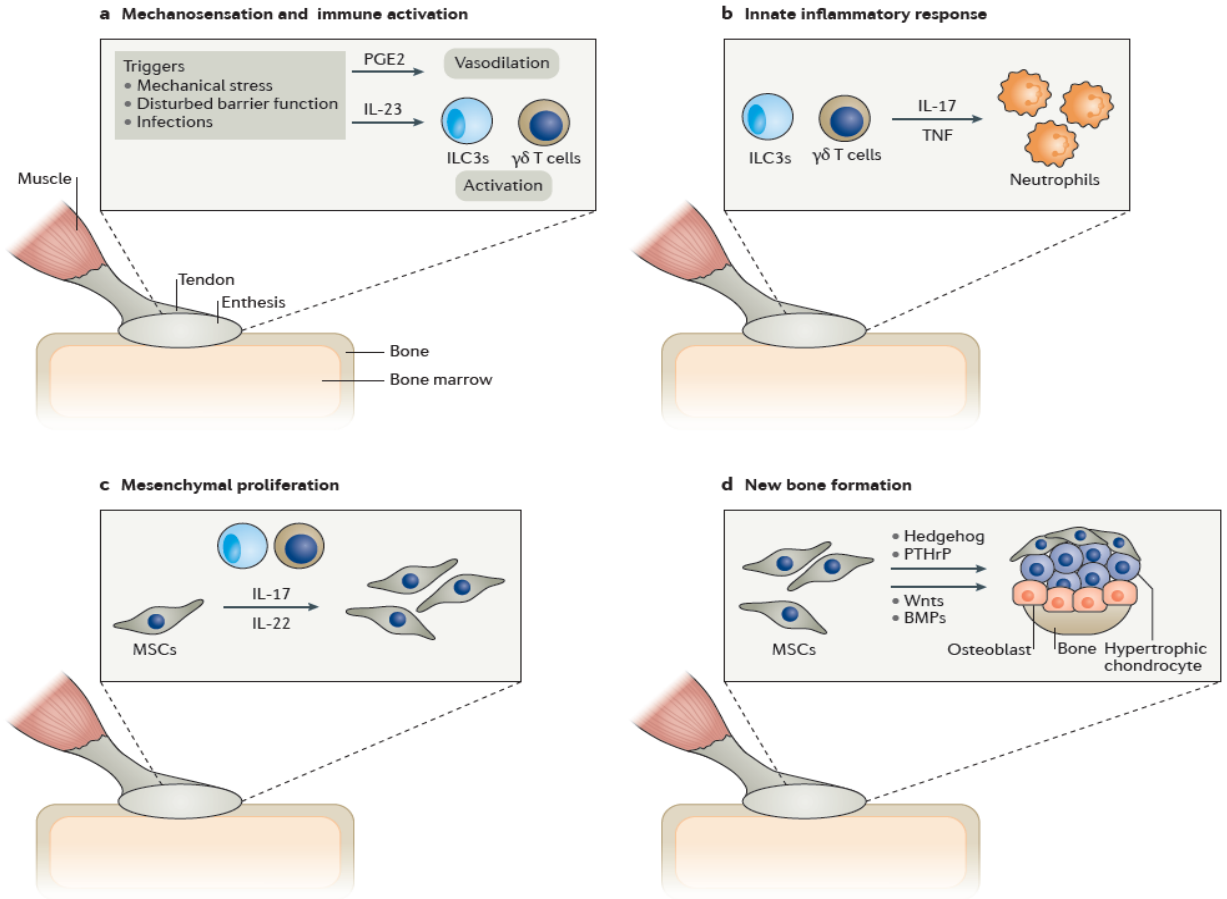


Figure 2 | **Functional model of enthesitis. a** | Enthesitis is initiated during a mechanosensation and immune activation phase involving mechanical and/or infectious stress that leads to the activation of prostaglandin E2 (PGE2) and IL-23, followed by vasodilatation and activation of resident γδ T cells and type 3 innate lymphoid cells (ILCs). **b** | The subsequent innate inflammatory response is characterized by the release of TNF and IL-17, leading to the influx of immune cells such as polymorphonuclear neutrophils (PMNs). **c** | Mesenchymal proliferation elicited by IL-17 and IL-22 is characterized by the activation and proliferation of resident mesenchymal stem cells (MSCs) from the perientheseal periosteum. **d** | New bone formation at entheseal sites (enthesophyte growth) is triggered by hedgehog signalling and parathyroid hormone related-peptide (PTHrP), which contribute to the mineralization of fibrocartilage; bone morphogenic proteins (BMPs) and Wnt proteins induce osteoblast differentiation and enable new bone apposition.

Enthesitis: from pathophysiology to treatment

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Table 1 | **Comparison of the features of enthesitis and synovitis**

Feature	Enthesitis (PsA and SpA)	Synovitis (RA)
Anatomical localization	Extra-articular	Intra-articular
Tissue composition	Fibrocartilage	Synovial membrane
Mechanical trigger	+++	+
Aetiopathogenesis	Danger response	Autoimmunity
Resident immune cells	γδ T cells, type 3 innate lymphoid cells	Tissue-resident macrophages
Resident non-immune cells	Periosteal and fibrocartilage MSCs	Fibroblast-like synoviocytes
Type of immune activation	Innate (mostly polymorphonuclear neutrophils)	Mixed
Genetic associations	MHC class I genes, *IL23R*	MHC class II genes
Clinical symptoms	Pain	Pain, swelling
Pre-clinical phase	Subclinical enthesitis	Autoantibodies, tenosynovitis
Bone marrow involvement	+++	+
New bone formation	+++	–
PGE2 dependence	+++	+

Entheseal imaging

- MRI imaging and ultrasonography have transformed our recognition of enthesitis especially at clinically inaccessible sites.
- MRI modality is the preferred strategy in the case of suspected axial enthesitis (spine, pelvis) and ultrasound is more suitable for peripheral enthesitis.
- MRI is also preferred in large joints including hip and others, in which the probe doesn't have the best acoustic window.

- Properties like , ability to image intra-osseous pathology along with surrounding structures exemplify the utility of MRI technology.
- The most sensitive method for identifying active enthesitis in MRI is fat-suppressed T2-weighted sequence/STIR which can show peri-entheseal inflammation with adjacent bone marrow edema

MRI

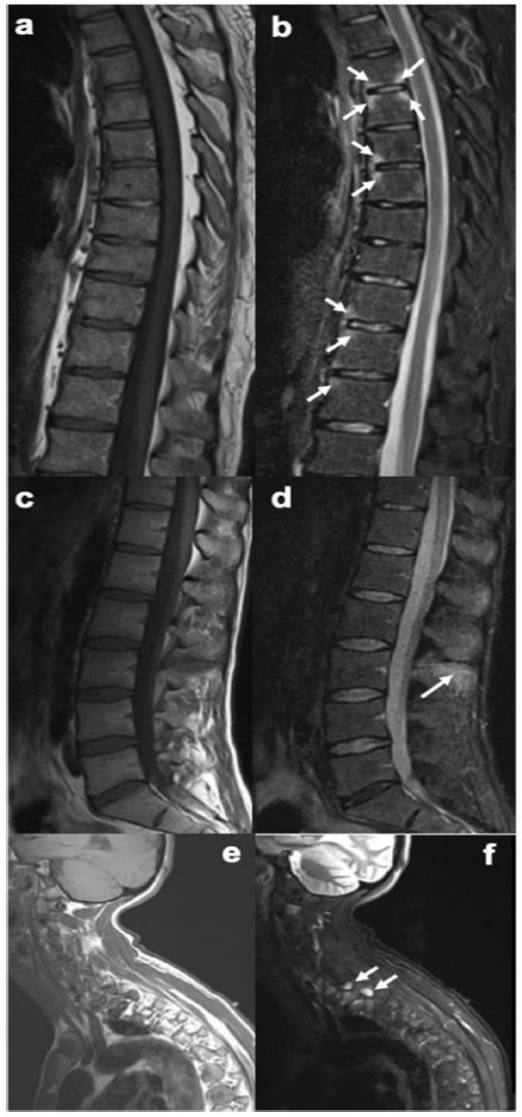


FIGURE 2 | Sagittal MR images of the spine, showing enthesitis at different locations (T1-weighted images on the left, short tau inversion recovery (STIR) *(Continued)*

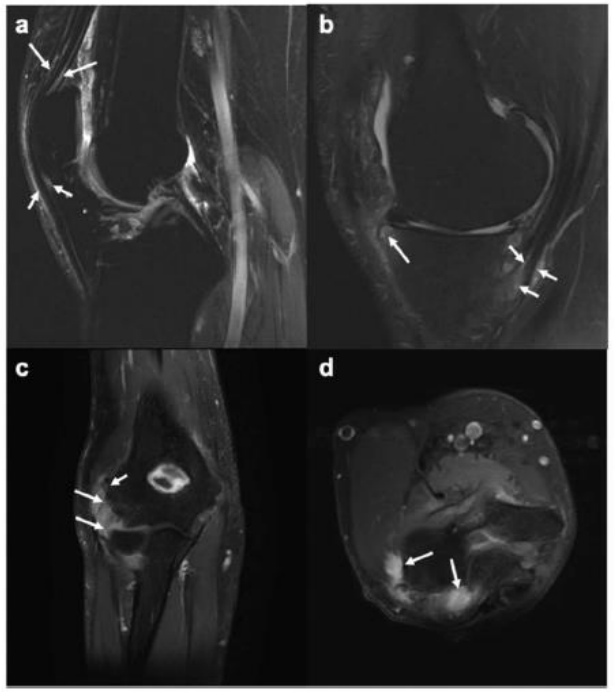


FIGURE 1 | MR images of the knee and elbow depicting enthesitis. **(a)** Sagittal STIR image of the knee showing soft tissue high signal intensity (intra- and peritendinous) at the insertions of the quadriceps tendon (long arrows) and the patellar ligament (short arrows) at the patella, suggesting enthesitis. **(b)** Sagittal T2-weighted fat suppressed image of the knee showing high signal intensity (intra- and peritendinous) in the soft tissues of the pes anserine (short arrows), indicating pes anserine enthesitis, as well as bone marrow edema (long arrows) close to the insertion of the medial patellar retinaculum at medial tibial plateau. **(c,d)** Coronal (c) and axial (d) STIR images of the elbow showing bone marrow edema (mild, short arrow) and soft tissue high signal intensity (long arrows) at the common extensor tendon insertion at the lateral epicondyle, indicating enthesitis. Images courtesy of Professor Iris Eshed, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel.

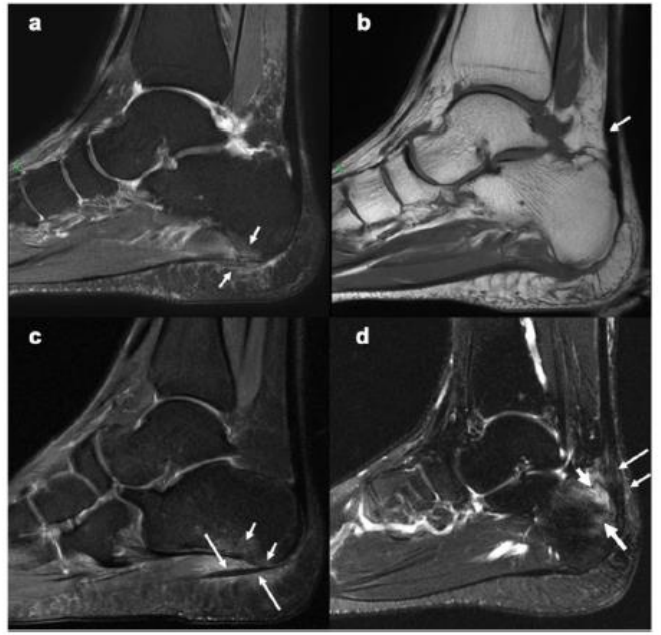
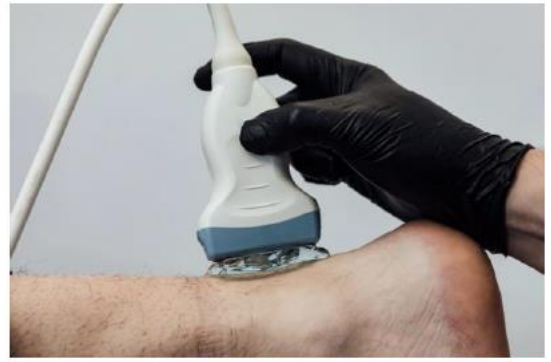


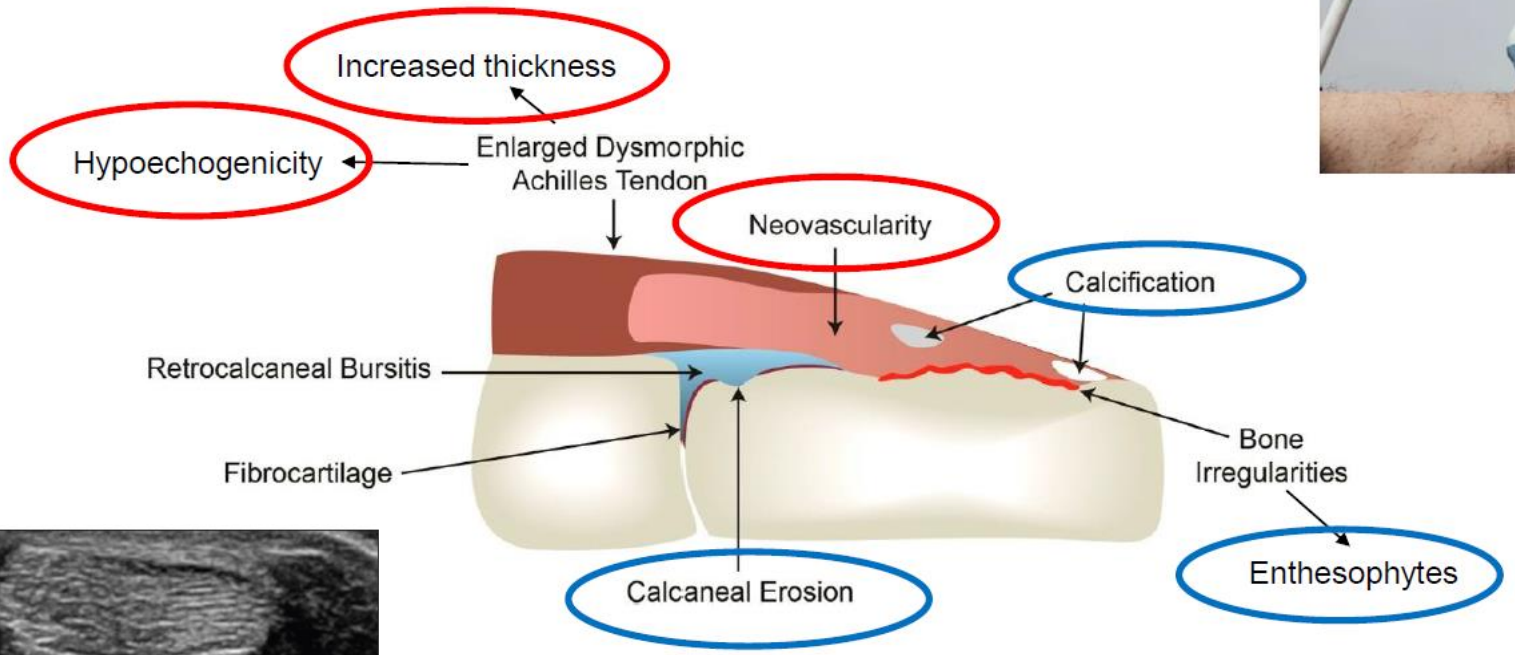
FIGURE 3 | Sagittal MR images of the heel region depicting enthesitis at Achilles tendon and plantar fascia attachments. **(a)** STIR image showing bone marrow edema at the plantar fascia insertion to the calcaneum, intrafascia high signal intensity and perifascia high signal intensity. **(b)** Corresponding T1-weighted image showing probable mild thickening of a part of the Achilles tendon (arrow). **(c)** STIR image showing bone marrow edema (short arrows) close to the plantar fascia insertion to calcaneum and severe perifascia high signal intensity (long arrows). **(d)** STIR image showing bone marrow edema (long thick arrow) at the Achilles tendon insertion to calcaneum, intratendonous (long thin arrow) and, peritendonous (short thin arrow) high signal intensity, as well as retrocalcaneal bursitis (short thick arrow). **(a,b)** Courtesy of Professor Iris Eshed, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel. **(c,d)** have been taken from the OMERACT MRI heel enthesitis exercises (27, 80).

Mathew and Ostergaard. MRI of Enthesitis in SpA and PsA. Frontiers in Medicine 2020

(OMERACT) US Task Force definition of enthesitis in SpA/PsA : "hypoechoic and/or thickened insertion of the tendon close to the bone (within 2 mm from the bony cortex) which exhibits Doppler signal if active and which may show erosions and enthesophytes/calcifications as a sign of structural damage"

Enthesitis – Ultrasound assessment





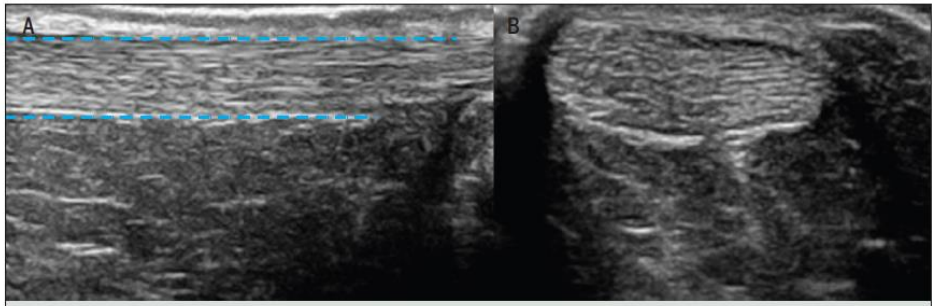
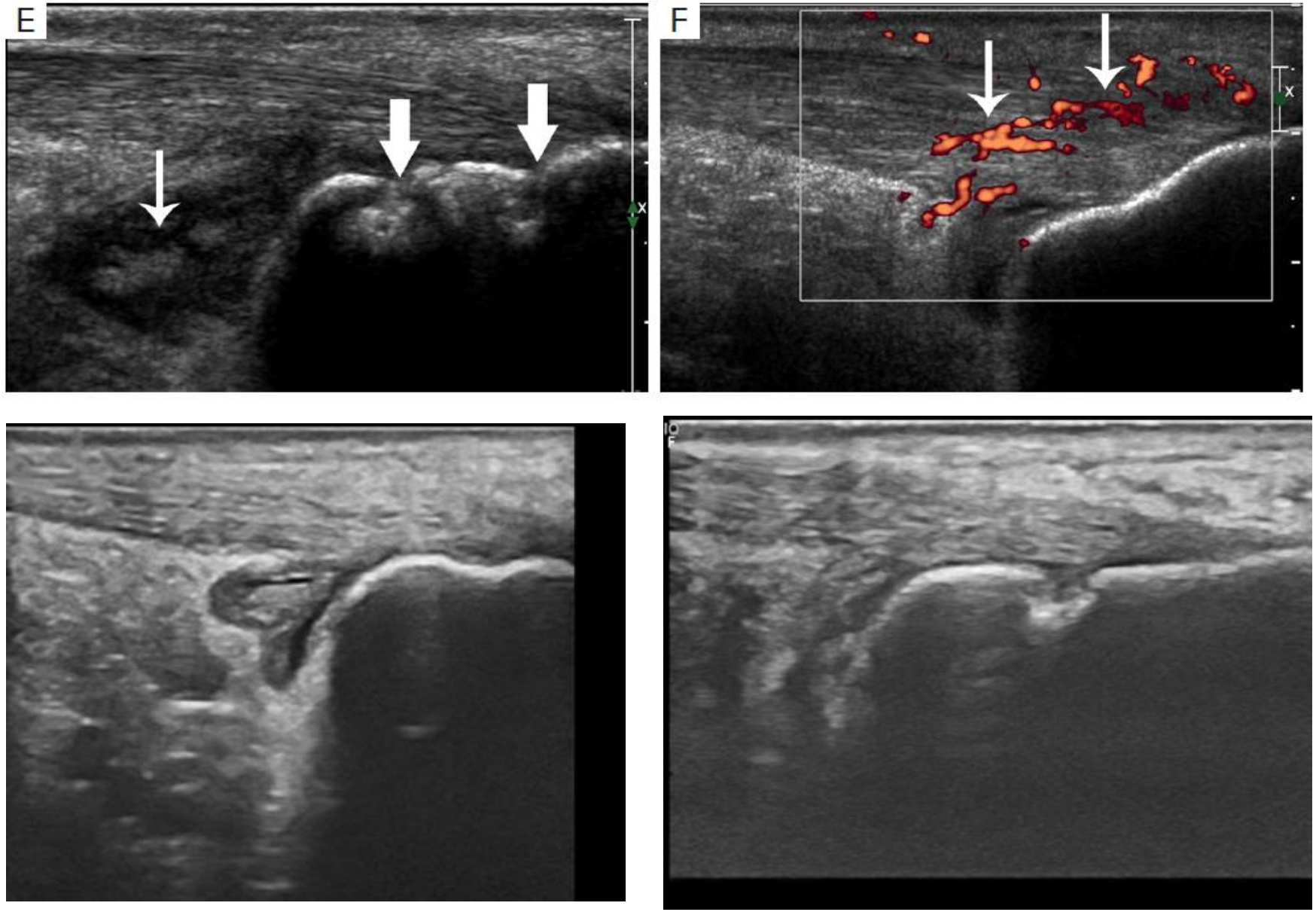


FIGURE 1. Ultrasound of a healthy Achilles tendon. (A) Longitudinal and (B) transverse ultrasound images of the mid Achilles tendon. The normal tendon texture appears homogeneous, with parallel echogenic lines reflecting the internal fibrillar structure of the tendon. The dashed blue lines represent the superficial and deep borders of the tendon.

Image from Kaeley et al, 2018.



Y Tang et al. *Quant Imaging Med Surg 2020*

Enthesitis vs degenerative tendinopathy

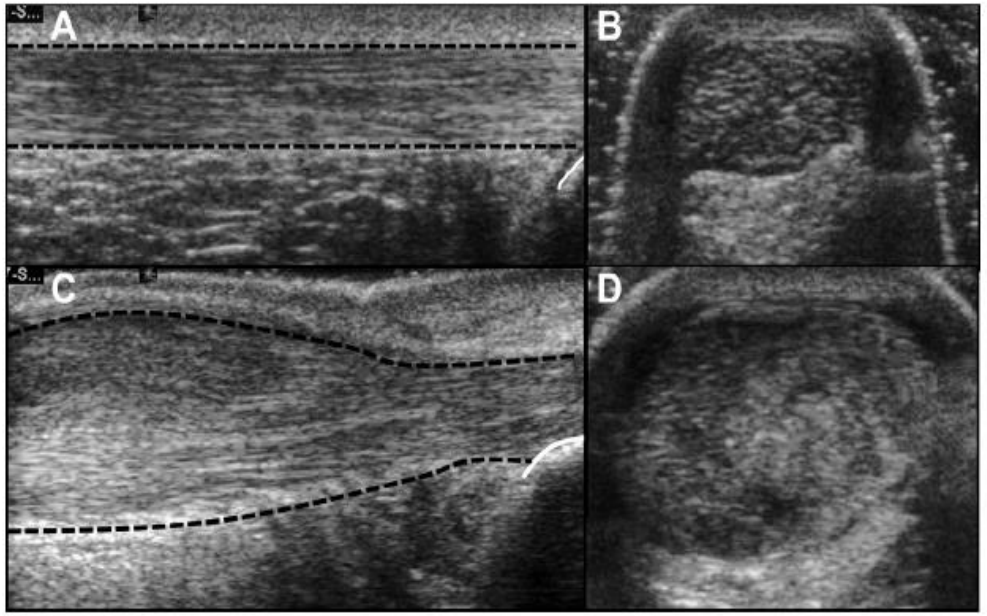


Fig. 1. Longitudinal and transverse grey-scale ultrasound images of normal (*A* and *B*) and tendinopathic (*C* and *D*) Achilles tendons from 1 control and 1 individual with Achilles tendinopathy. *C* and *D*: significant focal thickening of the tendon. Black dotted lines outline the tendons. White curved line on the right denotes the calcaneus.

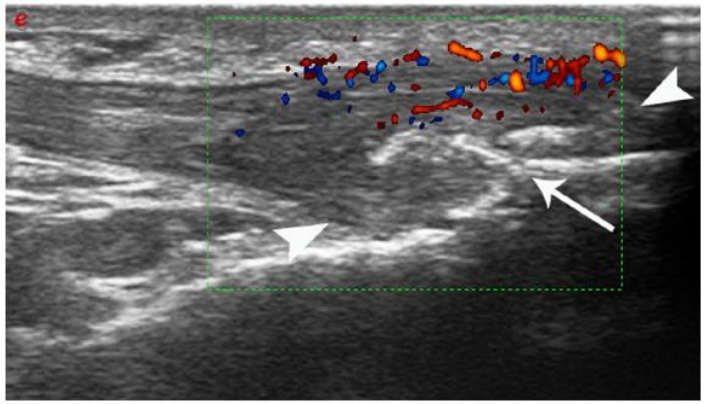


Fig. 1. Patellar tendon enthesopathic changes in patient with metabolic syndrome. Anterior longitudinal scan over the distal enthesis of patellar tendon, linear 6–18 MHz probe. The distal enthesis of the patellar tendon (between arrowheads) is markedly thickened and hypoechoic, with gross enthesophytosis (arrow). Power Doppler analysis (within the color box) shows abundant neovascularisation in the distal third of the tendon. All the abnormalities spread beyond the real enthesis toward the body of the tendon.

KEY POINTS FOR D/D

1) Patients with SpA generally have more than one entheseal site +chronicity
2) Spreading to the tendon body suggest degenerative /metabolic cause
3) The Doppler signal and erosions are relatively more specific for SpA/PsA
4) taking into consideration the patients' age, BMI, sex, and physical activity, as well as other clinical findings

Shruti Arya et al J Appl Physiol 2010

A synovio-entheseal complex, a central event influencing adjacent articular and periarticular inflammation in PsA

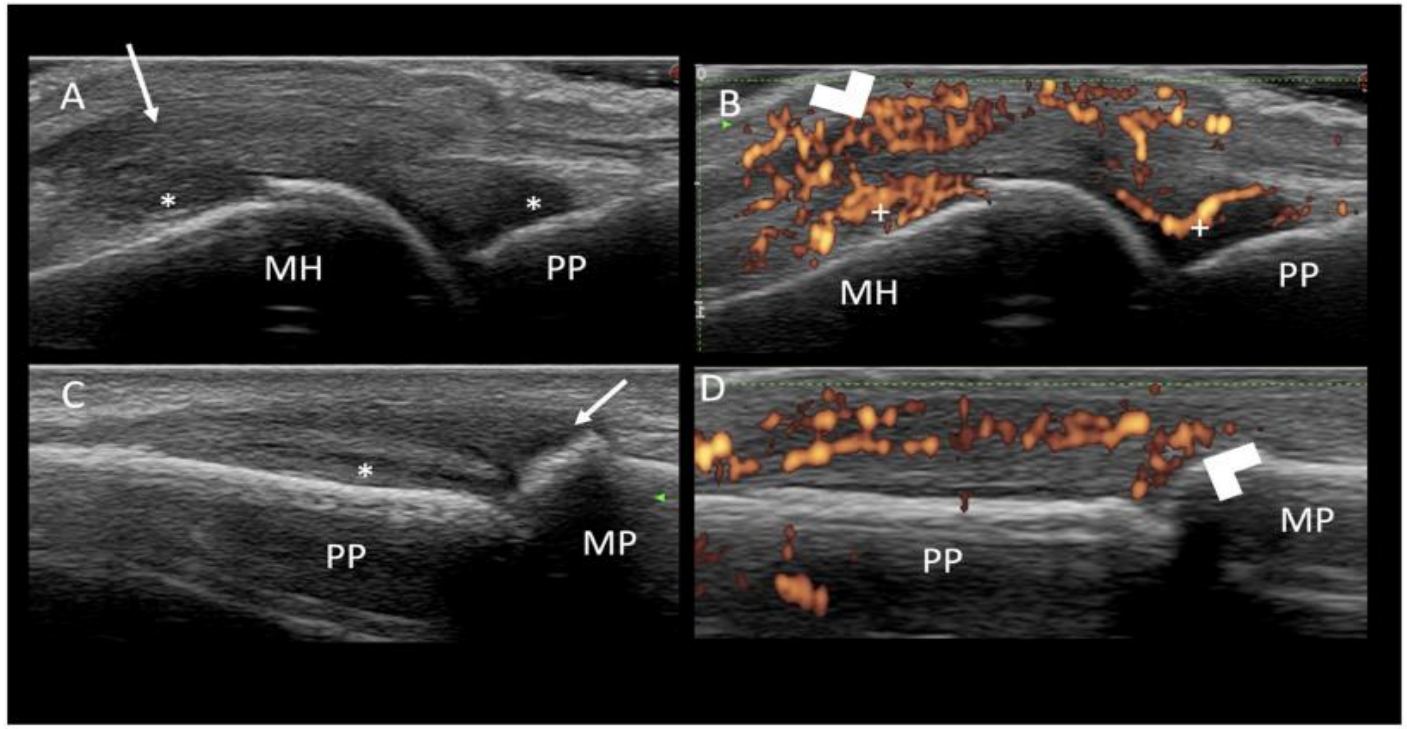
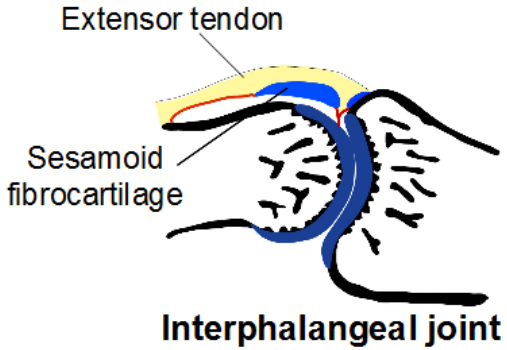


Figure 1. Longitudinal views of the metacarpophalangeal (A,B) and proximal interphalangeal joints (C,D) on ultrasound. (A) Synovial proliferation (*) within the metacarpophalangeal joint and thickening, hypoechogenicity, and loss of fibrillary echotexture of the extensor tendon (arrow). (B) Intratendineous power Doppler signals (arrow head) in addition to the intrasynovial Doppler signals within the metacarpophalangeal joint (+). (C) Synovial proliferation of the proximal interphalangeal joint (*) and thickening, hypoechogenicity, and loss of fibrillary echotexture of the extensor tendon insertion into the basis of the middle phalanx- enthesitis (arrow). (D) Entheseal power Doppler signals (arrow head).



Synvio-Entheseal Complex within the joint capsule in a small finger joint. The capsular Synovio-Entheseal Complex fibrocartilage is called a sesamoid fibrocartilage. It is in close contact with the joint lining or synovium. Disease of this structure will manifest as joint swelling.

U Gazel et al. J. Clin. Med. 2020

Functional enthesitis

The concept of a “functional enthesis,”: an anatomical, biomechanical, and pathological feature that share fibrocartilaginous entheses proximal to regions of attachment to allow tendons or ligament to wrap around bony pulleys.

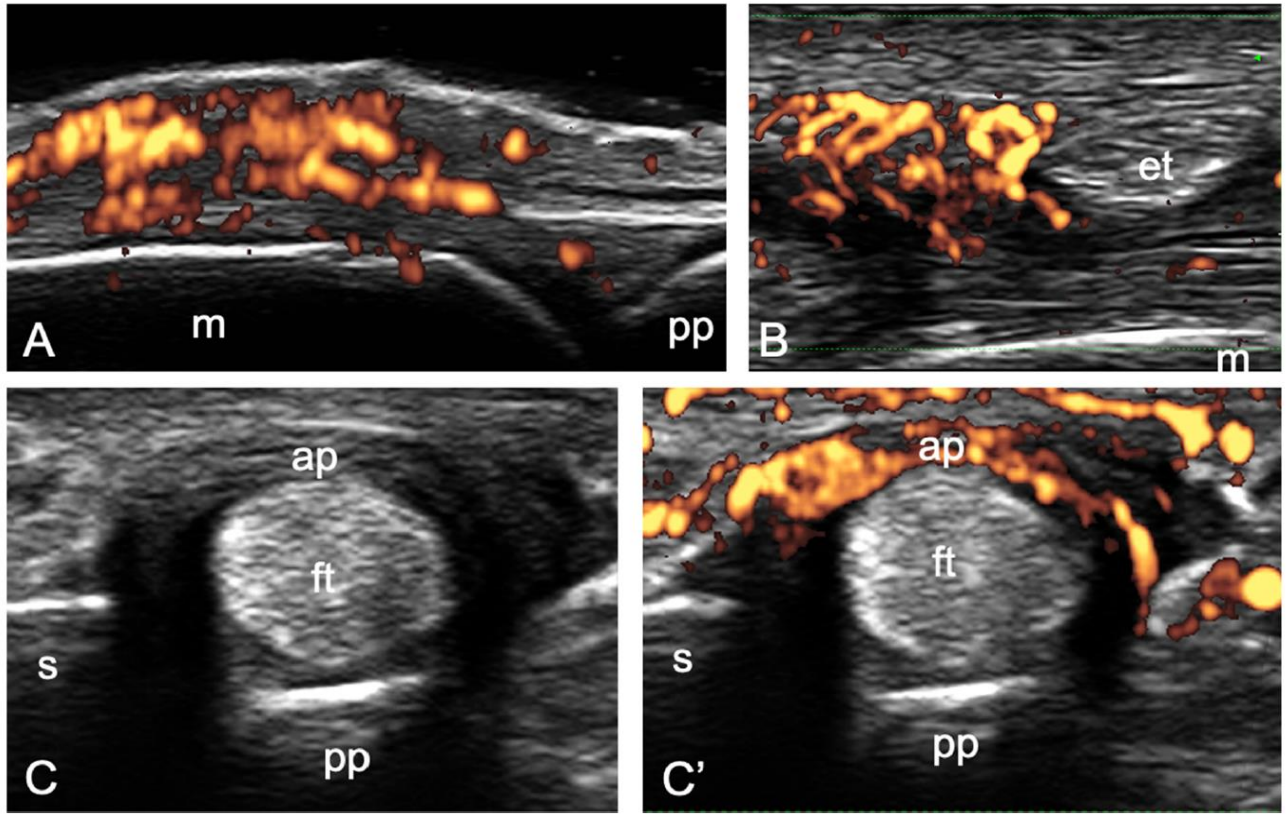
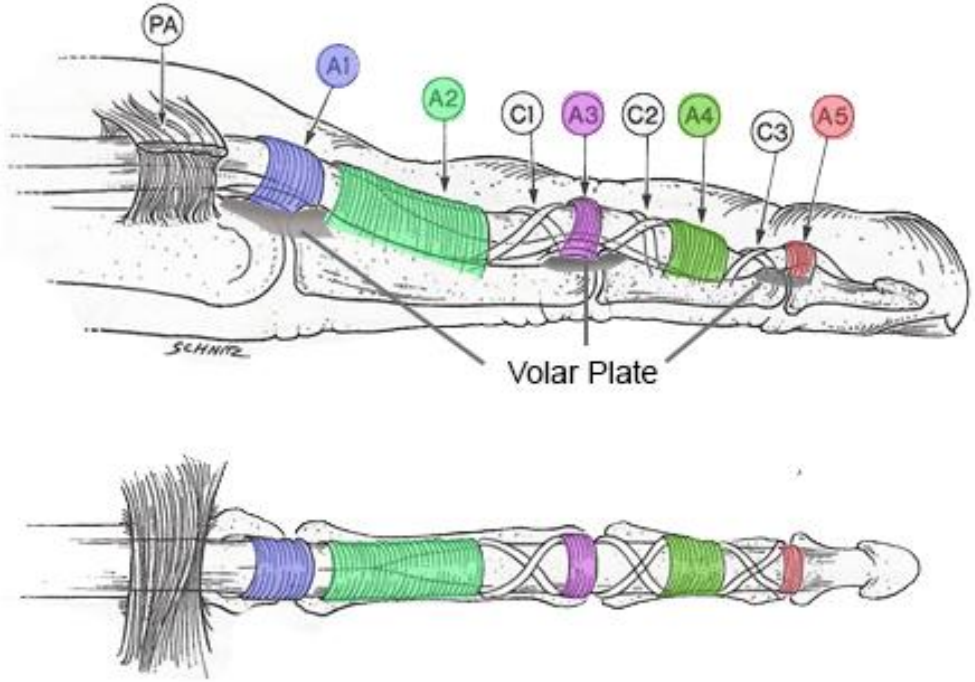


Fig. 4 Functional enthesitis in psoriatic arthritis. In **A** and **B**, longitudinal and transverse scans obtained at the dorsal aspect of a metacarpophalangeal joint with 6–18-MHz and 22-MHz probes show a peritenon extensor tendon inflammation (PTI) pattern. In **C** and **C’**, transverse scans obtained at the volar aspect of a metacarpophalangeal joint of another patients with a 22-MHz probe show A1 pulley (ap) inflammation (power Doppler signal inside a thickened pulley). et = extensor tendon, ft = finger flexor tendons, m = metacarpal bone, pp = proximal phalanx, s = sesamoid bone



Gianluca Smerilli et al. Current Rheumatology Reports 2021

Link between onychopathy & DIP extensor tendon enthesopathy

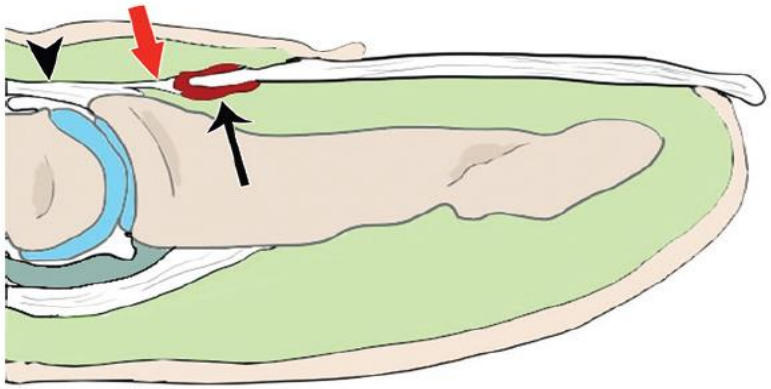
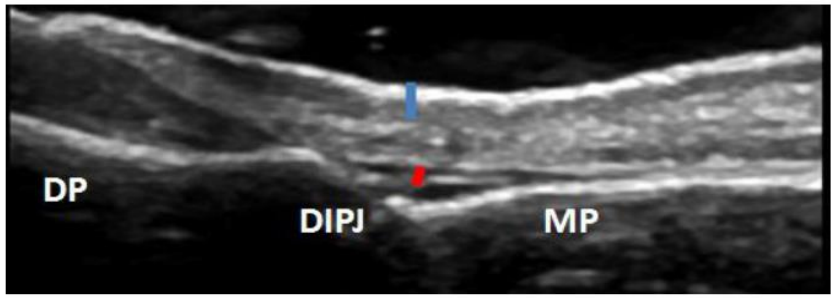
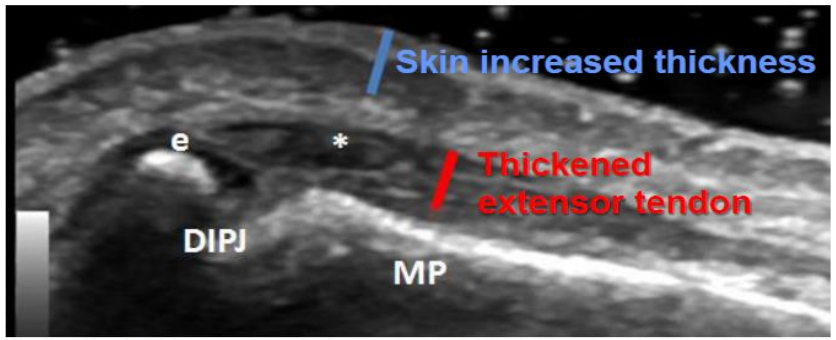


Figure 15. Anatomic details of the DIP joint and nail root. Distal to the extensor tendon where it attaches to the distal phalangeal base, the superficial lamina (red arrow) of the extensor tendon (arrowhead) encloses the proximal part of the nail root (black arrow).



Normal
Extensor tendon
Skin thickness



Psoriasis

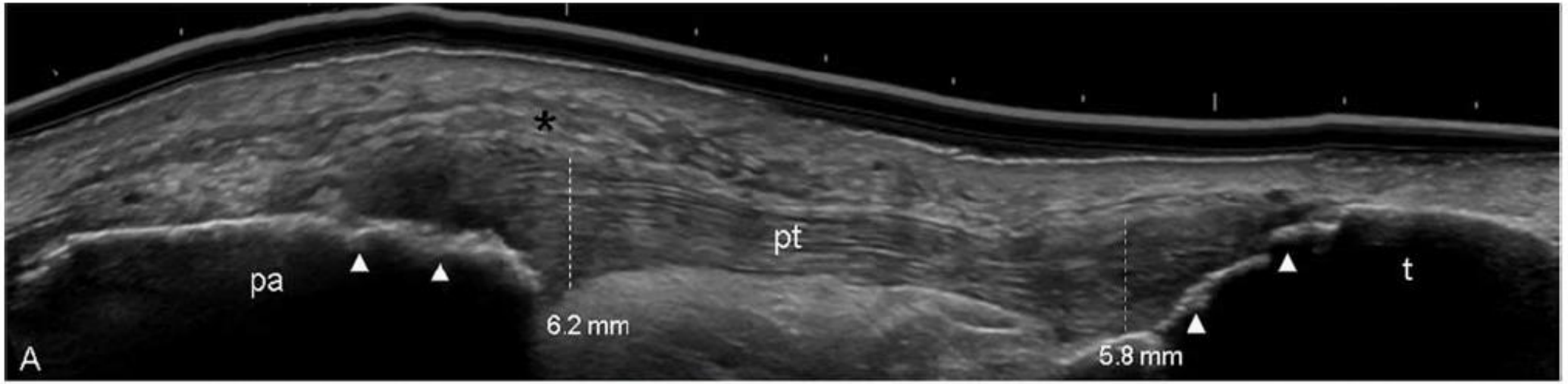
DP – distal phalanx MP – middle phalanx
e – enthesophyte * hypoechogenicity

Aydin, et al. Dermatology 2012

- The extensor tendon, which attaches to the dorsal base of the terminal phalanx after running over the DIP joint, has a small extension referred to as the superficial lamina that covers the nail root. This anatomic link is considered to be associated with inflammation of the nail and DIP joints in PsA.

Subclinical enthesitis may also be responsible for some of the ungual pain experienced by patients with psoriasis without clinical PsA

Shiraishi et al. RSNA 2020



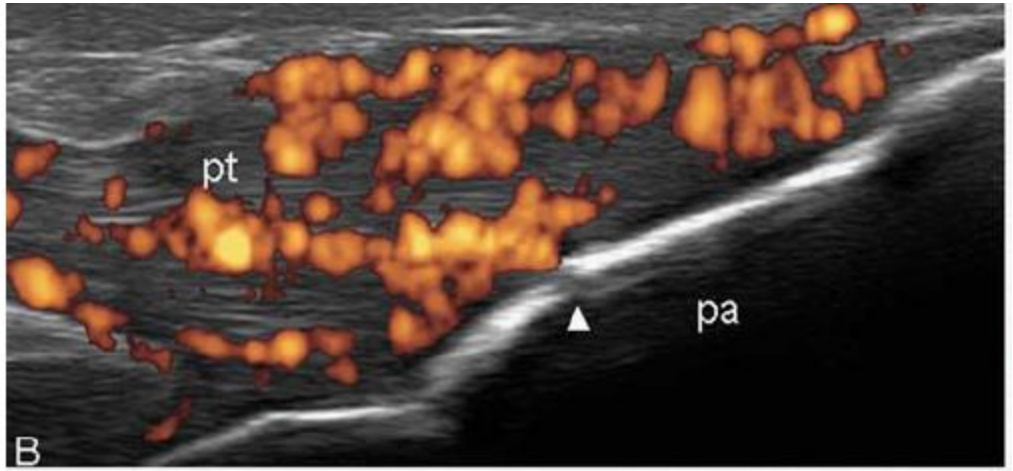


Fig. 6 Psoriatic arthritis. **a** Patelar tendon using "extended view" technique. Longitudinal view. Thickening of both proximal (6.2 mm) and distal (5.8 mm) entheses of patellar tendon (*pt*) with evident echotexture disomogeneity, oedema of the peritendineous tissue (*black asterisk*), and irregularities of the bone profile (*white arrowheads*). **b** Distal patellar enthesis. Longitudinal scan. Marked hypoechogenicity and fibrillar separation (due to intratendioneous oedema), generating an increase of the thickness of the enthesis. Note the intense power Doppler signal and the erosion of the cortical bone (*white arrowhead*)

M Gutierrez et al. Clin Rheumatol (2010)

POS0242 68Ga-FAPI-04 PET/CT REVEALS INCREASED ENTHESEAL AND SYNOVIAL MESENCHYMAL ACTIVATION IN PSORIASIS PATIENTS AT RISK OF TRANSITION TO PSORIATIC ARTHRITIS

G Corte et al.

Mesenchymal tissue activation plays a key role already in the early phases of development of synovitis and enthesitis. PET/CT imaging with ^{68}Gallium-labelled Fibroblast .

Activation Protein Inhibitor-04 (^{68}Ga-FAPI-04) enables the visualization of fibroblast activation *in vivo* and has already been used to track disease activity in inflammatory rheumatic diseases

Conclusion: Substantial fibroblast activation was found in joints and entheses of psoriasis patients with arthralgias and correlated with tenderness at the clinical examination and with a higher risk of transition to PsA.

No correlations with MSUS findings were found.

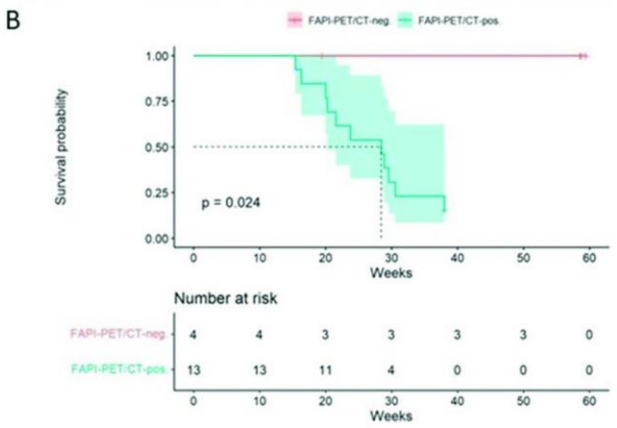
These results suggest that fibroblast activation as depicted by ^{68}Ga-FAPI-04-PET/CT imaging predate the onset of clinical and ultrasound signs of inflammation and might predict the development of a clinical PsA.

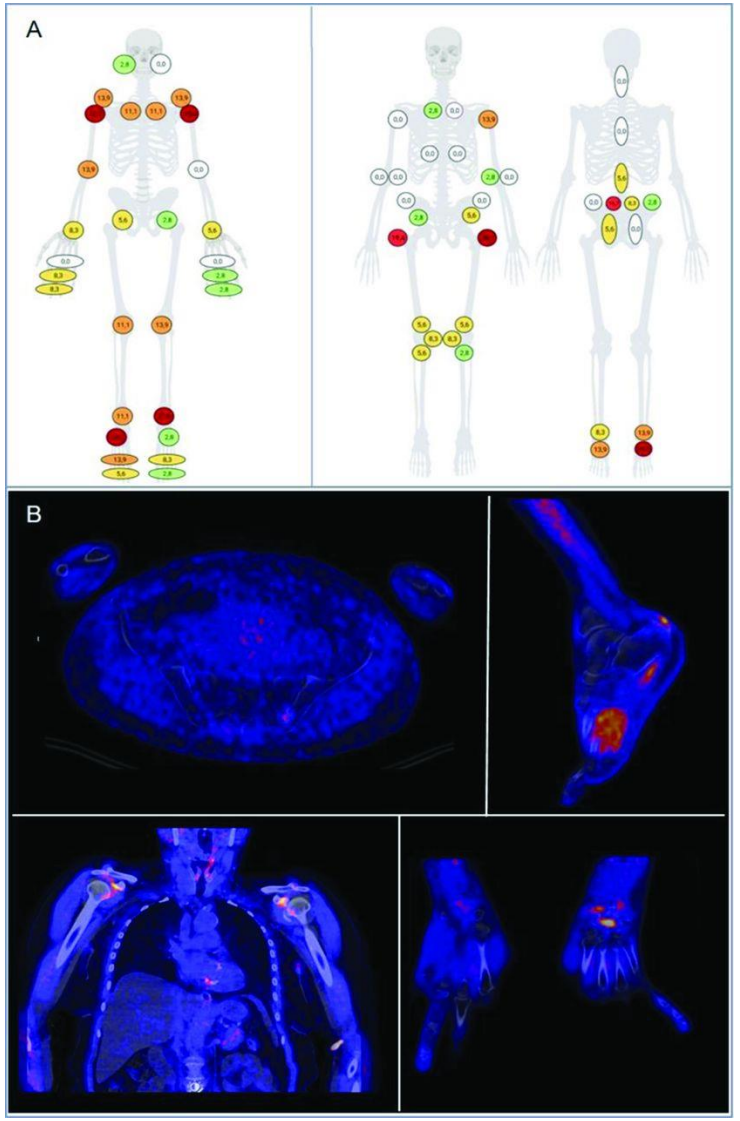
https://doi.org/10.1136/annrheumdis-2024-eular.800

A

FAPI_PET	Outcome	Site	Odds_Ratio	CI	p_value	Significance
SUVmax	Physical Examination	All	1.300	1.20-1.41	< 0.001	****
SUVmax	Physical Examination	Joints	1.290	1.17-1.42	< 0.001	****
SUVmax	Physical Examination	Entheses	1.300	1.12-1.50	< 0.001	****
Joint Count	Physical Examination	All	1.680	1.41-1.99	< 0.001	****
Joint Count	Physical Examination	Joints	1.690	1.35-2.07	< 0.001	****
Joint Count	Physical Examination	Entheses	1.620	1.17-2.17	0.002	***
SUVmax	Ultrasound	All	0.995	0.751-1.23	0.969	ns
SUVmax	Ultrasound	Joints	1.040	0.493-1.59	0.869	ns
SUVmax	Ultrasound	Entheses	0.956	0.678-1.22	0.745	ns
Joint Count	Ultrasound	All	1.100	0.617-1.77	0.72	ns
Joint Count	Ultrasound	Joints	1.220	0.302-2.83	0.686	ns
Joint Count	Ultrasound	Entheses	0.983	0.491-1.75	0.957	ns

B





The impact of enthesitis

Observational and prospective study conducted during 2 years of follow-up in the REGISPONSER-AS registry. Among the 749 patients included, 46 patients (6.1%) showed Achilles' tendon enthesitis during physical examination at the baseline study visit

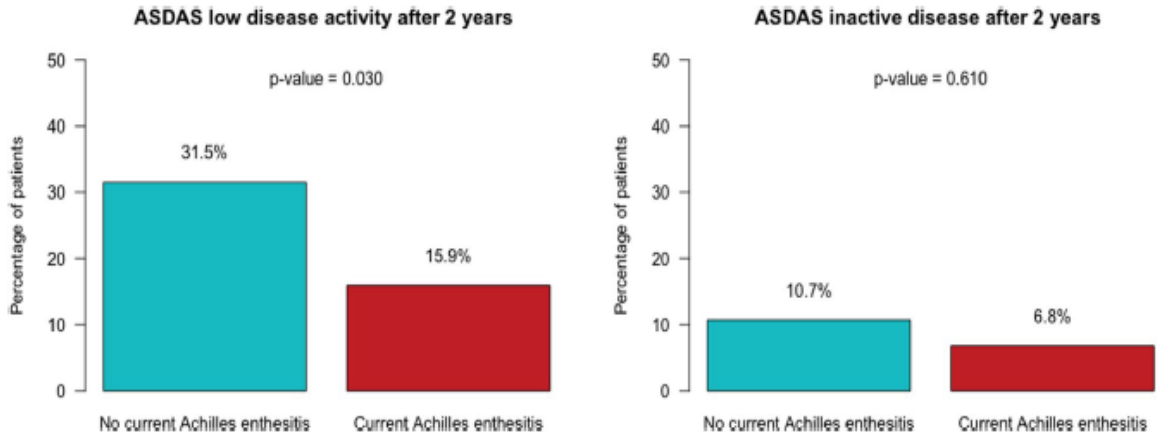


Fig. 1 ASDAS low disease activity and ASDAS inactive disease after 2 years of follow-up depending on the presence of Achilles enthesitis on physical examination

In patients with AS, the presence of Achilles' tendon enthesitis was associated with worse scores on the outcome measures after 2 years of follow-up, leading to a lower probability of achieving low disease activity.

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First Release January 15 2021

The Journal of Rheumatology

Disease Characteristics, Quality of Life, and Work Productivity by Enthesitis Site: Real-world Data From the US Corrona Psoriatic Arthritis/Spondyloarthritis Registry

Of 2003 patients with PsA, 391 (19.5%) had enthesitis:

- 80 (20.5%) in upper sites only
- 137 (35.0%) in lower sites only
- 174 (44.5%) in both.

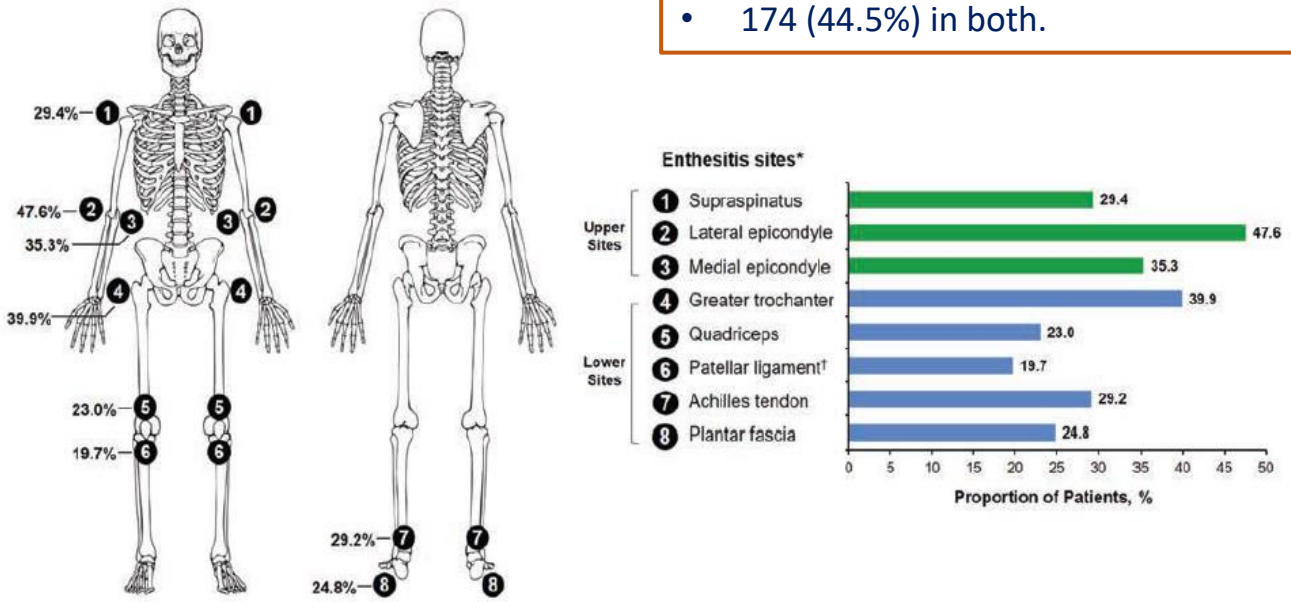


Figure 1. Prevalence of enthesitis by individual enthesitis site among patients with enthesitis (N = 391). * Percentages listed are a total of the left and right affected sites; patients may have reported enthesitis at > 1 site. † For scoring purposes, the inferior patellar and tibial tuberosity are considered 1 site because of their anatomical proximity.

Conclusion. Patients with clinical enthesitis had worse disease activity regardless of enthesitis location versus those without enthesitis, and patients with enthesitis in lower or both upper and lower sites had worse pain, fatigue, and work impairment.

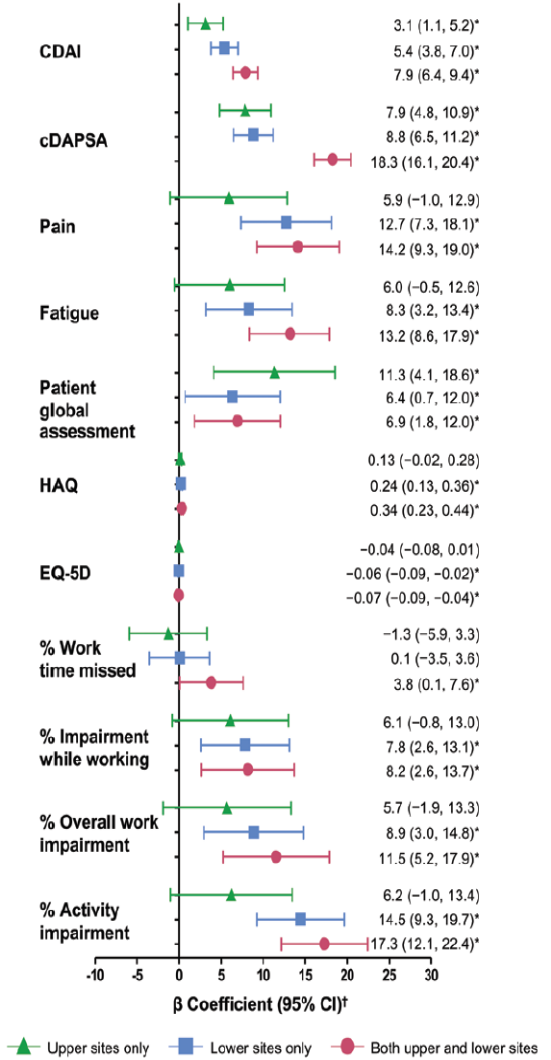


Figure 3. Association (β) of having enthesitis in the upper extremities only, lower extremities only, and both upper and lower extremities with disease activity, QOL, and work productivity relative to no enthesitis among patients with PsA in the Corrona PsA/SpA Registry. * $P < 0.05$. † Analyzed using linear regression models adjusted for age, sex, race, BMI, marital status, duration of PsA, depression, nail psoriasis, fibromyalgia, history of csDMARD use, history of biologic use, and current csDMARD use; β coefficients are nonstandardized. CDAI: Clinical Disease Activity Index; cDAPSA: clinical Disease Activity Index for Psoriatic Arthritis; csDMARD: conventional synthetic disease-modifying antirheumatic drug; EQ-5D: 5-dimension EuroQol scale; HAQ: Health Assessment Questionnaire; PsA: psoriatic arthritis; QOL: quality of life; SpA: spondyloarthritis.

The objective of this real-world cross-sectional study was to characterize the impact PsA enthesitis had on PROs and to explore the contribution of enthesitis to physician-reported satisfaction with their patients'

Rheumatologists (454) and dermatologists (238) provided information for 3157 participants with PsA

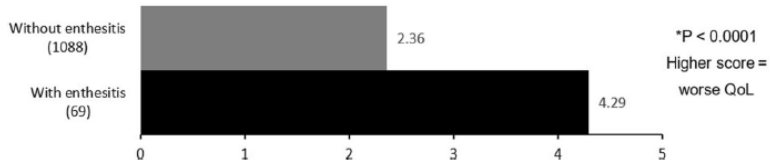


Fig. 1 PsAID12 score by enthesitis presence (mean). *Student's *t* test was used to compare outcomes from "with enthesitis" and "without enthesitis" groups. PsAID12 Psoriatic Arthritis Impact of Disease, QoL quality of life

Fig. 2 EQ5D utility score by enthesitis presence (mean). *Student's *t* test was used to compare outcomes from "with enthesitis" and "without enthesitis" groups. QoL quality of life

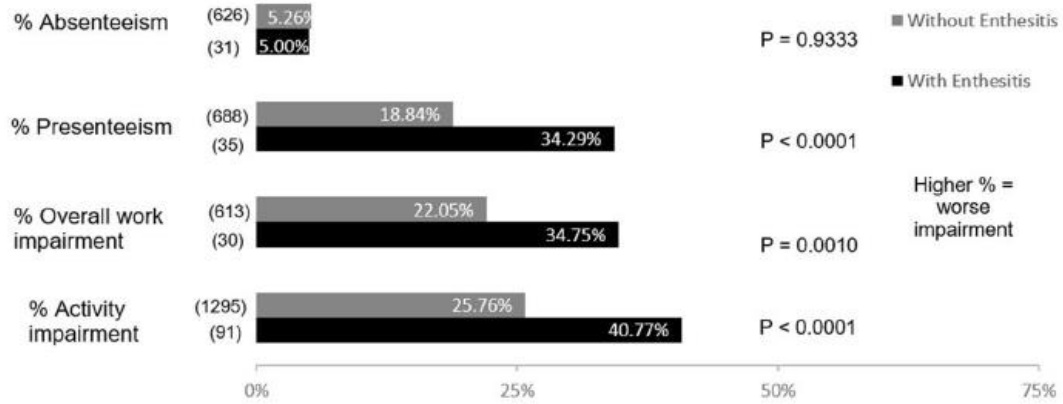


Fig. 3 Work productivity and activity impairment by enthesitis presence. *Student's *t* test was used to compare outcomes from "with enthesitis" and "without enthesitis" groups

Patients with enthesitis had worse overall disease severity, more extraarticular manifestations, more pain and opioid use, worse quality of life (QoL), and physicians were significantly less satisfied with current PsA treatment compared to patients without enthesitis.

Ana-Maria Orbai et al. Rheumatol Ther (2020

Dactylitis

I. Dactylitis is a term used to describe the clinical and radiologic diffuse uniform swelling of a entire digit or toe due to soft tissue, articular , entheseal and tendon sheath inflammation.

II. It is a common feature of PsA and usually causes severe pain , disability and is correlated with more severe and erosive disease

III. Dactylitis occurs in16–49% of patients with PsA, often early in disease as the inaugural symptom.

IV. it is also considered an independent predictor of cardiovascular morbidity

V. Due to its importance , is considered a

G.S. Kaeley et al. / Seminars in Arthritis and Rheumatism 48 (2018) 263–273

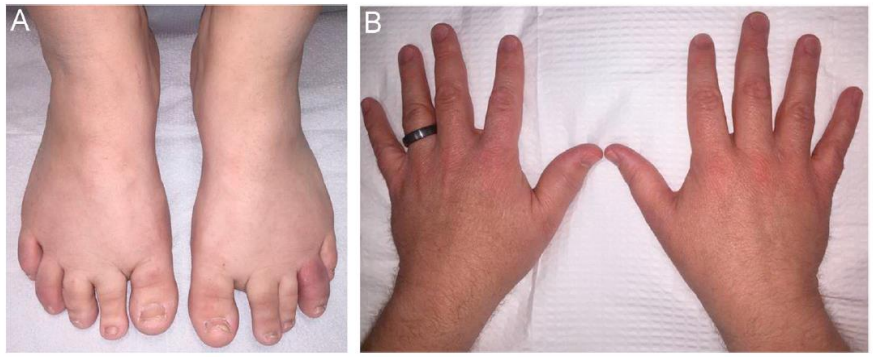


Fig. 1. Photographs of toe and thumb dactylitis. Images courtesy of Dr Catherine Bakewell. (A) Dactylitis, right 4th toe. (B) Dactylitis, left thumb.

Don't forget other causes:

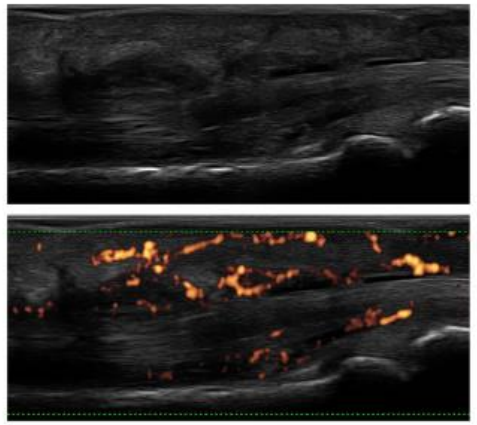
- TB
- Sarcoidosis
- SCD
- Infections
- Syphilis
- Gout

G.S. Kaeley et al. / Seminars in Arthritis and Rheumatism 48 (2018)

Table 1. Structures Involved in Dactylitis of Psoriatic Arthritis
Digital flexor tenosynovitis
Soft-tissue edema, pseudotenosynovitis
Thickness of the pulleys A1, A2, A4
Digital extensor paratenonitis
Synovitis
Flexor enthesitis
Pericapsular bone formation

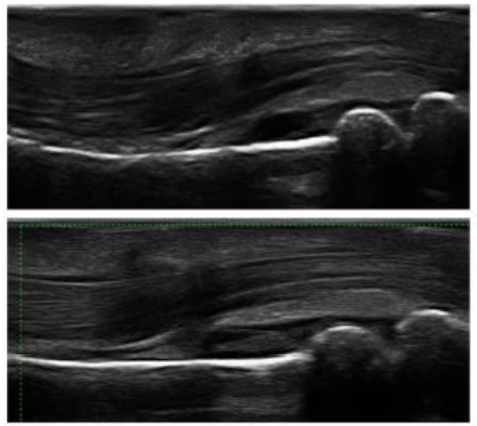
Symptoms in active dactylitis are linked with extracapsular lesions, particularly flexor tenosynovitis and STOe, highlighting the central role of extra-articular structures in the genesis of digit pain.

Acute – Hot Dactylitis



Physical examination	Often Tender
GS Flexor tenosynovitis	+++
PD Flexor tenosynovitis	+++
GS soft tissue oedema	+++
PD soft tissue oedema	+++
GS synovitis	–
PD synovitis	–

Chronic – Cold Dactylitis



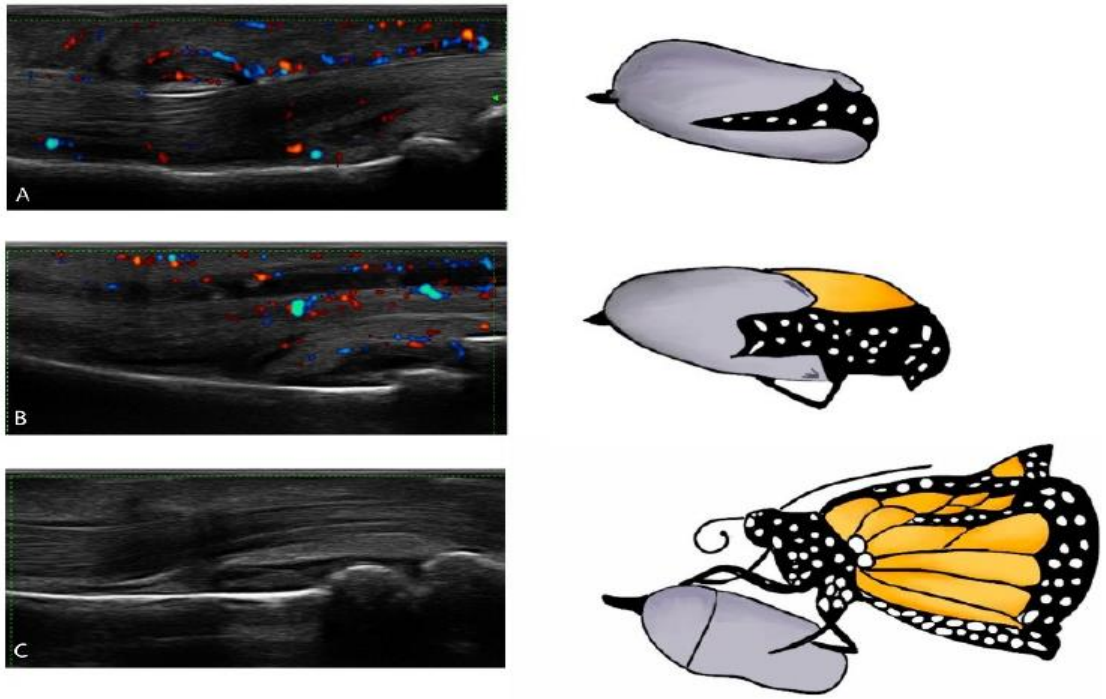
Physical examination	Often Tender
GS Flexor tenosynovitis	+/–
PD Flexor tenosynovitis	+/–
GS soft tissue oedema	–
PD soft tissue oedema	–
GS synovitis	+
PD synovitis	+/–

Figure 2. This figure summarizes the clinical and ultrasound characteristics of acute/hot and chronic/cold forms of dactylitis: Flexor tenosynovitis and soft tissue oedema are predominant in early cases, whereas synovitis is more frequent in the chronic form. Similarly, local symptoms are linked with extracapsular lesions, particularly flexor tenosynovitis and soft tissue oedema; joint synovitis does not seem to correlate with pain.

Urruticoechea-Arana et al. Ultrasound in Dactylitis and Enthesitis. Eur J Rheumatol 2024

Sara K Felbo et al. Clinical Rheumatology 2020

Girolimetto N, et al: J. Clin. Med. 2021



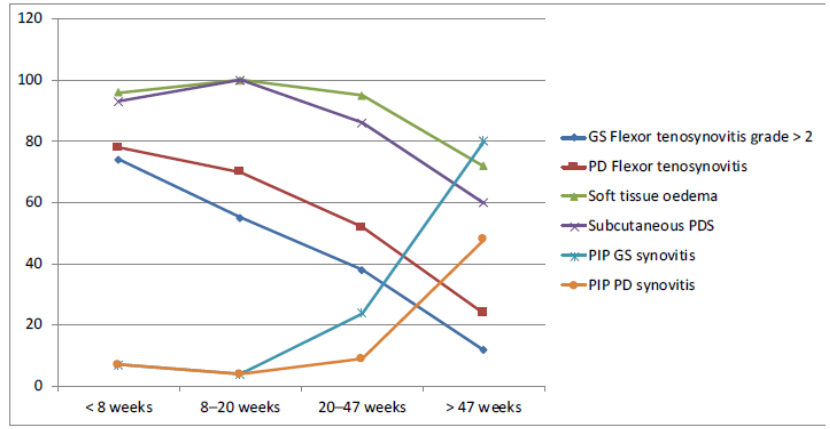


Figure 3. Prevalence of some US abnormalities after splitting cases into quartiles based on dactylitis duration: US: ultrasound; GS: greyscale; PD: power Doppler; PDS: subcutaneous PD signal; PIP: proximal interphalangeal. Figure reproduced from the article: Girolimetto et al. J Rheumatol. February 2020;47(2):227–233.

Figure 4. Evolution of dactylitis. Inflammation initially compromises the extracapsular structures and subsequently extends to the joint structures. The US lesions underlying dactylitis change over time, like evolving from a chrysalis to a butterfly. In particular: a) in the early phase flexor tenosynovitis and soft tissue oedema are prevalent. Joint synovitis is often absent; b) in the intermediate phase, both flexor tenosynovitis and synovitis may be present; c) in the late-chronic phase, joint synovitis is prevalent while flexor tenosynovitis is often absent or present but of minimal degree.

Girolimetto N, et al: J. Clin. Med. 2021

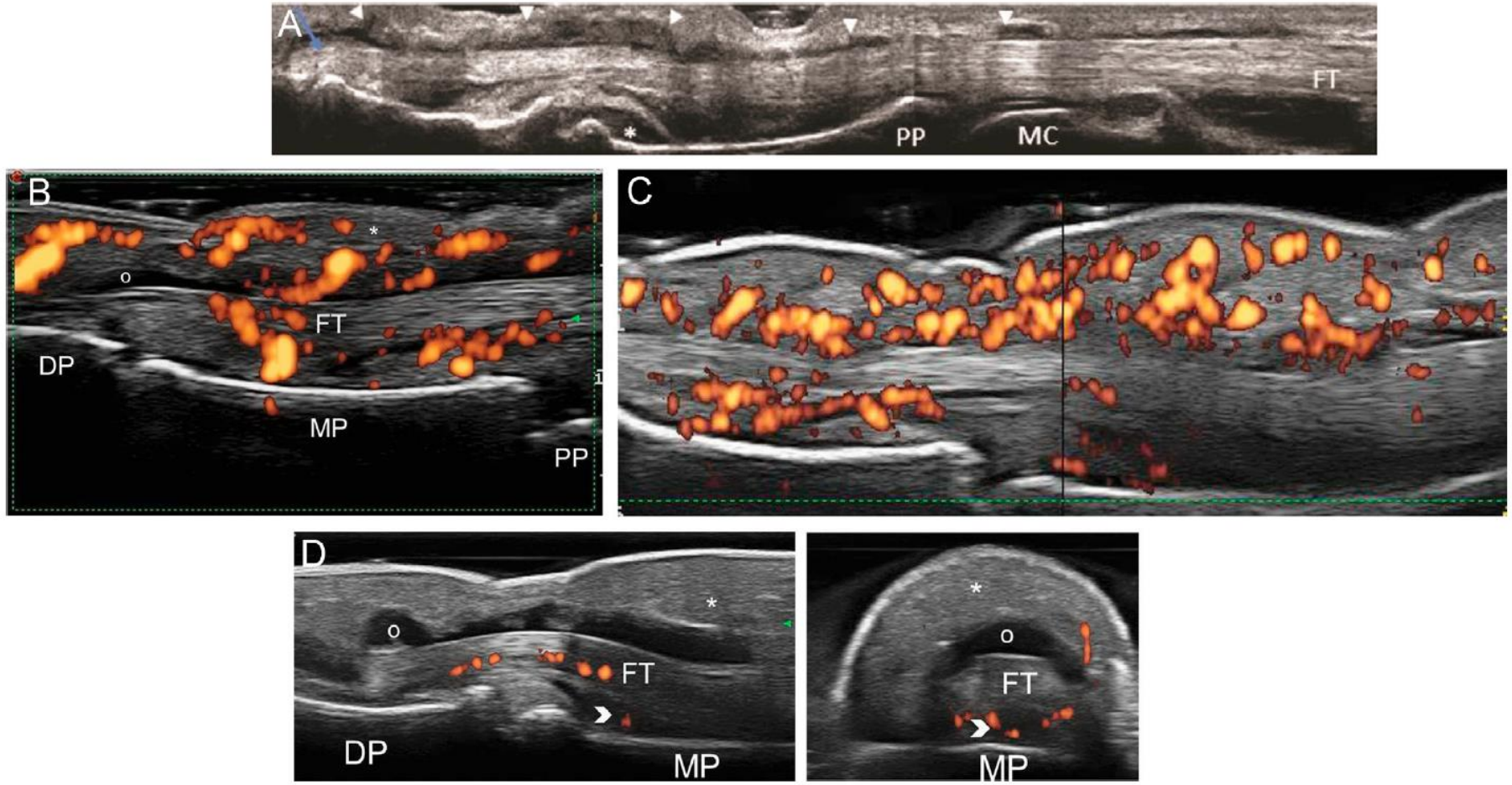


Fig. 5. Ultrasound of finger dactylitis. Image (A) courtesy of Dr Sibel Z. Aydin and images (B–D) courtesy of Dr Marwin Gutierrez. (A) Extended view of the volar aspect of the finger showing extensive tenosynovitis (arrow heads), enthesitis of the flexor tendon at the level of the insertion into the basis of the distal phalanx (arrow) as well as PIP and MCP joint synovitis (asterisk). FT, flexor tendon; MC, metacarpal; MCP, metacarpophalangeal joints; PIP, proximal interphalangeal; PP, proximal phalange. (B) Longitudinal volar ultrasound showing synovial sheath widening (circle) associated with soft-tissue edema (asterisk), loss of the typical fibrillar pattern of the flexor tendon, and intra- and peri-tendinous power Doppler. DP, distal phalanx; FT, flexor tendon; MP, medial phalanx; PP, proximal phalanx. (C) Volar scan of a dactylitic digit showing soft-tissue expansion, increased vascularity, and tenosynovitis. (D) Longitudinal (left) and transverse (right) scan. Note the mix of abnormalities characterized by synovial sheath widening (circle), soft-tissue edema (asterisk), proximal interphalangeal joint synovitis (arrowhead), and intra-tendinous and intra-articular power Doppler. DP, distal phalanx; FT, flexor tendon; MP, medial phalanx; PP, proximal phalanx.

but also

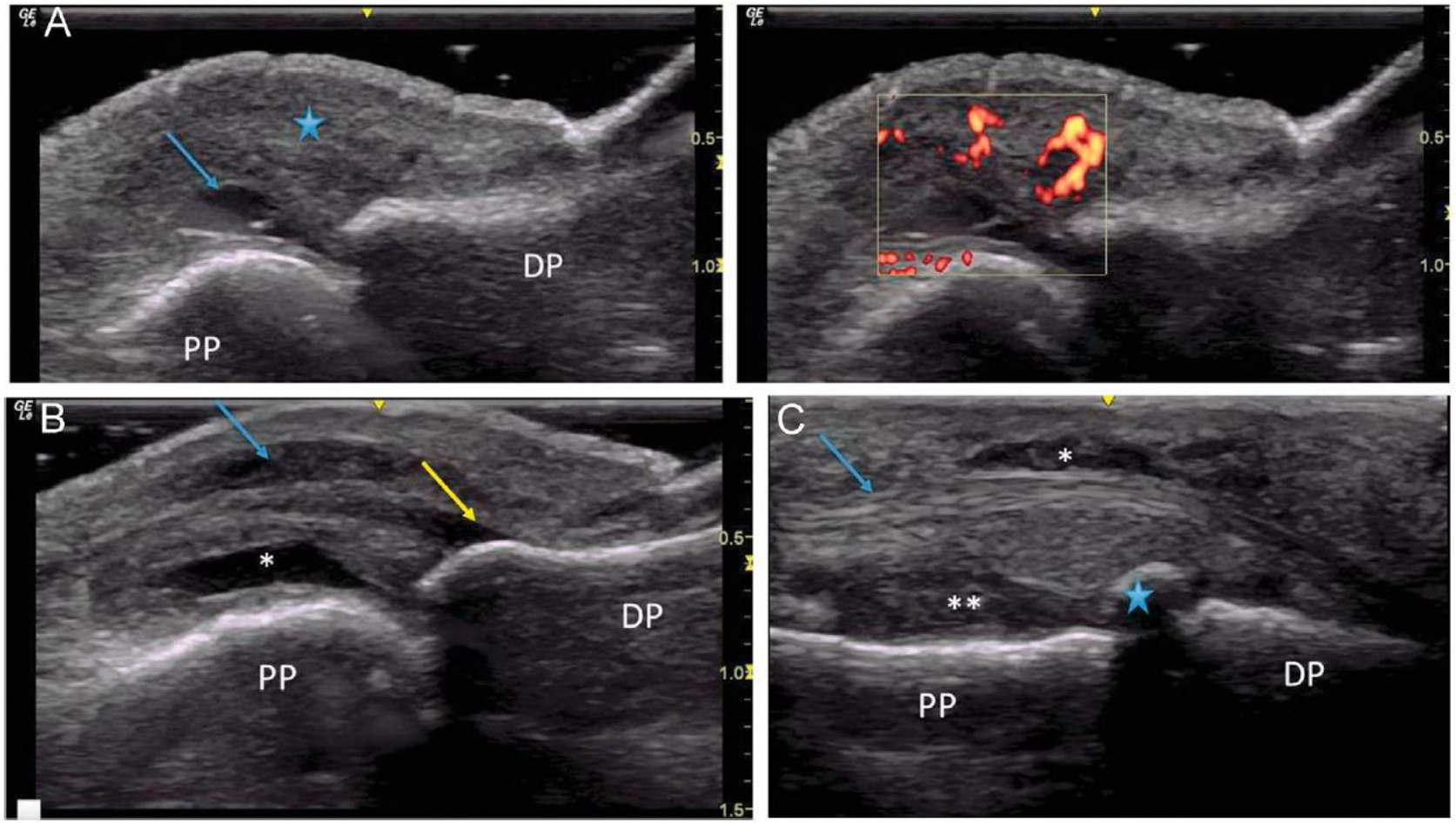


Fig. 4. Ultrasound of thumb dactylitis from a single patient. Images courtesy of Dr Catherine Bakewell. (A) Thumb dorsal longitudinal B-mode (left) and soft-tissue thickening with power Doppler changes present (right). Blue arrow, synovitis; star, diffuse soft-tissue thickening. DP, distal phalanx; PP, proximal phalanx. (B) Thumb dorsal longitudinal DIP joint—extensor tendinosis/paratendonitis and synovitis of the DIP joint with interphalangeal joint effusion. Asterisk, interphalangeal joint effusion; blue arrow, paratenonitis (soft-tissue edema adjacent to extensor tendon); yellow arrow, entheseal abnormalities at extensor tendon insertion (increased thickness, hypoechogenicity, loss of fibrillar echotexture). DIP, distal interphalangeal; DP, distal phalanx; PP, proximal phalanx. (C) Thumb palmar longitudinal: flexor tenosynovitis and joint synovitis. Single asterisk, tenosynovitis; double asterisk, synovial proliferation; blue arrow, flexor tendon; star, sesamoid. DP, distal phalanx; PP, proximal phalanx.

G.S. Kaeley et al. / Seminars in Arthritis and Rheumatism 48 (2018)

Dactylitis

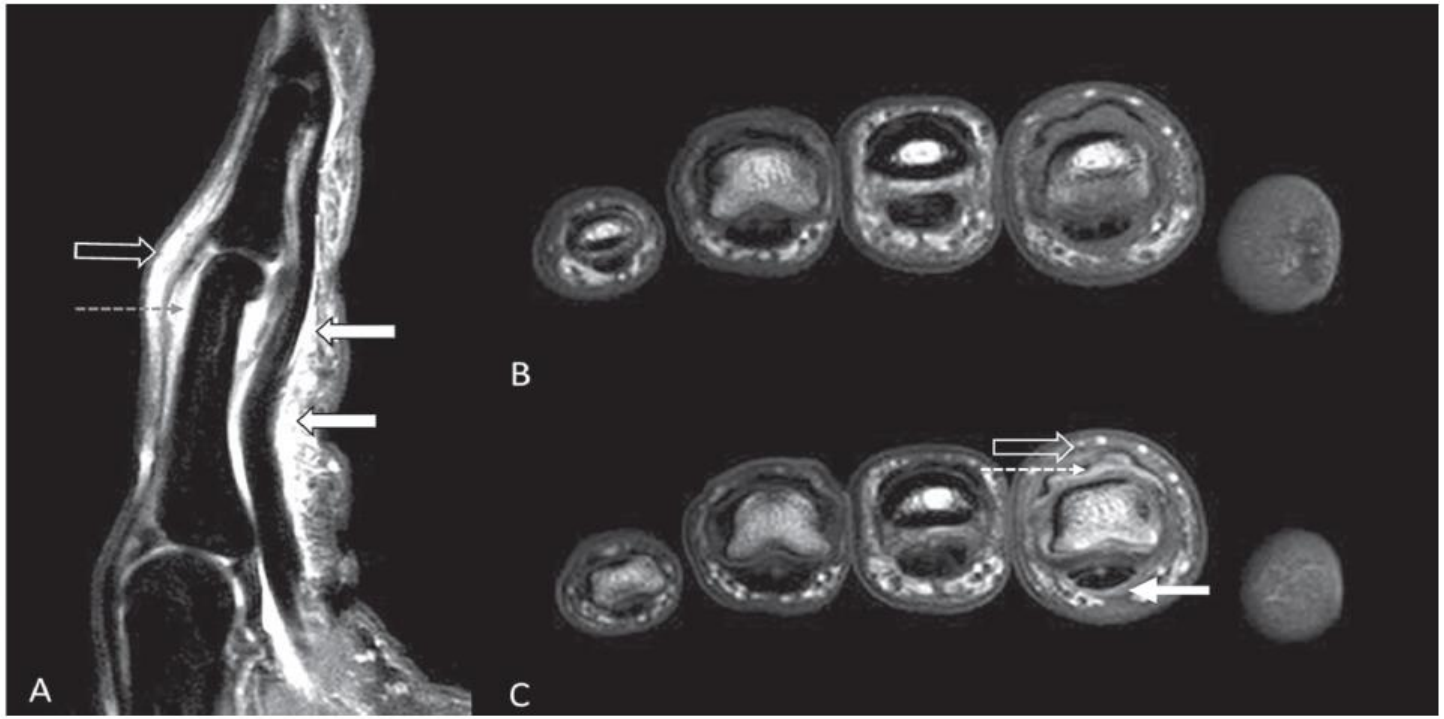


Fig. 6. MRI of fingers of patient med PsA. **A**: Sagittal STIR-image of 2. finger, showing dactylitis with synovitis/effusion (dashed arrow) in the PIP-joint, flexor tenosynovitis (thick arrows) and thickening and increased signal of soft tissues (periarticular inflammation, open arrow). **B-C**: Axial T1 weighted images before (**B**) and after (**C**) intravenuss contrast injection through 1st-5th finger (thumb right) showing contrast enhancement in the 2nd PIP joint (synovitis, dashed arrow), the flexor tendon sheet (tenosynovitis, thick arrow) and in the soft tissues around the joint (periarticular inflammation, open arrow).

Enthesitis is the primary lesion in SpA including PsA, and hr-MRI has demonstrated a link between dactylitis and digital polyenthesitis

S.K. Felbo et al. Clinical and Experimental Rheumatology 2018

Prevalence and characteristics associated with dactylitis in patients with early spondyloarthritis: results from the ESPeranza cohort

Table II. Multivariable analysis for the association between disease characteristics and dactylitis.

Characteristic	OR	*p*-value
CBP	0.44	0.07
IBP (ASAS criteria)	0.44	0.07
Peripheral arthritis	4.83	**<0.001**
Enthesitis	2.49	**0.01**
Psoriasis	3.62	**<0.01**
Nail lesion	0.61	0.6
Diarrhoea, cervicitis, urethritis	2.17	0.3
CRP	0.99	0.5
ESR	1.01	0.3
Radiographic sacroiliitis	1.26	0.6
Physician's VAS	0.82	**0.01**

OR: odds ratio; CBP: chronic back pain; IBP: inflammatory back pain; IBD: inflammatory bowel disease; CRP: C- reactive protein (mg/L); ESR: erythrocyte sedimentation rate (mm/hr); SJC: swollen joint count; VAS: visual analogue scale.

609 patients who were diagnosed with SpA
Fifty-eight (9.5%) patients currently or previously had dactylitis.

Clinical and Experimental Rheumatology 2018

The impact of dactylitis

Table 2. Unadjusted and adjusted data for odds ratios (ORs) and mean differences: psoriatic arthritis patients with dactylitis or enthesitis*

Parameter	Unadjusted data	Adjusted data†
Association of dactylitis or enthesitis with risk of not being in MDA/modified MDA, OR (95% CI)		
Dactylitis	2.73 (1.74, 4.28)‡	2.53 (1.55, 4.15)‡
Enthesitis	1.86 (1.29, 2.70)‡	1.88 (1.23, 2.86)‡
Association of dactylitis or enthesitis with functional status measured by HAQ, β coefficient (95% CI)§		
Dactylitis	0.09 (−0.005, 0.18)	0.08 (−0.02, 0.17)
Enthesitis	0.19 (0.11, 0.26)‡	0.16 (0.09, 0.24)‡
Estimated difference in mean patient-reported pain and fatigue VAS, and measures of work productivity between patients with and without enthesitis, β coefficient (95% CI)§		
Patient-reported pain VAS	9.19 (5.79, 12.58)‡	7.40 (3.78, 11.02)‡
Patient-reported fatigue VAS	8.47 (5.19, 11.76)‡	7.31 (3.88, 10.75)‡
WPAI		
Percentage work time missed	1.44 (−1.01, 3.89)	1.09 (−1.63, 3.82)
Percentage impairment while working	5.51 (2.05, 8.97)‡	3.74 (0.05, 7.42)‡
Percentage overall work impairment	6.99 (3.01, 10.97)‡	5.39 (1.12, 9.67)‡
Percentage activity impairment	9.44 (5.74, 13.14)‡	7.77 (3.87, 11.67)‡
Estimated difference in mean patient-reported pain and fatigue VAS, and measures of work productivity between patients with and without dactylitis, β coefficient (95% CI)§		
Patient-reported pain VAS	5.19 (0.92, 9.46)‡	3.30 (−1.22, 7.82)
Patient-reported fatigue VAS	3.55 (−0.61, 7.71)	2.47 (−1.86, 6.79)
WPAI		
Percentage work time missed	1.58 (−1.42, 4.57)	1.88 (−1.36, 5.11)
Percentage impairment while working	2.82 (−1.50, 7.14)	0.68 (−3.79, 5.14)
Percentage overall work impairment	2.40 (−2.49, 7.28)	0.33 (−4.75, 5.41)
Percentage activity impairment	5.22 (0.54, 9.90)§	3.44 (−1.33, 8.22)
Estimated ORs of any work or activity impairment vs. no impairment in patients with dactylitis or enthesitis, OR (95% CI)		
Dactylitis		
Percentage work time missed	1.40 (0.82, 2.39)	1.21 (0.66, 2.22)
Percentage impairment while working	1.22 (0.79, 1.87)	1.12 (0.70, 1.79)
Percentage overall work impairment	1.27 (0.81, 1.99)	1.17 (0.71, 1.93)
Percentage activity impairment	1.29 (0.82, 2.02)	1.07 (0.66, 1.74)
Enthesitis		
Percentage work time missed	1.45 (0.93, 2.27)	1.34 (0.81, 2.21)
Percentage impairment while working	1.68 (1.18, 2.40)‡	1.57 (1.05, 2.35)‡
Percentage overall work impairment	1.98 (1.34, 2.92)‡	1.85 (1.19, 2.87)‡
Percentage activity impairment	2.00 (1.37, 2.93)‡	1.77 (1.16, 2.69)‡

* MDA = minimal disease activity; 95% CI = 95% confidence interval; HAQ = Health Assessment Questionnaire; VAS = visual analog scale; WPAI = Work Productivity and Activity Impairment Questionnaire.
† Data adjusted for age, sex, race, body mass index, disease duration, history of biologic agent use, conventional synthetic disease-modifying antirheumatic drug use, and prednisone use.
‡ $P < 0.05$.
§ Greater mean differences reflect higher HAQ scores/poorer functional status or greater work/activity impairment.

- Enthesitis and dactylitis are associated with greater overall burden of disease in psoriatic arthritis (PsA).
- PsA patients with versus without dactylitis or enthesitis were more likely to have elevated disease activity, less likely to be in minimal disease activity, and more likely to have poorer functional status.

Mease et al. Corrona PsA/SpA Registry: Dactylitis and Enthesitis Analysis. Arthritis Care & Research 2017

Conclusions

- New imaging techniques have changed our view and understanding to enthesitis and dactylitis
- Enthesitis is corelated with worse clinical outcomes and PROs in SpA
- Dactylitis incorporate inflammation of multiple structures and similarly to enthesitis is related with higher disease activity, worse clinical outcome and poor functional status