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Description and therapy of palmoplantar pustular psoriasis under IL-17A or dual IL-17A/F inhibition

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A B S T R A C T

Background: Interleukin (IL)-17 inhibitors are effective in treating psoriatic disease, but paradoxical inflammatory reactions can occasionally occur. Palmoplantar pustular psoriasis (PPP) onset or flares have been rarely reported with anti-IL-17A but not dual IL-17A/F inhibition (bimekizumab).
Methods: Retrospective study: patients developing PPP while on anti-IL-17 were retrieved from hospital databases.
Results: Ten new PPP cases occurred during treatment with anti-IL-17: median age 46 years (range 33-59), females 40%. Six patients were obese, five smokers. Different IL-17 inhibitors were implicated, including secukinumab (n = 4), ixekizumab (n = 4), and for the first reported time bimekizumab (n = 2). PPP occurred after a median of 3 months (range 1-60) from anti-IL-17 initiation, earlier in those who did not respond in the primary disease domain (2 months, range 1-3) compared to responders (median 10 months, 1-60). Management of PPP included anti-IL-17 retention with topical agents, ciclosporin or colchicine, switching within class, or swapping to other mechanisms of action (IL-23, TNF, and JAK inhibition). Clinical benefit was reported with all approaches on available follow-up.
Conclusions: PPP is rare during IL-17 inhibition but can occur under dual IL-17A/F inhibition. The underlying immunological mechanisms may involve neutrophil inflammation that independent from type-17 immune response.

1. Introduction

Monoclonal antibodies targeting interleukin (IL)-17 have transformed the treatment of psoriasis, psoriatic arthritis (PsA), and axial spondyloarthritis (axSpA), providing rapid and sustained benefits in the skin domain and notable treatment retention in musculoskeletal phenotypes [1–3]. Therapeutic options include secukinumab and ixekizumab, which selectively inhibit IL-17A; bimekizumab, which neutralizes both IL-17A and IL-17F; and brodalumab, an antagonist of IL-17RA which is available only in dermatology [4].

Targeted IL-17 inhibition has a favourable safety profile but an increased risk of mucocutaneous candidiasis is recognised [5,6], with rare episodes of invasive fungal infections only in patients receiving multiple immunosuppressive treatments [7]. Nevertheless, immunological perturbation related to IL-17A blockade has occasionally resulted in paradoxical inflammatory reactions, most notably inflammatory bowel disease (IBD) [8]. Preclinical studies indicate that IL-17A plays a protective role in maintaining epithelial gut barrier integrity, offering an elegant explanation for this phenomenon [9].

Paradoxical psoriasis is a well-documented adverse event following treatment with tumour necrosis factor (TNF) inhibitors [10], likely related to sustained type I interferon (IFN) production from plasmacytoid dendritic cells in the absence of TNF-mediated regulation, and combined with preserved activation of T helper (Th)17 lymphocytes secreting type-17 cytokines, including IL-17A, IL-17F, and IL-22 [10]. Notably, anti-IL-17 therapies are effective in resolving psoriatic lesions in patients with TNF inhibitor-induced paradoxical psoriasis [10]. These reverse translational immunology insights support a model of unchecked IFN and IL-17 pathway activity in paradoxical psoriasis, supported by the limited literature describing psoriasis onset during IL-17 inhibitor therapy [10].

Palmoplantar pustular psoriasis (PPP) is a disease subset

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characterized by skin changes and a complex pathogenesis likely involving both autoinflammatory and type-17 mechanisms [11]. Preliminary evidence supports the role of IL-17 inhibitors for treating PPP [11–13]. However, PPP onset or flare has been rarely described with secukinumab, ixekizumab, and brodalumab [10], but not with bimekizumab. This might support that antagonism of IL-17F could prevent cutaneous neutrophilic inflammation [9], akin to the intestinal environment where IL-17F, but not IL-17A, exhibits proinflammatory functions, its blockade being associated with amelioration of experimental colitis [14], despite conflicting evidence in humans [15]. This view might be nonetheless simplistic, given the tissue specific roles of IL-17A and IL-17F in homeostasis and disease.

We report the largest series to date of patients developing PPP during anti-IL-17 therapy, including the first description of cases observed under dual IL-17A/F blockade (bimekizumab). We also review previously identified cases and propose potential pathogenic mechanisms underlying this rare event to inform treatment strategies and guide future research.

2. Materials and methods

2.1. Patients' records

The Electronic Health Record (EHR) dataset of Leeds Teaching Hospitals Trust (LTHT) was systematically searched, as previously described [16], to identify patients developing PPP while receiving anti-IL-17 therapy. The search strategy included drug-specific terms ("secukinumab," "ixekizumab," "bimekizumab," and "brodalumab") and terms related to the adverse event (e.g., "palmoplantar psoriasis," "pustular psoriasis," "palmoplantar pustular psoriasis", "psoriasis" AND "pustules," etc.). Clinical records of patients treated with at least one anti-IL-17 agent and documented as having PPP were identified, regardless of the underlying disease indication (psoriasis, PsA, SpA, or hidradenitis suppurativa). Clinical letters were then manually reviewed to select cases, defined when PPP newly developed or flared temporally after IL-17 inhibitor initiation, without alternative identifiable triggers. Any previous history of PPP was documented as was the phenotype of underlying psoriatic disease for each patient. Additional cases meeting the inclusion criteria were retrospectively retrieved from the clinical databases of "Elias" University Emergency Hospital (Bucharest, Romania) and Azienda Sanitaria Universitaria Friuli Centrale "*Santa Maria della Misericordia* Hospital" (Udine, Italy). All patients provided written consent.

For each patient, demographic characteristics, comorbidities, primary disease indication for anti-IL-17 therapy (psoriasis, PsA, axSpA, hidradenitis suppurativa), prior therapies, reason for treatment change (cutaneous and/or musculoskeletal flare), and the specific anti-IL-17 agent adopted with the corresponding dosing schedule were recorded. Disease activity indices were collected before anti-IL-17 initiation and at 3-6 months follow-up, depending on the underlying disease and the clinical record availability, and included Psoriasis Area Severity Index (PASI) for psoriasis and Disease Activity in Psoriatic Arthritis (DAPSA) for PsA. The time from the first anti-IL-17 prescription to the occurrence of PPP was documented, as well as the adopted therapeutic strategies to overcome the adverse event and the reported outcome.

2.2. Systematic case retrieval search strategy

To identify previously reported cases of PPP, PubMed was searched on 24 September 2025 using the same strategy applied to the LTHT dataset. Observational studies, case reports, and case series documenting the event were screened, additional cases cited within references of the selected manuscripts were eventually considered.

2.3. Statistical methods

Continuous variables are presented as medians with ranges (min-max), while categorical variables are reported as counts and percentages. Due to the small sample size, only descriptive statistics were applied.

3. Results

3.1. Patient characteristics

Ten new patients who developed PPP during anti-IL-17 therapy were identified (Table 1). Most were male (n = 6) and obese (n = 6), and a history of smoking was recorded in five cases. All patients had a history of plaque psoriasis, with a median disease duration of 10 years (range 3-24), and two patients had prior palmoplantar involvement, which was in remission at the time of IL-17 inhibitor initiation. Seven patients had PsA with a median duration of 5 years (range 2-20). Axial disease was present in two patients, both HLA-B27 positive: one with PsA and the other with ankylosing spondylitis, who had previously developed paradoxical plaque psoriasis during anti-TNF therapy. None of the patients had hidradenitis suppurativa, nor a history of eczema including hand eczema. No history of IBD or uveitis was recorded.

Previous treatments included methotrexate and anti-TNF agents in eight patients each, apremilast in two cases, and ustekinumab in one case. One patient had previously received two anti-IL-17A agents (secukinumab and ixekizumab), both discontinued due to secondary failure on joint involvement but no adverse events. Overall, the indications for initiating a new anti-IL-17 agent were joint flare (5/10), cutaneous flare (3/10), or high disease activity in both domains (2/10). Four patients each were started on secukinumab or ixekizumab, two received bimekizumab, none brodalumab. Clinical improvement in the affected domains was observed in five patients: two treated for joint flare (one with secukinumab and one with ixekizumab), two for skin flare (one with ixekizumab and one with bimekizumab), and one for concomitant joint and skin disease activity (secukinumab).

3.2. Onset and management of PPP following IL-17 inhibition

Fig. 1 shows the clinical presentation of one representative case of paradoxical PPP that developed during bimekizumab therapy. The median time from the first anti-IL-17 dose to PPP onset was 3 months (range 1-60). Notably, patients who exhibited a clinical benefit in their primary disease domains developed PPP later (median 10 months; range 3-60), whereas those who did not respond to anti-IL-17 therapy developed PPP earlier (median 2 months; range 1-3). The two patients exhibiting a prior history of PPP flared with this phenotype after 3 and 10 months, respectively, from anti-IL-17 initiation.

Therapeutic strategies included swapping to agents with different mechanisms of action, switching within the IL-17 inhibitor class, or continuing the original anti-IL-17 agent with the addition of adjunctive treatments. Specifically, swapping to anti-IL-23 was performed in two cases (both with guselkumab), to JAK inhibition in two cases (both upadacitinib), and to anti-TNF in one case (golimumab). Four patients were switched to another anti-IL-17 agent: three who developed PPP on secukinumab (n = 2) or ixekizumab (n = 1) were switched to bimekizumab, while the last one was cycled back from bimekizumab to secukinumab (previously used). One patient continued bimekizumab with the addition of colchicine (1 mg daily) and dapsone. At 3-month follow-up (available for seven patients), all showed clinical improvement or complete resolution of PPP lesions while maintaining control of the underlying disease.

3.3. Description of literature cases and the merged cohort

Eight articles were identified [18–25], reporting on 11 patients

Table 1
Characteristics of patients developing PPP while on anti-IL-17 treatment. Features are reported in separate columns for each presented case. The last column summarizes categorical variables as numbers with percentages, and continuous variables as medians with ranges.

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	Summary
Demographic features											
Age, years	59	49	50	42	33	38	51	42	39	49	46 (33–59)
Sex	M	F	M	M	M	F	M	M	F	F	F:M = 4:6
Smoke	–	+	–	–	–	–	+	+	+	+	5 (50)
Obesity (BMI ≥30 kg/m^2)	+	+	+	+	–	+	+	–	–	–	6 (60)
Anxiety/depression	–	+	–	–	–	–	+	–	–	–	2 (20)
HLA-B27	–	–	–	+	+	N/A	–	–	–	–	2 (22)
Clinical features											
PsO	+	+	+	+	+	+	+	+	+	+	10 (100)
PsO duration, years	24	3	16	18	10	6	20	3	10	10	10 (3–24)
Baseline PsO phenotype	Plaque	Plaque, PPP	Plaque	Plaque	Plaque	Plaque	Plaque	Plaque, PPP	Plaque	Plaque	2 (20)
PsA	–	+	+	+	–	–	+	+	+	+	7 (70)
PsA duration, years		3	15	2			20	3	6	5	5 (2–20)
Peripheral arthritis		+	+	+			+	+	+	+	7 (100)
Enthesitis		+	–	+			–	–	+	+	4 (57)
Dactylitis		–	+	–			–	+	+	+	4 (57)
Axial involvement		–	–	+			–	–	–	–	1 (14)
axSpA/AS	–	–	–	–	+	–	–	–	–	–	1 (10)
axSpA/AS duration, years					10						
Therapeutic history prior to anti-IL-17											
CsA	–	+	–	–	–	–	–	–	–	–	1 (10)
MTX	+	–	+	+	–	+	+	+	+	+	8 (80)
SSZ	–	+	+	+	–	–	–	–	–	–	3 (30)
Anti-TNF	–	+	–	+	+	+	+	+	+	+	8 (80)
Anti-TNF details		ADA		GOL	ADA, ETN	ADA, ETN	ADA, ETN, GOL, IFX	ADA	ADA	ADA	
Anti-IL-17	–	–	+	–	–	–	–	–	–	–	1 (10)
Anti-IL-17 details			SEC, IXE								
Apremilast	+	–	+	–	–	–	–	–	–	–	2 (20)
Ustekinumab	–	–	–	–	–	+	–	–	–	–	1 (10)
Disease activity measures before and after new anti-IL-17											
Drug	BIM	SEC	BIM	IXE	SEC	IXE	SEC	IXE	SEC	IXE	SEC: 4 [17] IXE: 4 (40) BIM: 2 (20)
Dose and schedule	320 mg Q4W	150 mg Q4W	160 mg Q4W	80 mg Q4W	150 mg Q4W	80 mg Q4W	300 mg Q4W	80 mg Q4W	300 mg Q4W	80 mg Q4W	
Reason for change	skin	msk	msk	skin	msk	skin	skin + msk	msk	msk	skin + msk	Skin: 5 (50) Msk: 7 (70)
Baseline PASI	18.8	0	0	24.3	0	5.4	9	1.2	3	N/A	3 (0–24.3)
Follow-up PASI	3.2	0	0	N/A	0	5.4	4	1.2	3	N/A	3 (0–5.4)
Baseline DAPSA	0	46	25	0	0	0	23	31.4	18.2	N/A	18.2 (0–46)
Follow-up DAPSA	0	4	25	0	0	0	13.6	4	15.1	N/A	4 (0–25)
Response to anti-IL-17	+	+	–	+	–	–	+	+	–	–	5 (50)
Adverse event features with anti-IL-17											
Time from anti-IL-17 start to AE, months	1	10	3	24	3	1	60	3	1	2	3 (1–60)
Anti-IL-17 retained	+	–	–	–	–	–	–	–	–	–	1 (10)
Therapeutic strategy	Colchicine Dapsone	Swap GUS	Switch SEC	Switch BIM	Swap GOL	Swap GUS	Switch BIM	Switch BIM	Swap UPA	Swap UPA	
Response	+	N/A	+	+	+	+	+	N/A	+	N/A	7 (100)

Abbreviations – ADA: adalimumab; axSpA/AS: axial spondyloarthritis/ankylosing spondylitis; BIM: bimekizumab; BMI: body mass index; CsA: ciclosporin A; DAPSA: disease activity of psoriatic arthritis; ETN: etanercept; F (sex): female; GOL: golimumab; GUS: guselkumab; IFX: infliximab; IXE: ixekizumab; M (sex): male; msk: musculoskeletal (i.e., arthritis, enthesitis, dactylitis, or axial disease); MTX: methotrexate; N/A: not available; PASI: psoriasis area severity index; PsA: psoriatic arthritis; PsO: psoriasis; Q4W: every four weeks; SEC: secukinumab; SSZ: sulfasalazine; UPA: upadacitinib; +: present; –: absent.

meeting the inclusion criteria. Most were female (9/11), with a median age of 48 years (range 26–69). Smoking and obesity were each reported in two patients. Underlying diagnoses included plaque psoriasis (10/11)—coexisting with PsA in five and axSpA in two cases—and hidradenitis suppurativa (1/10). Prior exposure to anti-TNF and anti-IL-17 agents was documented in four and two patients, respectively.

The anti-IL-17 agents implicated in PPP included secukinumab (7/11), brodalumab (3/11), and ixekizumab (1/11); no cases were reported with bimekizumab. All patients initially responded to therapy in the primary disease domains, and the median time to PPP onset was 4 months (range 1-16). Three patients (3/11) continued anti-IL-17 treatment after PPP onset—two managed with topical glucocorticoids and one with cyclosporine. Among those who discontinued therapy, management included acitretin (1/11), cyclosporine (1/11), or switching to

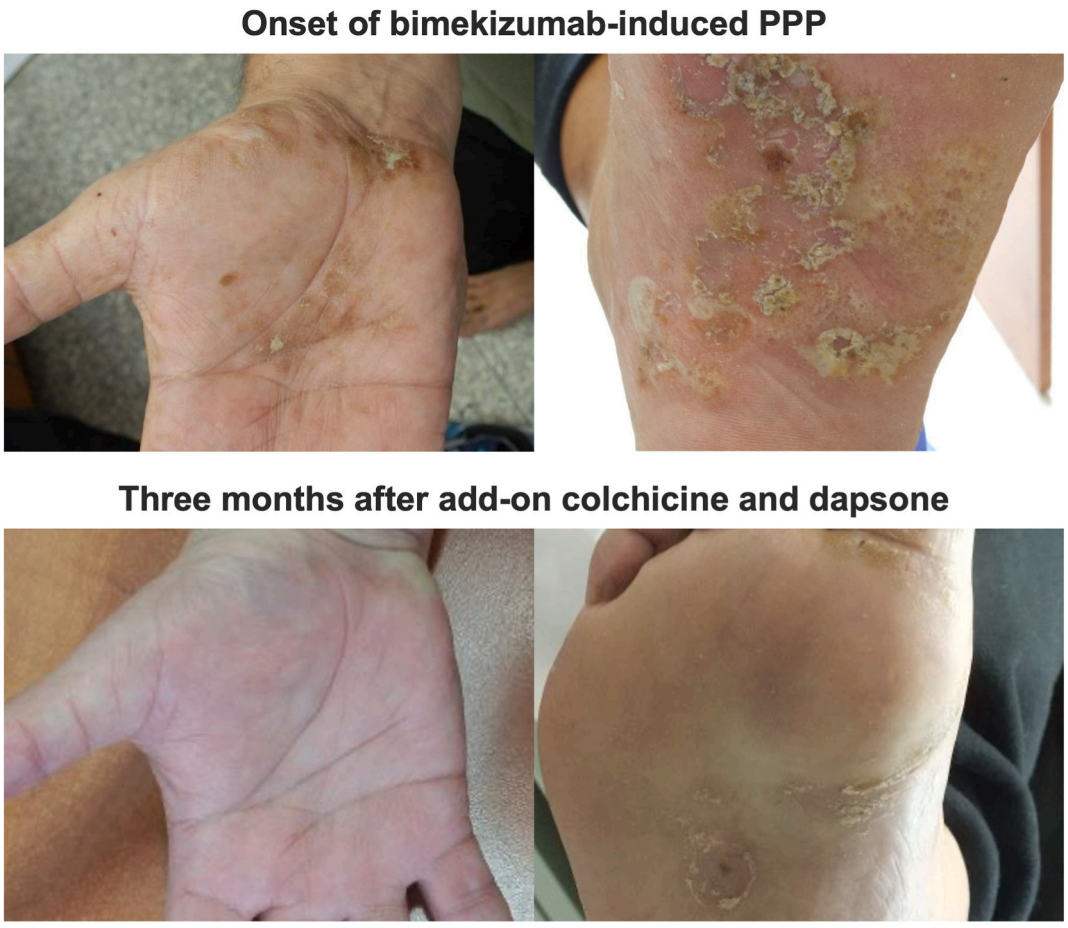

Fig. 1. Clinical presentation of PPP in Patient 1 of our series. The patient was receiving bimekizumab for severe plaque psoriasis. Palmar and plantar pustular lesions developed on the background of erythematous skin changes despite overall disease control of plaque psoriasis. Bimekizumab was retained on therapy, while add-on colchicine and dapsone provided resolution of the clinical alterations within three months of therapy.

anti-IL-23 agents (4/11; three ustekinumab, one guselkumab). No additional treatment was recorded in two cases.

Combining our series with literature data (n = 21; Table 2), 62% of patients were female, with a median age of 44 years (range 26-69). Obesity and smoking history were reported in 38% and 33% of patients, respectively. A history of plaque psoriasis was present in 95% of cases. Axial involvement, either as part of PsA or axSpA, was noted in four cases. Three patients had prior exposure to anti-IL-17 therapy, none of whom had experienced the index adverse event.

Across the 21 cases, PPP occurred with all available anti-IL-17 agents but most frequently with secukinumab (11/21) and ixekizumab (5/21). The median time to PPP onset or flare was 3 months (range 1-60) after treatment initiation. During follow-up, four patients (19%) continued anti-IL-17 therapy, in combination with other treatment strategies. Swapping to anti-IL-23 drugs was the most common management strategy (6/21, 33%), followed by switching to another anti-IL-17 agent (4/21, 19%). Notably, all patients with available follow-up data (n = 18) demonstrated clinical improvement or resolution of PPP.

4. Discussion

Psoriasis onset has been reported with biologic and targeted synthetic DMARDs, most commonly anti-TNF agents, seldom showing a PPP phenotype [10,26]. Similar observations, albeit less common, have also been described during IL-17 or IL-23 pathway inhibition [10,26]. Here we report the largest series of clinically documented cases of PPP occurring during anti-IL-17 therapy. The occurrence of paradoxical PPP under IL-17 inhibition may appear counterintuitive, given the efficacy of these drugs in treating primary forms of the disease [27], with brodalumab receiving specifical license in Japan [28]. Interestingly, four of the reported cases demonstrated resolution of PPP following a switch to another IL-17 inhibitor, three of which involved bimekizumab. A simplistic model might suggest that unopposed IL-17F activity could persist under selective IL-17A blockade, analogous to findings in murine models of IBD where IL-17F—but not IL-17A—drives inflammation [9]. Nevertheless, our observations extend this concept by showing that PPP can also develop under dual IL-17A/F inhibition.

Given the observed clinical phenotype, neutrophil-driven inflammation may contribute to the pathogenesis of this phenomenon. Indeed, even dual IL-17A/F inhibition leaves upstream IL-23 intact, allowing the persistence of a neutrophil-mediated autocrine loop [29] that promotes further Th17 polarization [29,30] and the production of other type-17 cytokines such as IL-22 [31]. IL-22 is a potent stimulator of keratinocyte proliferation and induces the synthesis of neutrophil-attracting chemokines (e.g., CXCL1, CXCL7, CXCL8) within the epidermis [32,33]. Also, IL-22 stimulates keratinocytes to produce IL-17C, which amplifies the inflammatory cascade by signalling through IL-17RA [34,35], enhancing neutrophil recruitment and activation [36]. This mechanism may be more pronounced in regions where the epidermis is thicker—reflecting a greater abundance of keratinocytes—and Koebner's phenomenon is more pronounced, such as the palms and soles. The observed efficacy of IL-23 blockade for treating the described cases of PPP may be linked to its ability to inhibit neutrophil-mediated processes upstream of IL-17 (Fig. 2).

Additional evidence supporting a role for innate neutrophil-driven inflammation comes from one patient in our series achieving PPP

Table 2
Merged cohort of patients experiencing PPP while on anti-IL-17 drugs, encompassing original data and those retrieved from literature. Continuous variables are reported with medians and ranges, categorical variables are reported as numbers and percentages.

Demographic and comorbidities	
Age, years	44 (26–69)
Female sex	13 (62)
Smoke	7 (33)
Obesity	8 (38)
Underlying disease	
PsO	20 (95)
PsA	12 (57)
axSpA	3 (14)
Hidradenitis suppurativa	1 (4.8)
Previous cs/b/tsDMARDs	
MTX	10 (48)
Anti-TNF	12 (57)
Anti-IL-17	3 (14)
Details on former anti-IL-17	SEC: 2; SEC and IXE: 1
New anti-IL-17 introduced	
SEC	11 (52)
IXE	5 (24)
BIM	2 (9.5)
BRO	3 (14)
Reason for introduction	skin: 13 (62); msk: 12 (57)
Responder	16 (76)
Adverse event	
Time to paradoxical PPP onset/flare, months	3 (1–60)
Anti-IL-17 retained	4 (19)
Treatment strategy	
Topical therapy only	2 (9.5)
CsA	2 (9.5)
Colchicine	1 (4.8)
Switch other anti-IL-17	4 (19)
Swap to anti-TNF	1 (4.8)
Swap to anti-IL-23	6 (29)
Swap to JAK-inhibitor	2 (9.5)
Response of PPP	18/18 (100)

Abbreviations – axSpA: axial spondyloarthritis; BIM: bimekizumab; BRO: brodalumab; CsA: ciclosporin A; IXE: ixekizumab; JAK: Janus kinase; msk: musculoskeletal (i.e., arthritis, enthesitis, dactylitis, or axial disease); MTX: methotrexate; PsA: psoriatic arthritis; PsO: psoriasis; SEC: secukinumab.

remission with colchicine and dapsone [37]. This finding parallels autoinflammatory disorders, in which IL-1β drives neutrophilic skin inflammation [38,39]. Remarkably, IL-36—a cytokine member of IL-1 superfamily—has been implicated in the pathogenesis of psoriasis and PPP [40], and deficiency of IL-36 receptor antagonist (DITRA) predisposes to generalized pustular psoriasis [17]. IL-36 is produced by keratinocytes upon different stimuli, including type-17 cytokines, and contributes to neutrophil recruitment [40]. This suggests that innate immune triggering cytokines such as IL-36, rather than adaptive immune mechanisms, may underlie the onset or flare of PPP during anti-IL-17 therapy but formal studies are needed.

'Primary' PPP occurs more frequently in obese women and is associated with smoking [41]. Our description of PPP occurring under anti-IL-17 treatment aligns only in part with these patterns, the prevalence of smokers being quite low in our cohort. However, our data further emphasize the potential impact of body constitution on PPP onset, perhaps pointing to the contribution of Koebner's phenomenon on body areas exposed to major pressure. Since obesity is associated to increased levels of IL-17, it is reasonable that targeted inhibition of this cytokine may redirect Th17 cells toward IL-22 production, sustaining the postulated pathogenic loop. Notably, only one of six obese patients and one of four non-obese patients had a prior history of PPP. Taken together, these observations suggest that obese patients initiating anti-IL-17 therapy may warrant closer clinical surveillance, as well as consideration of preventive or mitigating strategies to reduce the risk of PPP onset or flare.

Consistent with previous literature [42–44], in most cases PPP appeared early after the initiation of anti-IL-17 therapy. In our cohort, this pattern was particularly evident among patients who failed to respond in the primary disease domains for which the treatment had been prescribed. Nonetheless, three late-onset cases were identified. All of these patients were obese, two of them were male and smokers; only one had a prior history of PPP, which was in remission at the time anti-IL-17A therapy was started. Notably, two of these late-onset cases were successfully managed by switching to bimekizumab.

Several limitations should be acknowledged. First, the study design did not allow for robust statistical analyses, the results are therefore descriptive and should therefore be interpreted accordingly. Second, although selection and recall bias were minimized through a systematic hospital database search, some cases may have been missed if they were not captured by the adopted search strategy. Referral bias should be accounted given that all patients were identified in tertiary care centres. Third, the small sample size limits the ability to draw definitive conclusions, including HLA-B27 prevalence, relationships with prior treatment exposure, and response to different therapeutic strategies. Fourth, while we observed improvement in three patients switching from selective IL-17A inhibition to bimekizumab and in one patient switching from bimekizumab to secukinumab, there is still no evidence on 'intra class' switch among two selective anti-IL-17A. Given the expanding use of IL-17A and IL-17A/F inhibitors, systematic pharmacovigilance and registry-based surveillance are warranted to more accurately define the true incidence, risk factors, and clinical outcomes of PPP arising or flaring during treatment in real-world populations.

In conclusion, we report the largest series of patients developing or experiencing flares of PPP during anti-IL-17 therapy, including for the first time dual IL-17A/F blockade. This adverse event predominantly affected patients with plaque psoriasis, most of whom had no prior history of PPP, but also occurred in individuals with PsA or axSpA. PPP onset was observed regardless of clinical response to IL-17 therapy in the underlying disease. Various therapeutic strategies—including swapping to IL-23 or JAK inhibitors, switching within the anti-IL-17 class, or adding topical steroids, colchicine, or cyclosporine—provided clinical benefit. These findings underscore the complex immunopathology of this phenomenon and suggest a significant contribution of neutrophil-driven innate immune mechanisms.

Ethics

This study was conducted in accordance with the principles of Declaration of Helsinki. All patients received standard of care procedures and data collection was retrospective, therefore no ethical approval was needed. The patients in this manuscript have given written informed consent to publication of their case details.

CRediT authorship contribution statement

Antonio Tonutti: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Vlad Voiculescu:** Conceptualization, Data curation, Writing – review & editing. **Francesca Trunfio:** Data curation, Visualization, Writing – review & editing. **Kerem Abacar:** Data curation, Methodology, Writing – review & editing. **Ala Altaie:** Investigation, Visualization, Writing – review & editing. **Tom Macleod:** Investigation, Visualization, Writing – review & editing. **Claire Vandevelde:** Data curation, Writing – review & editing. **Katya Meridor:** Data curation, Writing – review & editing. **Kave Shams:** Data curation, Writing – review & editing. **Alen Zabotti:** Data curation, Investigation, Writing – review & editing. **Luca Quartuccio:** Data curation, Writing – review & editing. **Carlo Selmi:** Data curation, Writing – review & editing. **Helena Marzo-Ortega:** Data curation, Investigation, Writing – review & editing. **Dennis McGonagle:** Conceptualization, Formal analysis, Investigation, Writing – original draft, Writing – review & editing.

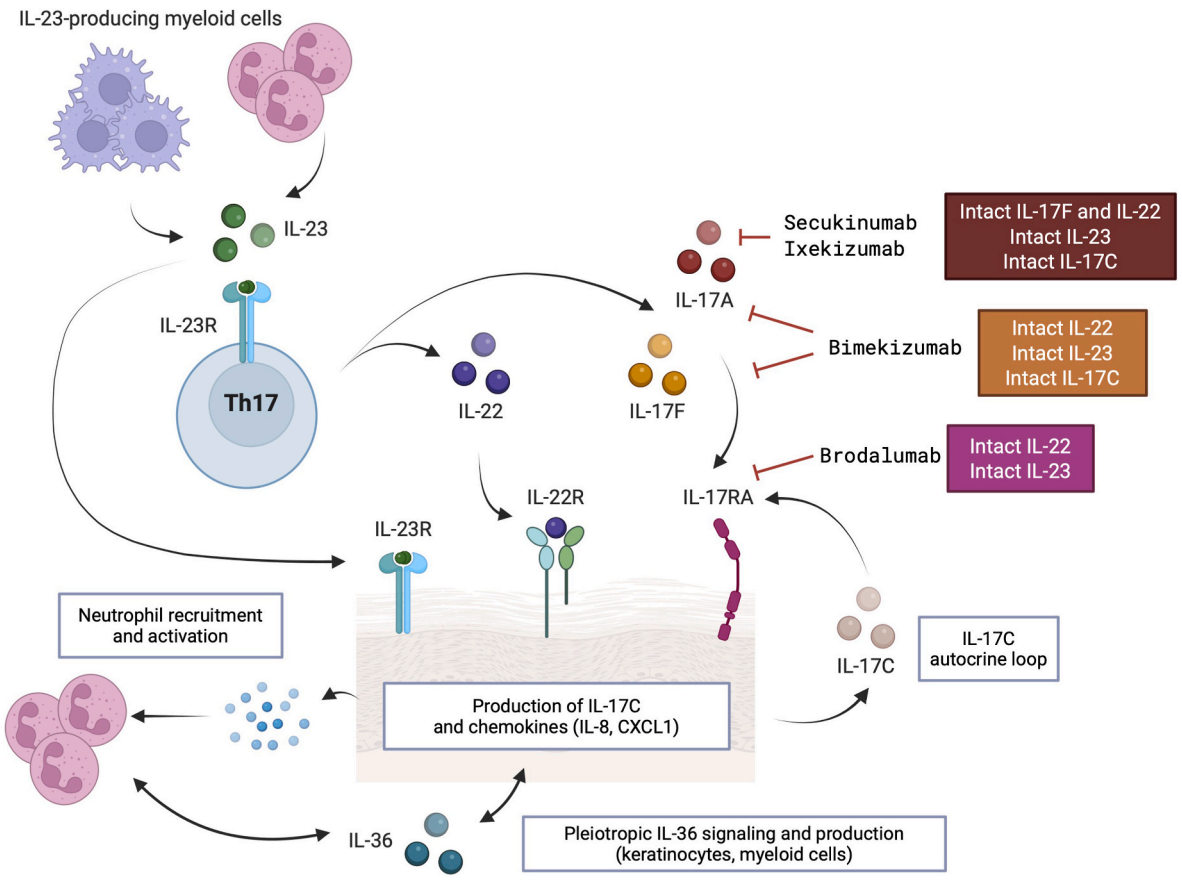

Fig. 2. Proposed pathogenic mechanisms of paradoxical PPP under anti-IL-17 inhibition.

Declaration of competing interest

AZ served as consultant and/or speaker for AbbVie, Amgen, Biogen, Eli Lilly, Novartis, UCB, and Jannsen. CS reports grants from AbbVie, Amgen, Janssen, Novartis, and Pfizer; and consulting fees and honoraria from AbbVie, Amgen, Alfa-Sigma, Biogen, Eli Lilly, EUSA Pharma-Recordati, Galapagos, Janssen, Novartis, Octapharma, Pfizer, and SOBI; HMO has received research grants from Janssen, Novartis, Pfizer and UCB; and has received honoraria/speaker fees from AbbVie, Amgen, Biogen, Eli Lilly, Janssen, Moonlake, Novartis, Pfizer, Takeda and UCB; DMcG has received speaker fees from Abbvie, BMS, Celegene, Janssen, Lilly, Novartis, Moonlake, Pfizer and UCB, received grant funding from Abbvie, BMS, Celegene, Janssen, Lilly, Novartis, Moonlake, Pfizer and UCB.

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Data availability

The data that has been used is confidential.

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