



Allergies from A to Z

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Objective



- To discuss the causes and treatment of allergy symptoms
 - ▣ Causes of rhinitis (allergic, nonallergic)
 - ▣ Different types of allergens
 - ▣ Treatment of allergic rhinitis
 - Avoidance
 - Medications
 - Allergy immunotherapy (“allergy shots”)
- To discuss the relationship between allergies and asthma

Rhinitis



- Definition of rhinitis: inflammation of the nasal mucous membranes.
 - Symptoms include sneezing, nasal itching, runny nose, nasal congestion.
- Often accompanied by eye symptoms – allergic conjunctivitis
 - Redness, itching, tearing of the eyes
 - Occurs in about 75% patients with rhinitis.
 - More often seen with pollen allergies than dust allergies.

Rhinitis



- Rhinitis can significantly decrease quality of life, aggravate comorbid conditions (such as asthma) and lead to lost work and school days.
- In the USA, approximately 30-60 million people have allergic rhinitis.
 - ▣ 10-20% population
 - ▣ Even higher in children.

Rhinitis

TABLE I. Types of rhinitis

I. Allergic rhinitis
II. Nonallergic rhinitis
A. Vasomotor rhinitis
1. Irritant triggered (eg, chlorine)
2. Cold air
3. Exercise (eg, running)
4. Undetermined or poorly defined triggers
B. Gustatory rhinitis
C. Infectious
D. NARES
III. Occupational rhinitis
A. Caused by protein and chemical allergens; IgE mediated
B. Caused by chemical respiratory sensitizers; immune mechanism uncertain
C. Work-aggravated rhinitis
IV. Other rhinitis syndromes
A. Hormonally induced
1. Pregnancy rhinitis
2. Menstrual cycle related
B. Drug induced
1. Rhinitis medicamentosa
2. Oral contraceptives
3. Antihypertensive and cardiovascular agents
4. Aspirin/NSAIDs
5. Other drugs
C. Atrophic rhinitis
D. Rhinitis associated with inflammatory-immunologic disorders
1. Granulomatous infections
2. Wegener granulomatosis
3. Sarcoidosis
4. Midline granuloma
5. Churg-Strauss syndrome
6. Relapsing polychondritis
7. Amyloidosis

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NSAIDs, Nonsteroidal anti-inflammatory drugs.

- Allergic rhinitis
- Irritant triggered (e.g. chlorine)
- Cold air
- Gustatory
- Infectious
- Pregnancy
- Medications
- Atrophic
- Wegener's, sarcoid

Other conditions that mimic rhinitis symptoms

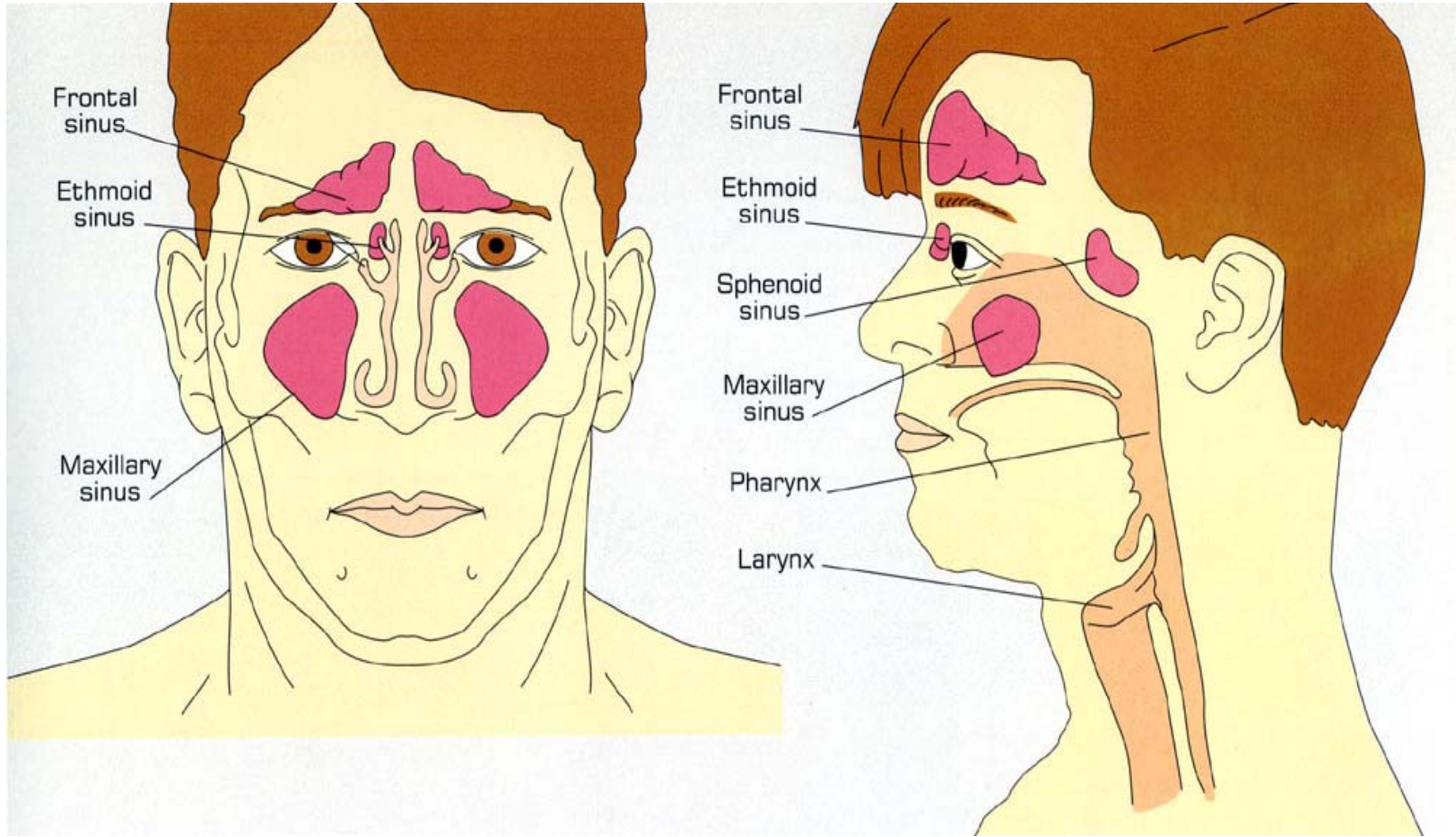
TABLE II. Differential diagnosis of rhinitis: Conditions that might mimic symptoms of rhinitis

A. Nasal polyps
B. Structural/mechanical factors
1. Deviated septum/septal wall anomalies
2. Adenoidal hypertrophy
3. Trauma
4. Foreign bodies
5. Nasal tumors
a. Benign
b. Malignant
6. Choanal atresia
7. Cleft palate
8. Pharyngonasal reflux
9. Acromegaly (excess growth hormone)
C. Cerebrospinal fluid rhinorrhea
D. Ciliary dyskinesia syndrome

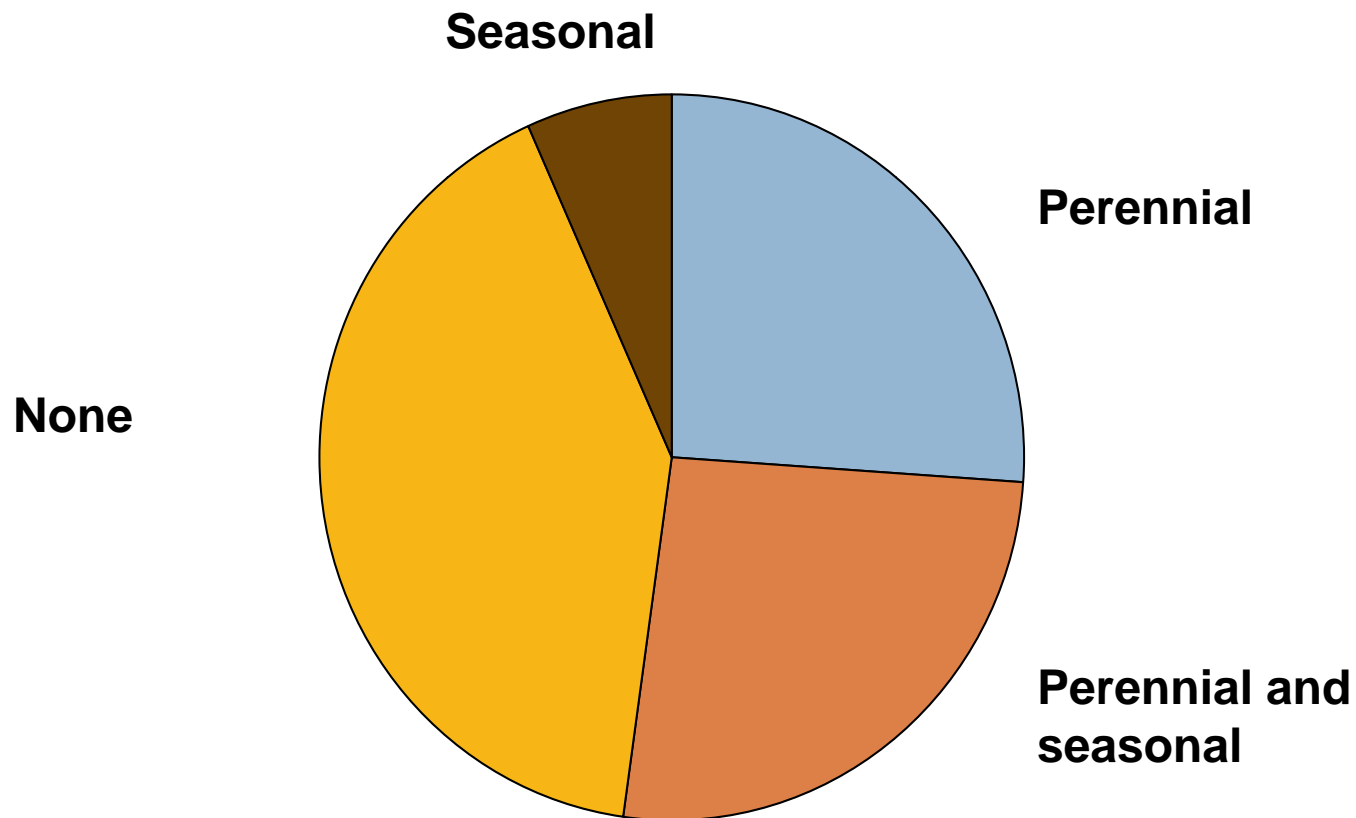
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“Is it allergies or sinuses?”

- Overlap between both conditions
- Chronic sinusitis is associated with allergic rhinitis in 60% of adults and 36-60% of children.
- Chronic sinusitis defined as inflammation of nose and sinuses causing:
 - Drainage
 - Congestion
 - Facial pain/pressure
 - Decreased sense of smell
 - Findings on rhinoscopy or imaging.



Type of Allergy Among Sinus Surgery Patients



Emmanuel et al. Otolaryngol H&N Surg 2000; 123:687 and Ramandan et al. Am J Rhinol 1999; 13:345

Pathway of Allergic Rhinitis

- Allergens (such as dust mite fecal particles, cockroach residues, animal danders, molds, pollens) are breathed in, and deposited in the nose.
- In an allergic individual, these allergens are processed by the immune system, and cause an allergic response.
 - ▣ Early response (within minutes): Substance such as histamine are released which cause itching, runny nose, sneezing; other substances such as leukotrienes and prostaglandin D2 cause nasal congestion.
 - ▣ Late response (4-8 hours): nasal congestion more prominent.

Priming Effect



- The greater number of times an allergic individual exposed to the allergen → less allergen is required to cause the immediate response.
- The lining of the nose becomes more inflamed and responsive to allergen.
- This explains why an allergic individual may have more symptoms as a season progresses, despite decreasing pollen levels.
- Priming is also associated with being more sensitive to non-allergic triggers, such as strong odors and tobacco smoke.

Diagnosis



- Detailed history
- Physical exam
- Allergy testing to determine allergen sensitivity.
 - ▣ Skin testing: simple, low cost, highly sensitive
 - “Scratch test” or “prick test.”
 - Must be off allergy pills for 5 days prior to test.
 - Test for airborne allergens (both indoor and outdoor – see next)
 - Done on the back or arms.
 - Results available after 15-20 minutes.
 - ▣ Blood testing: if unable to do skin testing.

Indoor

Allergens

- ❑ House dust mites
- ❑ Cockroaches
- ❑ Cats
- ❑ Dogs
- ❑ Mold

Nonallergens

- ❑ Combustion due to burning of:
 - ❑ Wood (stove, fireplace)
 - ❑ Tobacco
- ❑ Nitrogen dioxide: natural gas appliances.

House Dust Mites

- 2 major species: *Dermatophagoides farinae* and *Dermatophagoides pteronyssinus*.
- Varies with humidity of the environment (higher in humid places).
- Microscopic; do not bite.
- Found in bedding, upholstery, and carpeting.
- Require humid environment (55-75% relative humidity) because absorb water from the air.
- Droppings (feces) are allergenic.
- Tend to settle on surfaces and are not suspended in air.

Cockroaches

- German (*Blatella germanica*) and American (*Periplaneta americana*) cockroaches are most common.
- Cockroach allergy plays a critical role in inner city asthma.
 - ▣ 40% children living in cities are allergic to cockroaches (compared to 20% children living in suburbs).
 - ▣ Degree of allergy is linked to likelihood of requiring emergency treatment for asthma.
 - ▣ Active area of research: Inner City Asthma Consortium

Cockroaches



- ❑ Feed on discarded food.
- ❑ More common in townhomes and multifamily dwellings.
- ❑ Live in confined spaces, in walls, between floors in large buildings, more active at night.
- ❑ Bodies and droppings (feces) are allergenic.
- ❑ Tend to settle on dust; not suspended in air.
- ❑ Allergen found on floors, carpets, counters especially in rooms containing stored or discarded food.

Cats and Dogs



- Can f 1 and Fel d 1
- Saliva, dander, and other secretions are allergenic.
- Can be found suspended in air.
- These allergens (especially from cats) can be carried to other locations on clothing.
- Active area of research: does having a pet early in childhood prevent pet allergy later in life?

Mold



- ❑ Molds require high humidity and moisture.
- ❑ Mold can be found in ambient air.
- ❑ Many indoor molds enter from outside environment.
- ❑ Some indoor molds include *Penicillium* and *aspergillus* (though can be outdoors as well).
- ❑ Areas of mold can include: flooded basement carpeting, shower curtains, garbage containers, plumbing fixtures, vaporizers.

Outdoor

Allergens

- Pollen
- Mold

Nonallergens

- Diesel exhaust
- Sulfur dioxide (coal, oil, fossil fuels)
- Nitrogen dioxide (electricity generation, fossil fuels)
- Ozone

Pollen



- Trees pollinate in the spring
- Grasses pollinate in the late spring/early summer
- Weeds pollinate in the late summer and fall
- In some regions (such as parts of California), pollens can cause year round symptoms.

Pollen



- Plants can be insect-pollinated or wind-pollinated.
- Pollen carried in the wind can remain airborne for days and travel for 100s of miles.

Outdoor Mold



- *Alternaria, Cladosporium, Penicillium, Aspergillus*
- Levels extremely low during snow seasons, and peak in late summer/early fall, though other patterns can be seen as well.
- Some mold counts are higher on DRY days.
- Disturbances of compost piles, mulch; lawn cutting, leaf raking can cause symptoms in patients allergic to mold.

Particle size



- The nose and upper airway remove larger particles.
- Only particles < 5 micrometers reach the small airways of the lungs.
- Pollen size ranges 15-75 micrometers
- Most mold spores range 5-30 micrometers.
- Therefore the eyes and upper airway are exposed to the highest amount of airborne allergens.

Treatment



- Avoidance
- Medications
- Allergy immunotherapy (“allergy shots”)

Avoidance



- House Dust Mite
 - Dehumidification and air conditioning
 - Wash bedding in hot water
 - Dust mite covers
 - Carpet removal from bedroom
- Cockroaches
 - Repair wall and floor cracks
 - Securing food waste
 - Professional extermination

Avoidance



□ Mold

- Homes that have been flooded or have been water damaged are more likely to harbor mold.
- Examination of plumbing for leaks may reveal mold.
- Testing for mold can be done by contractors
 - This is not standardized and it is difficult to know what level of mold spores in ambient air represent a health risk
- Dehumidifier to reduce relative humidity to 50-55% in summer.
- HEPA filter.

Avoidance



- Cats and dogs
 - Remove from the home
 - Thorough cleaning of the home
 - Even with both of above, pet allergen can remain present for 6 months.
 - If the pet is not removed from the home:
 - Keep out of bedroom of allergic individual
 - HEPA filter

Avoidance



- Pollen:
 - Air conditioning
 - Windows closed
 - Wash hands and change clothes after being outside
 - Wearing a mask when cutting the grass

Medications



- Individualized based on patient preference (intranasal vs. oral), individual response, and cost.

Oral Medications

- Antihistamines (loratadine, cetirizine, fexofenadine)
 - ▣ Relatively rapid onset of action.
 - ▣ Discuss with physician whether to use “as needed” or continuously.
 - ▣ Less effective for nasal congestion than other nasal symptoms.
- Decongestants (pseudoephedrine)
 - ▣ Reduces nasal congestion
 - ▣ Side effects: insomnia, irritability, palpitations, high blood pressure.
- Leukotriene receptor antagonist (montelukast)
 - ▣ Similar efficacy to antihistamines
 - ▣ Can be considered for patients with both rhinitis and asthma.

Intranasal Medications



- Intranasal corticosteroids
 - Most effective single therapy for allergic rhinitis
 - Effective for all symptoms allergic rhinitis including nasal congestion.
 - Onset of action not as fast as allergy pills; may take days to weeks for maximal effectiveness.
 - Also treats eye symptoms.
 - At recommended doses, do not see growth suppression in children.
 - Local side effects are minimal; bloody nose can occur.

Intranasal Medications



- Intranasal antihistamines
 - ▣ Effectiveness equal or better than antihistamine pills; does have an effect on congestion.
 - ▣ Generally, less effective than intranasal corticosteroids for nasal symptoms.
 - ▣ Rapid onset of action (within several hours).
 - ▣ Side effects can include bitter taste.
- Intranasal decongestants (over the counter)
 - ▣ Useful for short term
 - ▣ Not appropriate for daily use – rebound

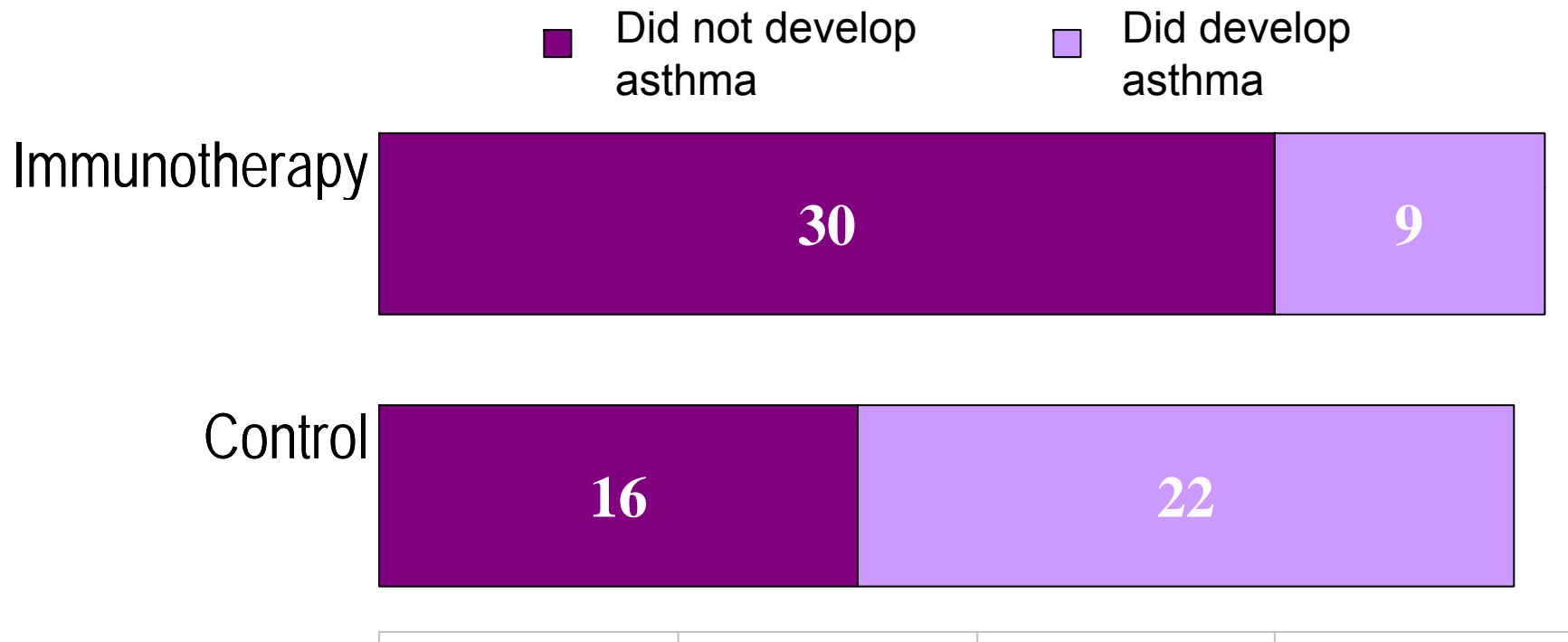
Combination Medications

	Therapeutic considerations
Combination therapy	
Antihistamine, oral with decongestant, oral Antihistamine, oral with LTRA, oral	<ul style="list-style-type: none"> ● Provides more effective relief of nasal congestion than antihistamines alone ● Might be more effective than monotherapy with an antihistamine or LTRA ● Combination is less effective than INSs. ● Alternative if patients are unresponsive to or not compliant with INSs
Antihistamine, oral with intranasal antihistamine Antihistamine, oral with INS	<ul style="list-style-type: none"> ● Combination can be considered, although controlled studies of additive benefit are lacking. ● Combination can be considered, although supporting studies are limited, and many studies are unsupportive of the additive benefit of adding an antihistamine to an intranasal steroid.
Intranasal anticholinergic with INS	<ul style="list-style-type: none"> ● Concomitant ipratropium bromide nasal spray with INS is more effective for rhinorrhea than administration of either drug alone.
Intranasal antihistamine with INS	<ul style="list-style-type: none"> ● Combination can be considered based on limited data indicating additive benefit. ● There are inadequate data about the optimal interval between administration of the 2 sprays. ● For mixed rhinitis, there is a possible added benefit to combination of intranasal antihistamine with INS.
LTRA, oral with INS	<ul style="list-style-type: none"> ● Provides subjective additive relief in limited studies; data are inadequate.

Immunotherapy (“Allergy Shots”)

- The allergen extract contains the airborne allergens the individual is allergic to (based on skin test).
- The extract is given to build up tolerance to the allergens.
- Dose is initially very low; then built up gradually until a plateau/maintenance dose is achieved.
- The maintenance injections are then continued monthly for approximately 3-5 years.
- The effectiveness can persist for many years after discontinuing therapy.

Prevention of Asthma by Immunotherapy – 5 year follow up



Association Between Allergies and Asthma



- “United airway hypothesis”
- >80% people with asthma have allergic rhinitis
- Allergic rhinitis is a risk factor for developing asthma.

Association Between Allergies and Asthma



- Asthma is characterized by
 - Airflow obstruction
 - Inflammation
 - Hyperresponsiveness
 - Reversibility
- Symptoms of asthma include
 - Coughing, wheezing, tightness, shortness of breath.

Association Between Allergies and Asthma



- Factors that worsen asthma include
 - Allergens
 - Viral infections
 - Exercise
 - Irritants (perfumes, strong odors, tobacco smoke)

Association Between Allergies and Asthma

- Pollen affecting asthma
 - ▣ Asthma flare can start later in the pollen season and persist after the season ends
 - ▣ Asthma can also worsen during thunderstorms due to gusts of wind making the allergenic part of the pollen become airborne.

Association Between Allergies and Asthma

- National Health and Nutrition Examination Survey (NHANES III), conducted from 1988 to 1994
- ~10,000 participants; 6 to 59 years old
- Allergy skin testing performed.
- Prevalence of asthma 5.2%
- Prevalence of rhinitis 54%
- Approximately 50% cases of asthma were attributed to allergies.

Summary



- ❑ Allergies can be caused by indoor and outdoor allergens.
- ❑ Treatment options for allergies include avoidance, medications, and immunotherapy.
- ❑ There is a strong relationship between allergies and asthma.

References



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Questions

