BELOW THE SURFACE:

Managing the Physical, Mental, and Social Impact of MODERATE-TO-SEVERE ATOPIC DERMATITIS

ALLEVIATE

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This activity is co-provided by Ultimate Medical Academy/Complete Conference Management (CCM).
This activity is supported by an educational grant from Lilly.

Below the Surface: Managing the Physical, Mental, and Social Impact of Moderate-to-Severe Atopic Dermatitis

FACULTY

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PROGRAM OVERVIEW
This live, case-based activity will cover the underlying causes of atopic dermatitis along with current and emerging systemic agents as part of the overall treatment plan.

TARGET AUDIENCE
This activity is intended for dermatologists, allergists, nurse practitioners, physician assistants, and other healthcare professionals involved in the care and treatment of patients with atopic dermatitis.

Learning Objectives

- Incorporate patient-reported outcomes on the physical, mental, and social impact of AD on patient's QoL into the selection of treatment options and the evaluation of therapeutic outcomes
- Assess the disease severity of atopic dermatitis and individualize treatment regimens to minimize disease burden, including itch and skin pain
- Apply knowledge of the mechanism of action of approved and emerging systemic agents and of clinical trial data on their efficacy and safety to the management of moderate-to-severe atopic dermatitis

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Purpose: This program would be beneficial for nurses involved in the therapeutic management of patients with atopic dermatitis.
CNE Credits: 1.5 ANCC Contact Hour(s).

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AGENDA

I. Atopic Dermatitis: An Overview

a. Epidemiology, incidence, and prevalence of atopic dermatitis (AD)
b. Pathophysiology of AD
c. Economic burden of AD: direct and indirect healthcare costs, lost productivity, lifestyle modifications, and reduced quality of life
d. Quality of life issues faced by patients with AD: lost sleep, comorbidities, skin pain and itch, depression and anxiety, and others

II. Challenges Associated with the Diagnosis of AD

a. Challenges in the diagnosis and management of atopic dermatitis
b. Measuring disease severity
c. Assessing quality of life issues

III. Management of Atopic Dermatitis

a. Guideline recommended management of AD
b. Managing chronic inflammation in AD with cytokine and JAK inhibition: MOAs of approved and emerging agents
c. Clinical trial data on the efficacy and safety of systemic agents:
c. Impact of systemic agents on quality of life
d. Patient-specific factors in treatment selection: comorbidities, symptom burden, quality of life issues, and others
e. Developing individualized treatment plans that incorporate guideline recommendations, clinical trial data, and patient-specific factors

IV. Case Study

V. Conclusions

VI. Q&A

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Notes/Acknowledgements

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- Assess the disease severity of AD and individualize treatment regimens to minimize disease burden, including itch and skin pain
- Apply knowledge of the mechanisms of action of approved and emerging systemic agents and of clinical trial data on their efficacy and safety to the management of moderate-to-severe AD

AD = atopic dermatitis; QoL = quality of life.

Features and Impact

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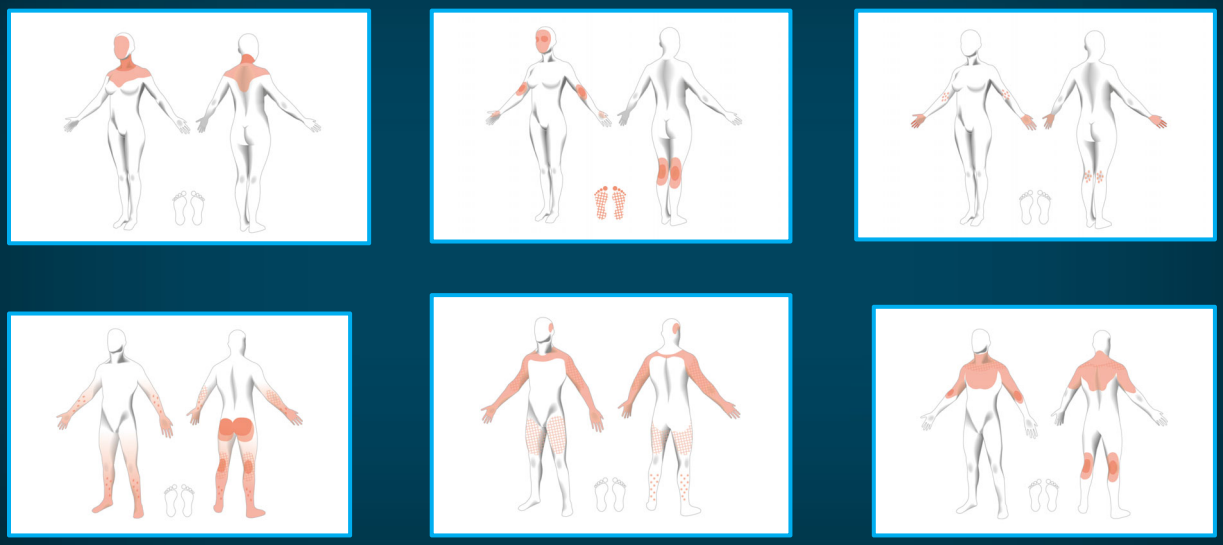
Features of Atopic Dermatitis (AD)

AD is a chronic, pruritic, inflammatory skin disease that typically involves:

- Childhood onset
- Familial occurrence
- Eczematous change
  - Erythema
  - Induration, papulation
  - Excoriation
  - Lichenification
- Characteristic distribution
- Intermittent flares
- Associated skin conditions (minor diagnostic criteria)
- Skin infections
- Associated morbidities

Siegfried EC, Hebert AA. *J Clin Med.* 2015;4:884-917. Ring J, et al. *J Eur Acad Dermatol Venereol.* 2012;26:1045-1060.

Various Clinical Subtypes Exist



Thyssen J, et al. *Acta Derm Venereol.* 2020;100;adv00015.

Impact of AD

Increasing prevalence: 12%-13% in children and adolescents and >7% in adults in **the US**

- 85% present by age 5 years
- Adult-onset in 2%-8%

Greater impact on QoL than type 1 diabetes

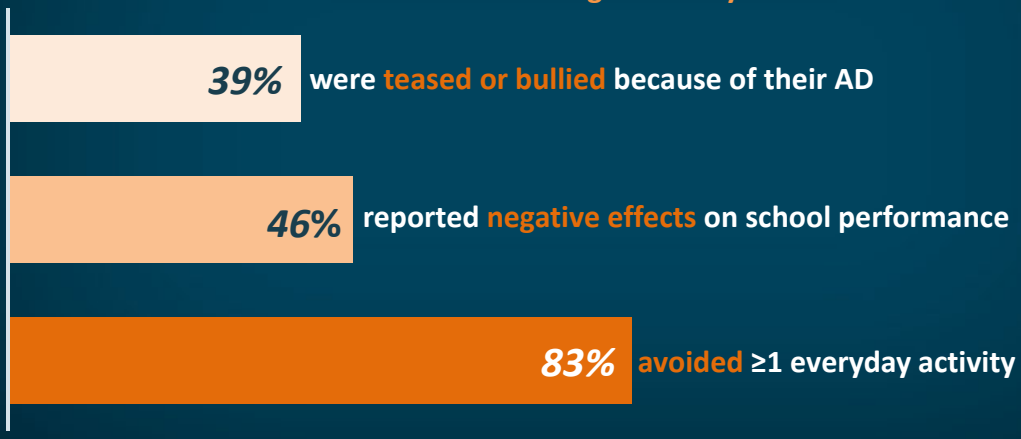
Increasing costs: ≈$5.3 billion/year

Silverberg JI. *Ann Allergy Asthma Immunol.* 2019;123:144-151. Silverberg JI, et al. *Ann Allergy Asthma Immunol.* 2018;121:340-347. Drucker AM, et al. *J Invest Dermatol.* 2017;137:26-30. Arkwright PD, et al. *J Allergy Clin Immunol Pract.* 2013;1:142-151.

Impact of Psychosocial Function

Phone interviews in 8 countries with 2,002 adolescents and adults with moderate-to-severe AD

Of the 125 teens aged 14-17 years…



Zuberbier T, et al. *J Allergy Clin Immunol*. 2006;118:226-232.

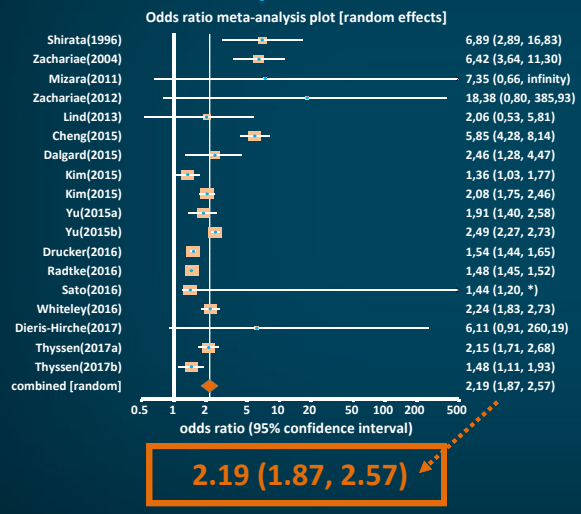
Impact on Quality of Life

- Consequences of ***sleep deprivation***
  - Exhaustion
  - Mood changes
  - Impaired psychosocial functioning
- Consequences of ***social isolation***
  - School avoidance
  - Depression
- **Restricted** lifestyle choices
  - Clothing, holidays, socializing, owning pets, and participating in sports

Lewis-Jones S. *Int J Clin Pract*. 2006;60:984-992.

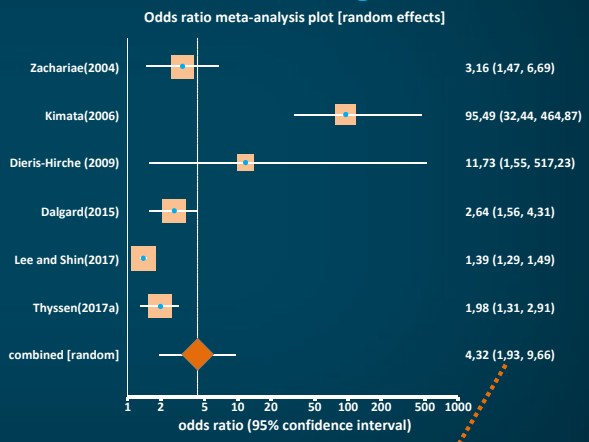
Association of Adult AD With Depression and Suicidal Thoughts

Depression



2.19 (1.87, 2.57)

Suicidal Thoughts



4.32 (1.93, 9.66)

Rønnstad A, et al. *J Am Acad Dermatol.* 2018;79:448-456.

Associated Morbidities

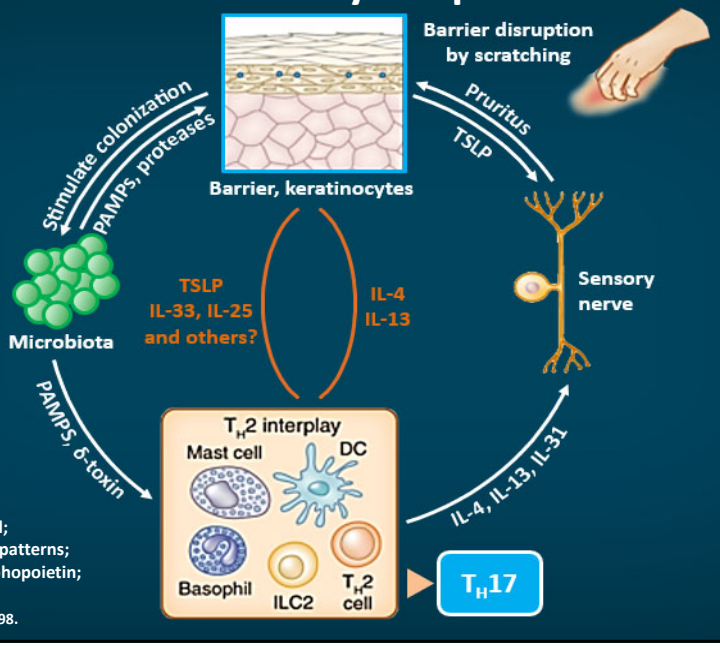
Atopic	Others[1,2,6,7]
• **Allergic rhinitis** (≈50% prevalence)[1]	• **Mental/behavioral health**
• **Allergic conjunctivitis**[2]	• **Skin infections**
• **Asthma** (≈22%-30% prevalence)[1,3,4]	• **Allergic contact dermatitis**
• **Primary eosinophilic gastrointestinal disorders**[2]	• **Immune deficiency**
• **Food allergy**[5]	• **Cataracts**

1. Whiteley J, et al. *Curr Med Res Opin.* 2016;32:1645-1651. 2. Silverberg JI. *Cutis.* 2019;104:142-143. 3. Silverberg JI, Hanifin JM. *J Allergy Clin Immunol.* 2013;132:1132-1138.
4. Wang D, Beck LA. *Am J Clin Dermatol.* 2016;17:425-443. 5. Greenhawt M. *Allergy Asthma Proc.* 2010;31:392-297. 6. Silverberg NB. *Cutis.* 2016;97:408-412.
7. De Benedetto A, et al. *J Invest Dermatol.* 2009;129:14-30.

Pathogenesis

Please click here to watch a brief animation exploring the pathophysiology of atopic dermatitis

The Inflammatory Loop in AD



IL = interleukin; ILC = innate lymphoid cell;
PAMPs = pathogen-associated molecular patterns;
T_H = T helper; TSLP = thymic stromal lymphopoietin;
DC = dendritic cell

Dainichi T, et al. *Nat Immunol*. 2018;19:1286-1298.

Evaluation and Diagnosis

Dermatitis Is a Phenotype

Characteristics

- Itch
- Skin lesions: poorly circumscribed erythema and induration with fine scale
  - Acute: edema/vesicles, quickly reversible
  - Subacute
  - Chronic: lichenification, persistent
- Histology
  - Epidermis: spongiosis, parakeratosis
  - Dermis: superficial perivascular infiltrate (lymphocytes/histiocytes > neutrophils/eosinophils)

Krafchik B. Atopic dermatitis. In: Schachner L, Hansen R. *Pediatric Dermatology.* 4th ed. Elsevier; 2011.

AD Is the Most Common Chronic Eczema in Children

Defined diagnostic criteria

- Hanifin and Rajka criteria
- UK Working Party
  - Family history of atopy, eczema, asthma, and allergies
  - Early age of onset
  - Itching

Features

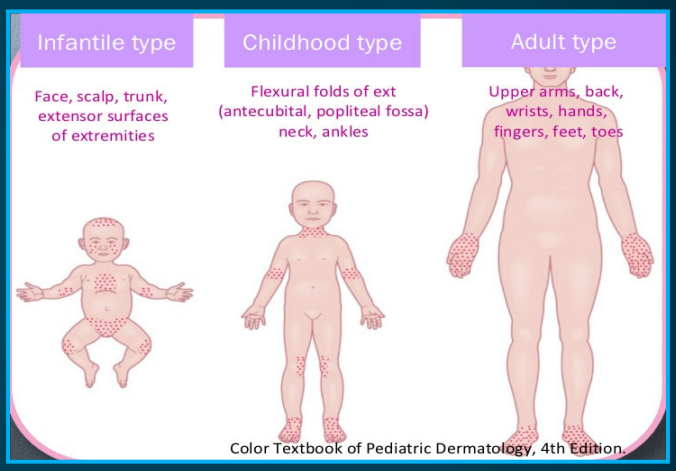
- Itch and pain
- Eczematous morphology
- Distribution
- Associated cutaneous conditions
- Associated morbidities
- Beware phenotypic mimics

Eichenfield LF, et al. *J Am Acad Dermatol.* 2014;70:338-351. Bradby C. Medscape. 2019. (www.medscape.com/answers/762045-171176/what-are-the-hanifin-and-rajka-diagnostic-criteria-for-atopic-dermatitis-ad). Accessed January 26, 2021. Siegfried EC, Hebert AA. *J Clin Med.* 2015;4:884-917.

Atopic Dermatitis: Diagnosis

Clinical diagnosis

- Historical features
- Distribution and morphology of skin lesions
- Associated clinical signs



Eichenfield LF, et al. *J Am Acad Dermatol.* 2014;70:338-351. Napolitano M, et al. *G Ital Dermatol Venereol.* 2016;151:403-411. Kulthanan K, et al. *Asian Pac J Allergy Immunol.* 2011;29:318-326. Weston W, et al. *Color Textbook of Pediatric Dermatology*. 4th ed. Mosby; 2007.

Atopic Dermatitis: Diagnosis Features

Features to be considered in diagnosing patients with AD

- **ESSENTIAL FEATURES**; must be present:
  - Pruritus
  - Eczema (acute, subacute, chronic):
    - Typical morphology and age-specific patterns*
    - Chronic or relapsing history

  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** ; these clinical associations help to suggest the diagnosis of AD but are too non-specific to be used for defining or detecting AD for research and epidemiologic studies:
  - Atypical vascular responses (e.g., facial pallor, white dermographism, delayed blanch response)
  - Keratosis pilaris / pityriasis alba / hyperlinear palms / ichthyosis
  - Ocular / periorbital changes
  - Other regional findings (e.g., perioral changes / periauricular lesions)
  - Perifollicular accentuation / lichenification / prurigo lesions

- **EXCLUSIONARY CONDITIONS;** it should be noted that a diagnosis of AD depends on excluding conditions such as:
  - scabies
  - seborrheic dermatitis
  - contact dermatitis (irritant or allergic)
  - ichthyoses
  - cutaneous T-cell lymphoma
  - psoriasis
  - photosensitivity dermatoses
  - immune deficiency diseases
  - erythroderma of other causes

Eichenfield LF, et al. *J Am Acad Dermatol.* 2003;49:1088-1095. Eichenfield LF, et al. *J Am Acad Dermatol.* 2014;70:338-351.

Classic AD Distribution Changes With Age

Infants: face, extensor extremities

Children: wrists, ankles, antecubital and popliteal fossae

AD across the lifespan (https://atopicdermatitis.net/across-lifespan). Accessed January 26, 2021.

Diaper-Area Sparing: A Diagnostic and Therapeutic Feature

More Common Features in Skin of Color





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

Boguniewicz M, et al. *J Allergy Clin Immunol Pract.* 2017;5:1519-1531. Poladian K, et al. *Cutis.* 2019;104:164-168. Siegfried EC, Hebert AA. *J Clin Med.* 2015;4:884-917.

Phenotypic Mimics

Otherwise healthy

- **Pityriasis alba**
- **Keratosis pilaris**
- **Ichthyosis vulgaris**
- Lichen simplex chronicus
- Contact dermatitis
- Psoriasiform overlap
- Seborrheic dermatitis
- Tinea
- Scabies

Unhealthy

- Immune deficiencies
- Nutritional deficiencies
- Cutaneous T-cell lymphoma
- Genodermatoses

Siegfried EC, Hebert AA. *J Clin Med.* 2015;4:884-917. Wine SJ, Steinberg S. *Can Fam Physician.* 1972;18:65-66. Purohit MP. Lichen simplex chronicus. DoveMed. 2018 (www.dovemed.com/diseases-conditions/lichen-simplex-chronicus). Fields D. NEWS Medical. 2019 (www.news-medical.net/health/Types-of-Genodermatoses.aspx). All URLs accessed January 26, 2021.

Recognizing Skin Infections

- Requires a high index of suspicion
- History, family history, and clinical findings are supportive
- Laboratory confirmation (variable sensitivity)
  - Fungal: skin and scalp reservoir swab + pulled hairs, nail clippings
  - HSV: skin scraping on ice for PCR, viral culture; serology
  - Coxsackie: nasal swab for PCR
  - Strep: skin and throat reservoir swab for culture (*Staphylococcus aureus* is a colonizer)
  - Skin biopsy
- Cutaneous HSV and group A streptococcal coinfection can occur
- Impact: avoid unnecessary treatment, prevent complications

HSV = herpes simplex virus; PCR = polymerase chain reaction.

Goodyear H. *Paediatr Child Health.* 2015;25:72-77 (https://www.sciencedirect.com/science/article/abs/pii/S1751722214002224). Accessed January 21, 2021.
Lyons JJ, et al. *Immunol Allergy Clin North Am.* 2015;35:161-183.

Common Skin Infections in AD

Scabies

Webspace and palmoplantar lesions

Tinea

Scaly plaques with border accentuation

Molluscum

Pearly dome-shaped papules with central umbilication

HSV

Grouped vesicles and punched-out erosions

Paul D, Papier A. *J Fam Pract.* 2020;69:10-17. Bhagavatula M, Powell C. *Paediatr Child Health.* 2011;21:132-136 (https://www.sciencedirect.com/science/article/abs/pii/S1751722210002568). Accessed January 21, 2021. Siegfried EC, Hebert AA. *J Clin Med.* 2015;4:884-917.

AD and Food Allergies

- Many families feel that this is a "root cause"
- Good data that excluding foods in unselected patients offers no benefit
- This also suggests that nonallergic mechanisms probably play little or no role

Getmetti C. *J Eur Acad Dermatol Venereol*. 2000;14:439-440. Bath-Hextall F, et al. *Allergy*. 2009;64:258-264.

AD and Food Allergies (cont)

- The ***prevalence*** of food allergy is higher in children with moderate-to-severe AD (≈30%)
- The ***role*** of food allergens in the pathogenesis of AD is unclear
- The association between AD and food allergy is complex and is a common source of conflicting therapeutic recommendations

Diagnosis	Clinical Signs and Symptoms	Most Common, Relevant Food Allergens in Children With AD
Clinically confirmed signs and symptoms after food exposure **PLUS** Laboratory evidence of sensitization (Diagnostic criteria not well established)	Range from transient/self limited to anaphylaxis Life-threatening reactions are rare Risk not predicted by initial presentation, laboratory parameters, or increasing clinical concern	Cow's milk Egg Wheat Soy Tree nut/peanut

Boyce JA, et al. *J Allergy Clin Immunol.* 2010;126:S1-S58. Heratizadeh A, et al. *Curr Allergy Asthma Rep.* 2011;11:284-291. Mehta H, et al. *Curr Opin Allergy Clin Immunol*. 2013;13:275-279. Akuete K, et al. *Ann Allergy Asthma Immunol.* 2017;119:339-348.e1. National Institute of Allergy and Infectious Diseases (NIAID). Guidelines for diagnosis and management of food allergy in US. 2011 (www.niaid.nih.gov/sites/default/files/faguidelinespatient.pdf). Accessed January 21, 2021. Schneider Chafen JJ, et al. *JAMA*. 2010;303:1848-1856. Järvinen KM, et al. *J Allergy Clin Immunol.* 2009;124:1267-1272.

Management

Disease Issues

- AD is a *chronic disease* with episodic flares
- There is **no cure**; the goal of treatment is to maintain control
- Early and consistent disease control may minimize long-term atopy risk

Johns Hopkins Medicine. Eczema (https://www.hopkinsmedicine.org/health/conditions-and-diseases/eczema). Accessed January 26, 2021. Tollefson MM, Bruckner AL. *Pediatrics.* 2014;134:e1735-e1744. Ker J, et al. *Ann Allergy Asthma Immunol*. 2009;103:4):282-9.

Management Issues

Variables impacting treatment choice

- Patient preference and ability
- Safety and efficacy
- Cost and access
- Comorbidities

Therapeutic goals

- To reduce symptoms, prevent exacerbations and minimize therapeutic risks
- Prolonged remission and infrequent flares
  - Improved adherence through affordable, easy-to-use and effective regimen
  - Resultant improved QoL, including restful sleep and undisturbed activities of daily living

Retzler J, et al. *Qual Life Res.* 2019;28:2373-2381. Tollefson MM, Bruckner AL. *Pediatrics.* 2014;134:e1735-e1744. Weston WL, Howe W. Treatment of atopic dermatitis. 2020 (https://www.uptodate.com/contents/treatment-of-atopic-dermatitis-eczema). Accessed January 26, 2021. Avena-Woods C. AJMC. 2017 (https://www.ajmc.com/view/overview-of-atopic-dermatitis-article). Accessed January 26, 2021.

Standard Treatment Strategies: 5 "I"s

Impaired skin barrier function

Ointment emollient, wet wraps, ambient humidity

Itch (and scratching)

Non-sedating antihistamines for urticarial component, N-acetylcysteine*

Interrupted sleep

Short-term sedating antihistamines, sleep hygiene

Inflammation

- Bleach baths
- Avoid topical allergens
- TCSs/calcineurin inhibitors/ crisaborole
- Systemic anti-inflammatory medication

Infection/risk (*Strep, HSV, molluscum, tinea*)

- Bleach baths
- Surveillance testing
- Appropriate antimicrobial medication

**N-acetylcysteine not FDA approved for AD.*

FDA = US Food and Drug Administration; HSV = herpes simplex virus; TCS = topical corticosteroid.

Original concept acknowledgement to Dr. Margaret Lee and Dr. Lisa Shen. Lio PA, et al. *J Allergy Clin Immunol Pract.* 2014;2:361-369. Janeczek M, et al. *J Clin Aesthet Dermatol.* 2019;12:20-26.

Assessment of Disease Severity

- Validated AD-specific severity scales
  - **SCORAD** (**SCOR**ing **A**topic **D**ermatitis index): includes extent, sleep, and itch
  - **EASI** (**E**czema **A**rea and **S**everity **I**ndex): includes extent
  - **IGA** (**I**nvestigator's **G**lobal **A**ssessment): simple 0- to 5-point scale
- Modified forms used in clinical trials
- SCORAD and EASI are too cumbersome for clinical practice
- IGA is simple, useful, and may be required for insurance authorization

Siegfried EC, et al. *Pediatr Dermatol*. 2018;35:303-322. Chopra R, et al. *Br J Dermatol*. 2017;177:1316-1321. Brunk D. *Dermatol News*. 2020 (www.mdedge.com/dermatology/article/220713/atopic-dermatitis/expert-discusses-her-approach-using-systemic-agents). Accessed January 26, 2021. Silverberg JI, et al. *Br J Dermatol*. 2019;181:80-87.

AD Severity Informs *Customized* Stepped Therapy

	MILD	MODERATE	SEVERE
Maintenance	**Skin care** Daily bath (bleach optional) Liberal, frequent moisturizer use **Trigger avoidance** Irritants, potential topical allergens, low ambient humidity **Consider comorbidities**	**Add bleach baths, wet wraps** **Maintenance TCI or crisaborole** • Up to twice daily • Monitor quantities **Intermittent TCS** • Medium potency • 15 days/month • Monitor quantities	**Specialist referral** **Consider comorbidities** **Short-term aggressive treatment** • Wet wraps • Hospitalization **Phototherapy** **Systemic immunosuppressants** • Cyclosporine A* • Methotrexate* • Mycophenolate mofetil* • Azathioprine* **Dupilumab**
Flare	**TCS** • Low-to-medium potency • PRN up to 15 days/month • Monitor quantities	**TCS** • Medium-to-high potency • Consider complicating factors	**Other considerations** • Nonadherence • Infection • Misdiagnosis • Contact allergy

PRN = as needed; TCI = topical calcineurin inhibitor.

**Not FDA approved for AD.*

Adapted from Boguniewicz M, et al. *Ann Allergy Asthma Immunol*. 2018;120:10-22.e2.

Atopic Dermatitis: Current Treatment Options
Considerations for Treatment

- Majority of patients with mild AD can expect to obtain clinical improvement and disease control with use of emollients, conventional topical therapies (TCS and/or TCI), and environmental and/or occupational modifications, when necessary

- These interventions may not be sufficient for patients with moderate-to-severe or difficult-to-control disease

Sidbury R, et al. *J Am Acad Dermatol.* 2014;71:327-349. Wollenberg A, et al. *J Eur Acad Dermatol Venereol.* 2016;30:729-747. Saeki H et al. *J Dermatol.* 2016;43:1117-1145.

Emollient Options

- Affordability
- Tactile acceptance
- Low allergenicity
- Options
  - Non-allergenic: plain petroleum jelly, plain mineral oil (beware tocopherol), Vanicream™ Moisturizing Ointment (formerly Vaniply™ Ointment)
  - Physiologic lipids (eg, CeraVe®, EpiCeram®); equimolar ratio of ceramides, cholesterol, fatty acids for benefit
  - pH <5 (A-Mantle™)
  - Colloidal oatmeal (Aveeno®)
  - Prescription skin-barrier devices (Hylatopic ®, Mimyx ®, Atopiclair ®)
- Wet wraps

Elias PM, et al. *Skin Pharmacol Physiol.* 2019;32:1-7. Dhandha MM, Siegfried EC. *Skin.* 2017;1:48-51 (www.jofskin.org/index.php/skin/article/download/4/pdf). URLs accessed January 26, 2021. Cincinnati Childrens. (https://www.cincinnatichildrens.org/health/e/eczema). Accessed January 26, 2021.

Safe and Effective Use of Topical Medications in Children

How much, how often, how to monitor?

Medication	Quantity	Frequency	Possible Safety Monitoring	Prescribing Guideline
Corticosteroids	15-60 g/month (based on age/body site/potency)	15 days/month	AM cortisol	Potency and age group specific
Calcineurin inhibitors	100-200 g/month; Supplied in 30- to 100-g tubes	BID	Tacrolimus peak	≥2 years*
PDE-4 inhibitors	100-200 g/month; Supplied in 60- to 100-g tubes	BID	—	≥3 months

Refer to individual medication prescribing information for approved indications and guidelines for treatment.

*Tacrolimus 0.03% is indicated for children 2-15 years; 0.1% is indicated for adults.

AM = morning; BID = twice daily; PDE-4 = phosphodiesterase-4.

Carr WW. *Paediatr Drugs.* 2013;15:303-310. Eichenfield LF, et al. *J Am Acad Dermatol.* 2014;71:116-132. Schwartz RA. Pediatric atopic dermatitis medication. Medscape. 2020 (https://emedicine.medscape.com/article/911574-medication). Accessed January 26, 2021. Pharmacist's Letter. 2012 (http://snapaprn.org/docs/SNAP%20Comparison%20of%20Topical%20Steroids.pdf). Accessed January 26, 2021. National Eczema Society. Factsheet. 2019 (https://eczema.org/wp-content/uploads/Topical-steroids-Sep-19-1.pdf). Accessed January 26, 2021.

Adherence

- The ***most important contributory factor*** to successful treatment
- Barriers
  - Time constraints
  - Unclear or difficult-to-follow instructions
  - Medication phobia
  - Cost/access
- Confirming medication use will inform therapeutic response

Strategies for Improvement

- **Consistent messaging across providers**
- **Frequent follow-up visits**
- **Patient/parent education**
- **Giving specific skin care instructions**
- **Prescribing adequate quantities**
- **Monitoring of medication use**
- **Electronic reminders (eg, email, text messages)**
- **Experience positive outcomes**

Bass AM, et al. *J Clin Med.* 2015;4:231-242. Snyder A, et al. *Cutis.* 2015;96:397-401. Ellis RM, et al. *Pediatr Dermatol.* 2011;28:242-244. Smith SD, et al. *Med J Aust.* 2013;199:467-469. Shi VY, et al. *JAMA Dermatol.* 2013;149:481-483. Pena-Robichaux V, et al. *Dermatol Res Pract.* 2010;2010:894258. Pérez-Jover V, et al. *J Med Internet Res.* 2019;21:e12505.

Audience Response Question

Which of the following is a hallmark of the *proactive* approach to treatment (vs *reactive*)?

A. Discontinuation of therapy once visible lesions are clear
B. Pulsed application of steroids to prevent striae
C. Use of systemic therapies for all patients as early as possible, to halt the atopic march
D. Daily maintenance skin care using emollients +/- intermittent anti-inflammatory medications

Optimizing Long-Term Control

Address only intermittent flares

Prescription antibiotics, potent TCS, and prednisone

Yields alternating roller-coaster improvement and flares

Practice daily skin care

Use adequate amounts of topical medication

Recognize and avoid triggers

Maintains control

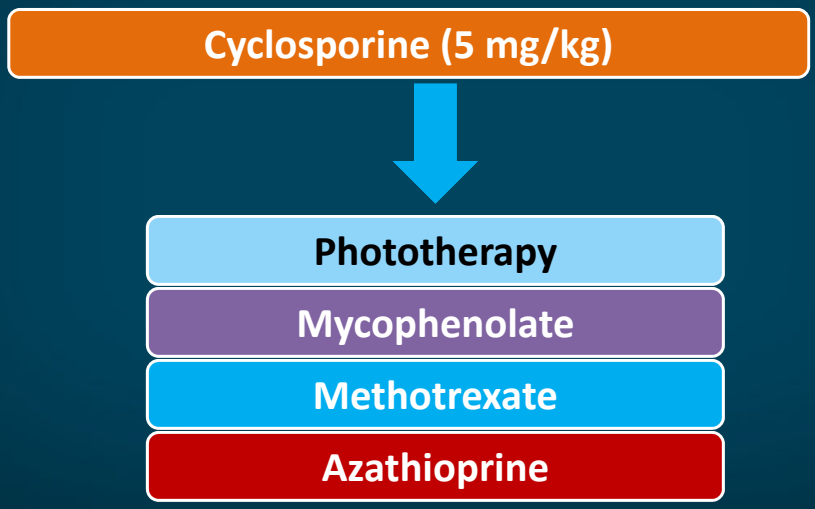
Wollenberg A, et al. *J Eur Acad Dermatol Venereol.* 2016;30:729-747. Torrelo A, et al. *Actas Dermosifiliogr.* 2013;104:409-417. Thaci D, et al. *J Eur Acad Dermatol Venereol.* 2010;24:1040-1046. Sidbury R, et al. *J Am Acad Dermatol.* 2014;71:1218-1233.

New and Targeted Therapy

Melinda Gooderham, MSc, MD, FRCPC
Dermatologist and Medical Director
SKiN Centre for Dermatology
Peterborough, Ontario

Please click here to watch a brief animation describing the mechanisms of action of approved and emerging therapies in AD

Conventional Systemic Treatment Algorithm



Cyclosporine, mycophenolate, methotrexate, and azathioprine are not FDA approved for AD.

Discontinuation Rates of Immunosuppressive Therapies

	CsA (N=356) (at 6-Year Follow-up)[1]	AZA (N=94) (at 3-Year Follow-up)[2]	MTX (N=89) (at 2-Year Follow-up)[3]	EC-MPS (N=84) (at 3-Year Follow-up)[2]
AE	22%	36%	25%	14%
Inefficacy	16%	19%	15%	38%
Controlled AD	26%	11%	6%	11%
Other reasons	11%	6%	7%	4%

Cyclosporine, mycophenolate, methotrexate, and azathioprine are not FDA approved for AD.

AE = adverse event; AZA = azathioprine; CsA = cyclosporine A; EC-MPS = enteric-coated mycophenolate sodium; MTX = methotrexate.

1. van der Schaft J, et al. *Br J Dermatol.* 2015;172:1621-1627. 2. van der Schaft J, et al. *Br J Dermatol.* 2016;175:199-202. 3. Politiek K, et al. *Br J Dermatol.* 2016;174:201-203.

Dupilumab

- A human monoclonal antibody against IL-4 receptor α
- Inhibits signaling of IL-4 and IL-13
- FDA approved for moderate-to-severe AD in adults in March 2017, for aged ≥12 years in 2019, and for aged ≥6 years in 2020
- Also FDA approved for moderate-to-severe eosinophilic asthma (≥12 years) and for add-on maintenance therapy for CRSwNP (adults)
- SC injection every 2 or 4 weeks, based on patient weight

CRSwNP = chronic rhinosinusitis with nasal polyposis; SC = subcutaneous.

Dupilumab (Dupixent®) PI 2020 (https://www.regeneron.com/sites/default/files/Dupixent_FPI.pdf). Press release. May 26, 2020 (https://www.prnewswire.com/news-releases/fda-approves-dupixent-dupilumab-as-first-biologic-medicine-for-children-aged-6-to-11-years-with-moderate-to-severe-atopic-dermatitis-301065273.html). All URLs accessed January 21, 2021.

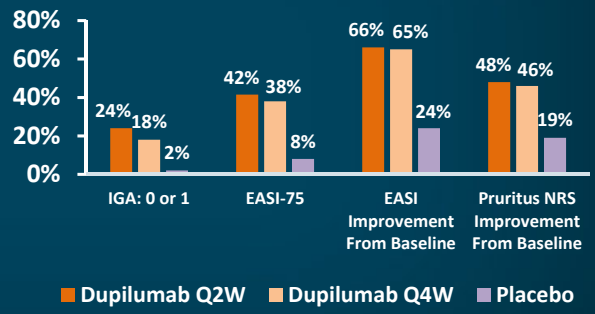
Dupilumab: Select Clinical Trials in Pediatric Patients

Phase 3 Trial (Jul 2020)[1]
- 16-week trial in 251 patients aged 12-17 years
- Dupilumab 200 or 300 mg Q2W
- Dupilumab 300 mg Q4W
- Placebo

Phase 3 Trial (Nov 2020)[2]
- 16-week trial of 367 patients aged 6-11 years with concomitant TCS
- 67%-70% achieved EASI 75 (27% PBO)
- 31%-33% achieved IGA 0/1 (11% PBO)
- 51%-58% achieved ≥4-pt itch reduction (12% PBO)

Additional Trials
- Case series (6 patients; 7-15 years): efficacy/safety over 8.5 months[3]
- Phase 3 open-label extension (6 months - 17 yrs): underway[4]
- Phase 2 and 3 (6 months-6 years): underway

Dupilumab vs Placebo: Clinical Endpoints

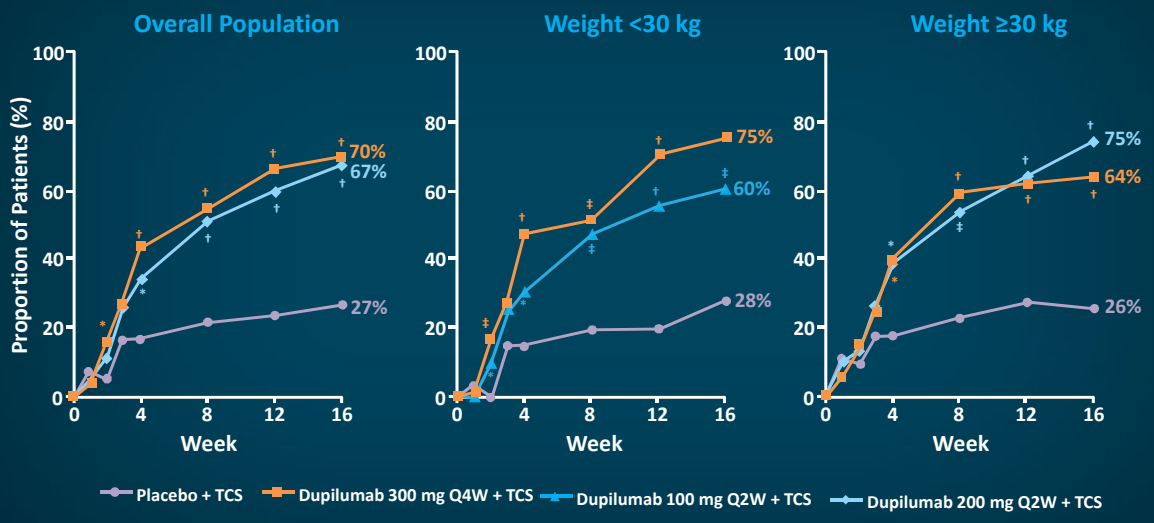


All *P*< .001 vs placebo; dupilumab is FDA approved for moderate-to-severe AD in patients aged ≥6 years.

NRS = Numeric Rating Scale; Q2W = every 2 weeks; Q4W = every 4 weeks; PBO = placebo.

1. Simpson E, et al. *JAMA Dermatol*. 2020;156(1):44-56. 2. Paller A, et al. JAAD. 2020;83(5):1282-93. 3. Treister AD, et al. *Pediatr Dermatol*. 2019;36:85-88. 4. https://clinicaltrials.gov/ct2/show/NCT02612454

Proportions of Children Aged 6-11 Years Achieving EASI-75



*$P \leq .05$; †$P \leq .0001$; ‡$P \leq .001$ vs placebo + TCS.

Paller AS, et al. *J Am Acad Dermatol.* 2020;83:1282-93.

Audience Response Question

While dupilumab appears to be safer than conventional immunosuppressants, which of the following is a safety consideration, occurring in up to 10% of patients?

A. Tuberculosis
B. Bronchitis
C. Conjunctivitis
D. Diarrhea

Dupilumab: Safety

- It appears much safer than conventional immunosuppressants, but other potential considerations include:
  - Conjunctivitis in up to 10% of patients[1,2]
    - Higher rates in those with higher baseline AD severity and/or history of conjunctivitis
    - Mostly mild to moderate
    - In dupilumab trials in other type 2 diseases (eg, asthma, CRSwNP), incidence similar to placebo
  - Head/neck erythema[3,4]
  - Injection site reaction/systemic reactions
  - Cost may be a factor
  - Injection

1. Akinlade B, et al. *Br J Dermatol*. 2019;181:459-473. 2. Achten R, et al. *J Allergy Clin Immunol Pract*. 2020;S2213-2198(20)31091-6.
3. de Beer F, et al. *JAAD Case Rep*. 2019;5:888-891. 4. de Wijs L, et al. *Br J Dermatol*. 2020;183:745-749.

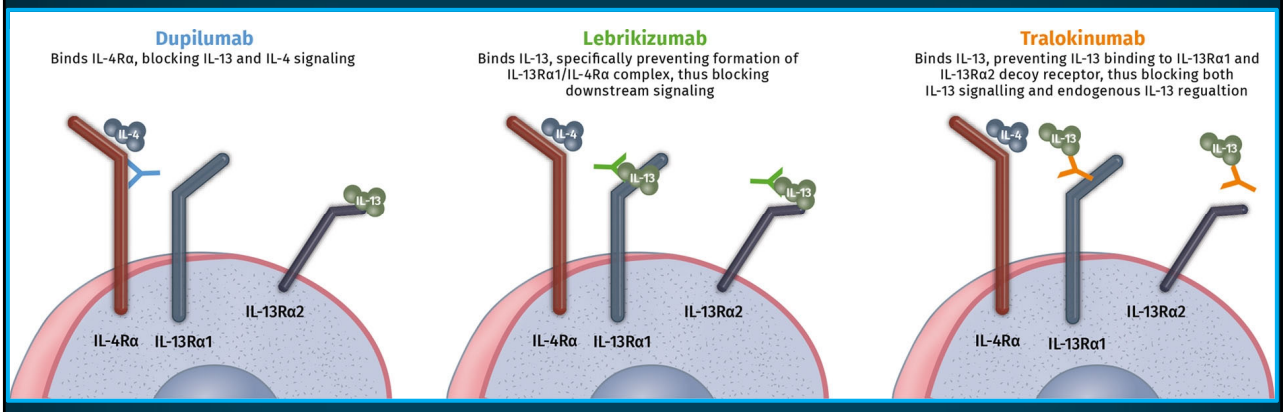
Pipeline: Selected Agents

Drug	Target
TOPICAL	
Delgocitinib	JAK1, JAK2, JAK3, and TYK2
E6005	PDE-4
OPA-15406	PDE-4
Ruxolitinib	JAK1 and JAK2
Tapinarof	AHR ligand
ORAL	
Abrocitinib	JAK1
ASN002	JAK
Baricitinib	JAK1 and JAK2
Upadacitinib	JAK1
SYSTEMIC INJECTION	
Lebrikizumab	IL-13
Nemolizumab	IL-31
Tralokinumab	IL-13

AHR = aryl hydrocarbon receptor; TYK2 = tyrosine kinase 2.

National Eczema Association. Eczema treatments (https://nationaleczema.org/research/eczema-treatment-research). Accessed January 26, 2021. Vakharia PP, Silverberg JI. *Lancet Child Adolesc Health*. 2019;3:343-353.

Not Identical Mechanisms



Lebrikizumab does not prevent binding to Rα2 → no increased levels of IL-13

Tralokinumab prevents the binding to Rα2 → thus increased total IL-13 levels

What does this mean?

We don't know!

Rα = receptor α.

Moyle M, et al. *Exp Dermatol*. 2019;28:756-768.

Emerging Agent: Tralokinumab (Anti–IL-13)

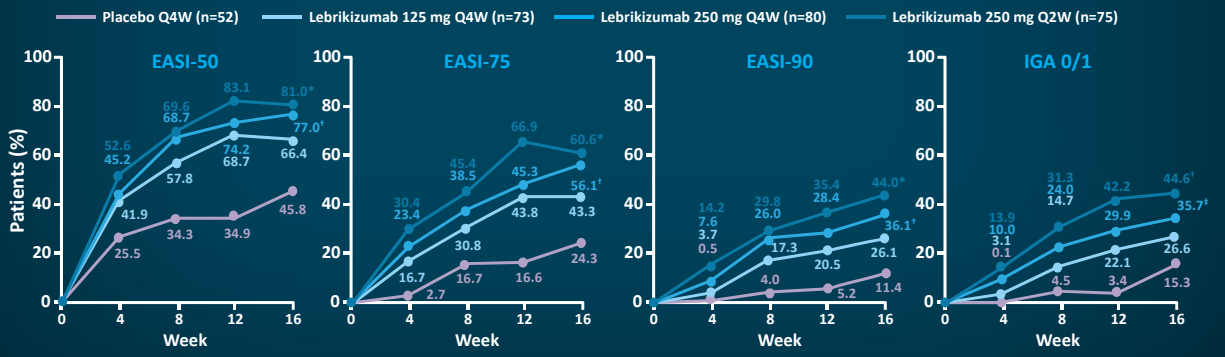
Study	Treatment	IGA 0/1 Response at Week 16	EASI-75 Response at Week 16
ECZTRA 1[1]	Tralokinumab	16%	25%
	Placebo	7%	13%
	Placebo-adjusted response	**9%**	**12%**
ECZTRA 2[1]	Tralokinumab	22%	33%
	Placebo	11%	11%
	Placebo-adjusted response	**11%**	**22%**
ECZTRA 3[2]	Tralokinumab	39%	56%
	Placebo	26%	36%
	Placebo-adjusted response	**13%**	**20%**

- ECZTRA 1/2: 51%-60% maintained response over 52 weeks
- ECZTRA 3: 78%-93% maintained response over 32 weeks

1. Wollenberg A, et al. *Br J Dermatol*. 2020;Sep 30. doi:10.1111/bjd.19574. 2. Silverberg JI, et al. *Br J Dermatol*. 2020 Sep 30. doi:10.1111/bjd.19573.

Emerging Agent: Lebrikizumab (Anti–IL-13)

- A phase 2, randomized, monotherapy trial in 280 adults with moderate-to-severe AD inadequately controlled with TCS
- At week 12, significantly more patients achieved EASI-50/75/90 with lebrikizumab 250 mg every 2 weeks or every 4 weeks vs placebo

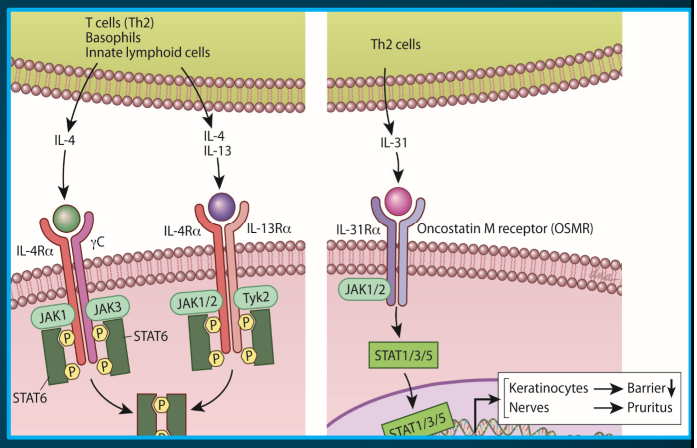


EASI-90 = 90% improvement from baseline in EASI.*$P < .001$; †$P < .01$; ‡$P < .05$ vs placebo.

Guttman-Yassky E, et al. *JAMA Dermatol*. 2020:156:411-420.

Janus-Associated Kinase (JAK)

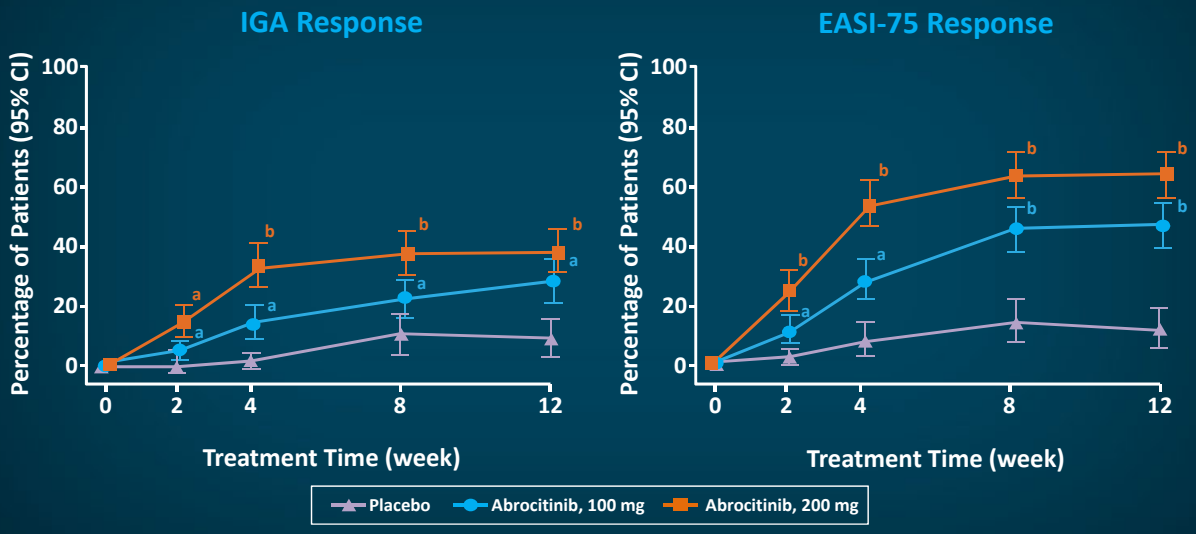
- The JAK-STAT pathway is a conserved master regulator of immunity and myeloproliferation
- JAK inhibitors are used to treat several hematologic and inflammatory diseases
- Small molecules (including JAK inhibitors) show improvement in AD disease scores, patient-reported outcomes, and QoL



STAT = signal transducer and activator of transcription.

Cotter DG, et al. *J Am Acad Dermatol*. 2018;78(3 suppl 1):S53-S62. Mobasher P, et al. *J Dermatolog Treat*. 2019;30:550-557. Paller AS, et al. *J Allergy Clin Immunol*. 2017;140:633-643.

Abrocitinib

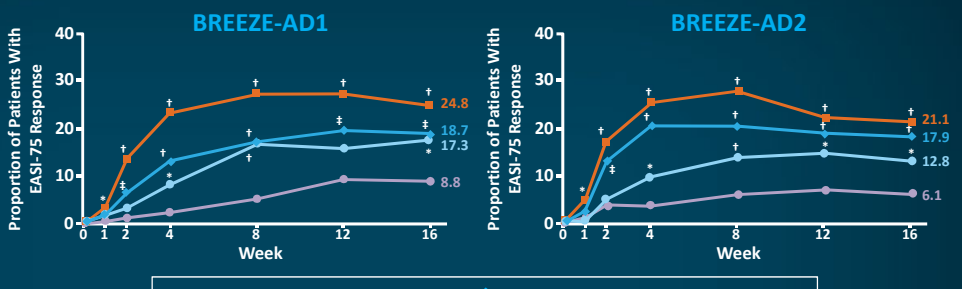


[a]*P*<.05; [b]*P*<.001 vs placebo.

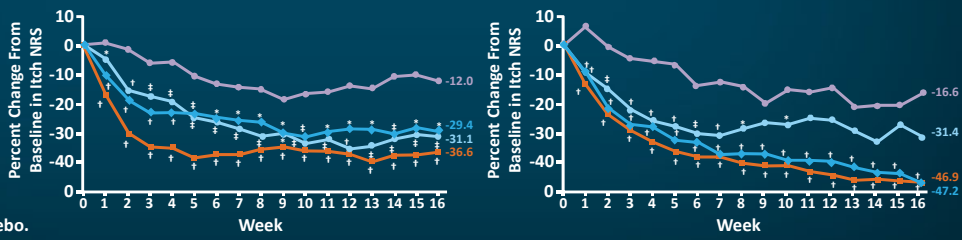
Silverberg JI, et al. *JAMA Dermatol*. 2020;156:863-873.

Baricitinib: BREEZE-AD1/AD2

EASI-75 Response



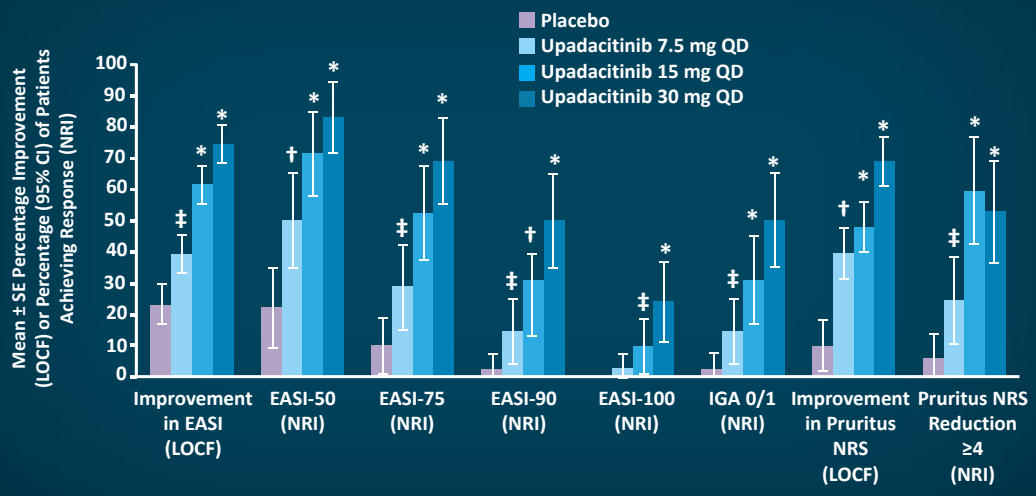
% Change From Baseline: Itch NRS



*P≤ .05; †P≤ .001; ‡P≤ .01 vs placebo.

Simpson EL, et al. *Br J Dermatol*. 2020;183:242-255.

Upadacitinib: Outcomes at Week 16 in Adults



*$P \leq .001$; †$P \leq .01$; ‡$P \leq .05$ for upadacitinib vs placebo.

LOCF = last observation carried forward; NRI = nonresponder imputation; QD = daily; SE = standard error.

Guttman-Yassky E, et al. *J Allergy Clin Immunol*. 2020;145:877-884.

JAK Inhibitors: Topical

- **Delgocitinib**
  - Dose ranging (0.25%-3% ointment) twice daily vs vehicle vs tacrolimus 0.1% x 4 weeks
  - All doses > vehicle in EASI (73% vs 12% in 3% group)
  - Tacrolimus = 62% reduction
  - No serious AEs
- **Ruxolitinub**
  - Phase 2 randomized, dose-ranging, vehicle- and active-controlled study to evaluate safety and efficacy in adult patients
    - 1.5% twice-daily group > vehicle in EASI (71.6% improvement at 4 weeks) and noninferior to triamcinolone cream 0.1%
  - Phase 1 study in children aged 2-7 years and 2 phase 3 studies in patients aged ≥12 years (TruE-AD1 and TruE-AD2) are underway

Nakagawa H, et al. *Br J Dermatol*. 2018;178:424-432. Bissonnette R. *Br J Dermatol*. 2018;178:321.

JAK Inhibitors: Key Adverse Events
≥3% (any dose) and >Placebo

- **Abrocitinib[1]**
  - Nausea, nasopharyngitis, headache, URTI, dermatitis atopic, acne, vomiting, upper abdominal pain, elevated CPK, folliculitis, thrombocytopenia
- **Baricitinib[2]**
  - Nasopharyngitis, headache, diarrhea, herpes simplex, URTI, influenza, oral herpes, UTI, folliculitis
- **Upadacitinib[3]**
  - URTI, AD worsening, acne, headache, nasopharyngitis, elevated CPK, nausea, diarrhea, influenza, oropharyngeal pain

- Serious AE's were rare, similar to placebo, and usually unrelated to treatment

URTI = upper respiratory tract infection; CPK = creatinine phosphokinase; UTI = urinary tract infection

1. Silverberg J, et al. *JAMA Dermatol*. 2020;156(8):873. 2. Bieber T, et al. JEADV. 2021;35:476-85. 3. Guttman-Yassky E, et al. *J Allergy Clin Immunol*. 2020;145:877-884.

Case Study

Case: Tim

- 31-yo man with a hx of AD with recurrent skin infections
- He is exhausted from many difficult nights of no/poor sleep; even when he does sleep he is scratching
- He is also fed up with the same treatment approaches over and over

History of Present Illness

- First developed AD patches on his cheeks in his first year of life.
- By age 5, it covered much of his body: arms, legs, abdomen, hands.
- Multiple staph infections in the last few years, each requiring oral antibiotics.
- Seasonal flares of AD especially in the winter.
- As a child/adolescent: behavioral problems at school, poor grades, difficulty concentrating.
- Currently: trouble keeping a job due to missed work and being distracted on the job.

Current Therapy

- Triamcinolone 0.1% ointment 2-3x daily to the areas
- Wet wrap therapy with the triamcinolone at night (most nights of the week)
- Diluted bleach baths 3x/week
- Hydroxyzine 25 mg by mouth at bedtime
- Cetirizine 10 mg by mouth every morning
- Various moisturizers
- No current antibiotics

Questions for Discussion

- Is this most likely AD?
- Are there other entities to consider or exclude?
- Are there other tests you would consider?
- What would you say is his AD severity?

Additional Workup

- Elevated IgE and high eosinophil count; laboratory results otherwise unremarkable
- Serum IgE testing positive for:
  - Ragweed
  - Bermuda grass
  - Dust mite
- Patch testing resulted in "angry back"

Case: Treatment Plan

- He is anxious about a treatment plan and has read about overusing TCSs
- He is also interested in getting to the "root" of the problem and not just using topicals since it is very difficult to apply them all over

Case: Treatment Plan

- UVB phototherapy is discussed, but he does not have easy access to a car and the closest center is more than 45 minutes away
- It is agreed that dupilumab would be the best option for him at this time and he is given the loading dose in clinic after explaining the risks and benefits of the drug

UVB = ultraviolet B.

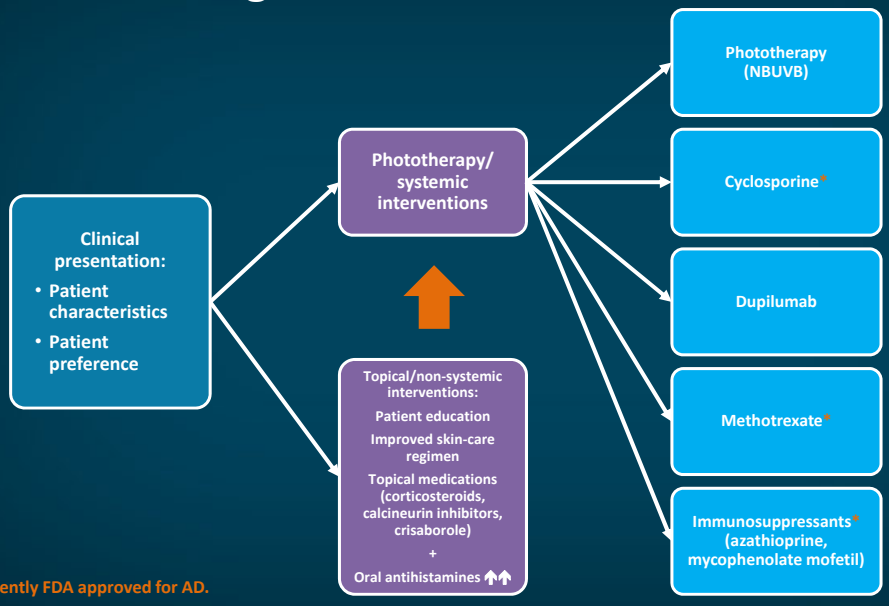
Case: 2 Months Later

- He returns and is doing very well
- He has been sleeping well, his itch is nearly gone, and his skin feels “brand new”
- He is very happy and is asking if he is now “cured” and can come off dupilumab

Questions

- What might be the next step for this patient?
- What could have been done differently?

Management and Treatment Decisions



*Not currently FDA approved for AD.

NBUVB = narrowband UVB.

Conclusions

- AD is a chronic disease with a significant impact on QoL
- A **pro**active approach is more effective than **re**active treatment
- Proactive treatment is stepwise and based on severity
- Management can be ***difficult*** and potentially complicated by conflicting messages from different care-team members (clinicians and family)
- **Adherence** is **key** to successful therapy
- Evolving biomarkers and targeted treatments promise to revolutionize treatment

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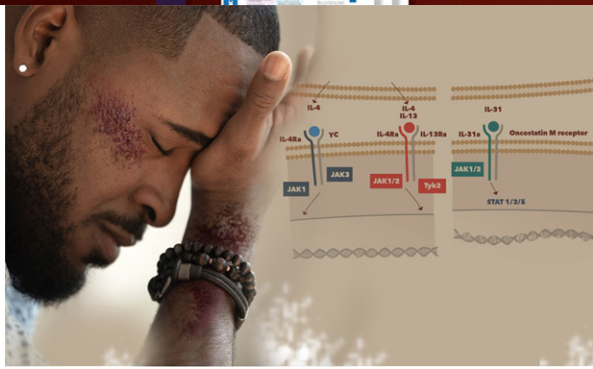
ALLEVIATE

BELOW THE SURFACE:

Managing the
Physical, Mental, and
Social Impact of
MODERATE-TO-SEVERE ATOPIC DERMATITIS



For more information and additional resources please visit

ad.posterprogram.com

BELOW THE SURFACE:

Managing the Physical, Mental, and Social Impact of MODERATE-TO-SEVERE ATOPIC DERMATITIS

ALLEVIATE

Please visit the **ALLEVIATE Atopic Dermatitis Initiative,** *which includes online CME offerings for clinicians and patients, toolkits, and a calendar of upcoming educational activities.*

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YOUTUBE: 360° VIRTUAL ANIMATIONS

Pathophysiology of Atopic Dermatitis: https://youtu.be/U5rBt5tHpRE

Emerging Agents in Atopic Dermatitis: https://youtu.be/RuRDYgNlfCc

Use your device's QR code scanner to view this 360° content in the **YOUTUBE APP!**