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REVIEW ARTICLE

Psoriatic arthritis: the role of the nonphysician clinician in the diagnosis and treatment of patients with psoriasis

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Abstract

Psoriatic arthritis is a clinically heterogeneous, chronic, and progressive disease that develops in up to 30% of patients with psoriasis and is characterized by multiple and increasing joint defects caused by persistent immune-mediated inflammation. Several treatment options are available, including multiple biologic agents that inhibit specific cellular mediators of inflammation either directly or indirectly. Early detection and intervention are critical to preventing severe joint damage and pain, necessitating increased awareness and education about this disease for primary providers and nonphysician clinicians. Physician assistants and nurse practitioners, given their role in the primary care setting and within multiple specialty areas such as dermatology and rheumatology, are often the first to see patients who may have psoriatic arthritis. These healthcare providers are increasingly important in the early diagnosis and treatment of this disease. In this review, we provide an overview of psoriasis and psoriatic arthritis and discuss the multiple treatment options that are available for these patients. We also discuss ways to help recognize early joint involvement in the clinic and emphasize the role that nonphysician clinicians play in the care of patients with psoriatic arthritis.

Key points

Psoriatic arthritis, an inflammatory disease, may cause irreversible joint damage in patients with psoriasis.

Physician assistants and nurse practitioners in dermatology and rheumatology, who are well positioned to recognize psoriatic arthritis early, treat patients, and prevent long-term complications, benefit from education on recognizing and treating psoriatic disease to improve outcomes.

Biologics have demonstrated efficacy in several disease domains of psoriatic arthritis, and treatment guidelines generally recommend their use over that of nonbiologic agents.

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Introduction

Psoriasis is a chronic, inflammatory, dermatologic disease that occurs in 2–3% of the US population [1, 2]. The disease is characterized by erythematous, scaly papules and plaques and causes itching and pain [2]. Psoriasis is highly variable and can range from mild disease with few localized skin patches to more severe cases involving lesions that cover > 10% of the body [3, 4].

Up to 30% of patients with psoriasis may develop psoriatic arthritis (PsA), a chronic, progressive, inflammatory disease with the potential to cause irreversible joint damage and disability if left untreated [5–7]. PsA is prevalent in about 0.06–0.25% of the US population [8] and is primarily diagnosed in patients between the ages of 30 and 50 years [8, 9]. It occurs equally in men and women and typically develops within 10 years after the onset of psoriasis [6, 10, 11]. Recent population-based studies in the USA observed that prevalence was highest in White patients (3.6%), followed by African American patients (1.9%), Hispanic patients (1.6%), and others (1.4%) [1]. In an ethnically diverse psoriasis cohort, PsA was found to occur half as frequently in African American as in White patients but was associated with a greater disease

burden in African American patients [12]. Approximately 80–100% of patients with PsA will also have psoriasis [11, 13].

The persistent immune-mediated inflammation associated with PsA results in destruction of cartilage and bone as well as altered bone remodeling [14, 15]. Within 2 years of PsA onset, up to 47% of patients may develop joint erosions in one or more joint [16]. Permanent loss of function is possible in advanced disease [16]. Early diagnosis and therapeutic intervention are critical for delaying structural bone and joint damage as well as improving patients' quality of life (QOL)—a delay of 6 months in diagnosis is linked to worse radiographic and functional outcomes [17, 18]. International guidelines developed by the Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPPA) in 2015 and the European League Against Rheumatism (EULAR) in 2019 [19, 20], as well as guidelines developed by the American College of Rheumatology and National Psoriasis Foundation (ACR/NPF) in 2018 [21] provide information regarding treatment of PsA. Healthcare providers (HCPs) in primary care and dermatology settings, including physician assistants (PAs) and nurse practitioners (NPs), are often the first to see patients and therefore play a critical role in the early diagnosis and treatment of those with PsA.

This review provides an overview of PsA and aims to inform the nonphysician clinician on their role in the diagnosis and treatment of the disease and how to apply the information in practice. We also discuss barriers to timely diagnosis and management of PsA and mechanisms that might improve patient care.

Clinical features of psoriatic arthritis (PsA)

According to the GRAPPA definition, PsA consists of six disease domains: peripheral arthritis, enthesitis (inflammation of the entheses, the area where a tendon or ligament inserts into bone [22, 23]), dactylitis (the swelling of a whole digit [13, 24]), axial involvement, skin manifestations, and nail alterations (Fig. 1) [19]. The disease most frequently affects the joints of the hands and feet, followed by those of the ankles, knees, and shoulders, commonly in an asymmetrical manner. Structural damage includes joint space narrowing and bone erosions [25, 26].

Psoriasis and PsA carry a significant burden and are associated with several comorbidities, including cardiovascular disease, diabetes, obesity, metabolic syndrome, inflammatory bowel disease, risk of malignancies, fatty liver disease, and depression [27, 28]. Moreover, patients with psoriasis and PsA have a reduced QOL, reduced work productivity [11, 29], and a shortened life expectancy [30].

Pathophysiology of PsA

The pathogenesis of PsA is complex and not fully understood but is thought to result from a combination of genetic, immune, and environmental factors. Psoriasis severity, psoriatic nail disease, infection, trauma, stress, and obesity are considered risk factors for the development of PsA; however, it remains unclear whether nail involvement is a predictor of PsA or an early manifestation of PsA [31]. Genetic studies have found PsA to have a strong genetic component [32–34] and have linked several human leukocyte antigen (HLA) genotypes to PsA (e.g., HLA-B*27) [35].

In addition, a series of complex immune signaling pathways involving activated T cells and macrophages contribute to the inflammation underlying PsA [11, 36, 37]. Inflammatory cytokines—such as interleukin (IL)-22, -17, and -23 as well as tumor necrosis factor (TNF)-α—promote inflammation [36]. TNFα and IL-23 are released in response to multiple stimuli, such as trauma or infection, and help activate T-helper type 17 (Th_{17}) cells. Th_{17} cells produce IL-17A/F, which promotes inflammation, pathologic bone remodeling, and bone and cartilage destruction. Th_{17} cells also produce other inflammatory cytokines, including TNF, IL-6, and IL-22, further amplifying the inflammatory response [11, 37].

Diagnosis of PsA

To ensure early detection of PsA, HCPs in primary care and dermatology clinics are encouraged to proactively screen their patients with psoriasis for signs of PsA. Currently, there are no standard or universally accepted clinical diagnostic criteria for PsA [38]. The Classification Criteria for Psoriatic Arthritis (CASPAR criteria), which were developed to classify patients with PsA in clinical studies [39], can serve as useful guidelines for clinicians in primary care or dermatology practice (Table 1) [39, 40]. The CASPAR criteria include items for personal or family history of psoriasis as well as radiographic evidence of new bone formation, highlighting the importance of history of disease and emphasizing the association between PsA and psoriasis.

In addition, various tools have been developed to aid non-rheumatology providers in the diagnosis of PsA. A commonly used screening tool is the Psoriasis Epidemiology Screening Tool (PEST; Fig. 2) [41]. PEST is a validated and user-friendly questionnaire that can help primary care physicians, dermatologists, PAs, and NPs in these settings start a dialogue with their patients with

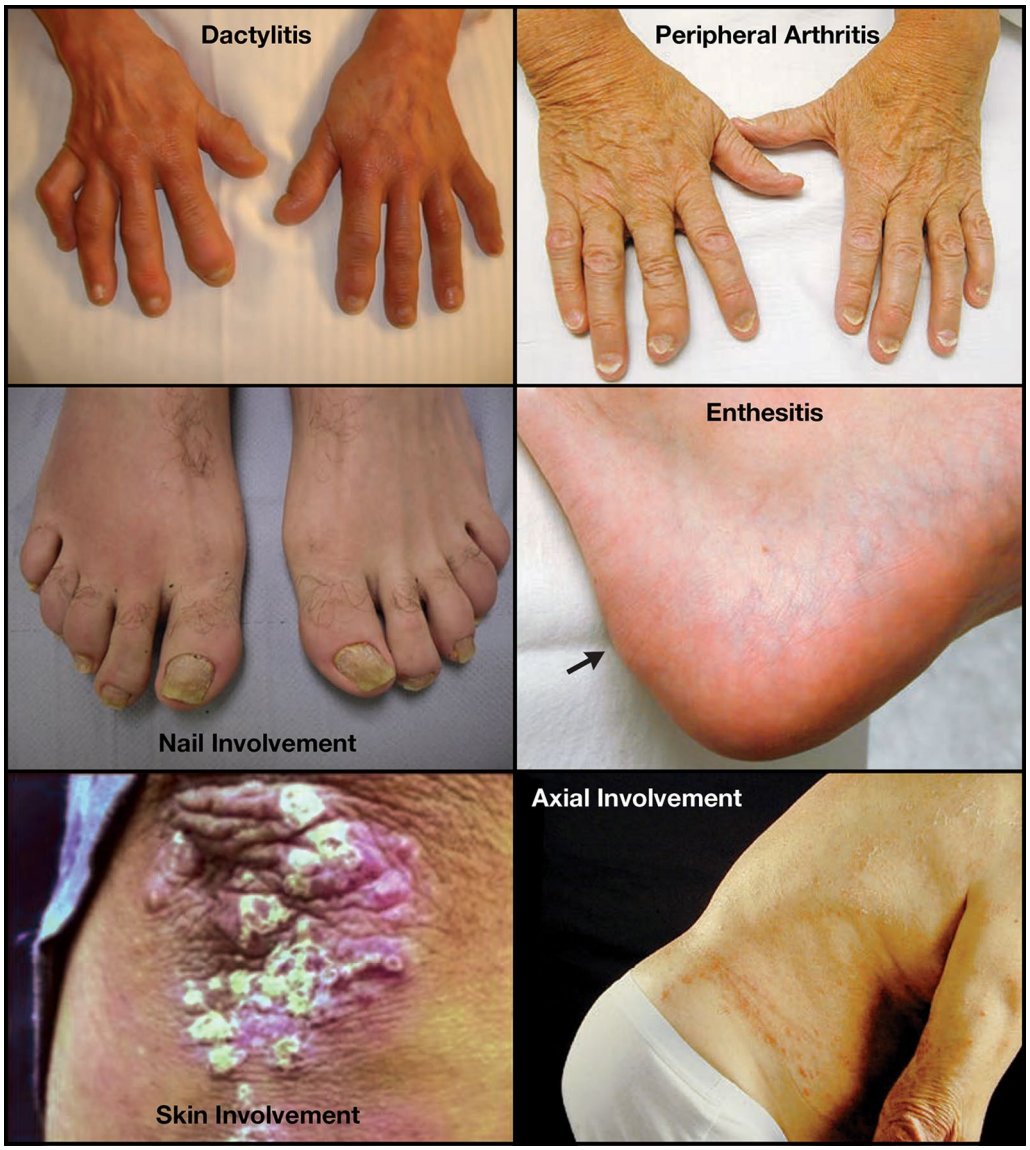

Fig. 1 Photographs showing manifestations of the six domains of psoriatic arthritis: dactylitis (top left) [13], peripheral arthritis (top right) [11], nail involvement (center left) [13], enthesitis (center right) [11], skin involvement (bottom left) [102], and axial involvement (bottom right) [11] Reprinted from Ritchlin et al. [11]. with permission from Massachusetts Medical Society. Copyright © 2017 Massachusetts Medical Society. Adapted from Coates and Helliwell [13]. © Royal College of Physicians 2017. Reprinted from Kim et al. [102] with permission. © The College of Family Physicians of Canada

Table 1 Classification criteria for psoriatic arthritis (CASPAR criteria) [39]

CASPAR	Points
Patient has PsO	2
Patient does not have PsO, but has a personal history of PsO	1
Patient does not have PsO or a personal history of PsO, but does have a family history of PsO	1
Patient has dactylitis or a history of dactylitis recorded by a rheumatologist	1
Patient has typical psoriatic nail dystrophy, including onycholysis, pitting, and hyperkeratosis observed on physical examination	1
Patient is negative for the presence of rheumatoid factor (by any method except latex)	1
Patient has radiographic evidence of juxta-articular new bone formation	1

To meet the CASPAR criteria, a patient must have inflammatory articular disease (joint, spine, or entheseal) with ≥ 3 points from the table

PsO psoriasis

	NO	YES
Have you ever had a swollen joint (or joints)?		
Has a doctor ever told you that you have arthritis?		
Do your finger nails or toe nails have holes or pits?		
Have you had pain in your heel?		
Have you had a finger or toe that was completely swollen and painful for no apparent reason?		

In the drawing below, please tick the joints that have caused you discomfort (i.e., stiff, swollen, or painful joints).

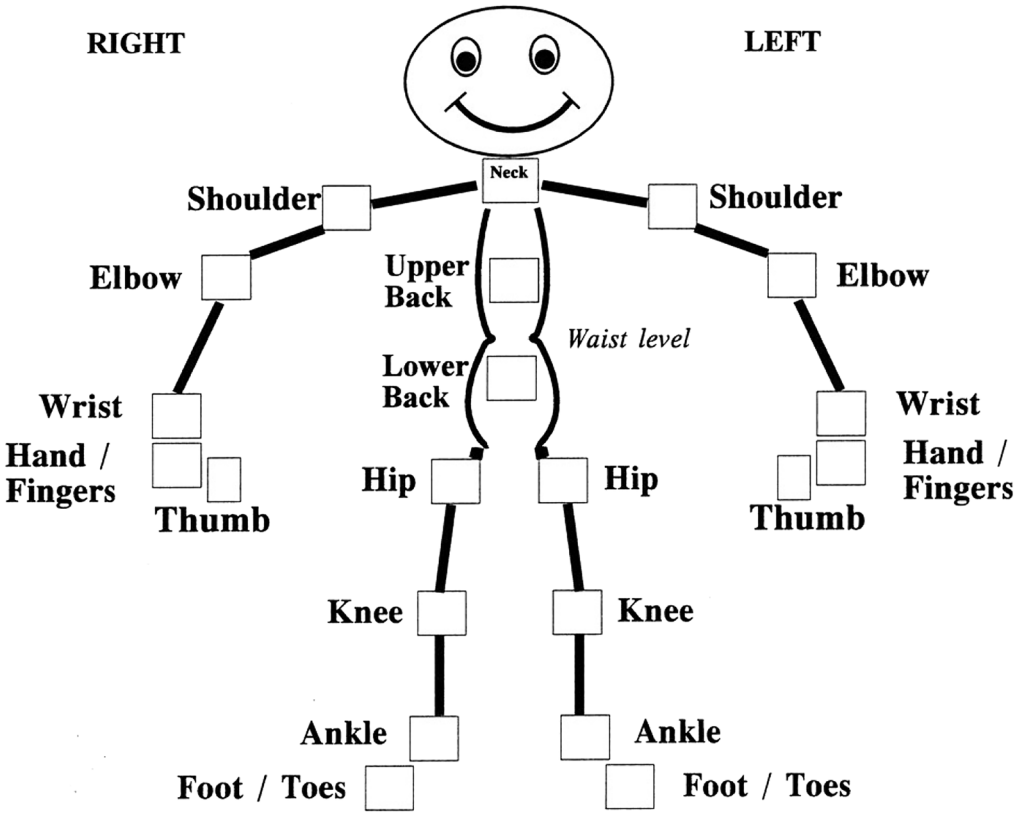

Fig. 2 The Psoriasis Epidemiology Screening Tool (PEST) questions, which can be discussed with patients with psoriasis during a consultation. The diagram allows identification of potentially affected joints [41]. Reproduced from Ibrahim et al. [41]. © Clinical and Experimental Rheumatology 2009

psoriasis [41, 42]. It consists of two parts: a set of five simple questions designed to easily identify patients with signs of PsA and a diagram that helps keep track of painful joints. For example, the PEST asks whether patients have nail pits or holes, pain in their heel, or a finger or toe that was swollen and painful for no apparent reason; a positive response to three of the five questions indicates the presence of PsA (Fig. 2). In such cases, HCPs screening for PsA (e.g., PAs/NPs in primary or dermatology settings) should refer patients to a rheumatologist [43].

To ensure an accurate diagnosis, HCPs in the rheumatology setting will need to differentiate the symptoms of PsA from those of other arthritides and can use clues provided by each of the six characteristic domains of PsA

Table 2 Differentiating psoriatic arthritis from other forms of arthritis [11, 38, 103]

Variable	Psoriatic arthritis	Rheumatoid arthritis	Osteoarthritis
Joint distribution	Asymmetrical	Symmetrical	Asymmetrical
DIP joint involvement	Common	Rare	Common
Number of affected joints	Oligoarticular	Polyarticular	Monoarticular or oligoarticular
Areas involved	All joints of a digit	Same joint across digits	Same joints across digits
Axial involvement	Common	Uncommon	Common (noninflammatory)
Sacroiliitis	Common	Never	Uncommon
Ankylosis	Common	Uncommon	Uncommon
Nail involvement	Common	Uncommon	Uncommon
Dactylitis	Common	Uncommon	Uncommon
Enthesitis	Common	Uncommon	Uncommon
New bone formation	Common	Never	Common
Stiffness after inactivity	Common	Common	Less common
Serology	Usually RF negative	Usually RF positive	Usually RF negative

DIP distal interphalangeal, *RF* rheumatoid factor

(Table 2). The peripheral arthritis associated with PsA usually occurs with asymmetrical distribution and involves the distal interphalangeal joints [25, 26]. Dactylitis is typically an early clinical sign of PsA and is more commonly observed in toes than in fingers [11, 24, 44]. Enthesitis, another early sign of PsA, is more common in the lower extremities; it is generally observed in the plantar fascia, Achilles tendons, and ligamentous attachments to the spine, pelvis, and ribs [9, 45, 46]. Axial involvement may present as asymmetrical sacroiliitis or spondylitis, and patients usually complain of lower back pain that worsens during inactivity [9]. Skin and nail disease is common in patients with PsA; skin manifestations may be hidden in areas such as the scalp, intergluteal and perianal regions, or flexural areas [13]. Common nail dystrophies include oil-drop (or "salmon patch") dyschromia, pitting, white discoloration, nail plate crumbling, and nail ridging—all of which disrupt nail plate attachment—and, eventually, onycholysis. Patients with nail psoriasis have an almost threefold higher risk of developing PsA than patients with psoriasis who lack signs of nail dystrophy, highlighting the need for early detection of nail disease [47–49].

Other diagnostic tools include laboratory tests and imaging. Although no specific laboratory test is available for PsA, it is often characterized by negative results for rheumatoid factor and anti-citrullinated peptides, with possible laboratory abnormalities, including hyperuricemia, elevated C-reactive protein, and prolonged erythrocyte sedimentation rate [50, 51]. Radiographs allow visualization of PsA-associated features (e.g., new bone formation), and magnetic resonance imaging provides visualization of soft tissue, facilitating the detection of enthesitis and spondylitis [52–55]. However, imaging is not commonly performed in primary care or dermatology settings. Overall, the diagnosis of PsA involves HCPs from multiple specialties, highlighting the importance of collaboration in patient care.

Treatment of PsA

Treatment of PsA is based on international guidelines developed by GRAPPA in 2015 and EULAR in 2019 [19, 20] and the ACR/NPF guidelines developed in 2018 [21]. The goal of PsA treatment is to achieve remission or minimal/low disease activity [56, 57].

Nonsteroidal anti-inflammatory drugs are commonly used as first-line treatment for pain, and adjunctive therapy with intra-articular glucocorticoid steroids may be considered [20]. Patients may then be treated with nonbiologic, conventional synthetic disease-modifying antirheumatic drugs (csDMARDs), biologic DMARDs (bDMARDs or biologics), or targeted synthetic DMARDs (tsDMARDs) [20]. csDMARDs (e.g., methotrexate, sulfasalazine) are commonly used to treat peripheral arthritis and skin disease; however, they often fail to improve enthesitis and axial disease [20, 58–60]. bDMARDs target various cytokines involved in the pathogenesis of PsA and have been shown to improve symptoms and inhibit the progression of structural damage [20, 61]. bDMARDs are typically used in patients in whom csDMARDs have failed, whereas tsDMARDs that inhibit phosphodiesterase-4 or Janus kinases are considered in patients who have experienced an inadequate response to, or are intolerant of, bDMARDs [20]. This section focuses on the use of bDMARDs and tsDMARDs in patients with PsA (Table 3), with several assessment tools used in the clinical trials described in Table 4.

TNFα inhibitors (TNFi) are often used as first-line biologic treatment (Table 3) [20, 21]; however, other biologics,

Table 3 Biologic and targeted synthetic disease-modifying antirheumatic drugs available for use in patients with psoriatic arthritis

Drug (administration route)	FDA approval year for PsA	Clinical trial in pts with active PsA	Clinical efficacy
TNF inhibitor			
ETA[a] (SC)	2002	Phase III RCT in 205 pts [104]	ACR20 response: significantly higher with ETA vs. PL at wk 12 (59 vs. 15%; $p < 0.0001$); results sustained at wk 24 and 48
ADA[b] (SC)	2005	Phase III RCT (ADEPT) in 315 pts [105]	ACR20 response: significantly higher with ADA vs. PL at wk 12 (58 vs. 14%; $p < 0.001$) and at wk 24 (57 vs. 15%; $p < 0.001$)
			PASI75 response: significantly higher with ADA vs. PL at wk 24 (59 vs. 1%; $p < 0.001$)
INF[c] (IV)	2005	Phase III RCT (IMPACT-2) in 200 pts [106]	ACR20 response: significantly higher with INF vs. PL at wk 14 (58 vs. 11%; $p < 0.001$)
			PsA response criteria: significantly higher with INF vs. PL (77 vs. 27%; $p < 0.001$)
GOL (SC)	2009	Phase III RCT (GO-REVEAL) in 405 pts [107]	ACR20 response: significantly higher with any dose of GOL (48%), GOL 50 mg (51%), and GOL 100 mg (45%) vs. PL at wk 14 ($p < 0.001$ for all comparisons)
CERP (SC)	2013	Phase III RCT (RAPID-PsA) of 409 pts [108]	ACR20 response: significantly higher with CERP 200 mg q2w and CERP 400 mg q4w vs. PL at wk 12 (58.0 and 51.9 vs. 24.3%; $p < 0.001$ for all comparisons)
GOL (IV)	2017	Phase III RCT (GO-VIBRANT) in 480 pts [109]	ACR20 response: significantly higher with GOL vs. PL at wk 14 (75.1 vs. 21.8%; $p < 0.001$)
IL-17A inhibitors			
SEC (SC)	2016	Phase III RCT (FUTURE 1) of 606 pts [63]	ACR20 response: significantly higher with SEC 150 mg and 75 mg vs. PL at wk 24 (50.0 and 50.5 vs. 17.3%; $p < 0.001$ for both comparisons)
		Phase III RCT (FUTURE 2) of 397 pts [64]	ACR20 response: significantly higher with SEC 300 mg (54%), SEC 150 mg (51%), and SEC 75 mg (29%) vs. PL (15%) at wk 24 ($p < 0.05$ for all comparisons)
		Phase III H2H RCT (EXCEED) of 853 pts [75]	ACR20 response: not statistically superior with SEC vs. ADA at wk 52 (67.4 vs. 61.5%; $p = 0.072$)
			PASI90 response: significantly higher with SEC vs. ADA at wk 52 (65.4 vs. 43.2%; $p < 0.0001$)
IXE (SC)	2017	Phase III RCT (SPIRIT-P1) of 417 biologic-naïve pts [68]	ACR20 response: significantly higher with IXE q4w vs. PL at wk 24 (57.9 vs. 30.2%; $p \leq 0.001$)
		Phase III RCT (SPIRIT-P2) of 363 pts with inadequate response to TNF inhibitors [69]	ACR20 response: significantly higher with IXE vs. PL at wk 24 (53 vs. 20%; $p < 0.0001$)
		Phase III H2H RCT (SPIRIT-H2H) of 566 pts [76]	ACR50 + PASI100 response: significantly higher with IXE vs. ADA at wk 24 (36 vs. 28%; $p = 0.036$)
			ACR50 response: IXE noninferior vs. ADA at wk 24 (50.5 vs. 46.6%; $p = 0.338$)
			PASI100 response: significantly higher with IXE vs. ADA at wk 24 (60.1 vs. 46.6%; $p = 0.001$)
IL-12/23 inhibitors			
UST (SC)	2013	Phase III RCT (PSUMMIT-1) of 615 adults [77]	ACR20 response: significantly higher with UST 45 mg and UST 90 mg vs. PL at wk 24 (42.4 and 49.5 vs. 22.8%; $p < 0.0001$ for both comparisons)
		Phase III RCT (PSUMMIT-2) of 312 adults [78]	ACR20 response: significantly higher with UST vs. PL at wk 24 (43.8 vs. 20.2%; $p < 0.001$)
T-cell modulator			
ABA (IV/SC)	2017	Phase II RCT (PsA-I) of 170 pts with PsO target lesion ≥ 2 cm, previously on DMARDs [110]	ACR response: vs. PL (19%), significantly higher with ABA 10 mg/kg (48%; $p = 0.006$) and ABA 30/10 mg/kg at day 169 (42%; $p = 0.022$), but not ABA 3 mg/kg (33%; $p = 0.121$)
		Phase III RCT (PsA-II) of 424 pts [111]	ACR20 response: significantly higher with ABA vs. PL at wk 24 (39.4 vs. 22.3%; $p < 0.001$)

Table 3 (continued)

Drug (administration route)	FDA approval year for PsA	Clinical trial in pts with active PsA	Clinical efficacy
tsDMARDs			
APR (oral)	2014	Phase III RCT (PALACE 1) of 504 pts who received prior csDMARD and/or biologic therapy [84]	ACR20 response: significantly higher with APR 20 mg BID and APR 30 mg BID vs. PL at wk 16 (31 and 40 vs. 19%; $p < 0.001$ for both comparisons)
		Phase III RCT (PALACE 2) of 484 pts who received prior csDMARD and/or biologic therapy [85]	ACR20 response: vs. PL (18.9%), significantly higher with APR 20 mg BID (37.4%; $p = 0.0002$) and APR 30 mg BID (32.1%; $p = 0.0060$) at wk 16
		Phase III RCT (PALACE 3) of 505 pts who received prior csDMARD and/or biologic therapy [86]	ACR20 response: vs. PL (18%), significantly higher with APR 20 mg BID (28%; $p = 0.0295$) and APR 30 mg BID (41%; $p < 0.0001$) at wk 16
TOF (oral)	2017	Phase III RCT (OPAL Broaden) of 422 pts with inadequate response to previous csDMARDs [87]	ACR20 response: significantly higher with TOF 5 and 10 mg vs. PL at 3 mo (50 and 61 vs. 33%; $p < 0.05$ for both comparisons)
			Mean changes in HAQ-DI score[d]: significantly greater improvement with TOF 5 and 10 mg vs. PL at 3 mo (− 0.35 and − 0.40 vs. − 0.18; $p < 0.01$ for both comparisons)
		Phase III RCT (OPAL Beyond) of 395 pts with inadequate response to TNF inhibitors [88]	ACR20 response: significantly higher with TOF 5 and 10 mg vs. PL (50 and 47 vs. 24%; $p < 0.001$ for both comparisons)
			Mean changes in HAQ-DI score[d]: significantly greater improvement with TOF 5 and 10 mg vs. PL at 3 mo (− 0.39 and − 0.35 vs. − 0.14; $p < 0.001$ for both comparisons)

ABA abatacept, *ACR* American College of Rheumatology, *ACR20* ≥ 20% improvement in ACR criteria, *ACR50* ≥ 50% improvement in ACR criteria, *ADA* adalimumab, *APR* apremilast, *BID* twice daily, *CERP* certolizumab pegol, *csDMARD* conventional synthetic disease-modifying antirheumatic drugs, *ETA* etanercept, *GOL* golimumab, *H2H* head-to-head trial, *HAQ-DI* Health Assessment Questionnaire Disability Index, *IL* interleukin, *INF* infliximab, *IV* intravenous, *IXE* ixekizumab, *mo* month(s), *PASI75/90/100* ≥ 75%, 90%, and 100% improvement in Psoriasis Area and Severity Index score from baseline, *PL* placebo, *PsA* psoriatic arthritis, *PsO* psoriasis, *pts* patients, *qxw* every × weeks, *RCT* randomized controlled trial, *SC* subcutaneous, *SEC* secukinumab, *TNF* tumor necrosis factor, *TOF* tofacitinib, *tsDMARD* targeted synthetic disease-modifying antirheumatic drug, *UST* ustekinumab, *wk* week(s)

[a]Biosimilar to ETA includes etanercept-szzs (approved 2016)

[b]Biosimilars to ADA include adalimumab-adbm (approved 2017), adalimumab-atto (2016), and adalimumab-adaz (2018)

[c]Biosimilars to INF include infliximab-abda (approved 2017), infliximab-dyyb (2016), and infliximab-qbtx (2017)

[d]Reductions in HAQ-DI score indicate improvements in disability

such as inhibitors of IL-17, IL-12/23, or IL-23, may be more appropriate first-line biologic treatment in certain situations (e.g., severe psoriasis) [21]. Patients who do not respond to one TNFi can be switched to another TNFi, although other biologics are recommended in case of primary TNFi efficacy failure or intolerance of TNFi [21, 62]. In these cases, IL-17 inhibitors are usually preferred over IL-12/23 inhibitors [21].

IL-17 inhibitors, which include secukinumab and ixekizumab, have also demonstrated efficacy in several disease domains of PsA and were recently recommended as first-line biologics for patients with PsA and skin involvement by the 2019 EULAR guidelines (Table 3) [20, 63–69]. Importantly, secukinumab and ixekizumab have shown efficacy in patients with PsA who had an inadequate response to TNFi therapy [63–67, 69]. Long-term analyses have shown that secukinumab sustained improvements in the symptoms of PsA out to 5 years and inhibition of radiographic progression through 2 years [70, 71], and ixekizumab sustained improvements in the signs and symptoms of PsA through 3 years of treatment [72]. Although IL-17 inhibitors have been shown to be safe in patients with PsA, they should be used with caution in patients with inflammatory bowel disease because they may exacerbate Crohn disease and ulcerative colitis [73, 74]. Moreover, results from two head-to-head trials in biologic-naive patients with PsA suggest IL-17 inhibitors may provide a greater benefit than TNFi in patients who are experiencing both skin and musculoskeletal manifestations (Table 3) [75, 76].

Ustekinumab, an IL-12/-23 inhibitor, is another biologic treatment that has been approved for PsA (Table 3) [77, 78]. However, it is not yet known whether ustekinumab provides benefits similar to those of IL-17 inhibitors in patients with PsA with skin manifestations given that no formal head-to-head comparison between ustekinumab and TNFi has been conducted.

In July 2020, guselkumab became the first IL-23 inhibitor to receive approval from the US FDA for PsA. Two phase III clinical trials, DISCOVER 1 and 2, found significant improvements in ACR20 at 24 weeks in adult patients, including patients previously treated with TNFi [79, 80]. In addition to these agents, other biologics, including additional inhibitors of IL-23 (tildrakizumab [81], risankizumab [82]) and IL-17 (bimekizumab [83]), are actively being investigated for the treatment of PsA. Results from these studies may inform future therapeutic strategies.

tsDMARDs have also emerged as treatments for PsA. These include apremilast, an oral phosphodiesterase 4 inhibitor [84–86], and tofacitinib, an oral Janus kinase inhibitor [87, 88] (Table 3). Despite apremilast showing efficacy, in an adjusted, indirect, network meta-analysis comparison study, biologics (secukinumab, infliximab, golimumab) demonstrated superior efficacy versus apremilast in treating multiple domains of PsA [89]. Tofacitinib has been approved only for patients with an inadequate response to, or who were intolerant of, methotrexate or other nonbiologic DMARDs. Despite apremilast and tofacitinib having shown efficacy in patients with PsA who had an inadequate response to TNFi therapy [84–86, 88], treatment guidelines recommend using biologics over these agents in patients with an inadequate response to TNFi [21].

Nonpharmacologic approaches

Guidelines also exist for treating psoriasis with nonpharmacologic approaches. These include topical therapies—such as emollients, vitamin D analogues, and tar—that can be valuable and inexpensive adjuncts to newer therapies. Ultraviolet irradiation has also been a time-honored modality for the treatment of psoriasis and has long been recognized as beneficial in controlling psoriatic skin lesions [90]. For patients with active PsA, nonpharmacologic interventions are often recommended regardless of pharmacologic treatment status. According to the 2018 ACR/NPF guidelines, these include low-impact exercises (e.g., tai chi, yoga, swimming), physical therapy, occupational therapy, massage therapy, and acupuncture. In addition, smoking cessation is recommended strongly because of effectiveness demonstrated in both randomized trials and the general population. In patients with PsA who are overweight or obese, weight loss is recommended for its potential to increase pharmacologic response [21].

Barriers to timely diagnosis and management of PsA

Several barriers contribute to the underdiagnosis and suboptimal care of patients with PsA. Clinicians treating patients with psoriasis are not always aware of the importance of routinely screening their patients for PsA. Similarly, patient education on the signs, symptoms, and risks of PsA is often inadequate. Diagnosis is often delayed because of the heterogeneity of PsA and lack of a defined set of diagnostic criteria [38].

Delays in diagnosis may also result from the long wait times experienced by patients referred to a rheumatologist [91]. The number of rheumatologists in the USA is low, and a decline in the rheumatology workforce is projected through 2030 [92–94]. Furthermore, rheumatology practices are unevenly distributed, with metropolitan areas having a higher density of rheumatologists than rural areas [92, 95]. These findings suggest that, in addition to experiencing long wait times to see a specialist, patients may have to travel long distances, further contributing to delays in diagnosis.

Another barrier is that patients with PsA may not always receive optimal treatment. For instance, more-efficacious agents may not be used because of their higher cost [96–98]. In some cases, patients may continue treatment with less costly and less effective therapies or discontinue new treatment soon after treatment initiation [99]. In other cases, patients may not be able or willing to make multiple physician visits or obtain laboratory tests. Additionally, patients may refuse treatment because of a fear of adverse events, which may stem from concerns over starting a new drug, or from information seen in TV advertisements or other media. This is likely based on the perception that the risks of treatment-associated adverse events are greater than the risks of disease progression.

Improving patient care in PsA

PAs and NPs play important roles in the diagnosis and treatment of psoriasis and PsA and can help improve the care of patients with PsA. Primary care and dermatology PAs and NPs are often the first to see patients with psoriasis and are therefore ideally positioned to screen them for PsA and refer them to a rheumatologist as needed.

Once patients are referred to a rheumatologist and a diagnosis of PsA has been confirmed, rheumatology PAs/NPs can effectively educate patients on the disease and available treatments. They can also treat patients with PsA and help prevent complications and disease progression by managing treat-to-target (T2T) strategies in rheumatology practice, as has been done previously for patients with rheumatoid arthritis (RA) [56, 100]. T2T strategies focus on disease that is inactive or in remission as the primary target and were shown to improve patient outcomes versus the standard of care in TICOPA, a randomized study in PsA [101]. These findings suggest that PAs and NPs should be trained in T2T strategies as part of their education.

Table 4 Key assessments of psoriatic arthritis

ACR20/50/70 response [112]
Patients must show a ≥ 20%, 50%, or 70% improvement in swollen and tender joint counts, and three of five other measures
Patient global assessment
Physician global assessment
Patient-reported pain
Patient-reported physical function
Acute-phase reactants (CRP or ESR)
MDA [113]
A patient is classified as achieving MDA when meeting five or more of the following seven criteria
Tender joint count ≤ 1
Swollen joint count ≤ 1
PASI ≤ 1 or BSA ≤ 3
Patient pain VAS ≤ 15
Patient global disease activity VAS ≤ 20
Health assessment questionnaire ≤ 0.5
Tender entheseal points ≤ 1
HAQ-DI [114]
20 items divided into eight domains: dressing and grooming, arising, eating, walking, hygiene, reach, grip, and common daily activities
Subjects rate the degree of difficulty they have had in the past week on a 4-point scale, ranging from 0 (no difficulty) to 3 (unable to do)
The highest scores in each category are summed (0–24) and divided by the number of categories scored to yield a score from 0 to 3
DLQI [115]
10-item questionnaire to measure how much a patient's skin problem has affected their life over the last week (range 0–30)
0–1: no effect at all on patient's life
2–5: small effect on patient's life
6–10: moderate effect on patient's life
11–20: very large effect on patient's life
21–30: extremely large effect on patient's life
PASI [116]
Measure of overall psoriasis severity and coverage, consisting of two major steps
Calculate the patient's BSA covered with lesions—each region of the body (head, upper limbs, trunk, lower limbs) is given a score representing the proportion involved: 1 (0–9%), 2 (10–29%), 3 (30–49%), 4 (50–69%), 5 (70–89%), or 6 (90–100%)
Assessment of the severity of lesions, which consists of assessing lesions' erythema (redness), induration (thickness), and scaling—each plaque sign is assessed on a 5-point scale: 0 (none), 1 (mild), 2 (moderate), 3 (severe), or 4 (very severe)
All calculations are combined into a single score (PASI score) in the range of 0 (no psoriasis on the body) to 72 (the most severe case of psoriasis)
Scores are summed and weighted by region (head = 0.1; upper limbs = 0.2; trunk = 0.3; lower limbs = 0.4)

ACR American College of Rheumatology, *BSA* body surface area, *CRP*, C-reactive protein, *DLQI* Dermatology Life Quality Index, *ESR* erythrocyte sedimentation rate, *HAQ-DI* Health Assessment Questionnaire Disability Index, *MDA* minimal disease activity, *PASI* Psoriasis Area and Severity Index, *VAS* visual analog score

The ACR Workforce studies have also underscored the important role that nonphysician clinicians have in treating PsA. To help close the gap between supply and demand for rheumatology services, these studies suggested increasing the recruitment of PAs and NPs into rheumatology practices and developed a web-based rheumatology curriculum for PAs and NPs [92–94]. An initiative by the ACR and Association of Rheumatology Professionals is also actively considering formal rheumatology programs for NPs and PAs, which would improve PsA patient care [92].

Conclusions

Psoriasis is a complex disease that extends beyond skin manifestations. A substantial proportion of patients with psoriasis develop PsA and are at risk of experiencing irreversible and disabling joint damage. Therefore, early diagnosis and intervention with therapies that effectively treat all aspects of psoriatic disease are necessary in these patients. Nonphysician clinicians are well positioned to identify patients with PsA and increasingly play larger roles in the early diagnosis, treatment, and education of these patients. Further utilization

of nonphysician clinicians is needed to improve the care of patients with psoriatic disease.

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Declarations

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Conflict of interest M.D. Overcash has served as a speaker or advisor for BioPlus, Novartis, Celgene, Bayer HealthCare, Pfizer, Sonoma, IQVIA, Amerita, Ranbaxy, Cipher Pharmaceuticals, Blue Sky, and The Dominion Group. C. Chillura, S.P. Fender, M.K. Ewald, A.M. McNair, M. Nye, and C. Blankenship have no conflicts of interest that are directly relevant to the content of this article.

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