

Can Team-Based Care and Novel Therapies Improve Outcomes in Moderate to Severe Pediatric Atopic Dermatitis?

Jonathan I. Silverberg, MD, PhD, MPH

Professor

Director of Clinical Research

Director of Patch Testing

George Washington University School of Medicine and

Health Sciences

Washington, DC

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Grant/Research Support from Galderma S.A.; Incyte; and Pfizer.

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Disease Burden and the Pathophysiology of AD

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Introduction^{1,2}

The prevalence of AD is estimated to be 15% to 20% in children and 1% to 3% in adults

The disease course of AD is commonly chronic in adults and more relapsing/remitting in children

The burden of symptoms can be profound, adversely impacting quality of life



Depression, anxiety, sleep disturbance, and other atopic conditions are frequent comorbidities

Family History of Atopic Disease Increases the Risk of Atopic Dermatitis¹

One parent with
atopic disease
raises the risk
1.5 fold



Both parents with
atopic disease
raises the risk
3-fold to 5-fold

Up to 70% of patients with atopic dermatitis
have family histories of atopic disease

Distribution of AD by Age¹



Infant

(Birth-2 years)

- Face (cheeks), scalp, ears
- Extensor extremities
- Seborrheic dermatitis overlap



Childhood

(2 years-puberty)

- Face (cheeks)
- Flexural extremities



Teenager-Adult

- Localized flexural extremities
- Hands, dorsum feet

Diagnostic Features of AD^{1,2}

Essential features must be present

- Pruritus
- Eczema (acute, subacute, chronic): typical morphology and age-specific patterns; chronic or relapsing history

} **Key features
in diagnosing AD**

Patterns include: (1) facial, neck, and extensor involvement in infants and children; (2) current or prior flexural lesions in any age group; (3) sparing of groin and axillary regions

Important features seen in most cases, adding support to the diagnosis

- Early age of onset
- Atopy: personal and/or family history; IgE reactivity
- Xerosis

Associated features help to suggest the diagnosis of AD but are too nonspecific to be used for defining/detecting AD for research or epidemiologic studies

- Atypical vascular responses (eg, facial pallor, white dermographism, delayed blanch response)
- Keratosis pilaris/pityriasis alba/hyperlinear palms/ichthyosis
- Ocular/periorbital changes
- Other regional findings (eg, perioral changes/periauricular lesions)
- Perifollicular accentuation/lichenification/prurigo lesions

AD in Patients of Lighter Skin



AD in Patients of Darker Skin: More Common Features¹⁻⁴

- Follicular/papular and nummular morphology
- Obscured erythema
- Prominent lichenification
- Dyspigmentation



AD is more common in Black individuals

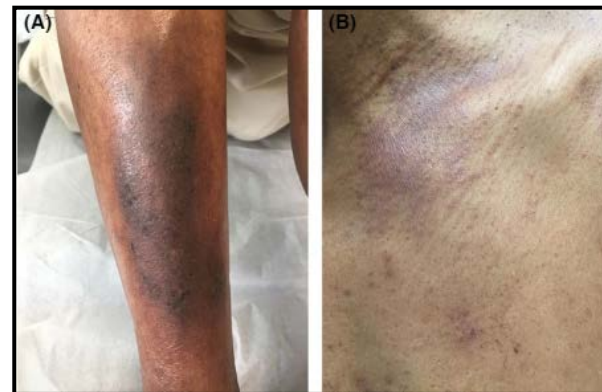
Mild AD¹

- Hyperpigmented, hypopigmented, or pink skin
- No crusting or oozing
- Barely swollen or thickened skin



Moderate AD¹

- Clearly perceptible erythema
- Clearly swollen, raised, or thickened skin
- Mild oozing and crusting might be present



Severe AD¹

- Prominent erythema
- Very swollen, raised, or thickened skin
- Oozing and crusting may be present
- Rash is widespread



Clinical Assessment Tools¹

Validated Sign and Symptom Scoring Tools	Mild	Moderate	Severe
EASI	1.1 to 7	7.1 to 21	21.1 to 50 50.1 to 72 (very severe)
POEM	3 to 7	8 to 16	17 to 24 25 to 28 (very severe)
PO-SCORAD	<25	>25 to <50	>50
SCORAD	<25	>25 to <50	>50
Other Tools		Scoring	
DLQI <i>Validated questionnaire on the impact of AD on QOL</i>	Each question 0 (not at all) to 3 (very much)		
Pruritus (itch) score <i>Patient's subjective assessment of itch</i>	VAS from 0 (none) to 10 (severe)		

1. Gooderham MJ et al. *J Cutan Med Surg*. 2018;22(suppl 1):10S-16S.

Objective Assessment of AD Severity¹

Validated Investigator Global Assessment for Atopic Dermatitis (IGA)

Score	Morphological Description
0 – Clear	No inflammatory signs of atopic dermatitis (no erythema, induration/papulation, lichenification, or oozing/crusting). Postinflammatory hyperpigmentation and/or hypopigmentation might be present.
1 – Almost Clear	Barely perceptible erythema, barely perceptible induration/papulation, and/or minimal lichenification. No oozing or crusting.
2 – Mild	Slight but definite erythema (pink), slight but definite induration/papulation, and/or slight but definite lichenification. No oozing or crusting.
3 – Moderate	Clearly perceptible erythema (dull red), clearly perceptible induration/papulation, and/or clearly perceptible lichenification. Oozing and crusting might be present.
4 – Severe	Marked erythema (deep or bright red), marked induration/papulation, and/or marked lichenification. Disease is widespread in extent. Oozing or crusting might be present.

Sleep Burden in Pediatric AD Is Significant for Patients and Families^{1,a}

AD Disease Activity of Severity	Difficulty Falling Asleep (Adjusted OR, 95% CI)	Early Morning Awakening (Adjusted OR, 95% CI)		Odds of Nightmares (Adjusted OR, 95% CI)		
	No Asthma or AR	Asthma or AR	No Asthma or AR	Asthma or AR	No Asthma or AR	Asthma or AR
Overall active AD	1.37 (1.20, 1.56)	1.49 (1.24, 1.79)	1.40 (1.21, 1.61)	1.56 (1.27, 1.91)	1.47 (1.28, 1.69)	1.71 (1.41, 2.07)
“Very bad AD”	1.73 (1.22, 2.45)	1.44 (0.96, 2.16)	1.81 (1.24, 2.66)	1.57 (1.00, 2.45)	1.63 (1.14, 2.34)	2.19 (1.45, 3.31)

Call to Action: Pediatricians should consider screening all children with atopic dermatitis for sleep disturbances, even if their disease is mild or no longer active

^a N = 13,988 children enrolled in the Avon Longitudinal Study of Parents and Children, a population-based birth cohort in Avon UK; n = 4,938 children with AD; measures of sleep duration were repeated between ages 2 to 16 years.

1. Ramirez FD et al. *JAMA Pediatr.* 2019;173:e190025.

Family Impact of AD in Infants/Preschoolers: Results From EPI-CARE¹

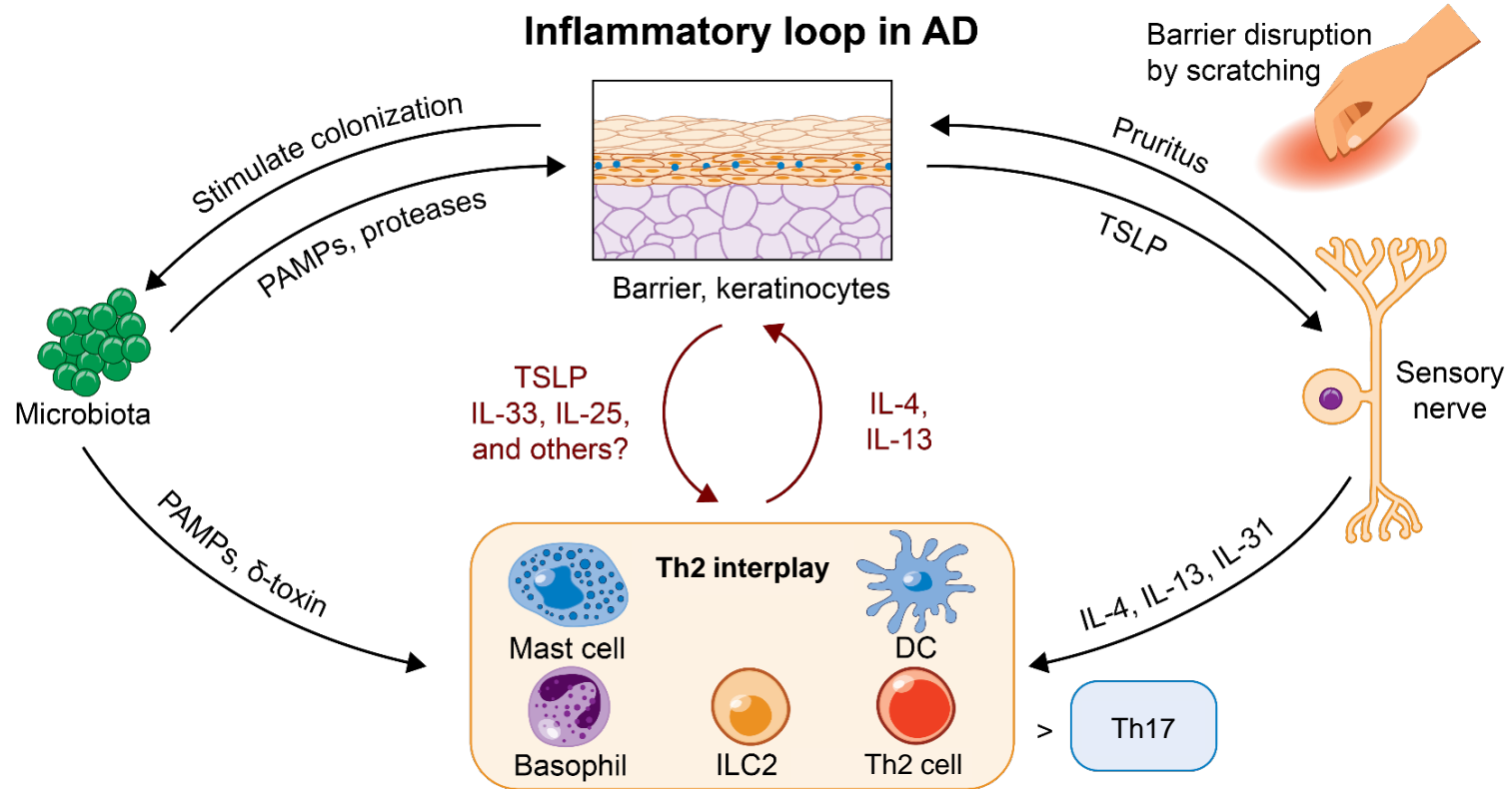
Results from an international, cross-sectional web-based survey (September 2018 to December 2019) of 1,489 parents/caregivers of children aged 6 months to <6 years with AD



Mean DFI score of >10 (representing moderate to high alteration in quality of life) was reported in

- 42.1% among those with children who had mild AD
- 58.7% among those with children who had moderate AD
- 78% among those with children who had severe AD

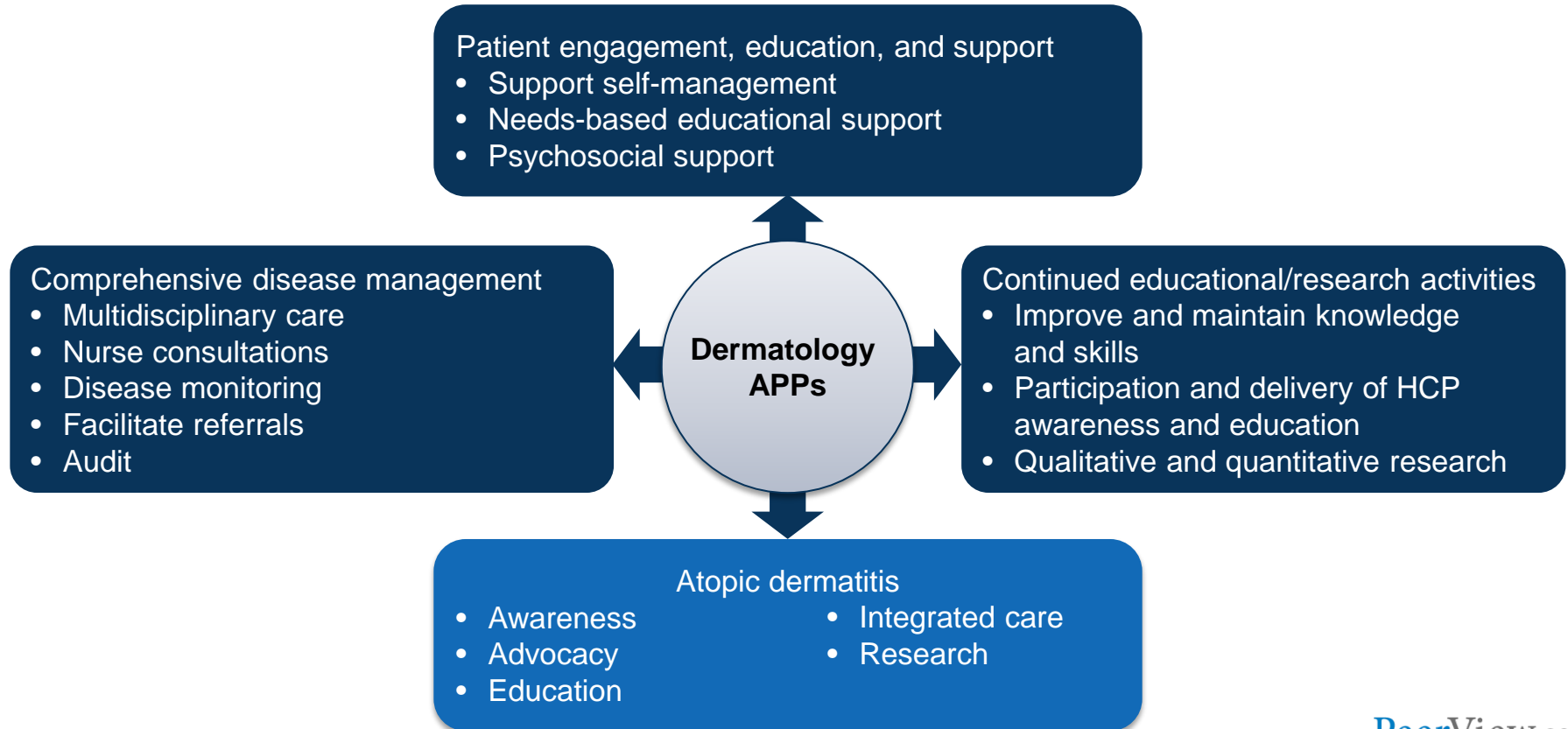
Pathogenesis of AD: Role of Type 2 Inflammation¹



A Team-Based Approach to Individualize the Management of Pediatric AD

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The Role of Specialty Advanced Practice Providers in AD



AD: Goals of Treatment



Stop inflammation

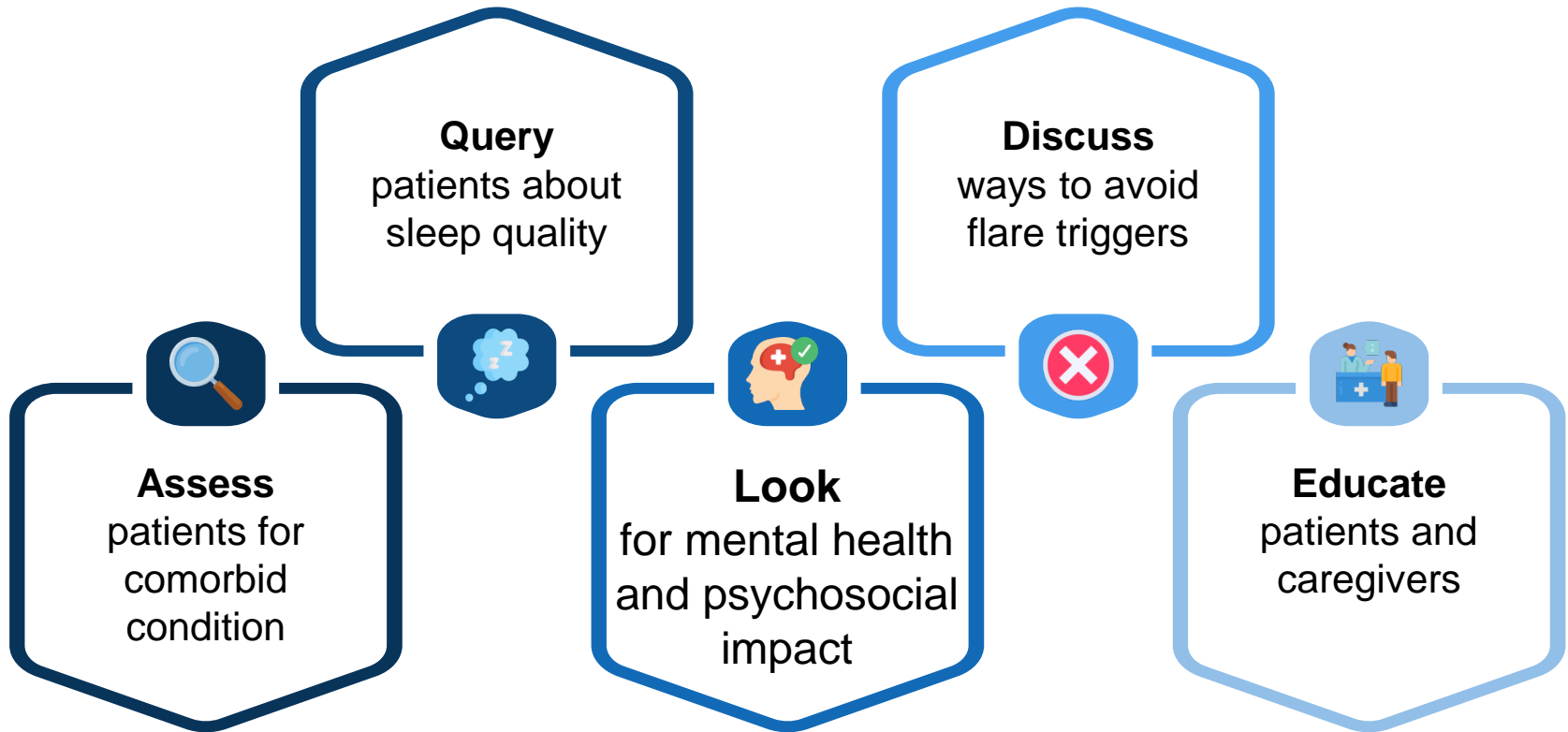


Prevent recurrence

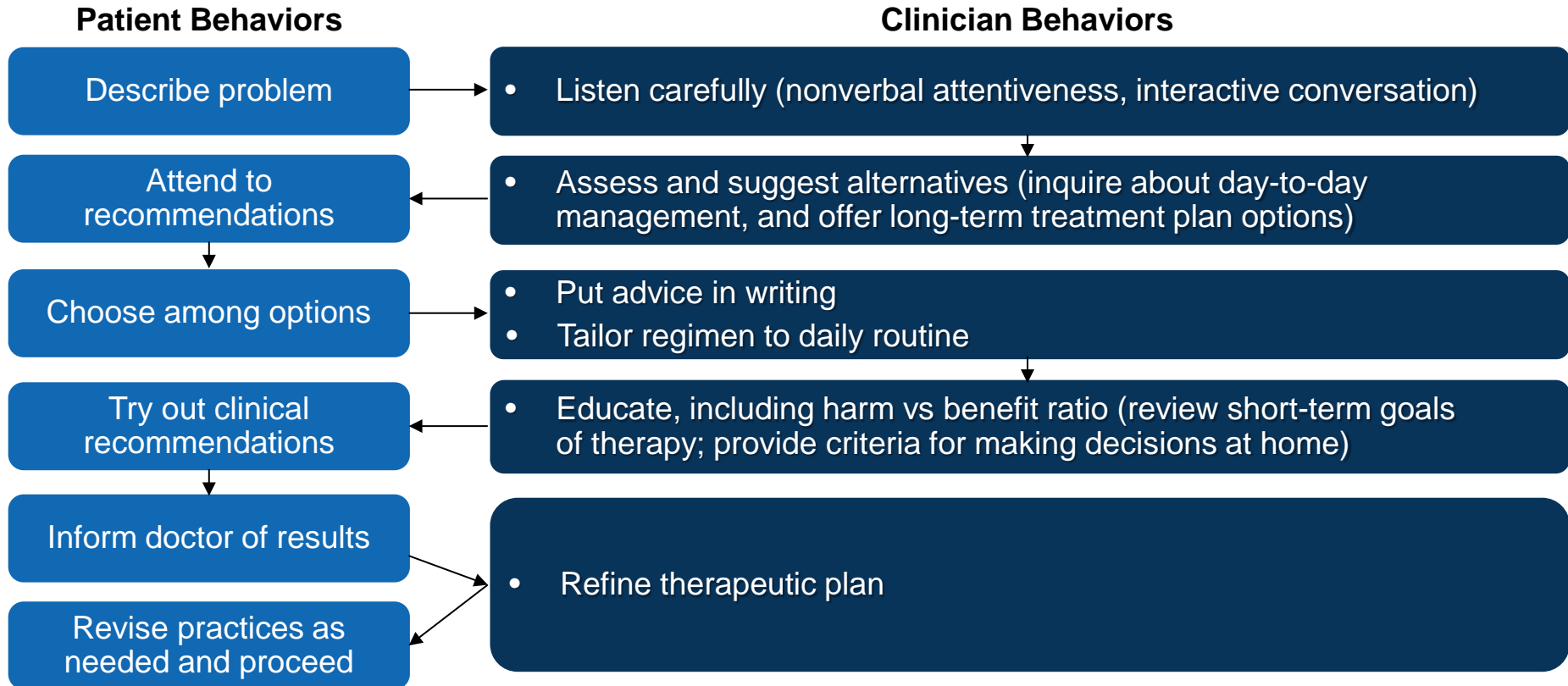


Treat safely and sustainably

Evaluating the Whole Patient



Importance of Patient–Caregiver Communication and Education¹



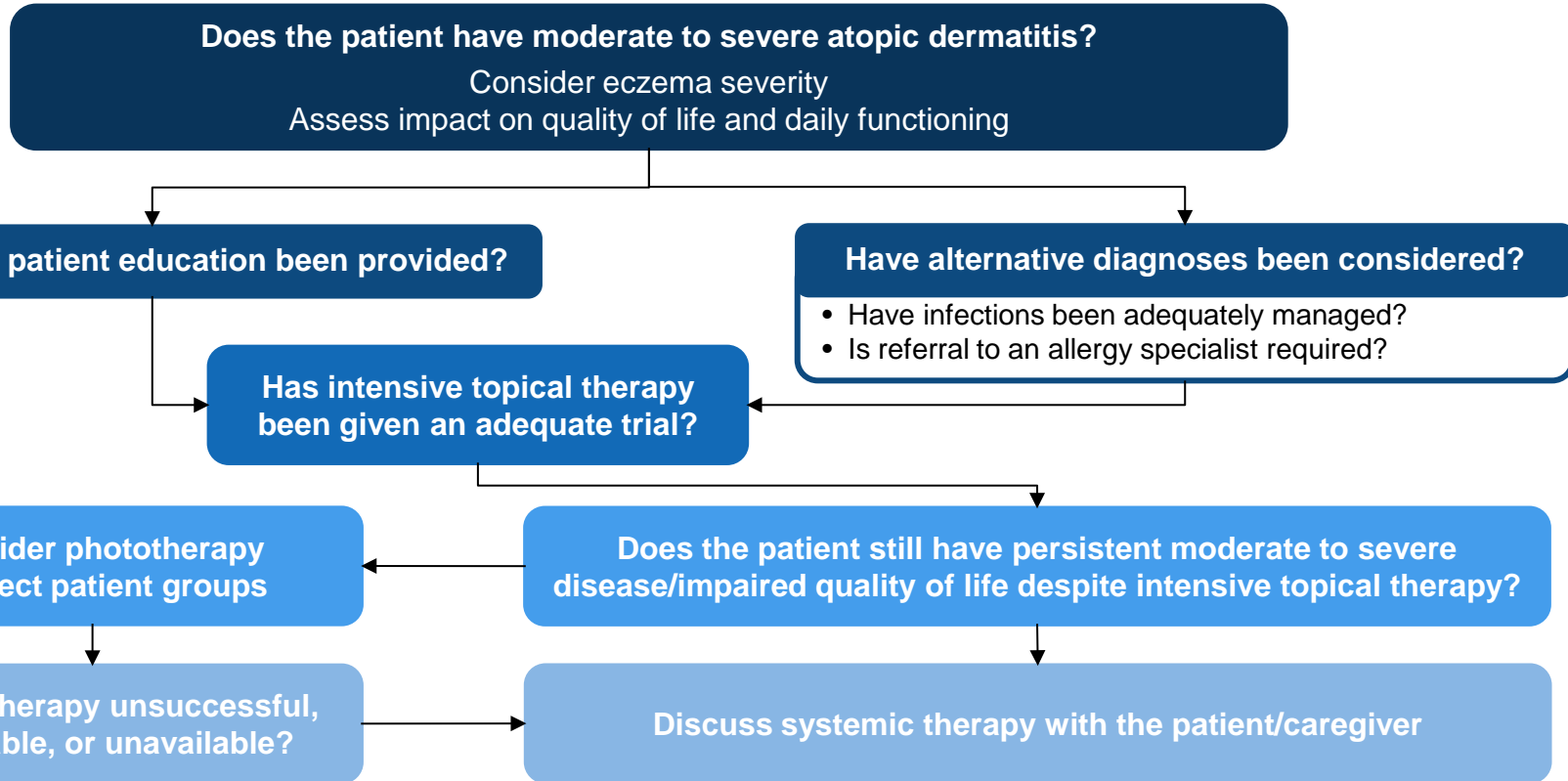
AD: Evolving Algorithm¹

	MILD	MODERATE	SEVERE	Next Steps
Acute Treatment	<p>Apply TCS to inflamed skin</p> <ul style="list-style-type: none"> Low- to medium-potency TCS, twice daily for 2 wk, daily x1 wk, few days beyond clearance <p>Alternative: Consider crisaborole 2% or TCI or ruxolitinib 1.5%</p>	<p>Apply TCS to inflamed skin</p> <ul style="list-style-type: none"> Medium- to high-potency TCS, 2x/day for 2 wk, 1x/day for 1 wk, 2x/wk to “hot spots,” few days beyond clearance Low-potency TCS for sensitive areas or consider crisaborole 2% or TCI <p>Alternative: Consider crisaborole 2% or TCI or ruxolitinib 1.5%</p>	<p>Apply TCS to inflamed skin</p> <ul style="list-style-type: none"> Medium- to high-potency TCS, 2x/day for 2 wk, 1x/day for 1 wk, 2x/wk to “hot spots”; 3-7 days beyond clearance Lower potency for sensitive areas or consider crisaborole 2% or TCI If unresolved after 7 days, reconsider next step 	<ul style="list-style-type: none"> Nonadherence Infection Misdiagnosis Contact allergy to medications Referral
Maintenance Treatment	<p><i>(Basic Management)</i></p> <ol style="list-style-type: none"> Skin care <ul style="list-style-type: none"> Liberal, frequent moisturizer use Daily warm bath/shower, followed by moisturizer Trigger avoidance <ul style="list-style-type: none"> Common irritants; allergens if proven Consider comorbidities 	<p>Basic Management + Maintenance TCS</p> <ul style="list-style-type: none"> Medium potency, 2-3x/wk (“proactive”) to recurrently active areas of involvement Low potency TCS several times/wk for sensitive areas <p>Maintenance TCI</p> <ul style="list-style-type: none"> 2-3 times/wk up to 2x/day (proactive approach) OR <p>Crisaborole 2%, 2x/day ≥2 years OR</p> <ul style="list-style-type: none"> Several times/wk <p>Ruxolitinib 1.5%, 2x/day ≥12 years</p> <ul style="list-style-type: none"> Several times/wk <p>Consider: Add bleach baths</p> <ul style="list-style-type: none"> 2-7x/wk based on severity and tendency to develop crusting at sites of excoriation 	<p><i>(Basic + Moderate Management + REFERRAL to AD Specialist)</i></p> <ol style="list-style-type: none"> Phototherapy Dupilumab ≥6 months Tralokinumab (adults) Abrocitinib (adults) Upadacitinib ≥12 years Systemic immunosuppressants <ul style="list-style-type: none"> Cyclosporine A Methotrexate Mycophenolate mofetil Azathioprine Corticosteroids Consider acute treatment for some patients to help gain control <ul style="list-style-type: none"> Wet wrap therapy Short-term hospitalization 	

Advance: when symptomatic despite appropriate use of medications and adherence to management and/or persistence or frequent flaring

1. Boguniewicz M et al. *Ann Allergy Asthma Immunol.* 2018;120:10-22.

Step-Up Care in AD: When Is It Time for Systemic Therapy?¹



Topical Calcineurin Inhibitor Immunosuppressants: Steroid-Sparing Anti-Inflammatory Agents¹⁻⁴



Pimecrolimus

- 1% cream FDA approved for children ≥ 2 years of age
- Clinical trials supported safety and efficacy in 0 to ≥ 2 years of age
- For mild to moderate AD



Tacrolimus

- 0.03% ointment FDA approved for children ≥ 2 years of age
- 0.1% indicated for patients > 15 years of age
- For moderate to severe AD

- Inhibit calcineurin-dependent T-cell activation, impeding the production of proinflammatory cytokines and mediators
- Black box warning: Although a causal relationship has not been established, rare cases of malignancy (eg, skin and lymphoma) have been reported in patients treated with TCIs
 - In 2021, Health Canada approved an update removing the black box warning for tacrolimus⁴

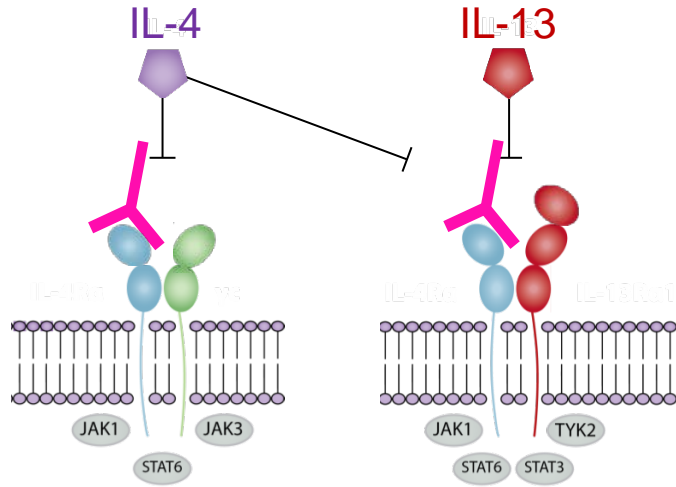
1. Boguniewicz M et al. *Ann Allergy Asthma Immunol*. 2018;120:10-22.

2. Elidel (pimecrolimus) Prescribing Information. https://www.accessdata.fda.gov/drugsatfda_docs/label/2014/021302s018lbl.pdf.

3. Protopic (tacrolimus) Prescribing Information. https://www.accessdata.fda.gov/drugsatfda_docs/label/2011/050777s018lbl.pdf.

4. https://www.leo-pharma.ca/Files/Filer/Protopic_PM_Aug2021_EN.pdf

Dupilumab: Anti-IL-4R α ^{1,2,a}



Type 1 receptor

B cells, T cells, monocytes,
eosinophils, fibroblasts

Type 2 receptor

Epithelial cells,
smooth muscle cells,
fibroblasts, monocytes,
activated B cells

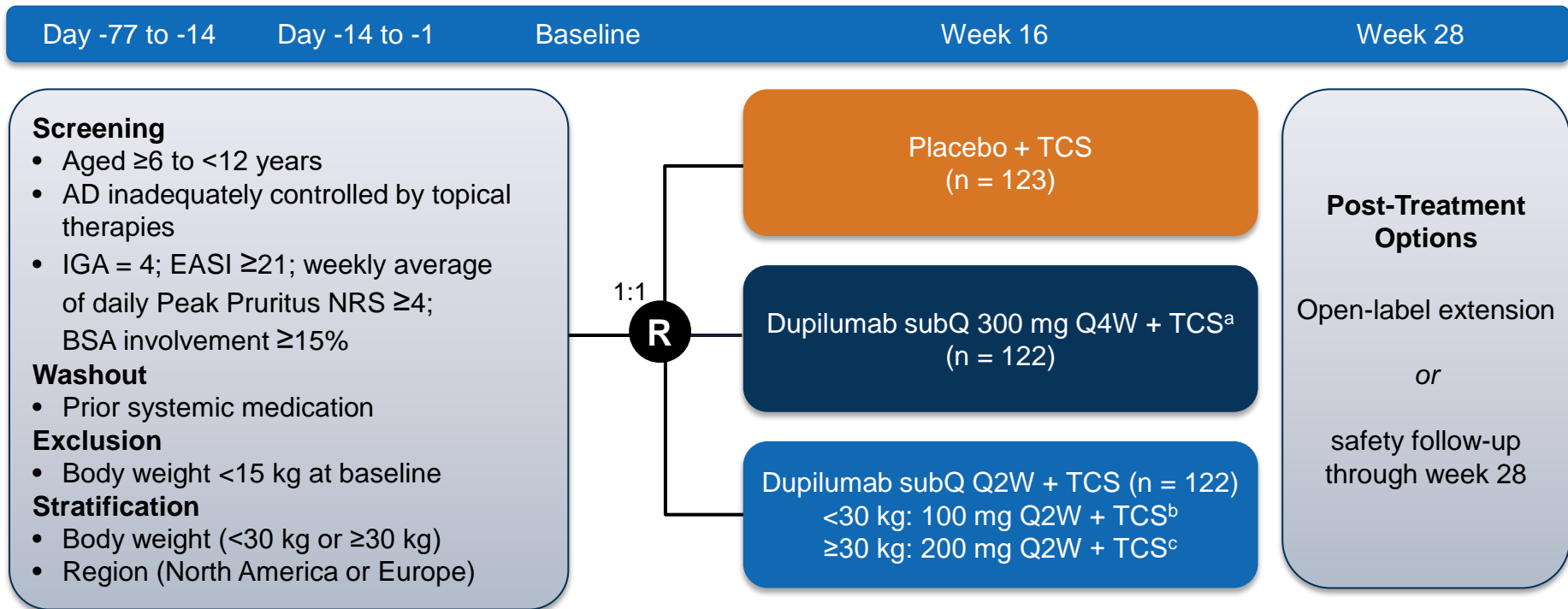
- Approved for treatment of patients **aged ≥ 6 months with moderate to severe AD** whose disease is not adequately controlled with topical prescription therapies or when those therapies are not advisable
- Can be used \pm topical corticosteroids
- **Most common AEs:** injection-site reactions, dry eye, conjunctivitis, blepharitis, eye pruritus, oral herpes

^a Dupilumab is also approved in Japan, as well as other countries, for use in appropriate patients with moderate to severe AD, in appropriate patients with asthma or CRSwNP in different age populations, and in appropriate patients with eosinophilic esophagitis. Please refer to the prescribing indication for full approval information.

1. Dupixent (dupilumab) Prescribing Information. https://www.accessdata.fda.gov/drugsatfda_docs/label/2022/761055s042lbl.pdf.

2. Gittler JK et al. *J Allergy Clin Immunol.* 2012;130:1344-1354.

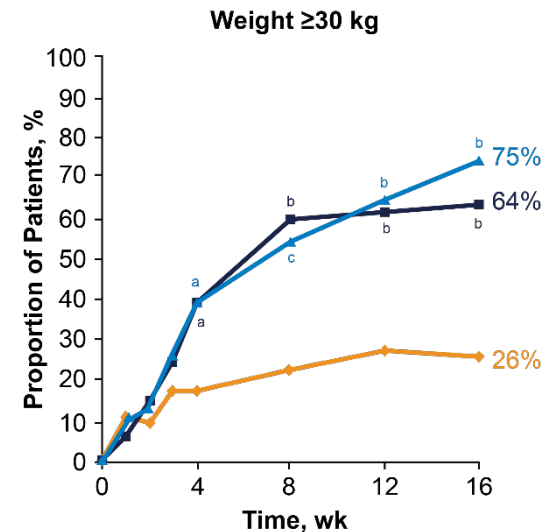
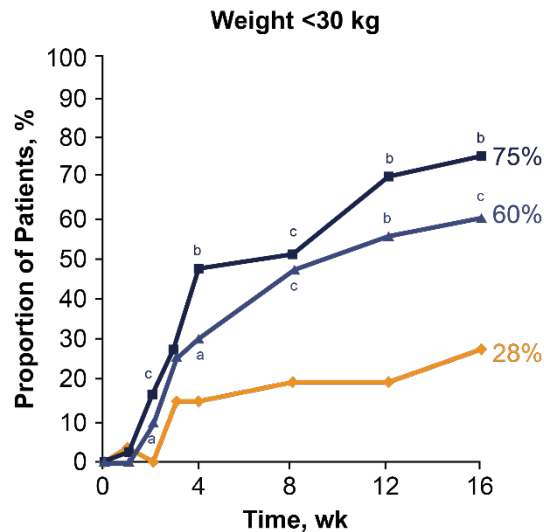
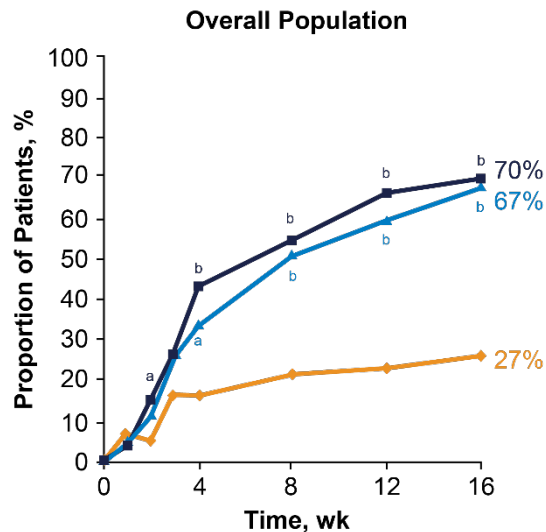
Dupilumab in Patients Aged 6-12 Years¹



^a 600-mg loading dose. ^b 200-mg loading dose. ^c 400-mg loading dose.

1. Paller AS et al. *J Am Acad Dermatol.* 2020;83:1282-1293.

Proportion of Patients Achieving EASI-75¹



- Placebo + TCS
- Dupilumab 300 mg Q4W + TCS
- Dupilumab 200 mg Q2W + TCS
- Dupilumab 100 mg Q2W + TCS

^a $P < .05$. ^b $P < .0001$. ^c $P < .001$.

1. Paller AS et al. *J Am Acad Dermatol*. 2020;83:1282-1293.

Safety in Patients Aged 6-12 Years¹

	Placebo + TCS (n = 120)	Dupilumab 300 mg Q4W + TCS (n = 120)	Dupilumab 100 or 200 mg Q2W + TCS (n = 122)
Patients with ≥1 TEAE, n (%)	88 (73.3)	78 (65.0)	82 (67.2)
Patients with ≥1 serious TEAE, n (%)	2 (1.7)	2 (1.7)	0
Patients with ≥1 TEAE leading to permanent tx discontinuation, n (%)	2 (1.7)	0	2 (1.6)
Deaths	0	0	0
TEAEs (PT) reported in ≥5% of patients, n (%)			
Atopic dermatitis, exacerbation	17 (14.2)	8 (6.7)	10 (8.2)
Asthma	12 (10.0)	2 (1.7)	4 (3.3)
Nasopharyngitis	8 (6.7)	15 (12.5)	8 (6.6)
URTI	12 (10.0)	13 (10.8)	10 (8.2)
Viral URTI	6 (5.0)	2 (1.7)	1 (0.8)
Vomiting	8 (6.7)	6 (5.0)	6 (4.9)
Cough	9 (7.5)	3 (2.5)	5 (4.1)
Headache	10 (8.3)	6 (5.0)	7 (5.7)

Baseline Weight <30 kg	Placebo + TCS (n = 60)	Dupilumab 300 mg Q4W + TCS (n = 60)	Dupilumab 100 mg Q2W + TCS (n = 63)
Patients with ≥1 TEAE, n (%)	43 (71.7)	39 (65.0)	46 (73.0)
TEAEs (PT), n (%)			
Atopic dermatitis	7 (11.7)	4 (6.7)	8 (12.7)
Asthma	7 (11.7)	0	4 (6.3)
Rhinitis allergic	2 (3.3)	1 (1.7)	3 (4.8)
Food allergy	0	1 (1.7)	3 (4.8)
Conjunctivitis cluster ^a	2 (3.3)	4 (6.7)	13 (20.6)
Herpes infections (HLT)	3 (5.0)	0	3 (4.8)
Baseline Weight ≥30 kg	Placebo + TCS (n = 60)	Dupilumab 300 mg Q4W + TCS (n = 60)	Dupilumab 200 mg Q2W + TCS (n = 59)
Patients with ≥1 TEAE, n (%)	45 (75.0)	39 (65.0)	36 (61.0)
TEAEs (PT), n (%)			
Atopic dermatitis	10 (16.7)	4 (6.7)	2 (3.4)
Asthma	5 (8.3)	2 (3.3)	0
Rhinitis allergic	3 (5.0)	2 (3.3)	1 (1.7)
Food allergy	0	0	0
Conjunctivitis cluster ^a	3 (5.0)	4 (6.7)	5 (8.5)
Herpes infections (HLT)	3 (5.0)	2 (3.3)	1 (1.7)

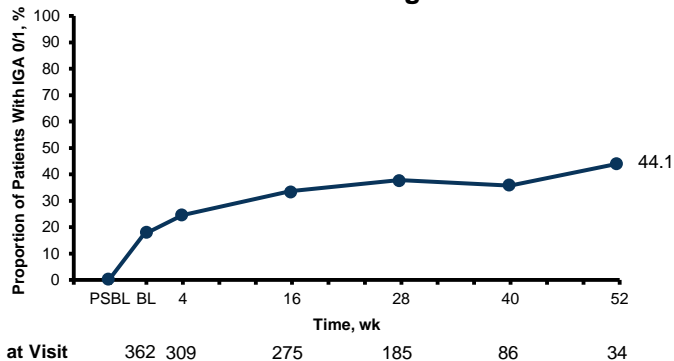
^a Conjunctivitis cluster includes the PTs conjunctivitis, conjunctivitis allergic, conjunctivitis bacterial, conjunctivitis viral, and atopic keratoconjunctivitis.

1. Paller AS et al. *J Am Acad Dermatol*. 2020;83:1282-1293.

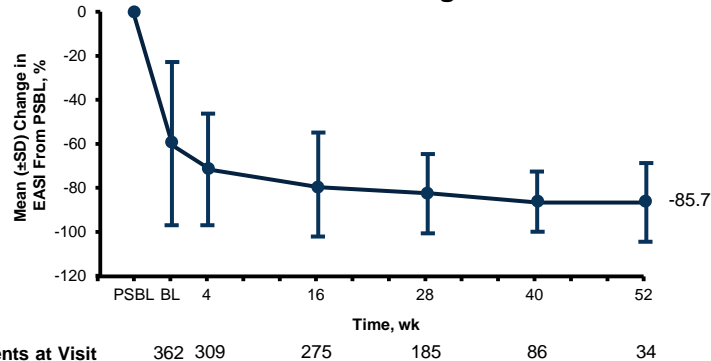
Long-Term Treatment With Dupilumab Showed Sustained Improvement in Patients Aged ≥ 6 to < 12 Years With Moderate to Severe AD¹

LIBERTY AD PED-OLE: Patients were treated with 200/300 mg of dupilumab every 2 weeks or 300 mg of dupilumab every 4 weeks and had participated in previous dupilumab trials

Patients achieving IGA 0/1

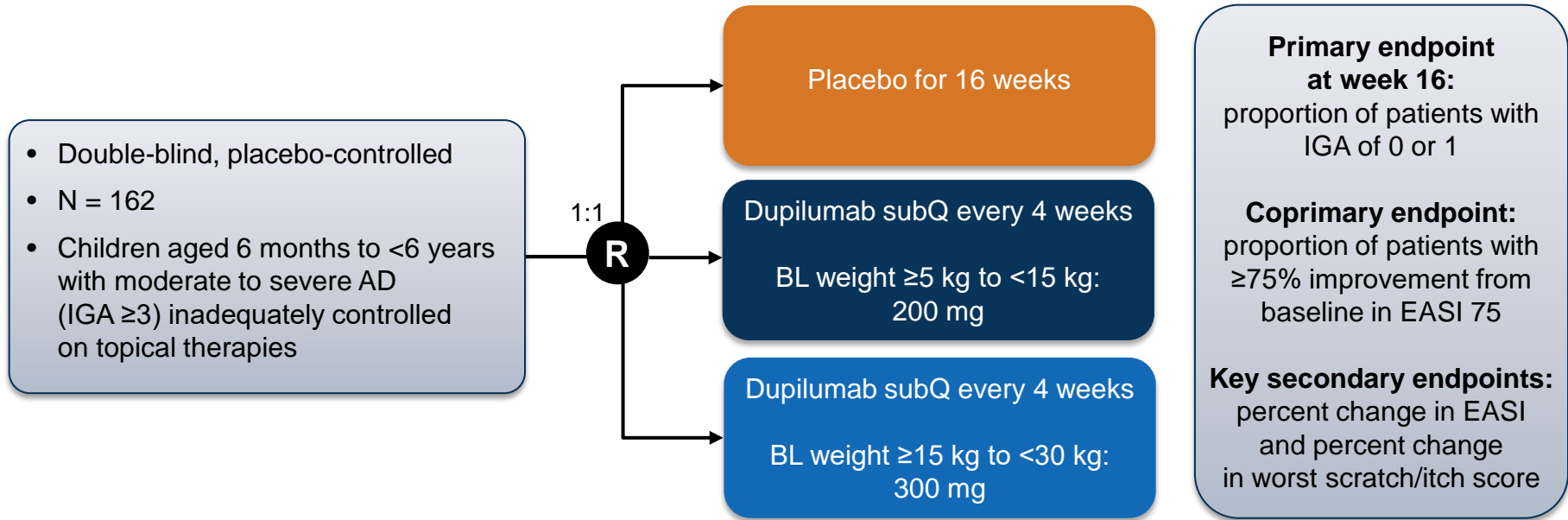


Mean Percent Change in EASI



1. Cork MJ et al. 14th World Congress of Pediatric Dermatology (WCPD 2021). Poster 1623270856177.

LIBERTY AD PRE-SCHOOL/INFANT: Phase 2/3 Design—Part B



LIBERTY AD PRE-SCHOOL/INFANT: Phase 2/3

Efficacy—Part B

- All primary and secondary endpoints were met
- At 16 weeks, in patients treated with dupilumab
 - 28% achieved clear or almost-clear skin (IGA 0 or 1) vs 4% with placebo
 - 53% achieved 75% greater overall disease improvement from baseline vs 11% placebo
 - 70% average improvement from baseline in EASI 75 vs 20% placebo
 - 49% average improvement from baseline in itch vs 2% placebo
 - Significantly improved measures of observed patient outcomes (eg, sleep, skin pain, health-related quality of life) as well as caregiver-reported health-related quality of life
- A lower rate of skin infections was also seen in the dupilumab arm (12%) vs placebo (24%)

LIBERTY AD PRE-SCHOOL/INFANT: Phase 2/3 Safety—Part B



Most Common Treatment-Emergent Adverse Events in the Dupilumab and Placebo Groups

- Nasopharyngitis (8.4% dupilumab and 9% placebo)
- Upper respiratory tract infection (6% dupilumab and 7.7% placebo)
- Impetigo (3.6% dupilumab and 7.7% placebo)
- Lymphadenopathy (3.6% dupilumab and 7.7% placebo)

Managing a Child's Fear of Injections¹

- ✓ Teach coping strategies (eg, mindfulness, deep breathing exercises)
- ✓ Focus on the health benefits (improvement of symptoms, itching, etc)
- ✓ Have child sit up; children might be more frightened when they have to lie down
- ✓ Model calmness
- ✓ Administer acetaminophen to relieve moderate pain and swelling at the injection site
- ✓ Apply ice packs at the site before and after the injection
- ✓ Use vibration devices near the injection site

Other Targeted Therapies¹⁻⁴

Lebrikizumab

- Phase 3 ADvocate 1 and 2: adults and adolescents ≥12 years of age
- Phase 3 for adults/adolescents with moderate to severe AD and skin of color

Tralokinumab

- Phase 3 INJECZTRA: adults and adolescents ≥12 years of age

Nemolizumab

- Phase 3: adults and adolescents ≥12 years of age
- Phase 2: children 2 -11 years of age

1. <https://clinicaltrials.gov/ct2/show/NCT05372419?term=lebrikizumab&cond=atopic+dermatitis&draw=2&rank=2>.
2. <https://clinicaltrials.gov/ct2/show/NCT05194540?term=tralokinumab&cond=atopic+dermatitis&draw=2&rank=2>.
3. <https://clinicaltrials.gov/ct2/show/NCT03985943?term=nemolizumab&cond=atopic+dermatitis&draw=2&rank=4>.
4. <https://clinicaltrials.gov/ct2/show/NCT04921345?term=nemolizumab&cond=atopic+dermatitis&draw=2&rank=2>.

Summary

- The entire healthcare team, including advanced practice providers, is crucial for the optimal assessment and management of pediatric moderate to severe AD patients and their families
- Patient/caregiver education is critical in making a shared treatment decision, particularly when stepping up from moderate to severe AD treatment, with the use of systemic medications, and when managing patient concerns (eg, needle phobia)
- Targeted biologic therapy with dupilumab has been proven safe and effective for patients aged ≥ 6 months with moderate to severe AD; other therapies are in development for pediatric and/or adolescent populations (eg, tralokinumab, nemolizumab, lebrikizumab, JAK inhibitors)

Audience Q&A



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**Please remember to complete and submit
your Program Evaluation.**

PeerView.com/AD-Survey-WVA

Thank you and have a good day.

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Abbreviations

AD: atopic dermatitis

AR: allergic rhinitis

DC: dendritic cell

DFI: Dermatitis Family Impact Score

DLQI: Dermatology Life Quality Index

EASI: Eczema Area and Severity Index

HCP: healthcare professional

HLT: high-level term

IGA: Investigator Global Assessment for Atopic Dermatitis

IL: interleukin

ILC2: type 2 innate lymphoid cell

JAK: Janus kinase

LLoQ: lower limit of quantitation

NRS: Numeric Rating Scale

OR: odds ratio

PAMPS: pathogen-associated molecular patterns

PG: peptidoglycan

PO-SCORAD: Patient-Oriented Scoring Atopic Dermatitis

POEM: Patient-Oriented Eczema Measure

PT: preferred term

Q2W: every 2 weeks

Q4W: every 4 weeks

SCORAD: Scoring Atopic Dermatitis

SD: standard deviation

STAT: signal transducer and activator of transcription

TCI: topical calcineurin inhibitors

TCS: topical corticosteroids

TEAE: treatment-emergent adverse event

Th2: T helper 2 cell

TSLP: thymic stromal lymphopietin

TYK2: tyrosine kinase 2

URTI: upper respiratory tract infection

VAS: Visual Analog Scale