Case Study

38 year old male with a history of nasal congestion, clear nasal discharge and episodes of itchy/watery eyes. Symptoms for the past five years and began after moving from Michigan to Texas six years ago. Symptoms mostly occur during the January/February timeframe. Take OTC antihistamines but only gets minor improvement. Older brother has asthma.

Allergic Rhinitis

- Defined as a constellation of symptoms:
  - Nasal congestion
  - Sneezing
  - Clear nasal discharge
  - Nasal/ocular pruritus
**Allergic rhinitis**

- Symptoms caused by IgE-mediated reactions against inhaled allergens and involving mucosal inflammation driven by type 2 helper T (Th2) cells.
- Allergens of importance include:
  - seasonal: pollens and molds
  - perennial: dust mites, pets, pests and molds
- The pattern of dominate allergens depends on geographic reaction and degree of urbanization.

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**Allergic Rhinitis**

Sensitization begins during the first year of life; indoor allergens preceed sensitization to pollens. Prevalence of allergic rhinitis peaks in the second to fourth decade of life and then gradually declines.


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**Allergic rhinitis**

- Frequency of sensitization to inhalant allergens is increasing and is now more than 40% in many populations in the U.S. and Europe.
- An estimated 15-30% of patients in United States have allergic rhinitis.
- Up to 40% of people with allergic rhinitis have or will have asthma.
- Allergy, asthma and atopic dermatitis association.

Development of Allergic Sensitization

As a consequence of mucosal inflammation, nasal symptoms can persist for hours and allergen exposure and the mucosa becomes more reactive. (Priming)

Non-specific nasal hyperresponsiveness

Allergic Inflammation

Hygiene hypothesis

- Based on the assumption that the immune system of the newborn is skewed towards Th2 cytokine generation. Following birth, environmental stimuli such as infections will activate Th1 responses and bring the Th1/Th2 relationship to an appropriate balance.
Hygiene hypothesis

1. The incidence of asthma is reduced in association with certain infections. (M. tuberculosis, measles, or hepatitis A)

2. Exposure to other children (presence of older siblings and early enrollment in childcare)

Hygiene hypothesis

3. “Please, Sneeze on My Child”

4. “Exposure to dogs and cats in the first year of life and the risk of allergic sensitization.”
   • JAMA 2002;288:963-72.

Unified Airway

The cellular profile of inflammation allergy/asthma:

- IgE
- Mast cells
- Histamine
- Cysteinyl-Leukotrienes
- IL3, 4, 5, and - Granulocyte-macrophage colony stimulating factor
- Gamma interferon, TGF
- Eosinophils-consistent feature of acute inflammation
- Chemokines-participate in the migration of cells to airway.
- Eotaxin
- Macrophage inflammatory protein-α alpha
Novel Therapeutic Approaches

Anti-IgE
• Early studies:
  • reduced serum IgE,
  • inhibit the immediate and late airway response to inhaled antigen,
  • decrease in amount of inhaled steroids.

Anti-IL-5
• reduced circulating eosinophils
• no change in the development of the late-phase response to an inhaled antigen.

Soluble IL-4 receptor
• Some early studies show a reduction in dose of inhaled steroids, other studies failed to demonstrate effectiveness.

Mediators of Allergic Inflammation

Histamine
Leukotrienes
Prostaglandins
Kinins
Platelet Activating Factor
Cytokines
Chemokines

Relevant Allergens in Allergic Rhinitis

• Seasonal
  • Trees—early spring
  • Grasses—late spring and summer
  • Weeds—fall
  • Mold Spores—spring through fall.

• Perennial
  • Dust Mites
  • Animal dander
  • cats
  • dogs
  • hamsters
  • guinea pigs
  • Insect debris
  • cockroaches
  • moths
Allergic Rhinitis

- History
  - types of symptoms—mediator release
  - perennial or seasonal
  - specific triggers
  - medications
  - environment
  - prior evaluation
  - occupation
  - family history of atopy

- Physical
  - skin—signs of eczema (flexural creases)
  - eye—conjunctival irritation, orbital shiners
  - nose—nasal crease, “shiners”, drainage (consistency, presence of cells), presence of polyps, septal deviation
  - chest—forced expiratory wheezes or cough
Allergic Rhinitis

- Lab
  - nasal smear
  - presence of specific IgE
    - skin testing*
    - RAST*
Allergic Rhinitis

- Management
  - avoidance/environmental control
  - antihistamines
    - first generation
    - second generation
  - decongestants
    - topical
    - systemic
Allergic Rhinitis

- Management, con’t.
  - anti-inflammatory
    - steroids
    - cromolyn
  - anti-cholinergics
  - immunotherapy

Environmental Control****

- Irritants
- Molds
- Dustmites
- Animals
Antihistamines

- First generation - lipophilic, penetrate blood-brain barrier, and therefore have side effects: CNS (sedation, poor concentration, dizziness, headache), anti-cholinergic (dry mouth/eyes/skin, constipation, urinary retention) and interaction with other drugs.
Antihistamines

- First Generation - con’t.
  - Ethanolamines: clemastine; carbinoxamine
  - Ethylenediamines: tripeledennamine
  - Alkylamines: chloraphenarinime; tripolidine
  - Piperazines: hydroxyzine
  - Tricyclics: doxepin

- Rotate the “chemical class”

Antihistamines

- Second Generation - H-1 receptor antagonists usually do not have the side effects of first generation antihistamines.
  - Cetirizine
  - Loratidin
  - Fexofenadine
  - Azelastine

Decongestants

- Systemic
  - Pseudoephedrine
  - Phenylephrine

- Topical
  - Neosynephrine
  - Oxymetazoline
Anti-Inflammatory Agents

- Cromolyn Sodium
- Corticosteroids
  - beclomethasone dipropionate
  - flunisolide
  - triamcinolone
  - dexamethasone * systemic absorption
  - budesonide
  - fluticasone
  - mometasone furoate

Anticholinergics

- Ipratropium bromide 0.03% & 0.06%

Allergy Immunotherapy
When to Begin Allergy Immunotherapy?

- Symptoms of allergic rhinitis or asthma
- Presence of allergen specific IgE
- Avoidance is impossible
- Medications not effective or side effects intolerable

Allergy Immunotherapy

- Two ways to desensitized allergy patients
  - 1. Subcutaneous immunotherapy
    - Traditional way of desensitization in the USA
    - Injections of increasing dosages of allergens on a weekly basis.
    - Can use multiple allergens
    - Must be done in a physician's office because of the risks for anaphylaxis
  - 2. Sublingual immunotherapy
    - Recently approved by the FDA for desensitization to grasses and ragweed.
    - Only available for monotherapy
    - Place a allergen containing tablet under the tongue. Usually done on a daily basis.
    - Can be done at home but requires an EpiPen.