ALLERGIC PATIENTS AND HEALTH CARE PROVIDERS

Implications For Clinical Practice

CONTINUING ALLERGY CHALLENGES

- Cockroach Allergy Morbidity and Role Among Inner-City Children.
- Mite & Cat Allergic Levels in Homes & Asthma Severity.
- Allergy to Foods Containing Concealed Milk Proteins.
- Cross-Reactivity Between Gutta-percha and Natural Rubber Latex: Assumptions vs. Reality.
- The Deadly Good Night Kiss
- Are We Becoming a More Allergic Population?
- Poison Ivy More Potent This Year
- When Romance and Allergies Don’t Mix

U.S. ALLERGY FACTS 2010

☐ 1 in 5 have allergy or asthma symptoms
   (as high as 1:4 in some geographic areas)
☐ Increasing incidence of multiple allergies:
   * mid-1960’s ----- 5% population atopic
   * 2000 ----- 15-20% atopic
   * 2010 ----- 20%
☐ 55% population test positive for 1 or more allergies
☐ 5th leading cause of chronic diseases
☐ 4 weeks = increase in length of ragweed pollen season in last 10-15 yrs; > 4 million work days lost /yr from hay fever
☐ $7.9 billion annual healthcare system & business cost
☐ 1.8 million ER visits caused by asthma; ~4,000 annual deaths

HYPERSENSITIVITY REACTIONS

(Allergies)

- The result of normally beneficial immune responses acting inappropriately.
- Exaggerated, pathological responses to substances, situations, or physical states c/o comparable effect in normal individuals.
- Do not occur in all members of the same species
- Can occur against “just about anything.”
Hypersensitivity Reactions: Potentially Life-Threatening Episodes

- Localized Type I rx (immediate) reaction.
- Anaphylactic response to bee sting & venom.
- Melittin in venom can aggravate rx leading to additional nonimmunologic mast cell degranulation trigger.

Hypersensitivity Reaction to Natural Rubber Latex (NRL)

- Type I hypersensitivity to latex gloves.
- Female DA (1983).
- hx multiple allergies, including airborne & food.
- Urticaria, burning.
- Itching c/in minutes of donning gloves.

Types of Hypersensitivity

<table>
<thead>
<tr>
<th>CLASS</th>
<th>NAME</th>
<th>INDICATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>immediate</td>
<td>IgE, rarely IgG</td>
</tr>
<tr>
<td>Type II</td>
<td>cytotoxic</td>
<td>IgG, IgM, rarely IgA</td>
</tr>
<tr>
<td>Type III</td>
<td>immune complex</td>
<td>IgG</td>
</tr>
<tr>
<td>Type IV</td>
<td>delayed</td>
<td>Cellular, T-cells</td>
</tr>
</tbody>
</table>

IRRITANT REACTIONS

A form of dermatitis caused by contact with a substance that physically or chemically damages the skin.

- Either 1x or multiple exposures.
- Not an immunologic response.
- Dryness, fissuring, redness of hands.
SENSITIZING DOSE
- initial immune response to allergen.
- no symptoms manifested from this response.
- latent interval required before sensitivity can be expressed.
- variable # of exposures for sensitization of individual:
  * some people are easily sensitized with single exposure.

Pollen in lining of nose & trachea
During sensitization, Abs / lymphocytes produced to remove pollen

CHALLENGE DOSE
- exposure to allergen in a sensitized person
- results in manifestation of allergic symptoms
- challenge occurs with much lower allergen exposure
- severity of symptoms dependent on extent of sensitization
- some do not react, or only slightly react, to multiple challenges ---- leads to diagnosis difficulties

TYPE I HYPERSENSITIVITY
- IgE - mediated allergic response
- reaginic -- skin-fixing Ab
- normally found in very low serum concentrations (< 1%)
- elevated in atopy (3 - 5%)
- primarily on mast cell & basophil surfaces

Leading Causes of Type I Allergies
CLINICAL MANIFESTATIONS OF ANAPHYLAXIS

<table>
<thead>
<tr>
<th>Organ System</th>
<th>Symptoms</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>pruritus</td>
<td>urticaaria</td>
</tr>
<tr>
<td></td>
<td>facial edema</td>
<td>angioedema</td>
</tr>
<tr>
<td>Respiratory tract</td>
<td>nasal congestion</td>
<td>rhinitis</td>
</tr>
<tr>
<td></td>
<td>sneezing, wheezing</td>
<td>laryngeal stridor</td>
</tr>
<tr>
<td></td>
<td>dyspnea, cough</td>
<td>wheezing</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>syncope</td>
<td>hypotension</td>
</tr>
<tr>
<td></td>
<td>general weakness</td>
<td>arrhythmias</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>abdominal pain</td>
<td>nausea, vomiting</td>
</tr>
<tr>
<td></td>
<td>diarrhea (bloody)</td>
<td></td>
</tr>
<tr>
<td>Eye</td>
<td>tearing, itching</td>
<td>conjunctivitis</td>
</tr>
</tbody>
</table>

FOOD ALLERGIES

- a condition caused by an IgE-mediated reaction to a food substance
- ~3.3 million Americans allergic to peanuts or tree nuts
- ~6.9 million are allergic to seafood.
- combined, food allergies cause 30,000 cases of anaphylaxis, 2,000 hospitalizations, and 150 deaths annually
- ~3.9% of children under the age of 18 & 2% of adults have food allergies.
- atopic persons more likely to develop food allergies
- remember, adverse food rx's may also occur to non-IgE mechanisms
- true allergy prevalence lower than # suspected:
  - believe have a food allergy = 15%
  - actually have a food allergy = 3-4%
- highest prevalence during infancy & childhood

Gluten Allergies

- sticky protein in cereal grains, wheat, rye, barley
- relatively common allergy (1:167 children & 1:111 adults?)
- may not be aware of allergy
- allergy symptoms similar to celiac disease:
  - respiratory, fatigue, oral ulcers, anemia
  - diarrhea, constipation, bloating, asthma
  - skin problems, depression, bloating, behavior

Airborne Allergens

Symptoms: nasal congestion, sneezing, itchy/runny nose
Mold Allergies

- exposed to some mold every day with no bad effects.
- may breathe in mold spores that are present in the air or eat foods in which mold has begun to grow.
- Some people may have a reaction if exposed to too much fungus
- Common early symptoms: coughing, wheezing, stuffy nose, or irritated eyes; can become more severe (sinus drainage, upper respiratory problems)
- ongoing 12 months a year
- severe mold allergy not a minimal problem
- “Black mold” -- *Stachybotrys chartarum*
  - can cause severe symptoms

Allergic Reactions to Molds

Molds produce allergens, irritants, and in some cases, potentially toxic substances.

Inhaling or touching mold or mold spores -- may cause allergic reactions in sensitive individuals.

Avoid activities that trigger symptoms, such as raking leaves.

Ventilate moist areas in the home.

Antiperspirant & Deodorant Allergies

- Deodorants used to mask odor; antiperspirants reduce amount of sweat produced
- Deodorants considered cosmetics (do not change skin function)
  - 2 mechanisms: -- antimicrobial agents # odor-causing bacteria
  -- fragrances cover any odor produced
- Antiperspirants classified as drugs (thus, FDA-regulated)
  - active ingredient usually aluminum (Al); causes obstruction of eccrine glands (AI components can be allergenic)
- Among most common products causing cosmetic allergies
- Frequently tested products for person c ACD
- Axillary dermatitis common in persons with known fragrance allergies
- Tx: topical corticosteroids & avoidance of allergenic chemical

Aluminum Effects on Skin

- Usual form not harmful
- Common aluminum compounds in antiperspirants:
  - Al chloride  - Al chlorohydrate
  - Al zirconium tetrachlorohydrex glycine
- Create chemical rxns with sweat & clog glands – may cause irritation in sensitive underarm areas
- Allergic contact dermatitis – Type IV hypersensitivity
- Alternative FDA-approved products available

Allergens Found in Deodorants & Antiperspirants

<table>
<thead>
<tr>
<th>Allergen</th>
<th># Products c Allergen</th>
<th>% Products c Allergen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragrance *</td>
<td>97/107</td>
<td>90%</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>51/107</td>
<td>47%</td>
</tr>
<tr>
<td>Essential Oils &amp; Biological Additives</td>
<td>11/107</td>
<td>10%</td>
</tr>
<tr>
<td>Parabens</td>
<td>2/107</td>
<td>2%</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>2/107</td>
<td>2%</td>
</tr>
<tr>
<td>Lanolin</td>
<td>1/107</td>
<td>1%</td>
</tr>
</tbody>
</table>

- 4% population allergic to fragrances
- No perfect product – multiple options

Type I Hypersensitivity Response

Reaction of Cell - Bound IgE With Ag Following Challenge Exposure
Pharmacologically Active Mediators
- chemical substances that act directly or indirectly on muscles, glands, or vessels to produce clinical allergic manifestations.
- histamine
- serotonin
- kinins
- SRA - A
- prostaglandins

Allergic Rxs: Dental Examples
- rx to nickel (i.e. in crowns, bridges)
- rx to toothpaste components & mouthwashes
- IC products: latex & nitrile gloves, masks
- allergic rxs to fragrances in hand hygiene products
- glutaraldehyde & chemical disinfectants
- allergy to amalgam – very rare
- allergies to cobalt alloy
- induced, systemic / local reactions to eugenol.
- allergic newer dental materials: acrylic resin, resin composite materials.
- antibiotics & local anesthetics

ALLERGIC RX TO TOOTHPASTES
- with initial tartar – control products.
- additional cinnamon (2-4%) added to mask taste of pyrophosphate.
- multiple oral reaction sites, with Type I (IgE) reactions.
- classic pattern: red, painful gingiva.

Plasma Cell Gingivitis (Allergic Gingivostomatitis)
- allergic rxs associated with use of herbal toothpastes containing cinnamon (cinnamonaldehyde).
- used to mask bitter taste of pyrophosphate.
- could cause confusion with other serious differential diagnoses (i.e. leukemia, myeloma, pemphigus).
- presence of atypical plasma cells could suggest a malignancy
- careful history taking required.
- spontaneous remission with each of the cases with cessation of herbal toothpaste use.

OTC Consumer Dental Products Associated With Allergic or Other Adverse Reactions

1. Toothpastes and mouth rinses containing sodium laurel sulfate (SLS)
2. Tartar control toothpastes
3. Toothpastes, mouth rinses and floss containing natural oil flavoring agents (i.e. cinnamon)
4. Topical pain relieving gels (topical anesthetics) that contain benzocaine
5. Whitening/bleaching agents – overuse can cause rash, irritant rxs on gingiva & other oral tissues, and cause demineralization of teeth

Sodium Lauryl Sulfate (SLS)
- in shampoo, bubble bath, liquid/bar soap, dish soap, toothpaste, & some mouthwashes
- deemed safe for personal care products – added to enhance foaming qualities
- used in labs to cause loss of skin integrity – thus, SLS in skin care products can cause damage!
  - breaks down skin before application of other chemicals;
  - causes stronger tissue rx's to other irritants, including easier entrance of allergens
- in sensitive persons – can cause canker sores, dry skin, itchy skin, eczema
- ~50% (?) with most sensitivity worse during winter
- issues for SLS in toothpaste & canker sores – research implications

Types of Dental Materials Associated c Allergic or Other Adverse Reactions

1. “Base metal” alloys containing nickel used to make crowns & bridges
2. Gold alloys used for crowns & bridges that may contain base metals
3. Dental amalgam: very rare allergic reactions to metals in amalgams – allergic individual may have family hx of metal allergies
4. Acrylics or denture reline materials: very small percentage of patients allergic or irritant reactions to chemicals in these materials

Allergic Conjunctivitis
- many etiologies: pollen, grasses, weeds, dust mites, dander, contact lenses & solns, cosmetics
Can occur:
  ◆ more frequently in people c other allergies (i.e. hay fever, asthma, eczema)
  ◆ usually in both eyes
  ◆ seasonally, c high pollen counts
  ◆ year-round due to indoor allergens (i.e. dust mites, animal dander)
  ◆ from exposure to certain drugs & cosmetics
  ◆ when contact lenses worn too long or not cleaned properly
�� 清除 反應: 可能 反応: when contact lenses worn too long or not cleaned properly
Allergic vs. Infectious Conjunctivitis

**ALLERGIC**
- Usually occurs in both eyes
- Not infectious
- Symptoms subside when allergen in removed

**VIRAL / BACTERIAL**
- Usually begins in 1 eye; may progress to 2nd eye c/in days
- Rapidly spread in people
- Typically mild; can last days or few wks
  - Viral: 2-3 weeks to completely resolve
  - Bacterial: 2-3 days to 2-3 weeks; topical antibiotics Rx

How Certain are You that the Pruritis and Erythema are Indications of an Allergic Reaction?

ATOPY
- from Gr. atopus meaning “out of place.”
- possibly > 15 -20% of population.
- characterized by: asthma, hay fever, hives.
- often hereditary predisposition: some families with >1 atopic member.
- odds that a child will develop allergies (2010):
  - 33% with 1 allergic parent
  - 70% with 2 allergic parents
- often readily discernable upon patient examination.

Atopic Allergies -- Types
- **Atopic Dermatitis (eczema)**
  - chronic skin disorder; scaly & itchy rashes; Type I rx occurs in skin causing chronic inflammation
  - children -- common; 50% cases clear by 3 yrs
  - adults -- recurring condition
- **Allergic Rhinitis (hay fever & year-round symptoms)**
  - allergen interacts c sensitized cells of URT
  - sneezing, coughing, congestion, tearing, conjunctivitis
  - histamine – primary mediator
- **Allergic Asthma**
  - primarily affect LRT; children common; IgE or other irritants provoke cell degranulation; release of pharm mediators
ANGIONEUROTIC EDEMA

- An acute, painless, dermal, subcutaneous or submucosal swelling of short duration involving the face, neck, lips, larynx, hands, feet, or genitalia.
- May result from:
  - food or drug allergy
  - infection
  - emotional stress
  - hereditary factors
- Also called angioedema

Allergy Medications

- Can help ease symptoms (runny nose, congestion)
- Antihistamines – block histamine receptors
  - OTC: Benadryl, Claritin, Chlor-Trimeton, Zyrtec, etc
  - PRE: Clarinex, Xyzal, Allegra, Astelin (nasal spray)
- Decongestants – relieve congestion
  - OTC: Zyrtec-D, Sudafed, Neo_synephrine, Afrin
  - PRE: Clarinex-D, Allegra-D
- Combination allergy medications
  - OTC: Zyrtec-D, Benadryl Allergy & Sinus, Tylenol Allergy & Sinus
  - PRE: Allegra-D, Claritin-D, Semprex (nasal), Naphcon

Allergic Desensitization (Hyposensitization)

- No cure for allergies
- BUT, “allergy shots” can gradually increase ability to tolerate allergens
- Goal: stimulation competing &/or blocking immune responses in serum:
  - humoral: IgG “competitive inhibition.”
  - cellular: lymphokine synthesis to prevent chronic inflammation.
- Competing for Ag on mast cell surfaces.

Specific Allergic Immunotherapy:
Why Is It Used?

- to treat Type I allergy caused by inhalant allergens.
- to treat bee/wasp allergic pts
- to treat atopic & asthmatic pts.
- variable success rate
Type I Hypersensitivity Screening & Diagnosis

RAST Assay

Sensitization vs. Hyposensitization

Sensitized Individual vs. Desensitized State

Allergic Manifestations During Screening

- allergic salute
- transverse nasal crease
- allergic shiners
- allergic gapers
- conjunctival changes
- nose & throat disorders

Look at patient

<table>
<thead>
<tr>
<th>IS IT A COLD OR SEASONAL ALLERGIES?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLD</strong></td>
</tr>
<tr>
<td>OCCURRENCE OF SYMPTOMS</td>
</tr>
<tr>
<td>INFECTION OF SYMPTOMS</td>
</tr>
<tr>
<td>MISCHIEF</td>
</tr>
<tr>
<td>SNEEZING</td>
</tr>
<tr>
<td>TIME OF YEAR</td>
</tr>
<tr>
<td>FEVER</td>
</tr>
</tbody>
</table>
**Allergies vs. Colds**

<table>
<thead>
<tr>
<th></th>
<th>Allergies</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>challenge with allergen</td>
<td>multiple viruses (rhinovirus most frequent)</td>
</tr>
<tr>
<td><strong>Contagious</strong></td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td>sneezing; runny, itchy, stuffy nose; watery, itchy eyes; itchy throat; coughing; clear mucus</td>
<td>sneezing; runny, stuffy nose; watery eyes; coughing; sore, scratchy throat; yellow-colored mucus; dull headache; muscle aches</td>
</tr>
</tbody>
</table>

**Type IV Hypersensitivity**
- delayed hypersensitivity -- sensitized CD4+ T cells.
- develops 12-24 hrs post-challenge with allergen.
- generally evokes local response, sometimes may extend past area of contact.
- forms:
  - contact dermatitis
  - tuberculin
  - granulomatous (21-28 days)

**Sources of Contact Dermatitis Allergens**

<table>
<thead>
<tr>
<th>Source</th>
<th>Common Sources</th>
<th>Common Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair</td>
<td>jewelry, belt buckles</td>
<td>contact dermatitis, eczema</td>
</tr>
<tr>
<td>Jewelry</td>
<td>metal, rubber, plastic, silk</td>
<td>eczema, urticaria, contact dermatitis</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>fragrances, hair dyes, perfumes, lotions</td>
<td>contact dermatitis, urticaria, contact urticaria</td>
</tr>
<tr>
<td>Sensitizer</td>
<td>chemicals, insect poisons, leather, metals</td>
<td>contact dermatitis, contact urticaria, eczema</td>
</tr>
<tr>
<td>Toys</td>
<td>paints, dyes, etc.</td>
<td>contact dermatitis, urticaria</td>
</tr>
</tbody>
</table>

**Allergic Rxs to Plants**

- Poison Ivy
- Poison Oak
- Poison Sumac
Contact Allergic Dermatitis (Type IV)
Rx's to Nickel in Metals
✓ Allergy to nickel one of the most common causes

GUESS WHO IS ALLERGIC TO LATEX

Latex Allergy Background
- 1890: latex surgical rubber gloves in hospls.
- 1979: 1st case of latex allergy reported (??).
- 1988: increasing # of latex allergy reports to FDA, including 16 deaths.
- 1991: FDA latex allergy alert to HCW.
- 1997: FDA regulations for manufacturer label, protein, & hypoallergenic claims.
- 9/30/98: FDA regulations go into effect.

Latex Hypersensitivity Terminology
- Non-Specific Irritation Dermatitis
  -- Irritation Contact Dermatitis
  -- Irritation Dermatitis
- Type I Latex Hypersensitivity
  -- Latex Allergy
  -- Immediate Latex Hypersensitivity
- Type IV Latex Hypersensitivity
  -- Allergic Contact Dermatitis
  -- Delayed Latex Hypersensitivity
  -- Chemical Sensitivity Dermatitis
Latex Hypersensitivity Symptoms

- **Type I localized:**
  - immediate IgE allergic reaction
  - develops within minutes to latex protein challenge
  - urticaria, hives, pruritus, rhinitis
- **Type I systemic:**
  - more generalized, severe manifestations
  - conjunctivitis, laryngeal / respiratory distress
- **Type IV:**
  - delayed, contact dermatitis
  - slow-forming, localized rash, necrosis, sloughing
  - develops within 12-24 hrs to chemical challenge

Latex Hypersensitivity Responses

- **Type I localized and systemic:** (immediate)
  - elution of water-soluble latex proteins into skin & mucous membranes
  - IgE response
- **Type IV:** (delayed)
  - not against latex components
  - sensitized CD4+ lymphocyte response to water-soluble chemicals added to latex
  - chemical accelerators, anti-oxidants, thiurams, conditioners, etc.

Latex Allergy Risk Factors

- Persons with multiple surgery hx.
- Persons with spina bifida (18-68%).
- Health care workers (3-17%).
- Rubber industry workers (11%).
- Atopy - presence of multiple allergies
  - note: increasing % of population atopic.
- Hx certain food allergies: banana, kiwi, avocado, papaya, melon, peach, chestnut, hazelnut, etc.
  - cross-reacting protein allergens in latex sap.
Household Objects With Latex

- Automobile tires
- Rubber (gum) bands
- Expandable fabric
- Shoe soles
- Swimming goggles
- Shower caps
- Erasers
- Dishwashing gloves
- Balloons
- Hot water bottles
- Adhesive bandages
- Handle grips

A Type I Allergy Develops to Plant-Based Proteins in NRL

- Natural rubber latex (NRL) is harvested from *Hevea brasiliensis* tree
- Contains >260 plant-based proteins

Required Latex Labeling

- “This product contains natural rubber latex which may cause allergic reactions in sensitized individuals.”
- Allowed label claim for reduced protein in gloves.
  - 50 ug protein / gm by modified Lowry
  - total protein not only allergenic protein
- “Safe use of this by or on latex sensitized individuals has not been established.”