The Basics of Atopic Dermatitis

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Disclosures

- I have no financial disclosures.
- I will use several brand names of over-the-counter products throughout the presentation, I have no financial relationship with these brands.
Lecture Objectives

• The background of atopic dermatitis (AD)
  – Epidemiology
  – Pathogenesis

• The clinical presentation of atopic dermatitis in adults and children

• The differential diagnosis of atopic dermatitis

• The treatment algorithm of atopic dermatitis
Epidemiology

• Prevalence is 10-30% in children and 2-10% in adults
  – 2-3 fold increase over the last 3 decades
• Highest prevalence
  – High-income
  – Urban populations

Pathogenesis

[Diagram showing the relationship between genes, environment, skin barrier breakdown, inflammation, and various factors leading to different types of AD (Atopic Dermatitis) and related conditions like asthma and allergic rhinitis.]
Pathogenesis

• Genetics
  – Two major gene sets:
    • Genes encoding epidermal proteins
      – Filaggrin
    • Genes encoding proteins with immunologic functions not specific to skin
      – High-affinity IgE receptor
      – Toll-like receptor-2
Pathogenesis

• Epidermal barrier impairment
  – Filaggrin
    • Filaggrin mutations lead to disruption of epidermal homeostasis
    • Filaggrin expression down regulated
      – Th2 cytokines
      – pH
      – Bacterial infections
  – Intrinsic inflammation
    • Underlying immunologic dysfunction
    • Scratching
Pathogenesis

- Environmental factors
  - Allergens
  - Bacterial colonization/infections
  - Irritants
    - Soaps, detergents
Environmental Factors

• Allergens
  – Role in atopic dermatitis is debated
  – Likely not causative but allergic sensitization occurs
• Barrier impairment → Penetration of allergens → Immune response → IgE mediated allergies
Environmental Factors

• Microbial Colonization
  – S. aureus colonization in >90% of AD patients
    • Down-regulation of antimicrobial peptides
    • Increased bacterial adherence
  – Stimulates inflammation
  – Leads to IgE-mediated sensitization
  – Secondary infections
Environmental Factors

• Irritants
  – Soap/detergents
    • Increase the skin pH
      – Down-regulates filaggrin
        » Worsening epidermal impairment
        » Increase in transepidermal water loss
        » Over drying of the skin
          • Itch → scratching → Increased inflammation
Pathogenesis

http://www.epiceram.ca/physician/new_paradigm.php
Clinical Presentation

• “Itch that rashes”
• Hallmark of AD is intense pruritus
  – Worse in evening
• Scratching and rubbing lead to:
  – Worsening of the rash
  – Excoriations
  – Thickening of plaques
  – Secondary infections
Clinical Presentation

- Classic Triad
  - Allergies
  - Atopic Dermatitis
  - Asthma
Clinical Presentation

• Varies with age of patient
  – Infantile
    • <2 years of age
  – Childhood
    • 2-12 years of age
  – Adolescent/Adulthood
    • >12 years of age
  – Senile
    • >60 years of age

http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)00149-X/fulltext
Clinical Presentation

• Infantile
  – Usually within the second month of life
  – Edematous papules and vesicles located on:
    • Cheeks
    • Scalp
    • Neck
    • Extensor surfaces of extremities
    • Trunk
  – Spares diaper area

http://www.childrenshospital.org/centers-and-services/atopic-dermatitis-center-program
Clinical Presentation

• Infantile
Clinical Presentation

• **Childhood**
  – Thickened pink plaques with accentuation of skin lines (lichenification) without exudate located on:
    • Antecubital fossae
    • Popliteal fossae
    • Head
    • Neck
    • Wrists
    • Ankles
  – Diffuse xerosis is pronounced in childhood AD
Clinical Presentation

• Childhood

http://www.medicalook.com/Skin_diseases/Atopic_dermatitis.html

Clinical Presentation

- Childhood


Clinical Presentation

- Adult/Adolescent
  - Similar to childhood AD with lichenified plaques affecting flexural sites.
  - Adults may present with “site specific” involvement:
    - Eyelid dermatitis
    - Hand dermatitis
    - Dyshidrotic eczema
    - Nummular eczema
    - Nipple eczema
Clinical Presentation

- Adulthood/Adolescent

http://www.advancedskinwisdom.com/eczemadermatitis.htm
http://www.dermis.net/bilder/CD003/550px/img0060.jpg
Clinical Presentation

- Adulthood/Adolescent

https://medicalpoint.org/eczema-on-eyelid/

Courtesy of Professor Dr Thomas Diepgen and [Medical Point](https://medicalpoint.org/eczema-on-eyelid/).
Clinical Presentation

- Adulthood/Adolescent
Clinical Presentation

• Senile
  – Characterized by diffuse xerosis
  – Typically do not have “classic” AD lesions
  – Pruritus is hallmark feature

https://www.dermquest.com/image-library/image/5044bfd0c97267166cd65229
## Diagnostic Criteria

**Major Criteria for Atopic Dermatitis**  
(*must have 3 of 4*)

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<tbody>
<tr>
<td><strong>1.</strong> Pruritus</td>
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</table>
| **2.** Typical morphology and distribution  
  - Flexural lichenification in adults  
  - Facial/extensor involvement in infants |   |
| **3.** Chronic or chronically relapsing dermatitis |   |
| **4.** Personal or family history of atopy (asthma, allergic rhinitis, atopic dermatitis) |   |
Associated Features

- Xerosis
- Ichthyosis vulgaris
- Keratosis pilaris
- Palmar and plantar hyperlinearity
- Dennie-Morgan lines
- Periorbital darkening
- Follicular prominence
- White dermographism
Complications

• Infections
  – Impetiginization
    • *S. aureus* colonization
  – Molluscum contagiosum
    • AD predisposes to widespread
Complications

- Eczema herpeticum
  - Dissemination of HSV infection in eczematous skin
  - Associated with fever, malaise and lymphadenopathy
  - Bacterial superinfections

http://www.pcds.org.uk/clinical-guidance/eczema-eczema-herpeticum
Complication

- Ocular complications
  - Acute conjunctivitis
    - Allergic
  - Atopic keratoconjunctivitis
    - Ocular itching, burning, discharge with blepharitis
  - Vernal keratoconjunctivitis
    - Cobblestone-like papillae on upper palpebral conjunctiva
  - Subcapsular cataracts
  - Keratoconus

http://medchrome.com/minor/ophthalmology/vernal-keratoconjunctivitis-vkc-or-spring-catarrah/
Histopathology

- Nonspecific spongiotic dermatitis
  - Acute
    - Marked spongiosis
    - Vesicles
    - Perivascular lymphocytes
  - Chronic
    - Irregular or regular acanthosis
    - Less inflammation and spongiosis

Fig. 12.18 Histologic features of acute and subacute atopic dermatitis.
A. Acute lesion showing spongiosis, intraepidermal vesicles and exocytosis of lymphocytes. B. Subacute lesion with parakeratosis and less spongiosis.
## Differential Diagnosis

### Chronic Dermatoses

<table>
<thead>
<tr>
<th>Rank</th>
<th>Condition</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>C&gt;A</td>
<td>Seborrheic dermatitis</td>
<td>Common</td>
</tr>
<tr>
<td>B</td>
<td>Contact dermatitis (allergic* or irritant)</td>
<td>Common</td>
</tr>
<tr>
<td>B</td>
<td>Psoriasis (especially palmoplantar)</td>
<td>Common</td>
</tr>
</tbody>
</table>

### Infections and Infestations

<table>
<thead>
<tr>
<th>Rank</th>
<th>Condition</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>Scabies</td>
<td>Common</td>
</tr>
<tr>
<td>B</td>
<td>Dermatophytosis*</td>
<td>Common</td>
</tr>
</tbody>
</table>

### Malignancies

<table>
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<tr>
<th>Rank</th>
<th>Condition</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>A&gt;C</td>
<td>Mycosis fungoides and Sézary syndrome</td>
<td>Uncommon</td>
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Treatment

• Management components:
  – Avoidance of irritants, allergens, trigger factors and microbial agents
  – Repair epidermal barrier
    • Emollients
  – Anti-inflammatory therapy
  – Adjunctive therapies
Avoidance of Triggers

– Patch test: Avoid exposure to allergens
– Avoid harsh soaps
  • Recommend Dove unscented, Cetaphil, CeraVe wash
– Wool and other rough clothing
– Cigarette smoke
– Emotional stress
Repair Epidermal Barrier

- **Ointments:**
  - Petroleum jelly
    - Vaseline and Aquaphor
      - Burn less when applied to dry skin
  - Ceramide-Containing creams
    - CeraVe
Repair Epidermal Barrier

- Soak and Smear Technique:
  - 10-20 minute lukewarm baths → pat dry → immediate application of corticosteroid cream or emollient

- Bleach soaks (pool baths):
  - 1-2 times per week
  - Decrease *S. aureus* colonization
  - ½ cup unscented bleach to full bath tub
Treatment

• Topical corticosteroids
  – Mainstay of treatment
    • 1st line in acute flares
  – Consider strength and vehicle of corticosteroid
    • Low potency for face
    • Mid to high potency for body
Treatment

• Topical calcineurin inhibitors
  – Tacrolimus and pimecrolimus
    • Used in children older than 2 years old
    • Useful for face and intertriginous areas
  – Used in conjunction with topical corticosteroids for maintenance therapy
• Crisaborole
  – Phosphodiesterase-4 inhibitor
  – Children older than 2 years old and adults with moderate to severe AD
Treatment

• Phototherapy
  – UVA and narrowband UVB is used for AD
    • 2-3 visits per week for UV therapy in light booth
    • Risk of burn, premature aging and skin cancer

[Link to WebMD article on eczema treatments](http://www.webmd.com/skin-problems-and-treatments/eczema/treatment-16/slideshow-eczema)
Treatment

• Systemic anti-inflammatory therapy
  – Severe refractory cases of AD
    • Cyclosporine
    • Azathioprine
    • Mycophenolate mofetil
    • Methotrexate
Treatment

• Adjunctive therapy
  – Antihistamines: diphenhydramine, doxepin, hydroxyzine
  • Break the “itch-scratch cycle”

https://nationaleczema.org/eczema/
Treatment

• Biologic therapy
  – Dupilumab
    • Injectable monoclonal antibody to IL-4 receptor with signaling modulation of IL-13
    • AD in adults

Latest News

Dupilumab: FDA approves first biologic for atopic dermatitis

Publish date: March 28, 2017
Summary

- The etiology of AD is complex and multifactorial
- The clinical presentation changes based on the age of onset
- Avoidance of allergens and irritants is important in management
- Topical corticosteroids are first line therapy for flares
  - Choose corticosteroids appropriately based on location treating
- For refractory cases consider systemic therapies
References

• Williams HC, Burney PG, Pembroke AC, Hay RJ. The U.K working party’s diagnostic criteria for atopic dermatitis. III. Derivation of a minimum set of discriminators for atopic dermaitis. Dr J Dermatol 1994;131:406-16