

Tiny Tots, Tactical Tummies: Infant Feeding's Role in Food Allergy Prevention

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Disclosures

- Board Member/Advisory Panel
 - Forbes Health Advisory Board Member since 2022
 - Member of the Advisory Council for the Robert Wood Johnson Foundation's Reframing Child Health and Obesity Project
 - Former National Media Spokesperson, Academy of Nutrition & Dietetics
 - Medical Advisor, Kabrita USA
- Author
 - *Safe and Simple Food Allergy Prevention: A Baby-Led Feeding Guide to Starting Solid and Introducing Top Allergens*, Benbella Books, Distributed by Penguin Random House, 2024
 - *Simple & Safe Baby-Led Weaning: How to Integrate Foods, Master Portion Sizes, and Identify Allergies*, Rockridge Press, 2020
- Founder and CEO of Malina Malkani, LLC, @healthy.mom.healthy.kids
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Food Allergies 101

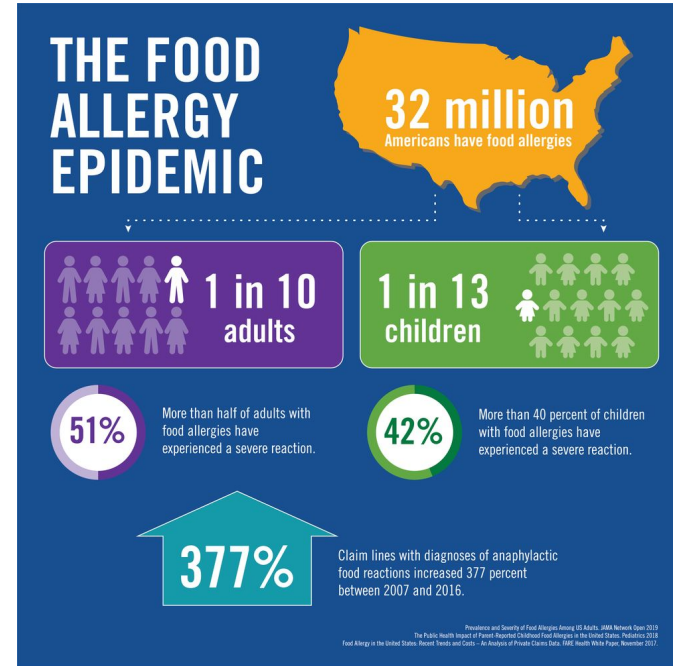
- Prevalence: between 6-8% in children (1 in every 13 kids); up to 10.8% of adults
- High cost: (financial, psychosocial, etc.)
- Disproportionately affects people of color, those with low SES
- Societal confusion about food allergies



Image credit: Deposit Photos

Food Allergies 101: What is a True Food Allergy?

- Immunoglobulin-E-mediated (IgE-mediated)
- Usually triggered by a food protein
- Reactions happen quickly
- Reproducible every time the food is eaten
- Different from non-IgE-mediated food sensitivities and/or intolerances



Source: <https://www.foodallergy.org/resources/epidemic-infographic>

Food Allergy Facts



Image credit: Deposit Photos

- Most babies are not born with food allergies
- No known cure
- 9 foods are responsible for ~90% of all food allergies



FISH



COW'S MILK



SHELLFISH



SOY



TREE NUTS



PEANUTS



WHEAT



EGG



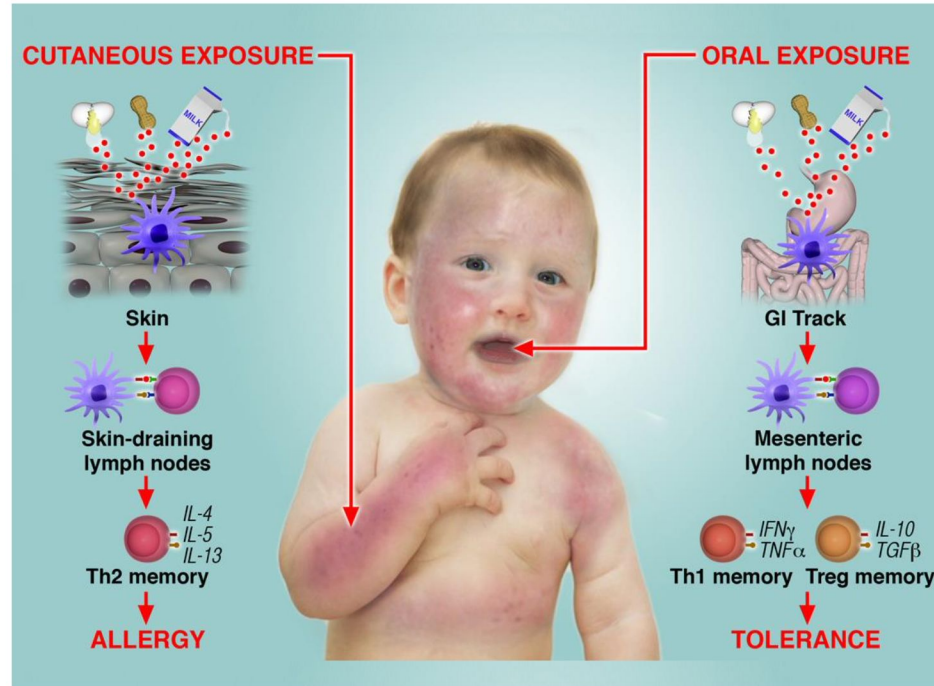
SESAME

Food allergies (FA): Causes & Rising Prevalence?

- 50% increase in food allergy prevalence between 1997-2011 (CDC)
- The development of FAs is complicated and likely multifactorial
- Potential contributing factors:
 - Hygiene Hypothesis
 - Genetics, epigenetics
 - Environment
 - Diet
 - Standard American Diet
 - Lack of diet diversity, high fiber, Mediterranean diet
 - Specific nutrient deficiencies (i.e., Vitamin D)
 - Microbiome
 - Dual Allergen Exposure Hypothesis



Dual Allergen Exposure Hypothesis



J allergy clin immunol 2008; 121: 1331-6

Timeline of the History of Changes in Infant Feeding Recommendations

2000: AAP recommends avoiding allergens until age 1-3

2010: NIAID Guidelines for the Dx & Mgmt of food allergies

2017: NIAID Addendum Guidelines are released

2020-2025: USDA Dietary Guidelines include guidance on allergen introduction

2008: AAP withdraws recommendations to delay allergen introduction

2015: LEAP Trial published
2016: EAT Study published

2019: AAP Clinical Report comes out

2021: AAAAI/ACAAI/CSACI Consensus Approach



Learning Early About Peanut (LEAP) Study

Image credit: Canva

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

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ABSTRACT

BACKGROUND

The prevalence of peanut allergy among children in Western countries has doubled in the past 10 years, and peanut allergy is becoming apparent in Africa and Asia. We evaluated strategies of peanut consumption and avoidance to determine which strategy is most effective in preventing the development of peanut allergy in infants at high risk for the allergy.

METHODS

We randomly assigned 640 infants with severe eczema, egg allergy, or both to consume or avoid peanuts until 60 months of age. Participants, who were at least 4 months but younger than 11 months of age at randomization, were assigned to separate study cohorts on the basis of preexisting sensitivity to peanut extract, which was determined with the use of a skin-prick test — one consisting of participants with no measurable wheal after testing and the other consisting of those with a wheal measuring 1 to 4 mm in diameter. The primary outcome, which was assessed independently in each cohort, was the proportion of participants with peanut allergy at 60 months of age.

RESULTS

Among the 530 infants in the intention-to-treat population who initially had negative results on the skin-prick test, the prevalence of peanut allergy at 60 months of age was 13.7% in the avoidance group and 1.9% in the consumption group ($P<0.001$). Among the 98 participants in the intention-to-treat population who initially had positive test results, the prevalence of peanut allergy was 35.3% in the avoidance group and 10.6% in the consumption group ($P=0.004$). There was no significant between-group difference in the incidence of serious adverse events. Increases in levels of peanut-specific IgG4 antibody occurred predominantly in the consumption group; a greater percentage of participants in the avoidance group had elevated titers of peanut-specific IgE antibody. A larger wheal on the skin-prick test and a lower ratio of peanut-specific IgG4:IgE were associated with peanut allergy.

CONCLUSIONS

The early introduction of peanuts significantly decreased the frequency of the development of peanut allergy among children at high risk for this allergy and modulated immune responses to peanuts. (Funded by the National Institute of Allergy and Infectious Diseases and others; ClinicalTrials.gov number, NCT00329784.)

From the Department of Pediatric Allergy, Division of Asthma, Allergy and Lung Biology, King's College London and Guy's and St. Thomas' National Health Service Foundation Trust, London (G.D.T., S.R., A.F.S., H.A.B., M.B., M.F., V.T., G.L.), and the University of Southampton and National Institute for Health Research Respiratory Biomedical Research Unit, Southampton and David Hide Centre, Newport, Isle of Wight (G.R.) — both in the United Kingdom; the Division of Hematology-Oncology, Department of Medicine (P.H.S.), and the Immune Tolerance Network (D.P.), University of California, San Francisco, San Francisco; the Federal Systems Division, Chapel Hill, NC (H.T.B., M.L.S.); and the National Institute of Allergy and Infectious Diseases, Bethesda, MD (M.G.L., M.F.). Address reprint requests to Dr. Lack at the Children's Allergy Unit, 2nd Fl., Starwell B, South Wing, Guy's and St. Thomas' NHS Foundation Trust, Westminster Bridge Rd., London SE1 7EH, United Kingdom.

*A complete list of members of the Learning Early about Peanut Allergy (LEAP) Study Team is provided in the Supplementary Appendix, available at nejm.org.

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Addendum Guidelines for the Prevention of Peanut Allergy



Summary of Addendum Guidelines

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

Who is at Risk for Food Allergies?

Highest risk for the development of food allergies

- ↑ Babies with severe eczema
- Babies with another diagnosed food allergy
- Babies with mild to moderate eczema
- Babies with a family history of allergic disease in one or both parents
- Babies in the general population



What is severe eczema?

Per the NIAID: severe eczema is “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 topical corticosteroids, calcineurin inhibitors, or other anti-inflammatory agents despite appropriate use of emollients.”



Photo: Sourced from Deposit Photos

Who is at Risk for Food Allergies?

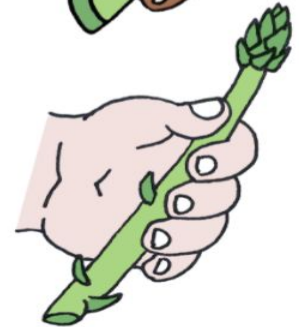
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- Babies with a family history of allergic disease in one or both parents
- Babies in the general population



Screening Prior to Introduction?

- Per the NIAID, high-risk babies may need screening prior to early intro (endorsed by AAP, USDA, HHS)
- U.S. is the only country that includes a screening step as part of early feeding guidelines
- In a more recent document providing their consensus approach to the primary prevention of food allergy, the AAAAI, ACAAI, & CSACI de-emphasize the need for screening, recommending that all babies, regardless of risk, should be fed peanut-containing foods + egg between 4-6 months when developmentally ready

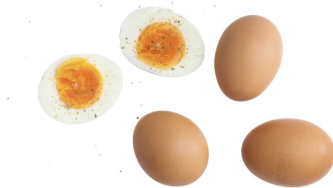




Offer Allergens Early and Often!

(Especially Peanut & Egg)

- FA Prevention is simple and effective, but not widely utilized
- AAP and the new Dietary Guidelines for Americans now encourage early intro of top allergens (especially peanut & egg) in the first year, starting at ~6 months
 - High-risk babies (with moderate to severe eczema or existing egg allergy) may benefit from starting peanut foods even earlier (4-6 months) (NIAID)
 - Parents of high-risk babies should speak with their pediatrician or healthcare provider and work together to create an individualized plan for allergen introduction
- IMPORTANT NOTE: Once introduced, **keep potential allergens in the diet frequently** – for peanut foods, that means 2 tsp, 2-3x/week



Signs & Symptoms of an Allergic Reaction

If one mild symptom, call the pediatrician & ask for guidance

Mild Symptoms Can Include:

- A new rash
- A few hives around the face or mouth

More Severe Symptoms Can Include:

- Vomiting
- Lip, face, or tongue swelling
- Widespread hives
- Wheeze
- Difficulty breathing
- Repetitive coughing
- Sudden lethargy or limpness
- Change in skin color

If more than one mild symptom, or any severe symptom, inject epinephrine & call 911 (request ambulance with epinephrine)

Challenges to Diversifying the Diet & Offering Allergens to Infants

- Lack of awareness
- Confusion
- Fear
- Lack of knowledge
- Cost of foods containing potential allergens
- Access to foods containing potential allergens



Importance of Shared Decision Making



- Cornerstone of patient-centered care
- Collaboration between providers, patients, and their families
 - Sharing evidence
 - Explaining available options
 - Discussing the benefits, risks, pros and cons
- Recommended by the NIH, AMA, AAP; allergy-related resources available through the AAAAI and the ACAAI
- Especially important in pediatric food allergy

“Food Before 1 is Just For Fun”

**OLD
MINDSET**



NUTRITION

1%

**FOOD
BEFORE
ONE**

FUN, EXPLORATION

99%

Is Food Before 1 Just For Fun? Nope!



At what age should babies start solids?

- Lots of confusion and changing guidelines over the past several decades
- Risks associated with starting too early (before 4 months) & too late (after 7 months)
- WHO, AND & AAP & the new DGAs all now recommend starting solids at ~6 mos when signs of readiness are present

SIGNS OF READINESS

for solids!



Options for Starting Solids

- Baby-Led Weaning
- Traditional Parent-Led Spoon-Feeding of Purees
- Combination of Both



Images: Sourced from Malina Malkani, LLC

Establish Feeding First

- There is no perfect first food!
- Great options include ripe banana, ripe avocado, steamed or baked sweet potato, iron-fortified infant oat cereal
- Consider safe food sizing & texture



Images sourced from Malina Malkani, LLC

FAQ: Should Peanut or Egg Be Introduced as the First Food?

- Establish feeding first with foods that are not common allergens
- Guide families toward a collection of nutrient-rich early foods with an eye toward iron and zinc
- Don't get stuck here for more than a few days before moving on to allergen introduction



Images sourced from Malina Malkani, LLC

FAQ: Are BLW and FA Prevention Compatible?

- Consider the Dual Exposure Hypothesis
- Emphasize the importance of early introduction
- Consider spoon-feeding for the first couple of introductions
- No evidence that using two different feeding models is detrimental
- Consider using a layer of ointment as a barrier before feeds
- Promote excellent skin care for babies with eczema



Image credit: Malina Malkani, LLC
(8-Month-Old baby eating pasta, tomato sauce, watermelon)

How to Begin Offering Top Allergens to Higher-Risk Babies



FISH



COW'S MILK



SHELLFISH



SOY



TREE NUTS



PEANUTS



WHEAT



EGG



SESAME

Image sourced from Malina Malkani, LLC

- Pick a day when caregiver can be fully attentive for ~2 hours, well before a nap
- Start with a healthy, happy baby!
- Offer a tiny bit to start on the tip of a spoon
- Wait 10 minutes
- If no reaction, continue to feed the rest of the portion at the infant's feeding pace
- Observe for ~2 hours
- Once introduced, continue to offer the allergen consistently (about 2x/week) going forward

Practical Ways to Introduce Peanuts

- Nutrient-dense, recommended early food for babies
- Early intro of peanut does not affect the duration of breastfeeding, nor does it negatively affect growth or nutrition
- Avoid whole peanuts and globs of peanut butter (choking hazards)
- Offer 2 grams peanut protein ~3x/week in an infant safe form (LEAP Study)

First few introductions



Images sourced from Malina Malkani, LLC; Peanut butter and peanut powder thinned with breast milk or formula; 21 peanut puffs, teething cracker and toast strip with thin layer of smooth peanut butter

Subsequent introductions



Practical Ways to Introduce Eggs

- Scrambled or hard-boiled
- Pureed with a little liquid
- Ensure egg is fully cooked
- Offer both the white and yolk
- Offer $\frac{1}{3}$ of an egg, 2-3x/week
- No restrictions on the number of eggs per week for babies

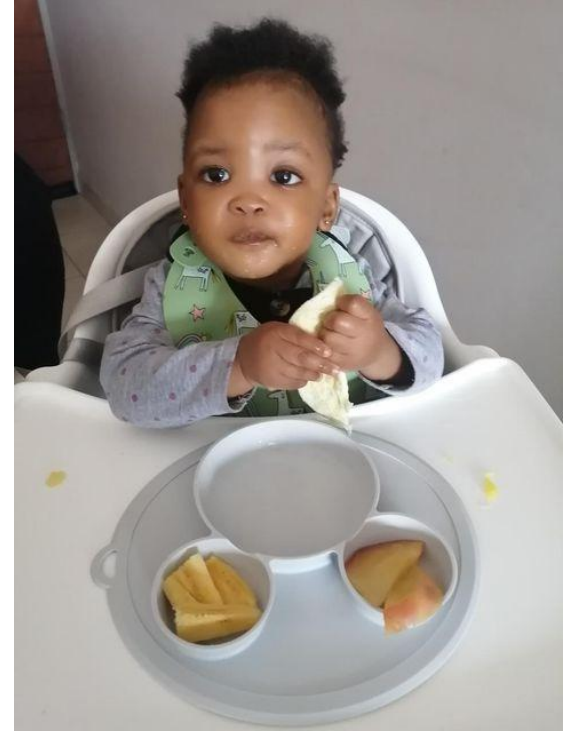


Image credit: Malina Malkani, LLC; 8-month-old baby girl eating cooked egg, steamed apple, banana

(<https://pubmed.ncbi.nlm.nih.gov/27939035/>)

Practical Ways to Offer Cow's Milk Protein

- Cow's milk not recommended as a beverage, but a little in recipes is fine
- Yogurt: choose plain (to keep added sugars low) and full-fat
- Cheese: Avoid soft cheeses made with unpasteurized milk (goat, feta)
- If baby is introduced to and tolerates a cow's milk formula at any point during infancy, keep offering it (regular ingestion, as little as 10mL/day has been shown to help prevent loss of tolerance)



Image credit Malina Malkani, LLC

Practical Ways to Offer Fish

- Cook thoroughly, remove any bones
- If canned, look for BPA-free packaging, 'low-salt,' or 'no-salt-added'
- Avoid large-prey, higher-mercury fish (i.e., shark, king mackerel, swordfish, tilefish from the Gulf of Mexico, bigeye and albacore tuna, orange roughy, and marlin per the CDC)

**Sardines
offered as a
finger food**



**Cooked, flaky
fish (i.e., Arctic
char, cod)**



**Salmon patty
cut into finger
sized strip**



**Canned salmon
mixed w/ plain
yogurt**



Images sourced from Malina Malkani, LLC; 2-year-old boy holding a fish bone

Practical Ways to Offer Tree Nuts



Add
ground
nuts or nut
flour to
baby's
pancake
or muffin
batter



Roll
slippery
wedges of
fruit in
ground
nuts or nut
flour



Mix
ground
nuts or
nut flour
into a
familiar
puree



Mix nut
powder with
breastmilk
or formula &
spread on a
teething
cracker

Practical Ways to Offer Shellfish

**Shredded & added to
pasta sauce**



Crabcake



Shrimp Fritter



Keep in mind...

Early introduction of top allergens is important, but so is keeping them in the diet **consistently** and **frequently** once introduced, as a part of the family's regular routine of meals and snacks. This is an essential part of the food allergy prevention puzzle that families often forget!

FAQs: Single Food Introductions?



Image credit: Malina Malkani, LLC; 7-month-old baby boy eating broccoli, beef, summer squash

- Healthcare clinicians used to recommend single food introductions for all new foods and waiting a few days before introducing another (not evidence-based)
- Single food introductions of unfamiliar top allergenic foods and pausing for a few days before introducing another is more of a common-sense, conservative approach to allergen introduction
- In the event of a reaction, it makes it easier to determine which food is responsible, but it's not evidence-based or necessary; it's simply an option

The Role of Diet Diversity

- More research is needed
- May help protect against the development of food allergies, decreasing the odds of developing a food allergy during the first 10 years of a child's life by a third
- Families should introduce foods from all the food groups that fit into their cultural traditions, budget and preferences (DGA)
- Aim to introduce at least 1 new food per day

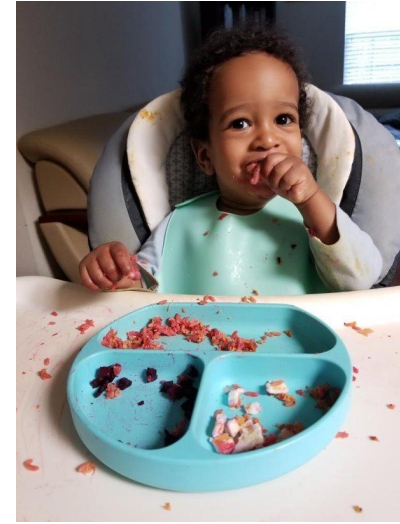


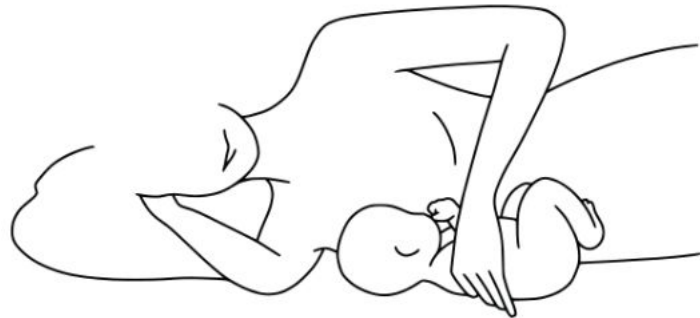
Image credits: Malina Malkani, LLC; a 6-month-old baby girl covered in pureed beets and an 11-month-old boy eating beetroot casserole, cheese and blackberries

Microbiome

- Probiotic supplementation during pregnancy, breastfeeding, and early life MAY reduce the risk of eczema and sensitization to cow's milk
- Probiotic supplementation: no effect on food allergy
- Butyrate:
 - Short-chain fatty acid that helps maintain the intestinal barrier
 - Higher levels associated with reduced risk of allergic disease



Breastfeeding for FA Prevention?



- Insufficient evidence to support maternal dietary restrictions during pregnancy or breastfeeding (EAACI, AAAAI/ACAAI/CSACI, AAP)
- We do have evidence that exclusive breastfeeding for 3-4 months decreases the incidence of eczema in the first 2 years of life
- No evidence that supports short- or long-term advantages for exclusive breastfeeding beyond 3 to 4 months for atopy prevention
- No conclusions can be made about the role of breastfeeding in either preventing or delaying the onset of specific food allergies

Hydrolyzed Formula for FA Prevention?



- Partially AND/OR extensively hydrolyzed infant formula is NOT recommended for the prevention of food allergy
- Qualified Health Claim: “Little scientific evidence suggests that, for healthy infants who are not exclusively breastfed and who have a family history of allergy, feeding a 100% whey protein partially hydrolyzed infant formula from birth up to 4 months of age instead of a formula containing intact cow’s milk proteins may reduce the risk of developing atopic dermatitis throughout the 1st year of life.”

FAQs: Dose?

- Peanut: for high-risk, 2 g (2 tsp) peanut protein 3x/week if tolerated (LEAP)
- Egg: 2 g egg protein (about 1/3 of an egg) 2-3x/week (Consensus Guidelines)
- Other allergens: 2 g allergenic protein per week is thought to be protective, but we don't know for sure
- Don't over-medicalize it!
- Emphasize serving an appropriate portion and keeping it in the diet, don't worry if baby doesn't finish



Image credit: Malina Malkani, LLC

Practice Applications (1)

Key points of focus when counseling families on infant feeding:



- Help identify babies at high risk for food allergy
- Promote excellent skincare
- Start conversations and education about food allergy prevention EARLY
- Babies with eczema are the priority, but ALL babies need early, frequent, consistent allergen exposure
- Guide families to NOT delay the introduction of common allergens
- Start solids when baby is developmentally ready (~6 mos, not before 4 mos)
- Help make early, frequent, and consistent introduction of allergens practical, accessible, and actionable

Practice Applications (2)



- Promote a healthy, diverse diet (at least 1 new food per day)
- Provide adequate nutrients, but do not over-supplement
- If baby is introduced to and tolerates a cow's milk-based formula at any point during infancy, keep offering regularly (as little as 10 mL or 2 tsp/day)
- Prioritize the introduction of peanut and egg
- Once an allergen is introduced, keep offering consistently!
- Encourage and facilitate shared decision-making
- Know that there is debate about whether to screen before allergen introduction



Find more info at:

MalinaMalkani.com/blog

Thank you!

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