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BRIEF REPORT

Real-World Effectiveness and Safety of Dupilumab, Tralokinumab, and Upadacitinib in Patients with Atopic Dermatitis: A 52-Week International, Multicenter Retrospective Cohort Study

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ABSTRACT

Introduction: Evaluating the real-world effectiveness, safety, and tolerability of targeted biologic and non-biologic therapies in patients with atopic dermatitis (AD) treated in routine clinical practice remains crucial. In this international, multicenter, retrospective, comparative study we aimed to evaluate the 52-week effectiveness, safety, and tolerability of dupilumab,

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tralokinumab, and upadacitinib in patients with AD aged ≥ 12 years.

***Methods*:** Effectiveness was assessed at weeks 16, 24, and 52 using Eczema Area and Severity Index (EASI) and itch Numerical Rating Scale (NRS) scores. Safety was measured via adverse events (AEs).

***Results*:** A total of 1286 treatment courses were included: 62.5% received dupilumab, 24.3% received upadacitinib, and 13.1% received tralokinumab. Upadacitinib demonstrated higher effectiveness than dupilumab and tralokinumab across all time points and most evaluated outcomes both on the overall population and the biologic-/JAKi-naïve population, including stringent treatment targets such as EASI 90 response and combined EASI 90 + itch NRS 0/1 response. While upadacitinib demonstrated superior effectiveness, it was associated with a higher incidence of AEs, both leading to and not leading to treatment discontinuation, including thromboembolic events, lipid abnormalities, and hematologic abnormalities. In contrast, conjunctivitis was the most frequently observed AE among patients receiving biologics.

***Conclusion*:** This study provides a comprehensive real-world comparison of dupilumab, tralokinumab, and upadacitinib in AD, highlighting upadacitinib's superior effectiveness in achieving stringent treatment targets, both in the short and long term, but also a higher incidence of AEs. However, the considerable heterogeneity of the study population, an inherent limitation of real-world studies, must be acknowledged when interpreting these findings.

Keywords: Atopic dermatitis; Dupilumab; Effectiveness; Safety; Tralokinumab; Upadacitinib

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Key Summary Points

Why carry out this study?

Atopic dermatitis (AD) is a chronic, burdensome disease often requiring systemic therapy in moderate-to-severe cases. Real-world evidence comparing targeted biologic and non-biologic treatments in AD remains limited.

This study aimed to compare the 52-week effectiveness, safety, and tolerability of dupilumab, tralokinumab, and upadacitinib in patients aged ≥ 12 years with AD.

What was learned from the study?

Upadacitinib showed superior effectiveness compared with dupilumab and tralokinumab at all time points, in both the overall population and the biologic-/JAKi-naïve population.

Upadacitinib was associated with a higher incidence of adverse events, including thromboembolic events, lipid abnormalities, and hematologic alterations. In contrast, biologic therapies were generally better tolerated, with conjunctivitis being the most frequently reported adverse event in this group.

These findings support a personalized approach to systemic treatment in AD, helping clinicians balance efficacy and safety profiles when selecting therapy.

INTRODUCTION

While novel targeted biologic and non-biologic therapies have demonstrated significant efficacy and favorable safety profile in controlled clinical trials for atopic dermatitis (AD) [1], evaluating their real-world performance in broader, more heterogeneous patient populations representative of routine clinical practice remains essential [2–4]. This international, multicenter, retrospective, comparative study aimed to evaluate the 52-week effectiveness, safety, and tolerability of dupilumab, tralokinumab, and upadacitinib in patients with atopic dermatitis (AD) aged ≥ 12 years.

METHODS

This study included patients aged ≥ 12 years with AD who were treated with dupilumab, tralokinumab, or upadacitinib between March 2021 and July 2024 across 16 dermatology centers in Canada, Czechia, Greece, Italy, Portugal, Spain, and Switzerland. No exclusion criteria based on concomitant medical conditions or prior treatment exposure were applied in order to reflect real-world clinical practice.

Effectiveness was assessed at weeks 16, 24, and 52 using Eczema Area and Severity Index (EASI) and itch Numerical Rating Scale (NRS) scores. A modified Non-Responder Imputation (mNRI) analysis was applied, where patients who discontinued treatment because of lack of response were classified as non-responders. Safety outcomes, including adverse events (AEs) and causes of treatment discontinuation, were also evaluated throughout the follow-up period. Data were extracted from medical records using a standardized data collection framework across participating centers.

Descriptive statistics were used to summarize baseline characteristics, safety outcomes, and treatment responses. Comparisons between treatment groups were conducted using chi-squared or Fisher's exact tests for categorical variables, and one-way analysis of variance (ANOVA) or Kruskal–Wallis tests for continuous variables, as appropriate. Post hoc multiple comparisons were performed to identify specific group differences.

The present study was conducted in accordance with the Declaration of Helsinki, initially published in 1964 on Ethical Principles for Medical Research Involving Human Subjects, and after approval by the local ethical committees.

RESULTS

A total of 1286 treatment courses were included: 62.5% received dupilumab, 24.3% received

upadacitinib, and 13.1% received tralokinumab. Mean EASI at baseline was significantly higher in the dupilumab versus tralokinumab and upadacitinib groups (24.4 ± 8.4 vs 21.6 ± 10.8 and 17.0 ± 11.6, respectively; $p < 0.001$). Prior biologic-/Janus kinase inhibitor (JAKi) use was significantly lower in the dupilumab versus tralokinumab and upadacitinib groups (4.4% vs 35.5% and 44.4%, respectively; $p < 0.001$). Baseline characteristics are summarized in Table 1.

Upadacitinib demonstrated higher overall effectiveness than dupilumab and tralokinumab across all time points and most evaluated outcomes (Supplemental Table 1). In the overall population, upadacitinib demonstrated significantly higher EASI 90 rates than dupilumab and tralokinumab at week 16 (65.8% vs 46.2% vs 30.3%, $p < 0.001$) and week 52 (76.6% vs 66.2% vs 32.9%, $p < 0.001$). EASI 90 + itch NRS 0/1 response was achieved by a significantly higher proportion of patients treated with upadacitinib compared to patients treated with dupilumab and tralokinumab at week 16 (31.9% vs 19.2% vs 9.9%, $p < 0.001$) and week 52 (37.5% vs 34.1% vs 11.4%, $p < 0.001$), respectively.

In patients who were biologic-/JAKi-naïve, upadacitinib demonstrated significantly higher EASI 90 rates than dupilumab and tralokinumab at week 16 (70.9% vs 47.4% vs 37.7%, $p < 0.001$) and week 52 (83.8% vs. 66.8% vs. 35.7%, $p < 0.001$). EASI90 + itch NRS 0/1 response was achieved by a significant higher proportion of patients treated with upadacitinib than patients treated with dupilumab and tralokinumab at week 16 (38% vs. 19.3% vs. 13.2%, $p < 0.001$) and week 52 (60.7% vs 34.3% vs 15.9%, $p < 0.001$), respectively (Fig. 1).

During the 52-week observation period, 7.8%, 13.6%, and 11.8% of patients discontinued dupilumab, tralokinumab, and upadacitinib, respectively. Loss of efficacy accounted for 4.2%, 9.5%, and 1.0% of discontinuations in the dupilumab, tralokinumab, and upadacitinib groups, respectively, while adverse events led to 2.0%, 2.4%, and 4.8% of discontinuations in the same groups (percentages refer to total treatment courses). AEs not leading to treatment discontinuation were observed in 23.6%, 18.3%, and 47.6% of patients receiving dupilumab, tralokinumab, and upadacitinib, respectively (Table 2).

In the dupilumab and tralokinumab groups, the most common AE was blepharitis/conjunctivitis (11.6% and 12.4%, respectively), followed by facial erythema (3.1%) with dupilumab and psoriasiform eruption (2.4%) with tralokinumab. In the upadacitinib group, the most frequently reported AEs included lipid abnormalities (12.5%), acne (9.9%), hematologic abnormalities (7%) and elevated creatine kinase (6.1%) (Table 3).

DISCUSSION

Real-world evidence directly comparing the effectiveness, safety, and tolerability of dupilumab, tralokinumab, and upadacitinib in AD remains limited. While head-to-head randomized controlled trials [5] and indirect comparisons from network meta-analyses [6] and matching-adjusted indirect comparisons (MAICs) [7] have provided valuable insights, these studies are conducted under controlled conditions and may not adequately capture the clinical heterogeneity and complexity encountered in routine practice. As such, real-world comparative studies are essential to better inform therapeutic decision-making across diverse patient populations.

This study provides a comprehensive real-world comparison of dupilumab, tralokinumab, and upadacitinib in AD, highlighting upadacitinib's superior effectiveness in achieving stringent treatment targets, both in the short and long term, although these results should be interpreted in the context of the considerable heterogeneity of the study population, an inherent limitation of real-world studies. These findings align with the growing emphasis on treat-to-target strategies, where EASI 90, and minimal disease activity (MDA) criteria (EASI 90 + itch NRS 0/1) have been proposed as optimal therapeutic goals [8].

Notably, upadacitinib demonstrated greater effectiveness despite a significantly higher

Table 1 Baseline characteristics

	Dupilumab $n = 804$	Tralokinumab $n = 169$	Upadacitinib $n = 313$	p
Age (baseline), y, mean ± SD	38.3 ± 19.7[a]	44.4 ± 19.5[b]	40.1 ± 16.8[b]	< 0.001*
Age at AD presentation, y, median (IQR, range)	3 (19)	3 (38)	3 (19)	0.581
AD disease duration, y, mean ± SD	18.2 ± 16.7[a]	24.1 ± 16.7[b]	22.7 ± 16.5[a,b]	< 0.001*
First-degree relative with AD, *n* (%)	117 (14.6)	4 (2.4)	15 (4.8)	0.314
BMI, kg/m^2, mean ± SD	24.4 ± 4.5	24.4 ± 4.4	25.2 ± 4.4	0.264
Smoking				0.208
Former, *n* (%)	104 (12.9)	25 (14.8)	14 (4.5)	
Current, *n* (%)	3 (0.4)	0 (0)	1 (0.3)	
Atopic comorbidities, *n* (%) (allergic rhinitis, asthma, allergic conjunctivitis and food allergy)	279 (34.7)[a]	78 (46.2)[a]	102 (32.6)[b]	< 0.001*
Hypertension, *n* (%)	37 (4.6)[a]	22 (13.0)[b]	11 (3.5)[a]	< 0.001*
Diabetes, *n* (%)	18 (2.2)[a]	11 (6.5)[b]	6 (1.9)[a]	0.022*
Dyslipidemia, *n* (%)	27 (3.4)[a]	18 (10.7)[b]	8 (2.6)[a]	< 0.001*
Cardiovascular disease, *n* (%)	33 (4.1)[a]	14 (8.3)[a]	0 (0)[b]	< 0.001*
Depression/anxiety, *n* (%)	73 (9.1)[a]	7 (4.1)[b]	9 (2.9)[b]	< 0.001*
Baseline EASI, mean ± SD	24.4 ± 8.4[a]	21.6 ± 10.8[b]	17.0 ± 11.6[c]	< 0.001*
Baseline itch NRS, mean ± SD	7.9 ± 1.6[a]	7.2 ± 2.3[b]	7.6 ± 2.4[c]	< 0.001*
Previous treatment exposure				
Topical therapy, *n* (%)	649 (80.7)[a]	145 (85.8)[a,b]	286 (91.4)[b]	< 0.001*
Conventional systemic therapies, *n* (%) (corticosteroids, cyclosporine, methotrexate, azathioprine and mofetil mycophenolate)	552 (68.7)[a]	142 (84.0)[b]	230 (73.5)[a]	< 0.001*
Phototherapy, *n* (%)	95 (11.8)[a]	26 (15.4)[a,b]	68 (21.7)[b]	< 0.001*
Advanced systemic therapy, *n* (%)	35 (4.4)	60 (35.5)	139 (44.4)	< 0.001*
Biologics, *n* (%) (dupilumab and tralokinumab)	8 (1.0)[a]	48 (28.4)[b]	133 (42.5)[c]	< 0.001*
JAK inhibitors, *n* (%)	27 (3.4)[a]	12 (7.1)[b]	6 (1.9)[a]	0.012*

Values that share the same superscript letter do not differ significantly from each other ($p > 0.05$)

AD atopic dermatitis, *BMI* body mass index, *EASI* Eczema Area and Severity Index, *IQR* interquartile range, *JAK* Janus kinase, *NRS* Numerical Rating Scale, *SD* standard deviation, *y* years

*Significant ($p < 0.05$)

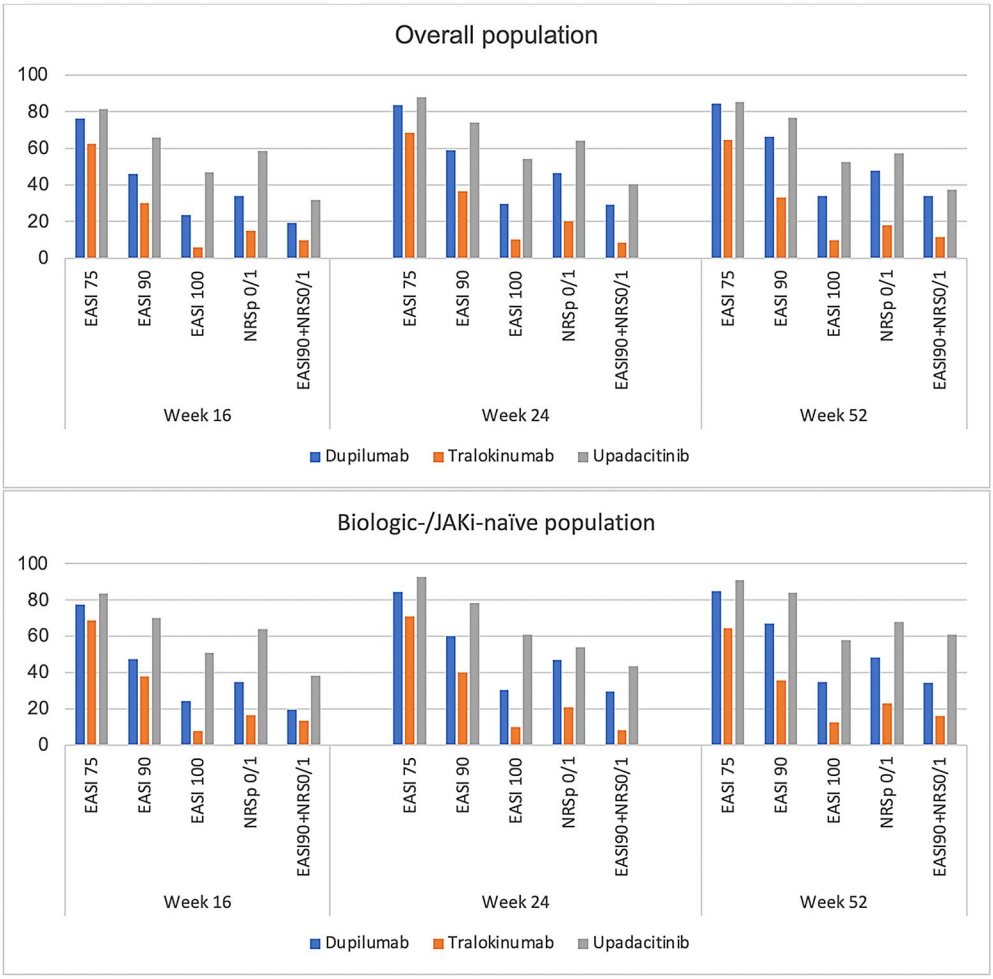

Fig. 1 52-week effectiveness outcomes: overall population and biologic-/JAKi-naive population. *EASI* Eczema Area and Severity Index, *JAK* Janus kinase, *NRS* Numerical Rating Scale

proportion of patients having prior biologic/JAKi exposure compared to the dupilumab group (44.4% vs 4.4%). When we assessed only patients who were biologic-/JAKi-naïve, upadacitinib provided even greater benefits, further reinforcing its enhanced efficacy in treatment-naïve individuals. Conversely, the lower effectiveness of tralokinumab compared to dupilumab, which could be partly explained by the higher proportion of patients who were biologic-/JAKi-experienced in the tralokinumab group (35.5% vs 4.4%), remained evident in the biologic-/JAKi-naïve population.

Despite these favorable effectiveness outcomes, treatment decisions must consider safety profiles. While upadacitinib demonstrated superior effectiveness, it was associated with a higher incidence of AEs, both leading to and not leading to treatment discontinuation, including thromboembolic events, lipid abnormalities, and hematologic abnormalities. In contrast, conjunctivitis was the most frequently observed AE among patients receiving biologics. These findings support a personalized treatment approach, balancing efficacy, safety, and patient preferences to achieve optimal disease control [9].

Table 2 Treatment discontinuation causes

	Dupilumab *n* = 804	Percent	Tralokinumab *n* = 169	Percent	Upadacitinib *n* = 313	Percent
All discontinuation	63	7.8	23	13.6	37	11.8
Lack of efficacy	34	4.2	16	9.5	3	1.0
Adverse events	16	2.0	4	2.4	15	4.8
Arthralgias/arthritis	0	0.0	0	0.0	1	0.3
Conjunctivitis	9	1.1	0	0.0	0	0.0
Facial erythema	3	0.4	0	0.0	0	0.0
Psoriasiform eruption	1	0.1	4	2.4	0	0.0
Gastrointestinal disturbances	0	0.0	0	0.0	2	0.6
Hematologic abnormalities	1	0.1	0	0.0	2	0.6
Venous thromboembolism	0	0.0	0	0.0	2	0.6
Other	2	0.2	0	0.0	8	2.6
Other reasons	13	1.6	3	1.8	19	6.1
Loss to follow-up	4	0.5	2	1.2	0	0.0
Pregnancy	3	0.4	1	0.6	0	0.0
Patient preference	2	0.2	0	0.0	6	1.9
Other	4	0.5	0	0.0	13	4.2

Our study has several strengths, including a large patient cohort and the use of an mNRI analysis instead of the as-observed analysis commonly applied in real-world studies. The as-observed approach often overestimates long-term effectiveness by including only patients who remain on treatment, whereas mNRI offers a more conservative and realistic estimate, minimizing bias from selective retention of patients with favorable outcomes. However certain limitations must be acknowledged, including its retrospective design, lack of a control group, short duration of follow-up, and the potential for selection bias and missing data, as well as the considerable heterogeneity in baseline characteristics across treatment groups, which may confound comparisons despite reflecting real-world clinical practice.

CONCLUSION

These real-world data for dupilumab, tralokinumab, and upadacitinib provide valuable insights into the comparative effectiveness and safety profiles of these therapies, highlighting the effectiveness and safety of all drugs up to 1 year of treatment, particularly with upadacitinib and dupilumab. Some of the observed differences may, at least in part, be explained by

Table 3 Adverse events not leading to drug discontinuation

	Dupilumab *n* = 804	Percent	Tralokinumab *n* = 169	Percent	Upadacitinib *n* = 313	Percent
Total adverse events	190	23.6	31	18.3	149	47.6
Acne	2	0.2	0	0.0	31	9.9
Alopecia areata	5	0.6	0	0.0	0	0.0
Arthralgias/arthritis	10	1.2	1	0.6	2	0.6
Blepharitis/conjunctivitis	93	11.6	21	12.4	0	0.0
Eczema	1	0.1	0	0.0	0	0.0
Elevated CK	0	0.0	0	0.0	19	6.1
Elevated liver enzymes	0	0.0	0	0.0	8	2.6
Facial erythema	25	3.1	0	0.0	0	0.0
Hematologic abnormalities	6	0.7	0	0.0	22	7.0
Herpetic infection	24	3.0	1	0.6	13	4.2
Infection	5	0.6	1	0.6	11	3.5
Injection site reaction	2	0.2	3	1.8	N/A	N/A
Lipid abnormalities	3	0.4	0	0.0	39	12.5
Psoriasiform eruption	2	0.2	4	2.4	1	0.3
Other	12	1.5	0	0.0	3	1.0

N/A not applicable (oral administration)

variations in baseline characteristics across the treatment groups.

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Antonio Kolios, Pedro Herranz, Stamatios Gregoriou, Natalia Rompoti, Spyridon Gkalpakiotis, Andrea Chiricozzi critical review and approved the final version of manuscript. All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this article, take responsibility for the integrity of the work, and have given their approval for this version to be published.

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Declarations

Conflicts of Interest. Tiago Torres has received consultancy and/or speaker's honoraria from and/or participated in clinical trials sponsored by AbbVie, Amgen, Almirall, Amgen, Apogee Therapeutics, Arena Pharmaceuticals, Biocad, Biogen, Boehringer Ingelheim, Bristol Myers Squibb, Celgene, Fresenius-Kabi, Johnson & Johnson Innovative Medicine, LEO Pharma, Eli Lilly, MSD, Mylan, Novartis, Pfizer, Samsung-Bioepis, Sanofi-Genzyme, Sandoz, STADA and UCB. Jensen Yeung has been an advisor, consultant, speaker, and/or investigator for AbbVie, Amgen, Anacor, Apogee, Arcutis, Astellas, Bausche, Baxalta, Boehringer Ingelheim, Bristol Myers Squibb, Celgene, Centocor, Coherus, Dermira, Forward, Fresenius Kabi, Galderma, Incyte, Janssen, LEO Pharma, Medimmune, Merck, Novartis, Pfizer, Regeneron, Roche, Sanofi Genzyme, Sun Pharma, Takeda, UCB, and Xenon. Vimal H. Prajapati has been an advisor, consultant, and/or speaker for: AbbVie, Actelion, Amgen, Apogee Therapeutics, Aralez, Arcutis, Aspen, Bausch Health, BioScript Solutions, Boehringer Ingelheim, Bristol Myers Squibb, Celgene, Celltrion, Cipher, CorEvitas, Eczema Society of Canada, Eli Lilly, Galderma, GlaxoSmithKline, Homeocan, Incyte, JAMP Pharma, J&J Innovative Medicine, Janssen, Johnson & Johnson, LEO Pharma, Medexus, Novartis, Organon, Pediapharm, Pfizer, Regeneron, Sanofi Genzyme, Sun Pharma, Tribute, UCB, and Valeant; investigator for: AbbVie, AnaptysBio, Apogee Therapeutics, Arcutis, Arena, Asana, Bausch Health, Boehringer Ingelheim, Bristol Myers Squibb, Celgene, Concert, CorEvitas, Dermavant, Dermira, Eli Lilly, Galderma, Incyte, J&J Innovative Medicine, Janssen, LEO Pharma, Meiji Pharma, Nektar Therapeutics, Nimbus Lakshmi, Novartis, Pfizer, RAPT Therapeutics, Regeneron, Reistone, Roche, Sanofi Genzyme, Sun Pharma, Takeda, and UCB; received grants from: AbbVie, Bausch Health, Janssen, LEO Pharma, Novartis, and Sanofi Genzyme. Anna Balato has received fees from Abbvie, Almirall, Amgen, BMS, Boehringer Ingelheim, Eli Lilly, LeoPharma, Novartis, UCB. Stefano Caccavale has received fees from Abbvie, Aristo pharma Italy srl, Novartis, Eli Lilly, Boehringer Ingelheim. Maria João Cruz has been an advisor, consultant, speaker, and/or investigator for AbbVie, Almirall, Beiersdorf, Eli Lilly, Galderma, La Roche-Posay, LEO Pharma, Novartis, Pfizer, Pierre Fabre, Regeneron Pharmaceuticals Inc., Sanofi. Francesca Prignano served as advisory board member and consultant and has received fees and speaker's honoraria or has participated in clinical trials for AbbVie, Almirall, Leo Pharma, Eli Lilly, Janssen, Novartis, Biogen, Sanofi Genzyme, UCB, Boehringer Ingelheim. Niccolò Gori served as advisory board member and received honoraria for lectures for AbbVie, Sanofi, and LEO Pharma. Andrea Chiricozzi has served as advisory board member and consultant and has received fees and speaker's honoraria or has participated in clinical trials for AbbVie, Almirall, Boehringer Ingelheim, Bristol Myers Squibb, Galderma, Leo Pharma, Lilly, Janssen, Novartis, Pfizer, and Sanofi Genzyme. Ketty Peris has served on advisory board, received honoraria for lectures and/or research grants for Abbvie, Almirall, Lilly, Galderma, Leo Pharma, Pierre Fabre, Novartis, Sanofi, Sun Pharma, Janssen. Simone Ribero has been an advisor, consultant, speaker, and/or investigator for AbbVie, Amgen, Boehringer Ingelheim, Bristol Myers Squibb, Galderma, Incyte, Janssen, LEO Pharma, Novartis, Pfizer, Sanofi Genzyme, and UCB. Michela Ortoncelli has been an advisor,

consultant, speaker, and/or investigator for AbbVie, Amgen, Boehringer Ingelheim, Bristol Myers Squibb, Galderma, Incyte, Janssen, LEO Pharma, Novartis, Pfizer, Sanofi Genzyme, and UCB. Elizabeth Lazaridou has received grants and speaker's honoraria and/or has participated in advisory meetings and clinical trials for Abbvie, Novartis, Pfizer, Sanofi, Leo Pharma, Eli Lilly, Galderma, Janssen, UCB, Amgen, Pierre Fabre, Loreal, Boehringer Ingelheim, Incyte. Angelo Valerio Marzano reports consultancy/advisory boards disease-relevant honoraria from AbbVie, Amgen, Boehringer Ingelheim, Bristol Myers Squibb, Incyte, Leopharma, Novartis, Pfizer, Sanofi, and UCB. Silvia Mariel Ferrucci reports consultancy/advisory boards disease-relevant honoraria from Amgen, Sanofi, Novartis, Lilly, Leo Pharma, Abbvie, Novartis, Menarini. Spyridon Gkalpakiotis has served as a consultant, speaker, or investigator for AbbVie, Celgene, Eli Lilly, Janssen, Leo Pharma, Novartis, Pfizer, Sanofi and UCB. Pedro Herranz has received grants and speaker's honoraria and/or has participated in advisory meetings and clinical for AbbVie, Amgen, Boehringer Ingelheim, Bristol Myers Squibb, Celgene, Galderma, Incyte, Janssen, LEO Pharma, Lilly, Novartis, Pfizer, Regeneron, Roche, Sandoz, Sanofi Genzyme, Takeda, UCB. Antonios G.A. Kolios has served as an investigator, speaker, and/or advisor for AbbVie, Abbott, AstraZeneca, Janssen, Eli Lilly, MSD, Pfizer, Celgene, Novartis, Actelion, Leo, Amgen, Alk-Abello, UCB, and does not hold any shares or other financial interest in any pharmaceutical company. Jose-Manuel Carrascosa has received grants and speaker's honoraria and/or has participated in advisory meetings and clinical for AbbVie, Novartis, Amgen, Boehringer Ingelheim, Bristol Myers Squibb, Celgene, Galderma, Incyte, Janssen, LEO Pharma, Lilly, Novartis, Pfizer, Roche, Sandoz, Sanofi Genzyme, UCB. Maria João Paiva Lopes has received grants and speaker's honoraria and/or has participated in advisory meetings and clinical AbbVie, Almirall, Boehringer Ingelheim, Janssen, LEO Pharma, Eli Lilly, Novartis, Pfizer, Sanofi-Genzyme, Viatris. José Miguel Alvarenga has nothing to disclose. Pedro Farinha has nothing to disclose. Bruno Duarte has nothing to disclose. Monica Munera-Campos has nothing to disclose. Siddhartha Sood has nothing to disclose. Brian D. Rankin has nothing to disclose. Gilberto Pires Rosa has nothing to disclose. Athina Ioanna Daponte has nothing to disclose. Gianmarco Silvi has nothing to disclose. Stamatios Gregoriou has nothing to disclose. Natalia Rompoti has nothing to disclose. Tiago Torres, Jose-Manuel Carrascosa and Stamatios Gregoriou are Editorial Board members of *Dermatology and Therapy*. Tiago Torres, Jose-Manuel Carrascosa and Stamatios Gregoriou were not involved in the selection of peer reviewers for the manuscript nor any of the subsequent editorial decisions.

Ethical Approval. The present study was conducted in accordance with the Declaration of Helsinki, initially published in 1964 on Ethical Principles for Medical Research Involving Human Subjects, and after approval by the local ethical committees. Patient consent was exempted due to the retrospective nature of the study and the use of de-identified, anonymized and aggregated data.

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