

# DERMATOLOGY NURSE PRACTICE



## The Evolving Treatment of Pustular Psoriasis:

WHERE WE ARE AND WHERE WE'RE GOING

### INSIDE THIS ISSUE:

How has the treatment of pustular psoriasis evolved in recent years?

What are the appropriate treatment goals among patients with generalized pustular psoriasis (GPP) and palmoplantar pustulosis (PPP)?

When should biologic therapies be introduced as options for patients with GPP and PPP?

What are some ways that providers can intervene to alleviate quality of life problems in patients with pustular psoriasis?

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This activity supported by an independent educational grant from Boehringer Ingelheim Pharmaceuticals, Inc.

RELEASE DATE: **June 30, 2023**

EXPIRATION DATE: **June 30, 2024**

ACTIVITY URL:  
[www.dnanurse.org/educational-activities](http://www.dnanurse.org/educational-activities)

## LEARNING OBJECTIVES

After participating in the activity, learners should be better able to:

- Describe appropriate treatment goals in patients with generalized pustular psoriasis (GPP) and palmoplantar pustulosis (PPP)
- Determine shortcomings of published guidelines for the treatment of pustular psoriasis
- Assess the role of currently approved and emerging biologic therapies in the treatment of GPP and PPP
- Identify the most common mental and psychological challenges associated with pustular psoriasis

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## OFF-LABEL PRODUCT DISCLOSURE

This activity includes discussion of investigational and/or off-label use of the following products or devices: Spesolimab, imsidolimab, anakinra, infliximab, etanercept, ustekinumab, guselkumab, secukinumab, brodalumab, ixekizumab, and risankizumab.

## TARGET AUDIENCE

This activity has been designed to meet the educational needs of nurses, nurse practitioners, and physician assistants. Other healthcare providers may also participate.

## ACTIVITY DESCRIPTION

In this issue of *Dermatology Nurse Practice*, we discuss the safety and efficacy of spesolimab, agents commonly used off-label to treat generalized pustular psoriasis and palmoplantar pustulosis, and agents in late-stage development for the treatment of pustular psoriasis. We also explore how clinicians can support patients with pustular psoriasis as they deal with the mental and psychological burden of these diseases.

## ACCREDITATION AND CREDIT DESIGNATION

### Nurses

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This activity is awarded 1.25 Nursing Continuing Professional Development/Continuing Education (NCPD/CE) Credits, which includes 0.25 ANCC Pharmacology Credits. The estimated time of completion is 75 minutes.

This educational activity is jointly provided by Dermatology Nurses' Association and Excalibur Medical Education.

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# THE EVOLVING TREATMENT OF PUSTULAR PSORIASIS: WHERE WE ARE AND WHERE WE'RE GOING

Pustular psoriasis is a rare, painful, and often debilitating form of psoriasis in which pustules form that are often surrounded by inflamed skin.<sup>1</sup> The most common subtypes of pustular psoriasis are generalized pustular psoriasis (GPP) and palmoplantar pustulosis (PPP), the treatment of which will be discussed in this article.

For years, many clinicians believed pustular psoriasis was a subtype of plaque psoriasis since many patients with pustular psoriasis have a history of plaque psoriasis.<sup>2,3</sup> In addition, because pustular psoriasis is so rare—for example, only 0.6% to 2.4% of patients with plaque psoriasis also develop GPP<sup>4</sup>—little information specific to pustular psoriasis has been historically available. As a result, treatment recommendations for pustular psoriasis have tended to reflect treatment recommendations for the much better understood plaque psoriasis, with poor results: In one study that followed patients with GPP for at least 6 months, roughly one-third were hospitalized at least once for a flare.<sup>5</sup> GPP cases that require hospitalization can be fatal, with an estimated mortality rate of 5% to 10%.<sup>6</sup>

Not surprisingly, in a recent survey of 66 patients in the United States with GPP, only one-third believed their disease was well-controlled.<sup>7</sup>

Thanks to recent genetic, molecular, and clinical studies, we now understand that GPP and PPP are conditions distinct from plaque psoriasis that require their own treatment approaches.<sup>2,8</sup> Even so, progress toward identifying effective treatments for GPP and PPP has been slow and challenging. Nearly all clinical trials conducted on candidate treatments for psoriasis exclude patients with pustular psoriasis.<sup>9</sup> At the same time, conducting clinical trials exclusive to pustular psoriasis is extremely difficult given the rarity of GPP and PPP, as well as their relapsing-remitting nature.<sup>10</sup> Thus, while patients with plaque psoriasis can choose from a wide range of treatments that have grown increasingly more effective, safer, and more convenient, patients with pustular psoriasis have been left behind.

Fortunately, the treatment landscape for pustular psoriasis has finally started to improve. In 2022, the

## DRUG NAMES INCLUDED WITHIN THIS ISSUE

Generic	Brand
Spesolimab	Spevigo
Acitretin	Soriatane
Cyclosporine	Gengraf, Neoral
Methotrexate	Otrexup, Rasuvo, RediTrex
Imsidolimab	Not available
Anakinra	Kineret
Infliximab	Remicade
Etanercept	Enbrel
Calcipotriene	Dovonex
Tacrolimus	Astagraf XL, Envarsus XR, Prograf, Protopic
Ustekinumab	Stelara
Guselkumab	Tremfya
Secukinumab	Cosentyx
Brodalumab	Siliq
Ixekizumab	Taltz
Risankizumab	Skyrizi

U.S. Food and Drug Administration approved spesolimab, the first-ever therapy indicated for the treatment of GPP flares.<sup>11</sup> In addition, a number of small clinical trials have assessed the safety and efficacy of various other agents for treating GPP and PPP, and rigorous clinical trials of additional agents are underway. These advances are coming just in time. Viral infections are one trigger for pustular psoriasis, and recently, COVID-19 infections and immunizations have been reported to cause *de novo* pustular psoriasis and disease-related flares.<sup>12-15</sup>

Because pustular psoriasis has such a grave impact on patients' lives and can even be fatal in the case of GPP, it is critical that patients receive effective treatment as soon as possible.<sup>16</sup> Finding an effective treatment, however, can be tricky in the absence of up-to-date, widely accepted guidelines for managing GPP and PPP. To help clinicians who treat patients with these conditions, in this issue of *Dermatology Nurse Practice*, we discuss the safety and efficacy of spesolimab, agents commonly used off-label to treat GPP and PPP, and agents in late-stage development for the treatment of pustular psoriasis. We also explore how clinicians can support patients with pustular psoriasis as they deal with the mental and psychological burden of these diseases. A more comprehensive discussion of the various types of pustular psoriasis, as well as photographs showing how they may appear in the clinic, can be found in the previous issue of *Dermatology Nurse Practice* entitled "The Pathophysiology of Pustular Psoriasis: A Nursing Primer."

## GENERALIZED PUSTULAR PSORIASIS (GPP)

GPP, which occurs in approximately 1 in 100,000 people in the United States,<sup>8</sup> has manifestations so severe that experts have proposed the term "skin failure" to describe the condition.<sup>17</sup> Although 65% of acute GPP cases occur in individuals with a prior diagnosis of plaque psoriasis, years often elapse between the onset of plaque psoriasis and the onset of GPP.<sup>2,18</sup> The course of GPP varies from patient to patient. It can be relapsing, with periods of relative ease punctuated by flares, or persistent, with mild pustulation continuously present but punctuated by flares of greater severity.<sup>8,19</sup>

Patients with GPP are at the highest risk of morbidity and mortality when they are experiencing flares, which should be treated as emergencies. Flares are characterized by a widespread eruption of macroscopically visible pustules that expand and coalesce, often forming "lakes of pus."<sup>2</sup> Systemic symptoms during GPP flares are also common, including fever, chills, malaise, anorexia, nausea, and severe pain.<sup>2</sup> During a flare, patients can develop serious complications such as sepsis, acute respiratory distress syndrome, renal failure, or congestive heart failure.<sup>8</sup> Hospitalization is often required. Some patients with GPP have multiple severe flares

per year while others only experience a flare every few years, and there is currently no reliable way to predict which pathway a patient may take.<sup>19</sup> Patients with GPP typically require hospitalization at least once every 5 years to manage flares, with each stay lasting roughly 10 to 14 days.<sup>8</sup>

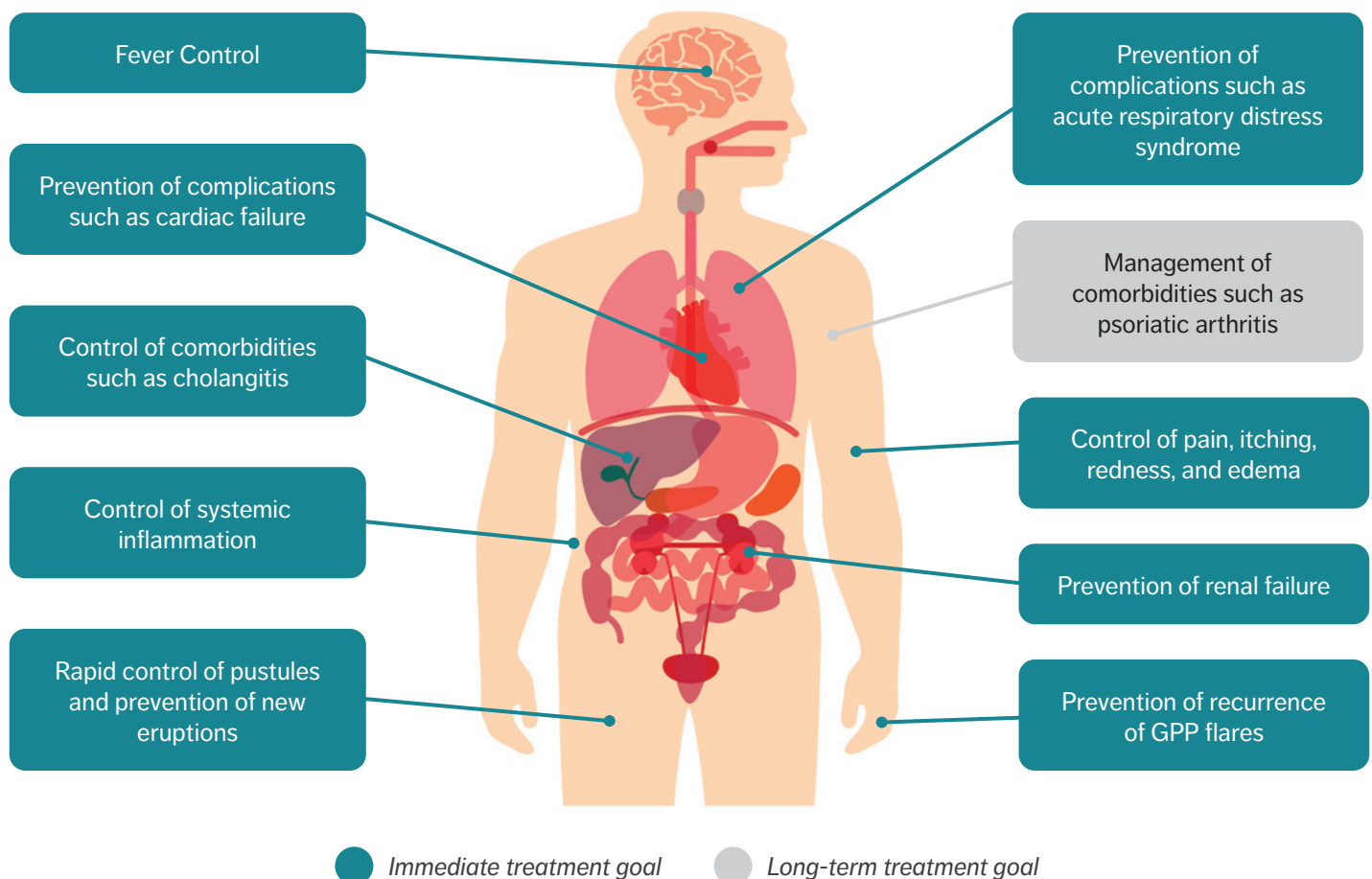
## GPP TREATMENT GOALS

No cure currently exists for GPP, and the burden of disease varies quite a bit from patient to patient. In a recent survey of U.S.-based dermatologists, 69% estimated that their patients with GPP experience an average of 0 to 1 disease flares per year, while 28% estimated an average of 2 to 3 flares per patient per year.<sup>4</sup> Further complicating treatment of GPP is that a specific treatment regimen that works for one patient may not work for another, and a treatment that is effective for a patient today may no longer be effective in a year. In short, managing GPP is a highly individualized process of trial and error, and the goals of treatment will vary based on patients' symptoms (see Figure 1).


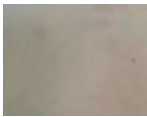





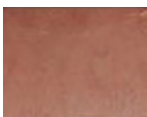






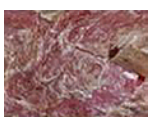
For many clinicians, the foremost goal when treating patients with GPP is to keep them out of the emergency room. This requires a continuous, long-term treatment plan that prevents and alleviates flares.<sup>20</sup> Continuous treatment is also important because, for many patients, symptoms persist between flares. In one study that followed patients with GPP for approximately 5 years, fewer than 5% had clear or almost-clear skin between flares, while 30% had persistent pustular lesions.<sup>19</sup> Periodically monitoring patients' symptoms with tools such as the Generalized Pustular Psoriasis Physician Global Assessment (GPPGA) can be extremely helpful for determining how well an individual's current treatment plan is working (see Figure 2).<sup>21</sup>

When a GPP flare does occur, the immediate goal of treatment is to improve a patient's skin manifestations, alleviate their systemic symptoms, and minimize their risk for developing complications such as neutrophilic cholangitis, uveitis, acute respiratory distress syndrome, cardiovascular aseptic shock, heart failure, prerenal kidney failure, and severe infection.<sup>20,22</sup> In practice, this

**FIGURE 1** Common treatment goals for generalized pustular psoriasis<sup>22</sup>



**FIGURE 2** Key Components of the Generalized Pustular Psoriasis Physician Global Assessment (GPPGA)<sup>21</sup>

Score		Pustule		Erythema		Scale/Crusting	
0	Clear		No visible pustules		Normal or post-inflammatory hyperpigmentation		No scaling or crusting
1	Almost Clear		Low-density occasional small discrete pustules (noncoalescent)		Faint, diffuse pink, or slight red		Superficial focal scaling or crusting restricted to periphery of lesions
2	Mild		Moderate-density grouped discrete small pustules (noncoalescent)		Light red		Predominantly fine scaling or crusting
3	Moderate		High-density pustules with some coalescence		Bright red		Moderate scaling or crusting covering most or all lesions
4	Severe		Very-high-density pustules with pustular lakes		Deep fiery red		Severe scaling or crusting covering most or all lesions

means helping a patient achieve a low, stable GPPGA score (ideally 0-1 points) without systemic inflammation.<sup>21</sup> Until recently, GPP flares could be expected to last anywhere from a couple of weeks to a few months, but even if pustules resolved in a matter of weeks, erythema and scaling often took months to disappear.<sup>23</sup> However, data from a recent spesolimab trial (discussed in more detail later in the article) indicate that, for many patients, it is now possible to achieve control of skin symptoms within a week of initiating treatment, representing a major advance in GPP treatment.<sup>21</sup> Today, with optimal treatment, it may be possible to shift from a focus on merely keeping patients with GPP out of the hospital to instead maximizing their quality of life.

## GPP TREATMENT OPTIONS

A variety of medications can be used to treat GPP. In fact, in a recent case series of 95 patients with GPP treated at 20 U.S. academic dermatology practices, a total of more than 20 different systemic therapies were tried, including steroids, traditional systemic treatments, and biologics, along with antibiotics, antivirals, and antifungals.<sup>5</sup> Because the sheer quantity of treatment options can

feel overwhelming for clinicians, here we discuss the best available evidence for crafting effective GPP treatment plans.

### Topical agents

In general, topical therapy alone is impractical for controlling GPP and should primarily serve as an adjunct to systemic therapy. Combining systemic and topical therapies may be helpful for managing severe disease, especially if patients are experiencing psoriasis-like symptoms.<sup>22</sup> Case reports have documented the effectiveness of topical calcipotriene and topical tacrolimus therapy for this purpose.<sup>24</sup> Wet wraps containing the corticosteroid triamcinolone and photochemotherapy with psoralen and UV light have also been reported to be effective.<sup>24</sup> Currently, however, treatment for GPP may rely too heavily on topical agents alone. In the case series of 95 patients with GPP just described, only 67% of subjects received systemic therapy despite being seen at academic dermatology practices.<sup>5</sup> It is important for patients with GPP to receive systemic therapy in order to prevent life-threatening flares and suppress the persistent symptoms that can compromise their quality of life.

Each component is graded separately,  
and the average is calculated

Composite Mean Score	Total GPPGA Score	Description
0	0	Clear
>0 to <1.5	1	Almost Clear
≥1.5 to <2.5	2	Mild
≥2.5 to <3.5	3	Moderate
≥3.5	4	Severe

The total GPPGA score is determined  
based on the composite score

### Systemic corticosteroids

In general, corticosteroids (see Table 1) are a critical tool for managing inflammatory diseases. However, prescribing systemic steroids to treat patients with GPP should be approached with caution as withdrawing these medications suddenly can cause GPP symptoms to worsen.<sup>2,25</sup> Some clinicians have likened prescribing systemic steroids such as prednisone in a patient with a GPP flare to throwing gasoline on a raging fire. However, in practice, patients experiencing a GPP flare are often treated with a

short course of systemic steroids to suppress inflammation.<sup>6</sup> In the case study of 95 patients with GPP mentioned previously, 25% of those treated as inpatients or in an emergency department received systemic steroids, as did 15% of those treated on an outpatient basis in academic dermatology practices.<sup>5</sup> Although the Japanese Dermatological Association's 2018 GPP treatment guidelines caution against treating GPP flares with systemic steroids as monotherapy, they indicate that steroids can be used as adjuvant therapy when patients have acute, systemic symptoms, or joint symptoms that do not respond to other therapies.<sup>25</sup> In particular, these guidelines recommend using systemic steroids to manage respiratory failure, one of the leading causes of death related to GPP.

### Traditional systemic therapies

According to the 2012 National Psoriasis Foundation (NPF) treatment guidelines for pustular psoriasis, first-line therapies for GPP should include traditional systemic therapies such as acitretin (an oral retinoid), cyclosporine, and methotrexate (see Table 2).<sup>24</sup> However, since these guidelines were published a decade ago, growing evidence has accumulated showing that biologics are the superior first-line treatment option for most patients with GPP. In severe cases of GPP, rapid and effective treatment is essential for preventing complications or even death.<sup>26</sup> Relative to biologics, traditional systemic therapies are slower to work and often fail to fully resolve skin symptoms.<sup>6</sup> Nevertheless, these agents are still commonly used to treat GPP, especially for patients dealing with insurance or cost issues associated with biologics. In fact, in a recent study of electronic health records for 1,535 U.S. patients with GPP treated between 2015 and 2020, after topical corticosteroids (35%) and opioids (21%), the most common treatments prescribed during flares were traditional systemic therapies (13%) such as methotrexate and cyclosporine.<sup>27</sup>

In the case series of 95 patients with GPP previously discussed, which focused on treatment from 2007 to

**TABLE 1** Benefits and Risks of Systemic Corticosteroids in GPP<sup>6</sup>

Benefits	Risks
<ul style="list-style-type: none"> <li>Fast onset of action</li> <li>Oral corticosteroids can be used short term during acute flares</li> </ul>	<ul style="list-style-type: none"> <li>Animal reproduction studies have shown an adverse effect on the fetus, and there are no adequate and well-controlled studies in humans. However, potential benefits may warrant use of corticosteroids in pregnant women despite potential risks.</li> <li>Risk of cleft palate when used during first trimester of pregnancy</li> <li>Dose tapering is necessary as rapid withdrawal of systemic corticosteroids may induce a GPP flare</li> </ul>

**TABLE 2** Benefits and Risks of Traditional Systemic Therapies in GPP<sup>6</sup>

Agent	Treatment Type	Benefits	Risks
Acitretin	Retinoid (oral)	<ul style="list-style-type: none"><li>• Onset of action in days/weeks</li></ul>	<ul style="list-style-type: none"><li>• Teratogenic</li><li>• Long-term use can cause osteoarticular symptoms</li><li>• Can adversely affect bone growth in children</li></ul>
Cyclosporine	Calcineurin inhibitor	<ul style="list-style-type: none"><li>• Best for severe, acute disease</li><li>• Onset of action in days/weeks</li></ul>	<ul style="list-style-type: none"><li>• Animal reproduction studies have shown an adverse effect on the fetus, and there are no adequate and well-controlled studies in humans. However, potential benefits may warrant use of cyclosporine in pregnant women despite potential risks.</li><li>• Long-term use can cause hypertension and renal dysfunction</li><li>• Necessary to monitor blood pressure, renal function, and immunosuppression</li></ul>
Methotrexate		<ul style="list-style-type: none"><li>• Recommended for patients unresponsive to/intolerant of retinoids</li></ul>	<ul style="list-style-type: none"><li>• Abortifacient, mutagenic, and teratogenic</li><li>• Should be stopped at least 3 months before conception in men and women</li><li>• Hepatotoxicity and hematologic toxicity</li><li>• Slow onset of action (weeks)</li></ul>

2018, acitretin was the most commonly-used traditional systemic therapy (24%), followed by cyclosporine (22%) and methotrexate (14%) (see Figure 3).<sup>5</sup> Of these traditional systemic agents, the 2012 NPF guidelines state that acitretin is considered the preferred option based on very limited data.<sup>24</sup> After these guidelines were released, acitretin was directly compared to methotrexate in a randomized trial conducted among 54 patients with GPP over 1 year.<sup>28</sup> This trial found that, relative to methotrexate (10 mg/week), high-dose acitretin (0.5 mg/kg/d) resulted in significantly lower recurrence rates at 1 and 3 months, superior Generalized Pustular Psoriasis Area and Severity Index 50 (GPPASI-50) rates (81% vs. 71%), similar GPPASI-90 rates (14% vs. 13%), and significantly better quality of life. A similar proportion of patients in both treatment groups experienced adverse reactions (15% vs. 16%). If these results are replicated in additional studies, including trials that include higher doses of methotrexate to better simulate real-world practice, they will bolster the evidence supporting the position of the 2012 NPF guidelines that acitretin is the preferred option among the traditional systemic therapies. It should be noted that cyclosporine has a faster onset of action than either acitretin or methotrexate, so it may be particularly

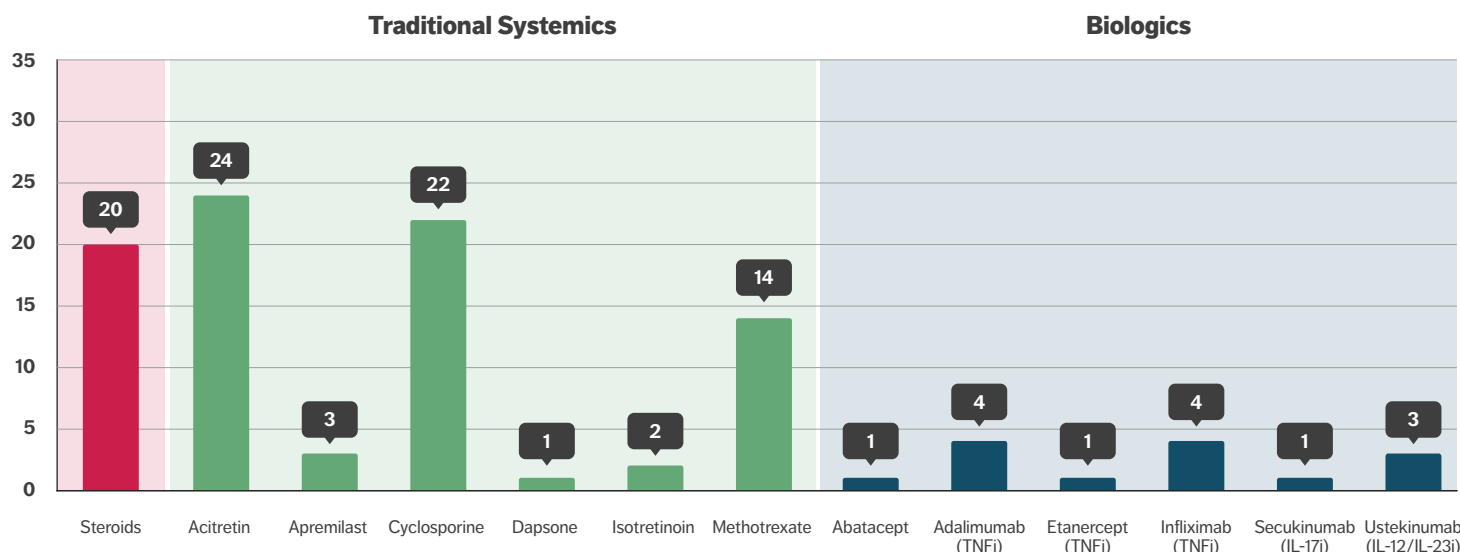
effective as an acute phase treatment.<sup>10</sup> However, long-term use of cyclosporine is not recommended because of the potential for renal dysfunction and hypertension.

### Biologics

Until recently, biologics used to treat GPP in the United States were prescribed off-label (see Table 3). The 2012 NPF guidelines for the treatment of pustular psoriasis recommend the TNF $\alpha$  inhibitors adalimumab and etanercept as second-line therapies for GPP, either as monotherapy or as components of combination therapy (typically, a traditional systemic agent plus a biologic).<sup>24</sup> Leading up to the release of these guidelines, little data were available specific to the use of biologics for the treatment of GPP. Since their publication, however, new data have emerged indicating that a number of biologics already used to treat plaque psoriasis improve GPP symptoms as well. Furthermore, compared with traditional systemic treatments, these biologics are significantly more likely to result in an excellent treatment response.<sup>29,30</sup> As a result of these findings, a variety of biologics—including TNF $\alpha$ , IL-17/IL-17R, and IL-23 inhibitors—have been approved to treat GPP in various Asian

**FIGURE 3**

Systemic Therapies Used to Treat 95 Patients with GPP at Academic Dermatology Practices Between 2007-2018<sup>5</sup>



**TABLE 3** Benefits and Risks of Biologics in GPP<sup>6</sup>

Class	Agent	Clinical Summary
IL-36R inhibitor	Spesolimab	In a randomized, controlled trial of 57 participants with GPP, 54% of patients given spesolimab achieved lesion clearance after 1 week of treatment (vs. 6% for placebo), with gains sustained through week 12. Spesolimab is associated with increased risk of infections and systemic drug reactions.
TNFa inhibitors	Adalimumab	In an open-label study, positive treatment outcomes were detected in 7 of 10 patients with GPP at week 16. Some patients develop drug resistance, and adalimumab is associated with an increased risk of serious infections, as well as lymphoma and other malignancies.
	Certolizumab pegol	In an open-label study, 7 of 7 patients with GPP achieved “much improved” or “very much improved” status on the Global Improvement Score or a PASI-50 response, with gains sustained through week 52. Certolizumab pegol can be used by pregnant women and breastfeeding mothers. It is associated with an increased risk of serious infections, as well as lymphoma and other malignancies.
	Etanercept	Efficacy data for etanercept in GPP are not available. Some patients taking etanercept develop drug resistance, and this agent is associated with an increased risk of serious infections, as well as lymphoma and other malignancies.
	Infliximab	In an open-label study of 7 patients with GPP, severity was graded as mild in 71% and moderate in 28% at week 0; it was graded as mild in all patients at weeks 24 and 40. Improvements were noted for both skin symptoms and C-reactive protein levels. Infliximab is associated with an increased risk of serious infections, as well as lymphoma and other malignancies.
IL-17/IL-17R inhibitors	Brodalumab	In an open-label study, positive treatment outcomes were detected in 10 of 12 patients with GPP at week 12, and 11 of 12 at week 52. Brodalumab is associated with an increased risk of serious infections, inflammatory bowel disease, and suicidal ideation and behavior.
	Ixekizumab	In one open-label study, 3 of 5 patients with GPP responded to ixekizumab and clinical outcomes were maintained over 52 weeks. In another open-label study, positive outcomes were demonstrated in 6 of 7 patients with GPP at week 12. Ixekizumab is associated with an increased risk of serious infections and inflammatory bowel disease.
	Secukinumab	In an open-label study, positive treatment outcomes were detected in 10 of 12 patients with GPP at week 16, and they were sustained through week 52. Secukinumab is associated with an increased risk of serious infections and inflammatory bowel disease.
IL-12/IL-23 inhibitors	Guselkumab	In an open-label study, rapid, sustained positive treatment outcomes were detected in 7 of 9 patients with GPP at week 16, and they were maintained through week 52. Guselkumab is associated with an increased risk of infection.
	Risankizumab	In an open-label study, positive treatment outcomes were detected in 9 of 9 patients with GPP at week 16, and they were maintained through week 52. Risankizumab is associated with an increased risk of infection.
	Ustekinumab	Efficacy data for ustekinumab in GPP are not available. Ustekinumab is associated with an increased risk of infection and malignancy.

"Paradoxically, although biologics are more commonly becoming front-line treatments for GPP, they can also cause GPP or worsen a patient's disease... If a biologic causes or worsens a patient's GPP, the therapy should be discontinued, and no other agents from the offending class should be used."

countries.<sup>4,6</sup> However, data supporting the use of these agents have come from very small, open-label, single-arm studies. As a result, until 2022, no biologic agents were approved for the treatment of GPP in the United States or Europe. Consequently, the use of biologics in the United States to treat GPP has remained low. In the case series of 95 patients with GPP, various biologics were used in only 1% to 4% of patients.<sup>5</sup> Scant use of biologics to treat GPP was also found in a recent analysis of U.S. patient electronic health records.<sup>27</sup>

That said, the use of biologics to treat GPP in the United States is poised to increase dramatically in response to the U.S. Food and Drug Administration's (FDA's) 2022 approval of spesolimab, the first agent with a specific indication for the treatment of GPP flares.<sup>31</sup> Spesolimab is a IL-36 receptor (IL-36R) inhibitor. Unlike many of the biologics used to treat GPP off-label, spesolimab is not approved to treat plaque psoriasis. Instead, it was developed specifically to treat GPP in response to abundant data implicating IL-36 as a central player in GPP pathogenesis. Research indicates that IL-36 is overexpressed in GPP skin lesions, and some patients with GPP also have loss-of-function mutations in genes connected with the IL-36 pathway.<sup>32</sup> These IL-36 alterations are associated with the downstream inflammatory cascade that results in GPP symptoms. Thus, researchers correctly

hypothesized that targeting the IL-36 pathway could alleviate GPP symptoms.

The FDA's approval of spesolimab was based on the results of a randomized, placebo-controlled trial that included 57 patients with GPP from 37 sites and 12 countries.<sup>33</sup> This 12-week phase 2 trial found that spesolimab cleared lesions in 54% of patients after just 1 week of treatment (vs. just 6% for placebo), with results sustained for up to 12 weeks. Moreover, patients who received spesolimab reported improvements in pain, fatigue, quality of life, and cutaneous symptoms after just 1 week of treatment; these improvements were sustained over the course of the 12-week trial.<sup>34</sup> The most important adverse events associated with spesolimab included infections and systemic drug reactions.<sup>33</sup> Participants who achieved clinical improvement in this trial and also completed the study without experiencing flare symptoms are now eligible for a 5-year open-label extension study, which will yield additional information on the safety and efficacy of spesolimab.<sup>35</sup>

A second phase 2 randomized controlled trial of spesolimab, this one testing the agent's ability to *prevent* flares in GPP, was recently completed. This trial enrolled 123 patients who had GPP flares in the past but whose skin was almost or totally clear at the start of the 48-week

study. Preliminary results indicate that the trial met its primary outcome target of a significantly longer time until first GPP flare relative to placebo, as well as its secondary outcome targets: lower rate of developing at least one GPP flare; longer time to first worsening, as measured by the Psoriasis Symptom Scale; longer time to first worsening, as measured by the Dermatology Quality of Life Index; and higher rate of sustained remission (defined as a GPPGA score of 0 or 1 for all study visits).<sup>36</sup>

Several additional biologics are currently being investigated for the treatment of GPP that, if proven effective, may further expand the range of evidence-based treatments available for this condition. One of the most promising agents is another IL-36R inhibitor, imsigolimab, which is currently being investigated in dual phase 3 clinical trials.<sup>6</sup> IL-1, which drives the autoinflammation present in GPP alongside IL-36, has also emerged as a potential therapeutic target.<sup>6</sup> Currently, anakinra, which targets the IL-1 receptor and is already used to treat rheumatoid arthritis, is being investigated as a treatment for GPP and other inflammatory pustular skin diseases in a phase 2 trial.<sup>6</sup>

In general, available research suggests that a key advantage of biologics over traditional systemic therapies is their rapid onset of action. For example, infliximab can yield results in as little as 24-48 hours after dosing, which can help rapidly control a GPP flare when time is of the essence.<sup>25</sup> However, the development of resistance to TNFα inhibitors has been well documented. For example, 20% to 30% of patients on long-term infliximab treatment will begin producing neutralizing antibodies.<sup>25</sup> Etanercept is slower acting than infliximab, but patients appear to develop neutralizing antibodies to it less frequently, and several cases have been reported in which etanercept and adalimumab have been used as effective maintenance drugs in patients with GPP after infliximab is discontinued.<sup>25,37</sup> Time will tell whether resistance to spesolimab is a problem for patients; if so, the biologics currently being used off-label to treat GPP may continue to serve as good second-line treatment options.

Paradoxically, although biologics are more commonly becoming front-line treatments for GPP, they can also cause GPP or worsen a patient's disease. TNFα inhibitors are the most commonly reported culprits, but cases have also been reported after the use of agents from other

classes, such as IL-17/IL-17R inhibitors.<sup>38</sup> No spesolimab-related flares have been reported from the clinical trials for this agent, but little real-world data exists at present.<sup>33,36</sup> If a biologic causes or worsens a patient's GPP, the therapy should be discontinued, and no other agents from the offending class should be used.<sup>10</sup>

## PALMOPLANTAR PUSTULOSIS (PPP)

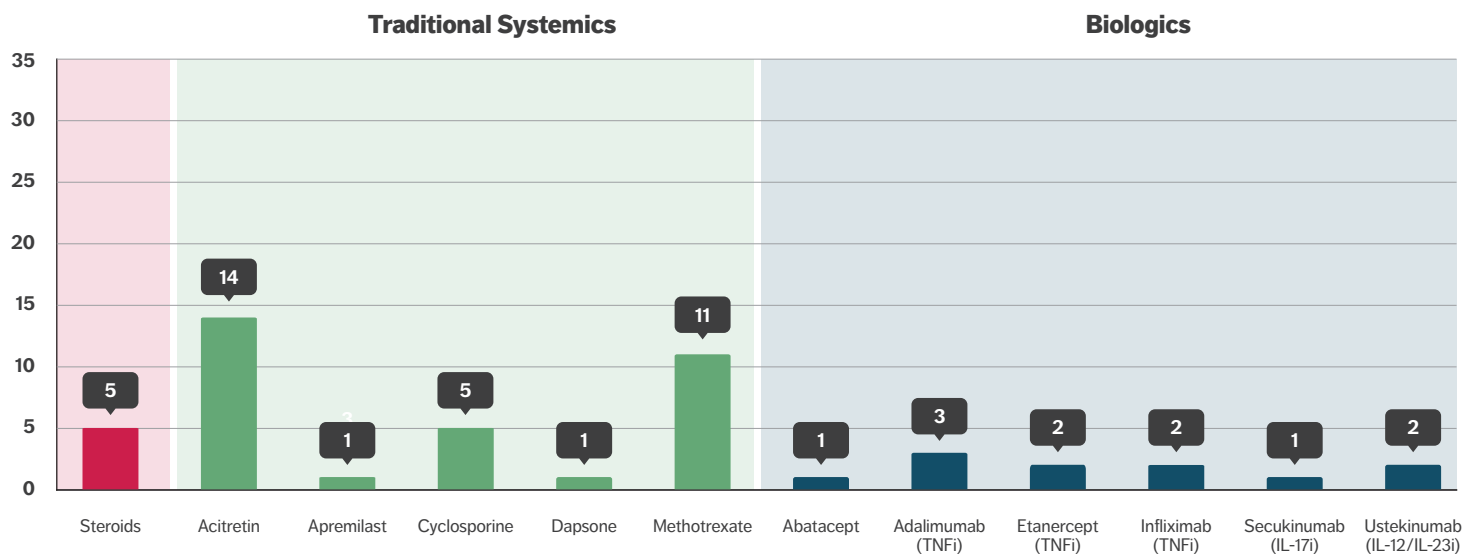
As with GPP, PPP is also a rare condition, occurring in approximately 5-10 in 10,000 individuals worldwide. That still makes it the most common subtype of pustular psoriasis.<sup>39</sup> PPP often develops in middle-aged adults. A history of plaque psoriasis is also common in patients with PPP, reported in 14% to 61% of cases.<sup>3,40</sup> PPP typically presents as sterile pustules with erythema, hyperkeratosis, and scaling on a patient's palms and soles, with the arches of the feet often affected.<sup>2</sup> Pustules often expand and coalesce, and after resolving, they tend to leave brown discoloration. Even though PPP is typically limited to the hands and feet, it can dramatically reduce patients' health-related quality of life by making basic tasks such as walking or using one's hands difficult and painful, and in some cases impossible.<sup>41</sup>

### PPP TREATMENT GOALS

Like GPP, PPP is notoriously difficult to manage.<sup>2</sup> In general, the goals of treatment are to improve a patient's skin manifestations and minimize bothersome or disabling symptoms.<sup>20</sup> Unfortunately, PPP's severity and the risk of recurrence does not appear to attenuate over time, so maintenance treatment between flares is necessary.<sup>40</sup> Currently, with effective treatment, many patients with PPP find they are able to exist mostly, but not completely, clear of symptoms. After achieving adequate control of their skin and joint pain, many patients can resume their daily activities and pursue the goals most important to them.

### PPP TREATMENT OPTIONS

Unfortunately, the evidence available to guide PPP treatment is even sparser than that available to guide treatment of GPP. The paucity of research in this area means that, at present, it is not possible to treat PPP in a truly evidence-based fashion.<sup>42</sup> This lack of evidence, paired

**FIGURE 4****Systemic Therapies Used to Treat 197 Patients with PPP Treated at Academic Dermatology Practices 2007-2018<sup>43</sup>**

with the large number of potential treatments currently in use and the high rate of treatment failure, can make selecting treatment plans for patients with PPP a frustrating exercise for clinicians. In a recently published case series of 197 U.S. patients with PPP treated between 2007 and 2018, more than 20 different systemic therapies were used, including steroids, traditional systemic treatments, and biologics, as well as antibiotics, antivirals, and antifungals (see Figure 4).<sup>43</sup> Here, we discuss the treatment options best supported by the available evidence.

### **Topical treatments**

According to the 2012 NPF guidelines for the treatment of pustular psoriasis, first-line local therapy for PPP should consist of topical calcipotriene, topical corticosteroids, or PUVA, while second-line local therapy should consist of photodynamic therapy and tacrolimus.<sup>24</sup> Very limited data support the use of topical corticosteroids to treat PPP, but if this approach is used, some experts recommend a super high-potency topical corticosteroid applied under occlusion.<sup>44</sup> In reality, topical treatment of any kind is seldom sufficient to result in remission for patients with PPP, so systemic therapy is often necessary and should not be delayed.<sup>2</sup> In the case study of 197 U.S. patients with PPP just mentioned, 85% received an initial treatment that included topical steroids, 14% received a topical vitamin D analog, and 2% received a topical retinoid.<sup>43</sup> Of note, 65% of the patients only received topical therapy as their initial treatment. This may indicate that

effective treatment is being unnecessarily delayed for most patients with PPP, prolonging their suffering from this painful condition.

### **Traditional systemic therapies**

The 2012 NPF guidelines recommend acitretin as the first-line systemic therapy option for PPP, with second-line options including cyclosporine and biologics, including TNF $\alpha$  inhibitors and the IL-12/23 inhibitor ustekinumab.<sup>24</sup> No practice-changing data on traditional systemic therapies have emerged since these guidelines were published. With regard to acitretin, if symptom control is achieved within 3 months, the agent should then be tapered to a low dose for maintenance treatment, which has been shown to be superior to placebo at sustaining remission.<sup>44</sup> Randomized clinical trials support the use of cyclosporine to treat PPP, whereas the evidence for methotrexate use is limited to retrospective research and uncontrolled studies.<sup>44</sup> All of these systemic treatments are associated with risks, especially for pregnant women, which may lead some patients to prefer biologic therapies.

A comparison of recent case studies for patients with GPP and PPP indicate that systemic treatments are used at a much lower rate for patients with PPP.<sup>5,43</sup> For example, whereas 24% of patients with GPP received acitretin, only 14% of patients with PPP did so as part of their initial treatment. This makes sense since PPP is a more

localized and less life-threatening disease. However, the low rates of systemic treatment in PPP may represent a missed opportunity to help patients control symptoms that impede their ability to function and impact their quality of life.

## Biologics

Since the 2012 NPF guidelines for the treatment of pustular psoriasis were published, a modest amount of new evidence has emerged regarding the efficacy of biologics in treating PPP. A 16-week phase 3 trial conducted in 159 patients with PPP who had an inadequate response to conventional therapies showed that the IL-23 inhibitor guselkumab is effective and safe for treating this condition.<sup>26,45</sup> Compared to placebo, guselkumab resulted in significant improvement to the PPP Area and Severity Index (PPASI) score, with 57% of patients who received 100 mg guselkumab achieving a PPASI-50 response vs. only 34% in the placebo group.<sup>45</sup> Furthermore, these improvements were maintained for the entire 52 weeks of the trial. No new safety signals for guselkumab emerged in the trial.

Studies of other biologics have been less promising in patients with PPP, and most other trials have included a very small number of patients. Available evidence indicates that other biologics are either no more effective than placebo (in the case of the IL-17 inhibitor secukinumab), result in either no or only moderate improvement in symptoms (in the case of the IL-17 inhibitor brodalumab), or improve symptoms in some patients while worsening them in others (in the case of the TNF $\alpha$  inhibitor etanercept). Meanwhile, available efficacy data for the IL-12/23 inhibitor ustekinumab is mixed.<sup>42</sup> Based on these data, not surprisingly, biologics are seldom used to treat PPP. In the case study of patients with PPP, various biologics were used in only 0.5% to 3% of patients.<sup>43</sup>

In addition to guselkumab, IL-1R and IL-36R inhibitors are currently being investigated for the treatment of PPP. One small study found that 78% of molecules dysregulated in PPP were also dysregulated in GPP, although 83% of molecules dysregulated in GPP were *not* dysregulated in PPP.<sup>32</sup> These findings may suggest that treatments effective for PPP are likely to be effective for GPP, but the inverse is not necessarily true. Nevertheless, researchers are cautiously hopeful that advances in GPP treatment will benefit patients with PPP as well. IL-36's involvement

in PPP pathogenesis is less established than it is for GPP pathogenesis.<sup>32</sup> Research indicates that the IL-36R inhibitor spesolimab rapidly alters the levels of molecules involved in pathways dysregulated in both GPP and PPP, which are primarily linked to inflammation.<sup>32</sup> However, a 16-week phase 2a trial found that, relative to placebo, spesolimab did not significantly improve the rate at which patients achieved a 50% decrease in PPP severity from baseline, though the spesolimab arm did display a faster decline in severity than the placebo arm.<sup>46</sup> A phase 2b study comparing 4 different doses of spesolimab to placebo for the treatment of PPP recently concluded; however, the results have not yet been published.<sup>47</sup> In addition, the IL-1R inhibitor anakinra, which is being investigated for the treatment of GPP, is also being investigated as a treatment for PPP and other inflammatory pustular skin diseases in a phase 2 trial.<sup>6</sup>

As is true for GPP, a number of biologics have been reported to cause PPP, including the TNF $\alpha$  inhibitors adalimumab and infliximab, as well as the IL-17 inhibitors secukinumab and brodalumab.<sup>48</sup> Agents that cause or worsen PPP should be discontinued, and patients should be treated with an agent in another class.

## STRATEGIES FOR TREATING THE WHOLE PUSTULAR PSORIASIS PATIENT

GPP and PPP are incredibly painful and stressful conditions to live with. In a recent survey of 66 people with GPP living in the United States, roughly half reported that flares had a major impact on their ability to perform daily activities that most healthy people take for granted, such as exercising, being intimate with a spouse or partner, wearing shoes, running errands, and socializing with family and friends.<sup>7</sup> Given the severity of GPP, this might be expected. However, even when flares were not present, many respondents reported that GPP negatively impacted their ability to complete daily activities. In addition to physical barriers to daily activity, the lesions of pustular psoriasis can be highly stigmatizing, and many patients also fear, with good reason, that their current treatments may eventually stop working.<sup>7</sup>

Given the impact of pustular psoriasis on patients' ability to function, it is inevitable that GPP and PPP have substantial consequences for patients' emotional wellbeing.

Although GPP is an incredibly painful disease, survey respondents reported that the most burdensome symptom of flares was actually the change in their mood, and not surprisingly, many also report a pervasive fear of future flares.<sup>7</sup> Respondents also believed that their mood had an impact on their GPP symptoms, with the most commonly reported cause of GPP flares being emotional stress.<sup>7</sup> Not surprisingly, depression and anxiety are common among patients with pustular psoriasis.<sup>49,50</sup>

By providing care that addresses the full range of challenges that individuals with GPP and PPP face, clinicians can improve the lives of their patients. Currently, roughly half of patients with GPP feel that their clinician does not understand the level of emotional, psychological, and physical pain they are experiencing as a result of their disease.<sup>7</sup> Simply acknowledging the complex and pervasive effects that pustular psoriasis has on patients' lives may go far toward making patients feel supported and improving the therapeutic alliance.

Some patients with GPP and PPP may be wary of clinicians and the healthcare system, having previously been misdiagnosed. In addition, many patients with pustular psoriasis will need to try multiple therapies before finding one that works, or a treatment that once controlled their symptoms may stop working. This is a demoralizing experience, especially given the severity of the condition and the associated expense, inconvenience, and side effects of treatment. Perhaps it is not surprising that,

in one analysis of electronic records for 1,535 patients with GPP, patients had no dermatologic treatment documented in the 30 days before, during, or after the episode for almost 24% of all disease flares.<sup>27</sup> By cultivating a secure bond with patients, healthcare providers can help patients remain in treatment, work with them to reduce the likelihood of flares and ensure that, when flares do occur, they will not feel alone.

Frequent monitoring is essential to ensure that patients with GPP and PPP are receiving effective treatment. In some cases, check-ins as often as every 2 weeks may be necessary. Using a rating tool such as the GPPGA is helpful for assessing the external symptoms of pustular psoriasis. However, in a recent gathering of experts, one key finding was that psychological follow-up is also an important yet often overlooked aspect of long-term care for pustular psoriasis.<sup>51</sup> To address this, clinicians should regularly ask about common stressors such as fear of treatment non-response and financial pressures linked to the disease and its treatment. Patients may not bring such concerns up themselves, even when these issues are taking a major toll on their wellbeing. However, once such stressors are identified, healthcare providers can link patients to resources that can provide the appropriate support. For example, therapists can arm patients with tools useful for adapting to life with their chronic conditions, and social workers or prescription assistance plans may prove useful when financial or insurance concerns arise.

## CONCLUSION

The recent approval of spesolimab to treat GPP represents a long-awaited advance for patients with pustular psoriasis and their healthcare providers. With any luck, this approval will herald a new age of effective, evidence-based treatment options for both GPP and PPP. Although conducting rigorous studies of these rare conditions has been challenging, thanks to novel collaborations, we can soon expect more data to help guide treatment. The Pustular Psoriasis in the US Research Group, which recently published the two case series discussed in this article, will continue to gather useful data on disease characteristics, treatments, and outcomes. Meanwhile, in Europe, the International Rare and Severe Psoriasis Expert Network plans to recruit 180 patients with pustular psoriasis, as well as unaffected family members, in order to collect tissue and blood samples, along with clinical, genetic, and epidemiologic data to better understand this condition.<sup>9</sup> Finally, multicenter, international collaborations such as the one that conducted the pivotal spesolimab trial are accumulating enough patients to conduct robust clinical trials of different agents. Perhaps in the not-so-distant future, healthcare providers will struggle to choose between treatment options for GPP and PPP because there is good evidence for multiple agents rather than struggling to choose between available options because there is a lack of evidence to guide treatment.

# REFERENCES

- National Psoriasis Foundation. Pustular psoriasis. Available at [www.psoriasis.org/pustular/](http://www.psoriasis.org/pustular/). Accessed May 3, 2023.
- Benjegerdes KE, Hyde K, Kivelevitch D, Mansouri B. Pustular psoriasis: pathophysiology and current treatment perspectives. *Psoriasis*. 2016;6:131-144.
- Andersen YMF, Augustin M, Petersen J, et al. Characteristics and prevalence of plaque psoriasis in patients with palmoplantar pustulosis. *Br J Dermatol*. 2019;181(5):976-982.
- Prinz JC, Choon SE, Griffiths CEM, et al. Prevalence, comorbidities and mortality of generalized pustular psoriasis: a literature review. *J Eur Acad Dermatol Venereol*. 2023;37(2):256-273.
- Noe MH, Wan MT, Mostaghimi A, et al. Evaluation of a case series of patients with generalized pustular psoriasis in the United States. *JAMA Dermatol*. 2022;158(1):73-78.
- Reich K, Augustin M, Gerdes S, et al. Generalized pustular psoriasis: overview of the status quo and results of a panel discussion. *J Dtsch Dermatol Ges*. 2022;20(6):753-771.
- Reisner DV, Johnsson FD, Kotowsky N, Brunette S, Valdecantos W, Eyerich K. Impact of generalized pustular psoriasis from the perspective of people living with the condition: results of an online survey. *Am J Clin Dermatol*. 2022;23(Suppl 1):65-71.
- Bachelez H, Barker J, Burden AD, Navarini AA, Krueger JG. Generalized pustular psoriasis is a disease distinct from psoriasis vulgaris: evidence and expert opinion. *Expert Rev Clin Immunol*. 2022;18(10):1033-1047.
- Cowen EW. It is time to focus on pustular psoriasis. *JAMA Dermatol*. 2022;158(1):13-14.
- Reynolds KA, Pithadia DJ, Lee EB, Clarey D, Liao W, Wu JJ. Generalized pustular psoriasis: a review of the pathophysiology, clinical manifestations, diagnosis, and treatment. *Cutis*. 2022;110(2 Suppl):19-25.
- Package insert: spesolimab. Available at [www.accessdata.fda.gov/drugsatfda\\_docs/label/2022/761244s000lbl.pdf](http://www.accessdata.fda.gov/drugsatfda_docs/label/2022/761244s000lbl.pdf). Accessed May 3, 2023.
- Elamin S, Hinds F, Tolland J. De novo generalized pustular psoriasis following Oxford-AstraZeneca COVID-19 vaccine. *Clin Exp Dermatol*. 2022;47(1):153-155.
- Pavia G, Gargiulo L, Spinelli F, et al. Generalized pustular psoriasis flare in a patient affected by plaque psoriasis after BNT162b2 mRNA COVID-19 vaccine, successfully treated with risankizumab. *J Eur Acad Dermatol Venereol*. 2022;36(7):e502-e505.
- Tachibana K, Kawakami Y, Tokuda M, et al. Flare-up of generalized pustular psoriasis following Pfizer-BioNTech BNT162b2 mRNA COVID-19 vaccine: Two cases without mutations of *IL36RN* and *CARD14* genes. *J Dermatol*. 2022;49(10):e393-e394.
- Yatsuzuka K, Murakami M, Kuroo Y, et al. Flare-up of generalized pustular psoriasis combined with systemic capillary leak syndrome after coronavirus disease 2019 mRNA vaccination. *J Dermatol*. 2022;49(4):454-458.
- Gooderham MJ, Van Voorhees AS, Lebwohl MG. An update on generalized pustular psoriasis. *Expert Rev Clin Immunol*. 2019;15(9):907-919.
- Koren J, Mburu S, Trigos D, Damiani G, Naldi L. Generalized pustular psoriasis: the case for rare disease and orphan designation. *Br J Dermatol*. 2022;187(3):411-413.
- Kalb RE. Pustular psoriasis: pathogenesis, clinical manifestations, and diagnosis. Available at [www.uptodate.com/contents/pustular-psoriasis-pathogenesis-clinical-manifestations-and-diagnosis?topicRef=93554&source=see\\_link](http://www.uptodate.com/contents/pustular-psoriasis-pathogenesis-clinical-manifestations-and-diagnosis?topicRef=93554&source=see_link). Accessed May 3, 2023.
- Choon SE, Navarini AA, Pinter A. Clinical course and characteristics of generalized pustular psoriasis. *Am J Clin Dermatol*. 2022;23(Suppl 1):21-29.
- Kalb RE. Pustular psoriasis: management. Available at [www.uptodate.com/contents/pustular-psoriasis-management](http://www.uptodate.com/contents/pustular-psoriasis-management). Accessed May 3, 2023.
- Rivera-Diaz R, Dauden E, Carrascosa JM, Cueva P, Puig L. Generalized pustular psoriasis: a review on clinical characteristics, diagnosis, and treatment. *Dermatol Ther (Heidelb)*. 2023;1-16.
- Krueger J, Puig L, Thaci D. Treatment options and goals for patients with generalized pustular psoriasis. *Am J Clin Dermatol*. 2022;23(Suppl 1):51-64.
- Strober B, Kotowsky N, Medeiros R, et al. Unmet medical needs in the treatment and management of generalized pustular psoriasis flares: evidence from a survey of Corrona Registry dermatologists. *Dermatol Ther (Heidelb)*. 2021;11(2):529-541.
- Robinson A, Van Voorhees AS, Hsu S, et al. Treatment of pustular psoriasis: from the Medical Board of the National Psoriasis Foundation. *J Am Acad Dermatol*. 2012;67(2):279-288.
- Fujita H, Terui T, Hayama K, et al. Japanese guidelines for the management and treatment of generalized pustular psoriasis: The new pathogenesis and treatment of GPP. *J Dermatol*. 2018;45(11):1235-1270.
- Okubo Y, Morishima H, Zheng R, Terui T. Sustained efficacy and safety of guselkumab in patients with palmoplantar pustulosis through 1.5 years in a randomized phase 3 study. *J Dermatol*. 2021;48(12):1838-1853.
- Zema CL, Valdecantos WC, Weiss J, Krebs B, Menter AM. Understanding flares in patients with generalized pustular psoriasis documented in US electronic health records. *JAMA Dermatol*. 2022;158(10):1142-1148.
- Lu J, Wang Y, Li Y, Gong Y, Ding Y, Shi Y. Comparative study on the clinical efficacy and safety of acitretin and MTX in the treatment of pustular psoriasis by TLR7/MyD88/CXCL16 pathway. *Appl Bionics Biomech*. 2022;2022:9640326.
- Kromer C, Loewe E, Schaarschmidt ML, et al. Drug survival in the treatment of generalized pustular psoriasis: A retrospective multicenter study. *Dermatol Ther*. 2021;34(2):e14814.
- Miyachi H, Konishi T, Kumazawa R, et al. Treatments and outcomes of generalized pustular psoriasis: A cohort of 1516 patients in a nationwide inpatient database in Japan. *J Am Acad Dermatol*. 2022;86(6):1266-1274.
- Mullard A. FDA approves first anti-IL-36 receptor antibody for rare skin disease. *Nat Rev Drug Discov*. 2022.
- Baum P, Visvanathan S, Garcet S, et al. Pustular psoriasis: Molecular pathways and effects of spesolimab in generalized pustular psoriasis. *J Allergy Clin Immunol*. 2022;149(4):1402-1412.
- Bachelez H, Choon SE, Marrakchi S, et al. Trial of spesolimab for generalized pustular psoriasis. *N Engl J Med*. 2021;385(26):2431-2440.
- Navarini AA, Prinz JC, Morita A, et al. Spesolimab improves patient-reported outcomes in patients with generalized pustular psoriasis: Results from the Effisayil 1 study. *J Eur Acad Dermatol Venereol*. 2022.

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# REFERENCES (continued)

35. Shao S, Wang G. Commentary on a clinical trial of spesolimab, a humanized anti-interleukin-36 receptor monoclonal antibody, in generalized pustular psoriasis. *Dermatol Ther (Heidelb)*. 2022;12(12):2627-2635.
36. Bader K. Spesolimab shows significant prevention of GPP flares up to 48 weeks. *Dermatology Times*. Available at [www.dermatologytimes.com/view/spesolimab-shows-significant-prevention-of-gpp-flares-up-to-48-weeks](http://www.dermatologytimes.com/view/spesolimab-shows-significant-prevention-of-gpp-flares-up-to-48-weeks). Accessed May 3, 2023.
37. Matsumoto A, Komine M, Karakawa M, Kishimoto M, Ohtsuki M. Adalimumab administration after infliximab therapy is a successful treatment strategy for generalized pustular psoriasis. *J Dermatol*. 2017;44(2):202-204.
38. McFeely O, Pender E, Victory L, Almutlaq H, Storan E. Risankizumab-induced paradoxical pustular psoriasis. *Clin Exp Dermatol*. 2022;47(3):616-617.
39. Brunasso AMG, Massone C. Recent advances in palmoplantar pustulosis. *Fac Rev*. 2021;10:62.
40. Brunasso G, Massone C. Palmoplantar pustulosis: epidemiology, clinical features, and diagnosis. Available at [www.uptodate.com/contents/palmoplantar-pustulosis-epidemiology-clinical-features-and-diagnosis?topicRef=93852&source=see\\_link](http://www.uptodate.com/contents/palmoplantar-pustulosis-epidemiology-clinical-features-and-diagnosis?topicRef=93852&source=see_link). Accessed May 3, 2023.
41. Crowley JJ, Pariser DM, Yamauchi PS. A brief guide to pustular psoriasis for primary care providers. *Postgrad Med*. 2021;133(3):330-344.
42. Menter A, Van Voorhees AS, Hsu S. Pustular psoriasis: a narrative review of recent developments in pathophysiology and therapeutic options. *Dermatol Ther*. 2021;11(6):1917-1929.
43. Noe MH, Wan MT, Mostaghimi A, et al. Evaluation of a case series of patients with palmoplantar pustulosis in the United States. *JAMA Dermatol*. 2022;158(1):68-72.
44. Brunasso G. Palmoplantar pustulosis: treatment. Available at [www.uptodate.com/contents/palmoplantar-pustulosis-treatment?topicRef=93554&source=see\\_link](http://www.uptodate.com/contents/palmoplantar-pustulosis-treatment?topicRef=93554&source=see_link). Accessed May 3, 2023.
45. Terui T, Kobayashi S, Okubo Y, et al. Efficacy and safety of guselkumab in Japanese patients with palmoplantar pustulosis: a phase 3 randomized clinical trial. *JAMA Dermatol*. 2019;155(10):1153-1161.
46. Mrowietz U, Burden AD, Pinter A, et al. Spesolimab, an anti-interleukin-36 receptor antibody, in patients with palmoplantar pustulosis: results of a phase IIa, multicenter, double-blind, randomized, placebo-controlled pilot study. *Dermatol Ther*. 2021;11(2):571-585.
47. A study to test how effective and safe different doses of BI 655130 are in patients with a moderate to severe form of the skin disease palmoplantar pustulosis. Available at [www.clinicaltrials.gov/ct2/show/NCT04015518](http://www.clinicaltrials.gov/ct2/show/NCT04015518). Accessed May 3, 2023.
48. Lu JD, Lytvyn Y, Mufti A, et al. Biologic therapies associated with development of palmoplantar pustulosis and palmoplantar pustular psoriasis: a systematic review. *Int J Dermatol*. 2023;62(1):12-21.
49. Crowley J, Colembesky A, Kotowsky N, et al. Clinical characteristics and healthcare resource utilization in patients with generalized pustular psoriasis: real-world evidence from a large claims-based dataset. *J Psoriasis Psoriatic Arthritis*. 2021;6(3):151-158.
50. Lebwohl M, Medeiros RA, Mackey RH, et al. The disease burden of generalized pustular psoriasis: real-world evidence from CorEvitas' psoriasis registry. *J Psoriasis Psoriatic Arthritis*. 2022;7(2):71-78.
51. Strober B, Leman J, Mockenhaupt M, et al. Unmet educational needs and clinical practice gaps in the management of generalized pustular psoriasis: global perspectives from the front line. *Dermatol Ther (Heidelb)*. 2022;12(2):381-393.
52. Okubo Y, Umezawa Y, Sakurai S, Hoshii N, Nakagawa H. Efficacy and safety of certolizumab pegol in Japanese patients with generalized pustular psoriasis and erythrodermic psoriasis: 52-week results. *Dermatol Ther (Heidelb)*. 2022;12(6):1397-1415.



# ***What Does Pustular Psoriasis Really Look Like, and Why Should I Care?***

by Leigh Ann Pansch, MSN, FNP-BC, DCNP

Because of the general rarity of pustular psoriasis, it is not something that dermatology providers have a deep well of experience treating. Lack of knowledge about the appropriate diagnostic protocol and treatment options often leaves many patients lingering either undertreated or mistreated, often with catastrophic and permanent outcomes. Given the recent advances in targeted therapies, it is critical that providers educate themselves about the nuts and bolts of pustular psoriasis to best serve their patients. In this essay, we'll focus on the most common pustular

psoriasis subtypes, with some personal insight into management protocols within my personal clinical practice.

## **GENERALIZED PUSTULAR PSORIASIS (GPP)**

GPP is a rare entity that commonly presents in patients with a prior history of plaque psoriasis. The initial onset of GPP is rapid, typically advancing significantly within a few days. In fact, due to the dangerous nature of the condition, a diagnosis of GPP should be considered in **any** patient with a prior history of plaque psoriasis who presents with a rapidly worsening rash.<sup>1</sup>

The physical evaluation of potential GPP should focus on the palms/soles and active borders of plaques, looking carefully for pustules. Other diagnostic clues include palmar/plantar erythema, anonychia (loss/absence of one or more nails), and mucus membrane involvement (erythema, scaling, and/or ulceration)

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"Many of my patients tell me they are often asked, "What is wrong with you?" ...This is why we educate, why we continue to collaborate to improve outcomes for our patients, and why we have to demonstrate empathy."

most often on the lips and tongue but also the oral cavity. Systemic symptoms, including fever, hypocalcemia, and cachexia, are often present early in the progression of GPP.<sup>1</sup>

So then after consolidating this information, the general profile of a GPP patient is as follows:

- Prior history of psoriasis
- Current or recent smoker
- Uncomfortable and itchy
- Systemic symptoms (fever, malaise)
- Rapidly spreading rash that initially developed and worsened on the palms of the hands and soles of the feet
- Recent history of exposure to corticosteroids (sometimes)

While this isn't a comprehensive list of symptoms, some combination of these characteristics may help clue you into a potential case of GPP.

It is critical that patients with GPP are appropriately diagnosed so they can receive focused treatment and avoid significant morbidity and mortality often associated with the condition. At the very least, a patient who presents with fever and malaise needs to receive a comprehensive skin and joint evaluation, preferably at a dermatology and/or rheumatology practice

that specializes in the care of inflammatory skin and joint disease. A punch biopsy of an active border with pustules should be performed to confirm the diagnosis of GPP. To help find the most appropriate location for the punch biopsy, ask your patient, "Where is the newest area of rash on your skin?" or "Where are you most itchy?"

GPP flares can lead to serious complications, including heart failure, renal failure, and sepsis, so treatment must be efficient and appropriate. GPP pustules can be subtle in appearance and are generally sterile. Wound culture of a pustule in GPP is often a good step to help guide treatment and ensure appropriate antibiotic stewardship. Any arthritis/arthropathies, as well as osteitis of the knees, spine, and ankles, should be identified and treated to halt the irreversible progression of joint disease.<sup>1,2</sup>

The initial treatment goals for a patient with GPP should focus on making patients more comfortable by addressing systemic inflammation. In my current practice, we often use long, tapered doses of systemic corticosteroids (never a dose pack) while awaiting pathology, culture, and other laboratory results. This helps ensure a rapid improvement in a patient's overall symptomatology. Our practice also often prescribes high-potency topical corticosteroids (TCS) in specific cutaneous areas of pain and inflammation. For example, in a patient with GPP who complains of fingertip and toe pain, we'll suggest application

of a high-potency TCS to those specific areas twice daily for 2-3 weeks. The use of wet wraps and mild compression can also be used to alleviate discomfort.

After confirmation of the diagnosis of GPP, we'll typically taper the use of systemic and topical corticosteroids in favor of more targeted therapy. Prior to 2022, we would often begin by prescribing off-label systemic retinoids, cyclosporine, methotrexate, or biologics. Things have changed significantly in the last year since the U.S. Food and Drug Administration's approval of spesolimab as the first systemic molecule specifically aimed at patients suffering from GPP flares. As discussed earlier in this issue of *Dermatology Nurse Practice*, spesolimab is a humanized, targeted, monoclonal antibody that targets the interleukin (IL)-36 receptor. Research has shown that IL-36 is a key driver of the inflammatory pathway in patients with GPP, making it an attractive therapeutic target. In clinical trials, more than half of patients who received intravenous spesolimab saw clearance of their pustules within 1 week of receiving treatment. Common side effects associated with spesolimab include infusion reactions, lethargy, nausea and vomiting, headache, pruritus, ecchymosis, and urinary tract infections.<sup>3</sup>

Patients prescribed spesolimab should be evaluated for serious infection, including tuberculosis, prior to initiating treatment.<sup>3</sup> Additionally, it is critical that patients taking spesolimab—along with other biologic medications—be up to date on all age-appropriate vaccines prior to starting therapy since live vaccines should not be taken during active use of most biologic therapies.

## PALMOPLANTAR PUSTULOSIS (PPP)

PPP is the most common pustular psoriasis subtype, occurring in approximately 1 in 10,000 individuals. Patients with PPP typically present with bilateral, symmetric rash favoring the thenar or hypothenar eminences (ie, the central portion of the palms and

soles). As a rule, PPP patients often complain of intense pruritus and pain.<sup>1</sup>

In some patients, PPP begins with erythema alone that then transitions to intraepidermal (think superficial) pustules. With time, these grouped pustules can form “lakes” of pus. As these pustules resolve, there are often denuded or eroded areas, scale, and/or hyperkeratosis on the affected skin.<sup>1</sup>

As with GPP, patients with PPP are often current or recent cigarette smokers, and many have underlying thyroid disease. For this reason, smoking cessation should be recommended and a thorough thyroid evaluation performed as part of routine practice in these patients. There have also been reports of certain medications, including lithium and tumor necrosis factor inhibitors, being associated with the development of PPP.<sup>1</sup>

As with all autoimmune disease, patients with PPP often have one or more secondary autoimmune diseases. When I have patients come to me asking why they have developed multiple autoimmune conditions, I like to tell them that autoimmune diseases “herd,” commonly occurring together like best friends forever. While this doesn't often alleviate their anger and concern of having to deal with yet another chronic condition, at least they understand better the commonality of autoimmune diseases in a single person or family.

As with all dermatologic conditions, it is important to complete a thorough patient history and physical exam in individuals with suspected PPP. Patients with well-managed thyroid disease, as well as those who successfully quit smoking, are more likely to see their PPP remain well controlled with reduced rash intensity and/or severity.

In our practice, we usually begin the treatment of PPP with high-potency topical corticosteroids. Occasionally, we'll also include systemic retinoids, cyclosporine, dapsone, colchicine, or mycophenolate mofetil. In patients with isolated areas of rash, phototherapy is also an option.

## CONCLUSION

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Patients with GPP and PPP often have a significantly diminished quality of life due to the impact of their condition.<sup>4</sup> When hands and feet are involved in a disease process, as they are with these conditions, the patient's rash is difficult to conceal, causing patients to become self-conscious about going out in public. Due to the widespread pruritis and pain on the hands and feet that are associated with GPP and PPP, patients often report being unable to perform

basic functions such as buttoning a shirt, opening a door/squeezing a door handle, and even shaking hands. Many of my patients tell me they are often asked, "What is wrong with you?" when they go out in public and are often thought to be infectious, even by well-meaning healthcare professionals. This is why we educate, why we continue to collaborate to improve outcomes for our patients, and why we have to demonstrate empathy.

## REFERENCES

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1. Bachelez, H. Pustular psoriasis and related pustular skin diseases. *Br J Dermatol*. 2018;178:614-618.
2. Ryan TJ, Baker H. The prognosis of generalized pustular psoriasis. *Br J Dermatol*. 1971;85:407-411.
3. Spesolimab-sbzo injection, for intravenous use [Prescribing Information]. Available at [www.accessdata.fda.gov/drugsatfda\\_docs/label/2022/761244s000lbl.pdf](http://www.accessdata.fda.gov/drugsatfda_docs/label/2022/761244s000lbl.pdf). Accessed May 3, 2023.
4. Sampogna F, Tabolli S, Söderfeldt B, et al. Measuring quality of life of patients with different clinical types of psoriasis using the SF-36. *Br J Dermatol*. 2006;154:844-849.



# ***When Life Interrupts Patient Care***

by Wendy Cantrell, DNP, CRNP

As healthcare professionals, we often see our patients in a vacuum. They come in on a specific day, with a specific issue (or, more often, series of issues), and we do our best to work together to find a solution. Typically, we can only rely on the patient's history, current symptoms, and what we learn in our often-limited conversations to offer the most appropriate suggestions we feel are viable. We can't go home with our patients, see what their living environment looks like, where they go on a day-to-day basis, and what they do that may or may not be beneficial for their health.

Our powers are limited to what we see and hear, which often leaves us scratching our heads wondering where we went wrong when things start going sideways.

In 2019, Catherine, a 54-year-old woman, presented to our clinic for evaluation of a rash on her hands and feet that had been present for several years. She had been unable to work for the last 18 months due to persistent pain and was on long-term disability. As the sole caregiver to her elderly mother with a limited stable income, Catherine's stress level was high, which she said was a trigger for exacerbations of her rash.

Catherine had been referred by her primary care provider to a podiatrist back in 2016, but she received no formal diagnosis at that time. She was prescribed a topical corticosteroid that she tried for a few weeks, but it didn't make a significant impact, and she quit applying it. The one thing Catherine told our team that did seem to improve



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the rash on her hands and feet—at least temporarily—was tanning beds.

Based on her presentation and history, we prescribed Catherine clobetasol propionate (a class I topical steroid) and initiated the process for excimer laser. After 6 months of twice-weekly laser treatments, along with administration of the potent topical steroid, Catherine demonstrated little improvement. Transportation and financial issues related to use of the laser—she had to drive 45 minutes each way twice a week to get to our office—were becoming onerous, especially since the treatments were ineffective, so Catherine requested an alternative approach. We first tried secukinumab, an interleukin-17 inhibitor that is commonly used to treat psoriasis, along with calcipotriene and betamethasone dipropionate foam. Hydroxyzine was also added to help quell nighttime itching.

Six months after initiating this regimen, Catherine was back for a regular checkup. It was clear that the biologic was working to help clear her rash within the first days of each monthly injection, but she would consistently flare in weeks 3 and 4 following each injection. Based on her pattern of response, we began dividing the usual 300 mg in half, injecting 150 mg every 2 weeks. This seemed to work well, and within 3 months of making this change, Catherine's hands were almost clear. Her feet, while not significantly better, at least weren't worsening. Unfortunately, this improvement didn't last long, and 9 months after starting the twice-monthly secukinumab, Catherine's disease began to flare again. The topical agents she was being prescribed weren't helping either, so we decided to switch to daily acitretin 25 mg. Again, there was some immediate improvement—her hands almost completely cleared, and the painful rash on Catherine's feet began to go away as well—but she began experiencing hair loss after approximately 6 months. Hair loss is a known side effect of acitretin that we had warned Catherine about prior to beginning treatment. Despite her hair loss, Catherine decided that the improvement in her PPP symptoms outweighed the drug's side effects, and she continued on this regimen for another 6 months.

As dermatology providers know, the management of PPP can be extremely challenging. Unlike some of our more common skin conditions, getting patients to “clear” or even “near clear” for a significant length of time is difficult, even without side effects. So all in all, we were all fairly happy with Catherine's progress to this point and hoped that her hair loss might subside with longer treatment.

But then that's when the unknowns of life popped up, and our momentum came crashing to a halt. We lost track of Catherine for several months. She missed multiple scheduled appointments. She stopped responding to our messages. We all scratched our heads wondering what was going on. Catherine certainly seemed in good spirits when we last saw her, and now – poof!! – she had disappeared.

We didn't see or hear from Catherine for another 9 months. When she finally returned, we found out that her mother's health had quickly worsened, and she had recently passed away. While dealing with those stressful issues, Catherine had stopped taking her medications, which not surprisingly exacerbated her PPP, and the painful rash on her hands and feet was as persistent as ever. Fortunately, we were able to restart her on secukinumab and acitretin, with a good overall response. She's now back to approximately the state where she was when we initially lost her to follow up.

As dermatology nurses and nurse practitioners, we do the best we can to deliver care to our patients. It's impossible to predict what sort of external factors might impact our care, and it's not unusual to lose contact with patients for weeks or months for all sorts of reasons. Maybe they've moved. Maybe they wanted a second opinion from another practice. Maybe they are dealing, as Catherine was, with family-related issues. Whatever the reason, it's not our job to judge but rather to put these patients back on the track toward success when they return to our practices.

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