

## Psoriasis: Pathogenesis, Clinical Features, and Treatment Approaches – A Review

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### Abstract

Psoriasis is a chronic, immune-mediated inflammatory skin disorder characterized by abnormal keratinocyte proliferation and persistent inflammation, leading to the development of thick, erythematous, and scaly plaques. The disease commonly presents with symptoms such as itching, pain, and discomfort, and significantly affects patients' physical, psychological, and social well-being. Globally, psoriasis affects approximately 2–3% of the population, with a higher prevalence reported in developed countries. The condition can manifest at any age and follows a lifelong course with periods of remission and relapse. The pathogenesis of psoriasis involves a complex interaction between genetic predisposition, immune system dysregulation, and environmental triggers. Activation of immune cells, particularly T lymphocytes, results in the release of pro-inflammatory cytokines such as tumor necrosis factor-alpha, interleukin-17, and interleukin-23. These mediators promote excessive keratinocyte proliferation and sustain chronic inflammation. Various external factors, including stress, infections, skin trauma, medications, and climatic changes, can exacerbate disease activity. Clinically, psoriasis presents in several forms, including plaque, guttate, inverse, pustular, and erythrodermic psoriasis, each with distinct morphological features and severity. Diagnosis is primarily based on clinical examination, supported by histopathological findings in atypical cases. Disease severity and impact on quality of life are assessed using standardized tools such as the Psoriasis Area and Severity Index and the Dermatology Life Quality Index. Management of psoriasis depends on disease severity, clinical type, and patient-related factors. Therapeutic options include topical agents, phototherapy, conventional systemic therapies, and biologic agents targeting specific inflammatory pathways. This review provides a comprehensive overview of the epidemiology, pathogenesis, clinical features, diagnosis, and current treatment approaches for psoriasis, highlighting recent therapeutic advances and future perspectives in disease management.

Keywords: Clinical features; Pathogenesis; Psoriasis; Treatment

### INTRODUCTION

Psoriasis is a chronic, immune-mediated inflammatory skin disorder characterized by excessive keratinocyte proliferation and persistent inflammation, resulting in well-defined erythematous plaques covered with silvery scales [1,2]. Although it primarily affects the skin, psoriasis is now recognized as a systemic disease with immunological, genetic, and environmental influences. The condition often presents with itching, pain,

and visible lesions, which can significantly impair daily functioning and social interactions.

The term psoriasis is derived from the Greek word “psora”, meaning itch, combined with “iasis”, indicating a disease condition [1]. Psoriasis affects approximately 2–3% of the global population and shows higher prevalence in developed regions such as Europe and North America [2,3]. It may occur at any age but most commonly

presents during adolescence or early adulthood, affecting both sexes [2].

Clinically, psoriasis presents in multiple forms, most commonly plaque psoriasis, which typically involves the elbows, knees, scalp, and lower back [4,5]. Other variants include guttate, inverse, pustular, and erythrodermic psoriasis, each with distinct morphological and clinical features.

Disease severity ranges from mild localized lesions to extensive skin involvement and may be assessed using validated scoring systems such as the Psoriasis Area and Severity Index (PASI) and Dermatology Life Quality Index (DLQI) [5].

Psoriasis is a lifelong disease marked by alternating phases of flare-ups and remission, influenced by factors such as stress, infections, medications, and environmental conditions [3,6]. Beyond skin involvement, persistent systemic inflammation increases the risk of comorbidities including psoriatic arthritis, cardiovascular disease, and metabolic disorders, highlighting the need for early recognition and appropriate management [6,7].

**EPIDEMIOLOGY**

Psoriasis is a common chronic inflammatory skin disorder affecting millions of people worldwide. Estimates suggest a global prevalence ranging from 0.14% to 3%, with variations across regions and populations [8,9]. The condition is more prevalent in Western and Central Europe, North America, and Australasia, where prevalence may reach 4–5%, while East Asia, South Asia, and Sub-Saharan Africa report lower rates, often below 1% [9,10].

Psoriasis can affect both men and women, with a slight variation in prevalence across populations. The disease may develop at any age, though it most commonly presents during adolescence and early adulthood [9].

Several genetic, environmental, and immunological factors contribute to its occurrence, explaining the differences observed between regions.

Apart from cutaneous symptoms, psoriasis is associated with multiple comorbidities, including psoriatic arthritis, cardiovascular diseases, metabolic syndrome, and psychological disorders such as depression and anxiety [6]. Epidemiological data remain incomplete in many countries, highlighting the need for standardized reporting and better disease monitoring to inform healthcare planning and patient care [8,9].

**Table 1: Estimated Prevalence of Psoriasis by Region (Adapted from Parisi et al., 2020)**

Region /Country	Prevalence
Western Europe	2-4
Central Europe	2-3
North America	3-4
East Asia	0.1-0.5
South Asia	0.2-0.6
Sub-Saharan Africa	0.1-1
Australasia	1-2
Global Average	0.14-1.99

**PATHOGENESIS**

Psoriasis is a chronic, immune-mediated inflammatory skin disorder that results from a complex interaction between genetic susceptibility, immune dysregulation, and environmental triggers.

Genome-wide association studies have identified several psoriasis-associated loci, particularly within the major histocompatibility complex (HLA-Cw6), supporting a strong genetic contribution to disease development. In genetically predisposed individuals, external factors such as infections, psychological stress, skin trauma (Koebner phenomenon), medications, smoking, and climatic changes act as initiating stimuli that activate the cutaneous immune system and precipitate disease onset or exacerbation [1,4].

The pathogenic cascade begins with the activation of innate immune cells, especially plasmacytoid and myeloid dendritic cells in the skin. These cells release interferon- $\alpha$  and other inflammatory mediators, which promote the activation and differentiation of naïve T cells into effector T helper subsets, predominantly Th1 and Th17 cells. The IL-23/Th17 axis plays a pivotal role in maintaining chronic inflammation, as IL-23 sustains Th17 cell survival and cytokine production [4,6,11].

Activated Th1 and Th17 cells migrate to the epidermis and dermis, where they secrete key pro-inflammatory cytokines such as tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interferon- $\gamma$  (IFN- $\gamma$ ), interleukin-17 (IL-17), interleukin-22 (IL-22), and interleukin-21 (IL-21). These cytokines act synergistically to amplify inflammatory signaling pathways, recruit additional immune cells including neutrophils and macrophages, and perpetuate the chronic inflammatory loop characteristic of psoriasis [6,11].

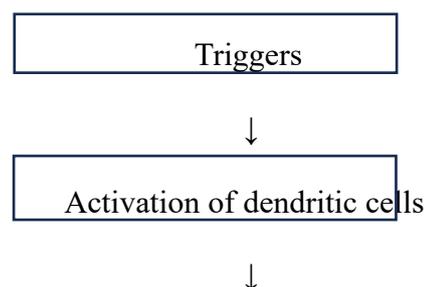
Keratinocytes are not merely passive targets but active participants in psoriatic inflammation. Cytokine stimulation causes keratinocytes to undergo abnormal differentiation and hyperproliferation. While normal epidermal turnover occurs over 28–30 days, psoriatic epidermis demonstrates a markedly accelerated turnover of approximately 3–5 days. This rapid proliferation

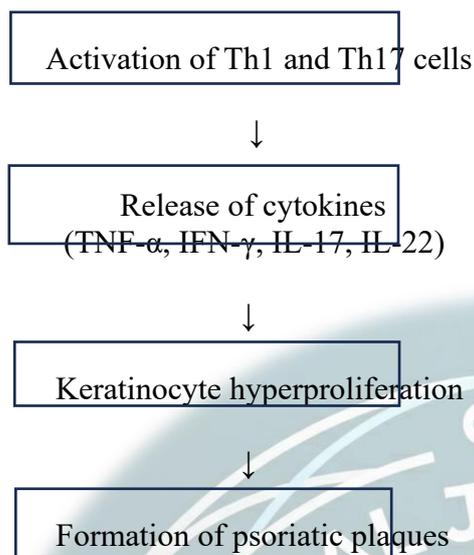
leads to the accumulation of immature keratinocytes and excessive scaling, forming the well-demarcated erythematous plaques typical of psoriasis. Additionally, keratinocytes release antimicrobial peptides, chemokines, and cytokines that further sustain immune activation [6,11].

Vascular alterations also contribute significantly to lesion formation. Enhanced angiogenesis and dilation of dermal blood vessels increase blood flow to psoriatic plaques, accounting for their characteristic erythema and warmth. Endothelial cells express adhesion molecules that facilitate leukocyte trafficking into inflamed skin, thereby reinforcing persistent inflammation [1,11]. Importantly, psoriasis is now recognized as a systemic inflammatory disease rather than a condition limited to the skin.

Chronic immune activation and circulating inflammatory mediators explain the strong association between psoriasis and comorbidities such as psoriatic arthritis, cardiovascular disease, metabolic syndrome, diabetes mellitus, and psychological disorders including depression and anxiety. This systemic involvement underscores the need for early diagnosis and comprehensive therapeutic strategies targeting immune pathways [11].

The immunopathogenic mechanism of psoriasis is summarized in Figure 1, illustrating the sequential involvement of environmental triggers, immune cell activation, cytokine release, keratinocyte hyperproliferation, and plaque formation.





**Figure 1: Pathogenesis of Psoriasis**

**CLINICAL FEATURES AND TYPES OF PSORIASIS**

Psoriasis is a chronic inflammatory skin disorder that can affect the skin, nails, and joints. Lesions, itching, and discomfort can significantly impact patients’ quality of life [1,2,4]. The severity of psoriasis varies, and disease burden is often assessed using tools like PASI (Psoriasis Area and Severity Index), BSA (Body Surface Area), and DLQI (Dermatology Life Quality Index) [2,6].

**1. Plaque Psoriasis (Psoriasis Vulgaris)**

The most common type, plaque psoriasis, presents as raised, red, scaly patches with sharply defined borders. Lesions typically occur on the elbows, knees, scalp, and lower back. Patients may experience mild to moderate itching and discomfort, and chronic visible plaques can negatively affect psychological well-being and social interactions [1,4].

**2. Guttate Psoriasis**

Guttate psoriasis appears as small, drop-shaped lesions, often triggered by bacterial infections such as streptococcal

pharyngitis. It is more frequent in children and young adults. While lesions may resolve spontaneously, sudden outbreaks can cause significant stress and anxiety [2,4].

**3. Inverse Psoriasis**

Inverse psoriasis affects skin folds, including under the breasts, the groin, and around the buttocks. Lesions are smooth, red, and shiny, with friction or sweating worsening symptoms. Although usually less scaly, these lesions can cause pain and discomfort during movement and daily activities, impacting quality of life [1,2].

**4. Pustular Psoriasis**

Pustular psoriasis is characterized by white pustules on inflamed skin, either localized (palms/soles) or generalized. Pain, redness, and discomfort are common. Severe or generalized forms may require hospitalization due to systemic effects, and patients often experience emotional distress [1,4].

**5. Erythrodermic Psoriasis**

Erythrodermic psoriasis is a rare, severe variant with widespread redness, scaling, and intense itching. This type can disrupt body temperature regulation and may be life-threatening, causing both physical and psychological stress [1,2].

**6. Nail Psoriasis**

Nail involvement may include pitting, thickening, discoloration, or crumbling, more often in fingernails than toenails. Nail changes can be painful, interfere with daily tasks, and are often linked to lower self-esteem. Nail psoriasis may also precede psoriatic arthritis [1,2].

**7. Psoriatic Arthritis**

Psoriatic arthritis affects both joints and skin, causing pain, swelling, stiffness, and functional impairment. Untreated arthritis can result in permanent joint damage and severely affect mobility and quality of life [2,4].

## DIAGNOSIS OF PSORIASIS

- **Clinical Examination**

The diagnosis of psoriasis is primarily clinical, based on a careful examination of the skin, nails, and occasionally joints. Typical lesions are well-demarcated, red, scaly plaques, most commonly seen on the elbows, knees, scalp, hands, feet, and skin folds. Nail changes, including pitting, discoloration, or onycholysis, can provide additional diagnostic clues and help support the clinical diagnosis [1,2,4].

A detailed patient history—including onset, family history, triggers (stress, infections, medications), and prior treatments—further aids in accurate diagnosis.

- **Dermoscopic Features**

Dermoscopy can reveal characteristic vascular patterns and scaling in psoriatic plaques, which can assist in early or atypical cases [2,4].

- **Histopathology (Skin Biopsy)**

In atypical or uncertain cases, a skin biopsy may be performed to confirm the diagnosis. Histopathological examination typically reveals epidermal hyperplasia, parakeratosis, Munro microabscesses, and dilated dermal blood vessels, which are characteristic features of psoriasis [2,4].

- **Laboratory Investigations**

Laboratory tests are rarely required for psoriasis diagnosis but may be used to rule out infections or other dermatological conditions when necessary.

- **Differential Diagnosis**

It is important to differentiate psoriasis from other skin disorders such as eczema, atopic dermatitis, seborrheic dermatitis, lichen planus, and fungal infections (tinea) to avoid misdiagnosis and ensure appropriate management [1,4].

- **Scoring and Severity Assessment**

Assessment of disease severity and its impact on quality of life is crucial for guiding treatment decisions. Tools commonly used include the Psoriasis Area and Severity Index (PASI) for evaluating lesion severity and extent, Body Surface Area (BSA) to estimate the percentage of affected skin [2,6].

## ETIOLOGY AND CAUSES OF PSORIASIS

Psoriasis is a chronic immune-mediated inflammatory skin disorder with a multifactorial etiology. Its development results from a complex interaction between genetic susceptibility, immune dysregulation, and environmental triggers [1,4,6].

1. **Genetic Factors**

A strong genetic predisposition plays a key role in psoriasis. Individuals with a family history of psoriasis are at a higher risk of developing the disease. Several susceptibility genes have been identified, particularly HLA-Cw6, which is associated with early-onset and severe forms of psoriasis [1,16].

2. **Immune System Dysregulation**

Psoriasis is characterized by abnormal activation of the immune system. T helper cells, especially Th1 and Th17, release pro-inflammatory cytokines such as TNF- $\alpha$ , IL-17, and IL-23, which stimulate keratinocyte hyperproliferation and sustain chronic inflammation [3,6,11].

3. **Environmental and Triggering Factors**

Various environmental factors can trigger disease onset or exacerbate existing psoriasis. These include psychological stress, skin trauma (Koebner phenomenon), infections, medications such as beta-blockers and lithium, smoking, alcohol consumption, and climatic changes [3,4].

4. **Infectious Factors**

Infections, particularly streptococcal throat infections, are strongly associated with the

onset of guttate psoriasis. Microbial antigens may activate immune pathways that initiate or worsen psoriatic inflammation [4,17].

### 5. Lifestyle and Metabolic Factors

Lifestyle-related factors such as obesity, sedentary habits, and metabolic syndrome are increasingly recognized contributors to psoriasis severity. These factors promote systemic inflammation and are linked with increased cardiovascular and metabolic comorbidities in psoriatic patients [9,12].

### 6. Summary

Psoriasis arises due to the interaction of genetic predisposition, immune system abnormalities, and environmental triggers. Understanding the etiological factors is essential for early intervention, prevention of disease flare-ups, and selection of personalized treatment strategies [1,4,6].

## TREATMENT APPROACHES OF PSORIASIS

Psoriasis management requires a comprehensive, patient-centered approach, tailored to disease severity, type, comorbidities, and individual quality of life. The main objectives are to reduce inflammation, control lesion progression, alleviate symptoms, prevent complications, and enhance psychosocial well-being [12-15].

Treatment strategies are broadly classified into topical therapy, phototherapy, systemic therapy, biologics, emerging therapies, and supportive measures.

### 1. Topical Therapies

Topical agents are the first-line choice for mild to moderate psoriasis, targeting localized plaques and minimizing systemic side effects:

- **Corticosteroids:** Suppress inflammation, reduce keratinocyte hyperproliferation, and relieve itching and redness [13,14].

- **Vitamin D analogs (e.g., calcipotriol):** Regulate keratinocyte differentiation and proliferation, often used in combination with corticosteroids for enhanced efficacy [14].
- **Coal tar and salicylic acid preparations:** Reduce scaling and inflammation, improve skin texture [15].
- **Moisturizers/emollients:** Essential adjuncts to maintain hydration, reduce xerosis, and enhance patient comfort [15].

### 2. Phototherapy

Phototherapy is highly effective for moderate to severe psoriasis, particularly when topical therapy is insufficient:

- **Narrowband UVB:** Standard therapy with favorable efficacy and safety profile for widespread lesions [6,14].
- **PUVA (Psoralen + UVA):** Combines photosensitizer psoralen with UVA exposure to target hyperproliferative skin [14].
- Treatment sessions require medical supervision to minimize phototoxicity and monitor cumulative UV exposure.

### 3. Systemic Therapies

For severe, refractory, or extensive psoriasis, systemic agents are used to control disease activity:

- **Methotrexate:** A folate antagonist reducing immune-mediated inflammation and keratinocyte turnover [6,12].
- **Cyclosporine:** Potent immunosuppressant with rapid onset, reserved for short-term use due to nephrotoxicity risk [12].
- **Acitretin:** Oral retinoid normalizing keratinocyte differentiation, often combined with phototherapy for synergistic effect [6].

### 4. Biologic Therapies

Biologics target specific pro-inflammatory cytokines driving psoriasis pathogenesis, suitable for moderate-to-severe disease unresponsive to conventional therapy:

- TNF- $\alpha$  inhibitors (e.g., etanercept, adalimumab) [12]
- IL-17 inhibitors (e.g., secukinumab, ixekizumab) [12]
- IL-23 inhibitors (e.g., guselkumab, risankizumab) [4]

Biologics offer rapid lesion clearance, reduced systemic inflammation, and improved quality of life, with ongoing monitoring for infections and other adverse effects.

#### 5. Emerging Therapies

- JAK inhibitors, PDE-4 inhibitors, and novel immune modulators are under investigation, offering promise for personalized and targeted therapy [4].
- Combination therapies and treatment algorithms tailored to disease subtype, severity, and patient comorbidities are an evolving strategy.

#### 6. Supportive Measures

- Lifestyle modifications, including weight management, smoking cessation, alcohol reduction, and stress control, can reduce flare-ups and improve therapeutic outcomes [4,15].
- Patient education, adherence counseling, and psychological support are crucial to enhance treatment response and overall quality of life.

### COMPLICATIONS AND COMORBIDITIES OF PSORIASIS

Psoriasis is not limited to the skin; it can affect multiple organ systems and significantly impact patients' overall health and quality of life. Awareness of associated complications is essential for comprehensive management.

#### 1. Psoriatic Arthritis

Approximately 20–30% of individuals with psoriasis develop psoriatic arthritis, which causes joint pain, stiffness, and swelling. If left untreated, it can lead to permanent joint

damage and functional impairment, further reducing quality of life [12,18].

#### 2. Cardiovascular Diseases

Chronic systemic inflammation in psoriasis patients increases the risk of cardiovascular conditions, including hypertension, coronary artery disease, and myocardial infarction. Early identification and management of cardiovascular risk factors are crucial [9,19].

#### 3. Metabolic Syndrome

Psoriasis is associated with metabolic syndrome, encompassing obesity, insulin resistance, dyslipidemia, and hypertension. These conditions not only exacerbate psoriasis severity but also increase the risk of long-term complications [9,20].

#### 4. Psychological Impact

Living with visible skin lesions and chronic discomfort can lead to significant psychological distress. Depression, anxiety, social stigma, and impaired self-esteem are commonly reported among psoriasis patients [18,21].

### DISCUSSION AND FUTURE DIRECTIONS

Psoriasis management has advanced significantly over the past decades, yet several challenges persist. Despite the availability of topical agents, systemic therapies, and biologics, treatment adherence, variable patient response, and potential adverse effects continue to limit optimal outcomes [9,20]. Current research highlights gaps in understanding the complete molecular pathways, environmental triggers, and the interplay between comorbidities and psoriasis severity.

Addressing these gaps is crucial for developing more targeted and effective therapies [4,19]. Emerging treatments, including novel biologic agents and small-molecule

inhibitors targeting specific cytokines and signaling pathways, offer promising avenues for personalized care. These strategies aim to improve efficacy while minimizing side effects, tailoring therapy to individual patient profiles [6,12].

Long-term management should emphasize regular monitoring of comorbid conditions such as psoriatic arthritis, cardiovascular risk factors, metabolic syndrome, and psychological impact. Integrating multidisciplinary care approaches can enhance patient quality of life and prevent complications [2].

Finally, public health initiatives promoting awareness, early diagnosis, and access to healthcare are essential, particularly in regions with limited resources or incomplete epidemiological data. Continued research and innovation will be key to improving outcomes for psoriasis patients worldwide.

## CONCLUSION

Psoriasis is a complex, chronic, immune-mediated skin disorder that significantly affects patients' quality of life. This review highlights its multifactorial pathogenesis involving genetic predisposition, immune dysregulation, and environmental triggers, along with a broad spectrum of clinical manifestations ranging from skin lesions to nail and joint involvement. Effective management requires a comprehensive, patient-centered approach tailored to disease severity and individual needs, incorporating topical therapies, phototherapy, systemic agents, and biologics.

Early diagnosis, appropriate treatment, and regular monitoring of comorbidities such as psoriatic arthritis, cardiovascular disease, and metabolic syndrome are essential to reduce long-term complications and improve clinical outcomes. Advances in understanding immune pathways and targeted therapies continue to enhance treatment

precision, while increased awareness and multidisciplinary care remain crucial for minimizing disease burden and improving overall patient well-being.

## REFERENCES

1. Nestle FO, Kaplan DH, Barker J. Psoriasis. *N Engl J Med*. 2009;361(5):496–509.
2. Parisi R, Symmons DPM, Griffiths CEM, Ashcroft DM. Global epidemiology of psoriasis: a systematic review of incidence and prevalence. *J Invest Dermatol*. 2020;140(2):154–162.
3. Griffiths CEM, Armstrong AW, Gudjonsson JE, Barker JN. Psoriasis. *Lancet*. 2021;397(10281):1301–1315.
4. Rendon A, Schäkel K. Psoriasis pathogenesis and treatment. *Int J Mol Sci*. 2019;20(6):1475.
5. Armstrong AW, Read C. Pathophysiology, clinical presentation, and treatment of psoriasis. *JAMA*. 2020;323(19):1945–1960.
6. Lowes MA, Suarez-Fariñas M, Krueger JG. Immunology of psoriasis. *Annu Rev Immunol*. 2014;32:227–255.
7. Mehta NN, Gelfand JM. Epidemiology and comorbidities of psoriasis. *Clin Dermatol*. 2018;36(6):721–728.
8. Parisi R, Symmons DP, Griffiths CE, Ashcroft DM. Global epidemiology of psoriasis: a systematic review of incidence and prevalence. *J Invest Dermatol*. 2013;133(2):377–385.
9. Boehncke WH, Schön MP. Psoriasis. *Lancet*. 2015;386(9997):983–994.
10. Gelfand JM, Weinstein R, Porter SB, et al. Prevalence and treatment of psoriasis in the United States. *Arch Dermatol*. 2005;141:1537–1544.
11. Bugaut H, Aractingi S. Major role of the IL-23/IL-17 axis in psoriasis supports targeted therapies. *J Invest Dermatol*. 2021;141(1):18–25.

12. Mehta NN, Yu Y, Pinnelas R, Krishnamoorthy P, Shin DB, Troxel AB, Gelfand JM. Attributable burden of comorbidities in patients with psoriasis: a population-based study. *Br J Dermatol*. 2019;181:1266–1274.
13. Nast A, et al. European S3-Guidelines on the systemic treatment of psoriasis vulgaris – Update 2015 – Part 1. *J Eur Acad Dermatol Venereol*. 2015;29(12):2277–2340.
14. Menter A, et al. Guidelines of care for the management of psoriasis with phototherapy and photochemotherapy. *J Am Acad Dermatol*. 2010;62:114–135.
15. Smith CH, et al. Management of psoriasis and psoriatic arthritis in adults: concise guidelines. *Br J Dermatol*. 2020;182:460–475.
16. Tsoi LC, Stuart PE, Tian C, et al. Large-scale genetic study of psoriasis. *Nat Genet*. 2017;49(5):692–701.
17. Fry L, Baker BS. Triggering psoriasis: the role of infections. *Clin Dermatol*. 2007;25(6):606–615.
18. Ritchlin CT, Colbert RA, Gladman DD. Psoriatic arthritis. *N Engl J Med*. 2017;376:957–970.
19. Armstrong AW, Harskamp CT, Armstrong EJ. Psoriasis and metabolic syndrome: a systematic review and meta-analysis. *J Am Acad Dermatol*. 2013;68:654–662.
20. Elmetts CA, Leonardi CL, Davis DMR, et al. Joint AAD-NPF guidelines of care for the management and treatment of psoriasis with awareness and management of comorbidities. *J Am Acad Dermatol*. 2019;80:1073–1113.
21. Kurd SK, Troxel AB, Crits-Christoph P, Gelfand JM. The risk of depression, anxiety, and suicidality in patients with psoriasis. *Arch Dermatol*. 2010;146:891–895.