Pediatrics TeamWork

437

Common Pediatric Allergies

Done by:

Ahad Algrain Marwah Alkhalil

Revised by:

Aseel Badukhon

Team Leader:

Aseel Badukhon

431 Teamwork was used in this lecture , pay attention to color code (:

Notes Previous Notes Book Important!

Overview of Allergy

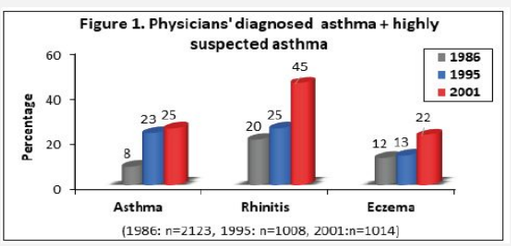
Epidemiology

- In 2013 Allergic disease is the 5th leading chronic disease among all ages
- 3rd common chronic disease among children under 18 years old; up to one child in three is affected
- Trends indicate that by 2015, half of all Europeans may be suffering from an allergy
- **Globally** Asthma and allergies strike 1 out of 4 Americans and 20-30 percent of total Indian population suffer from one or other allergic condition. Prevalence of atopy and asthma among primary school children in Australia Is 31.0 % Asthma , 38.4 % Hay Fever and 24.8% Eczema.
- **Locally** Asthma Prevalence among Saudi Children <5 years of age was 24%

Box 16.1 Allergy definitions

- *Hypersensitivity* – objectively reproducible symptoms or signs following exposure to a defined stimulus (e.g. food, drug, pollen) at a dose that is usually tolerated by most people
- *Allergy* – a hypersensitivity reaction initiated by specific immunological mechanisms. This can be IgE-mediated (e.g. peanut allergy) or non-IgE-mediated (e.g. coeliac disease)
- *Atopy* – a personal and/or familial tendency to produce IgE antibodies in response to ordinary exposures to potential allergens, usually proteins. Strongly associated with asthma, allergic rhinitis and conjunctivitis, eczema and food allergy
- *Anaphylaxis* – a serious allergic reaction with bronchial, laryngeal, or cardiovascular involvement that is rapid in onset and may cause death
- *Immune tolerance* – the absence of an active immune response against a particular antigen, e.g. the absence of an allergic immune response to peanut or house dust mite
- *Sensitization* – a positive test to an allergen, either by skin prick test, or specific IgE. Does not equate to allergy unless a clinical reaction is initiated on exposure. However, the higher the number of positive tests, the more likely the person is going to be "allergic"

From the book!

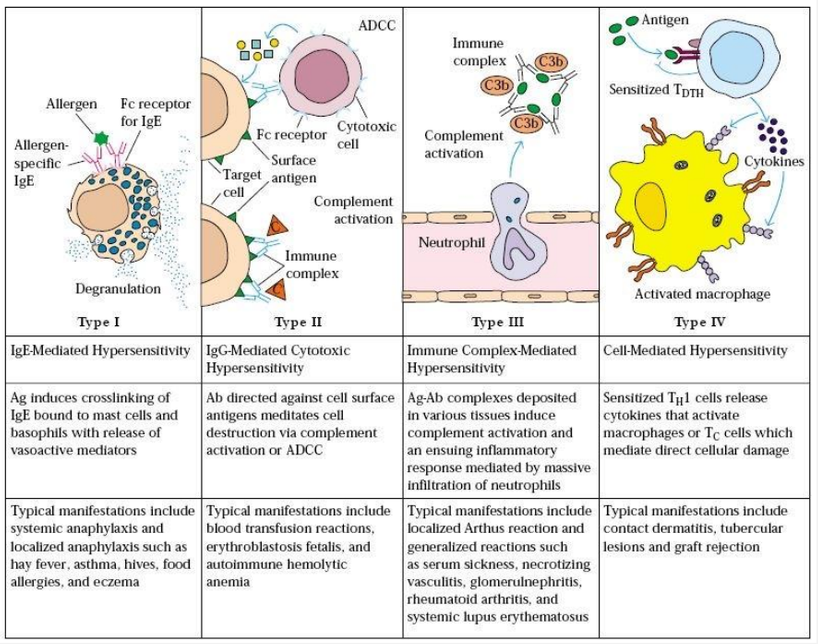


Hypersensitivity

Types of Hypersensitivity				
	Type I immediate hypersensitivity or anaphylactic	**Type II** antibody-mediated hypersensitivity	**Type III** immune complex-related hypersensitivity	**Type IV** cell mediated
Reactions	IgE mediated	Non-IgE (IgG or IgM) mediated	Immune complex mediated	Cell mediated
Mechanism	Degranulation of mast cells and. release of histamine and other mediators	Interaction of antibody with cell surface antigens leading to, complement activation and lysis or phagocytosis	Formation of immune complex and deposition on various sites such as blood vessels	Secreted cytokines from CD4+ and CD8+ cells activate macrophages leading to inflammation and tissue injury
		Autoimmune reactions		Direct killing of affected cells by CD8+ T cells
		Antibody-mediated cytotoxicity		
Onset of Action	Minutes to hours	Days	10–21 days	2-4 or more days
Examples	Urticaria, allergic rhinitis, food allergy	Hemolytic anemia, Hashimoto's thyroiditis, transfusion reaction	Serum sickness; systemic lupus erythematosus (SLE)	Mantoux reaction, allergic contact dermatitis

When we talk about hypersensitivity, we talk about possible manifestations of allergy which is usually discussed in lab environment. But when we talk about allergy we're talking about clinical manifestations. So, they are interchangeable, but allergy is used more by physicians and immunologists use hypersensitivity.

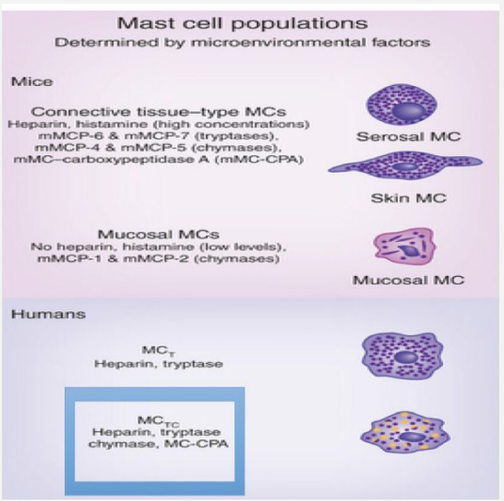
- Type 1 and 4 are most commen in allergic reaction
- Type 2 rarely see it in allergic reaction



Type I	Type II	Type III	Type IV
IgE-Mediated Hypersensitivity	IgG-Mediated Cytotoxic Hypersensitivity	Immune Complex-Mediated Hypersensitivity	Cell-Mediated Hypersensitivity
Ag induces crosslinking of IgE bound to mast cells and basophils with release of vasoactive mediators	Ab directed against cell surface antigens meditates cell destruction via complement activation or ADCC	Ag-Ab complexes deposited in various tissues induce complement activation and an ensuing inflammatory response mediated by massive infiltration of neutrophils	Sensitized T_H1 cells release cytokines that activate macrophages or T_C cells which mediate direct cellular damage
Typical manifestations include systemic anaphylaxis and localized anaphylaxis such as hay fever, asthma, hives, food allergies, and eczema	Typical manifestations include blood transfusion reactions, erythroblastosis fetalis, and autoimmune hemolytic anemia	Typical manifestations include localized Arthus reaction and generalized reactions such as serum sickness, necrotizing vasculitis, glomerulnephritis, rheumatoid arthritis, and systemic lupus erythematosus	Typical manifestations include contact dermatitis, tubercular lesions and graft rejection

You can never exclude any organ system from an allergic reaction. Allergy can occur anywhere:

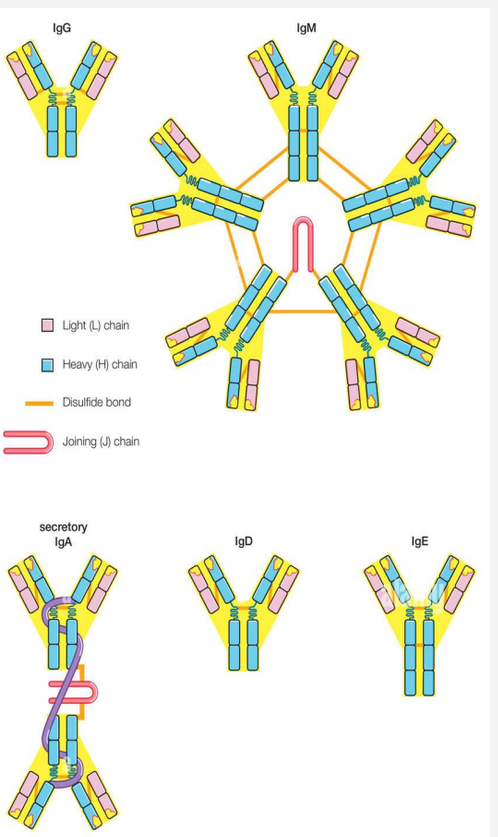
- Conjunctiva
- Angioedema and rhinitis
- Upper airway causing obstruction and stridor
- Cardiovascular system causing shock and hypotension
- Lower airways causing asthma and wheezing and obstruction
- GI causing abdominal pain diarrhea and vomiting
- Skin causing urticarial
- Lower GI intestinal edema and diarrhea



Mast cells are the main players in every reaction. There are different distributions of mast cells by phenotypes human whether tryptase and chymase containing cells or not. Those mast cells containing tryptase and chymase are in the skin 25% and intestine 80% and in alveolar wall 5%.
In order to understand why the reaction is different though IgE is the same depends on the type of mast cells for they are the core of every reaction.
Mast cells have different phenotypes; some contain tryptase and chymase and some don't so we get different phenotypes and different reactions

- **Classes of Antibodies**

IgA	Antibodies are dimmers – contain two Y shaped structures. Found in mucosal areas, such as the gut, respiratory tract and urogenital tract. Also found in saliva, tears, and breast milk. They attack microbes and prevents colonization by pathogens before they reach the blood stream so it is most important antibody in local immunity It is very important in allergic reaction and it works as the dimmer of allergic action
IgD	Functions mainly as an antigen receptor on B cells that have not been exposed to antigens. It has been shown to activate basophils and mast cells to produce antimicrobial factors.
IgG	In its four forms, provides the majority of antibody-based immunity against invading pathogens. It makes up about 75 % of all human antibodies and is the body's major defense against bacteria. The only antibody capable of crossing the placenta to give passive immunity to fetus. It is the most versatile of antibodies because it carries out functions of the other antibodies as well. Usually does not play a role in allergic reaction
IgE	Binds to allergens and triggers histamine release from mast cells and basophils, and is involved in allergy. Also protects against parasitic worms.
IgM	Expressed on the surface of B cells and in a secreted form with very high avidity. Eliminates pathogens in the early stages of B cell mediated (humoral) immunity before there is sufficient IgG.



Hypersensitivity type I

- Allergens are antigens that can stimulate a type I hypersensitivity response.
- Allergens bind to IgE and trigger degranulation of chemical mediators.
- **Mechanisms of allergic response (Sensitization) :**

- Th2/B cell interaction : IL-4 > IL-4R > CD40 >Drive B cell > Activation and IgE isotype switch.
- FcE receptors (FcER) : high affinity IgE receptor found on (mast cells/basophils/activated eosinophils.) , Allergen binding to IgE attached to FcER1 triggers release of granules from cell.

- **Mediators of Type I Hypersensitivity**
  - Immediate effects :

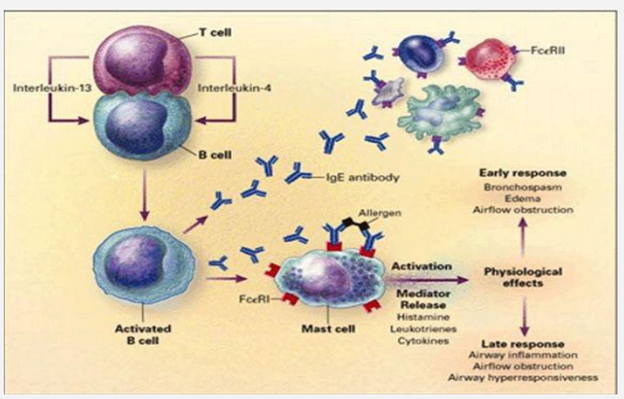
Histamine :
Constriction of smooth muscles> Bronchoconstriction = wheezing.>
Constriction of intestine = cramps-diarrhea.
Vasodilation with increased fluid into tissues> causing increased swelling or fluid in mucosa.
Activates enzymes for tissue breakdown.
Leukotrienes.
Prostaglandins.

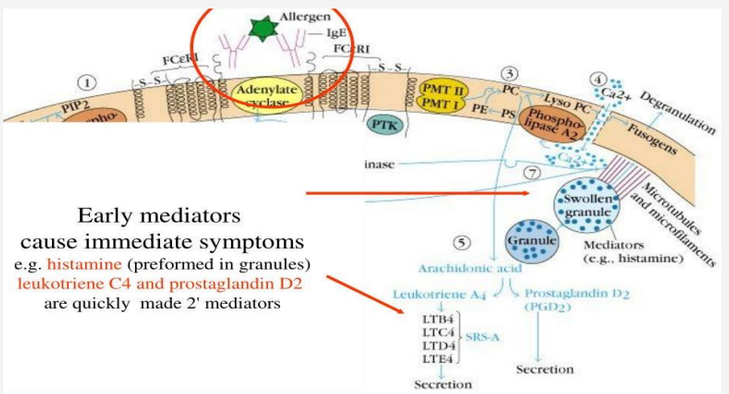
  - Primary Mediators (Pre-formed mediators in granules):

Histamine
Cytokines TNF-a, IL-1, IL-6.
Chemoattractants for Neutrophils and Eosinophils.
Enzymes: tryptase, chymase, cathepsin. Changes in connective tissue matrix, tissue breakdown.

TABLE 15-1 Common allergens associated with type I hypersensitivity

Proteins	**Foods**
Foreign serum	Nuts
Vaccines	Seafood
	Eggs
Plant pollens	Peas, beans
Rye grass	Milk
Ragweed	
Timothy grass	**Insect products**
Birch trees	Bee venom
	Wasp venom
Drugs	Ant venom
Penicillin	Cockroach calyx
Sulfonamides	Dust mites
Local anesthetics	
Salicylates	**Mold spores**
	Animal hair and dander
	Latex





- The mediators causing these symptoms is mainly histamine, platelet activating factors, leukotrienes and prostaglandins which are lipid mediators that are generated.So when looking at reactions, we need to differentiate between immediate reactions where platelet activating factors and histamine are released causing symptoms AND lipid (STORED) mediators which are leukotrienes and prostaglandins causing a late reaction. Those stored mediators are generated intracellularly and slowly released and are very important for they produce an ongoing inflammation in the GI system, skin etc..
- Calcium is an important second messenger in the phospholipase A2 and C signal transduction pathway. Following degranulation, Phospholipase C will be immediately released, phospholipase A2 will be released later on.
- There are different type of Fce receptors one of them is Fce1 which is responsible of IgE
- Singulair is a leukotriene receptor antagonist drug used to stop the cascade reaction of the allergy

- **Anaphylaxis**
  - Localized: (Target organ responds to direct contact with allergen.)
    a. Digestive tract contact results in vomiting, cramping, diarrhea.
    b. Skin sensitivity usually reddened inflamed area resulting in itching.
    c. Airway sensitivity results in sneezing and rhinitis OR wheezing and asthma.
  - Systemic : (Similar to systemic inflammation.): Systemic vasodilation and smooth muscle contraction leading to severe bronchoconstriction, edema, and shock.

Hypersensitivity type IV (Delayed Type Hypersensitivity)

type 4 hypersensitivity reaction(cell mediated reaction) is more common in 3 type :
- GI in food allergy or non IgE mediated allergy
- contact allergy
- الثالث ما قاله الدكتور :)

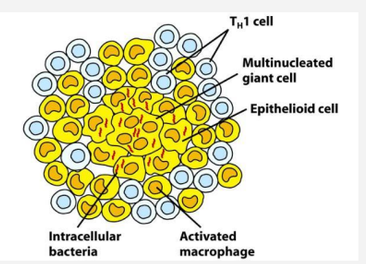
Delayed type hypersensitivity :
is a type of immune response classified by Th1 and macrophage activation that results in tissue damage. DTH can be the result of Chronic infection or Exposure to some antigens.

DTH response is from:
- Th1 cells release cytokines to activate macrophages causing inflammation and tissue damage. Continued macrophage activation can cause chronic inflammation resulting in tissue lesions, scarring, and granuloma formation.
- Delayed is relative because DTH response arise 24-72 hours after exposure rather than within minutes because it is cell mediated reaction NOT IgE mediated reaction! skin prick test is a IgE mediated reaction we can read it in 20 min.

Stages of Type IV DTH :

1-Sensitization stage
- Memory Th1 cells against DTH antigens are generated by dendritic cells during the sensitization stage.
- These Th1 cells can activate macrophages and trigger inflammatory response.

2-Effector stage



- Secondary contact yields what we call DTH.
- Th1 memory cells are activated and produce cytokines.
  - IFN-, TNF-a, and TNF-b which cause tissue destruction, inflammation.
  - IL-2 that activates T cells and CTLs.
  - Chemokines- for macrophage recruitment.
  - IL-3, GM-CSF for increased monocyte/macrophage
- Inflamed area becomes red and fluid filled can form lesion.
  - From tissue damage there is activation of clotting cascades and tissue repair.
- Continued exposure to antigen can cause chronic inflammation and result in granuloma formation.

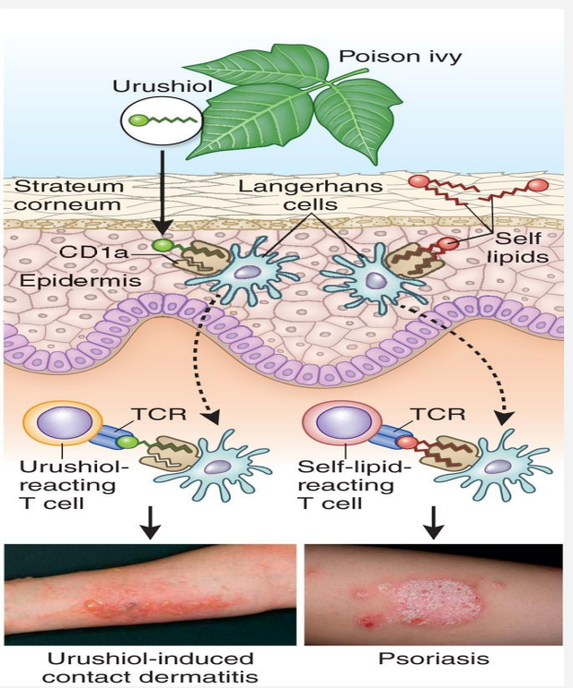
Contact dermatitis :
The response to poison oak is a classic Type IV.
- Small molecules act as haptens and complex with skin proteins to be taken up by APCs and presented to Th1 cells to get sensitization.
- During secondary exposure Th1 memory cells become activated to cause DTH.

TABLE 15-6 Intracellular pathogens and contact antigens that induce delayed-type (type IV) hypersensitivity

Intracellular bacteria	Intracellular viruses
Mycobacterium tuberculosis	Herpes simplex virus
Mycobacterium leprae	Variola (smallpox)
Listeria monocytogenes	Measles virus
Brucella abortus	
Intracellular fungi	Contact antigens
Pneumocystis carinii	Picrylchloride
Candida albicans	Hair dyes
Histoplasma capsulatum	Nickel salts
Cryptococcus neoformans	Poison ivy
Intracellular parasites	Poison oak
Leishmania sp.	

TABLE 16-5 Penicillin-induced hypersensitive reactions

Type of reaction	Antibody or lymphocytes induced	Clinical manifestations
I	IgE	Urticaria, systemic anaphylaxis
II	IgM, IgG	Hemolytic anemia
III	IgG	Serum sickness, glomerulonephritis
IV	T_{DTH} cells	Contact dermatitis

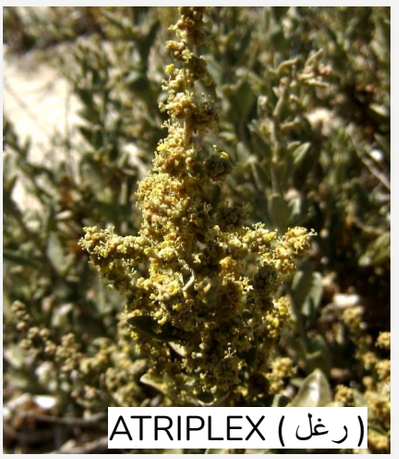


- Drugs allergy is one of the common scenarios that you are going to face
- in this case you can see that penicillin can be IgG, IgM, IgE or cell mediated reaction
- We conclude that drug reaction is mediated by all mediators of allergic manifestations/reaction

Overview of Allergy


Bermuda


Rye

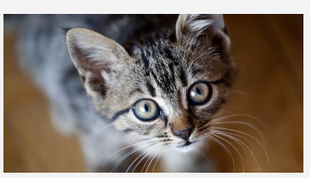

ATRIPLEX (رغل)

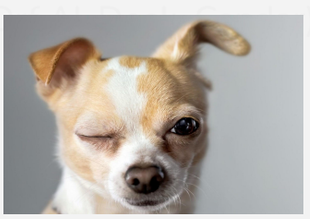

Amaranthus SP

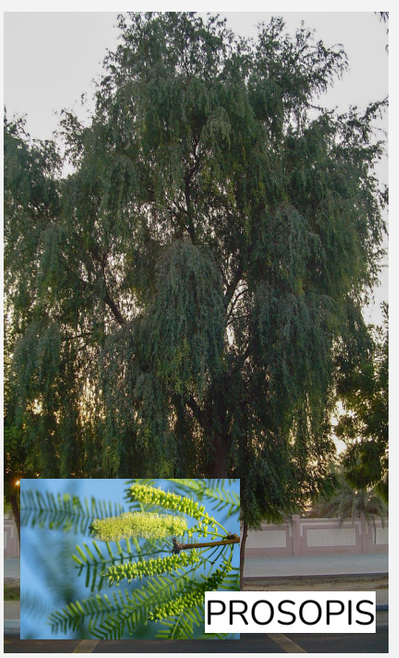

Amaranthus Viridis


Salsola SPP. (Herm)


Chenopodium Album






PROSOPIS

المصدر الناقل لها هي حاويات البضائع

COCKROACH

- Its need humidity and temperature below 25 to live
- You can find it in the A\C.

DUSTMITE

Common respiratory allergens (allergic rhinitis) include:

1. Indoor allergens like dust mites,pets, cockroaches
2. Outdoor allergens like Bermuda grass and pollens.

Most common allergy in our community is respiratory allergy

Overview of Allergy

The Allergic March

Allergic children develop individual allergic disorders at different ages:

- Eczema and food allergy usually develop in infancy
- Allergic rhinitis, conjunctivitis (or together as rhinoconjunctivitis) and asthma often occur in preschool and primary school years

➔ Rhinitis and conjunctivitis often precede the development of asthma
➔ In children with asthma, up to 80% have coexistent rhinitis
➔ The presence of eczema and food allergy in infancy is predictive of asthma and allergic rhinitis in later life.
➔ Those who have both food allergy and asthma must have their asthma well controlled as poorly controlled asthma in those patients is an indicative of severe food allergic reactions that can be fatal

Allergic Rhinitis

Health effects of AR

- Social inconvenience
- Sleep disturbances/obstruction
- Learning difficulties
- Impaired maxillary growth
- Dental problems
- Infection: nose and sinuses
- Comorbidities: conjunctivitis, asthma, rhinosinusitis, otitis media

Clinical presentation

-Classically, coryza and conjunctivitis. -Wheezing, mouth breathing and snoring	Cough variant rhinitis due to a post nasal drip	Chronically blocked nose causing sleep disturbance with impaired daytime behavior and concentration

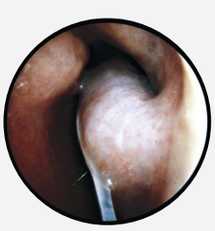
[Allergic rhinitis is associated with eczema, sinusitis and adenoidal hypertrophy and is closely associated with asthma]

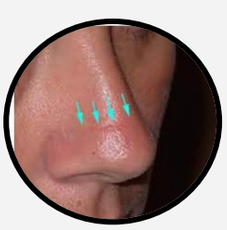
Allergic Rhinitis

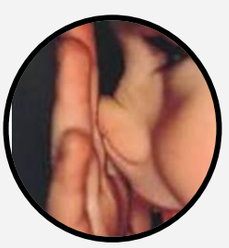
Diagnosis of AR

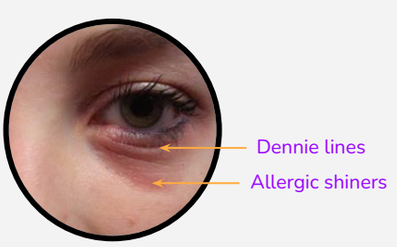
- History & symptoms of recurrent or persistent rhinitis and/or associated health effects. The history is the **most important** element in the evaluation of allergy.Key features of the history are:
    - Worsening of symptoms on exposure to aeroallergens
    - Seasonal variation in symptoms related to pollination of trees, grasses, and weeds
    - An environmental history assessing exposure to indoor and outdoor allergens and the presence of associated allergic conditions
    - A family history of atopic disease : Because allergic rhinitis has a significant genetic component, a positive family history for atopy makes the diagnosis more likely. A greater risk of allergic rhinitis exists if both parents are atopic than if one parent is atopic. However, the cause of allergic rhinitis appears to be multifactorial, and a person with no family history of allergic rhinitis can develop allergic rhinitis.
- Signs of atopy and recurrent or persistent rhinitis
    - Rhinorrhoea
    - Nasal blockage Enlarged nasal turbinate is the most common sign seen in examination.
    - Postnasal drip
    - Itchiness
    - Sneezing
    - Associated health effects
- Demonstration of **IgE** allergy
- Exclusion of other causes of rhinitis
- Physical examination:

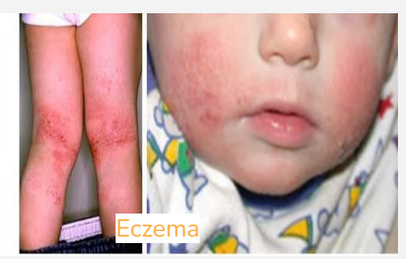
Examine the nose (pale, edematous nasal mucosa) and anterior turbinate looks shinny, hypertrophied, blocking the nose and causing sleep disturbance, mouth breathing, recurrent pharyngotonsillitis and otitis media in children.	Transverse nasal crease due to frequent rubbing of the nose, indicating a chronic allergic rhinitis	Allergic salute	Positive allergic shiners (dark circles under the eye), caused by pooling of blood under the eyes as a result of nasal and paranasal sinus congestion. (allergic rhinitis and sinusitis)	Dennie lines (Morgan folds)











Allergic Rhinitis

Differential diagnoses of AR

1. Inflammatory rhinitis
2. Vasomotor rhinitis (physical stimuli)
3. Nasal polyps (think of cystic fibrosis)
4. Septal deviation

Work up of AR

- BLOOD EOSINOPHILS 250-400 cell/mm3
- NASAL EOSINOPHILS>15/100 cells
- NASAL PROVOCATION TEST
- RHINOMETRY
- IgE
- RAST
- SKIN PRICK TEST (SPT) cheap and fast : The most important ancillary test to confirm the diagnosis of allergy is the skin test, which is the gold standard in this regard. The skin test results must be interpreted in light of the history to determine the importance of a positive test.
    - Positive result when wheal >3mm More than control
    - 80% OF +VE skin test give +VE RAST and 50% give +VE challenge
    - Panel of test antigens appropriate to the locality and season and history should be used

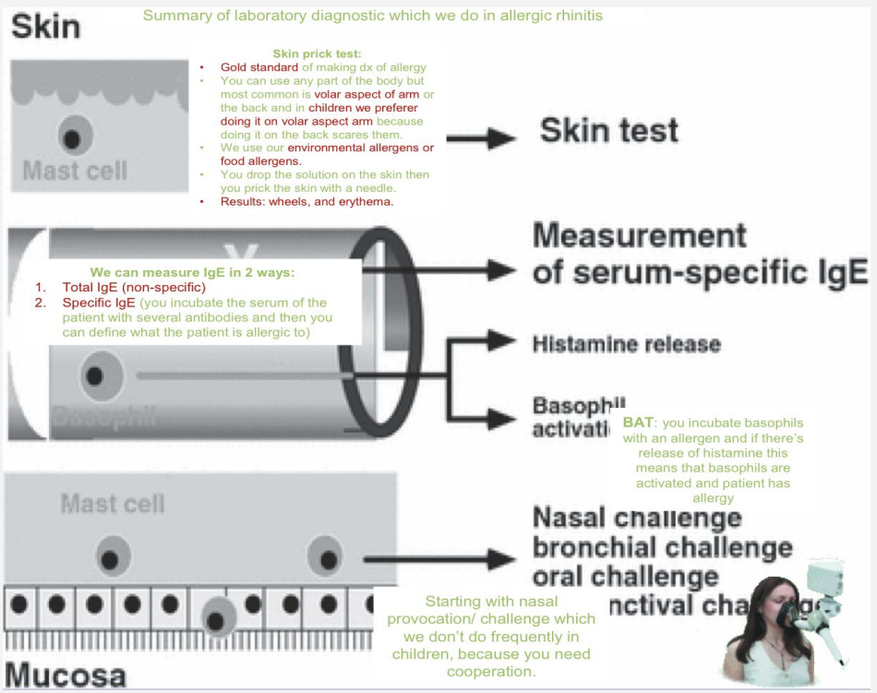
Recording and Scoring Skin-Test Results :
Skin-test reactions to allergens are normally evaluated 15-20 min after the tests have been placed, when the reactions are typically maximal. The best method to record the results of skin tests is to measure the greatest diameter of the wheal and flare in millimeters and record these results for all tests and for the positive and negative controls. After measurement, the result of a test can be easily recorded as, for example, 5/21, meaning that the wheal was 5 mm in greatest diameter and the flare was 21 mm in diameter. Any epicutaneous test that produces a wheal at least 3 mm larger than the wheal of the negative control with a larger surrounding flare is normally considered positive for the presence of allergen-specific IgE.

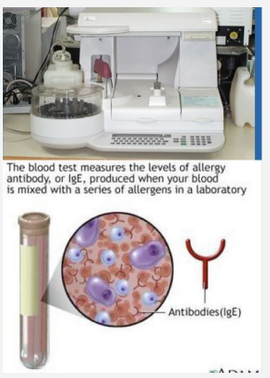
Causes of Eosinophilia (NAACP)
- Neoplasm
- Allergies
- Addison disease
- Connective tissue disease
- Parasites

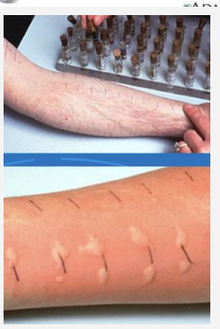
Treatment

1) Avoid allergens
2) Drugs
- Antihistamines (first line)
- Intranasal steroids
- Mast cell stabilizer (Cromolyn)
- Decongestant

Allergic Rhinitis

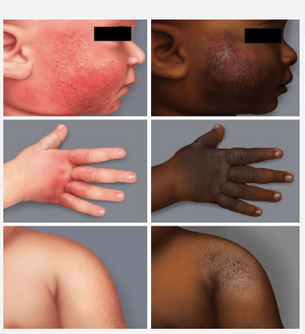


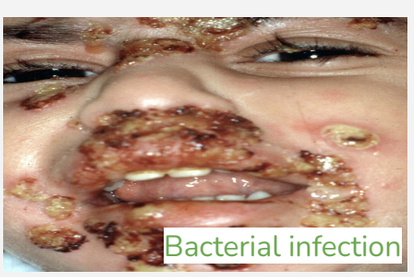


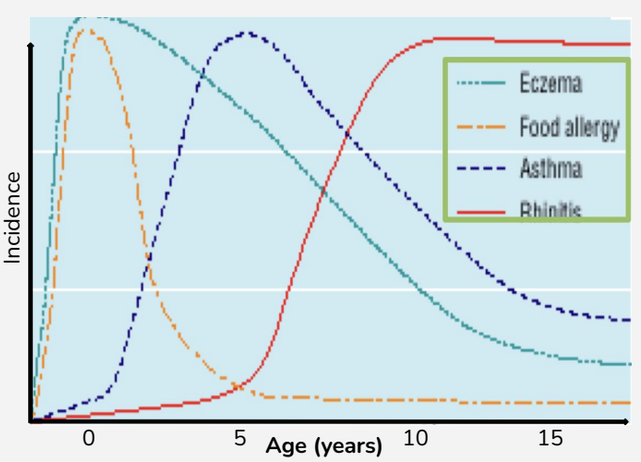


Atopic dermatitis

- Cell mediated reaction
- 50% diagnosed at one year of age
- Chronic relapsing course
- **Lichenification** (Rough elevated skin and we call this lichenification which is leather like skin after local contact with an allergen causing a reaction) and excoriations
- Can happen anywhere in the body most common site in pediatrics is the face on cheeks, forehead.Can also occur on the hands ,lower limbs and trunk. And on flexors and in some cases extensors
- Can be severe enough to affect the quality of the child's life and wellbeing
- Can get complicated with viral infection (Eczema herpeticum) or bacterial infection (staph aureus)
- **Pathophysiology:** An allergen stimulates specific T cells and activates APC (antigen presenting cells) which can be anywhere in the tissues but in this case they are on the skin and cause granulomas





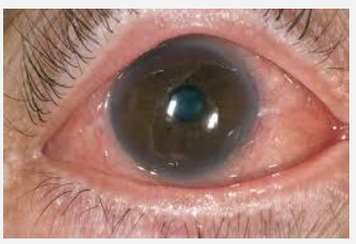
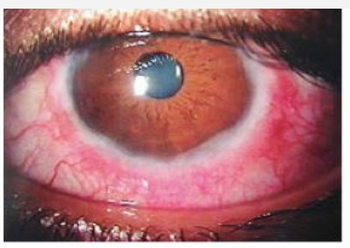
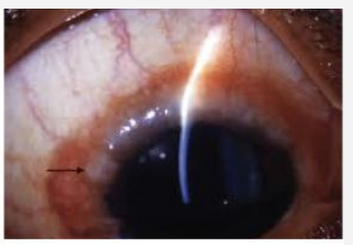
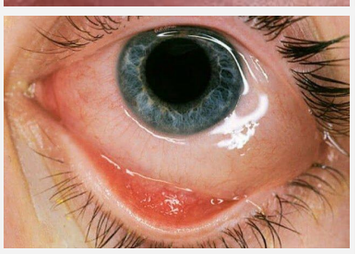


AD is in most cases the first manifestation of the atopic disposition

Means that there's atopy presenting in different stages of development of age.

Allergic Conjunctivitis

- Inflammation of the conjunctiva
- Can affect the cornea and cause corneal claudication (Vernal keratoconjunctivitis)
- Management: give topical antihistamine

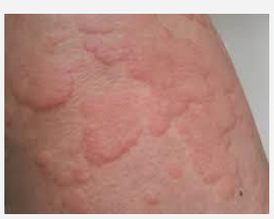

Vernal keratoconjunctivitis: This affects the conjunctiva and can cause clouding of the cornea and this needs immediate management. Vernal keratoconjunctivitis(VKC)is an atopic condition of the external ocular surface. It characteristically affects young males in hot dry climates in a seasonal manner; however this is not always the rule. It is bilateral.

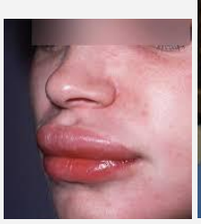
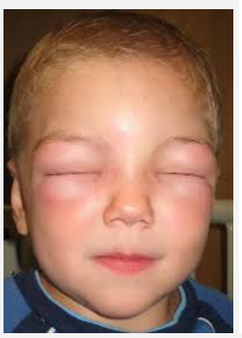
Urticaria & Angioedema

- Well Circumscribed, blanchable, raised skin lesions
- Caused by (drugs, viral infections, inhalants(allergic pollens), contact urticaria, autoimmune, bite and stings or can be idiopathic)
- Can manifest as urticarial rash
- Allergic Angioedema should be differentiated from **hereditary angioedema**, an autosomal dominant disease due to C1 esterase inhibitor deficiency, present as recurrent episodes of swelling that may affect the face, extremities, genitals, gastrointestinal tract and upper airways. So NOT an allergic disease.

Types of Urticaria/Angioedema

- Acute urticaria/angioedema lasts <u>less</u> than 8 weeks
- Chronic urticaria/angioedema lasts <u>more</u> than 8 weeks
- Idiopathic , autoimmune
- Urticarial vasculitis
- C1 inhibitor deficiency angioedema



Box 15.3 Classification of urticaria/angioedema

- Acute – resolve within 6 weeks; allergy such as food or drug reactions, or infection are common triggers
- Chronic idiopathic – intermittent for at least 6 weeks
- Physical urticarias
  - Cold, delayed pressure, heat contact, solar, vibratory urticaria
- Other causes
  - Water (aquagenic), sweating (cholinergic), exercise-induced
  - Aspirin and other non-steroidal anti-inflammatory agents
  - C1-esterase inhibitor deficiency (angioedema, but no urticaria or pruritus).

Consider hereditary angioedema, if a patient presents with:

1. Recurrent angioedema (without urticaria)
2. Recurrent episodes of abdominal pain and vomiting
3. Laryngeal edema
4. Positive family history of angioedema
5. A blood test, ideally taken during an episode, will show low levels of serum complement factor 4 (C4), C1 inhibitor (C1-INH) antigenic protein and functional level.

Food allergy

- Food allergic reaction range from IgE mediated to non-IgE mediated reactions.
- **IgE mediated:** Oral allergy syndrome (pollen-food allergy) and anaphylaxis syndrome. Reaction of immune system to certain food which mimic the original IgE mediated reaction to inhalant allergy (cross-reactions between foods and inhalant allergens). Seen in tree and weed allergic patients (for example a patient who has an allergy to Bermuda grass, can develop a food allergy while eating tree nuts, seafood, watermelon or eggplant)
- **Non IgE mediated reaction:** (protein induced enterocolitis or eosinophilic proctitis) like crohn's and celiac disease or dermatitis herpetiformis. This happens by stimulation of B and T cells.
- Common food allergies are to milk, egg, peanuts and other tree nuts
- Food allergy is the most common cause of anaphylaxis and subsequent ER admission. Common food allergies are egg, nuts, sesame.We usually give epinephrine injection in the ER.
- The best test to diagnose a food allergy is food elimination and challenge (take the food away, wait for a while then reintroduce it and look if allergy happens)
- Food Allergy and hypersensitivity to milk

Classical (class 1) food allergens

Peanut	Ara h1 , Ara h2 , Ara h3	:(I can't see
Cow's milk for cow milk, the allergic reaction is not caused by one protein only We have more than 6 caseins fractions.That's why in patient with cow milk allergy you may be able to diagnose by RAST test.	Caseins a,b,k	Bos d8
	B-Lactoglobulin	Bos d5
	A-Lactalbumin	Bos d4
	Bovine serum albumin	Bos d6
Eggs	Ovomucoid	Gal d1
	Ovalbumin	Gal d2
Shrimp	Tropomyosin	Pen a1
Codfish	Parvalbumin	Gad c1
Lipid transfer proteins		
Apple	Mal d1 , Mal d4	
Peach	Pru p1 , Pru p2 , Pru p3	
Hazelnut	Cor a1 , Cor a2	

- The complex part of this that the patient might have allergy to something that isn't present in your RAST test. And sometime something I present in RAST but doesn't cause clinical manifestations

Oral Allergy Syndrome (OAS)

OAS refers to clinical symptoms in the mucosa of the mouth and throat that:

- Result from direct contact with a food allergen
- In an individual who also exhibits allergy to inhaled allergens.
- Usually pollens (pollinosis) are the primary allergens
- Pollens usually trigger rhinitis or asthma in these subjects

Scenario:someone eats shrimp salad and feels numbness or itching of the lips and throat, so he stops and eats something else and the symptoms disappear. This is OSA.

Characteristics :

- Inhaled pollen allergens sensitise tissues of the upper respiratory tract
- Tissues of the respiratory tract are adjacent to oral tissues, and the mucosa is continuous
- sensitisation of one leads to sensitisation of the other
- First described in 1942 in patients allergic to birch pollens who experience oral symptoms when eating apple and hazelnut
- OAS symptoms are mild in contrast to primary food allergens and occur only in oral tissues

Allergens :

- Pollens and foods that cause OAS are usually botanically unrelated
- Several types of plant proteins with specific functions have been identified as being responsible for OAS:
  - **Profilins** > are associated with reproductive functions
  - **Pathogenesis-related proteins** > tend to be expressed when the tree is under stress (e.g. growing in a polluted area)
  - **Lipid Transfer Proteins** > induce IgE Antibodies,resistant to heat,gastric acid and digestive enzymes

Associated foods:

- Foods most frequently associated with OAS are mainly fruits, a few vegetables, and nuts
- The foods cause symptoms in the oral cavity and local tissues immediately **on contact :**
  - Swelling
  - Throat tightening
  - Tingling
  - Itching
  - Blistering

Cross-Reactivity allergens :

- Occurs most frequently in persons allergic to certain weeds and tree pollens eg. Ragweed pollen
- **Birch pollen (also: mugwort, and grass pollens) with:**
  - Apple
  - Stone Fruits (Apricot, Peach, Nectarine, Plum, Cherry)
  - Kiwi Fruit
  - Orange
  - Peanut
  - Melon
  - Hazelnut
  - Watermelon
  - Carrot
  - Potato
  - Celery
  - Tomato
  - Fennel
- **Ragweed pollen with:**
  - Banana
  - Cantaloupe
  - Honeydew
  - Watermelon
  - Other Melons
  - Zucchini (Courgette)
  - Cucumber

- **Scenario:** someone who used to eat shrimp without problem, now he start to have allergic symptoms after eating it, by investigation they discovered that he had untreated dust mites allergy .
- tropomyosin Is antigen present in dust mites and shrimp, after long time of untreated dust mites allergy, the immune system can not recognize the source of tropomyosin
- The patient have acquired allergy (cross reactive reaction) from the shrimp because of long time of untreated dust mites allergy

Book!

Examples of food allergy and hypersensitivity to milk

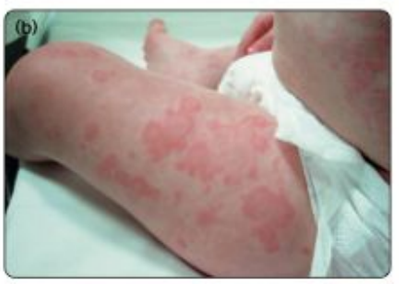
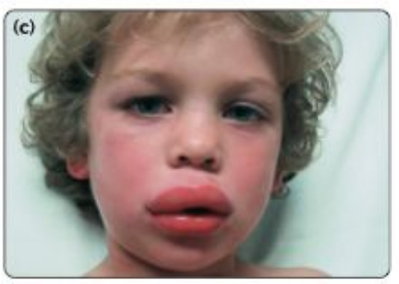
Condition	Clinical manifestation	
IgE-mediated food allergy • Immediate cow's milk allergy	The clinical features of an acute allergic reaction are listed in **(a)**. A 6-month-old breastfed infant developed widespread urticaria immediately after the first formula feed. Skin-prick test was strongly positive (8 mm weal) to cow's milk, confirming the diagnosis of IgE-mediated cow's milk allergy. Widespread urticaria and lip swelling after milk ingestion are shown in **(b)** and **(c)**.	**(a) Clinical features of an acute allergic reaction:** **Mild reaction** • Urticaria and itchy skin • Facial swelling **Severe reaction** • Wheeze • Stridor • Abdominal pain, vomiting, diarrhoea • Shock, collapse
		
Non-IgE-mediated cow's milk allergy	A 4-month-old infant, formula fed since birth, has loose stools and faltering growth. Skin-prick test to cow's milk is negative (0 mm weal). Elimination of cow's milk results in resolution of symptoms, which return on trial re-introduction.	
Non-allergic food hypersensitivity • Temporary lactose intolerance	Previously well 12-month-old infant develops diarrhoea and vomiting. The vomiting settles but watery stools continue for several weeks. • Stool sample – no pathogens but positive for reducing substances. • Diagnosis – temporary lactose intolerance following viral gastroenteritis.	

Figure 16.4 Examples of food allergy and hypersensitivity to milk. (**a**) Clinical features of an acute allergic reaction. (**b**, **c**) Widespread urticaria and lip swelling after milk ingestion. (Courtesy of Dr Pete Smith.)

Summary

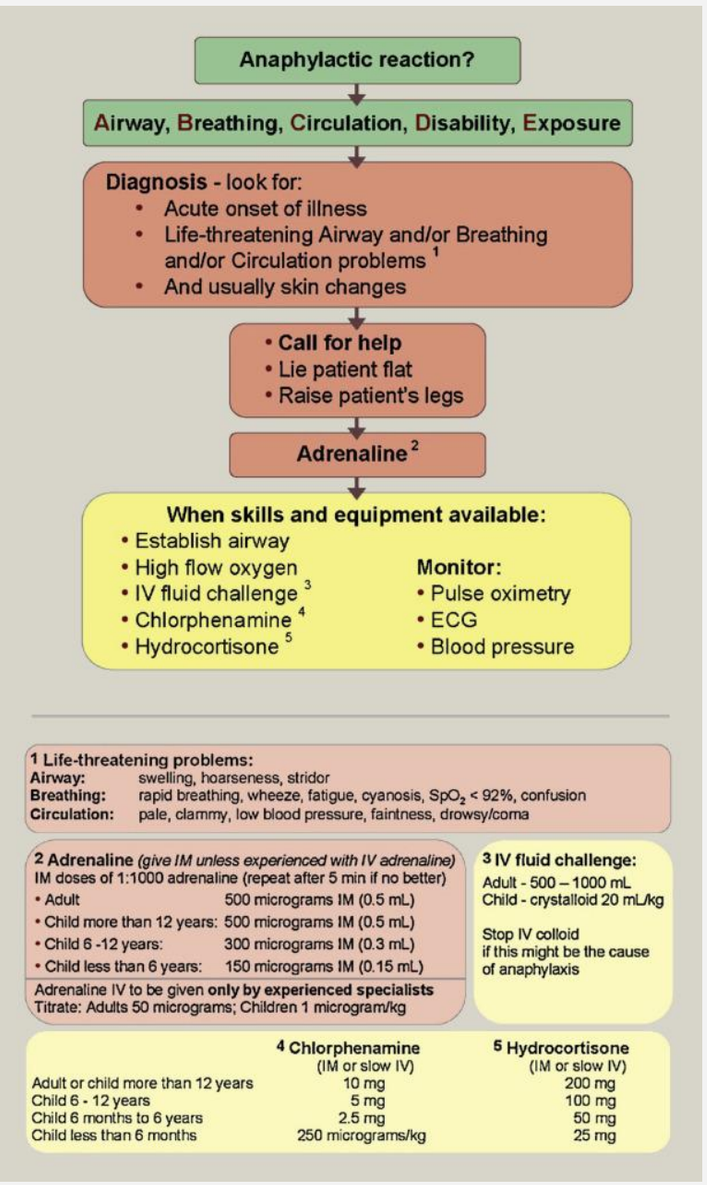
Food allergy

- Affects up to 6% of children.
- The most common causes are egg, milk, nuts, seafood, wheat, legumes, seeds and fruits.
- Diagnosis of IgE-mediated food allergy is based on a suggestive history supported by skin-prick tests or specific IgE antibodies in blood.
- Supervised food challenge is sometimes necessary to clarify the diagnosis.
- Those at risk of a severe reaction, e.g. with previous anaphylaxis or coexistent asthma, should carry an adrenaline autoinjector.

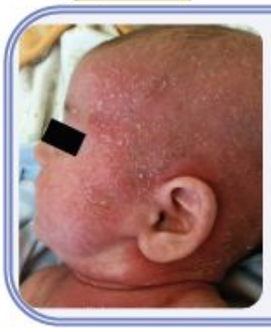
Extra

Anaphylaxis is highly likely when any one of the following 2 criteria are fulfilled:
1. Acute onset of an illness (minutes to several hours) with simultaneous involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula)
AND AT LEAST ONE OF THE FOLLOWING:
a. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia)
b. Reduced BP or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
c. Severe gastrointestinal symptoms (eg, severe crampy abdominal pain, repetitive vomiting), especially after exposure to non-food allergens
2. Acute onset of hypotension[a] or bronchospasm[b] or laryngeal involvement[c] after exposure to a known or highly probable allergen[d] for that patient (minutes to several hours), even in the absence of typical skin involvement.

Table 2. Amended criteria for the diagnosis of anaphylaxis. *PEF, Peak expiratory flow; BP, blood pressure. a. Hypotension defined as a decrease in systolic BP greater than 30% from that person's baseline, OR i. Infants and children under 10 years: systolic BP less than (70 mmHg + [2 x age in years]) ii. Adults and children over 10 years: systolic BP less than <90 mmHg. b. Excluding lower respiratory symptoms triggered by common inhalant allergens or food allergens perceived to cause "inhalational" reactions in the absence of ingestion. c. Laryngeal symptoms include: stridor, vocal changes, odynophagia. d. An allergen is a substance (usually a protein) capable of triggering an immune response that can result in an allergic reaction. Most allergens act through an IgE-mediated pathway, but some non-allergen triggers can act independent of IgE (for example, via direct activation of mast cells). Adapted from ([26])*

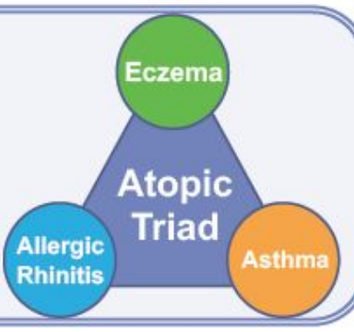


Atopic Dermatitis (AD)



Atopic dermatitis (also known as eczema) is a common chronic inflammatory skin condition that begins during infancy or early childhood, characterized by dry, pruritic, erythematous papules and plaques

Pattern of AD



CLINICAL FEATURES

Diagnostic criteria: itchy skin (essential) + ≥ 3 of the following:

1. Hx of relapsing **OR** current visible **flexural dermatitis (> 4 yo)** or dermatitis on **cheeks, forehead, outer limbs (< 4 yo)**
   See pattern of AD above
2. Personal Hx of **asthma** or **allergic rhinitis** (or positive FHx of first-degree relative in children < 4 yo)
3. **Xerosis** within past year
4. Onset < 2 years

PATHOPHYSIOLOGY

Epidermal Barrier Dysfunction
Genetic Disposition
Immune Dysregulation

QUALITY OF LIFE

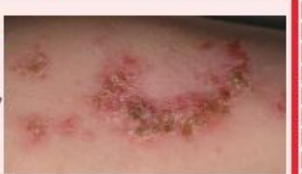
- Psychosocial distress (loss of sleep, intense pruritis, social embarrassment)
- ↑ risk of ADHD, depression, and anxiety

DIFFERENTIAL DIAGNOSIS

- **Seborrheic / contact / nummular dermatitis**
- **Infestations** - scabies
- **Infection** - tinea, impetigo
- **Autoimmune** - lupus, dermatomyositis
- **Primary immunodeficiencies** (rare)
- **Mycosis fungoides** (in adolescents)

COMPLICATIONS

IMPETIGO →
- *S. aureus* infection
- Yellow overlying "honey-crusting"
- Topical/systemic antibiotics



ECZEMA HERPETICUM →
- HSV infection
- Monomorphic, punched out erosions
- Immediate antiviral therapy

ECZEMA COXSACKIUM
- Coxsackie virus infection

MANAGEMENT

NON-PHARMALOGICAL (All patients)

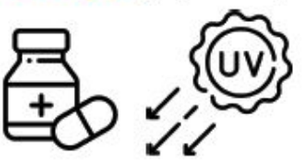
- **Patient education** (www.eczemahelp.ca)
- **Eliminate exacerbating factors** (e.g. scented products, dry air)
- Skin **hydration** (e.g. petroleum jelly, thick unscented creams)

MILD TO MODERATE DISEASE

- **Topical corticosteroids** (BID)
  - Face: Hydrocortisone 1% ointment
  - Body: Betamethasone valerate 0.05% ointment
- Topical calcineurin inhibitors
- Topical phosphodiesterase-4 inhibitor

MODERATE TO SEVERE DISEASE

- **Phototherapy**
- **Immunosuppressants**
- **Biologics** (dupilumab)



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Selena Osman (MD Student 2023, University of Calgary), Dr. Harry Liu (Dermatology Resident, UBC), and Dr. Michele Ramien (Pediatric Dermatologist, University of Calgary) for www.pedscases.com