Intercepting the psoriasis-psoriatic arthritis continuum: a precision-medicine framework for at-risk, subclinical, and early psoriatic arthritis

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ABSTRACT

Objective. *Psoriatic arthritis (PsA) arises in roughly 20–30% of individuals with psoriasis (PsO); notably, >80% of PsA cases are preceded by PsO after a clinically silent interval of immunogenetic priming and subclinical synovio-entheseal inflammation. Identification of this at-risk and subclinical window is hindered by absent staging criteria, validated biomarkers, and standardised surveillance, limiting opportunities for early intervention to prevent irreversible joint damage.*

Methods. *We conducted a structured narrative review of PubMed (through June 2025) targeting studies on: 1. immunogenetic and molecular drivers of PsO-to-PsA transition, 2. temporal staging frameworks and risk-stratification algorithms, 3. screening instruments and polygenic risk models, 4. imaging modalities for occult inflammation, and 5. pharmacologic and lifestyle interventions aimed at disease interception.*

Results. *Long-term factors (PsO severity, nail disease, family history, obesity) and short-term indicators (arthralgia, imaging-detected enthesitis or synovitis) help stratify PsA risk. Advanced ultrasound and MRI can reveal subclinical inflammation in asymptomatic PsO, though predictive validity remains to be confirmed. Observational data hint at a possible delay in PsA onset with early bDMARD exposure, but randomised prevention trials are lacking. Lifestyle interventions appear promising yet remain untested.*

Conclusion. *Framing PsA as a staged continuum supports a precision-medicine model that integrates genetic profiling, validated screening, advanced imaging, and targeted intervention. Prospective, biomarker-driven trials and integrated dermatology-rheumatology pathways are needed to validate predictive algorithms and establish effective prevention and early-treatment strategies.*

Introduction

Psoriatic arthritis (PsA) develops in about 20–30% of people with psoriasis (PsO) and is preceded by PsO in >80% of cases, typically after a clinically silent interval of immunogenetic priming and subclinical synovio-entheseal inflammation (1-3). Compelling evidence indicates that timely recognition and therapeutic engagement during the earliest phases of psoriatic disease can avert irreversible structural damage and mitigate diagnostic delay (4, 5). Consequently, PsA is increasingly conceptualised as a modifiable disease trajectory rather than an ineluctable clinical outcome, stimulating efforts to delineate its at-risk and subclinical stages and to embed precision-medicine paradigms within care pathways (6, 7).

Multimodal clinical, imaging, and translational datasets converge on the view that the PsO-PsA continuum is progressive yet heterogeneous, advancing from systemic immune priming to overt synovio-entheseal inflammation (7, 8). Building on multimodal clinical, imaging, and translational data, recent consensus frameworks describe a triphasic continuum: an at-risk stage (systemic immune activation without musculoskeletal symptoms), a subclinical stage (symptoms and demonstrable tissue inflammation without clinical arthritis), and early clinical PsA meeting CASPAR criteria (9-12).

Viewing PsA through this temporal lens shifts care from reactive to anticipatory and motivates precision strategies that match risk to surveillance and therapy (13-19).

Although definitive prevention trials are pending, converging evidence indicates that early recognition and mechanism-guided intervention can mitigate damage and shorten diagnostic delay (18-22). This review synthesises current insights into the PsO-PsA transition, immunogenetics, staging, imaging and biomarkers, risk stratification, and early-intervention approaches, toward an operational precision-interception framework.

Methods

A comprehensive PubMed/MEDLINE search (January 2000 - June 2025) was conducted using predefined Boolean combinations of key terms related to psoriasis, psoriatic arthritis, subclinical or preclinical phases, imaging modalities, and biomarkers. Only English-language, peer-reviewed human studies were included, encompassing original research, cohort studies, randomised trials, systematic reviews, and expert consensus papers. Non-English publications without English abstracts, case reports, and paediatric studies were excluded.

Titles and abstracts were independently screened by two reviewers (MT and MC), with full-text evaluation by consensus. Data were thematically synthesised across five domains: immunogenetics, molecular and imaging biomarkers, clinical staging, risk stratification, and early-intervention strategies.

After screening, 82 articles were included for qualitative synthesis, supplemented by manual searches of reference lists to ensure comprehensive coverage of psoriatic disease interception.

PsO-PsA transition: immunopathogenic insights

PsA arises in a subset of PsO patients with distinct immunogenetic endotypes involving both HLA and non-HLA loci that shape immune surveillance and tissue-specific inflammation. HLA-B27 associates with axial and entheseal disease, while HLA-B38 and HLA-C*06 link to peripheral phenotypes (23-25). Immunogenetic profiling may, therefore, serve as a cornerstone of risk stratification, enabling preclinical identification of PsO patients predisposed to PsA. Indeed, specific HLA-linked phenotypes may predict the time and pattern of disease evolution and support tailored surveillance algorithms (26, 27).

Beyond HLA, genome-wide association studies (GWAS) identify PsA-specific loci (IL23R, IL12B, TYK2, TRAF3IP2, RUNX3, REL) implicating IL-23/IL-17-driven T-cell differentiation and supporting polygenic risk models for early stratification (28-31).

The enthesis serves as the earliest immunologic interface, enriched in IL-23/IL-17-responsive ILC3, γδ, and MAIT cells that respond to mechanical or microbial stimuli, leading to neutrophil recruitment and IL-17-mediated inflammation. (32-40).

Emerging molecular imaging with ^{68}Ga-FAPI-04 PET/CT reveals stromal fibroblast activation at synovial and entheseal sites in PsO patients with arthralgia, preceding ultrasonographic changes and clinical onset. This fibroblast activation correlates with tenderness and short-term progression, positioning stromal remodelling as an early pathogenic event and a promising translational biomarker of subclinical disease (41).

Parallel cytokine and transcriptional profiling demonstrate a molecular shift from an IL-8/E-selectin-dominated PsO signature to FOXP3/STAT3-driven immune activation in PsA, reflecting endothelial and leukocyte activation during transition (20, 24, 42). Activation of the JAK1-STAT3/STAT1 axis, together with expansion of IL-23R$^+$ Th17 cells, sustains early entheseal inflammation (43).

Recent translational data further refine this paradigm. Graßhoff *et al*. reported distinct alterations in peripheral T-cell populations along the PsO-PsA continuum, characterised by expansion of Th17, Tc17, and CD4$^+$ effector memory subsets. Tc17 cells most clearly delineated at-risk, subclinical, and clinical stages, underscoring Tc17-mediated cytotoxic inflammation as a mechanistic bridge between systemic immune priming and entheseal pathology, and as a plausible target for early therapeutic interception (44).

Complementary multi-omics investigations, including transcriptomic and proteomic analyses, potentially could refine our understanding of coordinated immune pathways – particularly involving the IL-23/IL-17, GM-CSF, and JAK-STAT axes – across blood, synovial, and entheseal compartments. These approaches may help bridge immune cell phenotypes with tissue-level inflammation, providing a conceptual basis for future biomarker development (31, 42, 43).

Among candidate biomarkers, MMP-3, S100A8/A9, CXCL10, ADAMTSL5 autoantibodies, and altered Th17/Treg ratios correlate with subclinical inflammation and may signal early entheseal or synovial perturbation (26, 29).

Preliminary proteomic and cytokine-network analyses potentially could address short-term risk stratification by integrating IL-17/IL-23 mediators, angiogenic factors, and acute-phase reactants with genetic and imaging data, although these findings remain exploratory and require validation across independent cohorts (8, 26, 29, 31, 42, 43). Table I summarises the main genetic, cellular and molecular determinants that define the transition from PsO to PsA.

Risk factors for PsA: from cutaneous signals to precision interception

Early identification of PsO patients most likely to transition to PsA enables targeted surveillance and timely intervention. A recent EULAR framework separates medium/long-term predictors (*e.g*. PsO severity, nail disease, family history, obesity) from short-term indicators (arthralgia and imaging-detected synovitis/enthesitis), the latter enriching for near-term progression (9, 10, 17, 45, 46). Two preclinical trajectories emerge: high-risk cutaneous phenotypes with extrinsic modifiers, and asymptomatic PsO with subclinical inflammation on US/MRI (9, 10, 47-58).

The emergence of musculoskeletal symptoms such as arthralgia, morning stiffness, or enthesopathy further amplifies this short-term transition risk, often preceding clinically overt arthritis (48, 50, 52).

Comorbidities and lifestyle factors further refine this risk stratification. Multimorbidity and obesity-driven systemic inflammation independently predict transition, whereas weight reduction

Table I. Immunopathogenic stratification of the psoriasis-psoriatic arthritis continuum.

Domain	Key markers / cells	Pathogenic insight	Refs.
Genetic determinants	HLA-B27, HLA-B38, HLA-C*06	Class I HLA alleles influence the anatomic pattern and timing of PsA onset (axial/entheseal *vs*. peripheral). HLA profiling enables preclinical risk stratification.	23–25
Non-HLA variants (GWAS)	IL23R, IL12B, TYK2, TRAF3IP2, RUNX3, REL	Non-HLA loci highlight the central role of the IL-23/IL-17 axis and transcriptional networks controlling T-cell lineage commitment.	28, 29
Organ-specific immunity (enthesis)	ILC3, γδ T cells, MAIT cells, macrophages, neutrophils	The enthesis acts as the earliest immune niche; resident innate cells produce IL-17 in response to mechanical or microbial stress, triggering local inflammation.	32–40
Molecular imaging	^{6}Ga-FAPI-04 PET/CT	Detects fibroblast activation at synovial and entheseal sites in PsO with arthralgia; predicts transition to PsA even without ultrasound abnormalities.	41
Phase-specific cytokines	IL-8, TNF, E-selectin, ICAM-1, IP-10, MIP-1α/β	Multiplex cytokine profiling in naive PsO and PsA revealed overlapping IL-8, TNF, and endothelial mediators (E-selectin, ICAM-1), supporting a pathogenic PsO–PsA continuum with enhanced endothelial and chemokine activation in severe, obese, or nail-involved phenotypes.	42
Adaptive T-cell remodelling	Th17, Tc17, CD4^{+} TEM cells	Peripheral immune remodelling during transition: expansion of Th17, Tc17, and effector-memory CD4^{+} T cells, with Tc17 showing the greatest discriminatory power across at-risk, subclinical, and clinical stages; Tc17 identified as potential target for disease interception.	44

BMI: Body Mass Index; CD: cluster of differentiation; GM-CSF: granulocyte–macrophage colony-stimulating factor; GWAS: genome-wide association study; HLA: human leukocyte antigen; ICAM-1: intercellular adhesion molecule 1; ILC3: innate lymphoid cell type 3; IL: interleukin; IP-10: interferon-γ-induced protein 10; MAIT: mucosal-associated invariant T cell; MIP: macrophage inflammatory protein; PET: positron emission tomography; PsA: psoriatic arthritis; PsO: psoriasis; TEM: T effector memory cell; TNF: tumour necrosis factor.

Table II. Clinical, imaging, and lifestyle determinants of progression from psoriasis to psoriatic arthritis.

Domain	Risk factor(s)	Timeframe	Key implication	Refs.
Cutaneous phenotype	Nail (pitting, onychopathy), scalp, inverse PsO, high PASI, severe skin disease	Medium-long term	Defines "PsO at higher risk of PsA"; marks chronic cutaneous inflammation preceding joint involvement	9, 10, 17, 45, 46
Musculoskeletal signs	Arthralgia, morning stiffness, enthesopathy, musculoskeletal pain	Short term (<2 y)	Predicts imminent transition; precedes overt synovitis	9, 10, 48, 50, 52
Imaging biomarkers	Subclinical enthesitis or synovitis (US/MRI)	Short term (<2 y)	Identifies pre-clinical inflammation; enables intensified surveillance	9
Family history	First-degree relative with PsA	Medium-long term	Genetic predisposition; amplifies baseline risk	9, 17
Age of onset	Early PsO onset	Medium-long term	Linked to faster progression and distinct early phenotypes	47–51
Therapy-related	Biologic DMARD or systemic therapy exposure	Short (≤1 y) / Medium (≤5 y)	Reflects severe skin disease or immune modulation affecting PsA risk	52
Comorbidity burden	≥2 chronic comorbidities	Medium-long term	Indicates systemic inflammation; independent predictor of PsA onset	59
Obesity	BMI ≥30 kg/m^2	Medium-long term	Modifiable factor; adipose inflammation increases – weight loss reduces – PsA risk	60–64
Lifestyle factors	Alcohol use; tobacco ('smoking paradox')	Uncertain	Associations inconsistent; moderate alcohol slightly ↑ risk; smoking effect variable by population	64–67

BMI: Body Mass Index; DMARD: disease-modifying anti-rheumatic drug; MRI: magnetic resonance imaging; PASI: Psoriasis Area and Severity Index; PsA: psoriatic arthritis; PsO: psoriasis; US: ultrasound.

substantially decreases PsA incidence in metabolically active PsO (59-64). Associations with alcohol and tobacco use remain inconsistent, and the 'smoking paradox' unresolved (64-67). Nonetheless, smoking cessation mitigates systemic inflammation and enhances TNF-inhibitor responsiveness, whereas excessive alcohol consumption aggravates PsA activity (60-64, 67).

Collectively, these insights emphasise the need for integrated, multimodal precision assessment tools that merge clinical phenotypes, imaging biomarkers, genetics, and lifestyle factors, thereby enabling timely identification and tailored preventive strategies during the critical PsO-PsA transition period. Table II categorises clinical, imaging, genetic and lifestyle factors that stratify PsO patients by their risk of developing PsA.

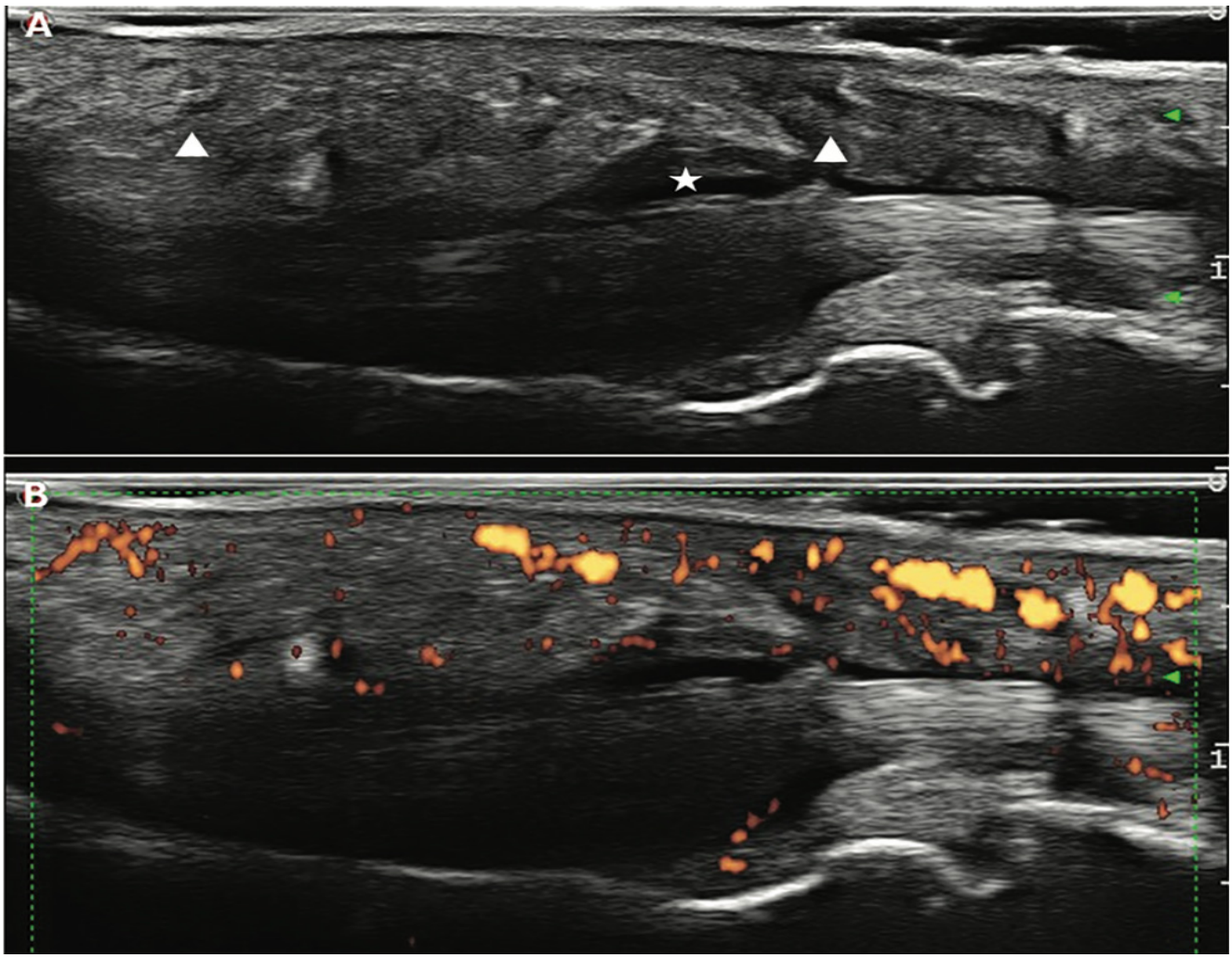

Fig. 1. Longitudinal ultrasound assessment of early hand dactylitis in a psoriasis patient.
A: Grey-scale imaging demonstrates fusiform enlargement of the flexor tendon sheath (*) associated with peritendinous soft-tissue oedema (arrowheads) and preservation of articular contours, indicating isolated tenosynovitis in the absence of synovial hypertrophy or effusion.
B: Power-Doppler imaging of the same digit reveals a subcutaneous and peritendinous vascular signal (dashed box) consistent with active tenosynovial inflammation. The absence of joint-space involvement confirms an extracapsular process characteristic of the earliest inflammatory stage of psoriatic dactylitis. This pattern exemplifies the subclinical phase of the PsO-PsA continuum, in which localised tendon-sheath inflammation precedes overt synovitis.

Clinical and diagnostic challenges in at-risk and subclinical PsA

Recognising PsA in its preclinical or subclinical phases remains challenging. In the absence of specific symptoms or biomarkers, ultrasound (US) and magnetic resonance imaging (MRI) are pivotal for detecting synovio-entheseal inflammation before clinical arthritis emerges (68, 69).

- *Clinical aspects of at-risk, subclinical and early PsA*

Dactylitis is uncommon in subclinical disease but, when present in about 10% of patients, usually heralds the transition to overt PsA (70) (Fig. 1). Symptomatic enthesopathy, typically at the plantar fascia, Achilles tendon, or patellar ligament, marks progression from immune priming to clinical inflammation; US and MRI can detect these changes before pain or swelling develops (Fig. 2) (70-73). Nail disease requires focused surveillance, as distal interphalangeal (DIP) arthritis occurs in about 15% of PsO patients with onychopathy, confirming the nail–joint pathogenic continuum. (74, 75).

Mono- oligo-arthralgia without swelling may precede PsA, warranting targeted imaging to unveil subclinical disease (10, 76-79). Axial disease occurs in <5% of incident cases, yet MRI can reveal occult sacroiliac or spinal inflammation, especially in young men with PsO, well before symptoms emerge (80-82).

- *Differential diagnosis*

Musculoskeletal pain in early PsA often mimics more common rheumatic disorders, complicating attribution. In PsO patients or first-degree relatives of affected individuals, persistent arthralgia warrants exclusion of osteoarthritis, rheumatoid arthritis (RA), gout, or fibromyalgia (83-85). Power-Doppler US and MRI can distinguish enthesitis, bone-marrow oedema, and peritendinous inflammation from alternative pathologies (83-85). Ancillary clues, nail pitting, anterior uveitis, IBD, mild CRP elevation, and HLA-B27 or HLA-C*06

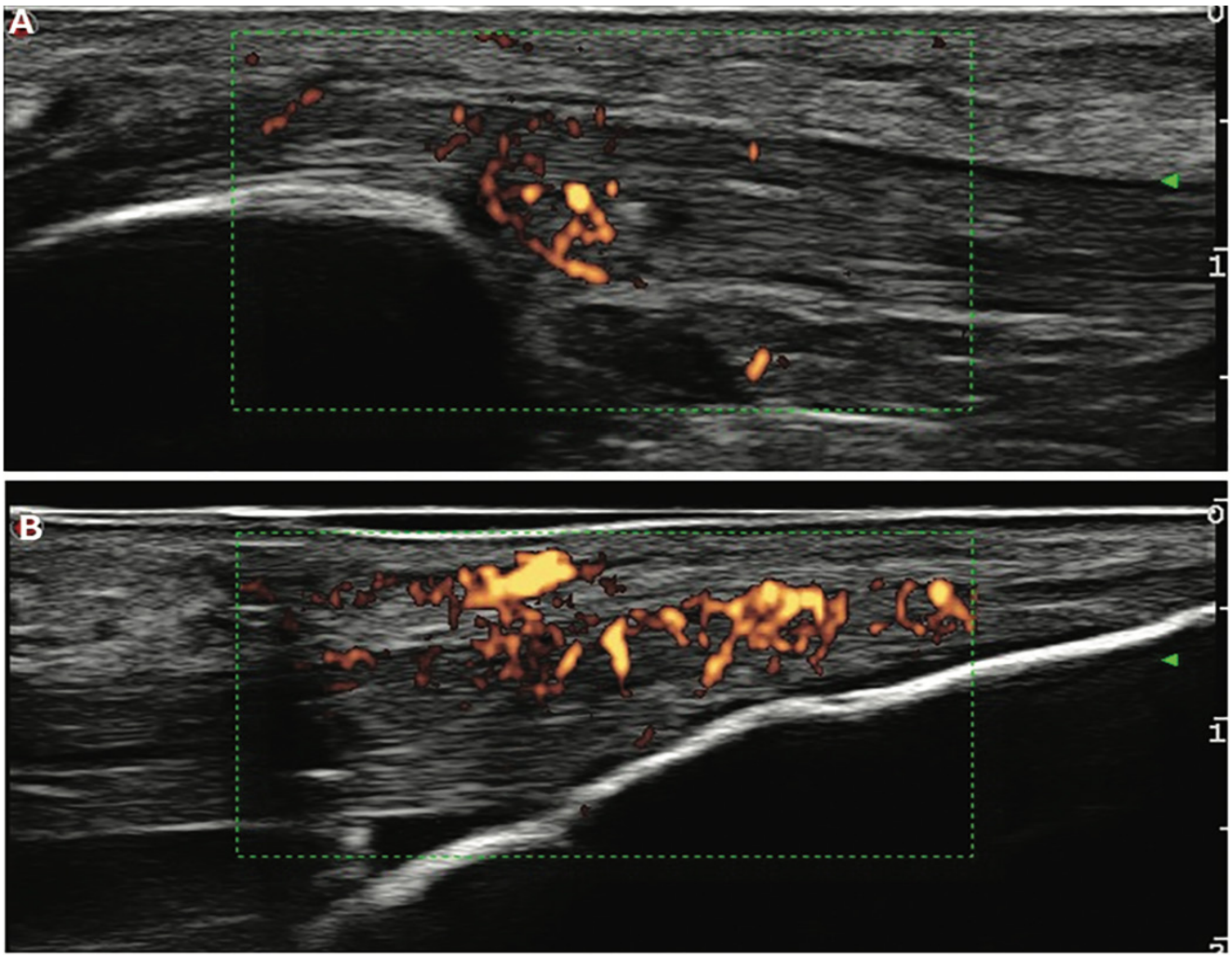

Fig. 2. Power-Doppler ultrasonography of proximal and distal patellar entheses in a patient with psoriasis.
Longitudinal scans demonstrate mild thickening of the patellar tendon insertion both at the quadriceps attachment to the superior pole of the patella (**A**) and at the distal insertion onto the tibial tuberosity (**B**). In both sites, Doppler signal extends within 2 mm of the cortical bone margin (dashed boxes), indicating active microvascular inflammation consistent with early enthesitis. Absence of cortical erosions or enthesophytes distinguishes this pattern from chronic entheseal remodelling.

carriage, increase pre-test probability, while RF or ACPA positivity favours RA (80-82, 86-89). The CASPAR criteria retain high sensitivity and specificity (≈91% and 99%) once inflammation is clinically evident but are not designed to detect at-risk or subclinical PsA (11, 90-93).

- Emerging biomarkers

Elevated hsCRP, calprotectin (S100A8/A9), serum amyloid A, and cytokine-angiokine signatures (IL-1, IL-12p40, IL-15, IFN-α, CCL-3, VEGF, angiopoietin-2) precede erosive PsA (94). Genetic risk, particularly loss of HLA-C06:02 and gain of HLA-B27/B38/B08, predicts entheseal inflammation and conversion within two years; variants in IL23R, IL23A, LCE3D, NFKBIL1, IL13 correlate with early polyarticular phenotypes (95, 96).

- Integrated interception strategy

PsA rarely presents *de novo*; it usually evolves after a 3- to 10-year subclinical interval following cutaneous PsO. Exploiting this window demands dermatology-led risk stratification combined with targeted musculoskeletal imaging for early rheumatology referral (97-101). High-risk features, severe, nail, scalp, or inverse PsO; obesity; uveitis; or IBD, should prompt intensified screening (102-104).

Five validated screening tools facilitate PsA surveillance in dermatologic practice. PEST offers rapid screening with high sensitivity (94%) and moderate specificity (78%) (105-109), while EARP provides the greatest diagnostic accuracy across PsO cohorts (110). PASE integrates symptom and functional domains (111, 112), ToPAS-2 captures axial and nail disease with maximal sensitivity (113), and PURE-4 serves as a concise rheumatology referral instrument (114). Comparative studies show context-dependent performance, with EARP most accurate overall and ToPAS-2 optimal for early, multisite disease (115-118).

- Composite measures and treat-to-target

Comprehensive early assessment should integrate joints, entheses, digits, axial disease, skin, nails, and PROs. Minimal Disease Activity (MDA) provides a unified treat-to-target (T2) framework,

applicable even at the subclinical/early interface (119-127). The TICOPA trial demonstrated that MDA-guided tight control within the first disease year significantly outperformed usual care, validating composite metrics as pivotal tools for precision interception in the PsO-PsA transition (128, 129).

A focus on imaging modalities in at-risk, subclinical and early PsA: implications for precision medicine

- Radiography: structural benchmarks and prognostic value

Conventional radiography, though limited to detecting established damage, remains an essential structural benchmark in early PsA evaluation. Baseline erosions, high CRP, dactylitis, and polyarticular onset predict rapid radiographic progression, particularly in men (130-132). Data from the SpARRO cohort demonstrate that erosions can appear within months of symptom onset, emphasising that even short diagnostic delays may permit irreversible injury (132). Despite lower sensitivity for early inflammation compared with US, radiography captures a broader range of erosive changes and retains strong prognostic value as a precision stratification tool. Longitudinal registry data corroborate its role in identifying patients at risk for progression, linking male sex, early erosions, and persistent inflammation to structural worsening, while remission or minimal disease activity mitigate damage (133-135).

- Ultrasonography and magnetic resonance imaging: detecting the subclinical and early disease

High-resolution imaging has become indispensable for intercepting PsA at its earliest stages. In PsO patients with heightened risk, those with nail, scalp, or inverse disease, a family history, or elevated screening scores, US and MRI reveal subclinical synovio-entheseal inflammation, refining diagnostic certainty and enabling stage-specific risk profiling (9, 10). In symptomatic PsO, Doppler-detected vascularity, synovial hypertrophy, and entheseal hypoechogenicity predict progression from subclinical inflammation to overt PsA (136-138). US quantifies inflammatory and structural changes, offering objective metrics for precision stratification and targeted intervention. Elevated Doppler scores, vascularised enthesitis, and high GUESS indices signal accelerated structural damage, positioning US as a key triage modality in the at-risk phase (139-145). By resolving phase-specific dactylitic and entheseal pathology, US differentiates acute extracapsular tenosynovitis and peri-digital oedema from chronic synovitis, supporting timely rheumatologic referral (146-148). Core sonographic markers, hypoechogenicity, increased entheseal thickness, and Doppler activity at tendon insertions, provide high diagnostic accuracy for early enthesitis, further enhanced by high-frequency imaging that visualises subtle nail and enthesis changes and refines detection of subclinical inflammation (53, 149-153).

MRI detects subclinical synovitis, enthesitis, and tenosynovitis in nearly half of PsO patients without clinical arthritis, identifying key predictors of PsA progression (154-156). Studies employing high-resolution MRI demonstrate a high prevalence of extracapsular inflammation, specifically flexor tenosynovitis, soft tissue oedema, and subclinical entheseal involvement, even in asymptomatic PsO patients, thus underlining MRI's prognostic value (157-159). Furthermore, MRI-based identification of subclinical joint inflammation in PsO patients significantly predicts progression to overt PsA, particularly when associated with arthralgia (155). When integrated with US, phenotypic risk factors, and serologic markers, MRI enables precise stratification along the PsO-PsA continuum and guides pre-emptive, precision-based intervention (160, 161). The integration of both modalities within dermatology-led surveillance frameworks, especially for PsO patients with arthralgia, enhances the granularity of PsA risk assessment and supports anticipatory therapeutic strategies aligned with precision medicine (139, 140, 143).

Treating the PsO-PsA transition: towards precision interception

- Rationale for early intervention

Emerging evidence supports a progressive shift from reactive management of established PsA toward earlier, risk-adapted intervention during its biologically active preclinical and subclinical phases (162, 163). Drawing on the 'window of opportunity' paradigm established in rheumatoid arthritis, timely therapeutic engagement may recalibrate immune activation and delay the onset of clinical arthritis, although confirmatory prevention trials are still required (164-166).

In line with this concept, GRAPPA and ACR/NPF frameworks emphasise domain-specific, treat-to-target (T2T) strategies, endorsing individualised early use of TNF, IL-17, IL-23, or JAK inhibitors according to disease domain and safety profile (167, 168). Within psoriatic disease, genetic predisposition, cytokine dysregulation, arthralgia, and subclinical US/MRI inflammation define a biologically active transition phase that may represent an actionable therapeutic window (9).

Notably, this PsO-PsA transitional stage often coexists with cardiometabolic and neuropsychiatric comorbidities, reinforcing the need for multidisciplinary surveillance and early intervention (169-171). Observational studies consistently show that shorter disease duration correlates with improved outcomes, while structured tight-control strategies, as demonstrated in TICOPA, enhance long-term efficacy and cost-effectiveness across the psoriatic disease spectrum (172-175).

- Conventional synthetic DMARDs

Among conventional synthetic agents, methotrexate (MTX) remains the most widely used in PsA, yet its role in at-risk or subclinical interception remains uncertain. Meta-analyses and registry studies show at best modest improvements in peripheral joint symptoms and physician-reported outcomes, with little effect on enthesitis, dactylitis, or radiographic progression (176-180).

Observational cohorts further reveal low remission rates and persistent IL-23/IL-10 pathway activation under MTX monotherapy, suggesting limited capacity to modify early immunopathogenesis (181, 182). In methotrexate-naive PsA, the RESPOND trial demonstrated that combination therapy with

Table III. Landmark clinical studies of biologic DMARDs informing precision interception across the psoriasis-psoriatic arthritis continuum.

Study / year / ref.	Population / Disease phase	Intervention (*vs*. Comparator)	Main outcomes	Early-phase implication
TICOPA 2015 (174)	Early PsA (<24 mo)	Tight-control T2T (cs/bDMARD escalation) *vs*. usual care	↑ ACR20 (61.8% *vs*. 44.6%); better PASI and HAQ	Treat-to-target within first year improves clinical outcomes
RESPOND 2012 (183)	MTX-naive early PsA	Infliximab + MTX *vs*. MTX	ACR20 86.3% *vs*. 66.7% (16 wk) + faster joint/skin control	Early biologic intensification outperforms MTX monotherapy
CRESPA 2017 (187)	Very-early peripheral SpA (≤12 wk)	Golimumab *vs*. placebo (24 wk)	75% *vs*. 20% stringent remission	Early TNF blockade prevents chronic inflammation
van Mens 2019 (194)	Untreated active PsA (≥3 swollen + 3 tender joints)	Golimumab + MTX *vs*. MTX	81% *vs*. 42% DAS remission (22 wk); superior MDA rates	Combination first-line therapy maximises disease control
Kingsley 2012 & Cochrane 2019 (179-180)	Active early PsA	MTX ≤15 mg/wk *vs*. placebo	Modest joint response over 6 mo	Limited efficacy of MTX monotherapy in early PsA
EARLY-PsA Registry 2017 (188)	PsA treated with adalimumab (ADA) ≥3 mo	Early ADA (<5 y) *vs*. delayed	Faster DAS28 and PsARC improvement; ↓ swollen joints	Supports 'earlier-is-better' for TNF blockade
Gisondi 2022 & Floris 2025 (189-190)	Plaque PsO without arthritis	Continuous biologics *vs*. topical/phototherapy	HR 0.27 for incident PsA; 8.9% *vs*. 26.1% prevalence	Systemic biologics may delay transition when used for PsO
Savage 2019 (197)	PsO + subclinical enthesitis	Ustekinumab (open-label)	Regression of MRI/US enthesitis	Enthesitis may be immunologically reversible pre-PsA
Kampylafka 2020 (196)	Very-early *vs*. established PsA	Secukinumab	Shift from stage- to response-based molecular clusters	IL-17 blockade reprogrammes early immune networks
Singla 2023 (198)	US claims PsO cohort	IL-12/23 or IL-23 inhibitors *vs*. TNFi	Lower HR for inflammatory arthritis onset	Upstream cytokine targeting may confer preventive advantage
DISCOVER-2 post-hoc 2024 (199)	Active PsA on guselkumab	Week-8 clinical responders *vs*. non-responders	Early response →↓ radiographic progression (100 wk)	Timely IL-23 inhibition limits structural damage
Piaserico 2025 (191)	Severe PsO without PsA	TNFi *vs*. nbUVB (propensity-matched)	HR 0.32 for PsA incidence (1.18 *vs*. 2.48 IR/100 PY)	TNFi significantly reduces PsA risk in high-risk PsO

ACR: American College of Rheumatology; ADA: adalimumab; bDMARD: biologic disease-modifying anti-rheumatic drug; csDMARD: conventional synthetic disease-modifying anti-rheumatic drug; DAS: Disease Activity Score; DMARD: disease-modifying anti-rheumatic drug; HAQ: Health Assessment Questionnaire; HR: hazard ratio; IL: interleukin; IR: inadequate responder; MDA: Minimal Disease Activity; MRI: magnetic resonance imaging; MTX: methotrexate; PASI: Psoriasis Area and Severity Index; PsA: psoriatic arthritis; PsO: psoriasis; PsARC: Psoriatic Arthritis Response Criteria; RCT: randomised controlled trial; SpA: spondyloarthritis; T2T: treat-to-target; TNF: tumour necrosis factor.

infliximab and methotrexate yielded superior outcomes compared with methotrexate monotherapy, achieving ACR20 responses of 86% *vs*. 67% and PASI75 improvements of 97% *vs*. 54% at 16 weeks (183). These findings confirmed MTX intrinsic efficacy as a csDMARD anchor while underscoring the additive benefit of early TNF inhibition in achieving multidomain disease control.

In early PsA, the TICOPA study established that tight-control management with rapid methotrexate escalation to 25 mg per week significantly improved joint and skin outcomes compared with standard care, independent of biologic exposure. Responses were dose- and protocol-dependent, supporting methotrexate as an effective csDMARD anchor, albeit constrained by tolerability and cost-effectiveness considerations (184). In the 12-week TICOPA methotrexate subanalysis, 40.8% of patients achieved ACR20 and 22.4% attained minimal disease activity, with notable improvements in dactylitis, enthesitis, and psoriasis. Higher methotrexate doses (>15 mg per week) correlated with enhanced responses, suggesting a dose-response effect despite the open-label design (185).

At approximately five years post-trial, long-term follow-up showed convergence between the tight-control and standard-care arms, with comparable rates of low disease activity (69% *vs*. 76%) and biologic use (54% *vs*. 52%), while methotrexate utilisation declined in both groups. The initial advantage of intensive treat-to-target management was not sustained once protocolised follow-up ended, highlighting the need to define durable csDMARD strategies and optimise the timing of biologic escalation (186).

Collectively, these data substantiate the short-term efficacy of csDMARD-based approaches, particularly methotrexate, in early PsA, while suggesting that sustained remission and long-term disease modification may require continued monitoring and, in selected patients, timely transition beyond conventional therapy.

- Biologic DMARDs: mechanism-based tools for precision interception

Biologic DMARDs (bDMARDs) targeting TNF, IL-17A/F, or the IL-23/Th17 axis are the most promising mech-

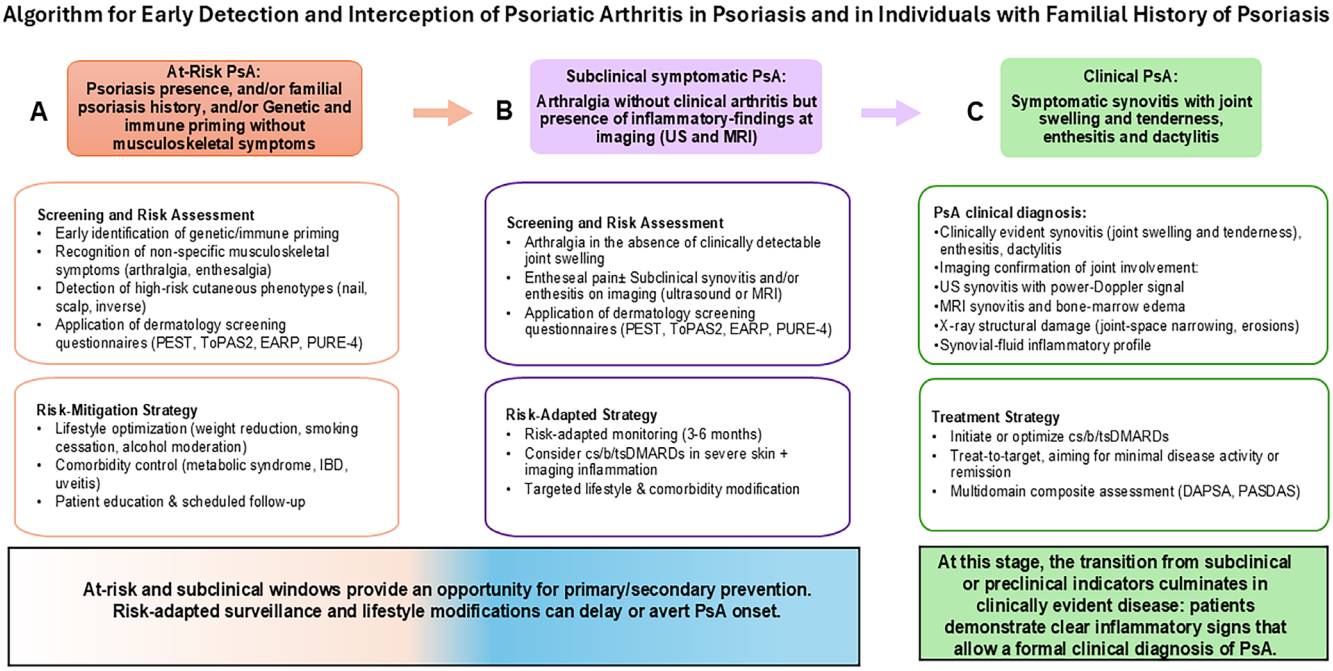

Fig. 3. Three-stage algorithm for early detection and interception of psoriatic arthritis (PsA) along the psoriasis-PsA continuum.
Stages **A**-**B** represent critical windows for primary and secondary prevention, during which risk-adapted surveillance and targeted lifestyle or pharmacologic interventions may avert or delay progression to clinically overt PsA (Stage C).
Stage **A** (Preclinical/At-Risk): Individuals with psoriasis or a family history of PsA, carrying genetic or immunologic susceptibility but no musculoskeletal symptoms. Screening is based on high-risk cutaneous phenotypes (nail, scalp, inverse psoriasis) and validated questionnaires (PEST, ToPAS2, EARP, PURE-4). Management focuses on lifestyle modification (weight reduction, smoking cessation, metabolic control) and scheduled follow-up.
Stage **B** (Subclinical Symptomatic): New-onset arthralgia or enthesalgia without objective swelling but with imaging evidence of inflammation on ultrasound or MRI. Risk-adapted monitoring every 3–6 months and early DMARD or biologic therapy may be considered in cases with severe skin disease and imaging-confirmed synovitis or enthesitis.
Stage **C** (Clinical PsA): Synovitis, enthesitis, or dactylitis confirmed by clinical examination and imaging (power-Doppler, MRI, x-ray). Management follows a treat-to-target approach using cs/b/tsDMARDs, guided by composite indices (DAPSA, PASDAS).
The algorithm integrates familial history, skin phenotype, symptom screening, targeted imaging, and timely rheumatology referral, providing an operational framework for precision interception in psoriatic disease.

anism-based candidates for PsA interception. Observational studies suggest that these agents may delay or attenuate PsA onset by controlling subclinical inflammation, although randomised trials specifically addressing preclinical or subclinical phases remain lacking (187). Several longitudinal cohorts support the concept that early biologic therapy in moderate-to-severe PsO can modify disease trajectory. In the Reuma.pt EARLY-PsA cohort, adalimumab initiated within five years of symptom onset achieved faster and more durable responses, enhanced by csDMARDs but not glucocorticoids (188).

In a referral cohort of 203 PsO patients, systemic therapy, particularly bDMARDs, was linked to a three- to four-fold reduction in incident PsA compared with topical or no treatment, though a residual prevalence of about 40% indicates partial but incomplete disease interception (176).

Continuous biologic therapy has been associated with a markedly lower risk of PsA development: Gisondi *et al.* reported reduced incidence *vs.* UVB phototherapy (HR 0.27) (189), corroborated by a monocentric cohort showing lower PsA prevalence in biologic-exposed *vs.* biologic-naive patients (8.9% *vs.* 26.1%) across TNF, IL-17, and IL-23 inhibitors (190). A decade-long propensity-matched analysis confirmed sustained protection with TNF blockade (HR 0.32; $p<0.0001$), while arthralgia, nail disease, and higher PASI independently predicted PsA onset. (191).

Early biologic intervention yields superior clinical and molecular outcomes. In early PsA (<12 months), TNF inhibitors rapidly improved joint and skin indices with high tolerability (192), and etanercept initiated within two years achieved greater symptom and quality-of-life gains (193). Golimumab plus MTX induced remission in 81% of patients *vs.* 42% with MTX alone (194), while early DAS28-CRP response to Certolizumab predicted later MDA achievement (195). Stage-dependent efficacy is evident: secukinumab reprogrammed immune clusters toward response-based phenotypes (196), and ustekinumab reversed subclinical enthesitis in PsO without arthritis, underscoring the reversibility of early inflammatory changes (197).

Large-scale cohort data suggest that IL-23 blockade (IL-12/23 or IL-23 inhibitors) may confer superior protection against inflammatory arthritis compared with TNF inhibition, although residual confounding persists (198). In DISCOVER-2, guselkumab sustained long-term radiographic benefit, particularly among early clinical responders (199). While JAK inhibitors demonstrate robust efficacy in established PsA, their interceptive potential remains untested. Meta-analyses indicate higher remission and persistence rates in bDMARD-

naive *vs*. TNF-experienced patients, emphasising the value of early, targeted immune modulation (200). The absence of biomarker-stratified prevention trials remains a critical unmet need.

Table III summarises the key clinical studies of bDMARDs that inform precision-interception strategies across the Pso-PsA continuum.

Conclusion: reframing PsA through temporal stratification and precision interception

This review supports the evolution of a precision-medicine framework for PsA interception, premised on the integration of molecular, imaging, and clinical dimensions to enable earlier, mechanism-based intervention. Converging evidence now positions PsA as the clinical culmination of a biologically active continuum that begins in genetically primed individuals with PsO and progresses through defined preclinical and subclinical phases (201-204).

As summarised in Figure 3, a pragmatic framework for precision interception across the PsO-PsA spectrum integrates multidisciplinary care and risk-adapted assessment. Dermatology-rheumatology collaboration through joint clinics facilitates timely evaluation of PsO patients with musculoskeletal manifestations. In the preclinical stage, stratification should incorporate clinical phenotype (nail, scalp, or inverse PsO), family history, polygenic risk scores, and serologic biomarkers such as hs-CRP. Building on the foundations laid by EULAR (9, 10) and GRAPPA (167), our framework complements these initiatives by outlining preliminary, measurable transition thresholds and integrated assessment pathways that could inform future PsA interception studies.

PsA evolves along a staged cutaneous-articular continuum, offering a window in which risk can be quantified and inflammation intercepted before overt arthritis develops. A precision framework linking genetic and cytokine signatures with standardised screening and high-resolution imaging may enable earlier, mechanism-based prevention (201-204). Operationalising this approach will require harmonised referral criteria, integrated prediction tools, and coordinated dermatology-rheumatology pathways. Early observational data suggest that targeted biologic therapy and structured lifestyle modification may attenuate transition in selected high-risk patients, but biomarker-enriched, randomised prevention trials remain essential. With such validation, PsA interception could advance from theoretical construct to clinical reality, transforming outcomes from inevitable progression to preventable disease.

Competing interests

M. Megna has acted as a speaker or scientific consultant for Amgen, Abbvie, Almirall, UCB, Novartis, Leo Pharma, Eli Lilly, Janssen, Bristol Myers Squibb. The other authors have declared no competing interests.

References

1. MERIDOR K, HARRISON SR, DE MARCO G *et al*.: Similar rates of new psoriatic arthritis diagnoses in a dedicated psoriatic disease triage clinic, regardless of referral route. *Rheumatol Adv Pract* 2025; 9(3): rkaf091. https://doi.org/10.1093/rap/rkaf091
2. ALINAGHI F, CALOV M, KRISTENSEN LE *et al*.: Prevalence of psoriatic arthritis in patients with psoriasis: a systematic review and meta-analysis of observational and clinical studies. *J Am Acad Dermatol* 2019; 80(1): 251-65.e19. https://doi.org/10.1016/j.jaad.2018.06.027
3. OCAMPO DV, GLADMAN D: Psoriatic arthritis. *F1000Res* 2019;8: F1000 Faculty Rev-1665. https://doi.org/10.12688/f1000research.19144.1
4. HIOKI T, KOMINE M, OHTSUKI M: Diagnosis and intervention in early psoriatic arthritis. *J Clin Med* 2022; 11(7): 2051. https://doi.org/10.3390/jcm11072051
5. MAHMOOD F, COATES LC, HELLIWELL PS: Current concepts and unmet needs in psoriatic arthritis. *Clin Rheumatol* 2018; 37(2): 297-305. https://doi.org/10.1007/s10067-017-3908-y
6. CASO F, COSTA L, MEGNA M *et al*.: Early psoriatic arthritis: clinical and therapeutic challenges. *Expert Opin Investig Drugs* 2024; 33(9): 945-65. https://doi.org/10.1080/13543784.2024.2383421
7. PEREZ-CHADA LM, HABERMAN RH, CHANDRAN V *et al*.: Consensus terminology for preclinical phases of psoriatic arthritis for use in research studies: results from a Delphi consensus study. *Nat Rev Rheumatol* 2021; 17(4): 238-43. https://doi.org/10.1038/s41584-021-00578-2
8. LÓPEZ-MEDINA C, MCGONAGLE D, GOSSEC L: Subclinical psoriatic arthritis and disease interception-where are we in 2024? *Rheumatology* (Oxford) 2025; 64(1): 56-64. https://doi.org/10.1093/rheumatology/keae399
9. ZABOTTI A, DE MARCO G, GOSSEC L *et al*.: EULAR points to consider for the definition of clinical and imaging features suspicious for progression from psoriasis to psoriatic arthritis. *Ann Rheum Dis* 2023; 82(9): 1162-70. https://doi.org/10.1136/ard-2023-224148
10. DE MARCO G, ZABOTTI A, BARALIAKOS X *et al*.: Characterisation of prodromal and very early psoriatic arthritis: a systematic literature review informing a EULAR taskforce. *RMD Open* 2023; 9(2): e003143. https://doi.org/10.1136/rmdopen-2023-003143
11. TAYLOR W, GLADMAN D, HELLIWELL P *et al*.; CASPAR Study Group: Classification criteria for psoriatic arthritis: development of new criteria from a large international study. *Arthritis Rheum* 2006; 54(8): 2665-73. https://doi.org/10.1002/art.21972
12. GARCIA-SALINAS R, MAGRI S, MARECO J *et al*.: Arthralgia with risk of progression to psoriatic arthritis: role of clinical assessments and ultrasound as prognostic factors. *Rheumatology* (Oxford) 2025; 64(5): 2550-56. doi: 10.1093/rheumatology/keae562
13. WU D, GRIFFITH JF, LAM SHM *et al*.: Progressive structural bone changes and their relationship with treatment in patients with psoriatic arthritis: a longitudinal HR-pQCT study. *Arthritis Res Ther* 2019; 21(1): 265. https://doi.org/10.1186/s13075-019-2043-3
14. WITTE T, MINOPOULOU I, DRZENIEK NM *et al*.: Advances in precision medicine in imaging and therapeutic strategies for psoriatic disease. *Autoimmun Rev* 2025; 24(8): 103839. https://doi.org/10.1016/j.autrev.2025.103839
15. ERMANN J: Rethinking spondyloarthritis: beyond lumping and splitting. *Curr Opin Rheumatol* 2025; 37(4): 207-14. https://doi.org/10.1097/bor.0000000000001094.
16. COLINA M, CAMPANA G: Precision medicine in rheumatology: the role of biomarkers in diagnosis and treatment optimization. *J Clin Med* 2025; 14(5): 1735. https://doi.org/10.3390/jcm14051735.
17. SCHER JU, OGDIE A, MEROLA JF, RITCHLIN C: Preventing psoriatic arthritis: focusing on patients with psoriasis at increased risk of transition. *Nat Rev Rheumatol* 2019; 15(3): 153-66. https://doi.org/10.1038/s41584-019-0175-0
18. SNOECK HENKEMANS SVJ, DE JONG PHP, LUIME JJ *et al*.: Window of opportunity in psoriatic arthritis: the earlier the better? *RMD Open* 2024; 10(1): e004062. https://doi.org/10.1136/rmdopen-2023-004062
19. SONG K, WEBB L, EDER L *et al*.: Screening and referral strategies for the early recognition of psoriatic arthritis among patients with psoriasis: results of a GRAPPA survey. *J Rheumatol* 2023; 50(11): 1439-45. https://doi.org/10.3899/jrheum.2023-0424
20. FUCHS F, MORF H, MOHN J *et al*.: Diagnostic delay stages and pre-diagnostic treatment in patients with suspected rheumatic diseases before special care consultation: results of a multicenter-based study. *Rheumatol Int* 2023; 43(3): 495-502. https://doi.org/10.1007/s00296-022-05223-z
21. GOSSEC L, KERSCHBAUMER A, FERREIRA RJO *et al*.: EULAR recommendations for the management of psoriatic arthritis with pharmacological therapies: 2023 update. *Ann Rheum Dis* 2024; 83(6): 706-19. https://doi.org/10.1136/ard-2024-225531

22. NAJM A, GOODYEAR CS, MCINNES IB, SIEBERT S: Phenotypic heterogeneity in psoriatic arthritis: towards tissue pathology-based therapy. *Nat Rev Rheumatol* 2023; 19(3): 153-65. https://doi.org/10.1038/s41584-022-00874-5
23. SOOMRO M, HUM R, BARTON A, BOWES J: Genetic studies investigating susceptibility to psoriatic arthritis: a narrative review. *Clin Ther* 2023; 45(9): 810-15. https://doi.org/10.1016/j.clinthera.2023.07.003
24. EDER L, CHANDRAN V, PELLET F *et al*.: Human leucocyte antigen risk alleles for psoriatic arthritis among patients with psoriasis. *Ann Rheum Dis* 2012; 71(1): 50-55. https://doi.org/10.1136/ard.2011.155044
25. QUEIRO R, TORRE JC, GONZÁLEZ S *et al*.: HLA antigens may influence the age of onset of psoriasis and psoriatic arthritis. *J Rheumatol* 2003; 30(3): 505-7.
26. SCHNEEBERGER EE, CITERA G, RODRÍGUEZ GIL G *et al*.: Clinical and immunogenetic characterization in psoriatic arthritis patients. *Clin Rheumatol* 2015; 34(8): 1413-8. https://doi.org/10.1007/s10067-014-2739-3
27. KARASON A, LOVE TJ, GUDBJORNSSON B: A strong heritability of psoriatic arthritis over four generations - the Reykjavik Psoriatic Arthritis Study. *Rheumatology* (Oxford) 2009; 48(11): 1424-28. https://doi.org/10.1093/rheumatology/kep243
28. STUART PE, NAIR RP, TSOI LC *et al*.: Genome-wide association analysis of psoriatic arthritis and cutaneous psoriasis reveals differences in their genetic architecture. *Am J Hum Genet* 2015; 97(6): 816-36. https://doi.org/10.1016/j.ajhg.2015.10.019
29. SHI C, RATTRAY M, BARTON A *et al*.: Using functional genomics to advance the understanding of psoriatic arthritis. *Rheumatology* (Oxford) 2020; 59(11): 3137-46. https://doi.org/10.1093/rheumatology/keaa283
30. CASO F, COSTA L, CHIMENTI MS *et al*.: Pathogenesis of psoriatic arthritis. *Crit Rev Immunol* 2019; 39(5): 361-77. https://doi.org/10.1615/critrevimmunol.2020033243
31. GURKE R, BENDES A, BOWES J *et al*.; HIPPOCRATES CONSORTIUM: Omics and multi-omics analysis for the early identification and improved outcome of patients with psoriatic arthritis. *Biomedicines* 2022; 10(10): 2387. https://doi.org/10.3390/biomedicines10102387
32. CUTHBERT RJ, FRAGKAKIS EM, DUNSMUIR R *et al*.: Brief report: Group 3 innate lymphoid cells in human enthesis. *Arthritis Rheumatol* 2017; 69(9): 1816-22. https://doi.org/10.1002/art.40150
33. CUTHBERT RJ, WATAD A, FRAGKAKIS EM *et al*.: Evidence that tissue resident human enthesis γδT-cells can produce IL-17A independently of IL-23R transcript expression. *Ann Rheum Dis* 2019; 78(11): 1559-65. https://doi.org/10.1136/annrheumdis-2019-215210
34. BRIDGEWOOD C, WATAD A, RUSSELL T *et al*.: Identification of myeloid cells in the human enthesis as the main source of local IL-23 production. *Ann Rheum Dis* 2019; 78(7): 929-33. https://doi.org/10.1136/annrheumdis-2018-214944
35. ROSINE N, ROWE H, KOTURAN S *et al*.: Characterization of blood mucosal- associated invariant t cells in patients with axial spondyloarthritis and of resident mucosal-associated invariant t cells from the axial entheses of non-axial spondyloarthritis control patients. *Arthritis Rheumatol* 2022; 74(11): 1786-95. https://doi.org/10.1002/art.42090
36. WATAD A, ROWE H, RUSSELL T *et al*.: Normal human enthesis harbours conventional CD4+ and CD8+ T cells with regulatory features and inducible IL-17A and TNF expression. *Ann Rheum Dis* 2020; 79(8): 1044-54. https://doi.org/10.1136/annrheumdis-2020-217309
37. CASO F, SAVIANO A, MARIGLIANO N *et al*.: IL-17A in psoriatic arthritis: mechanistic insights, clinical implications, and advances in therapeutic strategies. *Expert Rev Clin Immunol* 2025; 21(8): 1055-71. https://doi.org/10.1080/1744666x.2025.2522950
38. CASO F, SAVIANO A, TASSO M *et al*.: Analysis of rheumatoid- vs psoriatic arthritis synovial fluid reveals differential macrophage (CCR2) and T helper subsets (STAT3/4 and FOXP3) activation. *Autoimmun Rev* 2022; 21(12): 103207. https://doi.org/10.1016/j.autrev.2022.103207
39. REINHARDT A, YEVSA T, WORBS T *et al*.: IL-23-dependent γ/δ T cells produce interleukin-17 and accumulate in the enthesis, aortic valve, and ciliary body in mice. *Arthritis Rheumatol* 2016; 68(10): 2476-86. https://doi.org/10.1002/art.39732
40. STAVRE Z, BRIDGEWOOD C, ZHOU Q *et al*.: A role for neutrophils in early enthesitis in spondyloarthritis. *Arthritis Res Ther* 2022; 24(1): 24. https://doi.org/10.1186/s13075-021-02693-7
41. CORTE G, ATZINGER A, TEMIZ SA *et al*.: Anatomical pattern of entheseal and synovial fibroblast activation in patients with psoriasis and its risk of developing psoriatic arthritis. *RMD Open* 2024; 10(2): e004294. https://doi.org/10.1136/rmdopen-2024-004294
42. RUSCITTI P, ESPOSITO M, DI COLA I *et al*.: Cytokine profile characterization of naïve patients with psoriasis and psoriatic arthritis: implications for a pathogenic disease continuum. *Front Immunol* 2023; 14: 1229516. https://doi.org/10.3389/fimmu.2023.1229516
43. FIOCCO U, MARTINI V, ACCORDI B *et al*.: Ex vivo signaling protein mapping in T lymphocytes in the psoriatic arthritis joints. *J Rheumatol Suppl* 2015; 93: 48-52. https://doi.org/10.3899/jrheum.150636
44. GRAßHOFF H, COMDÜHR S, NORDING H *et al*.: Transition from psoriasis to psoriatic arthritis is characterized by distinct alterations in peripheral blood Tc17, Th17 and CD4+ TEM cells. *Arthritis Rheumatol* 2025 Sep 16. https://doi.org/10.1002/art.43396
45. ZABOTTI A, GIOVANNINI I, ERRICHETTI E: Predictive and early signs of psoriatic arthritis: a deeper insight based on literature evidence. *Ital J Dermatol Venerol* 2022; 157(6): 530-31. https://doi.org/10.23736/s2784-8671.22.07322-4
46. OGDIE A, GELFAND JM: Clinical risk factors for the development of psoriatic arthritis among patients with psoriasis: a review of available evidence. *Curr Rheumatol Rep* 2015; 17(10): 64. https://doi.org/10.1007/s11926-015-0540-1
47. MEROLA JF, PATIL D, EGANA A *et al*.: Prevalence of musculoskeletal symptoms in patients with psoriasis and predictors associated with the development of psoriatic arthritis: retrospective analysis of a us claims database. *Dermatol Ther* (Heidelb) 2023; 13(11): 2635-48. https://doi.org/10.1007/s13555-023-01025-8
48. BILGIN E, AYDIN SZ, TINAZZI I *et al*.: Disease characteristics of psoriatic arthritis patients may differ according to age at psoriasis onset: cross-sectional data from the Psoriatic Arthritis-International Database. *Clin Exp Rheumatol* 2021; 39(3): 532-36. https://doi.org/10.55563/clinexprheumatol/ert0p7
49. ALONSO S, TEJÓN P, SARASQUETA C *et al*.: Age at disease onset may help to further characterize the disease phenotype in psoriatic arthritis. *Joint Bone Spine* 2016; 83(5): 533-37. https://doi.org/10.1016/j.jbspin.2015.09.004
50. QUEIRO R, ALPERI M, ALONSO-CASTRO S *et al*.: Patients with psoriatic arthritis may show differences in their clinical and genetic profiles depending on their age at psoriasis onset. *Clin Exp Rheumatol* 2012; 30(4): 476-80.
51. PUCHE-LARRUBIA MÁ, LADEHESA-PINEDA L, LÓPEZ-MONTILLA MD *et al*.: Differences between early vs. late-onset of psoriatic arthritis: data from the RESPONDIA and REGISPONSER registries. *Joint Bone Spine* 2023; 90(4): 105563. https://doi.org/10.1016/j.jbspin.2023.105563
52. EDER L, LEE KA, CHANDRAN V *et al*.: Derivation of a multivariable psoriatic arthritis risk estimation tool (PRESTO): a step towards prevention. *Arthritis Rheumatol* 2025; 77(6): 686-95. https://doi.org/10.1002/art.42661
53. RUSCITTI P, ESPOSITO M, GIANNERAMO C *et al*.: Nail and enthesis assessment in patients with psoriatic disease by high frequency ultrasonography: findings from a single-centre cross-sectional study. *Radiol Med* 2022; 127(12): 1400-6. https://doi.org/10.1007/s11547-022-01568-4
54. MESSINA F, VALENTI M, MALAGOLI P *et al*.: Early predictors of psoriatic arthritis: a Delphi-based consensus from Italian dermatology centers. *Ital J Dermatol Venerol* 2022; 157(3): 231-34. https://doi.org/10.23736/S2784-8671.21.07203-0
55. LANGENBRUCH A, RADTKE MA, KRENSEL M *et al*.: Nail involvement as a predictor of concomitant psoriatic arthritis in patients with psoriasis. *Br J Dermatol* 2014; 171(5): 1123-28. https://doi.org/10.1111/bjd.13272
56. WILSON FC, ICEN M, CROWSON CS *et al*.: Incidence and clinical predictors of psoriatic arthritis in patients with psoriasis: a population-based study. *Arthritis Rheum* 2009; 61(2): 233-39. https://doi.org/10.1002/art.24172
57. PATRIZI A, VENTURI M, SCORZONI R *et al*.: Nail dystrophies, scalp and intergluteal/perianal psoriatic lesions: risk factors for psoriatic arthritis in mild skin psoriasis? *G Ital Dermatol Venereol* 2014; 149(2): 177-84.
58. ROUZAUD M, SEVRAIN M, VILLANI AP *et al*.: Is there a psoriasis skin phenotype associated with psoriatic arthritis? Systematic literature review. *J Eur Acad Dermatol Venereol* 2014:28 Suppl 5:17-26.

https://doi.org/10.1111/jdv.12562
59. KARMACHARYA P, CHAKRADHAR R, HULSHIZER CA *et al*.: Multimorbidity in psoriasis as a risk factor for psoriatic arthritis: a population-based study. *Rheumatology* (Oxford) 2025; 64(4): 2199-203. https://doi.org/10.1093/rheumatology/keae040
60. GLADMAN DD, CALLEN JP: Early-onset obesity and risk for psoriatic arthritis. *JAMA* 2010; 304(7): 787-88. https://doi.org/10.1001/jama.2010.1162
61. LI W, HAN J, QURESHI AA: Smoking and risk of incident psoriatic arthritis in US women. *Ann Rheum Dis* 2012; 71(6): 804-8. https://doi.org/10.1136/annrheumdis-2011-200416
62. LOVE TJ, ZHU Y, ZHANG Y, WALL-BURNS L *et al*.: Obesity and the risk of psoriatic arthritis: a population-based study. *Ann Rheum Dis* 2012; 71(8): 1273-77. https://doi.org/10.1136/annrheumdis-2012-201299
63. SOLTANI-ARABSHAHI R, WONG B, FENG BJ *et al*.: Obesity in early adulthood as a risk factor for psoriatic arthritis. *Arch Dermatol* 2010; 146(7): 721-26. https://doi.org/10.1001/archdermatol.2010.141
64. GREEN A, SHADDICK G, CHARLTON R *et al*.; PROMPT study group: Modifiable risk factors and the development of psoriatic arthritis in people with psoriasis. *Br J Dermatol* 2020; 182(3): 714-20. https://doi.org/10.1111/bjd.18227
65. SETTY AR, CURHAN G, CHOI HK: Smoking and the risk of psoriasis in women: Nurses' Health Study II. *Am J Med* 2007; 120(11): 953-59. https://doi.org/10.1016/j.amjmed.2007.06.020
66. EDER L, SHANMUGARAJAH S, THAVANESWARAN A *et al*.: The association between smoking and the development of psoriatic arthritis among psoriasis patients. *Ann Rheum Dis* 2012; 71(2): 219-24. https://doi.org/10.1136/ard.2010.147793
67. NGUYEN UDT, ZHANG Y, LU N *et al*.: Smoking paradox in the development of psoriatic arthritis among patients with psoriasis: a population- based study. *Ann Rheum Dis* 2018; 77(1): 119-23. https://doi.org/10.1136/annrheumdis-2017-211625
68. LANDELLS I, MACCALLUM C, KHRAISHI M: The role of the dermatologist in identification and treatment of the early stages of psoriatic arthritis. *Skin Therapy Lett* 2008; 13(4): 4-7.
69. EDER L, POLACHEK A, ROSEN CF *et al*.: The development of psoriatic arthritis in patients with psoriasis is preceded by a period of nonspecific musculoskeletal symptoms: a prospective cohort study. *Arthritis Rheumatol* 2017; 69(3): 622-29. https://doi.org/10.1002/art.39973
70. BAGEL J, SCHWARTZMAN S: Enthesitis and dactylitis in psoriatic disease: a guide for dermatologists. *Am J Clin Dermatol* 2018; 19(6): 839-52. https://doi.org/10.1007/s40257-018-0377-2
71. ROJAS-VARGAS M, MUÑOZ-GOMARIZ E, ESCUDERO A *et al*.; REGISTRO ESPAÑOL DE ESPONDILOARTRITIS DE LA SOCIEDAD ESPAÑOLA DE REUMATOLOGÍA WORKING GROUP: First signs and symptoms of spondyloarthritis--data from an inception cohort with a disease course of two years or less (REGISPONSER-Early). *Rheumatology* (Oxford) 2009; 48(4): 404-9. https://doi.org/10.1093/rheumatology/ken506
72. TÉVAR-SÁNCHEZ MI, NAVARRO-COMPÁN V, AZNAR JJ *et al*.; ESPERANZA GROUP: Prevalence and characteristics associated with dactylitis in patients with early spondyloarthritis: results from the ESPeranza cohort. *Clin Exp Rheumatol* 2018; 36(5): 879-83.
73. DUBASH S, ALABAS OA, MICHELENA X *et al*.: Dactylitis is an indicator of a more severe phenotype independently associated with greater SJC, CRP, ultrasound synovitis and erosive damage in DMARD-naive early psoriatic arthritis. *Ann Rheum Dis* 2022; 81(4): 490-95. https://doi.org/10.1136/annrheumdis-2021-220964
74. KANE D, STAFFORD L, BRESNIHAN B, FITZGERALD O: A classification study of clinical subsets in an inception cohort of early psoriatic peripheral arthritis - 'DIP or not DIP revisited'. *Rheumatology* (Oxford) 2003; 42(12): 1469-76. https://doi.org/10.1093/rheumatology/keg445
75. GAMONAL SBL, GAMONAL ACC, BRANDÃO MAF *et al*.: Prevalence of psoriatic arthritis among patients with plaque psoriasis: a Brazilian retrospective study. *Sao Paulo Med J* 2021; 139(5): 476-80. https://doi.org/10.1590/1516-3180.2020.0629.16032021
76. ZABOTTI A, DE LUCIA O, SAKELLARIOU G *et al*.: Predictors, risk factors, and incidence rates of psoriatic arthritis development in psoriasis patients: a systematic literature review and meta-analysis. *Rheumatol Ther* 2021; 8(4): 1519-34. https://doi.org/10.1007/s40744-021-00378-w
77. RUDGE A, MCHUGH N, TILLETT W, SMITH T: An interpretable machine learning approach for detecting psoriatic arthritis in a UK primary care psoriasis cohort using electronic health records from the Clinical Practice Research Datalink. *Ann Rheum Dis* 2025; 84(4): 575-83. https://doi.org/10.1016/j.ard.2025.01.051
78. CASO F, COSTA L, ATTENO M *et al*.: Simple clinical indicators for early psoriatic arthritis detection. *Springerplus* 2014; 3: 759. https://doi.org/10.1186/2193-1801-3-759
79. LINDQVIST UR, ALENIUS GM, HUSMARK T *et al*.; Psoriatic Arthritis Group of the Society for Rheumatology: The Swedish Early Psoriatic Arthritis Register - 2-year followup: a comparison with early rheumatoid arthritis. *J Rheumatol* 2008; 35(4): 668-73
80. WERVERS K, LUIME JJ, TCHETVERIKOV I *et al*.: Influence of disease manifestations on health-related quality of life in early psoriatic arthritis. *J Rheumatol* 2018; 45(11): 1526-531. https://doi.org/10.3899/jrheum.171406
81. PROFT F, LÜDERS S, HUNTER T *et al*.: Early identification of axial psoriatic arthritis among patients with psoriasis: a prospective multicentre study. *Ann Rheum Dis* 2022; 81(11): 1534-40. https://doi.org/10.1136/ard-2022-222562
82. LUCHETTI GENTILONI MM, PACI V, CIMAROLI I *et al*.: The ATTRACT study: screening for the early identification of axial psoriatic arthritis in a cohort of Italian psoriatic patients. *Rheumatology* (Oxford) 2024; 63(8): 2152-61. https://doi.org/10.1093/rheumatology/kead566
83. SAALFELD W, MIXON AM, ZELIE J, LYDON EJ: Differentiating psoriatic arthritis from osteoarthritis and rheumatoid arthritis: a narrative review and guide for advanced practice providers. *Rheumatol Ther* 2021; 8(4): 1493-517. https://doi.org/10.1007/s40744-021-00365-1
84. RIDA MA, CHANDRAN V: Challenges in the clinical diagnosis of psoriatic arthritis. *Clin Immunol* 2020; 214: 108390. https://doi.org/10.1016/j.clim.2020.108390
85. RUTA S, JALDIN CESPEDES R, CUELLAR L *et al*.: Psoriatic arthritis: differential features at the time of clinical presentation in a large cohort of patients with polyarthralgia. *Eur J Rheumatol* 2023; 10(1): 12-17. https://doi.org/10.5152/eurjrheum.2022.22035
86. GISONDI P, GIROLOMONI G, SAMPOGNA F *et al*.: Prevalence of psoriatic arthritis and joint complaints in a large population of Italian patients hospitalised for psoriasis. *Eur J Dermatol* 2005; 15(4): 279-83.
87. FLORIS A, MUGHEDDU C, SICHI L *et al*.: The challenging differentiation of psoriatic arthritis from other arthropathies and non-specific arthralgias in patients with psoriasis: results of a cross-sectional rheumatologic assessment of a large dermatologic cohort. *J Clin Med* 2023; 12(18): 6090. https://doi.org/10.3390/jcm12186090
88. LANDEWÉ RBM: Overdiagnosis and overtreatment in rheumatology: a little caution is in order. *Ann Rheum Dis* 2018; 77(10): 1394-96. https://doi.org/10.1136/annrheumdis-2018-213700
89. SAVAGE L, TINAZZI I, ZABOTTI A *et al*.: Defining pre-clinical psoriatic arthritis in an integrated dermato-rheumatology environment. *J Clin Med* 2020; 9(10): 3262. https://doi.org/10.3390/jcm9103262
90. CHANDRAN V: Spondyloarthritis: CASPAR criteria in early psoriatic arthritis. *Nat Rev Rheumatol* 2012; 8(9): 503-4. https://doi.org/10.1038/nrrheum.2012.121
91. COATES LC, CONAGHAN PG, EMERY P *et al*.: Sensitivity and specificity of the classification of psoriatic arthritis criteria in early psoriatic arthritis. *Arthritis Rheum* 2012; 64(10): 3150-55. https://doi.org/10.1002/art.34536
92. VAN DEN BERG R, VAN GAALEN F, VAN DER HELM-VAN MIL A *et al*.: Performance of classification criteria for peripheral spondyloarthritis and psoriatic arthritis in the Leiden Early Arthritis cohort. *Ann Rheum Dis* 2012; 71(8): 1366-69. https://doi.org/10.1136/annrheumdis-2011-201081
93. CHANDRAN V, SCHENTAG CT, GLADMAN DD: Sensitivity of the classification of psoriatic arthritis criteria in early psoriatic arthritis. *Arthritis Rheum* 2007; 57(8): 1560-63. https://doi.org/10.1002/art.23104
94. MCARDLE A, FLATLEY B, PENNINGTON SR, FITZGERALD O: Early biomarkers of joint damage in rheumatoid and psoriatic arthritis. *Arthritis Res Ther* 2015; 17(1): 141. https://doi.org/10.1186/s13075-015-0652-z
95. MURRAY C, MANN DL, GERBER LN *et al*.: Histocompatibility alloantigens in psoriasis and psoriatic arthritis. Evidence for the influence of multiple genes in the major histocompatibility complex. *J Clin Invest* 1980; 66(4): 670-75. https://doi.org/10.1172/jci109903
96. RAMESSUR R, CORBETT M, MARSHALL D *et al*.; BIOMAP CONSORTIUM: Biomarkers of

disease progression in people with psoriasis: a scoping review. *Br J Dermatol* 2022; 187(4): 481-93. https://doi.org/10.1111/bjd.21627
97. BELINCHÓN I, SALGADO-BOQUETE L, LÓPEZ-FERRER A *et al*.: Dermatologists' role in the early diagnosis of psoriatic arthritis: expert recommendations. *Actas Dermosifiliogr* (Engl Ed) 2020; 111(10): 835-46. https://doi.org/10.1016/j.ad.2020.06.004
98. QURESHI AA, HUSNI ME, MODY E: Psoriatic arthritis and psoriasis: need for a multidisciplinary approach. *Semin Cutan Med Surg* 2005; 24(1): 46-51. https://doi.org/10.1016/j.sder.2005.01.006
99. VAN HAL TW, MULDER MLM, WENINK MH *et al*.: Discovery of psoriatic arthritis in psoriasis patients for early rheumatological referral (DAPPER) study: a prospective observational cohort. *Acta Derm Venereol* 2022; 102: adv00768. https://doi.org/10.2340/actadv.v102.2225
100. LUBRANO E, DELLE SEDIE A, ROMANELLI M *et al*.: Management of psoriatic arthritis in rheumatology and dermatology settings: sub-analysis of the Italian population from the international LOOP study. *Clin Rheumatol* 2021; 40(6): 2251-62. https://doi.org/10.1007/s10067-020-05482-w
101. KARMACHARYA P, WRIGHT K, ACHENBACH SJ *et al*.: Time to transition from psoriasis to psoriatic arthritis: A population-based study. *Semin Arthritis Rheum* 2022; 52: 151949. https://doi.org/10.1016/j.semarthrit.2021.12.013
102. WATAD A, MCGONAGLE D: Towards early diagnosis of axial psoriatic arthritis. *Rheumatology* (Oxford) 2024; 63(8): 2042-43. https://doi.org/10.1093/rheumatology/keae002
103. GOTTLIEB AB, MEROLA JF: A clinical perspective on risk factors and signs of subclinical and early psoriatic arthritis among patients with psoriasis. *J Dermatolog Treat* 2022; 33(4): 1907-15. https://doi.org/10.1080/09546634.2021.1942423
104. BELMAN S, WALSH JA, CARROLL C *et al*.: Psoriasis characteristics for the early detection of psoriatic arthritis. *J Rheumatol* 2021; 48(10): 1559-65. https://doi.org/10.3899/jrheum.201123
105. MCHUGH NJ: Early psoriatic arthritis. *Rheum Dis Clin North Am* 2015; 41(4): 615-22. https://doi.org/10.1016/j.rdc.2015.07.005
106. COATES LC, EDER L, PODDUBNYY D, ROSEN CF: Identification of psoriatic arthritis in patients with psoriasis. *J Rheumatol* 2023; 50(Suppl 2): 25-26. https://doi.org/10.3899/jrheum.2023-0520
107. IBRAHIM GH, BUCH MH, LAWSON C *et al*.: Evaluation of an existing screening tool for psoriatic arthritis in people with psoriasis and the development of a new instrument: the Psoriasis Epidemiology Screening Tool (PEST) questionnaire. *Clin Exp Rheumatol* 2009; 27(3): 469-74.
108. HELLIWELL PS: Psoriasis Epidemiology Screening Tool (PEST): a report from the GRAPPA 2009 annual meeting. *J Rheumatol* 2011; 38(3): 551-52. https://doi.org/10.3899/jrheum.101119
109. BIONDI G, ADDIS G, CARCASSI M *et al*.: Early psoriatic arthritis in psoriatic patients: risk factors and screening for rheumatological evaluation. *Int J Dermatol* 2018; 57(10): e97-e98. https://doi.org/10.1111/ijd.14136
110. TINAZZI I, ADAMI S, ZANOLIN EM *et al*.: The early psoriatic arthritis screening questionnaire: a simple and fast method for the identification of arthritis in patients with psoriasis. *Rheumatology* (Oxford) 2012; 51(11): 2058-63. https://doi.org/10.1093/rheumatology/kes187
111. DOMINGUEZ P, HUSNI ME, GARG A, QURESHI AA: Psoriatic Arthritis Screening and Evaluation (PASE) questionnaire and the role of dermatologists: a report from the GRAPPA 2009 annual meeting. *J Rheumatol* 2011; 38(3): 548-50. https://doi.org/10.3899/jrheum.101118
112. HUSNI ME, MEYER KH, COHEN DS *et al*.: The PASE questionnaire: pilot-testing a psoriatic arthritis screening and evaluation tool. *J Am Acad Dermatol* 2007; 57(4): 581-87. https://doi.org/10.1016/j.jaad.2007.04.001
113. TOM BD, CHANDRAN V, FAREWELL VT *et al*.: Validation of the Toronto Psoriatic Arthritis Screen Version 2 (ToPAS 2). *J Rheumatol* 2015; 42(5): 841-46. https://doi.org/10.3899/jrheum.140857
114. AUDUREAU E, ROUX F, LONS DANIC D *et al*.: Psoriatic arthritis screening by the dermatologist: development and first validation of the 'PURE-4 scale'. *J Eur Acad Dermatol Venereol* 2018; 32(11): 1950-53. https://doi.org/10.1111/jdv.14861
115. COATES LC, ASLAM T, AL BALUSHI F *et al*.: Comparison of three screening tools to detect psoriatic arthritis in patients with psoriasis (CONTEST study). *Br J Dermatol* 2013; 168(4): 802-7. https://doi.org/10.1111/bjd.12190
116. BUSQUETS-PÉREZ N, MARZO-ORTEGA H, MCGONAGLE D *et al*.; CONTEST COLLABORATION: Screening psoriatic arthritis tools: analysis of the Early Arthritis for Psoriatic Patients questionnaire. *Rheumatology* (Oxford) 2015; 54(1): 200-2. https://doi.org/10.1093/rheumatology/keu426
117. IRAGORRI N, HAZLEWOOD G, MANNS B *et al*.: Psoriatic arthritis screening: a systematic review and meta-analysis. *Rheumatology* (Oxford) 2019; 58(4): 692-707. https://doi.org/10.1093/rheumatology/key314
118. MISHRA S, KANCHARLA H, DOGRA S, SHARMA A: Comparison of four validated psoriatic arthritis screening tools in diagnosing psoriatic arthritis in patients with psoriasis (COMPAQ Study). *Br J Dermatol* 2017; 176(3): 765-70. https://doi.org/10.1111/bjd.14929
119. LEUNG YY, ORBAI AM, TILLETT W *et al*.: Instruments measuring physical function for psoriatic arthritis endorsed at GRAPPA 2020 annual meeting: updates of the GRAPPA-OMERACT Working Group. *J Rheumatol Suppl* 2021; 97: 60-63. https://doi.org/10.3899/jrheum.201679
120. TUCKER LJ, COATES LC, HELLIWELL PS: Assessing disease activity in psoriatic arthritis: a literature review. *Rheumatol Ther* 2019; 6(1): 23-32. https://doi.org/10.1007/s40744-018-0132-4
121. HER M, KAVANAUGH A: A review of disease activity measures for psoriatic arthritis: what is the best approach? *Expert Rev Clin Immunol* 2014; 10(9): 1241-54. https://doi.org/10.1586/1744666x.2014.943663
122. SCARPA R, CASO F: Spondyloarthritis: which composite measures to use in psoriatic arthritis? *Nat Rev Rheumatol* 2018; 14(3): 125-26. https://doi.org/10.1038/nrrheum.2018.15
123. TILLETT W, FITZGERALD O, COATES LC *et al*.; PROMPT STUDY GROUP: composite measures for clinical trials in psoriatic arthritis: testing pain and fatigue modifications in a UK multicenter study. *J Rheumatol Suppl* 2021; 97: 39-44. https://doi.org/10.3899/jrheum.201674
124. MUMTAZ A, GALLAGHER P, KIRBY B *et al*.: Development of a preliminary composite disease activity index in psoriatic arthritis. *Ann Rheum Dis* 2011; 70(2): 272-77. https://doi.org/10.1136/ard.2010.129379
125. SMOLEN JS, SCHOELS M, ALETAHA D: Disease activity and response assessment in psoriatic arthritis using the Disease Activity index for PSoriatic Arthritis (DAPSA). A brief review. *Clin Exp Rheumatol* 2015; 33(5 Suppl 93): S48-50.
126. SCHOELS MM, ALETAHA D, ALASTI F, SMOLEN JS: Disease activity in psoriatic arthritis (PsA): defining remission and treatment success using the DAPSA score. *Ann Rheum Dis* 2016; 75(5): 811-18. https://doi.org/10.1136/annrheumdis-2015-207507
127. HELLIWELL PS, FITZGERALD O, FRANSEN J *et al*.: The development of candidate composite disease activity and responder indices for psoriatic arthritis (GRACE project). *Ann Rheum Dis* 2013; 72(6): 986-91. https://doi.org/10.1136/annrheumdis-2012-201341
128. COATES LC, NAVARRO-COY N, BROWN SR *et al*.: The TICOPA protocol (TIght COntrol of Psoriatic Arthritis): a randomised controlled trial to compare intensive management versus standard care in early psoriatic arthritis. *BMC Musculoskelet Disord* 2013; 14: 101. https://doi.org/10.1186/1471-2474-14-101
129. COATES LC, MAHMOOD F, EMERY P *et al*.: The dynamics of response as measured by multiple composite outcome tools in the TIght COntrol of inflammation in early Psoriatic Arthritis (TICOPA) trial. *Ann Rheum Dis* 2017; 76(10): 1688-92. https://doi.org/10.1136/annrheumdis-2017-211137
130. ABACAR K, RENNIE WJ, RAYCHAUDHURI SP *et al*.: Focusing on ligamentous soft tissue inflammation for the future understanding of early axial psoriatic arthritis. *Rheumatology* (Oxford) 2024; 63(Supplement_2): ii7-ii14. https://doi.org/10.1093/rheumatology/keae568
131. MEROLA JF, CHAKRAVARTY SD, CHOI O *et al*.: A clinical review of structural damage in psoriatic arthritis for dermatologists: from pathogenesis to ongoing controversies. *J Am Acad Dermatol* 2024; 90(2): 349-57. https://doi.org/10.1016/j.jaad.2023.10.021
132. HEN O, DI MATTEO A, DUBASH SR *et al*.: High prevalence of radiographic erosions in early, untreated PsA: results from the SpARRO cohort. *RMD Open* 2024; 10(2): e003841. https://doi.org/10.1136/rmdopen-2023-003841
133. VAN DER HEIJDE D, GLADMAN DD, KAVANAUGH A, MEASE PJ: Assessing structural damage progression in psoriatic arthritis and its role as an outcome in research. *Arthritis Res Ther* 2020; 22(1): 18. https://doi.org/10.1186/s13075-020-2103-8
134. GEIJER M, LINDQVIST U, HUSMARK T *et*

al.: The Swedish Early Psoriatic Arthritis Registry 5-year follow-up: substantial radiographic progression mainly in men with high disease activity and development of dactylitis. *J Rheumatol* 2015; 42(11): 2110-17. https://doi.org/10.3899/jrheum.150165
135. KANE D, STAFFORD L, BRESNIHAN B, FITZGERALD O: A prospective, clinical and radiological study of early psoriatic arthritis: an early synovitis clinic experience. *Rheumatology* (Oxford) 2003; 42(12): 1460-68. https://doi.org/10.1093/rheumatology/keg384
136. MATHEW AJ, ØSTERGAARD M, EDER L: Imaging in psoriatic arthritis: status and recent advances. *Best Pract Res Clin Rheumatol* 2021; 35(2): 101690. https://doi.org/10.1016/j.berh.2021.101690
137. GOTTLIEB AB, BAKEWELL C, MEROLA JF: Musculoskeletal imaging for dermatologists: techniques in the diagnosis and management of psoriatic arthritis. *Dermatol Ther* (Heidelb) 2021; 11(4): 1199-216. https://doi.org/10.1007/s13555-021-00565-1
138. CRESPO-RODRÍGUEZ AM, SANZ SANZ J, FREITES D *et al*.: Role of diagnostic imaging in psoriatic arthritis: how, when, and why. *Insights Imaging* 2021; 12(1): 121. https://doi.org/10.1186/s13244-021-01035-0
139. ZABOTTI A, TINAZZI I, AYDIN SZ, MCGONAGLE D: From psoriasis to psoriatic arthritis: insights from imaging on the transition to psoriatic arthritis and implications for arthritis prevention. *Curr Rheumatol Rep 2020*; 22(6): 24. https://doi.org/10.1007/s11926-020-00891-x
140. THEODORAKOPOULOU E, DALAMAGA M, KATSIMBRI P *et al*.: How does the joint dermatology-rheumatology clinic benefit both patients and dermatologists? *Dermatol Ther* 2020; 33(3): e13283. https://doi.org/10.1111/dth.13283
141. QI F, YAO A, HE Y: Medical imaging examination in psoriasis and early psoriatic arthritis patients: an updated systematic review and meta-analysis. *Int J Dermatol* 2021; 60(11): 1354-62. https://doi.org/10.1111/ijd.15384
142. GUDU T, NG B, JETHWA H *et al*.: Improving imaging modalities in early psoriatic arthritis: the role of ultrasound in early diagnosis. *Front Med* (Lausanne) 2022; 8: 804695. https://doi.org/10.3389/fmed.2021.804695
143. RIBEIRO AL, EDER L: From psoriasis to psoriatic arthritis: ultrasound insights connecting psoriasis with subclinical musculoskeletal inflammation and the path to psoriatic arthritis. *Curr Rheumatol Rep* 2024; 26(7): 235-47. https://doi.org/10.1007/s11926-024-01146-9
144. SAKELLARIOU G, QUAGLINI S, BUGATTI S *et al*.: In patients with early peripheral psoriatic arthritis baseline C-reactive protein, pain and ultrasound-detected synovitis predict subsequent treatment with ts/bDMARDs: a retrospective analysis. *J Clin Med* 2021; 10(13): 2834. https://doi.org/10.3390/jcm10132834
145. BANDINELLI F, BONACCI E, MATUCCI-CERINIC M: Ultrasound-integrated tight control in early psoriatic arthritis during adalimumab treatment. *Clin Exp Rheumatol* 2013; 31(3): 440-42.
146. GIROLIMETTO N, COSTA L, MANCARELLA L *et al*.: Symptomatic psoriatic dactylitis is associated with ultrasound-determined extrasynovial inflammatory features and shorter disease duration. *Clin Rheumatol* 2019; 38(3): 903-11. https://doi.org/10.1007/s10067-018-4400-z
147. GIROLIMETTO N, MACCHIONI P, TINAZZI I *et al*.: Predominant ultrasonographic extracapsular changes in symptomatic psoriatic dactylitis: a multicenter cross-sectional study. *Clin Rheumatol 2020*; 39(4): 1157-65. https://doi.org/10.1007/s10067-019-04683-2
148. GIROLIMETTO N, MACCHIONI P, TINAZZI I *et al*.: Ultrasonographic evidence of acute extracapsular and chronic intrasynovial patterns in 100 cases of psoriatic hand dactylitis. *J Rheumatol* 2020; 47(2): 227-33. https://doi.org/10.3899/jrheum.190046
149. BAKEWELL C, AYDIN SZ, RANGANATH VK *et al*.: Imaging techniques: options for the diagnosis and monitoring of treatment of enthesitis in psoriatic arthritis. *J Rheumatol* 2020; 47(7): 973-82. https://doi.org/10.3899/jrheum.190512
150. BALINT PV, TERSLEV L, AEGERTER P *et al*.; OMERACT ULTRASOUND TASK FORCE MEMBERS: Reliability of a consensus-based ultrasound definition and scoring for enthesitis in spondyloarthritis and psoriatic arthritis: an OMERACT US initiative. *Ann Rheum Dis* 2018; 77(12): 1730-35. https://doi.org/10.1136/annrheumdis-2018-213609
151. BRUYN GA, IAGNOCCO A, NAREDO E *et al*.; OMERACT ULTRASOUND WORKING GROUP: OMERACT definitions for ultrasonographic pathologies and elementary lesions of rheumatic disorders 15 years on. *J Rheumatol* 2019; 46(10): 1388-93. https://doi.org/10.3899/jrheum.181095
152. NORDEN A, OULEE A, IVANIC M *et al*.: Use of ultrasound to detect enthesitis as a guide for intervention in psoriasis at risk of PsA: systematic review. *Int J Dermatol* 2023; 62(8): 973-79. https://doi.org/10.1111/ijd.16645
153. EL MIEDANY Y, EL GAAFARY M, YOUSSEF S *et al*.: Tailored approach to early PsA: clinical and ultrasonographic predictors of structural damage. *Clin Rheumatol* 2015; 34(2): 307-13. https://doi.org/10.1007/s10067-014-2630-2
154. HAYASHI M, YANABA K, UMEZAWA Y *et al*.: Superiority of MRI over radiography in early PsA diagnosis. *J Dermatol* 2017; 44(10): e232-e33. https://doi.org/10.1111/1346-8138.13918
155. FAUSTINI F, SIMON D, OLIVEIRA I *et al*.: Subclinical joint inflammation in patients with psoriasis without concomitant psoriatic arthritis: a cross-sectional and longitudinal analysis. *Ann Rheum Dis* 2016; 75(12): 2068-74. https://doi.org/10.1136/annrheumdis-2015-208821
156. SIMON D, FAUSTINI F, KLEYER A *et al*.: Analysis of periarticular bone changes in patients with cutaneous psoriasis without associated psoriatic arthritis. *Ann Rheum Dis* 2016; 75(4): 660-66. https://doi.org/10.1136/annrheumdis-2014-206347
157. EMAD Y, RAGAB Y, GHEITA T *et al*.; KNEE ENTHESITIS WORKING GROUP: Knee enthesitis and synovitis on magnetic resonance imaging in patients with psoriasis without arthritic symptoms. *J Rheumatol* 2012; 39(10): 1979-86. https://doi.org/10.3899/jrheum.120301
158. MATHEW AJ, BIRD P, GUPTA A *et al*.: Magnetic resonance imaging (MRI) of feet demonstrates subclinical inflammatory joint disease in cutaneous psoriasis patients without clinical arthritis. *Clin Rheumatol* 2018; 37(2): 383-88. https://doi.org/10.1007/s10067-017-3895-z
159. SCARANO E, GILIO M, BELMONTE G *et al*.: Morphologic, dynamic and high-resolution microscopy MRI in early-onset spondyloarthritis finger dactylitis. *Skeletal Radiol* 2023; 52(6): 1211-19. https://doi.org/10.1007/s00256-022-04218-y
160. BAKEWELL CJ, OLIVIERI I, AYDIN SZ *et al*.; OMERACT ULTRASOUND TASK FORCE: Ultrasound and magnetic resonance imaging in the evaluation of psoriatic dactylitis: status and perspectives. *J Rheumatol* 2013; 40(12): 1951-57. https://doi.org/10.3899/jrheum.130643
161. TAN AL, FUKUBA E, HALLIDAY NA *et al*.: High-resolution MRI assessment of dactylitis in psoriatic arthritis shows flexor tendon pulley and sheath-related enthesitis. *Ann Rheum Dis* 2015; 74(1): 185-89. https://doi.org/10.1136/annrheumdis-2014-205839
162. GLADMAN DD: The road to a new horizon in psoriatic arthritis. *J Rheumatol* 2025 May 15. https://doi.org/10.3899/jrheum.2025-0330
163. ZABOTTI A, AYDIN SZ, DAVID P *et al*.: Delineating inflammatory from non-inflammatory mechanisms for therapy optimization in psoriatic arthritis. *Nat Rev Rheumatol* 2025; 21(4): 237-48. https://doi.org/10.1038/s41584-025-01229-6
164. DUMOULIN QA, KRIJBOLDER DI, VISSER K *et al*.: Development of rheumatoid arthritis after methotrexate in anticitrullinated protein antibody-negative people with clinically suspect arthralgia at risk of rheumatoid arthritis: 4-year data from the TREAT EARLIER trial. *Lancet Rheumatol* 2024; 6(12): e827-e36. https://doi.org/10.1016/s2665-9913(24)00196-6
165. RECH J, TASCILAR K, HAGEN M *et al*.: Abatacept inhibits inflammation and onset of rheumatoid arthritis in individuals at high risk (ARIAA): a randomised, international, multicentre, double-blind, placebo- controlled trial. *Lancet* 2024; 403(10429): 850-59. https://doi.org/10.1016/s0140-6736(23)02650-8
166. COPE AP, JASENECOVA M, VASCONCELOS JC *et al*.; APIPPRA STUDY INVESTIGATORS: Abatacept in individuals at high risk of rheumatoid arthritis (APIPPRA): a randomised, double-blind, multicentre, parallel, placebo-controlled, phase 2b clinical trial. *Lancet* 2024; 403(10429): 838-49. https://doi.org/10.1016/s0140-6736(23)02649-1
167. COATES LC, SORIANO ER, CORP N *et al*.; GRAPPA TREATMENT RECOMMENDATIONS DOMAIN SUBCOMMITTEES: Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPPA): updated treatment recommendations for psoriatic arthritis 2021. *Nat Rev Rheumatol* 2022; 18(8): 465-79. https://doi.org/10.1038/s41584-022-00798-0
168. SINGH JA, GUYATT G, OGDIE A *et al*.: Special article: 2018 American College of Rheumatology/National Psoriasis Foundation Guideline for the Treatment of Psoriatic

Arthritis. *Arthritis Rheumatol* 2019; 71(1): 5-32. https://doi.org/10.1002/art.40726
169. ARMSTRONG AW, BLAUVELT A, CALLIS DUFFIN K *et al*.: Psoriasis. *Nat Rev Dis Primers* 2025; 11(1): 45. https://doi.org/10.1038/s41572-025-00630-5
170. AZUAGA AB, CUERVO A, REINA D *et al*.: Clinical and ultrasound features of a cohort of psoriasis patients without musculoskeletal symptoms: a prospective and multicenter study. *Rheumatology* (Oxford) 2025: 64(10): 5396-403. https://doi.org/10.1093/rheumatology/keaf307
171. SKORNICKI M, PRINCE P, SURUKI R *et al*.: Clinical burden of concomitant joint disease in psoriasis: a us-linked claims and electronic health records database analysis. *Adv Ther* 2021; 38(5): 2458-71. https://doi.org/10.1007/s12325-021-01698-7
172. CAPELUSNIK D, BENAVENT D, VAN DER HEIJDE D *et al*.: Treating spondyloarthritis early: does it matter? Results from a systematic literature review. *Rheumatology* (Oxford) 2023; 62(4): 1398-409. https://doi.org/10.1093/rheumatology/keac532
173. GLADMAN DD, THAVANESWARAN A, CHANDRAN V, COOK RJ: Do patients with psoriatic arthritis who present early fare better than those presenting later in the disease? *Ann Rheum Dis* 2011; 70(12): 2152-154. https://doi.org/10.1136/ard.2011.150938
174. COATES LC, HELLIWELL PS: Treat to target in psoriatic arthritis – evidence, target, research agenda. *Curr Rheumatol Rep* 2015; 17(6): 517. https://doi.org/10.1007/s11926-015-0517-0
175. COATES LC, O'DWYER J, MEADS D *et al*.: Treat-to-target in psoriatic arthritis – cost-effective in the biosimilar era. *Lancet Rheumatol* 2022; 4(6): e390-e391. https://doi.org/10.1016/s2665-9913(22)00101-1
176. SOLMAZ D, EHLEBRACHT A, KARSH J *et al*.: Evidence that systemic therapies for psoriasis may reduce psoriatic arthritis occurrence. *Clin Exp Rheumatol* 2020; 38(2): 257-61. https://doi.org/10.55563/clinexprheumatol/8thj0l
177. SORIANO ER, OGDIE A: Can early aggressive treatment of psoriasis prevent psoriatic arthritis? A debate at the GRAPPA Annual Meeting. *J Rheumatol* 2023; 50(Suppl 2): 8-10. https://doi.org/10.3899/jrheum.2023-0506
178. DE MARCO G, BEREKMÉRI A, COATES LC *et al*.: Systematic literature review of non-topical treatments for early, untreated (systemic therapy naïve) psoriatic disease: a GRAPPA initiative. *Rheumatol Adv Pract* 2020; 4(2): rkaa032. https://doi.org/10.1093/rap/rkaa032
179. WILSDON TD, WHITTLE SL, THYNNE TR, MANGONI AA: Methotrexate for psoriatic arthritis. *Cochrane Database Syst Rev* 2019; 1: CD012722. https://doi.org/10.1002/14651858.cd012722.pub2
180. KINGSLEY GH, KOWALCZYK A, TAYLOR H *et al*.: A randomized placebo-controlled trial of methotrexate in psoriatic arthritis. *Rheumatology* (Oxford) 2012; 51(8): 1368-77. https://doi.org/10.1093/rheumatology/kes001
181. LINDSTRÖM U, DI GIUSEPPE D, EXARCHOU S *et al*.: Methotrexate treatment in early psoriatic arthritis in comparison to rheumatoid arthritis: an observational nationwide study. *RMD Open* 2023; 9(2): e002883. https://doi.org/10.1136/rmdopen-2022-002883
182. DEN BRAANKER H, WERVERS K, MUS AMC *et al*.: Achieving sustained minimal disease activity with methotrexate in early interleukin 23-driven early psoriatic arthritis. *RMD Open* 2020; 6(2): e001175. https://doi.org/10.1136/rmdopen-2020-001175
183. BARANAUSKAITE A, RAFFAYOVÁ H, KUNGUROV NV *et al*.; RESPOND INVESTIGATORS: Infliximab plus methotrexate is superior to methotrexate alone in the treatment of psoriatic arthritis in methotrexate-naive patients: the RESPOND study. *Ann Rheum Dis* 2012; 71(4): 541-48. https://doi.org/10.1136/ard.2011.152223
184. COATES LC, MOVERLEY AR, MCPARLAND L *et al*.: Effect of tight control of inflammation in early psoriatic arthritis (TICOPA): a UK multicentre, open- label, randomised controlled trial. *Lancet* 2015; 386(10012): 2489-98. https://doi.org/10.1016/s0140-6736(15)00347-5
185. COATES LC, HELLIWELL PS: Methotrexate efficacy in the Tight Control in Psoriatic Arthritis Study. *J Rheumatol* 2016; 43(2): 356-61. https://doi.org/10.3899/jrheum.150614
186. COATES LC, MAHMOOD F, FREESTON J *et al*.: Long- term follow-up of patients in the TIght COntrol of inflammation in early Psoriatic Arthritis (TICOPA) trial. *Rheumatology* (Oxford) 2020; 59(4): 807-10. https://doi.org/10.1093/rheumatology/kez369
187. CARRON P, VARKAS G, CYPERS H *et al*.: Anti-TNF-induced remission in very early peripheral spondyloarthritis: the CRESPA study. *Ann Rheum Dis* 2017; 76(8): 1389-95. https://doi.org/10.1136/annrheumdis-2016-210775
188. SANTOS H, EUSÉBIO M, BORGES J *et al*.: Effectiveness of early adalimumab therapy in psoriatic arthritis patients from Reuma. pt - EARLY PsA. *Acta Reumatol Port* 2017; 42(4): 287-99.
189. GISONDI P, BELLINATO F, TARGHER G *et al*.: Biological disease-modifying antirheumatic drugs may mitigate the risk of psoriatic arthritis in patients with chronic plaque psoriasis *Ann Rheum Dis* 2022; 81(1): 68-73. https://doi.org/10.1136/annrheumdis-2021-219961
190. FLORIS A, MUGHEDDU C, SICHI L *et al*.: Treatment of psoriasis with different classes of biologics reduces the likelihood of peripheral and axial psoriatic arthritis development. *Rheumatology* (Oxford) 2025; 64(3): 1131-37. https://doi.org/10.1093/rheumatology/keae257
191. PIASERICO S, MEGNA M, BARDAZZI F *et al*.: TNF-alpha inhibitors reduce the incidence of psoriatic arthritis in patients with psoriasis: a propensity score-matched cohort study. *Rheumatology* (Oxford) 2025 Jul 3. https://doi.org/10.1093/rheumatology/keaf364
192. SCARPA R, ATTENO M, LUBRANO E *et al*.: The effectiveness and safety of TNF-alpha blockers in the treatment of early psoriatic arthritis: an Italian multicentre longitudinal observational pilot study. *Clin Rheumatol* 2011; 30(8): 1063-67. https://doi.org/10.1007/s10067-011-1680-y
193. KIRKHAM B, DE VLAM K, LI W *et al*.: Early treatment of psoriatic arthritis is associated with improved patient-reported outcomes: findings from the etanercept PRESTA trial. *Clin Exp Rheumatol* 2015; 33(1): 11-19.
194. VAN MENS LJJ, DE JONG HM, FLURI I *et al*.: Achieving remission in psoriatic arthritis by early initiation of TNF inhibition: a double-blind, randomised, placebo-controlled trial of golimumab plus methotrexate versus placebo plus methotrexate. *Ann Rheum Dis* 2019; 78(5): 610-16. https://doi.org/10.1136/annrheumdis-2018-214746
195. VAN DER HEIJDE D, DEODHAR A, FLEISCHMANN R *et al*.: Early disease activity or clinical response as predictors of long- term outcomes with certolizumab pegol in axial spondyloarthritis or psoriatic arthritis. *Arthritis Care Res* (Hoboken) 2017; 69(7): 1030-39. https://doi.org/10.1002/acr.23092
196. KAMPYLAFKA E, TASCILAR K, LERCHEN V *et al*.: Secukinumab leads to shifts from stage-based towards response-based disease clusters-comparative data from very early and established psoriatic arthritis. *Arthritis Res Ther* 2020; 22(1): 207. https://doi.org/10.1186/s13075-020-02268-y
197. SAVAGE L, GOODFIELD M, HORTON L *et al*.: Regression of peripheral subclinical enthesopathy in therapy-naive patients treated with ustekinumab for moderate-to-severe chronic plaque psoriasis: a fifty-two-week, prospective, open-label feasibility study. *Arthritis Rheumatol* 2019; 71(4): 626-31. https://doi.org/10.1002/art.40778
198. SINGLA S, PUTMAN M, LIEW J, GORDON K: Association between biological immunotherapy for psoriasis and time to incident inflammatory arthritis: a retrospective cohort study. *Lancet Rheumatol* 2023; 5(4): e200-7. https://doi.org/10.1016/s2665-9913(23)00034-6
199. MEASE PJ, GOTTLIEB AB, OGDIE A *et al*.: Earlier clinical response predicts low rates of radiographic progression in biologic-naïve patients with active psoriatic arthritis receiving guselkumab treatment. *Clin Rheumatol* 2024; 43(1): 241-49. https://doi.org/10.1007/s10067-023-06745-y
200. GLADMAN DD, DOUGADOS M, MARZO-ORTEGA H *et al*.: Long-term tofacitinib efficacy and safety in psoriatic arthritis with or without prior biologic DMARD exposure: a post hoc analysis. *Rheumatol Adv Pract* 2025; 9(2): rkaf008. https://doi.org/10.1093/rap/rkaf008
201. MCGONAGLE DG, ZABOTTI A, WATAD A *et al*.: Intercepting psoriatic arthritis in patients with psoriasis: buy one get one free? *Ann Rheum Dis* 2022; 81(1): 7-10. https://doi.org/10.1136/annrheumdis-2021-221255
202. RIBEIRO AL, EDER L, AYDIN SZ, KAELEY GS: Toward increasing precision in the early diagnosis of psoriatic arthritis. *J Rheumatol* 2025 Aug 5. https://doi.org/10.3899/jrheum.2025-0363
203. QUEIRO R, ALVAREZ P, CALLEJA N *et al*.: Psoriatic arthritis phenotype may vary depending on whether the skin or joint domain appears first or whether both appear simultaneously. *Clin Exp Rheumatol* 2025; 43(5): 889-96. https://doi.org/10.55563/clinexprheumatol/8gl4ja
204. ESTI L, FATTORINI F, CIGOLINI C *et al*.: Clinical aspects of psoriatic arthritis: one year in review 2024. *Clin Exp Rheumatol* 2025; 43(1): 4-13. https://doi.org/10.55563/clinexprheumatol/7gug1a