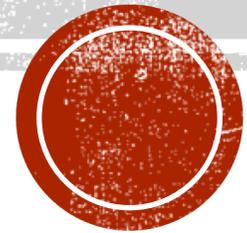


Paediatric Allergy Questions Answered



Audrey Segal, MD, FRCPC

Paediatric Allergy & Clinical Immunology

Faculty/Presenter Disclosure

- **Faculty:** Audrey Segal
- **Relationships with financial sponsors:**
 - **Grants/Research Support:** Not applicable
 - **Speakers Bureau/Honoraria:** Not applicable
 - **Consulting Fees:** Not applicable
 - **Patents:** Not applicable
 - **Other:** Not applicable



Disclosure of Financial Support

- **This program has received financial support from *Med. Johnson Nutrition, Bioderma Laboratoire Dermatologique, Nutricia Advanced Medical Nutrition, Nestle, Abbvie, MBE, and 3M Medical Solutions* in the form of an educational grant.**
- **This program has received No in-kind support.**
- **Potential for conflict(s) of interest:**
 - Not applicable



Mitigating Potential Bias

The organizers of this program selected presentations topics based on the results of a needs assessment carried out every year by the Dept. of Family and Community Medicine. The speakers are asked to present information from the guidelines, that are based on evidence and expert opinion.

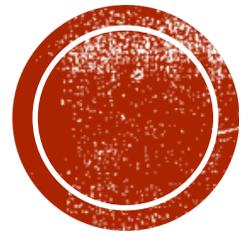
The presenters of this program will present unbiased information.



Objectives

1. Review of penicillin allergy and indications for testing
2. Approach to food allergy testing
3. Allergen introduction guidelines





Penicillin Allergy

Who and why to test

Penicillin Allergy

- Complex heterogeneous condition
- Penicillin-associated anaphylaxis rate¹:
 - 1:225,000 PO
 - 1:80,000 IV
- Testing now recommended as part of an effective antibiotic stewardship program²



1. Macy. *J Allergy Clin Immunol*. 2017:139.

2. Macy. *Clin Inf Dis*. 2017: 64.



Penicillin Allergy

- 83.1% \pm 2.2% of children with a diagnosis of AOM received an antibiotic Rx, mostly amoxicillin (40.9%)¹
- Up to 10% of kids get rashes on antibiotics
- Penicillin alternatives are often...
 - Less effective
 - More toxic
 - More expensive
 - **YUCKIER**



← amoxicillin
(according to my 4y/o)



1. Sidell. *Otolaryngal Head Neck Surg.* 2012: 146(4).



Immunology of Drug Allergy

- **IgE-mediated**

- Rapid onset (within 1hr)

- Typical “allergic” features (urticaria, angioedema, rhinitis, vomiting, respiratory distress, hypotension...)

- **Other (T lymphocyte, IgG...)**

- Delayed (at least 1hr delay)

- “maculopapular rash”

- More severe, very rare, entities (SJS, SSLR, EM, AGEP, DRESS)



Drug Allergy

Diagnosis based on:

1. **Clinical history**
2. **Confirmatory tests**

For many antibiotics:

- High false negative rate
- Unavailable
- Not *validated*

Gold standard: graded oral/IV challenge



Original Investigation

Assessing the Diagnostic Properties of a Graded Oral Provocation Challenge for the Diagnosis of Immediate and Nonimmediate Reactions to Amoxicillin in Children

Christopher Mill, MPH; Marie-Noël Primeau, MD; Elaine Medoff, MD; Christine Lejtenyi, MD; Andrew O'Keefe, MD; Elena Netchiporouk, MD; Alizee Dery, BSc; Moshe Ben-Shoshan, MD, MSc

JAMA Pediatrics June 2016 Volume 170, Number 6



Mill *et al.* JAMA Pediatr 2016

- Study included all children referred for suspected **amoxicillin allergy: 818 children**
- All tested via in-hospital graded oral provocation challenge ONLY (no in vivo/vitro testing performed)
 - 31 non-immediate reactors (3.8%)
 - 17 immediate reactors (2.1%)
 - ALL then tested with current “standard of care” intradermal reagents (in vivo testing)
 - Positive in 1 patient



Mill *et al.* JAMA Pediatr 2016

- The vast majority of children suspected to have amoxicillin allergy are tolerant to amoxicillin
- Most rashes while on amoxicillin are related to the infection being treated

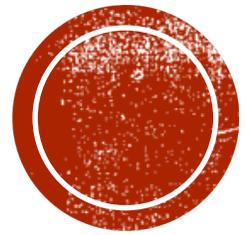
Direct microbe effect
VS
Drug + microbe synergy



Drug Allergy Conclusions

- Most children with suspected amoxicillin allergy are not allergic
 - Most of these children can/should undergo assessment by an allergist for consideration of graded oral provocation challenge
- **No minimum age** for testing
- Non-amoxicillin/antibiotic allergies addressed on case-by-case basis...
 - Talk to your friendly allergist





Food Allergy Testing

Who, what, when, why?

Food Allergy



- Prevalence of paediatric food allergy: 4-6%

- Milk: 2.5%

- Egg: 1.3%

- Peanut: 1%

- Tree nuts: 0.2%

- Fish: 0.1%

- Shellfish: 0.1%

- Sesame: 0.1%



- Self-reported rates are much higher



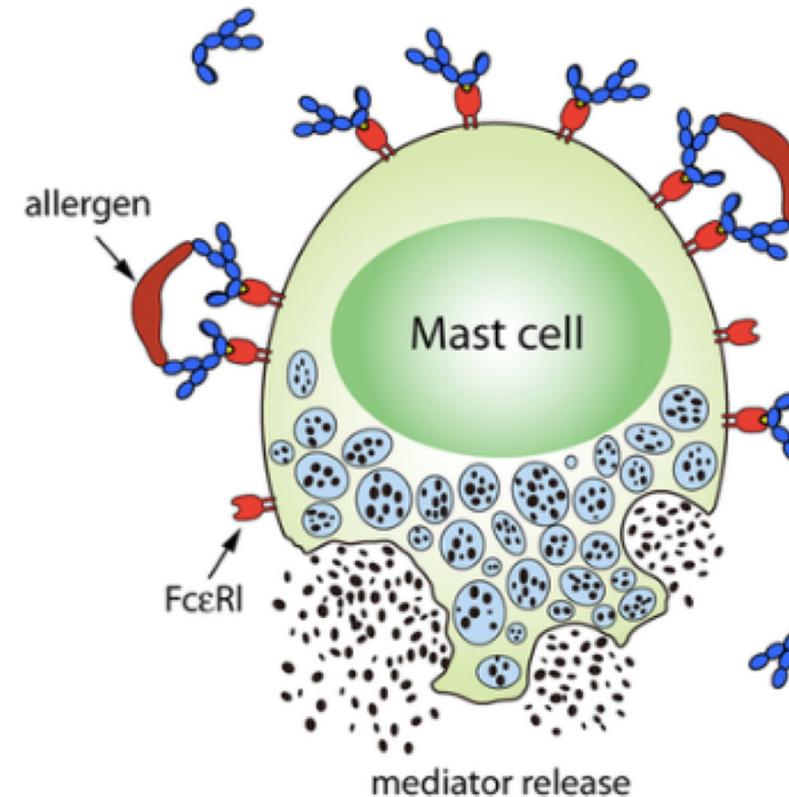
Food Allergy

- “an adverse effect arising from a specific immune response that occurs reproducibly on exposure to a given food”¹
- Unnecessary food avoidance leads to:
 - Nutritional deficiency
 - Poor weight gain
 - Increased financial burden on family
 - **Development of food allergy in certain patient populations**



IgE-mediated Food Allergy

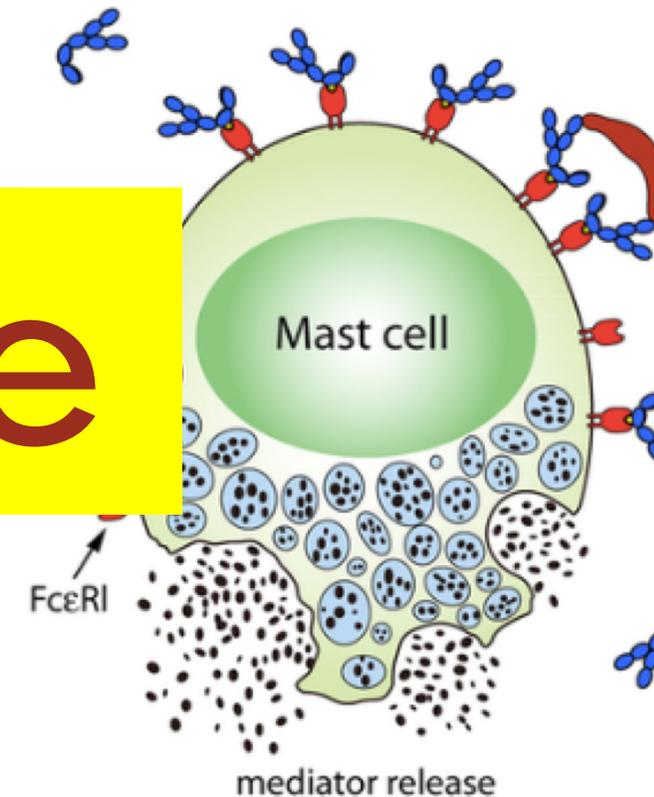
- Occurs rapidly (within min - hr)
- Symptoms:
 - Urticaria/angioedema
 - Nausea/vomiting/abdominal pain
 - Cough/wheeze/stridor/respiratory distress/voice change
 - Rhinorrhea/sneezing/conjunctivitis
 - Lethargy/hypotension/LOC
- Short-lived (2 - 24hrs)



IgE-mediated Food Allergy

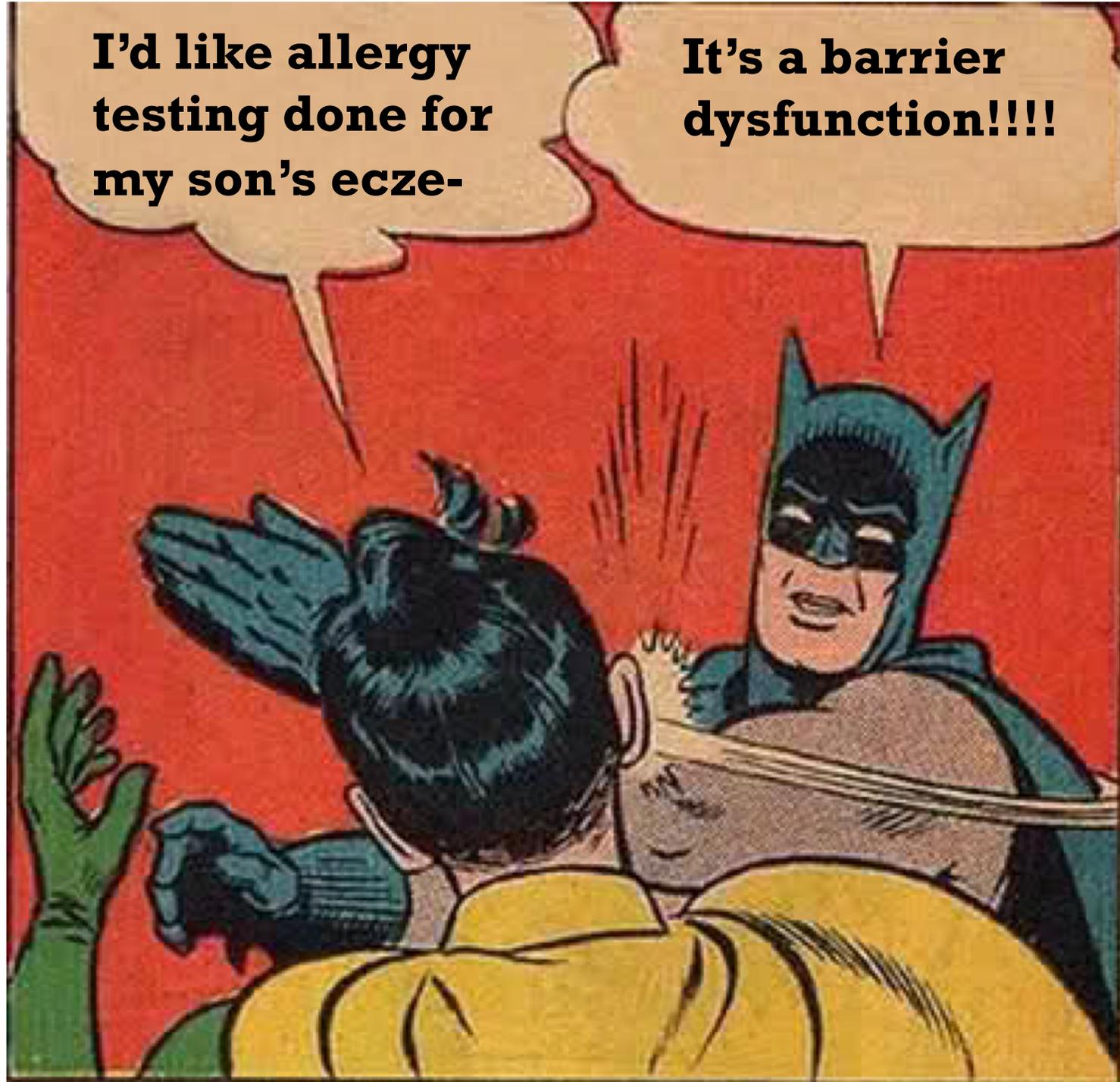
- Occurs rapidly (within min - hr)
- Symptoms:
 - Urticaria
 - Malaise
 - Cough
 - Distress/voice change
 - Rhinorrhea/sneezing/conjunctivitis
 - Lethargy/hypotension/LOC
- Short-lived (2 - 24hrs)

Reproducible



I'd like allergy testing done for my son's ecze-

It's a barrier dysfunction!!!!



Food Allergy Diagnosis

1. Medical history
2. Diagnostic testing
 - Skin testing
 - 90% sensitivity, <50% specificity
 - Indicates sensitization, where sensitization \neq allergy
 - **Panel testing almost never indicated**
 - Specific-IgE blood tests
 - Graded oral provocation challenge



Food-specific IgG Testing

- Used to identify “sensitivities” and “intolerances”
- **NOT** a validated clinical tool
- IgG is actually a marker of exposure and tolerance!



Reasons to Perform
Total IgG Food Allergy
Testing Instead of
IgG4 Food Allergy Testing



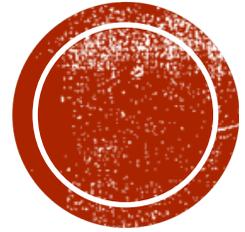


CSACI Position statement on the testing of food-specific IgG

Stuart Carr^{1*}, Edmond Chan², Elana Lavine³ and William Moote⁴

- **Unvalidated form of testing**
- **No body of research that supports its use**
- **Positive test results for food-specific IgG are normal**
- **Use results in:**
 - **False diagnosis**
 - **Unnecessary dietary restriction**
 - **Decreased QoL**
- **Plays no role in the diagnosis of food allergy or intolerance**





Allergen Introduction Guidelines

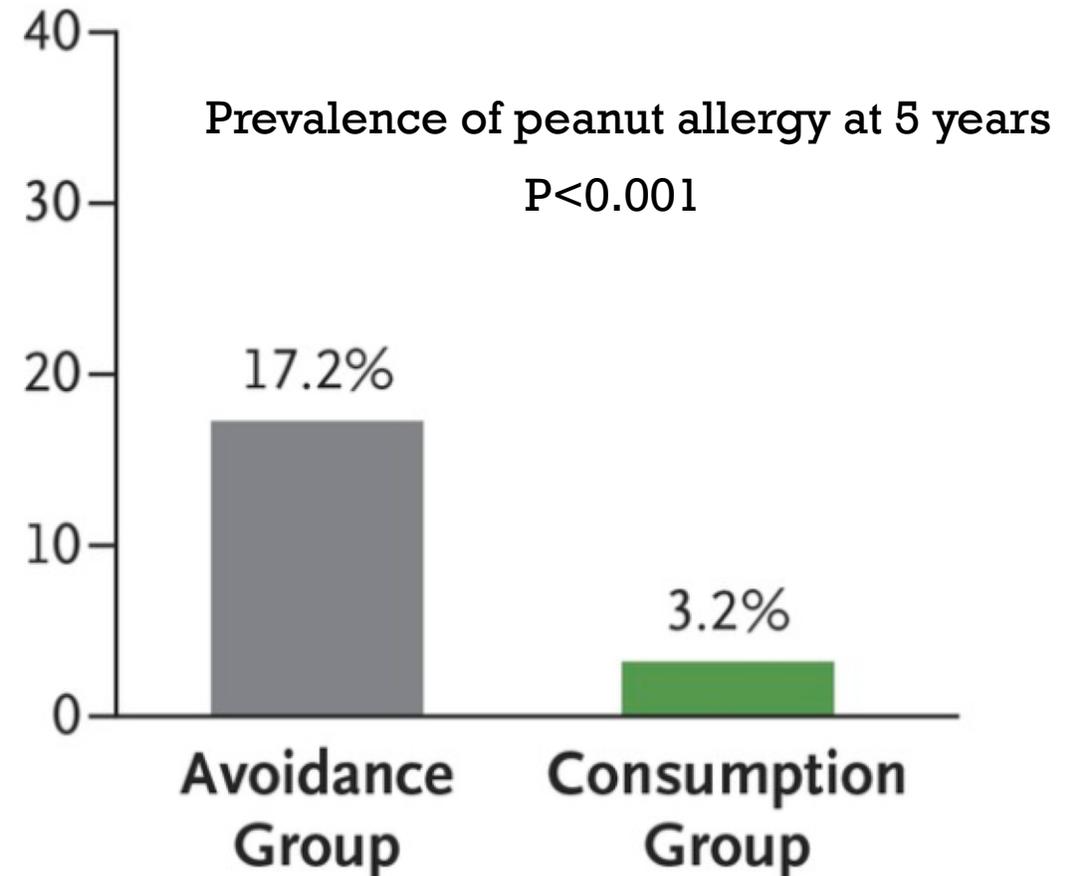
The earlier the better...

Randomized Trial of Peanut Consumption in Infants at Risk for Peanut Allergy

George Du Toit, M.B., B.Ch., Graham Roberts, D.M., Peter H. Sayre, M.D., Ph.D., Henry T. Bahnson, M.P.H., Suzana Radulovic, M.D., Alexandra F. Santos, M.D., Helen A. Brough, M.B., B.S., Deborah Phippard, Ph.D., Monica Basting, M.A., Mary Feeney, M.Sc., R.D., Victor Turcanu, M.D., Ph.D., Michelle L. Sever, M.S.P.H., Ph.D., et al., for the LEAP Study Team*

N Engl J Med 2015; 372:803-813

- RCT, n=628 (age 4-11m)
- All patients had severe AD, egg allergy, or both
- Consume vs avoid peanut until age 5yr
- NNT = 7.1
- RR reduction 80%



Chan *et al.*
Allergy Asthma Clin Immunol 2018, **14**(Suppl 2):57
<https://doi.org/10.1186/s13223-018-0286-1>

Allergy, Asthma & Clinical Immunology

REVIEW

Open Access



Early introduction of foods to prevent food allergy

Edmond S. Chan^{1*}, Elissa M. Abrams², Kyla J. Hildebrand¹ and Wade Watson³



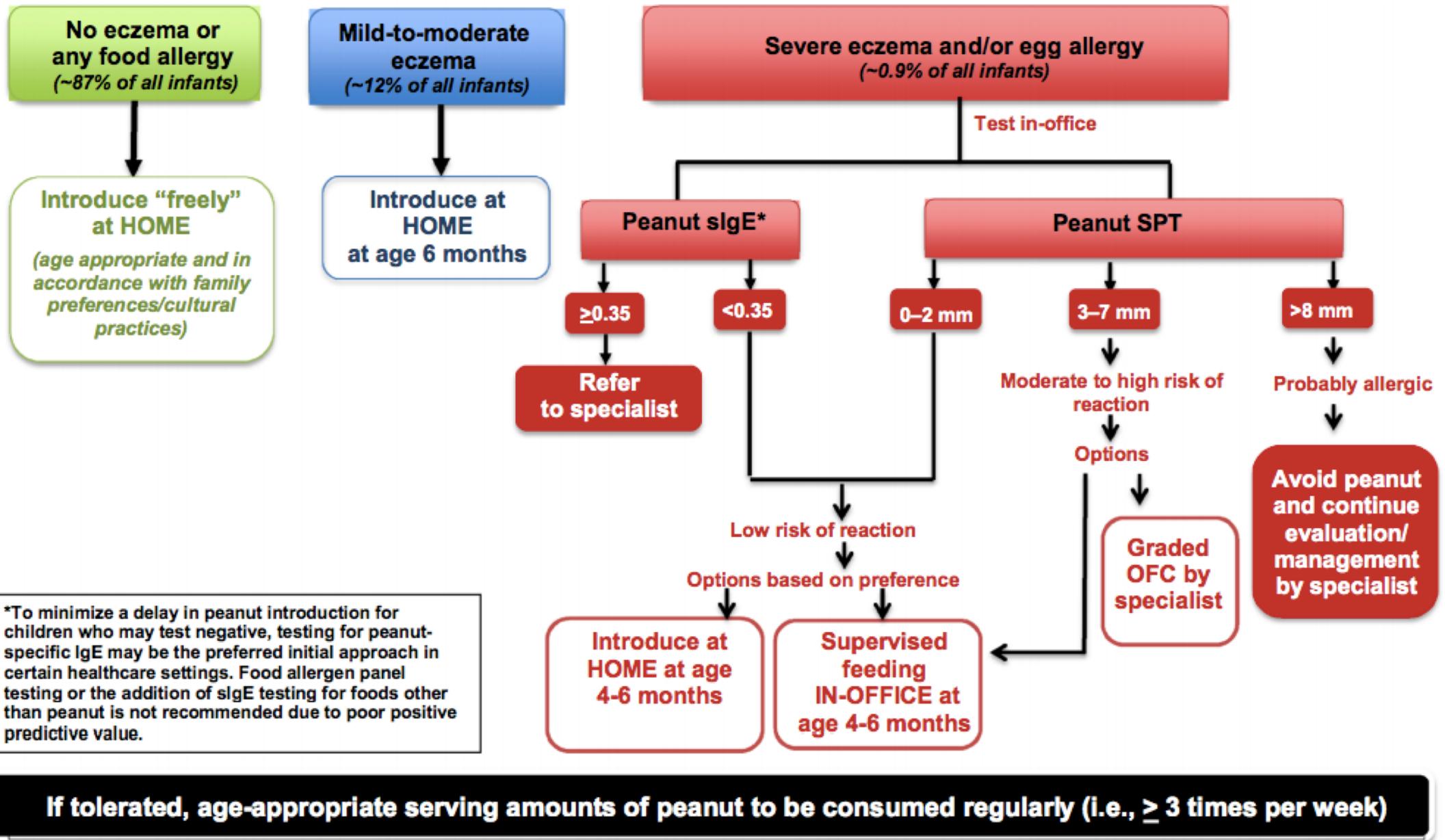


Fig. 1 Recommended approaches for when and where to introduce peanut and for the evaluation of children with severe eczema and/or egg allergy before peanut introduction Adapted from: Togias et al. [2]



**No eczema or
any food allergy**
(~87% of all infants)



**Introduce "freely"
at HOME**
*(age appropriate and in
accordance with family
preferences/cultural
practices)*

**Mild-to-moderate
eczema**
(~12% of all infants)



**Introduce at
HOME
at age 6 months**

Severe eczema and/or egg allergy
(~0.9% of all infants)

Test in-office BEFORE 4-6m



No eczema or any food allergy
(~87% of all infants)

Mild-to-moderate eczema
(~12% of all infants)

Severe eczema and/or egg allergy
(~0.9% of all infants)

Test in-office BEFORE 4-6m

Introduce "freely" at HOME
(age appropriate and in accordance with family preferences/cultural practices)

Introduce at HOME at age 6 months

The vast majority of infants can be introduced to peanuts at home



Severe eczema = persistent or frequently recurring eczema with typical morphology and distribution assessed as severe by a health care provider and requiring frequent need for prescription-strength corticosteroids, calcineurin inhibitors, or other anti-inflammatory agents despite appropriate use of emollients.

- NIAID Addendum guidelines



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(~87% of all infants)



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(age appropriate and in accordance with family preferences/cultural practices)

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Severe eczema and/or egg allergy
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Test in-office BEFORE 4-6m



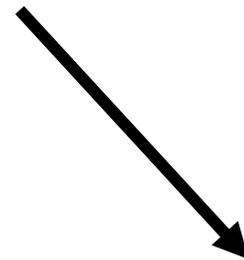
High risk for peanut allergy \neq siblings/parents with peanut/food allergy



If tolerated, age-appropriate serving amounts of peanut to be consumed regularly (i.e., ≥ 3 times per week)



Ideally, 6-7g peanut protein/wk,
divided in to 3 or more servings.
Eg. 2 tsp (=2g) peanut butter, 3x/wk



If tolerated, age-appropriate serving amounts of peanut to be consumed regularly (i.e., ≥ 3 times per week)





Guidelines for Clinicians and Patients for Diagnosis and Management of Food Allergy in the United States

APPENDIX D. INSTRUCTIONS FOR HOME FEEDING OF PEANUT PROTEIN FOR INFANTS AT LOW RISK OF AN ALLERGIC REACTION TO PEANUT

https://www.niaid.nih.gov/sites/default/files/addendum_guidelines_peanut_appx_d.pdf



Four Recipe Options, Each Containing Approximately 2g of Peanut Protein

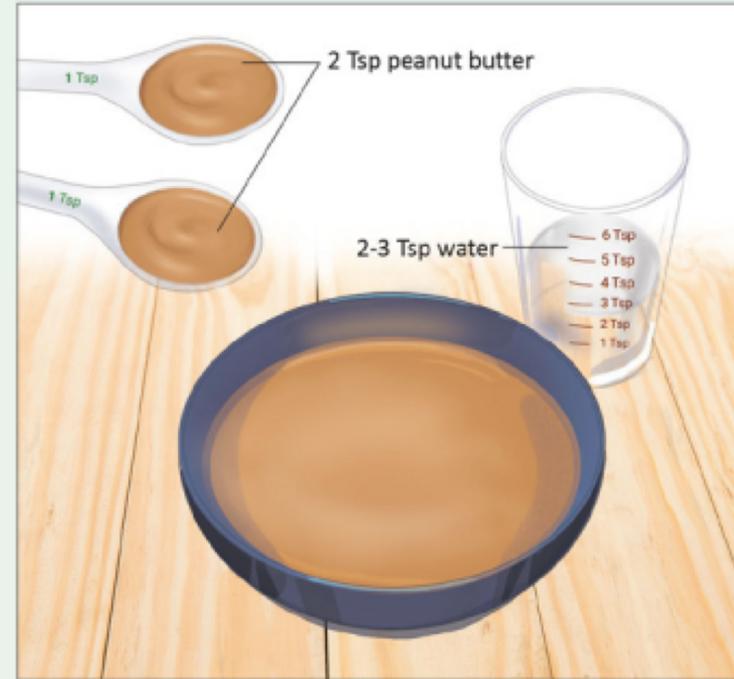
Note: Teaspoons and tablespoons are US measures (5 and 15 mL for a level teaspoon or tablespoon, respectively).



Option 1: Bamba (Osem, Israel), 21 pieces (approximately 2 g of peanut protein)

Note: Bamba is named because it was the product used in the LEAP trial and therefore has proven efficacy and safety. Other peanut puff products with similar peanut protein content can be substituted.

- For infants less than 7 months of age, soften the Bamba with 4 to 6 teaspoons of water.
- For older infants who can manage dissolvable textures, unmodified Bamba can be fed. If dissolvable textures are not yet part of the infant's diet, softened Bamba should be provided.



Option 2: Thinned smooth peanut butter, 2 teaspoons (9-10 g of peanut butter; approximately 2 g of peanut protein)

- Measure 2 teaspoons of peanut butter and slowly add 2 to 3 teaspoons of hot water.
- Stir until peanut butter is dissolved, thinned, and well blended.
- Let cool.
- Increase water amount if necessary (or add previously tolerated infant cereal) to achieve consistency comfortable for the infant.



What about other allergens?

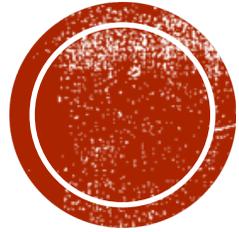
- Introduce solids at around 6mo, but not before 4mo
 - Aim for earlier in kids with severe eczema
- Major allergens: dairy, eggs, peanuts, tree nuts, wheat, soy, fish, shellfish, sesame
- Introduce in an *age-appropriate* manner
- First exposure should be oral not topical
- Continue to feed these foods **regularly**
- **Delayed introduction of allergenic foods may increase risk of allergy development**



Take Home Points

- <10% of “penicillin allergic” patients are truly allergic
- Food allergy testing is indicated in children (of any age) with a history suggestive of IgE-mediated allergy to a suspected allergen
- IgG testing for food intolerance is unproven as a diagnostic tool, and lacks clinical relevance
- Early introduction of allergens (4-6 months) to prevent food allergy
 - Refer kids with “severe” eczema and/or egg allergy prior to peanut introduction





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Thank you!!!