Understanding Allergies

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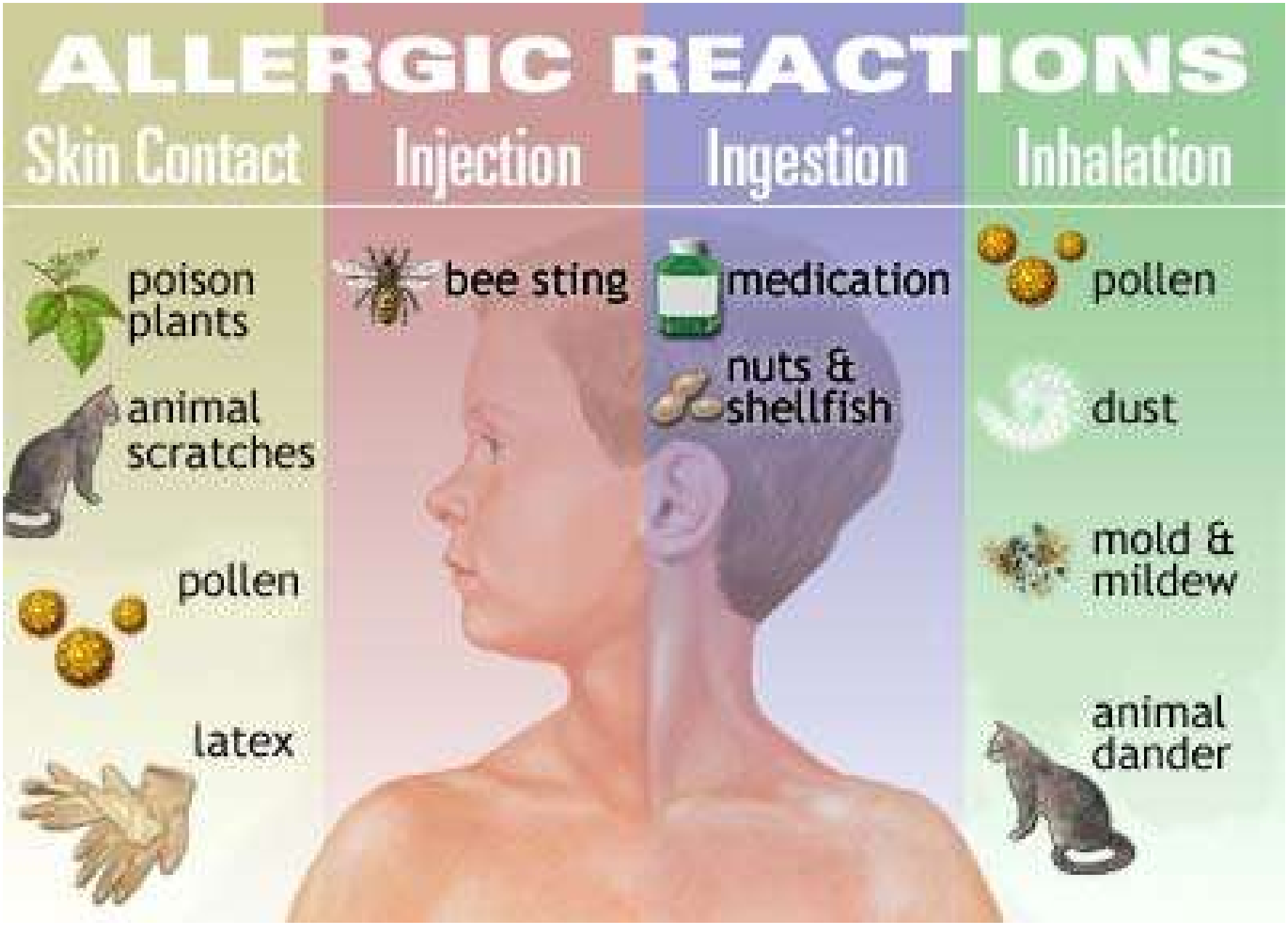
Allergy

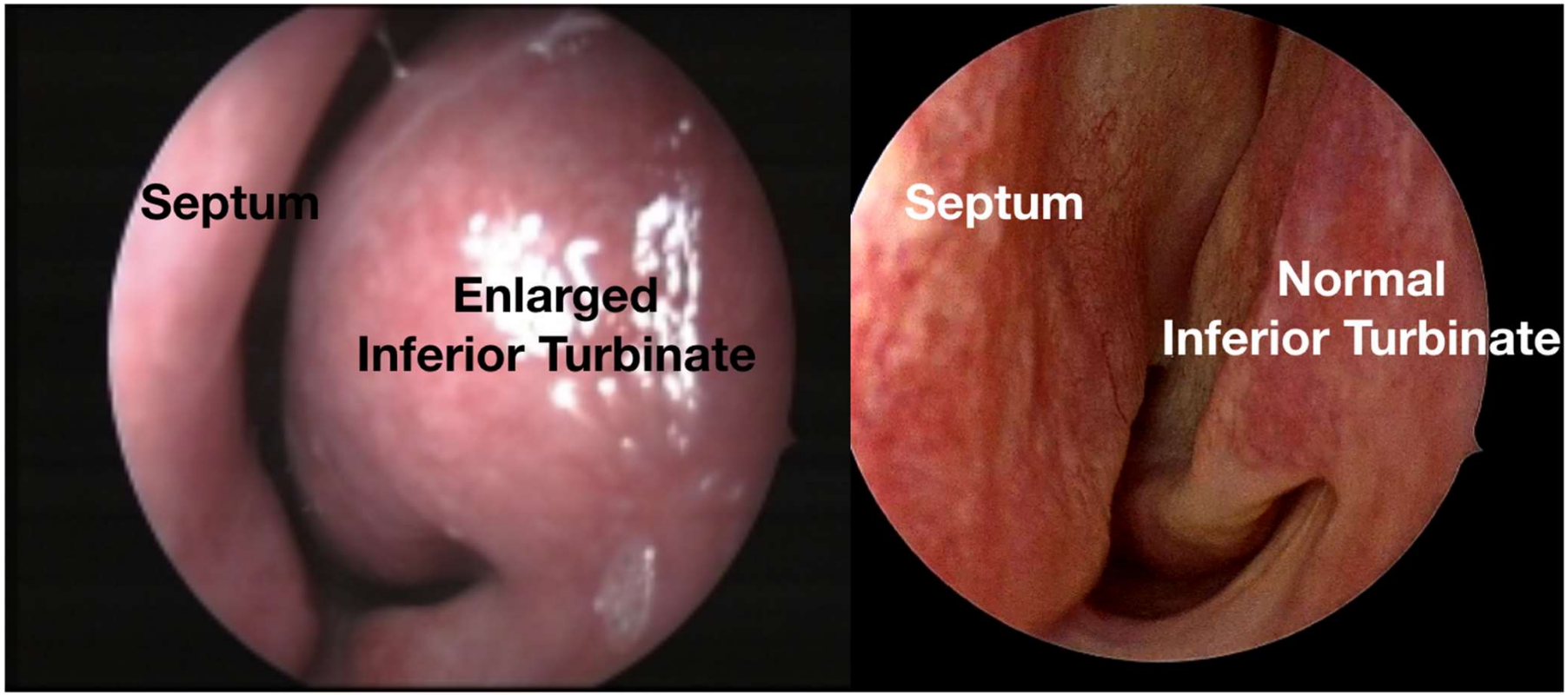
What to cover???

- Some allergy basics (not too much but important) Build a foundation
- What we are doing in the allergy office, refer
- A look at food allergy and what is new
- Some Tips and Tricks (40+ pearls)
- Questions

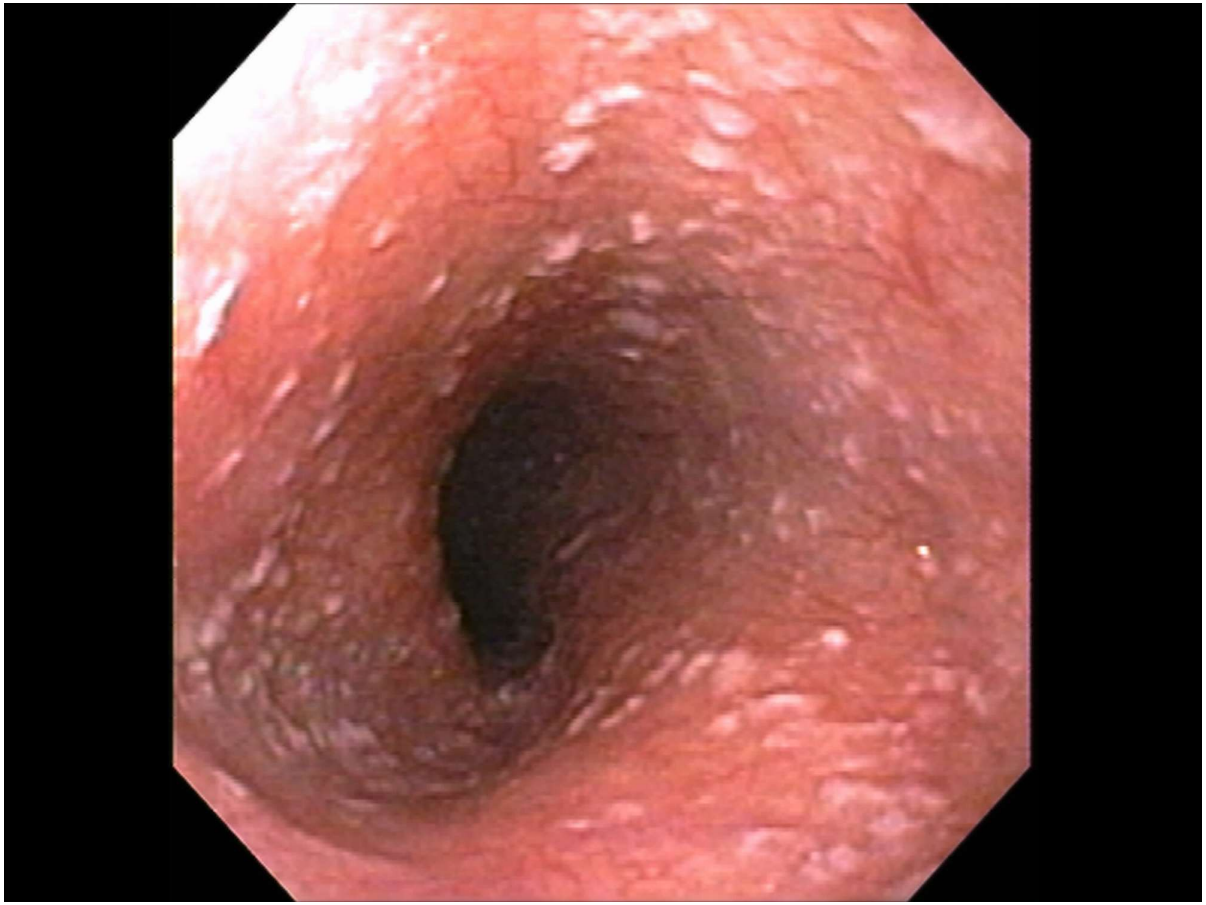


Why do we have allergic reactions?

Allergic Conjunctivitis



Allergic Rhinitis



Eosinophilic Esophagitis

Allergic Urticaria

Allergic Dermatitis (eczema)

Atopy

- Atopy is the genetic predisposition to make IgE antibodies in response to allergen exposure.

- Allergic rhinitis, allergic asthma, atopic dermatitis are the most common manifestation of atopy.

Allergy

- Type of hypersensitivity reactions of the immune system. Allergy may involve more the one type of reaction.

- An allergy is a reaction to something that is not harmful, but the body perceives it as dangerous, thus taking steps to rid the body of the substance.

Allergy

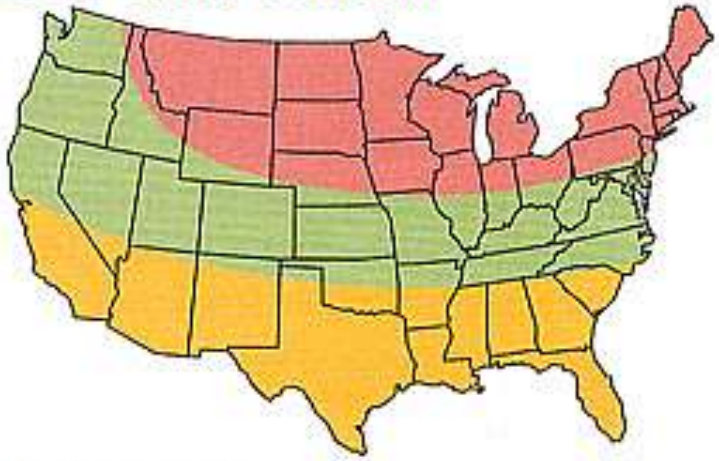
Risk factors

- Host factors: heredity, gender, race, and age.
- Environmental factors: infectious diseases during early childhood, environmental pollution, allergen levels.
- Food Factors: The lack of introduction of foods in the first year of life

Grass Pollen Season

- March to October
- April to September
- May to August

Tree Pollen Season



- January to June
- February to June
- March to June

Ragweed Pollen Season

- July to November
- August to October
- August to November

Weed Pollen Season

- April to November
- June to October
- July to October
- July to November

Source: American Academy of Allergy, Asthma and Immunology

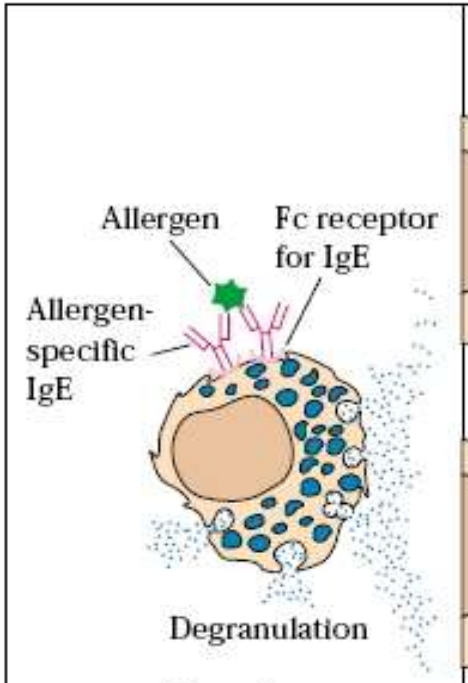
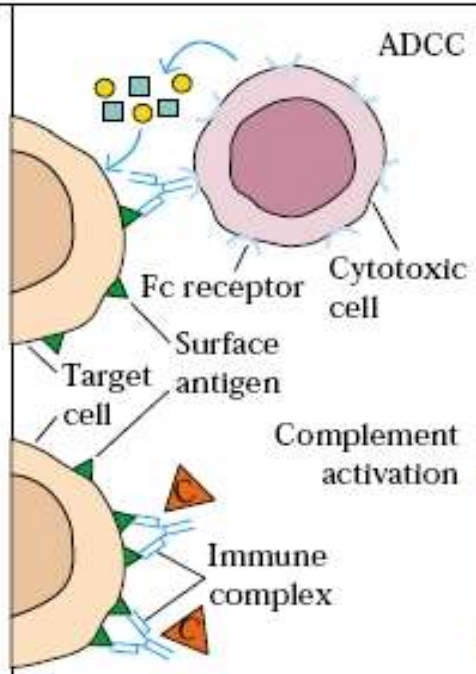
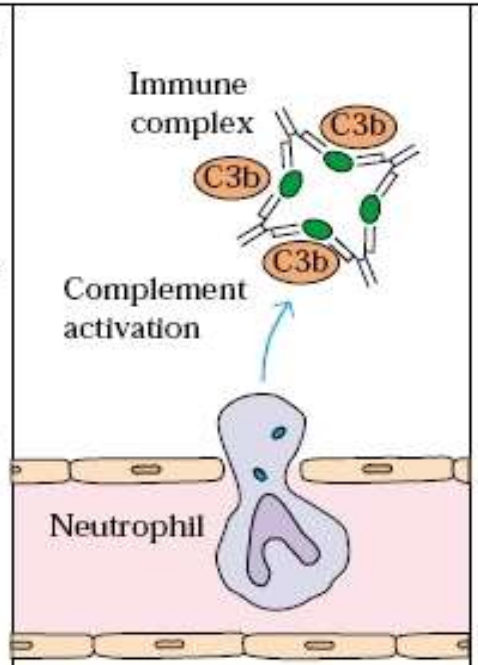
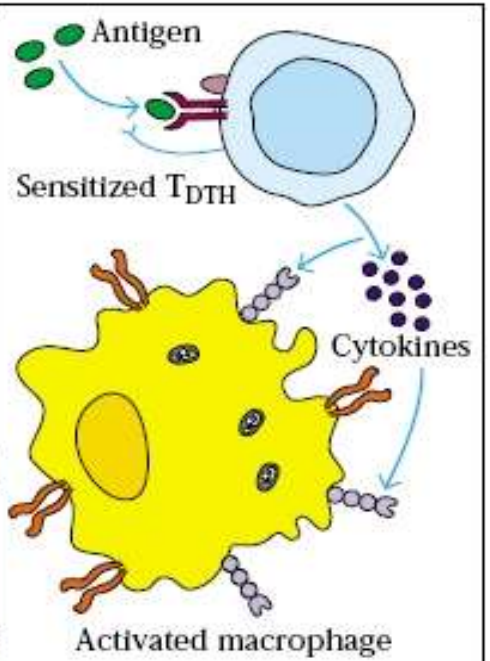
Hypersensitivity

- Hypersensitivity (hypersensitivity reaction) refers to undesirable immune reactions produced by the normal immune system.

- Hypersensitivity reactions require a pre-sensitized (immune) state of the host.

- Hypersensitivity reactions: four types; based on the mechanisms involved and time taken for the reaction, a particular clinical condition (disease) may involve more than one type of reaction.

Hypersensitivity Reactions

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

Hypersensitivity Reactions

Immediate

Common

Typical allergy

Type I
IgE-Mediated Hypersensitivity
Ag induces crosslinking of IgE bound to mast cells and basophils with release of vasoactive mediators
Typical manifestations include systemic anaphylaxis and localized anaphylaxis such as hay fever, asthma, hives, food allergies, and eczema

Hypersensitivity Reactions

Delayed

Contact dermatitis

Steroids typically needed

COVID vaccine reactions

Type IV
Cell-Mediated Hypersensitivity
Sensitized T_H1 cells release cytokines that activate macrophages or T_C cells which mediate direct cellular damage
Typical manifestations include contact dermatitis, tubercular lesions and graft rejection

Type IV

IgE Mediated: Type I

- Overreaction to an allergen that is contact through skin, inhaled through lung, swallowed or injected.

- Triggered by harmless substances such as; pollen, dust, animal danders, food, … can also occur as a result of drug or bee stings or stings from other insects (an allergen).

- An allergen; an antigen that causes allergy. Either inhaled, ingested, .. Can be complete protein antigens (Pollen and animal dander) or low molecular weight proteins.

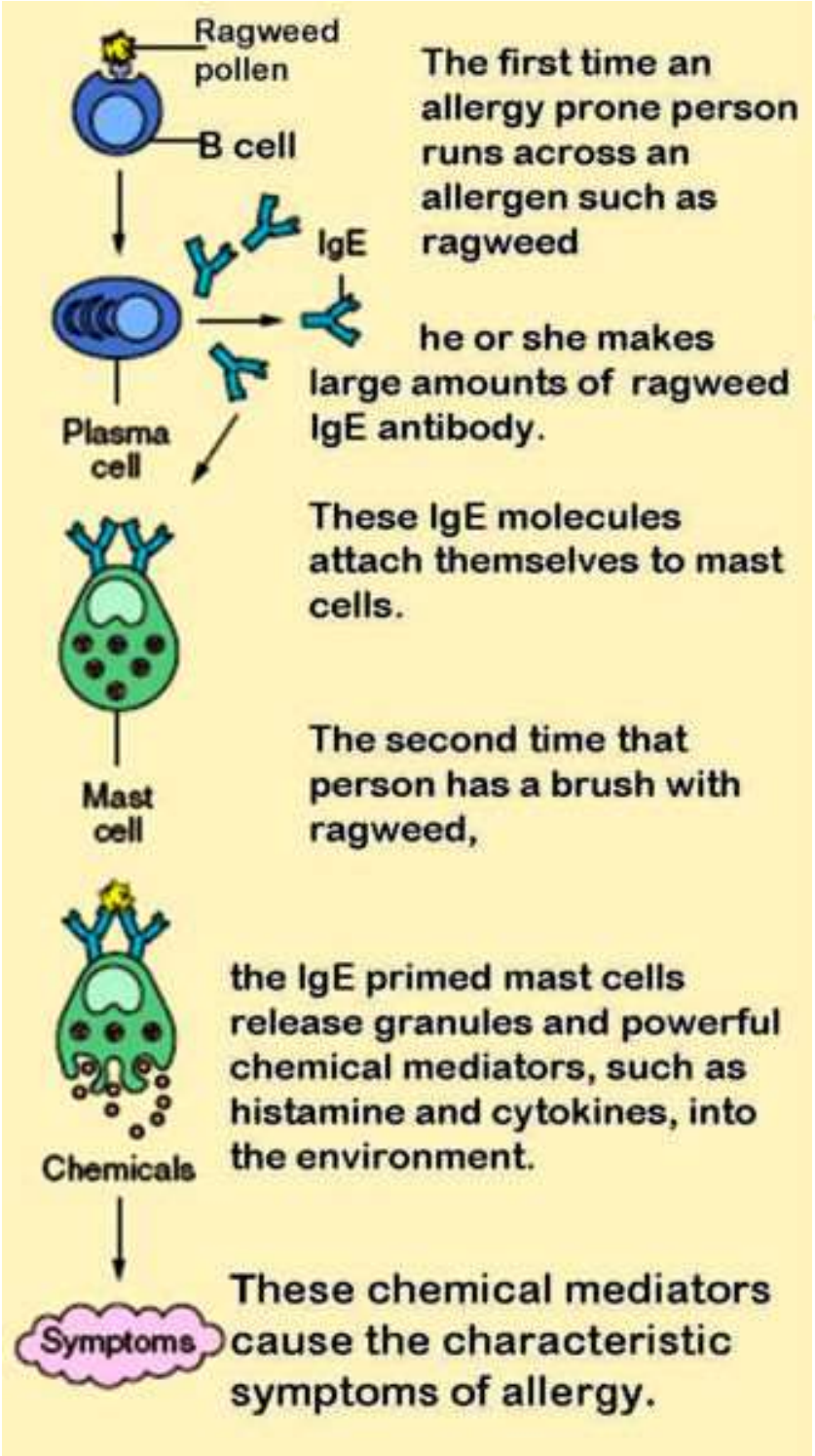
Type IV

- Quick note on this –
- This is DELAYED, this is not immediate
- This is what is called cell-mediated, just means that nothing happens fast, nothing is pre-made, the mediators are drawn to the area. Also drawn to the area are cells
- Antihistamines can help but if you need to change the way cells work, you need a steroid

Mechanism

- While first-time exposure may only produce a mild reaction, repeated exposures may lead to more serious reactions. Once a person is sensitized (has had a previous sensitivity reaction), even a very limited exposure to a very small amount of allergen can trigger a severe reaction.

- Most occur within seconds or minutes after exposure to the allergen, but some can occur after several hours, particularly if the allergen causes a reaction after it is partially digested. In very rare cases, reactions develop after 24 hours.



The first time an allergy prone person runs across an allergen such as ragweed

he or she makes large amounts of ragweed IgE antibody.

These IgE molecules attach themselves to mast cells.

The second time that person has a brush with ragweed,

the IgE primed mast cells release granules and powerful chemical mediators, such as histamine and cytokines, into the environment.

These chemical mediators cause the characteristic symptoms of allergy.

Mast Cell

- Mast cells are abundant in the mucosa of the respiratory, gastrointestinal tracts and in the skin

- Mast cells release mediator cause the pathophysiology of the immediate and late phases of atopic diseases.

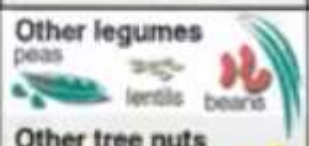
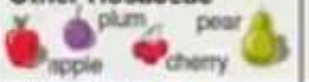
Primary Mediators

- Histamine: key mediator. Acts on histamine 1(H1) and histamine 2 (H2) receptors to cause: contraction of smooth muscles of the airway and GI tract, increased vascular permeability and vasodilation, nasal mucus production, airway mucus production, pruritus, cutaneous vasodilation, and gastric acid secretion.

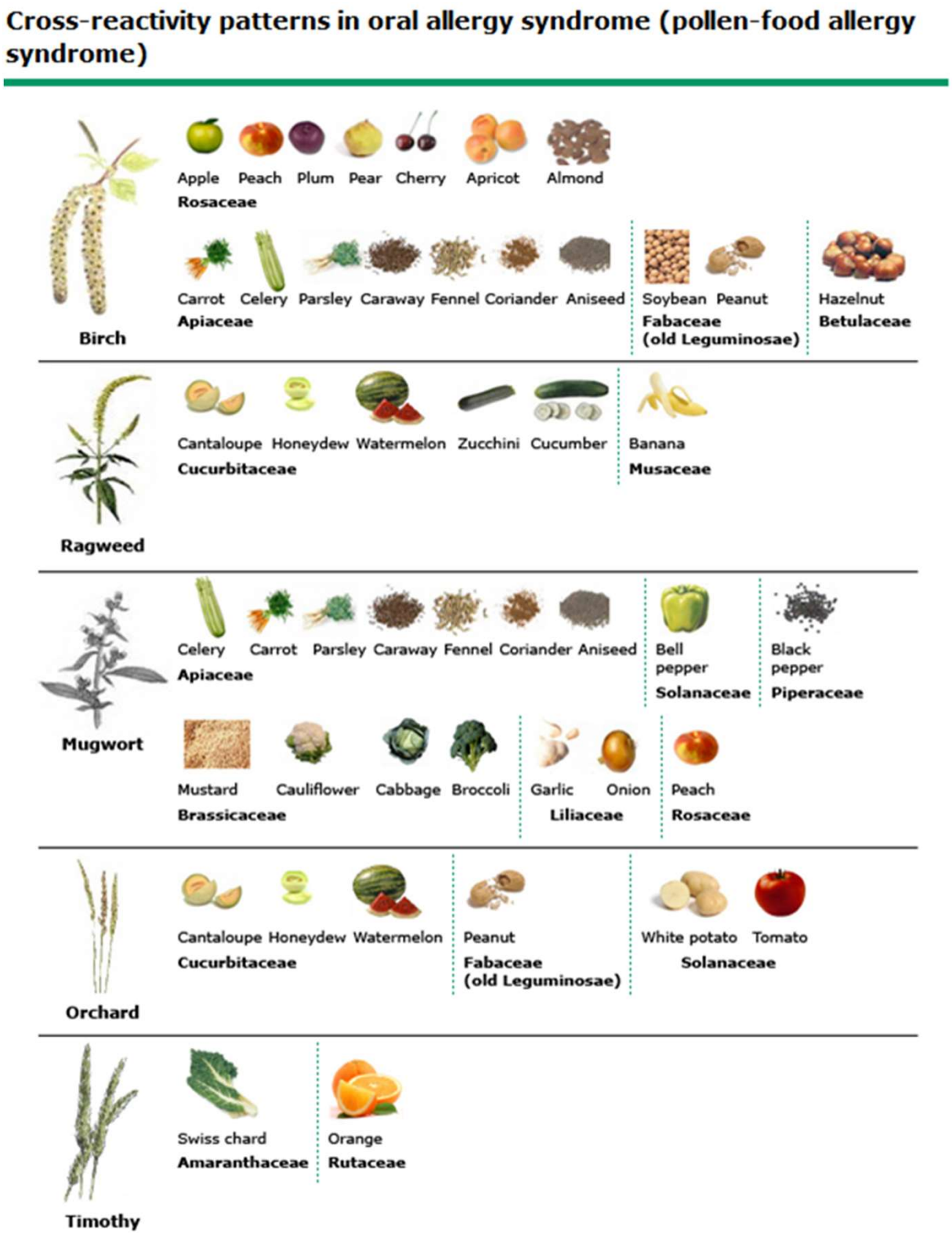
- Tryptase: is a major player in many allergic reactions, especially anaphylaxis. Testing for this can confirm an anaphylactic reaction.

Important Clinical Aspects of Immediate Hypersensitivity

Main organ	Disease	Main symptoms	Typical allergens	Route of entry
Lung	Asthma	Wheezing, dyspnea, tachypnea	Pollens, house dust, animal danders	Inhalation
Nose and Eyes	Rhinitis, conjunctivitis Hay fever	Runny nose, redness and itching of eyes	Pollens	Contact with mucous membrane
Skin	Eczema (atopic dermatitis) Urticaria	Pruritic, vesicular lesions Pruritic, bullous lesions	Uncertain Various foods Drugs	Uncertain Ingestion Various
Intestinal tract	Allergic GI issues	Vomiting diarrhea	Various food	Ingestion
Systemic	Anaphylaxis	Shock, hypotension, wheezing	Insect venom; honey bee Drugs; penicillin Foods; Peanuts	Sting Various Ingestion

If Allergic to:	Risk of Reaction to at Least One:	Risk:
A legume* 	Other legumes 	5% 
A tree nut 	Other tree nuts 	37% 
A fish* 	Other fish 	50% 
A shellfish 	Other shellfish 	75% 
A grain* 	Other grains 	20% 
Cow's milk* 	Beef 	10% 
Cow's milk* 	Goat's milk 	92% 
Cow's milk* 	Mare's milk 	4% 
Pollen 	Fruits/vegetables 	55% 
Peach* 	Other Rosaceae 	55% 
Melon* 	Other fruits 	92% 
Latex* 	Fruits 	35% 
Fruits 	Latex 	11% 

Oral Allergy Syndrome or Pollen-food overlap

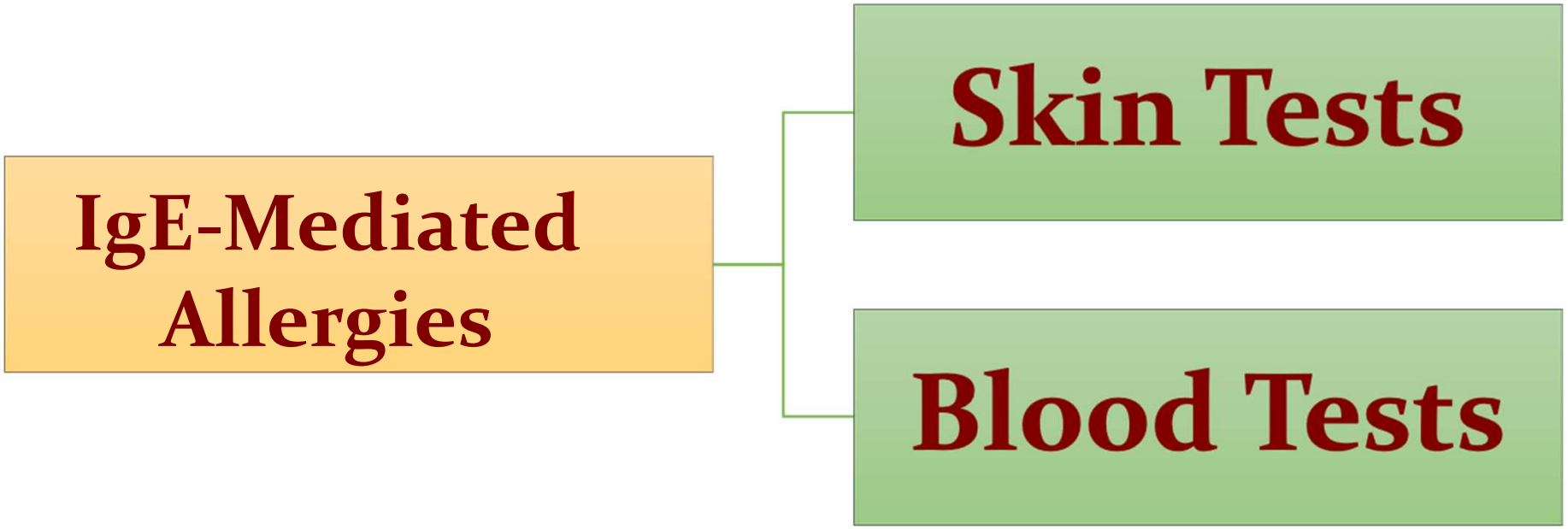


Allergy Testing

- Referral to an allergist for testing can be a life changing event for patients!

- Refer early in the atopic process for the best outcome possible

Laboratory Diagnosis

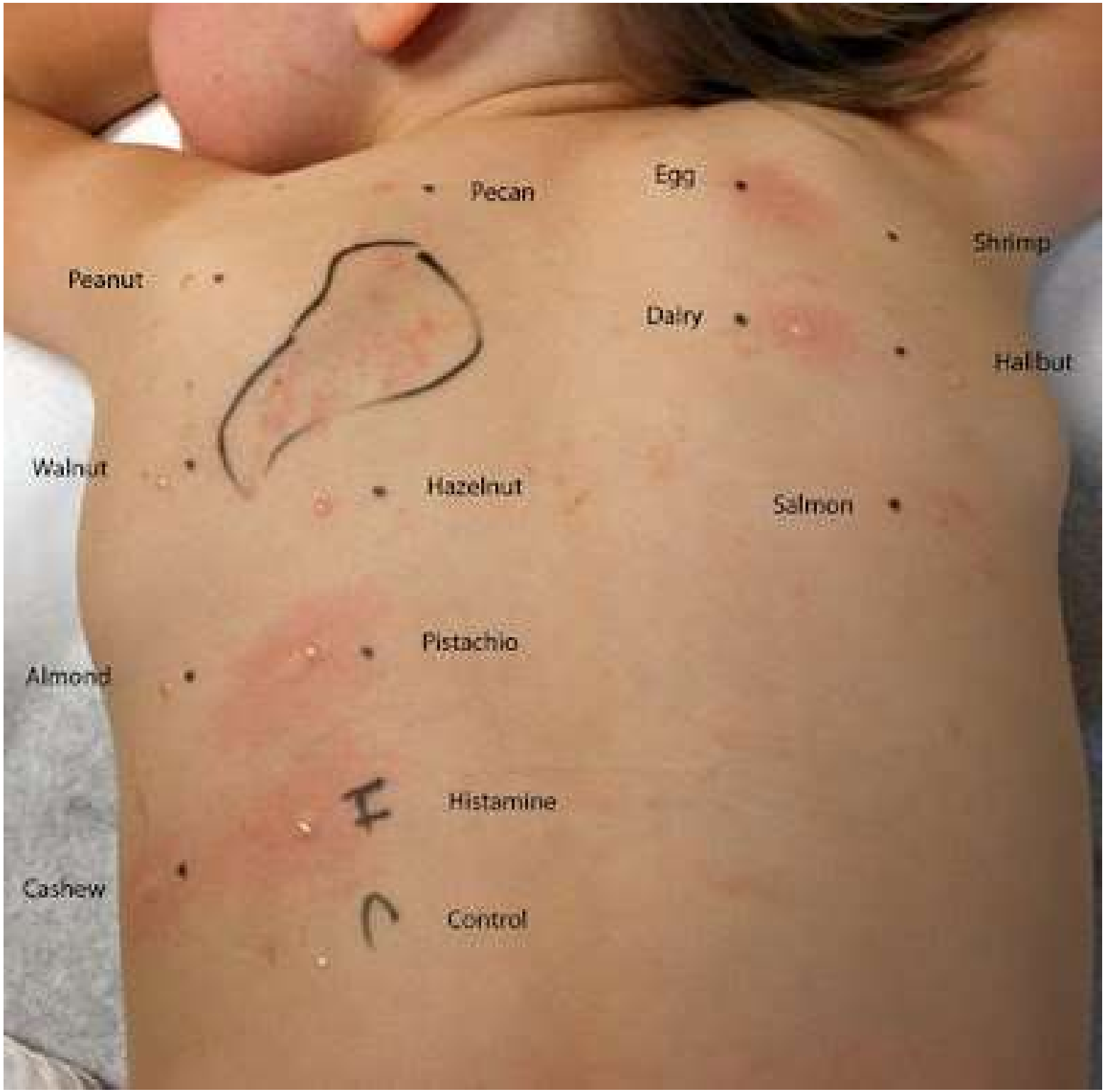


When is it a good time to order large panels of serum IgE (allergy) tests?

NEVER!

Skin Prick Test

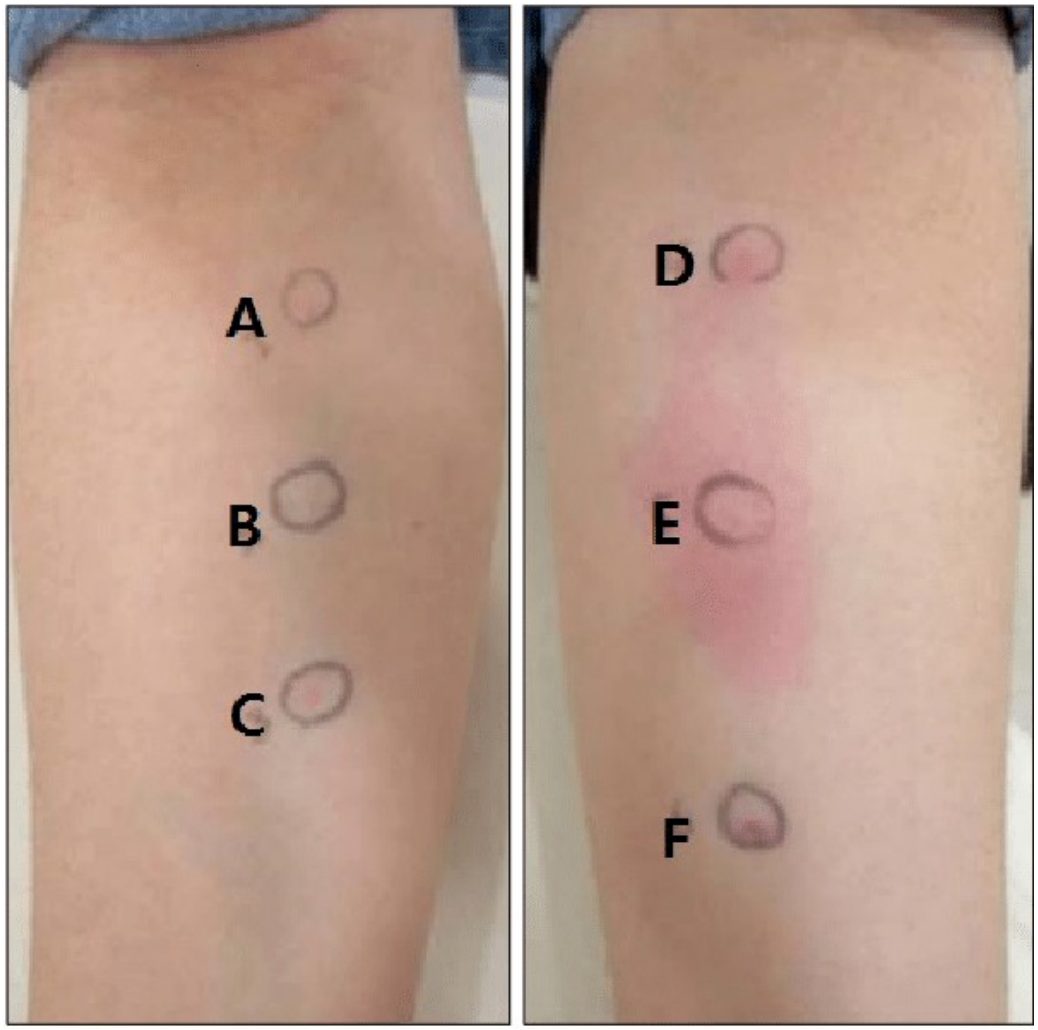
- Easy to administer: Done in the allergy office, readings available right away
- If you think about it ☺ have the patient stop antihistamines for 4 days prior
- Testing includes:
    - Outdoor – trees, grasses, weeds, any pollen that is a known allergen
    - Indoor – molds, pets, pests

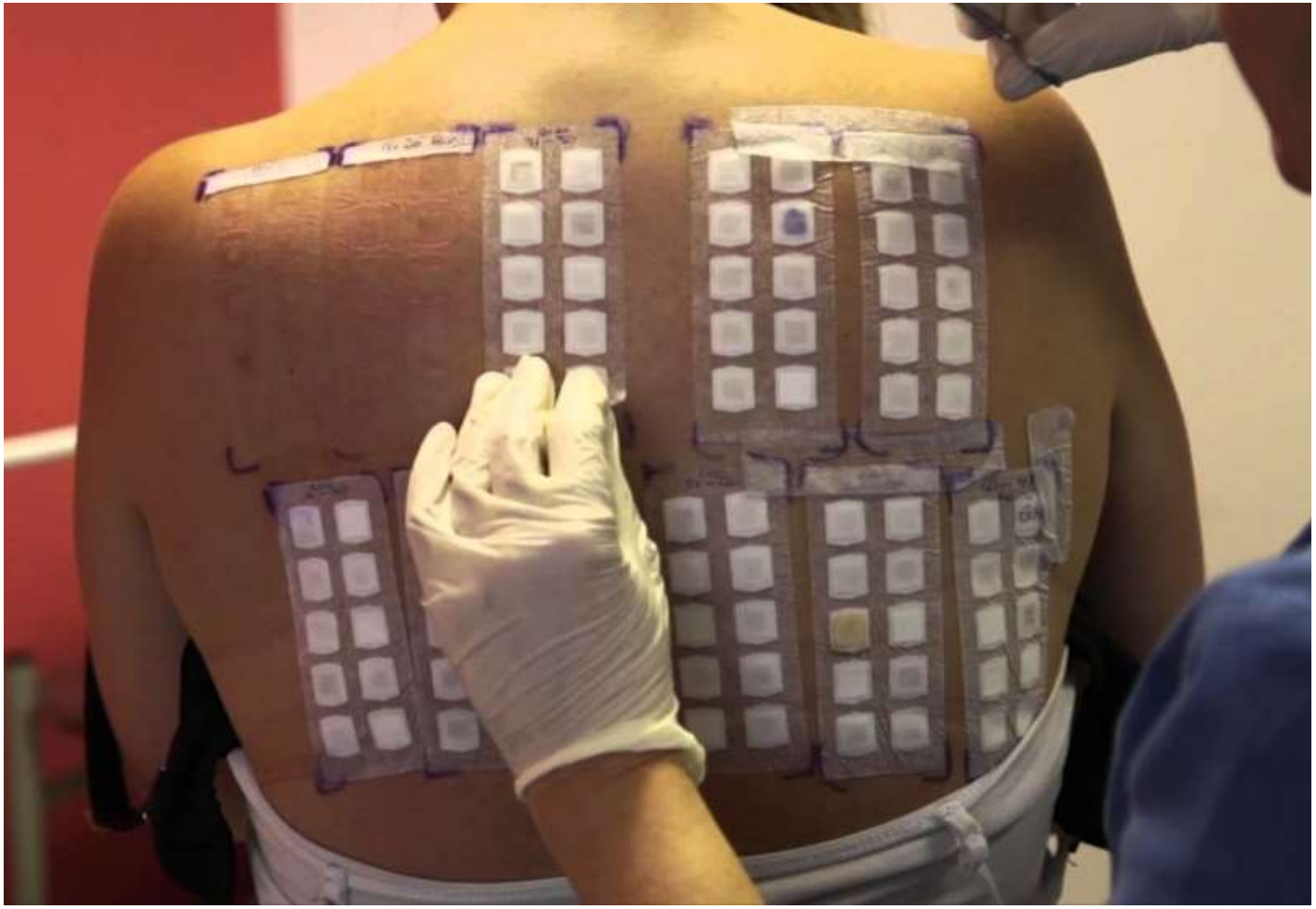

Pecan
Egg
Shrimp
Peanut
Dairy
Halibut
Walnut
Hazelnut
Salmon
Pistachio
Almond
Histamine
Cashew
Control

Intradermal testing

About 10 times stronger than skin prick testing

Can be helpful if other testing ambiguous





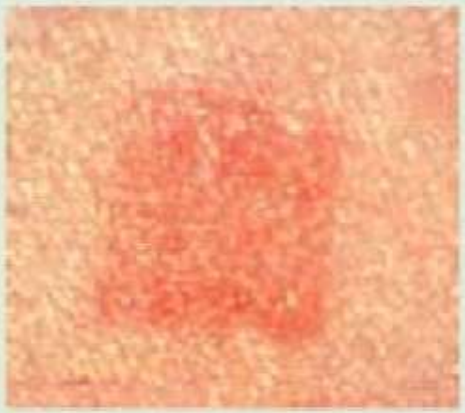
Patch Testing

Left on for 2-4 days

Great for contact allergens (stuff we touch)

Extreme positive
Coalescing
vesicles;
bulla

Strong positive
Erythema;
papules;
infiltration;
discrete vesicles



Weak positive
Erythema;
infiltration;
discrete papules

Doubtful
Faint or homo-
genous erythema;
no infiltration

Irritant
Discrete, patchy
or homogenous
erythema; no infiltration

Allergy Testing

- If there are positive tests, then allergy immunotherapy can be used for what often amounts to a CURE!

- Typical allergy shot plan would include weekly for a year, bi-weekly for a year (or so) and then monthly for 1-2 years

Laboratory Tests

- CBC can show elevated eosinophils
- Total serum IgE can be elevated as well

Food Allergies – What is New!

Think about two groups –

- Infants born with a high likelihood of having a peanut allergy

- Children through adults who already have had an anaphylactic reaction to a food (especially nuts)

PEANUT SNIFFING DOG

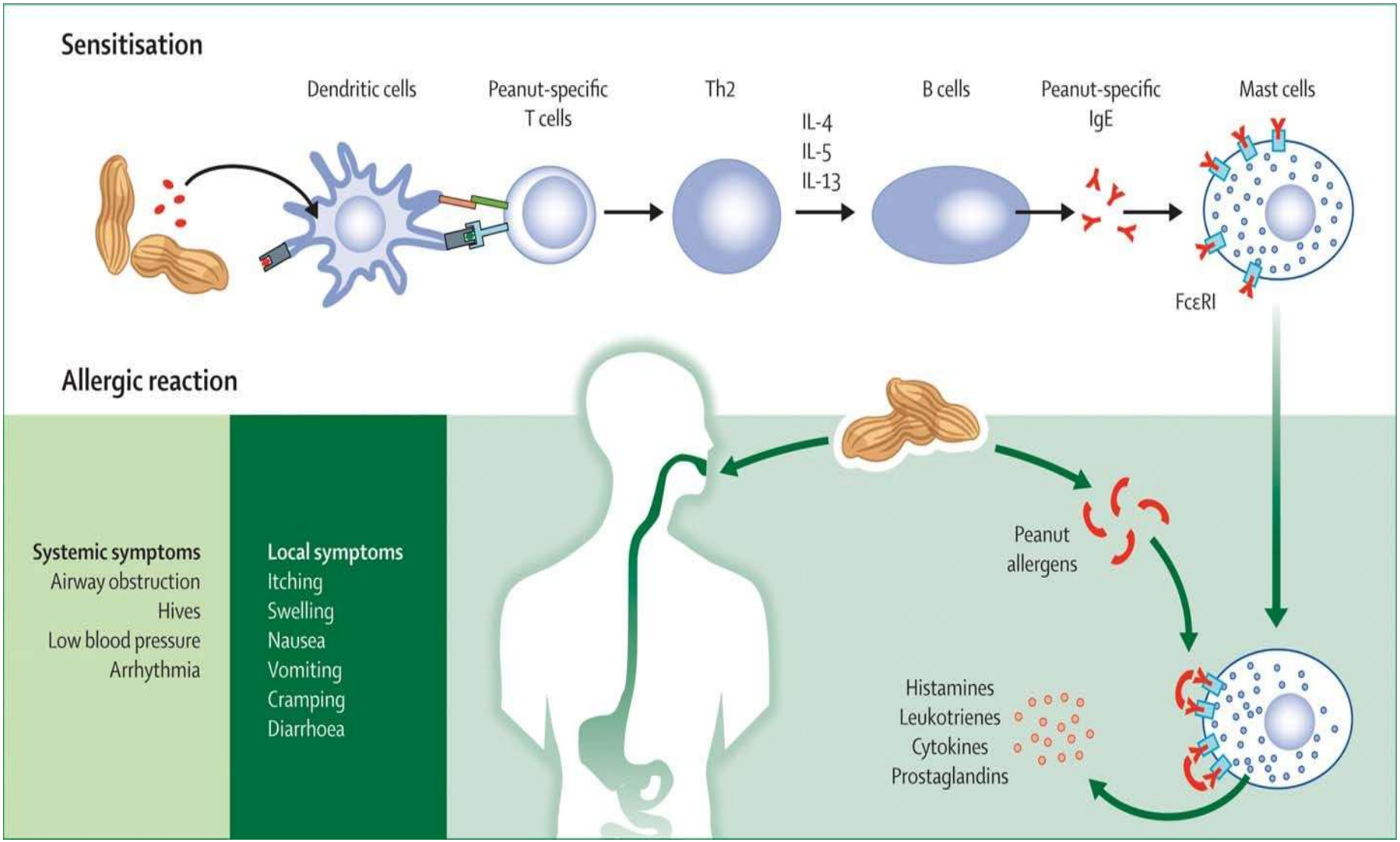
First Group

Infants with a high likelihood of having a peanut allergy

- Is there a way to reduce this risk SIGNIFICANTLY?

- What do we know from dogs for example?

Peanut Sensitization



Burks AW. Lancet 2008;371,9623:1538-1546

Incidence of Peanut Allergy

- 1-3 % of all children in the U.S. have a peanut allergy
- Doubled in the past 10 years in Western countries
- Peak incidence is by one year of age
- Only 20% of children outgrow a peanut allergy
- Question – what percent of children outgrow milk allergy?

Osborne NJ, Koplin JJ, et. al., Prevalence of challenge – proven IgE – mediated food allergy using population based sampling and predetermined challenge criteria in infants. J. Allergy Clin Immunol. 2011;127(3):668.

WHO IS AT HIGHEST RISK?

- Family history of food allergy
- Moderate – severe atopic dermatitis
- Egg allergic
- History of other allergic diseases, for example, children with allergic asthma

Randomized trial of peanut consumption in infants at risk for peanut allergy

> *DuTort G., Roberts, G., etal. Randomized trial of peanut comsumption in infants at risk for peanut allergy. N Engl J Med. 2015;372(9):803*

STUDY RESULTS

- 530 Infants in the intention to treat
  - At 60 months
    - 13.7% in the avoidance were peanut allergic
    - 1.9% in the consumption group (P<0.001)

DuTort G, Roberts G., et al. , Randomized trial of peanut consumption in infants at risk for peanut allergy. N.Engl J Med. 2015; 372(9):803

CONCLUSION

- “ THE EARLY INTRODUCTION OF PEANUTS SIGNIFICANTLY DECREASED THE FREQUENCY OF THE DEVELOPMENT OF PEANUT ALLERGY AMOUNG CHILDREN AT HIGH RISK FOR THIS ALLERGY”

DuTort G, Roberts G., et al. , Randomized trial of peanut consumption in infants at risk for peanut allergy. N.Engl J Med. 2015; 372(9):803

2016 NIAID FOOD GUIDELINES UPDATE

Addendum Guideline	Infant Criteria	Recommendations	Earliest Age of Peanut Introduction
1	Severe eczema, egg allergy, or both	Strongly consider evaluation with peanut-specific IgE and/or skin prick test and, if necessary, an oral food challenge. Based on test results, introduce peanut-containing foods.	4 to 6 months
2	Mild to moderate eczema	Introduce peanut-containing foods.	Around 6 months
3	No eczema or any food allergy	Introduce peanut-containing foods.	Age-appropriate and in accordance with family preferences and cultural practices

Boyce JA, et al. J Allergy Clin Immunol 2017; 139:29-44

PEANUT containing products for infants

5 EASY WAYS TO INTRODUCE PEANUT FOODS TO YOUR INFANT

preventpeanutallergies.org

1 MIX WITH WATER, FORMULA OR BREAST MILK

Thin 2 tsp. of peanut butter with 2-3 tsp. hot water, formula or breast milk. Allow to cool before serving.

2 MIX WITH FOOD

Blend 2 tsp. of peanut butter into 2-3 Tbsp. of foods like infant cereal, yogurt (if already tolerating dairy), pureed chicken or tofu.

3 MIX WITH PRODUCE

Stir 2 tsp. of powdered peanut butter into 2 Tbsp. of previously tolerated pureed fruits or vegetables.

4 PEANUT SNACKS

Give your baby a peanut-containing teething food, such as peanut puffs.

5 TEETHING BISCUITS

Teething infants who are older and self-feeding may enjoy homemade peanut butter teething biscuits. Find a recipe for teething biscuits at **nationalpeanutboard.org**

Remember:

The recommended way to introduce baby-friendly peanut foods depends on each child's individual risk factors. Depending on your child's risk, peanut foods should be introduced according to NIAID guidelines after they've already started other solid foods. Whole nuts should not be given to children under 5 years of age. Peanut butter directly from a spoon or in lumps/dollops should not be given to children less than 4 years of age. This content is not intended to be a substitute for professional medical advice, diagnosis or treatment. Always seek the advice of your pediatrician.

Second Group

Any person with a known anaphylactic food reaction

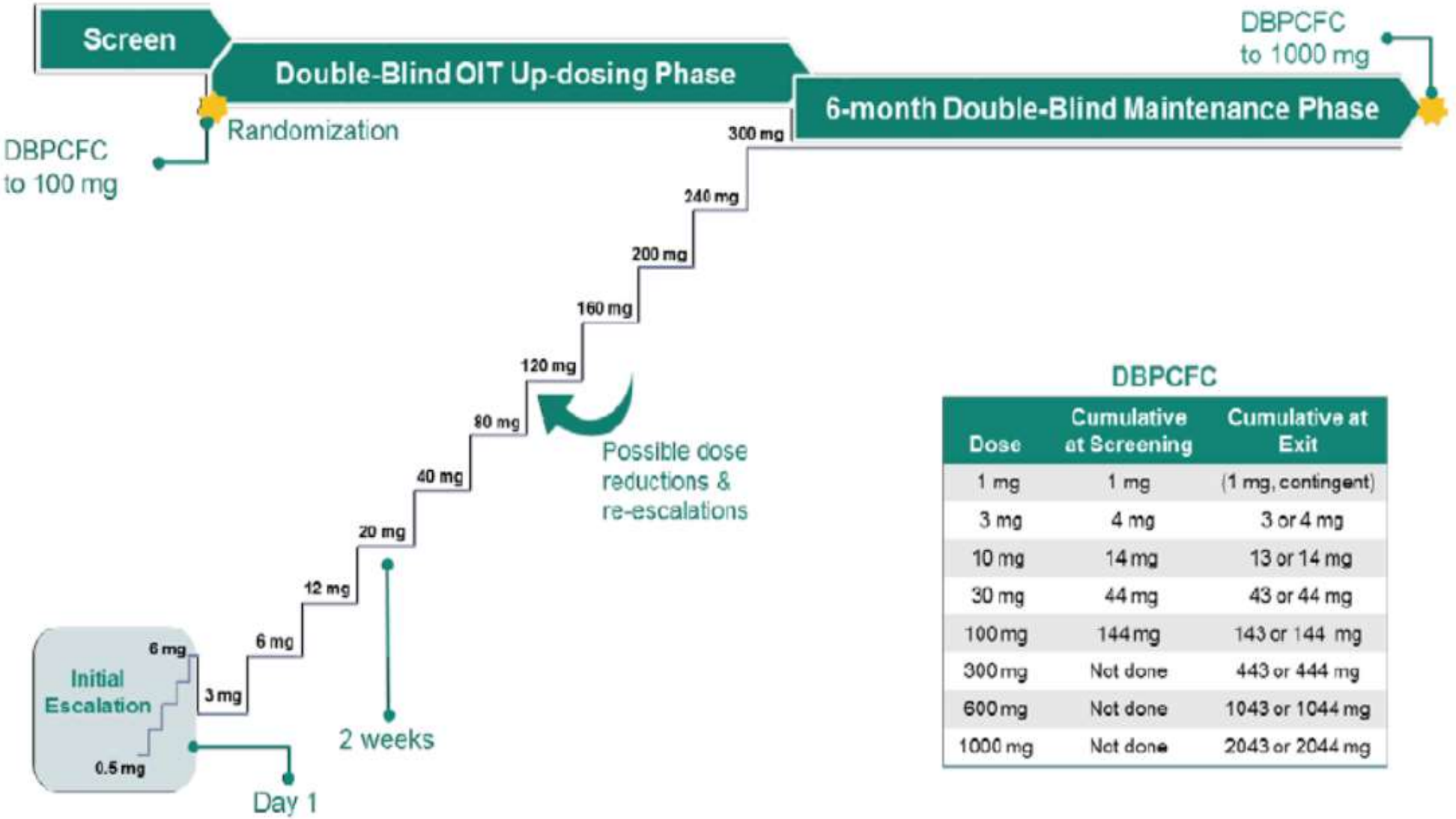
- Can we treat this like a pollen or pet allergy?
- Can we take away the very real fear?

Second Group

Any person with a known anaphylactic food reaction

- The goal is to desensitize the patient to achieve tolerance
- The goal is not to allow unrestricted peanut consumption but rather to make accidental exposure harmless

Peanut Trials



DBPCFC

Dose	Cumulative at Screening	Cumulative at Exit
1 mg	1 mg	(1 mg, contingent)
3 mg	4 mg	3 or 4 mg
10 mg	14 mg	13 or 14 mg
30 mg	44 mg	43 or 44 mg
100 mg	144 mg	143 or 144 mg
300 mg	Not done	443 or 444 mg
600 mg	Not done	1043 or 1044 mg
1000 mg	Not done	2043 or 2044 mg

Second Group

Any person with a known anaphylactic peanut reaction

- By slowly increasing the amount ingested tolerance is achieved
- 90% of all accidental peanut exposures are less than 600mg

Second Group

Any person with a known anaphylactic food reaction

Palforzia™

Peanut (*Arachis hypogaea*)
Allergen Powder-dnfp

Take Home

- High risk infants need to have peanut introduced early – 80% percent reduced risk of a life-threatening peanut allergy

- If anyone over the age of 3 has a serious food allergy, refer if desensitization is desired.

Brian Bizik, 8/23/2020

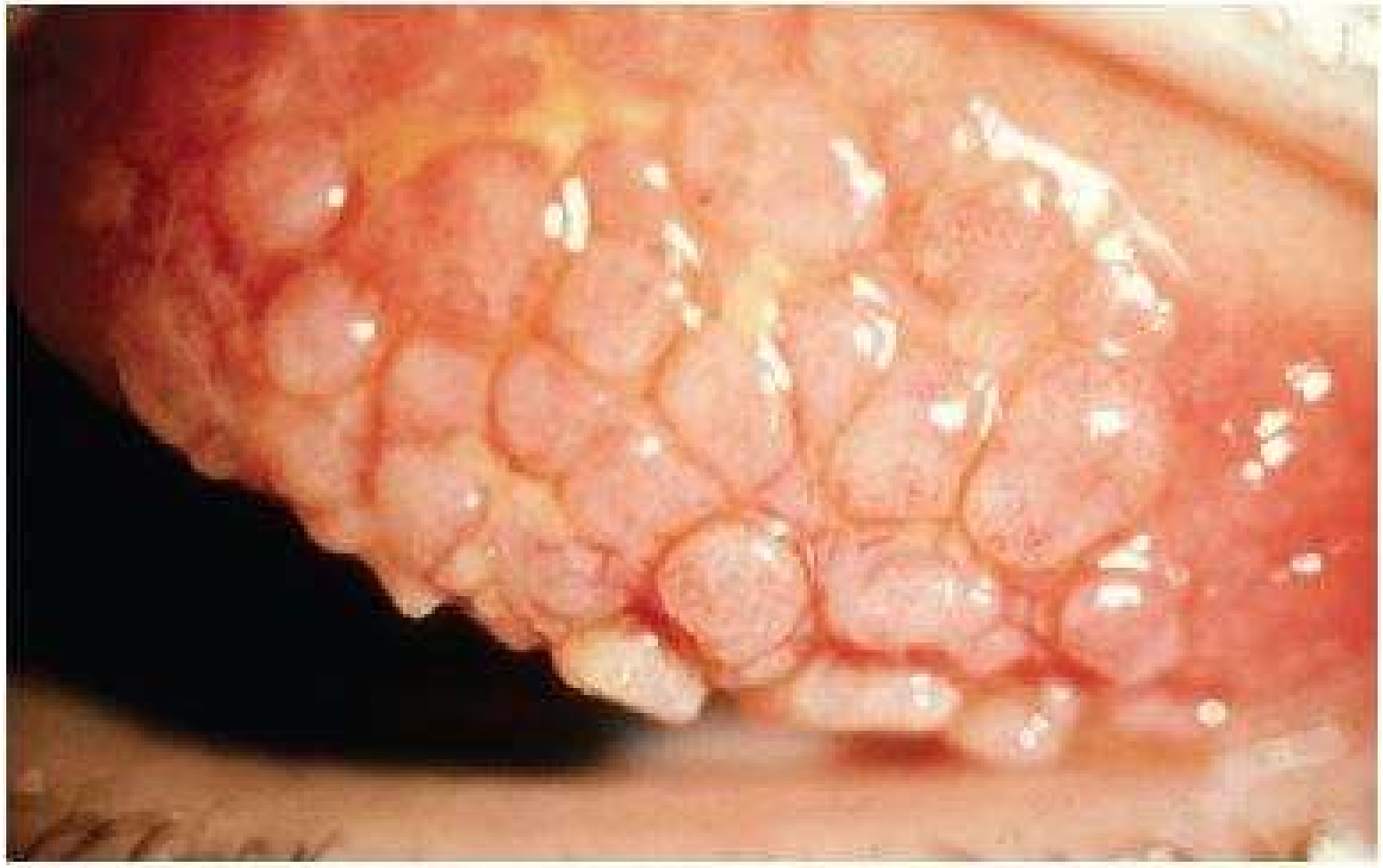
BB

Allergic Conjunctivitis

Tips and Tricks
Allergic Conjunctivitis

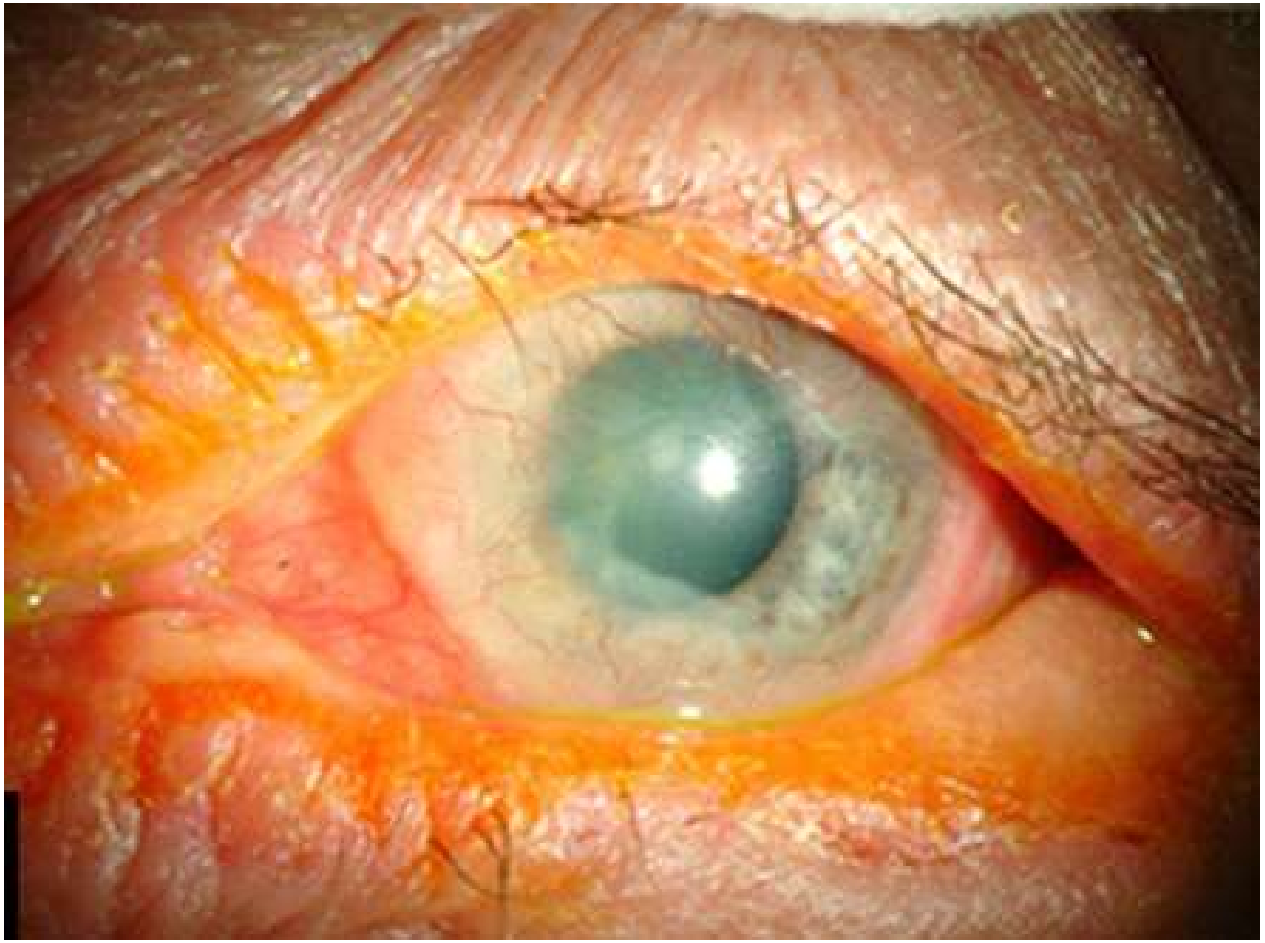
- PO antihistamines and nasal sprays do little for eye symptoms.
- Pataday or any form of the active ingredient olopatadine is great.
- Pataday just went OTC so is reasonably priced.
- Keep these drops in the fridge, the cooler drops feel wonderful and the bottle is good for 3 years or so when refrigerated.
- Zatidor eye drops work differently, can use both
- Ketorolac eye drops can be wonderful!

Tips and Tricks
Allergic Conjunctivitis

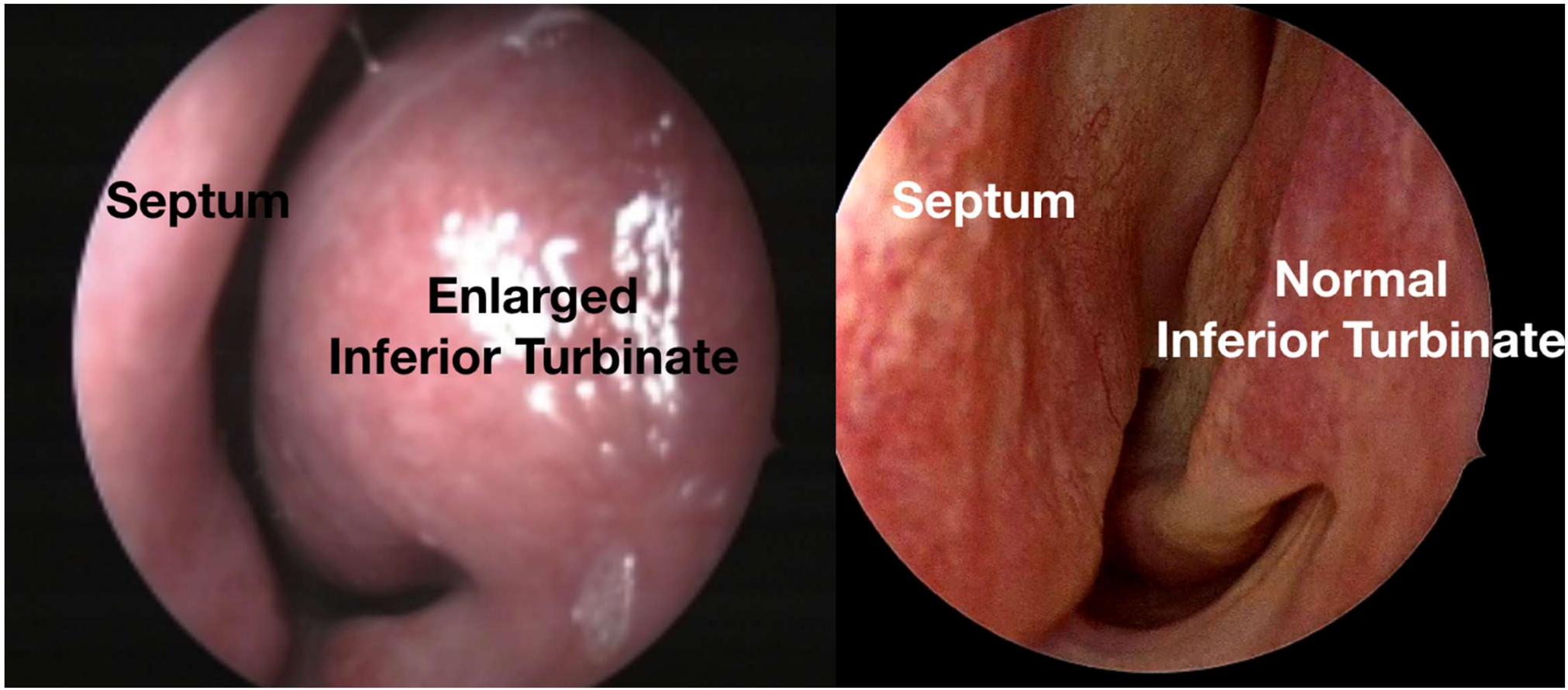


Severe disease, look under the lid

Allergic Conjunctivitis



Severe disease, look at the eye
These patients need topical NSAIDs and Steroids



Allergic Rhinitis

Tips and Tricks

- Antihistamines – the base to all treatment for seasonal allergies and the base for chronic allergic issues
  - Sedating are good at night –
  - First Generation – all have anticholinergic properties

Antihistamine	Generation and classification	Common trade names
Chlorpheniramine	First, sedating	Chlor-Trimeton
Brompheniramine	First, sedating	Dimetapp
Diphenhydramine	First, sedating	Benadryl
Cetirizine	Second, nonsedating	Zrytec
Levocetirizine	Second, nonsedating	Xyzal
Loratadine	Second, nonsedating	Claritin
Desloratadine	Second, nonsedating	Clarinex
Fexofenadine	Second, nonsedating	Allegra

Tips and Tricks

- Non sedating for the day –
  - Zyrtec (cetirizine) best, strongest – 10 mg is fine for mild allergies but fine to go to 20 mg either QD or 10 mg BID
  - Claritin (loratadine) – good, same dosing at Zyrtec
  - Allegra – a bit weaker but the least sedating of all – 180 mg or 360 mg

Notes – ok to mix and match, ok to take BID or QD, MUCH better when taken every day – in fact not worth much for severe allergies if taken prn.

For urticaria, either chronic or sporadic these are also the base of therapy

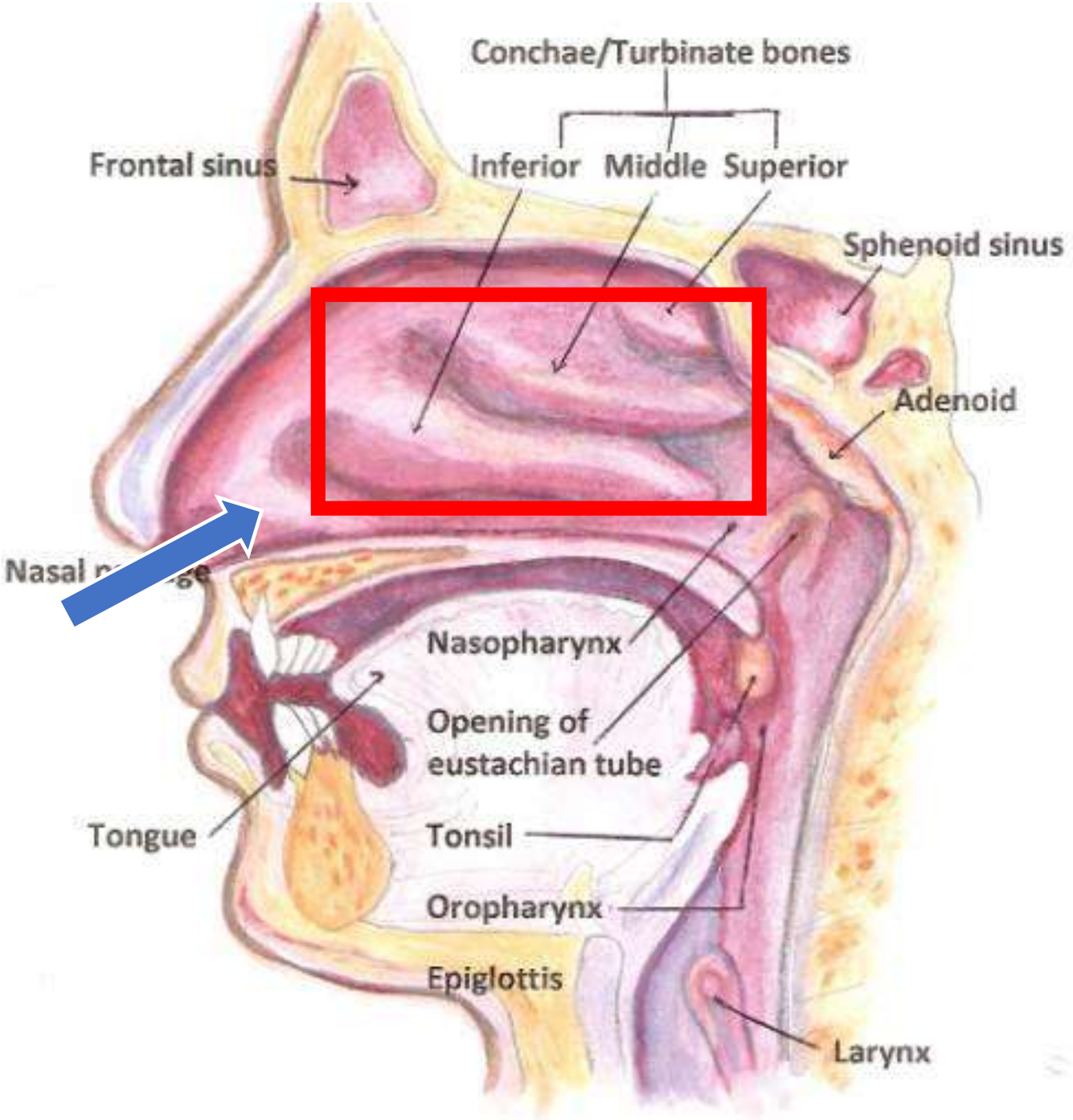
Tips and Tricks
Allergic Rhinitis

- Nasal Steroids
  - All work great, use daily or BID
  - Make sure to use the opposite hand technique and avoid hitting the septum – where the blood vessels

Tips and Tricks

Head level or sniffing position
Don’t inhale

The Approach



Tips and Tricks
Allergic Rhinitis

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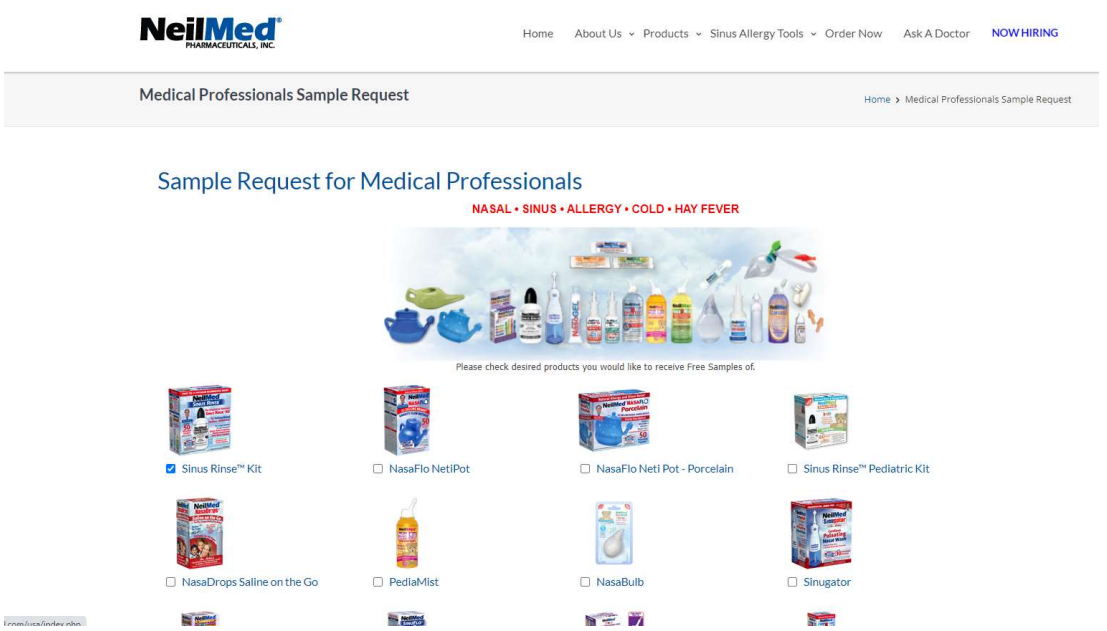
Tips and Tricks

Tips and Tricks



https://www.neilmed.com/usa/samplerequest.php

Choose a one-quart glass jar that is thoroughly cleansed.

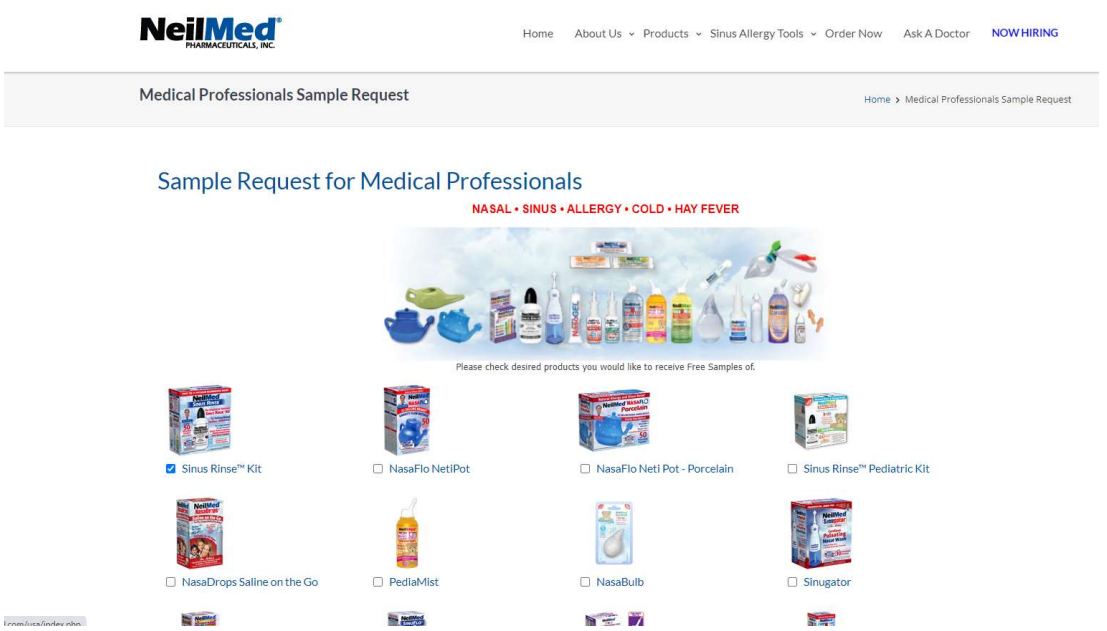
Fill it with distilled or bottled water. It should not contain chlorine or other chemicals in high concentrations.

Add 2-3 heaping teaspoons of pickling/canning salt, not table salt as it contains a large number of additives.

Add 1 teaspoon Arm & Hammer Baking Soda (pure bicarbonate).

Mix ingredients together and store them at room temperature. Discard after one week.

Tips and Tricks



Prescription budesonide in the irrigation bottle works great

Adding in mupirocin ointment? No data but likely not harmful

Ipratropium bromide nasal ALWAYS works to dry things up

amazon assistant 30-Day Price Tracker

‹ Back to results

Click image to open expanded view

$21.98
& **FREE Shipping**

Arrives: **April 6 - 10**
Fastest delivery: **April 2 - 7**

Deliver to Brian - Boise 83705

Only 12 left in stock - order soon.

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Ad feedback

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Kirkland Signature Aller-FEX, 180 Mg 180 Tablets
729
$45.97
prime FREE Delivery **Sun, Apr 5**
Only 17 left in stock - order soon.
More Buying Choices
$44.13 (12 new offers)

ValuMeds 24-Hour Allergy Medicine (100-Count) Fexofenadine HCl Tablets | Non-Drowsy Antihistamine | Pollen, ...
1,050
$18.99 ($0.19/Count) $19.99
Save 5% more with Subscribe & Save
prime FREE Delivery **Sat, Apr 4**

Allegra Adult 24 Hour Allergy Relief 70-Count Long-Lasting Fast-Acting Antihistamine for Noticeable Relief from Indoor ...
2,131
More Buying Choices
$34.48 (10 new offers)

Kirkland Signature Aller-Fex , 180 mg 150 Tablets
711
$48.99 ($0.33/Count)
FREE Shipping
Only 9 left in stock - order soon.

Allergic Urticaria

Often will use “histamine blockade”

BID Zyrtec 10 mg
BID Ranitidine 150 mg
Often start with 4 days of prednisone, 40 mg for 2 days then 20 mg for 2 days

10 FAACTs *about* Food Allergies

1. Food allergies affect **15-32 million** Americans, including 6 million children. Studies report that **1 in 13** children and up to **1 in 10** adults in the United States have a food allergy. For children, this averages to **two** children per classroom.
2. A food allergy is an **immune system response** to a food that the body mistakenly believes is harmful.
3. Eight foods account for 90% of all food allergy reactions: **Peanuts, Tree nuts, Milk, Egg, Wheat, Soy, Fish, & Shellfish**. However, almost any food can cause a reaction.
4. There is **no cure** for food allergies and **strict avoidance** is the only way to prevent an allergic reaction.
5. **Trace amounts** of an allergen can trigger an allergic reaction in some individuals. Past reactions to a food allergy **do not predict future reactions**! Someone can still have a life-threatening reaction to a food they are allergic to, even if they have never had a serious reaction before.
6. Symptoms can **develop rapidly** after exposure to an allergen, often within minutes and usually within 30 minutes. However, it can take up to 2 hours for symptoms to occur after exposure to a food allergen.
7. Anaphylaxis is a **serious allergic reaction** that comes on quickly and has the potential to become life-threatening. Anaphylaxis requires immediate medical treatment, including an injection of epinephrine and a visit to the emergency room.
8. It is important to be deliberate and not hesitate when you have to use epinephrine. The device is **potentially life-saving**. A call to 9-1-1 and a trip to the emergency room should always follow epinephrine administration.
9. Individuals at risk should carry **two epinephrine auto-injectable devices** with them at all times AND an **Allergy and Anaphylaxis Emergency Care Action Plan** signed by a board-certified allergist.
10. **Food allergies continue to rise** and are a safety and public health concern across the United States. You can get free resources and find out how to help keep those with food allergies safe at:

www.FoodAllergyAwareness.org

FAACT
Food Allergy & Anaphylaxis Connection Team
AWARENESS • ADVOCACY • EDUCATION
www.FoodAllergyAwareness.org

SafeFARE: Chef Card Template

How to use your chef card: In addition to asking a lot of questions about the ingredients and preparation methods, carry a "chef card" that outlines the foods you must avoid. Present the card to the chef or manager for review.

Fold your card in half, then tape it together and store in your wallet. You can even laminate it to make it more durable. Be sure to make several copies in case you forget to retrieve it from the restaurant or to store in multiple locations.

This is an interactive PDF that will allow you to type your allergens directly onto the chef card.

FOLD HERE

Food Allergy Alert

I have severe food allergies. In order for me to avoid a **life-threatening** reaction, I **must avoid** all foods that contain:

Food Allergy Alert

Please make sure that my food does not contain any of the ingredients on the front of this card, and that any utensils and equipment used to prepare my meal, as well as prep surfaces, are fully cleaned immediately before using. **THANK YOU for your help.**

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FOLD HERE

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RESOURCES FOR CLINICIANS

- Local allergist
- American Academy of Allergy, Asthma and Immunology (AAAAI) – www.aaaai.org
- American College of Allergy, Asthma and Immunology (ACAAI) – www.acaai.org
- FARE (Food Allergy Research Education) – www.foodallergy.org

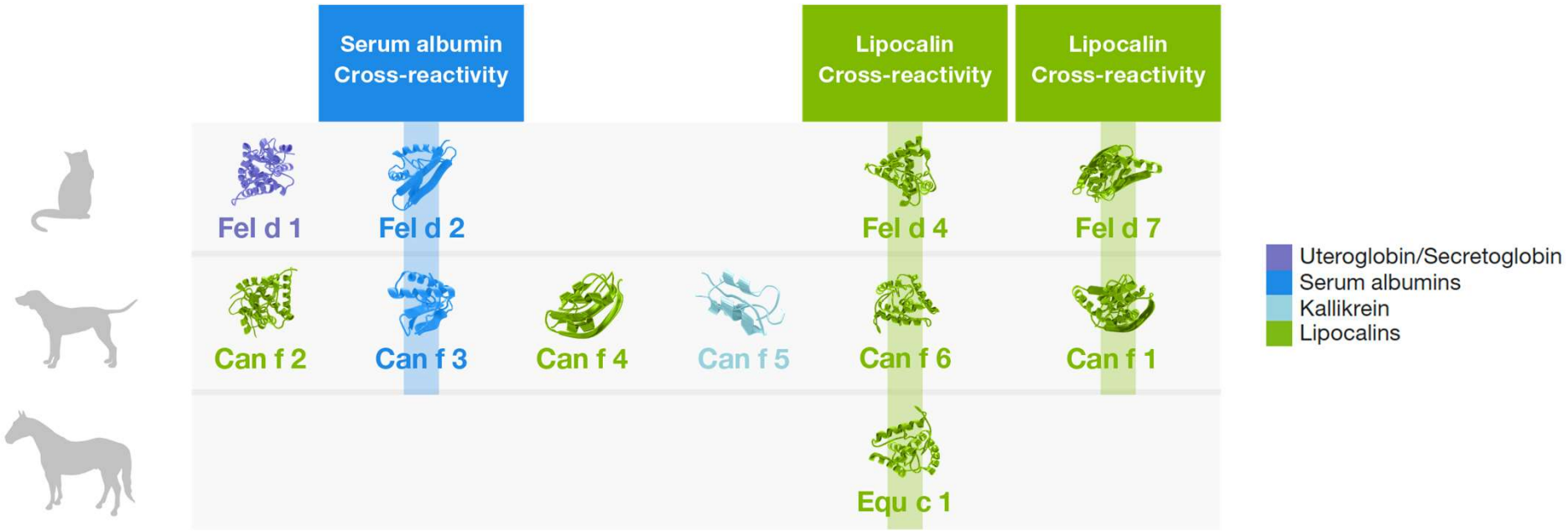
Topics if time…

- Penicillin Allergy – this does not really exist much. 95% of the people with a documented PCN allergy in the chart can safely take PCN containing medications.

- If no anaphylaxis, if treatment for the allergic reaction was not needed and if reaction was more than 5 years ago the number goes to near 99% an tolerate.

- But since this causes much fear, the best thing is to send for PCN allergy testing if you can, especially kids with recurrent OM or tonsillitis.

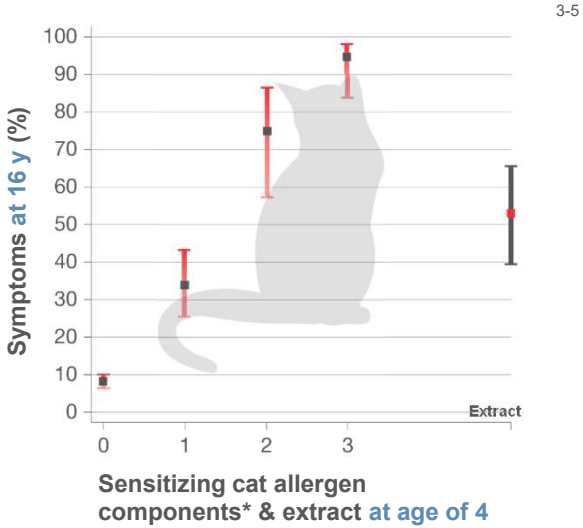
Provide a More Precise Diagnosis[1]



110804.AL.US1.EN.v1.2020

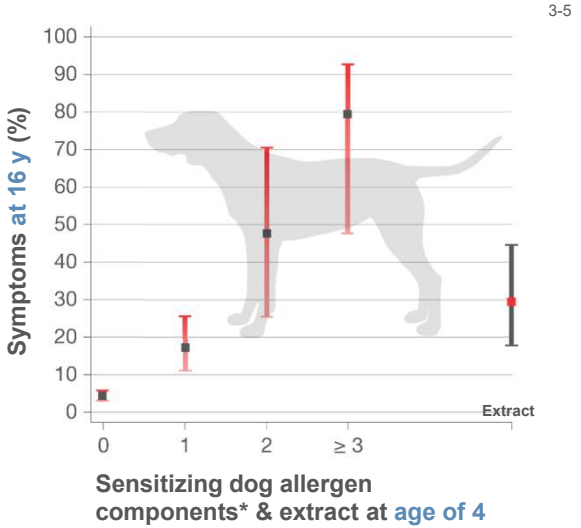
1. Matricardi P.M. et al. EACCI Molecular Allergology User's Guide P.M. et al PAI 2016;27(suppl23): 1-250

Help Predict Asthma Severity and Development[1]



Sensitizing cat allergen components* & extract at age of 4

Polysensitization at age 4 predicts risk for rhinitis, conjunctivitis and asthma at age 16.[5]



Sensitizing dog allergen components* & extract at age of 4

**n= 779 from BAMSE cohort. Fel d 1, 2 or 4. Can f 1, 2, 3, 5 or 6. Redrawn from Assamoj A et al.[5]*

The risk for and severity of respiratory diseases increase with the number of Pet Allergen Components the patient is sensitized to.[1-4]

1. Nordlund B, et al. Allergy. 2012;67(5):661-9
2. Konradsen JR, et al. Pediatr Allergy Immunol. 2014;25:187-92.
3 .Patelis A et al. Clin Exp Allergy. 2016;46:730-40.
4. Davila I. et al. Allergy. 2018 Jun;73(6):1206-1222.
5. Asarnoj A et al. J Allergy Clin Immunol. 2016;137:813-21.

Pet Selection And Human Semen Allergy Relationship

Up to 30% of dog-allergic patients are monosensitized to Can f 5[1]*

Patients who are monosensitized may tolerate female dogs or castrated males dogs.[2,3]

> *"In women allergic to dog that refer to reactions following contact with human seminal fluid, it would be advisable to determine IgE against Can f 5.[3]"*

A comprehensive allergen component profile may help healthcare providers determine if monosensitization to Can f 5 is causing symptoms[1-3]

1. Konradsen W, et al. *J Allergy Clin Immunol.* 2015;135:616-25.
2. Matricardi P. M. et al. *EAACI Molecular Allergology User's Guide*. PAI 2016: 27: (suppl23): 1–250 (165-170).
3. Davila I. et al. *Allergy*. 2018 Jun;73(6):1206-1222.

**Can f 5 is a androgen-regulated protein expressed in the prostate, hence present only in male dogs*

Thank you!!

Please email, call or text anytime with questions!

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208-404-5338

Questions now?

"Before we come in, was any part of your home produced in a facility that also handles wheat, milk, nuts, eggs, or soy?"