Atopic Dermatitis: A Common Childhood Skin Disease

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Introduction

- Atopic dermatitis (AD) is a chronic, inflammatory skin disease characterized by pruritus and a chronic course of exacerbations and remissions.
- It is one of the commonest and debilitating dermatoses in children.

Cont…

- Associated with other atopic conditions, including
  - Food allergies,
  - Asthma,
  - Allergic rhinoconjunctivitis,
  - Eosinophilic esophagitis, and
  - Eosinophilic gastroenteritis.

Epidemiology

- Prevalence: 10–20% of children worldwide.
- Commonly begins in infancy or early childhood.
- Girls are slightly more likely to develop AD.
- About 50% of cases of AD appear in the first year of life, the vast majority within the first 5 years of life, and the remaining cases of “adult” AD usually before age 30.

Cont...

- Seasonal variation: Symptoms worsen in winter due to dry air, low humidity, and cold exposure.
- Improvement often seen in humid or summer climates.
- Slightly more common in urban and developed regions.

Stages of AD

AD can be divided into **three stages**:

- Infantile AD, occurring from 2 months to 2 years of age;
- Childhood AD, from 2 to 10 years; and
- Adolescent/adult AD.

Widespread dermatitis in children under 2 months may be due to –

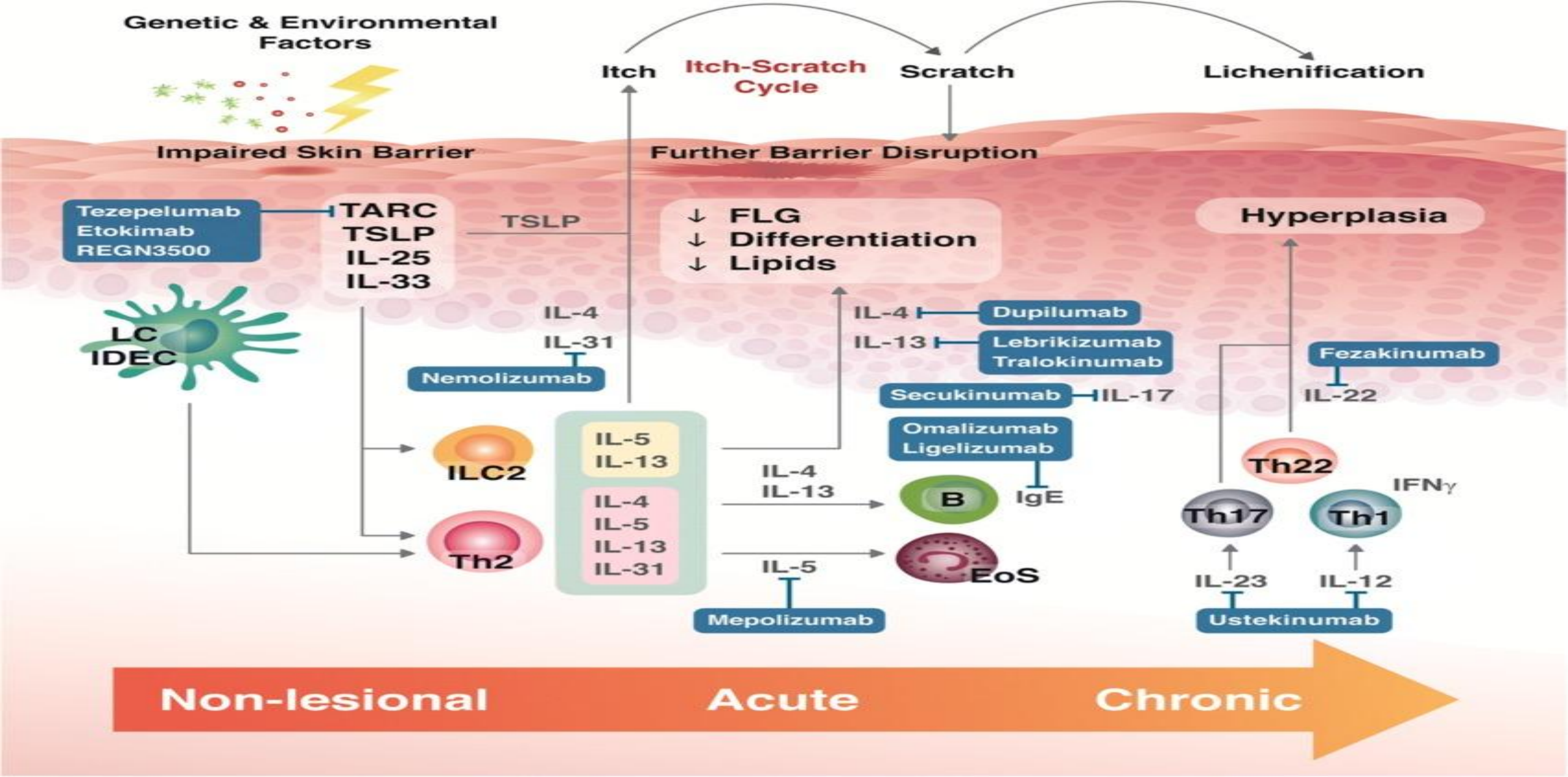
- Irritant contact dermatitis
- Allergic contact dermatitis
- Ichthyosis
- Seborrheic dermatitis or
- as a hallmark of severe immunodeficiency

Etiopathogenesis

- Multifactorial origin
- Genetic predisposition: mutation in filaggrin gene → impaired skin barrier.
- Immune dysregulation: predominance of Th2-type cytokines (IL-4, IL-13).
- Microbial factors: Staphylococcus aureus colonization.
- Environmental triggers: cold, dry weather, wool clothing, allergens, irritants.

Cont….

- Food Allergy: About 90% of food allergy is caused by a limited number of foods, including -
  - ✓Cow’s milk
  - ✓Egg
  - ✓Soybean
  - ✓Wheat
  - ✓Peanut
  - ✓Tree nuts
  - ✓Crustacean shellfish
  - ✓Sesame
  - ✓Kiwi fruit



Immunopathogenesis of Atopic Dermatitis

Immunopathogenesis of Atopic Dermatitis

1. **Initiation:** Skin barrier defect allows pathogen entry (e.g., S. aureus), activating innate immunity

2. Th2 Dominance: Adaptive immunity shifts to a Th2 response, driven mainly by IL-4 and IL-13 via the IL-4 receptor.

- **Key Cytokines:**
  - IL-4, IL-13, IL-31, IL-5

Cont...

3. TSLP (Thymic Stromal Lymphopoietin)

→ Amplifies Th2 inflammation.

4. JAK-STAT Pathway

→ enhances Th2 cytokine signaling and itching.

5. Chronic AD

- May shift toward Th1, Th17, and Th22 involvement.
- IL-17 and IL-22 levels increase.

Vicious Cycle of AD

- Barrier defect → Th2 inflammation → cytokine release → further barrier damage → chronic itch and inflammation

Why Winter Worsens AD?

- Low humidity → increased transepidermal water loss.
- Cold air → skin barrier dysfunction.
- Frequent hot baths → further dryness.
- Reduced sweating → decreased natural moisturization.
- Woolen clothing → irritation and scratching.

Criteria for Atopic Dermatitis (Hannifin and Rajka)

MAJOR CRITERIA

Must have **three** of the following:

1. Pruritus
2. Typical morphology and distribution
   - Flexural lichenification in adults
   - Facial and extensor involvement in infancy
3. Chronic or chronically relapsing dermatitis
4. Personal or family history of atopic disease (e.g., asthma, allergic rhinitis, atopic dermatitis)

Cont....

MINOR CRITERIA

Must also have three of the following:

1. Xerosis
2. Ichthyosis/hyperlinear palms/keratosis pilaris
3. IgE reactivity (immediate skin test reactivity, RAST test positive)
4. Elevated serum IgE
5. Early age of onset

Cont…

6. Tendency for cutaneous infections (especially *Staphylococcus aureus* and HSV)
7. Tendency to nonspecific hand/foot dermatitis
8. Nipple eczema
9. Cheilitis
10. Recurrent conjunctivitis
11. Dennie-Morgan infraorbital fold
12. Keratoconus

Cont…

13. Anterior subcapsular cataracts
14. Orbital darkening
15. Facial pallor/facial erythema
16. Pityriasis alba
17. Itch when sweating
18. Intolerance to wool and lipid solvents
19. Perifollicular accentuation
20. Food hypersensitivity

Cont....

21. Course influenced by environmental and/or emotional factors

22. White dermatographism or delayed blanch to cholinergic agents

Atopic Eczema

Ichthyosis

Nonspecific hand/foot dermatitis

Dennei-Morgan infraorboital fold

Atopic Cheilitis

Differential Diagnosis

- Seborrheic dermatitis
- Contact dermatitis
- Nummular eczema
- Photodermatitis
- Psoriasis
- Scabies
- Ichthyosis vulgaris

Complications

- Secondary bacterial infection (S. aureus, Streptococcus).
- Increased susceptibility to viral superinfection, especially from HSV, varicella-zoster virus (VZV), enteroviruses (Coxsackie), vaccinia, and molluscum.
- Eczema herpeticum (Herpes simplex infection)
- Exfoliative dermatitis
- Sleep disturbance due to itching.
- Growth retardation
- Psychological distress in older children

Secondary Bacterial infection

Eczema Herpeticum

Exfoliative Dermatitis

Why AD skin is more susceptible to infection?

- AD skin has lowered innate immunity, specifically decreased antimicrobial peptides such as
  - Cathelicidin LL-37
  - Human β-defensins 2 and 3.

Management of Atopic Dermatitis

PRACTICE AID

Tools to Assess the Severity of Atopic Dermatitis

PeerView INSTITUTE FOR MEDICAL EDUCATION

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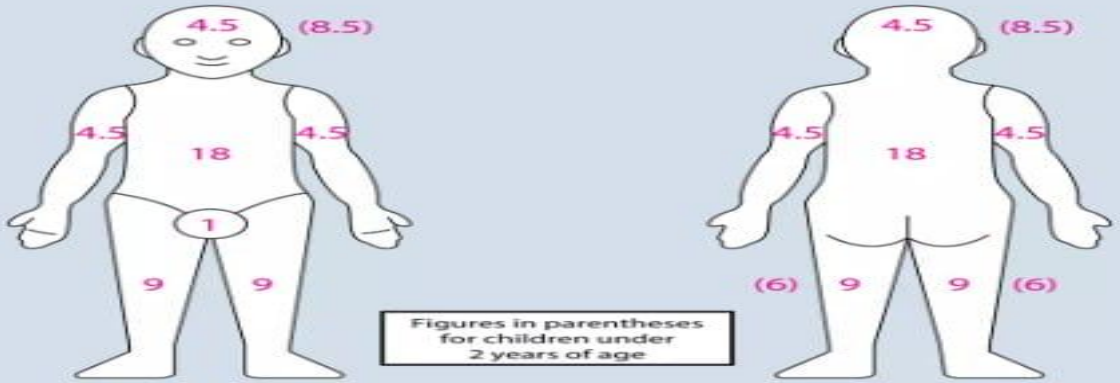
The Scoring of Atopic Dermatitis (SCORAD) Tool for Measuring Disease Severity (European Task Force on Atopic Dermatitis, 1993)[1]



A: Extent: Please indicate area involved.

B: Intensity

Criteria	Intensity	Means of Calculation
Erythema		Intensity Items (Average representative area) 0 – absence 1 – mild 2 – moderate 3 – severe
Edema/papulation		
Oozing/crust		
Excoriation		
Lichenification		
Dryness[a]		

[a] Dryness is evaluated on involved areas.

C: Subjective Symptoms: pruritus and sleep loss

Visual analog scale (average for the last 3 days or nights)

Pruritus (0–10) 0 — 10

Sleep loss (0–10) 0 — 10

SCORAD: A/5+7B/2+C

A: total area; possible maximum of 100%

B: intensity scores are added together; possible maximum of 18

C: subjective symptoms (itch/sleeplessness) scored by patient or relative using a VAS
- 0 is no itch (or no sleeplessness)
- 10 is the worst imaginable itch (or sleeplessness)
- Possible maximum of 20

SCORAD Intensity Scoring[2]

SCORAD Results

With a maximum possible SCORAD score of 103, patients with a score >50 are typically considered to have severe atopic dermatitis, while those with a score <25 are considered to have mild disease

- **Most cases of allergic dermatitis are mild with <10% considered severe**
- **Severe disease does seem to be more common in adult patients**

Access the activity, "A Closer Look at the Atopic Dermatitis Patient Journey: Effective Management Approaches Across the Age and Disease Spectrum," at **PeerView.com/XHY40.**

General Management

- Education and Support
- Barrier Repair with moisturizer
  - A cornerstone of treatment and prevention of AD
  - Patients should moisturize daily, especially immediately after bathing
  - Petrolatum and petrolatum-based moisturizers are most often recommended and are often the least expensive.
  - Moisturizers should ideally be free of fragrance, thiazolinones, and formaldehyde because these are three of the most common allergens in patients with AD

Types of Moisturizer

1. Humectants

- They are basically hygroscopic compounds which attract water into stratum corneum
- Examples :
  - Glycerin
  - Urea 5-10%
  - Hyaluronic acid
  - Lactic acid
  - Sorbitol
  - Honey

Cont…

2. Emollients

- They are mainly lipids and oils, which hydrate and fill gaps between corneocytes and improve the skin softness.
- Example:
  - Ceramides
  - Jojoba oil
  - Castor oil
  - Shea butter
  - Isopropyl myristate

Cont...

3. Occlusives

- They are substances that physically block TEWL in the stratum corneum
- They create a hydrophobic barrier over the skin
- Example:
  - Liquid paraffin
  - White soft paraffin
  - Petrolatum

Cont....

- Antimicrobial Therapy
- Environmental Factors
  - Stress, heat, sweating, humidity changes, and external irritants (such as wool and fragrances) may precipitate an attack of itching and flare in patients with AD.
  - Addressing these triggers may improve the AD.

Cont....

- Antipruritics
  - Antihistamines are frequently prescribed for the pruritus of AD
  - Mainly beneficial for their sedative properties and have little primary benefit on the AD.
  - Second generation antihistamines are preferable

Specific Treatment Modalities

Topical Therapy

- Topical Corticosteroid
- Topical Calcineurin Inhibitors
  - Tacrolimus 0.03–0.1%, Pimecrolimus
  - Especially for face, neck, flexures
- Topical Phosphodiesterase-4 Inhibitors
  - Crisaborole 2% is approved for mild to moderate AD in children older than 3 months of age
  - Difamilast approved for mild to moderate AD older than 2 years of age
- Topical JAK inhibitors
  - Ruxolitinib is approved for AD in people ages 12 and older

Physical Modalities

- Phototherapy
  - Narrow-band (NB) UVB

Systemic Therapy

1. Conventional therapy
   - Systemic steroids
     - If require, short courses (≤3 weeks) are preferred
   - Cyclosporine
     - The dose range is typically 2–5 mg/kg/day divided BID

Cont…

- Methotrexate
  - Doses are similar to what is used for psoriasis (0.3–0.6 mg/kg given once weekly [up to 25 mg] in children and 10–25 mg weekly in adults).
- Mycophenolate mofetil
- Azathioprine

Cont....

2. JAK inhibitors

- Upadacitinib
  - very rapidly reduces pruritis (likely due to inhibition of IL-31) and is approved in people aged 12 years and over (and over 40 kg) at 15 mg but can be up-titrated to 30 mg if inadequate response.
- Abrocitinib
  - 100 mg dosing is the standard starting dose for those 12 years and older (and over 25 kg) and can be escalated to 200 mg if inadequate response.

Cont…

3. Biologics

(First-line systemic therapies for those with moderate to severe AD who have failed to respond to conventional therapy)

- Dupilumab IL-4Rα inhibitor (blocks the function of IL-4 and IL-13)
  - Approved in the United States for patients 6 months of age and older for moderate to severe AD. It is an injection given every 2–4 weeks (depending on age and weight) after a loading dose (in patients 6 years and older).
- Tralokinumab IL-13 inhibitor
- Lebrikizumab IL-13 inhibitor

Cont…

4. Other systemic agents

- Apremilast
- Baricitinib
- Omalizumab
- Infliximab
- Ustekinumab

Management of Acute Flare

1. Precipitating cause of the flare should be sought such as -
   - Secondary infection with *S. aureus,* manifest with pustules and honey-colored erosions.
   - History of recent stressful event
   - Less frequently, HSV or coxsackievirus infection
   - History of Pityriasis rosea
   - The development of contact sensitivity to an applied medication or photosensitivity must be considered.

Cont....

2. Soaking and smearing (wet wrapping) is recommended as first-line treatment.

3. A short course of cyclosporine or systemic corticosteroids.

Prevention in High-Risk Children

- Prolonged exclusive breastfeeding beyond 3–4 months of age, House dust mites (HDMs) avoidance and Maternal allergen avoidance during pregnancy does not reduce the risk of AD in the offspring.
- But high levels of HDMs in the environment in early life reduce AD risk
- Multiple studies that show early moisturization, starting before 3 weeks of life, with thick emollient, may prevent AD in children at high risk of developing AD.

Cont….

- Probiotic administration during and after pregnancy has been shown to decrease AD incidence by 14% based on data from a meta-analysis.
- However, the type of probiotic to use, exactly when to start, and the safety during pregnancy are not fully elucidated

Prognosis

- Most children improve with age; some may develop asthma or allergic rhinitis (atopic march).
- Proper management reduces frequency and severity of flares.
- Education and adherence are key to long-term control.

Takeaways

- Atopic dermatitis is one of the most common dermatosis in children.
- Caused by skin barrier dysfunction and immune dysregulation.
- Winter aggravation due to dryness and environmental stress.
- Early diagnosis, consistent moisturization, and trigger avoidance are crucial.

Thank You