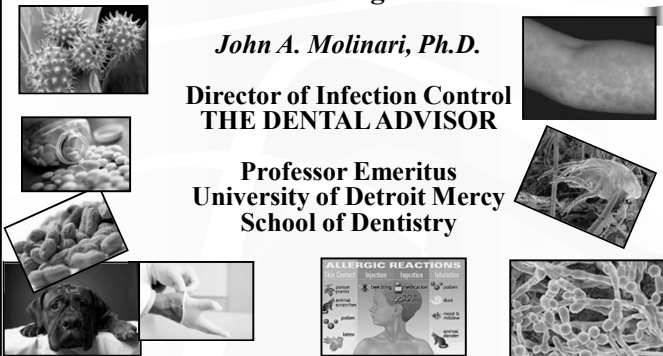


## ALLERGIES: Their Increasing Incidence and Challenges to Health Care

*John A. Molinari, Ph.D.*

Director of Infection Control  
THE DENTAL ADVISOR

Professor Emeritus  
University of Detroit Mercy  
School of Dentistry



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## 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
- Damaging, uncomfortable, or occasionally fatal
- Do not occur in all members of the same species
- Can occur against "just about anything" JAM

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## 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.



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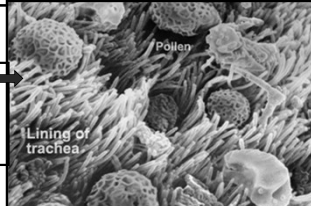
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## SENSITIZING DOSE

- 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



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## 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



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## 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

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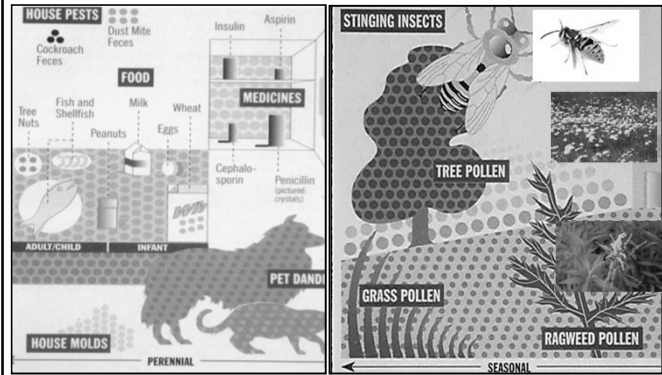
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## Leading Causes of Type I Allergies




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## CLINICAL MANIFESTATIONS OF ANAPHYLAXIS

Organ System	Symptom	Sign
Skin	pruritic facial swelling	urticaria angioedema
Respiratory tract	nasal congestion itching, sneezing dyspnea, cough	rhinitis laryngeal stridor wheezing
Cardiovascular	syncope general weakness	hypotension arrhythmias
Gastrointestinal	abdominal pain nausea, vomiting diarrhea (bloody)	
Eye	tearing, itching	conjunctivitis

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## Adult-Onset Food Allergies (AOFA)

- ◊ Shellfish – most common allergenic food
- ◊ 15% adults c AOFA developed allergies after age 18
- ◊ Each of Top 8 allergies were AOFA triggers
- ◊ most common:
  1. shellfish
  2. tree nuts
  3. fish
  4. soy
  5. peanuts
- ◊ Majority females (onset age 18-86 yrs) – early 30's peak age
- ◊ Older age onset of AOFA = greater risk of severe rx



Bryce, et al. J Allergy Clin Immunol (8/2014)

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## Top 8 Food Allergy Triggers

- #1. Peanuts
2. Tree nuts (walnuts, cashews, pecans)
3. Milk
4. Shellfish (shrimp, lobster, crab)
5. Fish (cod, salmon, tuna)
6. Eggs
7. Soy
8. Wheat




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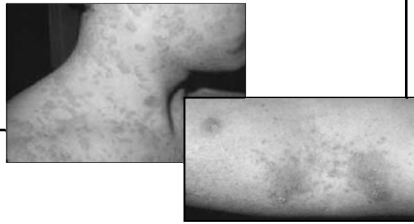
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## Food Allergy Symptoms

Can be sudden & severe commonly include one or more of following:

- ☛ hives
- ☛ tingling in the mouth
- ☛ swelling in the tongue and throat
- ☛ difficulty breathing
- ☛ abdominal cramps
- ☛ vomiting or diarrhea
- ☛ eczema or rash
- ☛ coughing or wheezing
- ☛ loss of consciousness
- ☛ dizziness




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## Available Flu Vaccines

Name	Manufacturer	Age Range	# of Strains
Afluria	bioCSL	9 years and older*	Trivalent
Fluarix Quadrivalent	GSK	3 years and older	Quadrivalent
Flublok	Protein Sciences	18 years and older	Trivalent
Flucelvax	Novartis	18 years and older	Trivalent
FluLaval Quadrivalent	GSK	3 years and older	Quadrivalent
FluMist Quadrivalent	Medimmune	2 – 49 years	Quadrivalent
Fluvirin	Novartis	4 years and older	Trivalent
Fluzone	Sanofi Pasteur	6 months and older	Trivalent
Fluzone Quadrivalent	Sanofi Pasteur	6 months and older	Quadrivalent
Fluzone High-Dose	Sanofi Pasteur	65 years and older	Trivalent
Fluzone Intradermal	Sanofi Pasteur	18 – 64 years	Quadrivalent

\*Afluria is licensed for ages 5 and older, but ACIP recommends that it not be used in children 5 through 8 years of age because of increased reports of febrile reactions in this age group. See "Safety," below

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**COVER STORY**

## Mighty dust mite can make us miserable – and rich

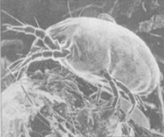
By Katy Kelly  
USA TODAY

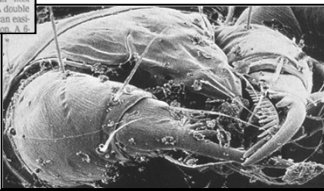
Dreaming of ways to make a million? Look under your pillow. The foundation for a big business is right before your eyes, though too small to actually see.

*Dermatophagoides pteronyssinus*  
Trossaert and D.

beds and mattress pads to make the bed an unfriendly breeding ground for mites. They're ordering air purifiers to suck them up and powders to break them down.

And no wonder. A gram of dust can house up to 500 mites. An ounce can host some 12,500. A double bed mattress can easily hold 2 million. A





**Dust Mite With Fecal Pellets**

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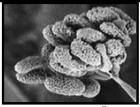
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## Mold Allergies

- ◊ 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


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## 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 (*Al 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

Zirwas. Clin Cont Derm (2008)

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## Aluminum Effects on Skin

- ⇒ Usual form not harmful
- ⇒ Common aluminum compounds in antiperspirants:
  - Al chloride    - Al chlorohydrate
  - Al zirconium tetrachlorohydrate 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




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## Allergens Found in Deodorants & Antiperspirants

Zirwas. Clin. Con. Dermat. (9/2008)

Allergen	# Products c Allergen	% Products c Allergen
Fragrance *	97/107	90%
Propylene glycol	51/107	47%
Essential Oils & Biological Additives	11/107	10%
Parabens	2/107	2%
Vitamin E	2/107	2%
Lanolin	1/107	1%

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




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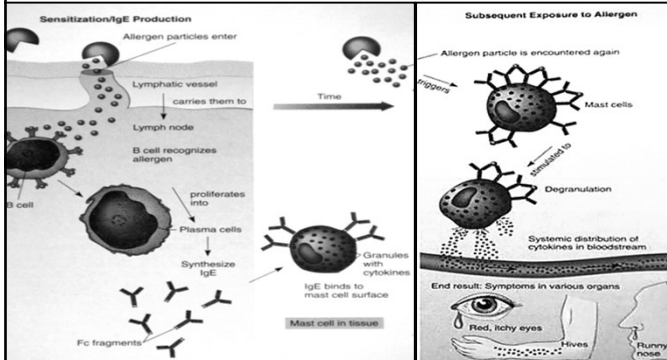
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## Type I Hypersensitivity Response




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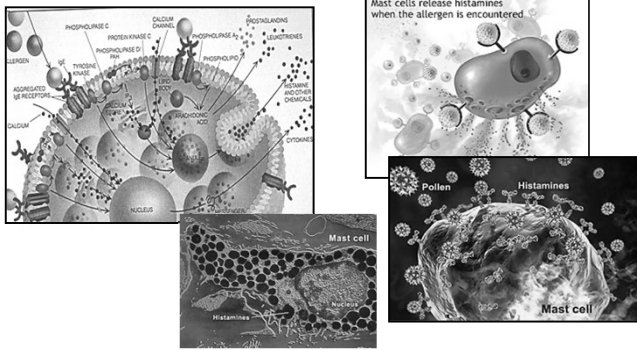
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## Reaction of Cell - Bound IgE With Ag Following Challenge Exposure




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### 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

JAM

CHEMICAL	ACTIVITY	SYMPTOMS
Histamine	Constricts bronchial airways	Wheezing; difficulty breathing
	Dilates blood vessels	Local redness at sites of allergen delivery; if dilatation is widespread, it can contribute to a lethal drop in blood pressure (shock)
	Increases permeability of small blood vessels	Swelling of local tissue; if change in permeability is widespread, it can contribute to shock
	Stimulates nerve endings	Itching and pain in skin
Platelet-activating factor	Stimulates secretion of mucus in airways	Congestion of airways
	Constricts bronchial airways	Same as for histamine
Leukotrienes	Dilates blood vessels	Same as for histamine
	Constrict bronchial airways	Same as for histamine
Prostaglandin D	Increase permeability of small blood vessels	Same as for histamine
	Constricts bronchial airways	Same as for histamine

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## Hypersensitivity Against Medicaments & Materials

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### 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.
- allergenic newer dental materials: acrylic resin, resin composite materials.
- antibiotics & local anesthetics



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### 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. JAM



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### 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

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### 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

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### 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

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### Allergy to Denture Cleansers

- ✓ FDA warning (2008)
- ✓ Reports of allergic reactions, including at least one death, linked to denture cleansers
- ✓ Persulfate most likely cause of problem
- ✓ Denture cleaners designed to clean dentures in a container -- NOT in the mouth!
- ✓ Never chew, swallow, or gargle with denture cleansers.
- ✓ Always thoroughly rinse dentures & other dental appliances before placing in mouth
- ✓ Rxs may not occur right away – may worsen c years of use.

(2008)

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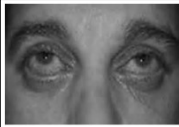
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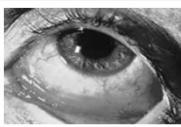
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## Allergic Conjunctivitis



- many etiologies: pollen, grasses, weeds, dust mites, dander, contact lenses & solns, cosmetics

Can occur:

- ◆ more frequent in people c other allergies (i.e. hay fever, asthma, eczema)
- ◆ usually both eyes
- ◆ seasonal, 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

⇒ **Clears up once allergen/irritant removed or after allergy medication tx**

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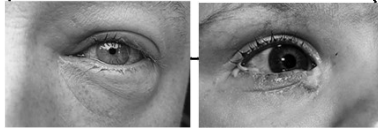
## Allergic vs. Infectious Conjunctivitis

### ALLERGIC

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

### VIRAL / BACTERIAL

- Usually begins in 1 eye; may progress to 2<sup>nd</sup> eye c/in days
- Rapidly spread to others
- Typically mild; can last days or few wks  
viral: 2-3 weeks for complete resolution  
bacterial: 2-3 days to 2-3 weeks; topical antibiotics




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## Atopy

exposure of skin, nose, or airway to a challenge allergen dose produces cutaneous wheal - flare rx, sneezing, wheezing, running nose c/in minutes.

often have chronic manifestations with repeated episodes:

↓  
mouth breathing,  
conjunctivitis,  
constant stuffed nose

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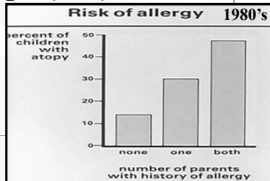
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## ATOPY

- from Gr. *atopos* meaning “out of place.”
- often used to describe IgE-mediated diseases.
- 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.




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## ANGIONEUROTIC EDEMA

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

JAM

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## 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
  - shrink swollen nasal tissues & blood vessels
  - OTC: Zyrtec-D, Sudafed, Neo\_synephrine, Afrin
  - PRE: Claritin-D, Allegra-D
- Combination allergy medications
  - OTC: Zyrtec-D, Benadryl Allergy & Sinus, Tylenol Allergy & Sinus
  - PRE: Allegra-D, Claritin-D, Semprex (nasal), Naphcon

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## 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.




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## 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




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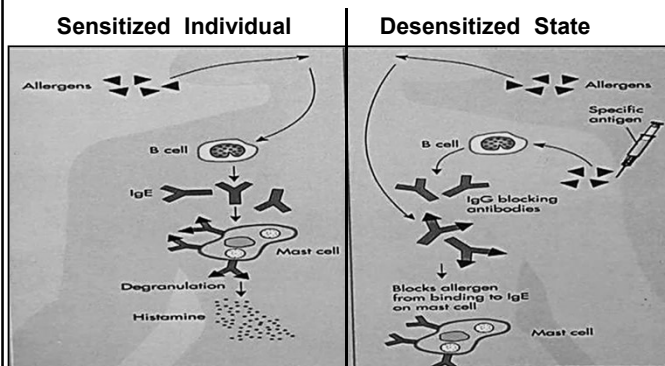
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## Sensitization vs. Hyposensitization




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## Allergic Manifestations During Screening

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

Look  
at  
patient

THE DENTAL  
ADVISOR  
www.dentaladvisor.com

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### Is It a Cold or the Flu ?

Symptoms	Cold	Flu
Fever	rare in adults and older children, but can be as high as 102° F in infants and small children	usually 102° F, but can go up to 104° F and usually lasts 3 to 4 days
Headache	rare	sudden onset and can be severe
Muscle aches	mild	usual, and often severe
Tiredness and Weakness	mild	often extreme, and can last two or more weeks
Extreme exhaustion	never	sudden onset and can be severe
Runny nose	often	sometimes
Sneezing	often	sometimes
Sore throat	often	sometimes
Cough	mild hacking cough	usual, and can become severe <span style="float: right; font-size: x-small;">CDC</span>

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### Allergies vs. Colds

	<u>allergies</u>	<u>cold</u>
Cause	challenge with allergen	multiple viruses (rhinovirus most frequent)
Contagious	no	yes
Symptoms	sneezing; runny, itchy, stuffy nose; watery, itchy eyes, itchy throat; coughing; clear mucus	sneezing; runny, stuffy nose; watery eyes; coughing; sore, scratchy throat; yellow-colored mucus; dull headache; muscle aches

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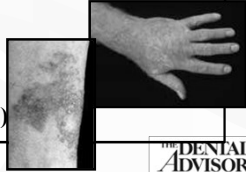
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## Type IV Hypersensitivity

- delayed hypersensitivity -- sensitized CD<sub>4</sub><sup>+</sup> 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)



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## Sources of Contact Dermatitis Allergens

OBJECT	REP. SOURCES	COMPOUNDS
Metal	jewelry, belt buckles, watches (& bands)	nickel, chromium, copper, mercury
Clothing		animal & plant fibers, dyes, vinyl, permanent press agents
Rubber	swim wear, shoes, condoms, garters	antioxidants, accelerators
Cosmetics	lipstick, hair dye, perfumes, lotions	iron / cobalt dyes, sulfides, balsam
Leather	belts, shoes, watchbands, leather	potassium dichromate, dyes
Plants	poison ivy, oak, sumac, etc.	catchols

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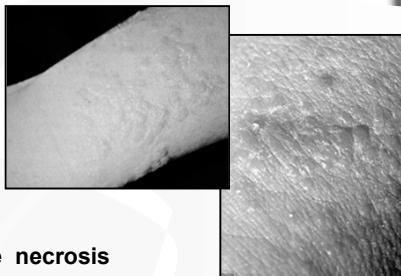
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## Type IV Hypersensitivity

most common form is contact dermatitis

### Manifestations:

- erythema
- edema
- pruritus
- bullae formation
- vesiculation
- localized tissue necrosis
- sloughing of affected tissues



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## Allergic Rxns to Plants

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## GUESS WHO IS ALLERGIC TO LATEX

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***“Healthcare is rich in evidence-based innovations, yet...they often disseminate slowly, if at all.”*** *D.M. Berwick, JAMA 2003*

- Rubber surgical gloves popularized by Halsted in 1889
- Allergic reactions to rubber gloves reported 1927 & 1933

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## Latex Allergy Background

- 1890: latex surgical rubber gloves in hospls.
- 1979: 1<sup>st</sup> 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.

JAM

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## 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

JAM

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## Type I Latex Allergy on Dental Assistant

- ✓ atopic -- hx of multiple allergies
- ✓ initial rx on hands c/in minutes of donning gloves
- ✓ 2<sup>nd</sup> rx on face from touching while wearing gloves
- ✓ complicated by staph pyoderma

JAM



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## 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

JAM

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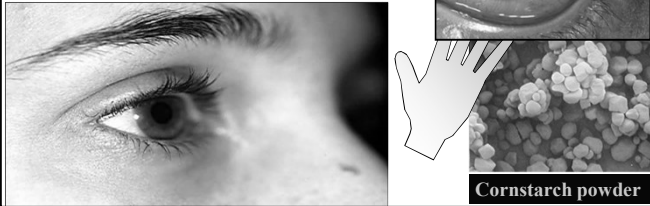
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## *Glove powder: carrier for allergenic NRL proteins*

### Airborne powder:

- NRL proteins absorbed in manufacturing (slurry)
- Aerosolized and inspired allergen
- Cornstarch alone is a rare sensitizer



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## 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.

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## Latex Allergy Risk Factors

- People who have multiple allergic conditions (Atopic individuals)
  - increasing % in population (15-20%)
- People with spina bifida (up to 17-68%)
- Hx of multiple surgeries
- Occupational factors (HCWs; Rubber industry workers)
  - HCW risk decreased since late 1990's – manufacturing changes
- People with allergies to certain fruits & nuts, such as:




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## Common Products Containing Latex

### Household Goods

- Automobile tires
- Motorcycle and bicycle handgrips
- Carpeting
- Swimming goggles
- Racquet handles
- Shoe soles
- Expandable fabric (waistbands)
- Dishwashing gloves
- Hot water bottles
- Condoms
- Diaphragms
- Balloons
- Pacifiers
- Baby bottle nipples



### Office Supplies

- Rubber bands
- Erasers

Some of the listed products are available in latex-free forms.

WA State Dept Labor & Statistics (2011)

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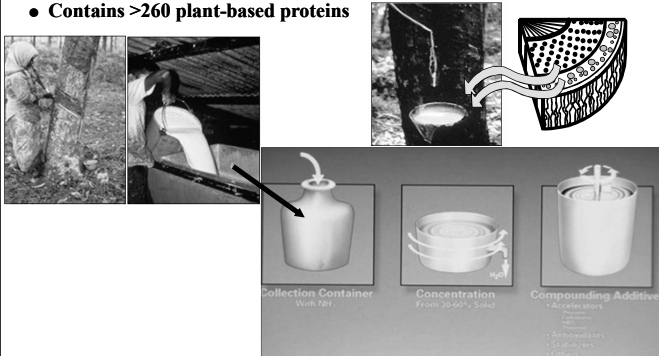
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## A Type I Allergy Develops to Plant-Based Proteins in NRL

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




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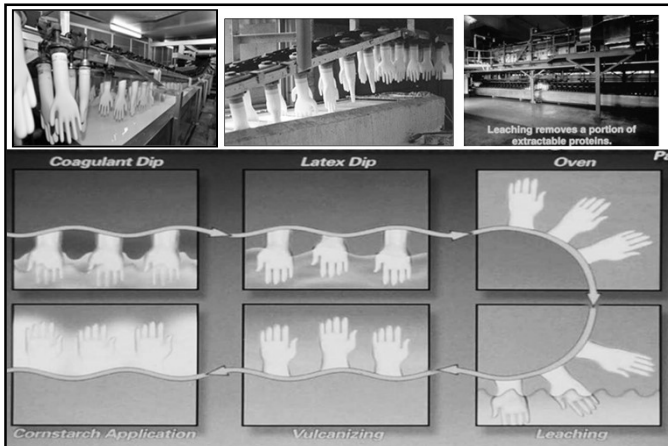
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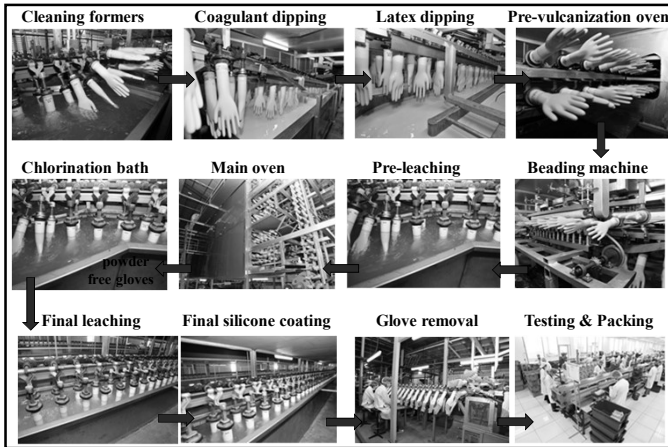
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**Required Latex Labeling**

- "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."

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### Care of Latex – Allergic Persons

- LATEX AVOIDANCE
- LATEX AVOIDANCE
- LATEX AVOIDANCE

UDM



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### Representative Latex – Free Items



**Tip:** Can purchase a complete kit containing latex-free items for use on known patients allergic to latex



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**Thank You  
Any Questions ?**

**THE DENTAL  
ADVISOR™**  
**www.dentaladvisor.com**

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