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Food Allergies: An Overview and Update

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Food Allergies: An Overview and Update

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Today's Presenter

Marion Groetch, MS, RDN

Director of Nutrition Services
Jaffe Food Allergy Institute

Associate Professor
Division of Allergy & Immunology
Icahn School of Medicine
Mount Sinai

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Food Allergy Definition

"An adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food."

Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the united states: Report of the NIAID-sponsored expert panel. J Allergy Clin Immunol. 2010; 126 (6): S1-58

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Non-immunologic

Toxic / Pharmacologic	*Non-Toxic / Intolerance*
▪ Bacterial food poisoning ▪ Heavy metal poisoning ▪ Scombroid fish poisoning ▪ Caffeine	▪ Lactase deficiency ▪ Galactosemia ▪ Pancreatic insufficiency ▪ Gallbladder / liver disease ▪ Gustatory rhinitis

Adapted from Sicherer S, Sampson H. J Allergy Clin Immunol 2006;117:S470-475.

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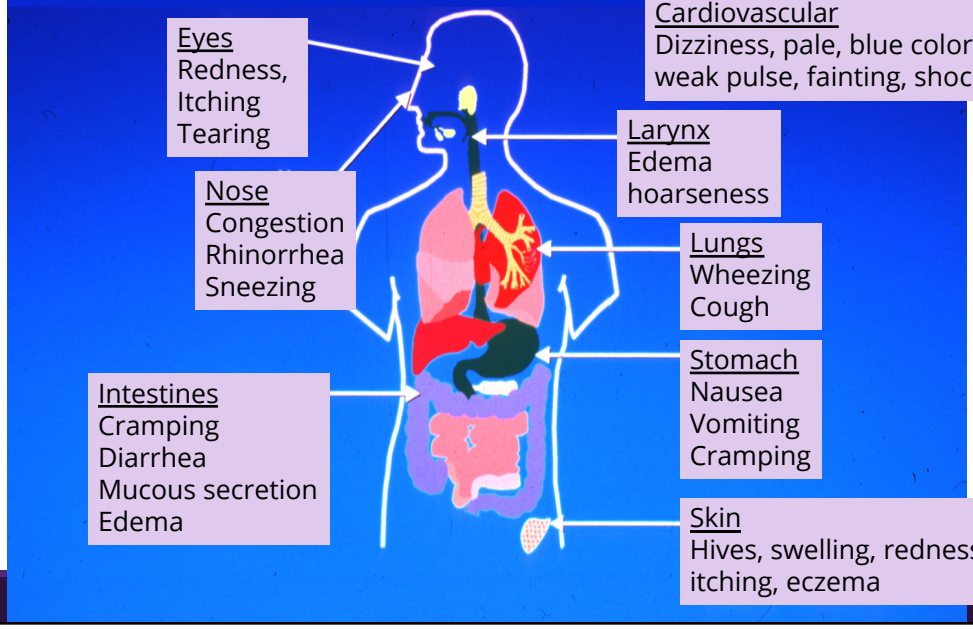
Symptoms of IgE-Food Allergy



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	World Allergy Organization (WAO) Guidelines	American Academy of Allergy, Asthma & Immunology (AAAAI) & American College of Allergy, Asthma, & Immunology (ACAA) Guidelines	European Academy of Allergy & Clinical Immunology (EAACI) Guidelines
Definition of Anaphylaxis	"a serious life-threatening generalized or systemic hypersensitivity reaction" and "a serious allergic reaction that is rapid in onset and might cause death"	"an acute life-threatening systemic reaction with varied mechanisms, clinical presentations, and severity that results from the sudden release of mediators from mast cells and basophils"	"a severe life-threatening generalized or systemic hypersensitivity reaction"

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Food-associated exercise induced anaphylaxis

- Can eat a food without a reaction and can exercise without a reaction
- Food ingestion followed by exercise (within 4 hours) can result in anaphylaxis

Most common foods:

- Wheat, oat, barley, rye, turkey, celery, soy, milk, shellfish, alcohol

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Pollen-Food Allergy Syndrome

- Clinical features: rapid onset oral pruritus, rarely progressive
- Epidemiology: prior sensitization to pollens
- Key foods: raw fruits and vegetables
- Proteins that cross react with pollen proteins
- Heat labile (cooked food usually OK)

Birch → Apple, carrot, celery, cherry, pear, hazelnut
Ragweed → Banana, cucumber, melons
Grass → Melon, tomato, orange
Mugwort → Melon, apple, peach, cherry

Image from Pixabay

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Latex-Fruit Syndrome

- 30-50% of those with latex allergy are sensitive to some fruits due to cross-reactive IgE
- Most common fruits: banana, avocado, kiwi, chestnut but other fruits and nuts have been reported
- Can clinically present as anaphylaxis to fruit
- Warn latex-sensitive patients of potential cross-reactivity
- Some fruit-allergic patients may be at risk for latex allergy

Image from Pexels by Adri Ana.

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Alpha Gal Syndrome

- Alpha-gal syndrome is an emerging IgE–mediated allergy to galactose-alpha-1,3-galactose (alpha-gal) caused by a tick bite (commonly the Lone Star tick in the US)
- Alpha-gal (galactose-α-1,3-galactose) is a sugar molecule found in mammalian meat (pork, beef, rabbit, lamb, venison, etc.) and products made from mammals (including gelatin, cow's milk, and milk products)
- Results in delayed allergic symptoms 3-6 hours post ingestion of foods containing alpha-gal.
- Alpha-gal is **not** found in fish or poultry

Alison M. Binder, Scott P. Commins, Michelle L. Altrich, Tyler Wachs, Brad J. Biggerstaff, Charles B. Beard, et al. Annals of Allergy, Asthma & Immunology, 2021.

Image from Pexels by Erik Karits.

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Adverse Food Reactions

IgE-Mediated (most common)

- Systemic
- Oral Allergy Syndrome
- Exercise-induced anaphylaxis
- Immediate gastrointestinal allergy
- Asthma/rhinitis
- Urticaria
- Morbilliform rashes and flushing
- Contact urticaria
- Alpha Gal

Immunologic

Eosinophilic disorders (EoE)

Non-IgE Mediated Cell-Mediated

- Protein-Induced Enterocolitis (FPIES)
- Protein-Induced Enteropathy
- Proctitis/Proctocolitis (FPIAP)
- Contact dermatitis
- Heiner's Syndrome

Sampson H. J Allergy Clin Immunol 2004;113:805-9
Chapman J et al. Ann Allergy Asthma & Immunol 2006;96:S51-68.

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Disorders Not Proven to be Related to Food Allergy

- Migraines
- Behavioral / Developmental disorders
- Arthritis
- Seizures
- Inflammatory bowel disease

Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the united states: Report of the NIAID-sponsored expert panel. J Allergy Clin Immunol. 2010; 126 (6): S1-58

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Diagnosis

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History and epidemiologic considerations should guide test selection

Why are food allergy tests useful?

- Tests are used to confirm suspicion of IgE-mediated allergy
- Tests are also used to monitor tolerance development in IgE-mediated allergy

However, …

- Tolerated foods generally need not be tested
- A positive test in the absence of symptoms is not food allergy!
- Panel tests are not advised!

Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the united states: Report of the NIAID-sponsored expert panel. J Allergy Clin Immunol. 2010; 126 (6): S1-58

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Food Allergy Testing-IgE Mediated: What and How

1. Prick Skin Test (PST) (IgE)
2. Serum – Quantitative measurement of food specific Immunoglobulin E (sIgE)
3. Component Resolve Diagnostics (CRD)- based on allergen components (IgE)
4. Double Blind Placebo Controlled Food Challenge- Considered "Gold Standard" for FA diagnosis

Sicherer SH, Sampson HA. Food allergy: Epidemiology, pathogenesis, diagnosis, and treatment. JACI. 2014 Feb;133(2):291-307.

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Dietary Elimination as Diagnostic Tool

- Useful when chronic symptoms or delayed symptoms make determining the cause difficult
- Removal of the suspected allergen should result in significant improvement or remission of symptoms
- Followed by food challenge and recurrence of symptoms

Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the united states: Report of the NIAID-sponsored expert panel. J Allergy Clin Immunol. 2010; 126 (6): S1-58

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Summary

1. Not all adverse food reactions to food are food allergy.
2. Food Allergy: Adverse food reactions that are triggered by the immune system and are reproducible to a given food.
3. The term "Food Allergy" covers a broad spectrum of allergic disease with both IgE- and non IgE- mediated mechanisms.
4. Food sensitization does not equal food allergy!
5. Testing is imperfect and we only test to suspected foods. Food allergy panels are strongly discouraged.

1. Fleischer D, et al J Allergy Clin Immunol Prac. 2021;9(1):22-43.
2. Schroer B, Groetch M, Mack D, Venter C. J Allergy Clin Immunol Prac. 2021;9:44-56.
3. Du Toit G et al. NEJM 2015; 372:803-813

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Dietary Management

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Dietary Management

- Effective avoidance
- Nutritional adequacy

To prevent acute and chronic food allergic reactions, while maintaining appropriate nutrition for growth and development.

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National and International Labeling Laws

Allergens labelled	United States	European Union	Canada	Australia/ New Zealand
Celery		✓		
CRUSTACEANS	✓	✓	✓	
EGG	✓	✓	✓	✓
FISH	✓	✓	✓	✓
Cereal containing gluten (excluding wheat)	[1]	✓	✓	✓
Lupin		✓		✓
MILK	✓	✓	✓	✓
Mollusk		✓	✓	
Mustard		✓	✓	
PEANUT	✓	✓	✓	✓
SESAME	✓	✓	✓	✓
SOYBEAN	✓	✓	✓	✓
Sulfur dioxide and sulfites	✓	✓	✓	✓
TREE NUT	✓	✓	✓	✓
WHEAT	✓	✓	✓	✓

Durban, Groetch, Meyer, et al. Immunol Allergy Clin North Am 2021 Vol. 41 Issue 2 Pages 233-270

https://farrp.unl.edu/IRChart

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How to Read a Label

Food Allergen Labeling and Consumer Protection Act (FALCPA) regulated allergens can be identified in one of three ways:

1. In the ingredient list, using the allergen's common name
2. Parenthetically in the ingredient list-if the ingredient is not the common name.
3. In a Contains statement (If used, all allergens must be included.)

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How to Read a Label

Intentional allergenic ingredients will be listed in the ingredient list OR the Contains statement

Ingredients:
Enriched wheat flour, water, farina (**wheat**), yeast, salt, sugar, soybean oil, wheat gluten, grain vinegar, **soy** lecithin, whey (**milk**), **peanut**

Does not require Contains statement

Ingredients:
Enriched wheat flour, water, farina (**wheat**), yeast, salt, sugar, soybean oil, wheat gluten, grain vinegar, **soy lecithin**, whey, **peanut**

Contains wheat, soy, milk, peanut

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Front of package labeling not useful

- "Dairy free" no definition
- "Non-dairy" defined but allows milk protein
- MUST READ ingredient list and contains statement

https://farrp.unl.edu/resources/gi-fas/opinion-and-summaries/dairy-free-and-non-dairy

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Foods labeled “Dairy-free” or “Non-Dairy” are not necessarily milk-protein free!

Ingredients:
Water, Milk Protein Isolate, Calcium Caseinate (Milk), Sodium Caseinate (Milk), Soluble Vegetable Fiber, Less than 1% of: Natural and Artificial Flavors, Canola Oil…

Ingredients: …sodium caseinate (milk)

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Novel VEGAN allergens

MUST BE LABELED AS AN ALLERGEN

Cow milk or egg protein that is derived from precision fermentation in a non-milk or non-egg food source, such as a genetically engineered strain of yeast.

More information on FALCPA:
Guidance for Industry: Questions and Answers Regarding Food Allergens, Including the Food Allergen Labeling Requirements of the Federal Food, Drug, and Cosmetic Act (5th Edition) (fda.gov)

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Precautionary Allergen Labels (PAL) Voluntary and Unregulated

Made in a factory…

May contain…

A precautionary label such as, "may contain peanut" carries the same risk as "manufactured in a facility that handles peanut."

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One large food manufacturer validation process flow

Although not dictated by the legislation, in some cases the absence or presence of PAL *is meaningful*. However, one cannot determine this simply by looking at a label.

Step 1: Physical Validation of the line (Refer **section 5.2)**

Step 2: Proceed to swab sampling as per the approved allergen testing for quantitative ELISA.
Sampling should be performed as per **Section 6.**

Step 3: Post swab sampling, proceed to production of the product and collect FP samples which do not contain the allergen of concern. Hold **4 hrs*** of production until satisfactory analytical validation results are available using ELISA method from approved lab.

Step 4: Proceed to the next actions based on **section 5.4.3.**

Step 5. Validation should be completed for 3 different consecutive batches/run following the above procedure.

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Two sample patient approaches:

My son is allergic to peanut and we avoid peanut as an ingredient, but we don't worry about products with labels like "may contain."

My son is allergic to peanut and I don't bring any products into my home that are labeled with PAL. Furthermore, I don't use any products unless I have called the manufactured to determine if there is a risk of cross contact. I prefer dedicated peanut-free facilities.

How do you respond to this?

Who should avoid products with PAL?

Patients with FPIES?
- Not typically [1]

Patients with EoE?
- Maybe [2]

Patients tolerating baked milk or baked egg?
- Depends on the product [3]

Patients with high threshold?
- Not easy to define

1. Groetch M, Baker MG, Durban R, et al. Ann Allergy Asthma Immunol. 2021
2. Groetch, Venter, Skypala, et al. J Allergy Clin Immunol Pract 2017
3. S. A. Leonard, J. C. Caubet, J. S. Kim, M. Groetch and A. Nowak-Wegrzyn. J Allergy Clin Immunol Pract 2015

Image from Pexels by Polina Tankilevitch and Cats.

What is not covered by FALCPA?

- Prescription drugs
- Over-the-counter drugs
- Personal care items such as cosmetics, shampoo, mouthwash, toothpaste or shaving cream.
- Any food product regulated by the USDA, which includes meat, poultry, or certain egg products.
- Any product regulated by the Alcohol, Tobacco Tax and Trade Bureau (ATTB). This includes alcoholic drinks, spirits, beer and tobacco products.
- Any restaurant foods or foods that are placed in a wrapper or container in response to a person's order for that food. This includes street vendors, festival foods, fast food restaurants.
- Pet: foods, supplements, and supplies

More information on FALCPA: Guidance for Industry: Questions and Answers Regarding Food Allergens, Including the Food Allergen Labeling Requirements of the Federal Food, Drug, and Cosmetic Act (5th Edition) (fda.gov)

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Patient Question:

I find the soy allergy the most difficult to manage because everything contains soy! Can you help me find a bread that is soy-free?

Image from Pexels by Hermaion.

Soy Oil and Soy Lecithin are generally tolerated and need not be avoided.

Unbleached Enriched Flour (Wheat Flour, Malted Barley Flour, Niacin, Reduced Iron, Thiamin Mononitrate, Riboflavin, Folic Acid), Water, Whole Wheat Flour, Contains 2% or Less of Each of the Following: Yeast, Salt, Soybean Oil, Enzymes, Monocalcium Phosphate, Soy Lecithin…

Unbleached Enriched Flour (Wheat Flour, Malted Barley Flour, Niacin, Reduced Iron, Thiamin Mononitrate, Riboflavin, Folic Acid), Water, Whole Wheat Flour, Soy Flour, Contains 2% or Less of Each of the Following: Yeast, Salt, Soybean Oil, Enzymes, Monocalcium Phosphate, Soy Lecithin…

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NOVEL allergens

Meal Worms

Cricket products may trigger crustacean allergies!"

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Tolerance Varies

The majority of children outgrow milk or egg allergy. They are also more likely to tolerate milk or egg baked into a baked good.

About 75% of those with milk or egg allergy tolerate baked milk or egg ingredients.

Leonard, Caubet, Kim, Groetch, Nowak-Wegrzyn. JACI In Pract. 2015

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Patient Question:

My child eats cookies from the store that have milk in them. Does that mean that they tolerate baked milk?

Ingredients: wheat flour, butter (milk), sugar, fructose, contains less than 2 percent of the following: egg, salt, whey (milk), baking soda, natural flavoring, soy lecithin

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Use a standardized recipe

- To know how much baked ingredient your patient has tolerated!
- THEN you can provide specific guidance for at home feeding.

Our published recipes provide[1]:

- No more than 1/6 cup of milk per serving (1.3 g protein)
  - For example: I cup of milk in a recipe that yields 6 servings
- No more than 1/3 egg per serving (2 grams egg protein)
  - For example: 2 eggs in a recipe that yields 6 servings

Groetch, Venter. Nutritional Management of Food Allergy Journal of Food Allergy 2020

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What to do about Peanut (PN) and Tree Nuts (TN) allergies?

- In the US, a retrospective case series showed that many patients with TN allergy passed an OFC to other TNs even when sensitized.2
- British Society for Allergy and Clinical Immunology (BSACI) recommends active inclusion of non-allergic nuts in the diets of those with TNA once tolerance has been ascertained.

1. Venter, Sommer, Moonesinghe, et al. Pediatr Allergy Immunol. 2015
2. Couch, Franxman, Greenhawt. Ann Allergy Asthma Immunol. 2017

Image from Pexels by Marta Branco.

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What about cross contact?
Choose those from dedicated facilities*

*Risk of cross contact may change and frequent contact with the manufacturer is required!

Nuts	Brands
Almonds	Barney Butter, Barney flour and almonds
Cashews	Sunshine brand
Hazelnuts	Ken and June Hazelnuts
Macadamia	Hamakuoa brand
Pecan	Purely Pecan Butter, Pearson's Farm Pecans
Pistachio	Wonderful brand Pistachios, Pistachio Factory butter
Walnuts	Primavera Walnuts, Crazy go nuts walnut butter
Sesame	Kavala brand tahini

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Avoidance Summary

- Avoidance of the allergen is the cornerstone of food allergy management.
- Avoidance issues are fraught with nuance.
- Educating families to adequately avoid identified allergens without over-avoidance is one key role of the dietitian.

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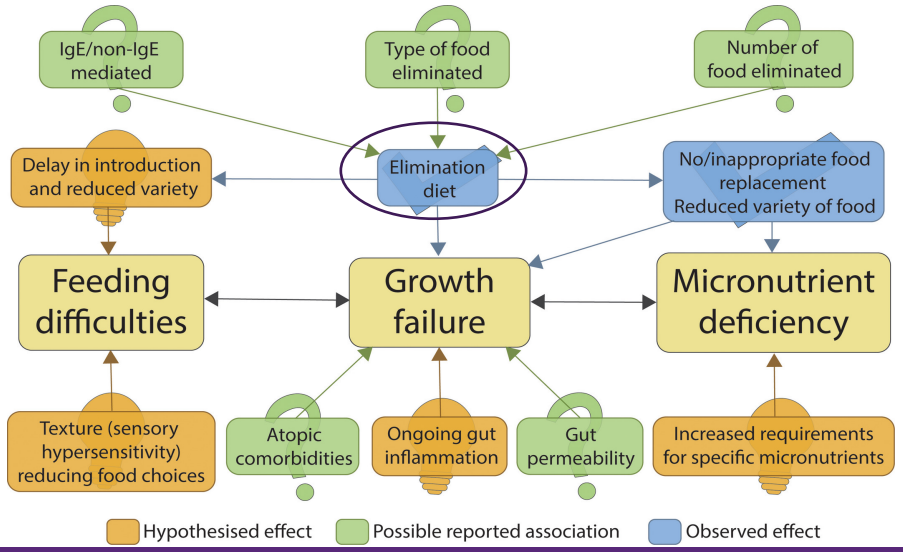
Dietary Management of Food Allergy

Immunology and Allergy Clinics of North America.

Durban, Raquel, MS, RDN, LDN; Groetch, Marion, MS, RDN… Show all. Published April 30, 2021. Volume 41, Issue 2. Pages 233-270. © 2021.



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Effect of food allergy on growth

8 % overweight
(US population: 33%)

6% underweight
(US population: 4%)

9% stunted
(US population: 2%)

Meyer, et al. J Human Nutr Diet. 2019
n=430 from 12 centers

Colson et al. J Allergy Clin Immunol Pract. 2014;2(5):587-93.
Mukkada et al. Pediatrics. 2010;126(3):e672-7.
Lucendo. Allergy. 2013;68(8):1065-72.
Peterson Am J Gastroenterol. 2013;108(5):759-66.

A cow's milk substitute of adequate nutritional value is necessary until 2 years of age to meet nutritional requirements.

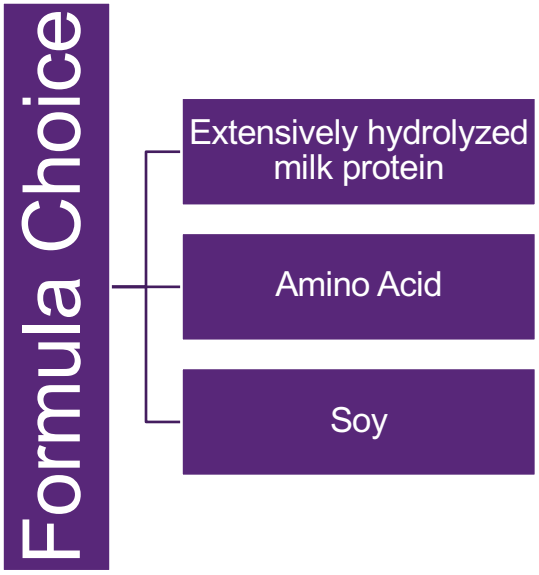
- Breast milk
- Substitute formula

Fiocchi, Brozek, Schuenemann, et al. WAO Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) Guidelines. April 2010.
J Pediatr Gastroenterol Nutr. 2012 Aug;55(2):221-9

Image from Pexels by Anna Shvets and Wendy Wei.

UPDATED
Diagnosis and Rationale against Cow's Milk Allergy

Recommendations for both
IgE- and non-IgE-mediated
Cow's milk allergy



https://www.worldallergyorganizationjournal.org/article/S1939-4551(24)00019-X/fulltext

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Prevalence of IgE-mediated food allergy during exclusive breastfeeding

A systematic review (32 studies)

- Levels of food proteins present in breast milk across the studies were much lower than the eliciting dose (ED01) in the most highly allergic patients (top 1%) in most samples.
- Probability of an IgE-mediated allergic reaction in a food-allergic infant breastfed by a woman consuming the relevant food can be estimated as **≤ 1:1000 for cow's milk, egg, peanut, and wheat.**

Gamirova A, Berbenyuk A, Levina D, et al. Food Proteins in Human Breast Milk and Probability of IgE-Mediated Allergic Reaction in Children During Breastfeeding: A Systematic Review. J Allergy Clin Immunol Pract. 2022 May;10(5):1312-1324.e8.

IgE = Immunoglobulin E

Gamirova et al. Journal of Allergy and Clinical Immunology: In Practice, 2022-05-01, Volume 10, Issue 5, Pages 1312-1324.e8

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Beyond Infancy

Image from Pexels by Aviz.

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Transition to milk substitute when the child is at least 1 year of age and can:

- Eat a varied solid food diet with a variety of foods from each food group;
- Get at least 2/3 of their calories from the varied solid food diet;
- Consume no more than 16 ounces of milk substitute per day (this includes breastmilk, formula, and other dairy substitutes like yogurt);
- Eat age-appropriate textures; AND
- Get enough protein and fat and micronutrients in the diet from the solid foods and the available milk substitute.

Groetch, Venter. J of Food Allergy. 2022

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1 year old energy needs about 1000 kcal	Dairy recommendation for 1 year old: 2 servings full fat or 300 calories ~ 30% of daily caloric intake and most of protein needs (based on USDA ChooseMyPlate.gov)			
Cow's milk or enriched substitute	kcal/ 16 oz.	Protein g 16 oz.	Fat g 16 oz.	Calcium mg/ Vitamin D IU
Cow's Milk	300	16	16	600/200
Pea	200	16	9	Brand specific!
Soy	200	14	8	
Oat	240	8	6	
Rice	240	2	5	
Coconut	160	0	9	
Almond	100	2	5	

As presently constituted, almond, rice, coconut, hemp, flax seed, and cashew "milks" are inappropriate replacements for CM in toddlers and young children for whom milk remains an important part of the diet. NASPGHAN Journal of Pediatric Gastroenterology and Nutrition71(2):276-281, August 2020

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Brief Vignette: 20-month-old with cow's milk allergy growing well presents with iron deficiency anemia. Has a limited appetite.

24-hour recall:

Breakfast: Homemade white toast with peanut butter and jelly and 4 ounces of apple juice and 1 cup strawberries

Snack: 8 ounces pea protein beverage and ½ banana

Lunch: 4 ounces soy yogurt, fruit cup-1/2 cup, 1 rice cracker and 3 ounces pea protein beverage

Snack: 4 ounces applesauce and 8 ounces pea protein beverage

Dinner: 1 ounce chicken, 1 tablespoon of rice, 2 ounces carrots, ½ slice homemade white bread with milk-free margarine

Snack: Homemade cookie and 8 ounces of pea protein milk

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Does this child need a nutritionally complete formula?

- She is getting the majority of her daily calories from a nutritionally incomplete beverage.
- She is consuming 28 ounces total of milk substitute-much more than the recommended servings of milk substitute (16 ounces) for her age.
- She does not eat a varied solid food diet.
- Her diet is low in vegetables, whole or enriched grains and high in fruit and milk substitute.
- Her diet does not provide adequate iron.

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How can we help?

- Add iron supplement to correct IDA and devise a plan to include a balance of foods to meet nutritional needs
- Help caregiver to plan a balanced diet for a 20-month-old
- If balancing the diet is determined to not be possible at this time, transition to a tolerated toddler formula until the diet is varied and age appropriate.

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Brief History: 14-month-old child growing well with allergy to milk, egg, soy, peanut, tree nuts, green pea and lentil

24-hour recall:

Breakfast:	Oatmeal (1/2 cup) with chia seeds (1 tablespoon) and blueberries (1/2 cup)
Snack:	Hypoallergenic formula 4-6 ounces from sippy cup, 1/3 banana
Lunch:	2 tablespoon black beans and ½ cup whole wheat pasta with olive oil, ½ cup broccoli
Snack:	Watermelon- 2 large cubes, 1 whole grain cracker with hummus 1 T
Dinner:	Salmon- 2 ounces, ¼ large sweet potato and ¼ cup zucchini with olive oil
Bed-time:	6 ounces hypoallergenic formula from a sippy cup

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Does this child need a nutritionally complete infant or toddler formula?

- She has a balanced diet of foods from a variety of food groups and is taking 12 ounces of hypoallergenic formula. She is getting most of her nutrition from solid age-appropriate foods.
- Her infant formula has less calcium and vitamin D than the chosen milk substitute and her solid food diet provides the other nutrients provided by the formula.
- We discussed options and the parents chose a full fat oat milk that has 160 calories per cup, 9 grams of fat, 3 grams of protein, and is fortified with 350 mg calcium and 3.6 mcg vitamin D per cup.

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Nutrition and Food Allergies through the life cycle

Life Stage	Infants and children (birth – 8 years)	Teenager	Adult (19 – 50 years)	Older adults (51 and older)
Age related nutritional concerns	energy, protein, essential fatty acids, > 6 months: iron	energy, protein, calcium, phosphorus, magnesium Females: iron	females, compared with males: iron	Needs increase for vitamin B_6, vitamin D; Beginning to have decreased energy requirements and iron needs in females
Increased Nutritional Risk	• Delayed introduction of foods • Altered complementary feeding schedule • Cow's milk allergy • Multiple food allergies • Feeding difficulties or delays • Food aversions/phobia • Family inability to manage the food allergy • Daycare/school inability to provide nutritious safe foods	• Longer term food aversions • Continued avoidance of foods that are no longer allergens • Increased requirements with increased activity (sports) • New onset food allergies e.g pollen food syndrome/tree nut allergies • Family inability to manage the food allergy • School/social events where safe, nutritious food unavailable	• Longer term food aversions • Continued avoidance of foods that are no longer allergens • Increased requirements with increased activity (sports) • New onset food allergies e.g pollen food syndrome • Multiple (new) food allergies • Inability to cook or college unable to provide safe, nutritious foods • Emotional stress/inability to manage away from home e.g. over restriction due to fear of eating	• Reduced appetite • Limited time to cook safe foods • Work related / social events where safe, nutritious food is not provided • Food restrictions due to prevention or development of other chronic conditions

Groetch, Venter. J of Food Allergy. 2021

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Dietary Management of Pollen Food Syndrome

Food	High risk	Lower risk	Usually tolerated
Fruits and vegetables (general)	Raw fruits (type depends on pollen sensitization), fresh fruit or vegetable smoothies or juices	Peeled or microwaved	Baked, boiled, dried, or canned fruits, vegetables, and herbs
Fruits (specific)	Apples, pears, peaches, apricots, cherries, plums, melon, kiwifruit, banana,	Cranberries, raspberries blueberries, grapes	
Vegetables (specific)	Carrot, celery, parsley, coriander, tomato, cucumber, peeling potatoes, parsnips, squash	Eggplant, zucchini, arugula, lettuce, snow peas, beansprouts, sugar snap peas, jacket/baked potato	Cabbage, cauliflower, broccoli, mushrooms, green beans, canned tomatoes, tomato puree, onions, garlic, turnip, rutabaga, peeled roasted, fried, or boiled potatoes, parsnips, carrots, squash,
Legumes	Soy milk, tofu, soy protein powder, edamame beans, raw peanuts (monkey nuts, redskin peanuts)	Well-roasted peanuts	Cooked or canned beans including haricot bean, chickpeas/garbanzo bean, black-eyed peas, lima bean, butter bean, kidney bean, black beans, adzuki bean, broad bean, fava bean, lentils, soy flour, soy lecithin, roasted peanuts in savory and sweet dishes and in chocolate, foods labeled as "may contain peanuts"
Tree nuts	Raw hazelnuts, walnuts, pecan nuts, almonds, Brazil nuts, macadamia nuts	Roasted hazelnuts, almonds, walnuts, pecan nuts, or these nuts in sweet or savory foods	Cashew nuts, pistachio nuts, shea nut, chestnut, foods that say "may contain nuts"
Seeds		Sunflower seeds, pumpkin seeds, mustard seeds/mustard	Sesame seeds, tahini, linseeds/ flaxseed, poppy seeds, pine nuts
Miscellaneous	Bee pollen	Honey	Syrup, maple syrup, sugar, jam, marmalade, candy, chocolate
All other foods including cereals (wheat, rye, barley, oats, rice, and corn), milk, eggs, seafood, and meat are usually tolerated.			

Skypala I, Bauer M, DunnGalvin A, Venter C. J Allergy Clin Immunol Pract. 2022

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Summary Nutrition Management

- Infants and children with food allergy are at increased risk of inadequate nutrient intake and poor growth.
- Adults may also be a nutritional risk of eliminated foods/food groups are not adequately substituted.

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Guidelines for Food Allergy Prevention

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American Academy of Pediatrics (AAP) History of Prevention Guidelines

AAP Committee on Nutrition (CON) 2000[1]

- No milk until 12 months
- No egg until 2 years
- No peanut, tree nuts, fish or shellfish until 3 years of age.

2008 AAP advised there is no convincing evidence for delaying the introduction of highly allergenic foods after 4-6 months of age for the prevention of allergy. [2]

1. AAP Committee on Nutrition. Pediatrics. 2000;106(2 pt 1):346-349.
2. Greer FR, et al. Pediatrics. 2008;121(1):183-191.

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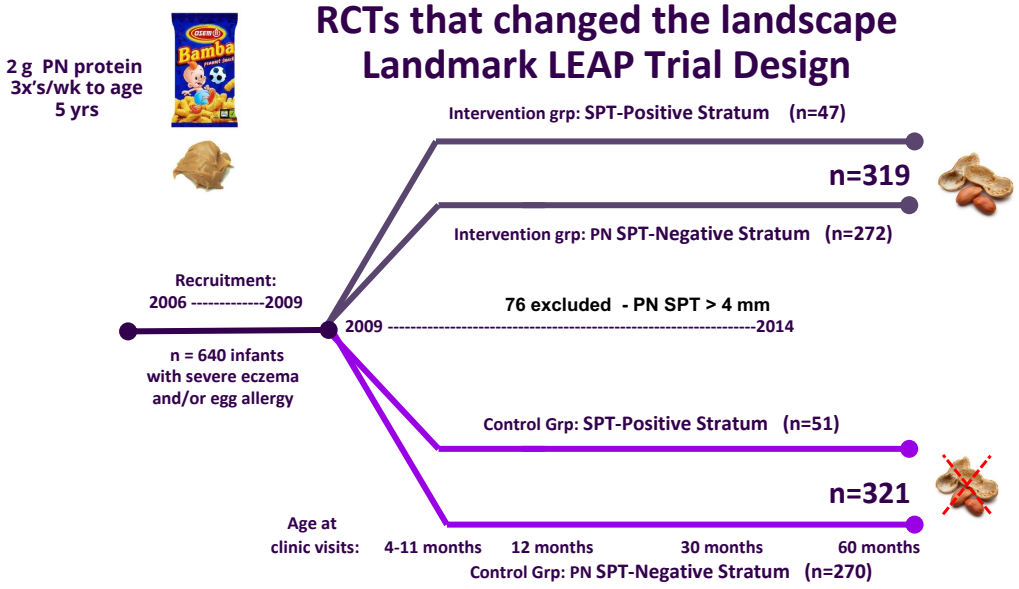
RCTs that changed the landscape Landmark LEAP Trial Design



Du Toit G et al. *NEJM* 2015; 372:803-813

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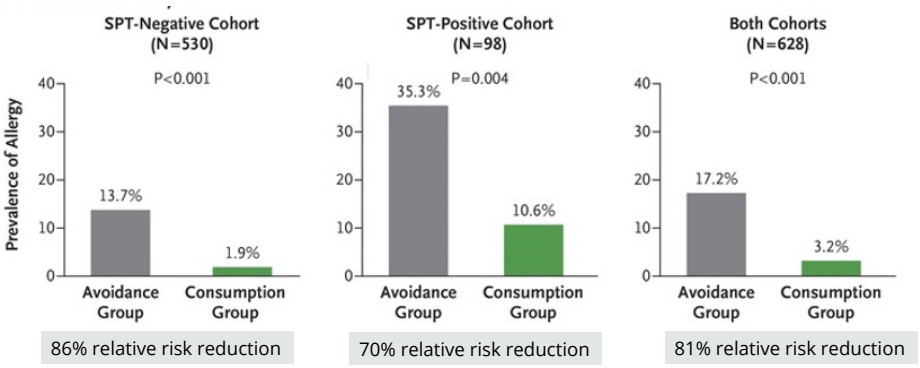
LEAP Outcome: Intention to Treat Analysis



86% relative risk reduction

70% relative risk reduction

81% relative risk reduction

Du Toit G et al. *NEJM* 2016; Jul 28;375(4):398

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JAMA. 2016 Sep 20;316(11):1181-1192.

JAMA | Original Investigation

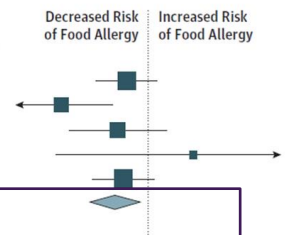
Timing of Allergenic Food Introduction to the Infant Diet and Risk of Allergic or Autoimmune Disease

A Systematic Review and Meta-analysis

Despo Ierodiakonou, MD, PhD; Vanessa Garcia-Larsen, PhD; Andrew Logan, PhD; Annabel Groome, BSc; Sergio Cunha, MD; Jennifer Chivinge, BSc; Zoe Robinson, BSc; Natalie Geoghegan, BSc; Katharine Jarrold, BSc; Tim Reeves, BSc; Nara Tagiveva-Milne, PhD;

Conclusion: Moderate-certainty evidence from 5 trials (1915 participants) that early egg introduction at 4 to 6 months associated with reduced egg allergy (Risk Ratio 0.56, 95% CI 0.36=0.87, P=0.009)

Outcome	Dietary Introduction of Allergenic Food: Early, No. of Events	Early, Total No.	Late, No. of Events	Late, Total No.	Risk Ratio (95% CI)
Egg allergy					
Perkin et al,[6] 2016	21	569	32	596	0.69 (0.40-1.18)
Natsume et al,[17] 2016	5	60	23	61	0.22 (0.09-0.54)
Tan et al,[18] 2016	8	130	13	124	0.59 (0.25-1.37)
Bellach et al,[16] 2015	2	142	1	156	2.20 (0.20-23.97)
Palmer et al,[15] 2013	14	42	18	35	0.65 (0.38-1.11)
Random-effects model Heterogeneity: I^2 = 35.8%; P = .18		943		972	0.56 (0.36-0.87)



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Updated Guidelines

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2017 Addendum Guidelines for the Prevention of Peanut Allergy in the US

Report of the Report of the National Institute of Allergy and Infectious Diseases- sponsored expert panel recommend early introduction of peanut in those at risk of peanut allergy.

Togias, A., Cooper, S. F., Acebal, M. L. et al. J Allergy Clin Immunol. 2017

Image from Pexels by Eva Bronzini.

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Summary of Addendum Guideline-When to Introduce

Guideline	Infant Criteria	Recommendations	Introduce Peanut
1	Severe eczema and/or egg allergy	Strongly consider evaluation by sIgE and/or SPT, and if necessary, an oral food challenge.*	As early as 4-6 months *
2	Mild to moderate eczema	Introduce peanut-containing foods	Around 6 months
3	No eczema/no food allergy	Introduce peanut-containing foods	Age appropriate and In accordance with Family/cultural practices

*Based on test results, introduce peanut containing foods

https://www.niaid.nih.gov/sites/default/files/peanut-allergy-prevention-guidelines-clinician-summary.pdf

Togias A, Cooper SF, Acebal ML, Assa'ad A, Baker JR, Jr., Beck LA, et al. J Allergy Clinol. 2017;139(1):29-44.

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2019 American Academy of Pediatrics- SUMMARY

The Effects of Early Nutritional Interventions on the Development of Atopic Disease in Infants and Children

INFANT feeding:

- There is no evidence that avoiding allergenic foods during pregnancy and lactation prevents atopic disease.
- There is **no evidence that delaying** introduction of allergenic foods beyond 4-6 months of age prevents atopic disease.
- There is evidence that early introduction of infant-safe forms of peanut **reduces the risk** for peanut allergies.
- Data are less clear for timing of introduction of egg.

Greer, Sicherer, Burks. Pediatrics. 2019 Apr;143(4)

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Dietary Guidelines for Americans

U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. Available at DietaryGuidelines.gov

- If an infant has **severe eczema, egg allergy,** or both, peanut containing foods should be introduced into the diet as early as age **4 to 6 months**.
- It is **important** to introduce potentially allergenic foods (e.g., peanut, egg, cow milk products, tree nuts, wheat, crustacean shellfish, fish, and soy) when other complementary foods are introduced (around 6 months of age).

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Common question: How do I feed allergens and still keep my baby's diet healthy?

Protein foods, including meats, poultry, eggs, seafood, nuts, seeds, and soy products, are important sources of **iron, zinc, protein, choline, and long chain polyunsaturated fatty acids.**

https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

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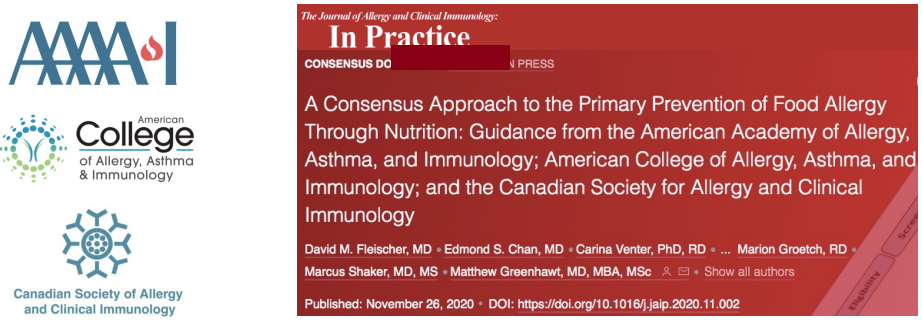

There is strong evidence that **early introduction of peanut and egg** within the first year of life can prevent the development of food allergy to these respective foods.

- Around 6 months but not before 4 months
- Use only cooked forms of egg

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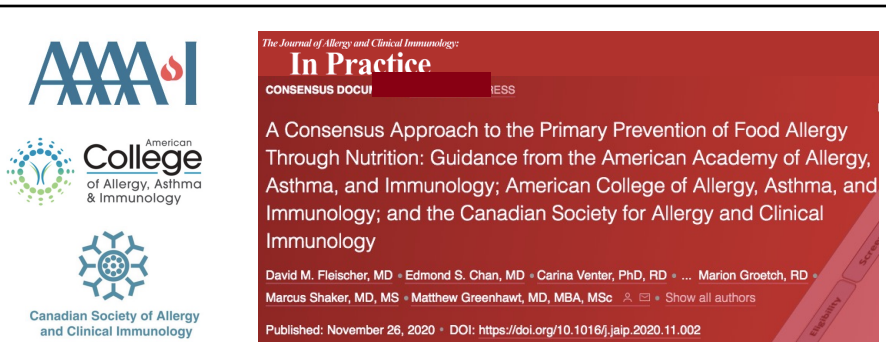

With respect to **other potentially allergenic foods** (cow's milk, soy, wheat, tree nut, sesame, fish, shellfish):

- **There are no data suggesting that early introduction at around 6 months of life is harmful.**
- There are observational data suggesting **harm from intentional delayed introduction**.

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Approximately how much peanut product equals 2 grams of peanut protein?

a) 21 Bamba Sticks
b) 2 teaspoons peanut butter
c) 2 teaspoons peanut powder or flour
d) 10 peanuts
e) All of the above

Image from Pexels by Vanessa Loring.

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Nutritional Comparison 2g Peanut Protein

	Natural Peanut Butter	Peanut	Peanut Flour	Peanut Butter	Bamba Snack
Serving size	2 tsp	10 peanuts	2 tsp	2 tsp	21 sticks
Calories	60	45	13	60	93
Fat (g)	5	3.9	0.02	5	6.1
Sodium (mg)	1.6	1	7	48	68
Sugar (g)	<0.5	0.38	<0.5	1.3	0.4

Bamba: Peanuts, Corn, Palm oil and salt

Traditional Peanut butter: Peanuts, Sugar, Palm Oil, Salt, Molasses.

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How much peanut and egg protein?

NIAID guidelines recommends 2g peanut protein, 3 x/wk

EAT Trial: 2 g of peanut protein and egg protein per week protected against these allergies

AAAAI/ACAAI/CSACI Consensus Approach:

- **Regular exposure for several years is felt to be more important** than focusing on a particular fixed dosing interval or amount.
- A reasonable amount and frequency, such as **1 to 2 teaspoons of peanut butter or egg (or their equivalents) at least once weekly,** should be encouraged.

Perkin et al. N Engl J Med. 2016 May 5;374(18):1733-43
Perkin et al. J Allergy Clin Immunol. 2016 May;137(5):1477-1486

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How do I advise my patients?

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

These instructions for home feeding of peanut protein are provided by your doctor. You should discuss any questions that you have with your doctor before starting. These instructions are meant for feeding infants who have severe eczema or egg allergy and were allergy tested (blood test, skin test, or both) with results that your doctor considers safe for you to introduce peanut protein at home (low risk of allergy).

General Instructions

1. Feed your infant only when he or she is healthy; do not do the feeding if he or she has a cold, vomiting, diarrhea, or other illness.
2. Give the first peanut feeding at home and not at a day care facility or restaurant.
3. Make sure at least 1 adult will be able to focus all of his or her attention on the infant, without distractions from other children or household activities.
4. Make sure that you will be able to spend at least 2 hours with your infant after the feeding to watch for any signs of an allergic reaction.

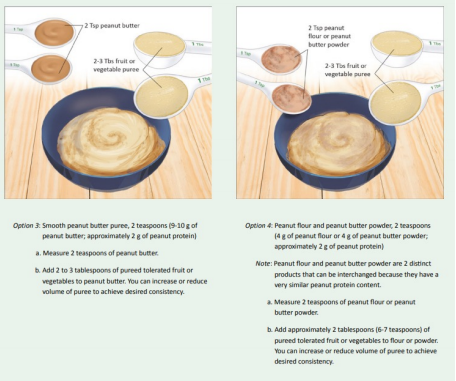
Feeding Your Infant

1. Prepare a full portion of one of the peanut-containing foods from the recipe options below.
2. Offer your infant a small part of the peanut serving on the tip of a spoon.
3. Wait 10 minutes.
4. If there is no allergic reaction after this small taste, then slowly give the remainder of the peanut-containing food at the infant's usual eating speed.

What are symptoms of an allergic reaction? What should I look for?

- Mild symptoms can include:
  - a new rash
  - or
  - a few hives around the mouth or face
- More severe symptoms can include any of the following alone or in combination:
  - lip swelling
  - vomiting
  - widespread hives (welts) over the body
  - face or tongue swelling
  - any difficulty breathing
  - wheeze
  - repetitive coughing
  - change in skin color (pale, blue)
  - sudden tiredness/lethargy/seeming limp

If you have any concerns about your infant's response to peanut, seek immediate medical attention/call 911.



Option 3: Smooth peanut butter puree, 2 teaspoons (9-10 g of peanut butter; approximately 2 g of peanut protein)

a. Measure 2 teaspoons of peanut butter.

b. Add 2 to 3 tablespoons of pureed tolerated fruit or vegetables to peanut butter. You can increase or reduce volume of puree to achieve desired consistency.

Option 4: Peanut flour and peanut butter powder, 2 teaspoons (4 g of peanut flour or 4 g of peanut butter powder; approximately 2 g of peanut protein)

Note: Peanut flour and peanut butter powder are 2 distinct products that can be interchanged because they have a very similar peanut protein content.

a. Measure 2 teaspoons of peanut flour or peanut butter powder.

b. Add approximately 2 tablespoons (6-7 teaspoons) of pureed tolerated fruit or vegetables to flour or powder. You can increase or reduce volume of puree to achieve desired consistency.

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

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Clinical Pearls - Introduce Allergens!

- Beneficial for prevention
  - Peanut-Strong evidence & multiple US guideline recommendations
  - Egg- Moderate evidence & one US guideline recommendation
- Do not delay introduction of other allergens
- Early introduction of common allergens can help infants meet critical nutrient gaps and are important sources of iron, zinc, protein, choline and LCPUFA.
- Introduce allergens early and feed often!

1. Fleischer D, et alJ Allergy Clin Immunol Prac. 2021;9(1):22-43.
2. Schroer B, Groetch M, Mack D, Venter C. J Allergy Clin Immunol Prac. 2021;9:44-56
3. Du Toit G et al. NEJM 2015; 372:803-813

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Resources

- **Dietary Guidelines:** https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf
- **NIAID Handouts:** https://www.niaid.nih.gov/sites/default/files/addendum_guidelines_peanut_appx_d.pdf
- **NIAID Guidance for Health Care Providers:** https://www.niaid.nih.gov/sites/default/files/peanut-allergy-prevention-guidelines-clinician-summary.pdf
- **Dietitians in Food Allergy**
  - INDANA: www.indana-allergynetwork.org/
  - Food Allergy Research and Education (FARE): https://www.foodallergy.org/our-initiatives/education-programs-training/fare-training/pediatric-food-allergy-course

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Questions?

Thank you!

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Upcoming Event

Diet Quality, The Gut Microbiome, and Health Disparities

Wednesday, May 29, 2024, 11:00 AM – 12:00 PM EDT

Does dietary intake shift microbial ecology and function toward the formation of harmful microbial metabolites that contribute to cancer risk? Recent research has discovered that dietary intake and microbes may be associated with health disparities. Attend this webinar to learn how we can translate research into actionable interventions and future directions to make these interventions accessible to the patients we serve.

Continuing education credit will be available for this session!

https://oneop.org/learn/160045/

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Continuing Education

This webinar has been approved for 1.5 continuing education (CE) credits by the:

- Commission on Dietetic Registration
- American Association of Family & Consumer Sciences for CFCS
- American Association of Family & Consumer Sciences for CNWE
- Certificate of attendance

Evaluation Link

Go to the event page for the evaluation and post-test link.

Continuing Education

Questions?

Email Bethany Daugherty:
ce@oneop.org

OneOp.org/learn/160038

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