

# **Update on Food Allergy Diagnosis, Management & Prevention**

Toronto Anaphylaxis Education Group



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# Disclosures



This talk is a general summary of recent advances in the field of Clinical Immunology & Allergy.

Please discuss your child's specific needs with your physician.

# About me....



- **Education:**

- Queen's University, BSc (Hons) Life Sciences
- University of Maryland, MD
- University of Toronto/The Hospital for Sick Children, Paediatrics
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# Outline



- Food Allergy Facts
- Primary Prevention of Food Allergy
- Food Immunotherapy & Other Promising Treatments
- Anaphylaxis Management

# Food Allergy Facts



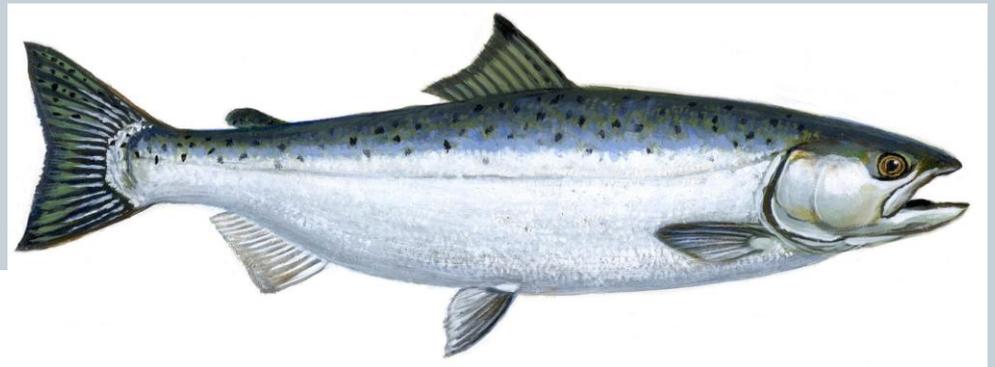
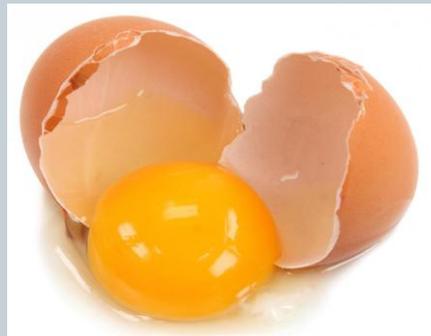
**WHAT WE KNOW**

# Food Allergy Prevalence



- Prevalence of paediatric food allergy in N. America:  
4-6%

- Milk: 2.5%
- Egg: 1.3%
- Peanut: 1%
- Tree nuts: 0.2%
- Fish: 0.1%
- Shellfish: 0.1%
- Sesame: 0.1%



# Theories Behind Increased Prevalence



1. Hygiene hypothesis
2. Changes in dietary components
  - Anti-oxidants, fats, vitamin D, nutrients... Etc.
3. Use of antacids
4. Food processing
  - Emulsifying peanut vs boiling peanut
5. Delay in oral exposure
  - Resulting in a topical “sensitizing” exposure, instead of an oral “tolerizing” exposure
6. **We don't know**

# Food Allergy Treatment



1. Strict avoidance
2. Epinephrine in case of accidental ingestion

# Pathophysiology of Food Allergy



- “Dysregualtaion of normal immune tolerance”
  - = generating an immune reaction to something that our bodies should recognize as harmless
- Note: ALL food proteins are recognized by our gut as “foreign”
  - Only people with allergy generate an actual immune response
  - “tolerance” = suppressing this response
- Food allergy development stages:
  1. Sensitization (allergic pathways established)
  2. Elicitation (immune response on re-exposure)

# Food Allergy Primary Prevention



**WHAT HAVE WE LEARNED THUS FAR?**

American Academy of Pediatrics, 2000



**Delay dairy until 1 year,  
eggs until 2 years, and  
peanuts, tree nuts & fish  
until 3 years**

American Academy of Pediatrics, 2000



**Delay dairy until 1 year,  
eggs until 2 years, and  
peanuts, tree nuts & fish  
until 3 years**



# New Guidelines Suggest



- No convincing evidence for delaying the introduction of highly allergenic foods
- So, introduce ANY foods starting at 4-6mo of age
  - Yes. Peanut butter at 4 months. I'm not kidding.
- No need to avoid highly allergenic foods
  - Introduce these at home (not at daycare, restaurant)

# What About Pregnancy & Lactation?



- No evidence that avoiding allergenic foods (milk, egg, peanut, tree nuts, shellfish... etc) during pregnancy or lactation will cause or prevent food allergy
- Exclusive breastfeeding for the first 4-6 months may decrease incidence of early-onset eczema and wheeze

# Food Immunotherapy & Other Promising Treatments



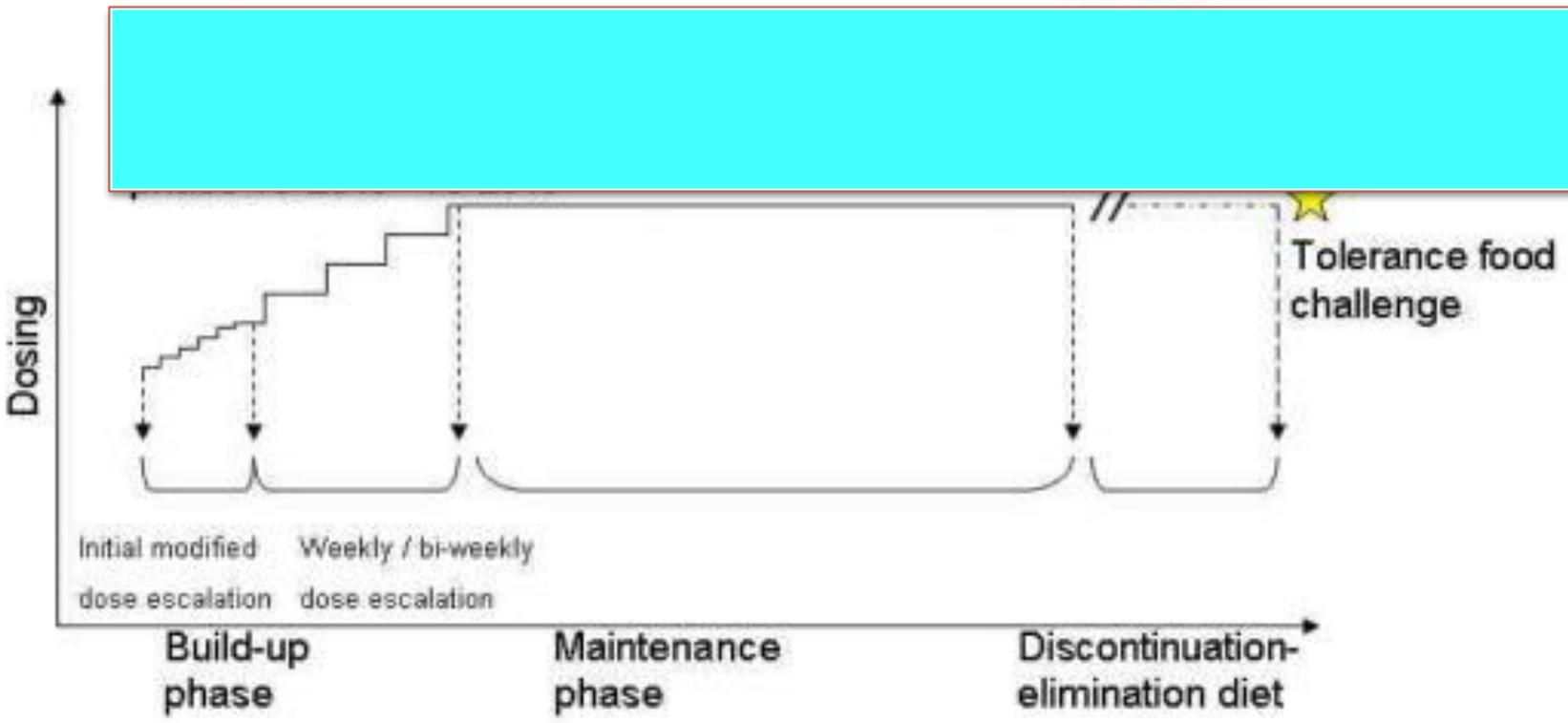
**IS THIS THE CURE FOR FOOD ALLERGY?**

# What is “Immunotherapy”?



- The only treatment available for allergy that modifies the natural course of the disease
- Used currently for patients with allergic rhinitis (“hay fever”)
  - = Allergy shots
- Administering gradual incremental doses of allergen
- Change from an *allergic* response to a *tolerant* response

Allergy  Tolerance



Nowak-Wegrzyn, Sampson. JACI 2011.

# What Are We Aiming For?



- *Tolerance vs desensitization*
  - **Tolerance** = food may be ingested without symptoms, despite prolonged avoidance
    - ✦ Eg. Billy can eat a PB&J sandwich whenever he feels like it, and won't react
  - **Desensitization** = protection depends on regular ingestion of food allergen; if dosing is discontinued, protective effect is lost or decreased
    - ✦ Eg. Billy will not react if a knife contaminated by peanut is used to cut his toast, provided he takes his immunotherapy daily

# Types of Immunotherapy



- **Subcutaneous**
  - injection into the fat under the skin
- **Oral**
  - powder (mixed in a “vehicle”) taken by mouth
- **Sublingual**
  - pill/serum under the tongue
- **Epicutaneous**
  - a patch on the skin

# Oral Food Immunotherapy (OIT)



- First reported in 1908!
- Numerous studies (with egg, milk, peanut... etc)
- Some studies exclude patients with severe allergy
- Too early to assess for long-term tolerance, but rates of desensitization have been reasonable
- Peanut study:
  - 16/16 patients who remained in the study tolerated a serving of peanut by the end of the study
  - 8/16 who were considered to have less severe allergy were given peanut again 4 weeks later; all 8 tolerated it without reaction

# Oral Immunotherapy (OIT) cont.



- Egg study (7 patients only!):
  - 57% of patients who had received OIT could tolerate a full serving of egg at the end of the trial
  - 3 months later, only 28% of patients could tolerate a full serving
  - Suggests *desensitization*, not *tolerance*
  - These numbers were improved upon with higher maintenance doses, and longer treatment
- 5 milk of the “best” milk studies combined:
  - 62% of patients who had received OIT could tolerate a full serving of milk by the end of the trial
  - Another 25% could tolerate a partial serving

# OIT Immunologic Changes



- After treatment with OIT:
  - Skin test size shown to decrease at the end of treatment
    - ✦ BUT, in one study, after being off OIT for several weeks, the skin test size increased back to baseline (size before start of OIT)
  - Allergen-specific antibodies decrease
- Patients more likely to achieve desensitization/tolerance if smaller skin tests and lower allergen-specific blood tests at start of trial

# Patterns of Response to OIT



# Oral Food Immunotherapy (OIT) Safety



- “all patients in the active treatment group experienced adverse events” (milk)
- “adverse reactions were common: 97 of 106 OIT patients had at least one symptom” (milk)
- Some patients (up to 25-30%) drop out of the trial because of side effects of OIT
- 1/11 patients in 5 “best” milk studies needed epinephrine at some point during therapy
- New diseases as complications of therapy

**Overall, not ready for clinical practice**

# Sublingual Food Immunotherapy (SLIT)



- Food held under the tongue for a period of time before being swallowed/spat out
- Already used in Canada to treat grass allergy
- Doses used are lower than those in OIT
  - Therefore, theoretically fewer side effects
- Thought to work via immune cells found in the mouth
- Not many studies
- Overall, appears to be less successful than OIT
  - BUT, could be used for patients who cannot tolerate OIT

# Factors to Consider with both OIT & SLIT



- Adverse reactions to home doses associated with:
  - Concurrent infections (eg. Patient sick with a cold)
  - Exercise
  - Menstruation
  - Dosing on an empty stomach
  - Suboptimal asthma control
- Highlights the difficulties in transitioning SLIT or OIT into every day life

# Epicutaneous Food Immunotherapy (EPIT)



- A skin patch to deliver allergen
- Few studies published thus far (many ongoing)
- Major side effects: eczema and itchiness at the site of the patch
- In the works.... Promising?....



# FAHF-2



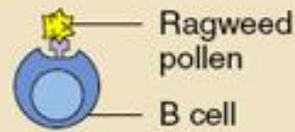
- Food Allergy Herbal Formula-2
- 9 “herbs”
- Being studied for use in patients with multiple food allergies
- May be protective against anaphylaxis if taken by patients with food allergy
  - Proven in mouse models
- Trial assessing safety, efficacy and immune effects in humans underway



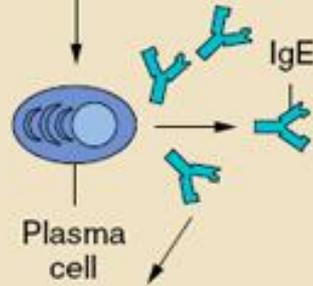
# Omalizumab



- A drug approved for the treatment of allergic asthma
- “Anti-IgE”



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



he or she makes large amounts of ragweed IgE antibody.

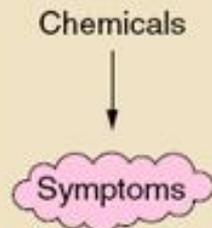


These IgE molecules attach themselves to mast cells.



The second time that person has a brush with ragweed,

the IgE-primed mast cell will release its powerful chemicals,



and the person will suffer the wheezing and/or sneezing, runny nose, watery eyes, and itching of allergy.

# Omalizumab



- A drug approved for the treatment of allergic asthma
- “Anti-IgE”
- If we “eat up” all the IgE, can we then prevent a reaction that would be caused by IgE?
- Trial using omalizumab in peanut allergy patients was stopped early because of safety concerns
  - BUT, in the early patients who tolerated it, the results were promising
- Needs more studies...
- Used by Nadeau...

# The New York Times

## The Allergy Buster

Can a Radical New Treatment Save Children With Severe Food Allergies?



# Stanford – Nadeau's Study



- Phase I studies
  - Therefore, looking at safety and efficacy
- Addressed the need to treat kids with multiple food allergies
  - 30% of kids with food allergies have more than one food allergy
- OIT to multiple foods at once
- Use oral immunotherapy (OIT) +/- omalizumab
  - Addition of omalizumab to increase the threshold for reactivity to an allergen

# Stanford – Nadeau's Study cont.



- In order to enter the study, true allergy had to be proven (by eliciting a reaction when eating the food in clinic)
- Two arms to the study:
  1. OIT to multiple food allergens, with dose advanced slowly
  2. OIT to multiple food allergens + omalizumab, with a faster dose escalation
- Reaction rates 54-58%
  - But few needed epinephrine (6 out of ~80 patients)

# Stanford – Nadeau's Study cont.



- Omalizumab appeared to be promising in terms of decreasing reaction rates
  - Improved quality of life in both arms of study
  - Caution with:
    - infections (colds, flu)
    - menstrual periods
    - hot showers (!)
    - exercise
    - stress...
- Alter threshold of reactivity
- Overall, very encouraging, but still too early!!!

# Baked Milk and Egg



- Baked milk/egg = foods in which milk/egg has been added as a minor ingredient, and then baked at  $\sim 350^{\circ}$  for  $\sim 30$ min
- Tolerated by many children with milk/egg allergy
- Appears to accelerate the resolution of allergy
  - Therefore, thought of a form of immunotherapy
  - Parameters dictating who will tolerate baked milk/egg not clear

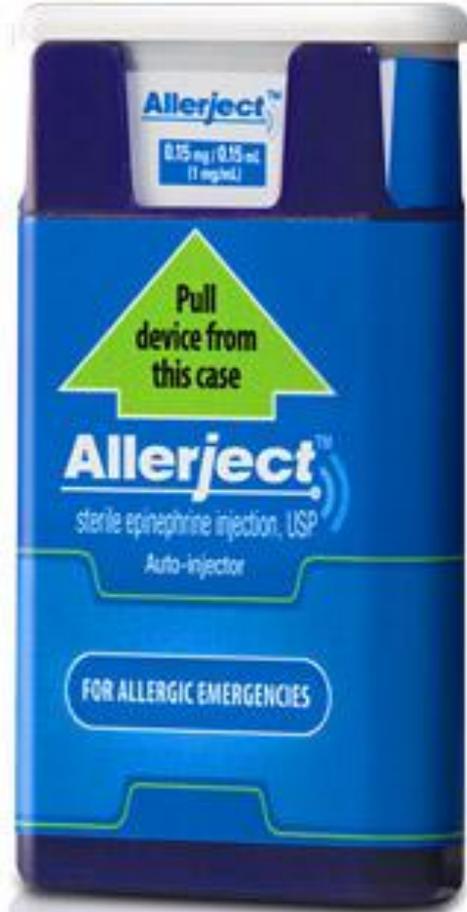


# Anaphylaxis Management



**WHAT YOU NEED TO KNOW...**

# The ONLY treatment for Anaphylaxis



# Conclusions



# Conclusions



- Food allergy is a complex disease that is increasing in prevalence, but the causes and risk factors remain unclear
- There is no evidence to avoid allergenic foods in pregnancy or lactation to prevent allergy or atopy
- Start solids at 4-6 months of age
- No therapy currently exists for food allergy
  - Several specific and non-specific immunotherapies are under investigation
  - Oral immunotherapy is promising, but still experimental and requires more study to enhance safety
- Epinephrine is the **ONLY** treatment for anaphylaxis

# Questions?



# References



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