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M. LOUISE FITZPATRICK COLLEGE OF NURSING
MacDonald
CENTER FOR NUTRITION EDUCATION AND RESEARCH

Food Allergy Prevention and Management

Wednesday, March 20, 2024

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Associate Director
MacDonald Center for Nutrition Education and Research
Villanova University M. Louise Fitzpatrick College of Nursing

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Food Allergy Prevention and Management

Raquel Durban, MS, RD, LD/N
Carolina Asthma & Allergy Center

FEEDING THE NEED DEVELOPING SOLUTIONS

VILLANOVA NURSING

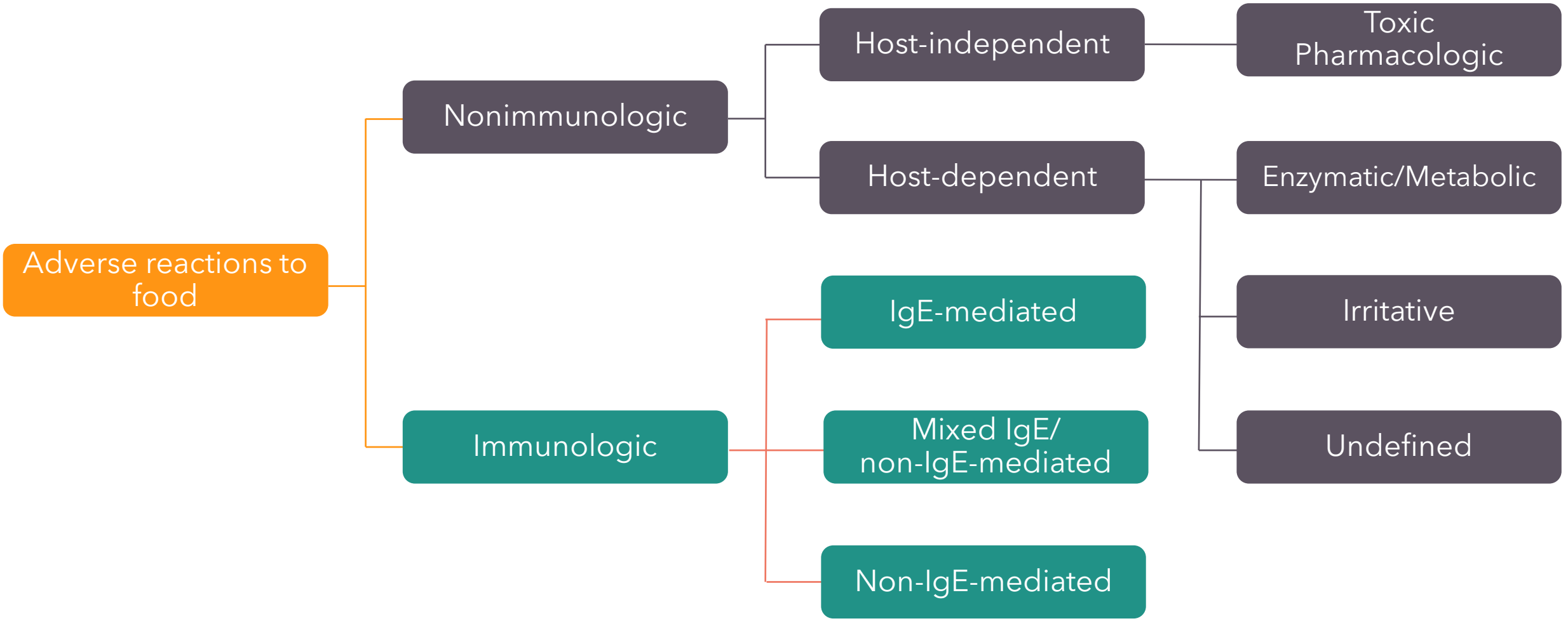
Food Allergy: Prevention and Management

Raquel Durban MS, RD, LD/N
Carolina Asthma & Allergy Center

Agenda

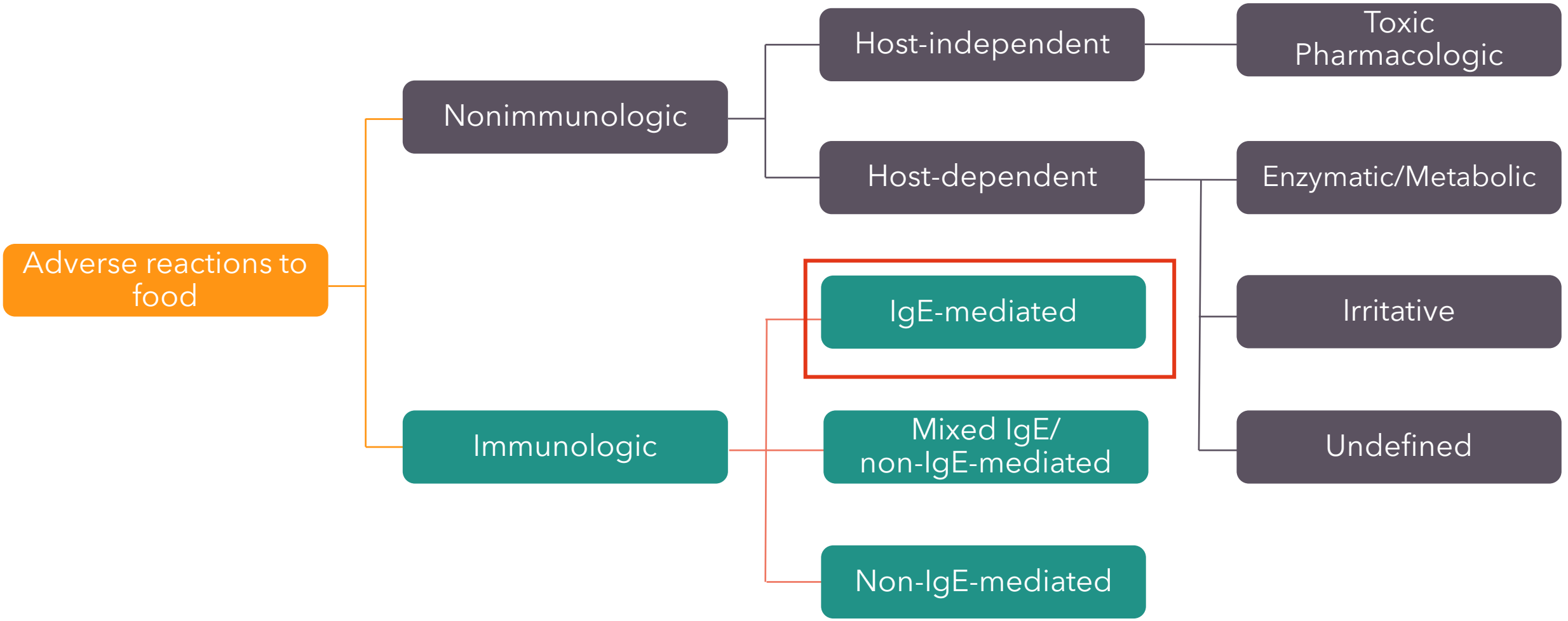
- What and why is food allergy?
- Importance of skin care.
- What is appropriate testing?
- When to consider highly allergenic food introduction.
- How to introduce highly allergenic foods.

Food Allergy vs Food Intolerance



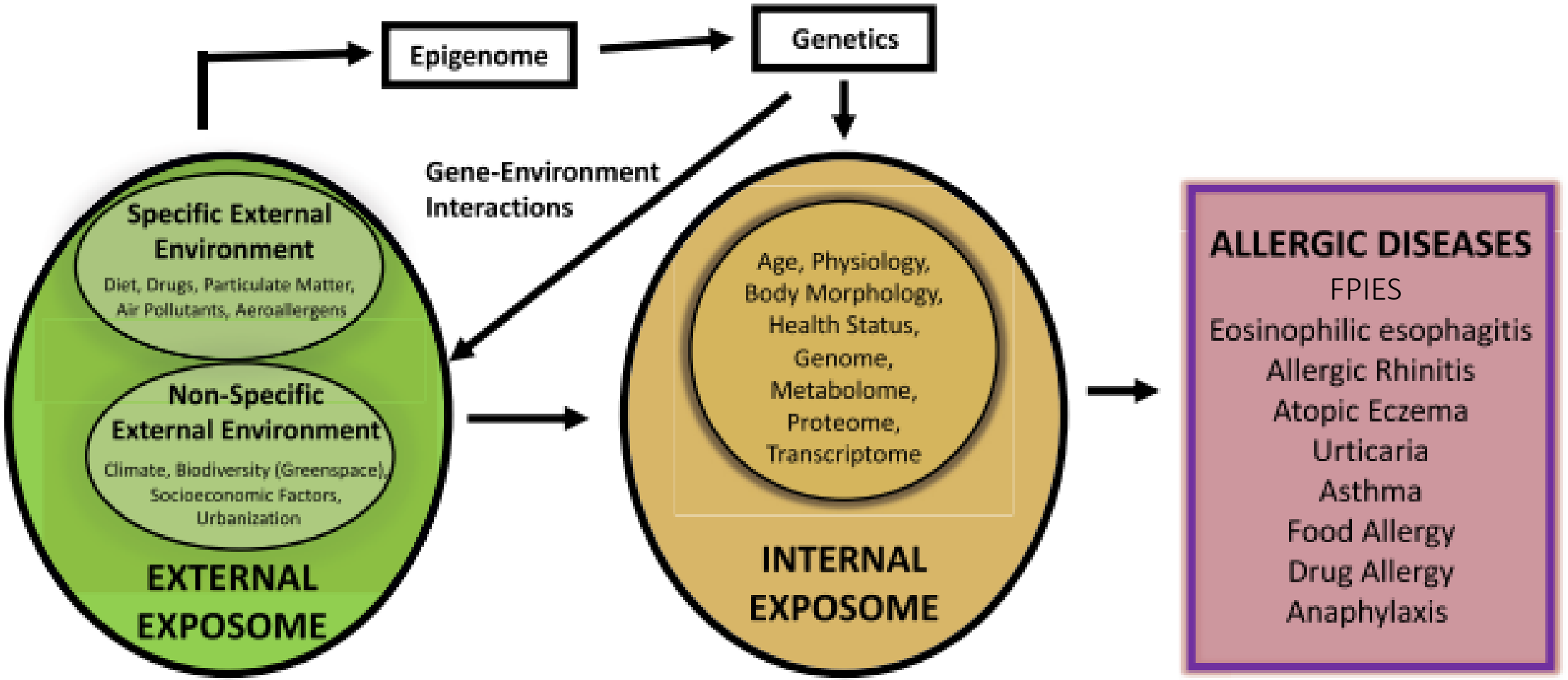
Gargano D, et al. *Nutrients*. 2021;13(5):1638.

Food Allergy vs Food Intolerance

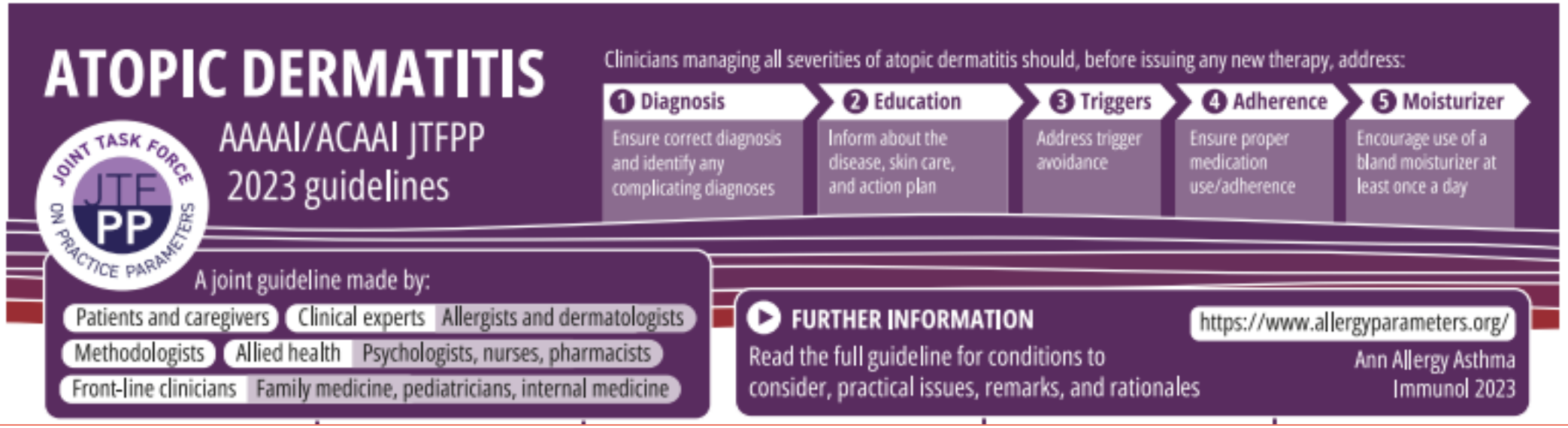


Gargano D, et al. *Nutrients*. 2021;13(5):1638.

Exposome Involvement in Allergic Diseases

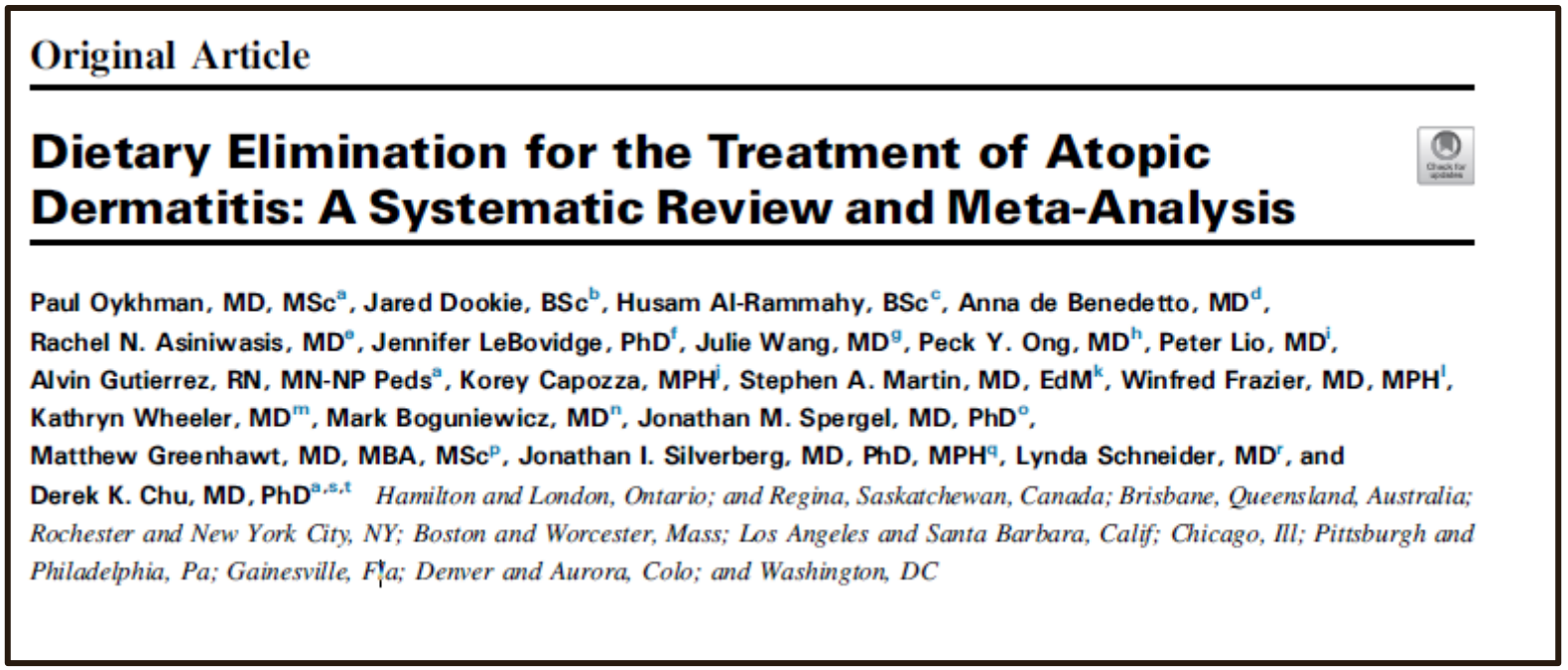


Cianferoni A, Jensen E, Davis CM. The Role of the Environment in Eosinophilic Esophagitis. *J Allergy Clin Immunol Pract*. 2021;9(9):3268-3274.



Chu DK, Schneider L, Asiniwasis RN. Et, al. Atopic dermatitis (eczema) guidelines: 2023 AAAA/ACAAI Joint Task Force on Practice Parameters. GRADE- and Institute of Medicine –based recommendations. Ann Allergy Asthma Immunol. 2023

Empiric Elimination diet for Eczema— Risks outweigh the uncertain small benefit!



Original Article

Dietary Elimination for the Treatment of Atopic Dermatitis: A Systematic Review and Meta-Analysis

Paul Oykhman, MD, MSc[a], Jared Dookie, BSc[b], Husam Al-Rammahy, BSc[c], Anna de Benedetto, MD[d], Rachel N. Asiniwasis, MD[e], Jennifer LeBovidge, PhD[f], Julie Wang, MD[g], Peck Y. Ong, MD[h], Peter Lio, MD[i], Alvin Gutierrez, RN, MN-NP Peds[a], Korey Capozza, MPH[j], Stephen A. Martin, MD, EdM[k], Winfred Frazier, MD, MPH[l], Kathryn Wheeler, MD[m], Mark Boguniewicz, MD[n], Jonathan M. Spergel, MD, PhD[o], Matthew Greenhawt, MD, MBA, MSc[p], Jonathan I. Silverberg, MD, PhD, MPH[q], Lynda Schneider, MD[r], and Derek K. Chu, MD, PhD[a,s,t] *Hamilton and London, Ontario; and Regina, Saskatchewan, Canada; Brisbane, Queensland, Australia; Rochester and New York City, NY; Boston and Worcester, Mass; Los Angeles and Santa Barbara, Calif; Chicago, Ill; Pittsburgh and Philadelphia, Pa; Gainesville, Fla; Denver and Aurora, Colo; and Washington, DC*

Potential Risks

- Development of IgE-mediated Allergy (particularly in young children)
- Financial and Quality of Life Burden
- Case Reports of Malnutrition

Maternal restriction for CMPA during breast feeding

Recommendations:

- Generally, restriction not recommended
- Several guidelines recommend no restriction if infant is asymptomatic
- May be indicated in the setting of food protein-induced allergic proctocolitis (FPIAP), but re-challenging to confirm the diagnosis is strongly recommended.

Potential Risks:

- ✓ Potential effects on quality of life
- ✓ Financial burden
- ✓ Nutrient density of cow's milk and fermented food (yogurt)

WHAT ABOUT THOSE EU FORMULAS?

Lack of FDA regulation

Shipping & storage concerns

Labeling differences

- Language.
- Definitions.

More expensive without proven benefit.

Formula recall notice delays

Age-based stages

DiMaggio DM, Du N, Scherer C, Brodlie S, Shabanova V, Belamarich P, Porto AF. Comparison of Imported European and US Infant Formulas: Labeling, Nutrient and Safety Concerns. J Pediatr Gastroenterol Nutr. 2019 Oct;69(4):480-486.

Nutrients of Concerns

MILK:

- Calcium, Phosphorus
- Riboflavin, B12
- Vitamin D
- Magnesium, Zinc

WHEAT:

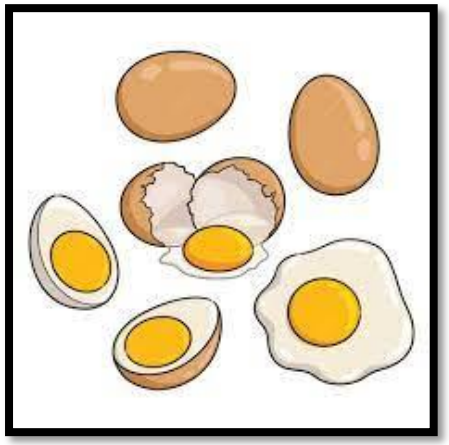
- Thiamin
- Riboflavin
- Niacin
- Folic Acid
- Iron

NUTS:

Vitamin E
Iron
Healthful fat

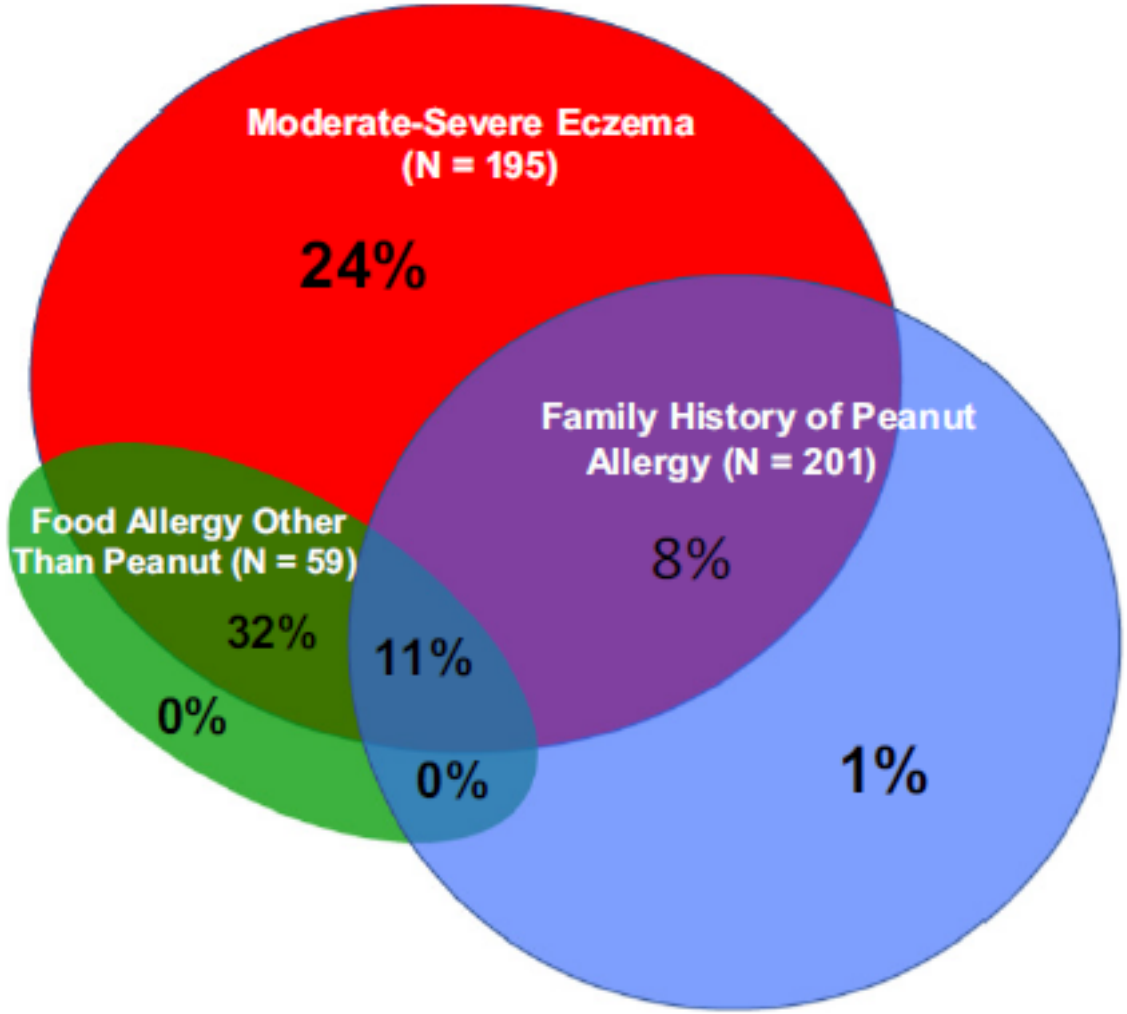
EGGS:

- Choline
- Vitamin B 12
- Selenium
- Vitamin D



Age and eczema severity, but not family history, are major risk factors for peanut allergy in infancy

Rates of peanut allergy



Population:

- 321 infants 4-11 months of age with:
  - no history of peanut exposure or allergy testing
  - at least one risk factor

Procedures:

- Skin prick test and oral food challenge (or observed feeding) to determine peanut allergy status

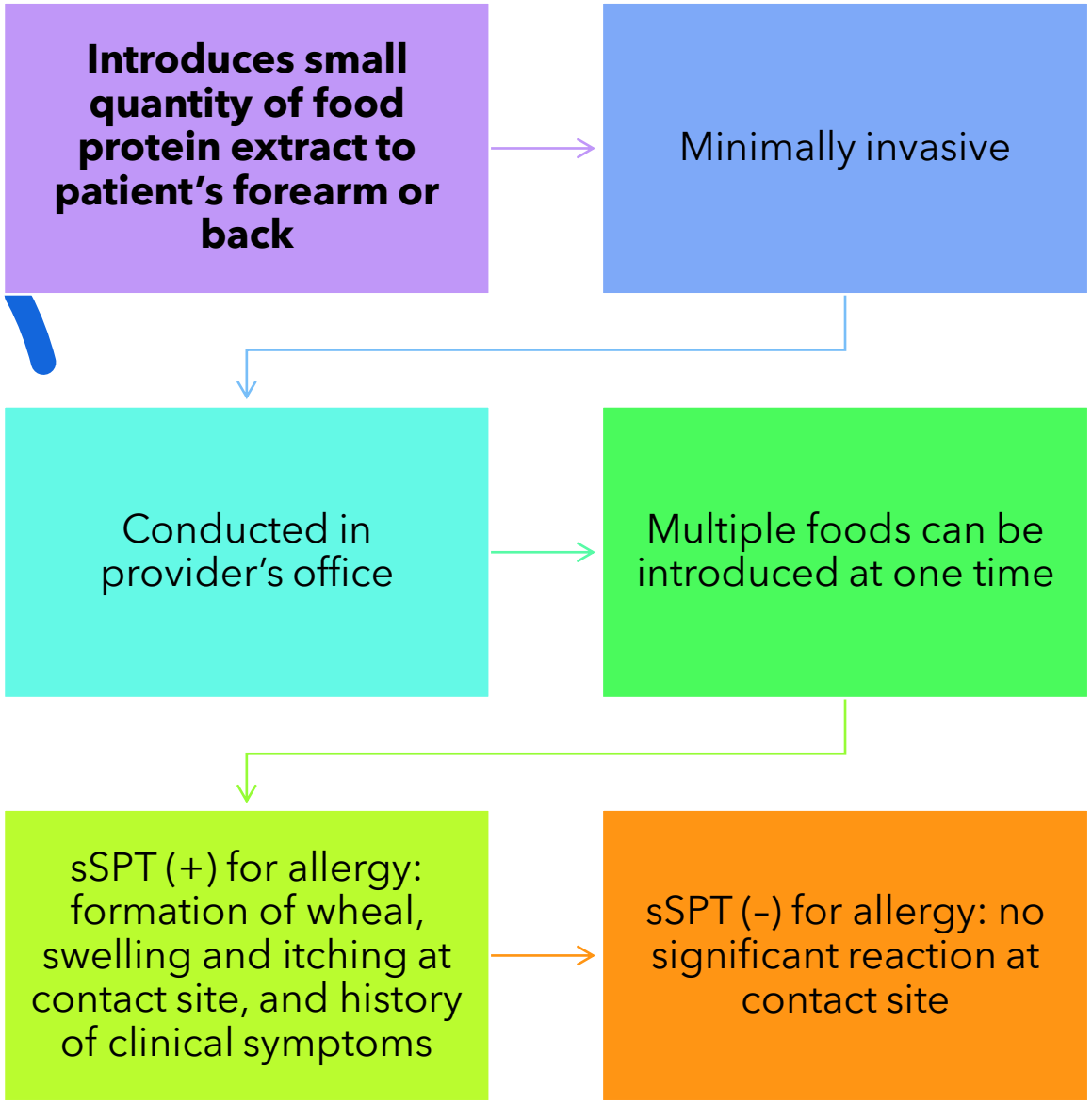
Risk Modification:

- Higher age and SCORAD (SCORing Atopic Dermatitis) score increase risk
- In the absence of eczema, family history confers very little risk
- Among those with eczema, food allergy other than peanut increases risk

Testing for IgE Food Allergy

- Skin prick test (sSPT)
- Blood testing (sIgE)

Skin Prick Test



Blood Test

Measures level of antibodies produced in response to specific allergen

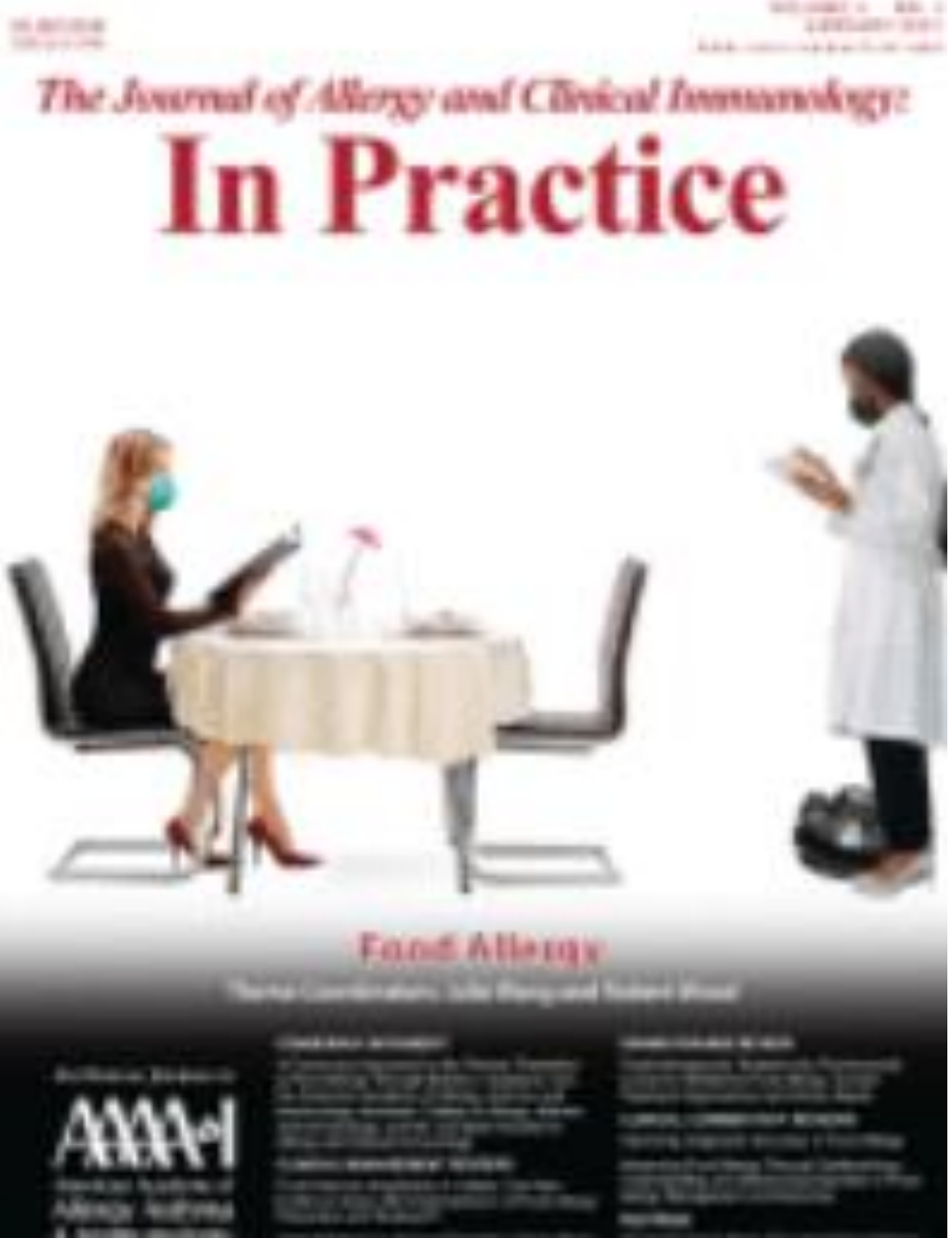
- Results may be assessed alongside SPT results
- Consideration of total IgE
- AND always with clinical history of adverse reactions

Is prevention a reality?

In 2008, the AAP partially reversed the 2000 recommendation, stating that the introduction of allergenic foods “should not be delayed”.

But when should they be introduced?

Greer et al. Pediatrics. 2019;143(4):e20190281



A Consensus Approach to the Primary Prevention of Food Allergy Through Nutrition: Guidance from the American Academy of Allergy, Asthma, and Immunology; American College of Allergy, Asthma, and Immunology; and the Canadian Society for Allergy and Clinical Immunology

Journal of Allergy and Clinical Immunology: In Practice, 2021-01-01, Volume 9, Issue 1, Pages 22-43.e4,

Risk Assessment for Development of Food Allergy

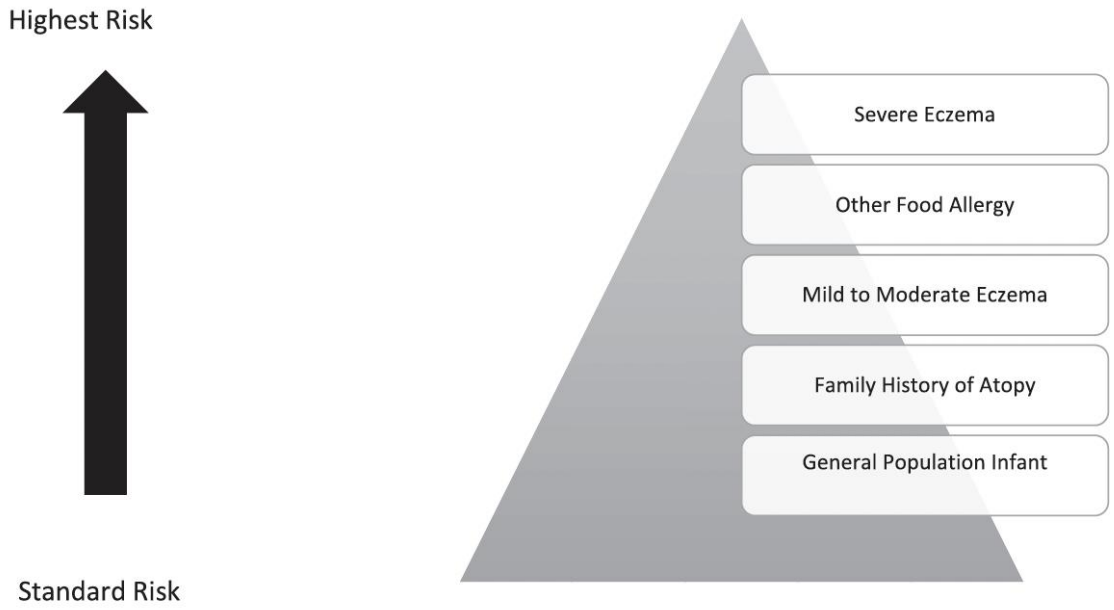


FIGURE 2. Ascending gradient of risk assessment for the development of food allergy among infants. The bottom of the pyramid represents standard risk and the peak the highest risk for developing food allergy.

Fleischer D. JACI: In Practice 2021; 9(1): 22-43.e4

RECOMMENDATIONS:

- Recommendation 1: Consider infants with **severe eczema at highest risk for FA**
  - Mild to moderate eczema other FA some risk
  - Be aware that FA develops in children without risk. *Moderate strength*
- Recommendation 2: Irrespective of risk, introduce peanut around 6 months of life
  - But not before 4 months.
- Recommendation 3: Introduce Egg or Egg containing foods around 6 months
  - But not before 4 months. Avoid raw, pasteurized egg.
- Recommendation 4: **Do not deliberately delay introduction of other allergens**.
  - There may be potential harm in delay based on past observational studies.
  - No data shows harm in earlier introduction (around 6 months but not before 4 months)
- Recommendation 5: Observational studies *but not RCT* suggest diet diversity may foster prevention of food allergy
- Recommendations 6 and 7: Do not routinely prescribe hypoallergenic formula

TABLE I. Including potential allergens for allergy prevention and/or healthy infant feeding during the first year of life

Food	Choose healthy infant foods*	How much/how often As part of the infant's complementary diet
BENEFICIAL for prevention When developmentally ready† around 6 mo of age or between 4 and 6 mo of age if advised by your doctor due to high risk of allergy (severe eczema or egg allergy)‡		
Peanut§	Choose peanut flour or thinned peanut butter that has no added ingredients (salt, sugar, oils) for healthier options Peanut butter should be thinned with breast milk, water, or formula or mixed into a pureed food, eg, 2 teaspoons of peanut butter mixed with 2-3 teaspoons of liquid	Approximately 1-2 teaspoons of peanut butter/powder per serving, served 2-3 times per week as tolerated
BENEFICIAL for prevention but effective dose requires further research When developmentally ready after 4-6 mo of age†		
Egg	Serve *well-cooked* egg mashed with pureed foods or chopped and served as finger food	Approximately 1/3 of a well-cooked egg, 2-3 times per week
HAVE NOT BEEN STUDIED SUFFICIENTLY to know if early introduction decreases the risk of allergy; therefore, doses are based on healthy feeding‖ There is currently no evidence of benefit to delay the introduction of highly allergenic foods after 4-6 mo of age and developmentally ready†		
Wheat	Infant wheat cereals (iron-fortified for the breastfed infant); whole-wheat toast, pasta, or crackers for older infants	1/2 to 1 ounce total grains per day. 1/2 ounce wheat serving includes 1/4 cup fortified infant wheat cereal, 1/4 cup pasta, 1/2 slice bread
Milk	Plain, full-fat yogurt can be mixed into pureed fruit or vegetable; cow's milk should not substitute for breast milk or infant formula	2-4 fluid ounces per day
Sesame§	Tahini is sesame paste typically served as an ingredient in hummus or as tahini dipping sauce for finger foods like vegetables (blended with water, lemon juice, olive oil, and herbs for flavoring)	≥1/2 ounce seeds/any nuts per week (or 3 teaspoons)
Seafood	Low mercury finfish https://www.fda.gov/media/102331/download	1 ounce per serving, 3 times per week (see FDA link for frequency and type of fish)

Learning Early About Peanut (LEAP)

2017

Leap Early About Peanut

Early introduction of peanut-based products (before 11 months of age) lead to the prevention of peanut allergy in high-risk infants

NIAID released feeding updates based on LEAP trial in 2017

Du Toit G et al. N Engl J Med 2015;372:803-813

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

This update is significant to dermatologists because atopic dermatitis patients have an increased risk for food allergy.

The updated guideline provides three recommendations for infants at various risk levels:

- Severe eczema and/or egg allergy: Consider food allergy testing, and based on test results, introduce peanut-containing foods at four to six months.
- Mild to moderate eczema: Introduce peanut-containing foods around six months.
- No eczema or food allergy: Introduce peanut-containing foods at the appropriate age in accordance with family and cultural preferences.

Home Feeding Guide

Early Peanut Introduction Works!

- In Australia- early introduction practices led to a 16% decrease in peanut allergy
- Peanut allergy prevalence in early introduction group
  - 2018-2019: 2.6% VS
  - 2007-2011: 3.1%*
    - *After accounting for migration and population changes.
  - 2018-2019: 4.8% in infants that did not consume peanuts until after 12 months of age
- Severe reactions to introducing peanut early were uncommon

Soriano V et al. J Allergy Clin Immunol. 2021 Feb; 147 (2), SUPPLEMENT: AB236

Enquiring about tolerance (EAT) study

2016

2016 - Enquiring About Tolerance (EAT) study

Randomly assigned to:

- Early introduction of 6 foods (peanuts, cooked egg, cow's milk, sesame, whitefish and wheat) by 5 months age 2-3 times per week

OR

- Standard introduction group (exclusively breast fed until 6 months of age)

OUTCOMES

- Prevalence of food allergy was significantly lower (2.4% vs. 7.3%) in early introduction group than standard introduction
    - Peanut and egg also showed significantly lower allergy with the ingestion of 2g each per week
- Trial failed to showed efficacy of early introduction vs. standard introduction in an-intention-to treat analysis.
    - Question if prevention of food allergies by early introduction may be dependent on adherence and dose

Perkins M, et al. N Engl J Med; 374:1733-1743

Strategy for Prevention of Milk Allergy by Daily Ingestion of Infant Formula in Early Infancy (SPADE)

2021

Cow's milk prevention?

The Strategy for Prevention of Milk Allergy by Daily Ingestion of Infant Formula in Early Infancy (SPADE)

Enrolled 504 general population infants in Japan

- Daily cow's milk formula supplementation with ongoing breastfeeding between 1-2 months
    - OR
- Cow's milk avoidance with soymilk supplementation

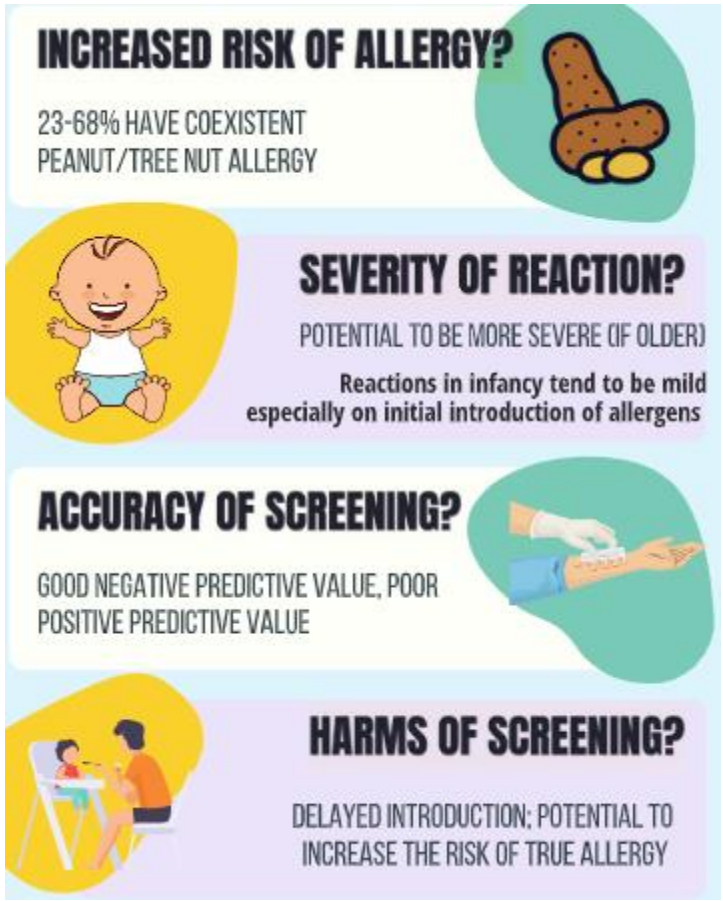
- Findings:
    - Significant reduction in cow's milk allergy 0.8% vs 6.8%
    - At least 10ml ingestion per day is required for tolerance

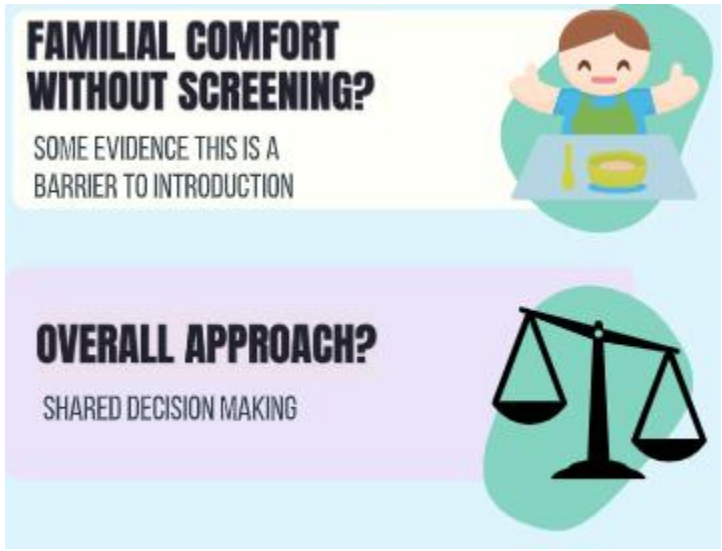
Abrams and Sicherer. Annals 2021; 127 (1): 36-41

Tree Nut Introduction in the Peanut Allergic Child

2022

Tree Nut Introduction





Abrams EM, Sicherer SH. Tree nut introduction in a peanut-allergic child: To eat, to screen, or to avoid? Pediatr Allergy Immunol. 2022 Jan;33(1):e13669. doi: 10.1111/pai.13669. Epub 2021 Sep 29. PMID: 34553798.

How do these foods fit into the diet?

2020-2025 Dietary Guidelines

Follow a healthy dietary pattern at every life stage

- Exclusive breastfeeding for 6 months of life
  - WHO recommends up to 2 years of age
  - Iron fortified formula if breastmilk unavailable
- Introduce "nutrient dense" foods at 6 months of life including potentially allergenic foods
  - Introduction of peanut containing food at 4-6 months in infants at high risk of peanut allergy

TABLE E1. Recommended daily infant portions, 6 to 12 months[43]

	Smaller portions for younger infants	Sample infant-safe forms
Fruits	2-8 tablespoons	Smooth puree or soft cooked and chopped
Vegetables: include red, orange, and dark green vegetables	2-8 tablespoons	Smooth puree or soft cooked and chopped
Grains:* choose a variety of whole grains including wheat grains	1/2 to 1 ounce (this includes 1/2 ounce per day or fortified grains for the breast-fed infant)	Whole wheat or fortified infant cereal (or farina or cream of wheat), whole grain pasta or pastina, toast, or crackers
Protein foods:† meat, fish, poultry, eggs, nuts, and seeds	3/4 to 3 ounces	Smooth diluted peanut or tree nut butters or powders or butters/powders mixed into pureed foods Hard-boiled, well-scrambled eggs blended into pureed foods or chopped for finger foods Tahini (sesame)
Dairy	1/4 to 1/2 cup	Yogurt and cheese
Breast milk or formula	3-5 feedings 24-32 ounces/d (and as low as 16-20 ounces as infant approaches 12 mo of age)	

*One ounce protein foods = 50 g egg; 28.35 g lean meat or seafood; 1/4 cup tofu; 1 tablespoon of peanut butter, tree nut butter, or seed butter (diluted for infant-safe feeding); for vegetarian diets, the recommendation for protein foods increases to 4 ounces per day of nuts, seeds, and legumes.

†One ounce grain = 1/2 cup pasta, 1 slice bread, or 4 tablespoons for infant cereal.

Cost of Delayed Introduction

TABLE VI. Cost-effectiveness of strategies for early introduction of peanut and egg*

Infant risk scenario	Cost per patient at risk	QALY per patient at risk	Allergic reactions per patient at risk	Incremental societal cost to screen
For peanut allergy (personal history of early-onset eczema and/or egg allergy)[72]				
No screening, early introduction	$6,557	19.63	0.4	—
Skin test screening before early introduction	$7,576	19.62	0.35	$654,115,322
sIgE screening before early introduction	$7,977	19.6	0.38	$911,211,774
Delayed introduction	$11,708	19.46	0.72	
For peanut allergy (sibling history of peanut allergy)[75]				
No screening before introduction	$3,278	19.72	0.2	—
Skin test screening with challenge before introduction	$3,984	19.72	0.2	Dominated
For egg allergy (early-onset eczema)[73]				
No screening, early cooked introduction	$2,235	19.78	0.03	—
Skin test screening before early cooked introduction	$9,100	19.59	0.12	$2,009,351,175
sIgE screening before early cooked introduction	$18,957	19.28	0.26	$4,894,445,790
Delayed cooked introduction	$10,615	19.53	0.13	

QALY, Quality-adjusted life-year.
*Model simulations over 20-y time horizons.

Fleischer D. JACI: In Practice 2021; 9(1): 22-43.e4

Health & Economic Outcomes Associated with Early Allergenic Food Introduction

- For egg and peanut introduction:
  - Universal introduction to all infants was associated with superior health benefits and lower costs than either screening or delayed introduction.

- Universal introduction cost less, prevented more cases of the food allergy, and produced more net benefit to the patient (measured by gain in quality-adjusted life-years) than other options

WHAT ABOUT THOSE LITTLE ALLERGEN INTRO PACKETS?

- Why?
- These are not cost effective
- Often multiple foods in 1 packet
- How much protein is in them per food?
- How does this impact the gut microbiota?
- How does it impact taste preference?
- Developmental readiness
- Grocery shopping?
  - WIC, SNAP, EBT?

Nutrients: Cow's Milk vs Unsweetened Alternative Options

Cow's milk: Protein, fat, calcium, vitamin D, A, B12, riboflavin, phosphorous, pantothenic acid, selenium

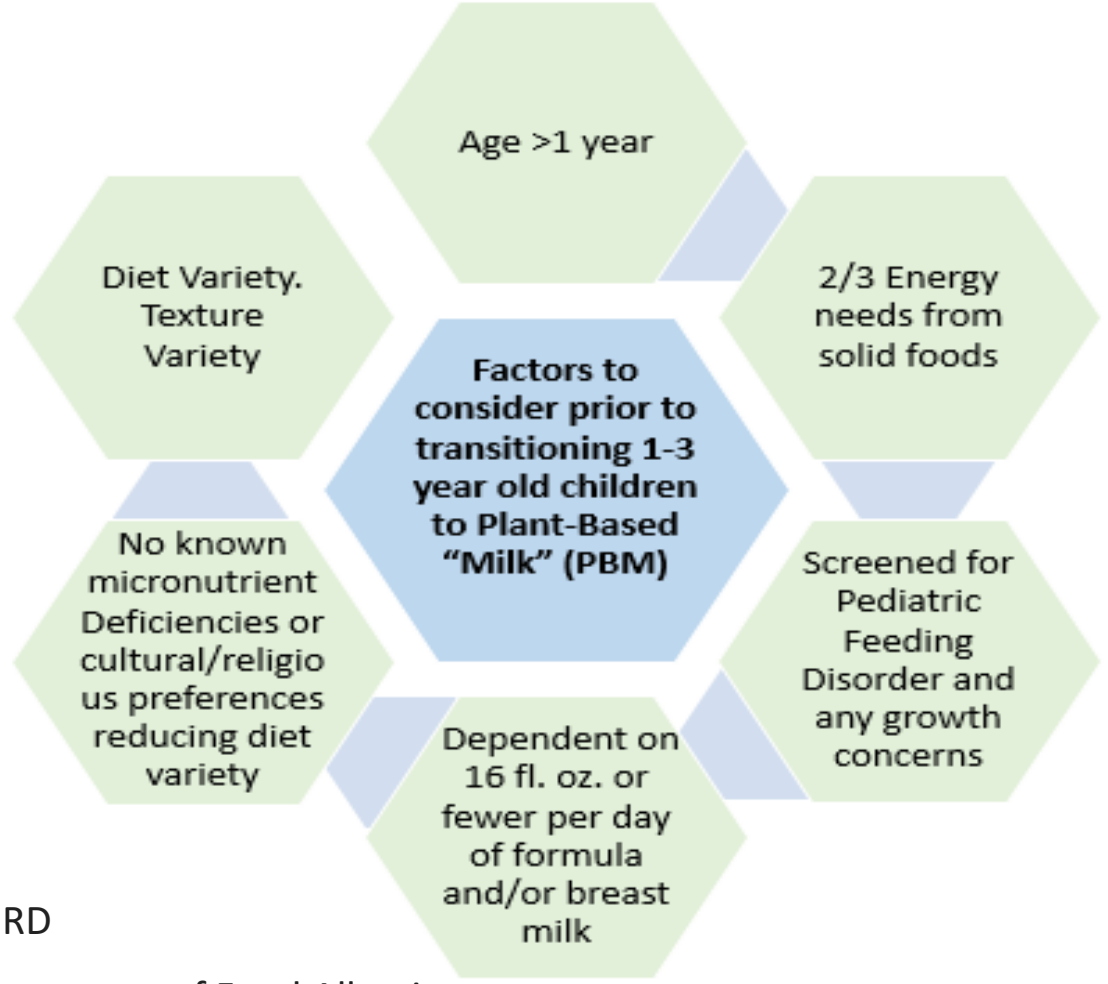
Cow's milk OR Alternative	Calories	Protein	Fat	Calcium (mg)/vitamin D (IU)
Whole cow's milk	150	8	8	300/100
Pea	100	8	8	Variable! Enrichment varies per brand and per alternative! Always check the label!
Soy	100	7	4	
Oat	120	4	3	
Rice	120	1	2.5	
Coconut	80	0	4.5	
Almond	50	1	2.5	

COST OF INFANT MILK ALTERNATIVES

	Cost per can	**Monthly cost (~ 30oz /day)**
Amino acid	$48-55/400g	US: $11.25 - $13.80 (6% ave income)
Extensively hydrolyzed	$36-40/400g	US: $7.40 (4% ave income)
Soy formula	$33/366g can	US: $4 (2.5% ave income)

Estimations based on 2023 costs and US median income data

Determining appropriate use



Graphic courtesy of Wendy Elverson, RD

Groetch M, Venter C. Nutritional Management of Food Allergies.

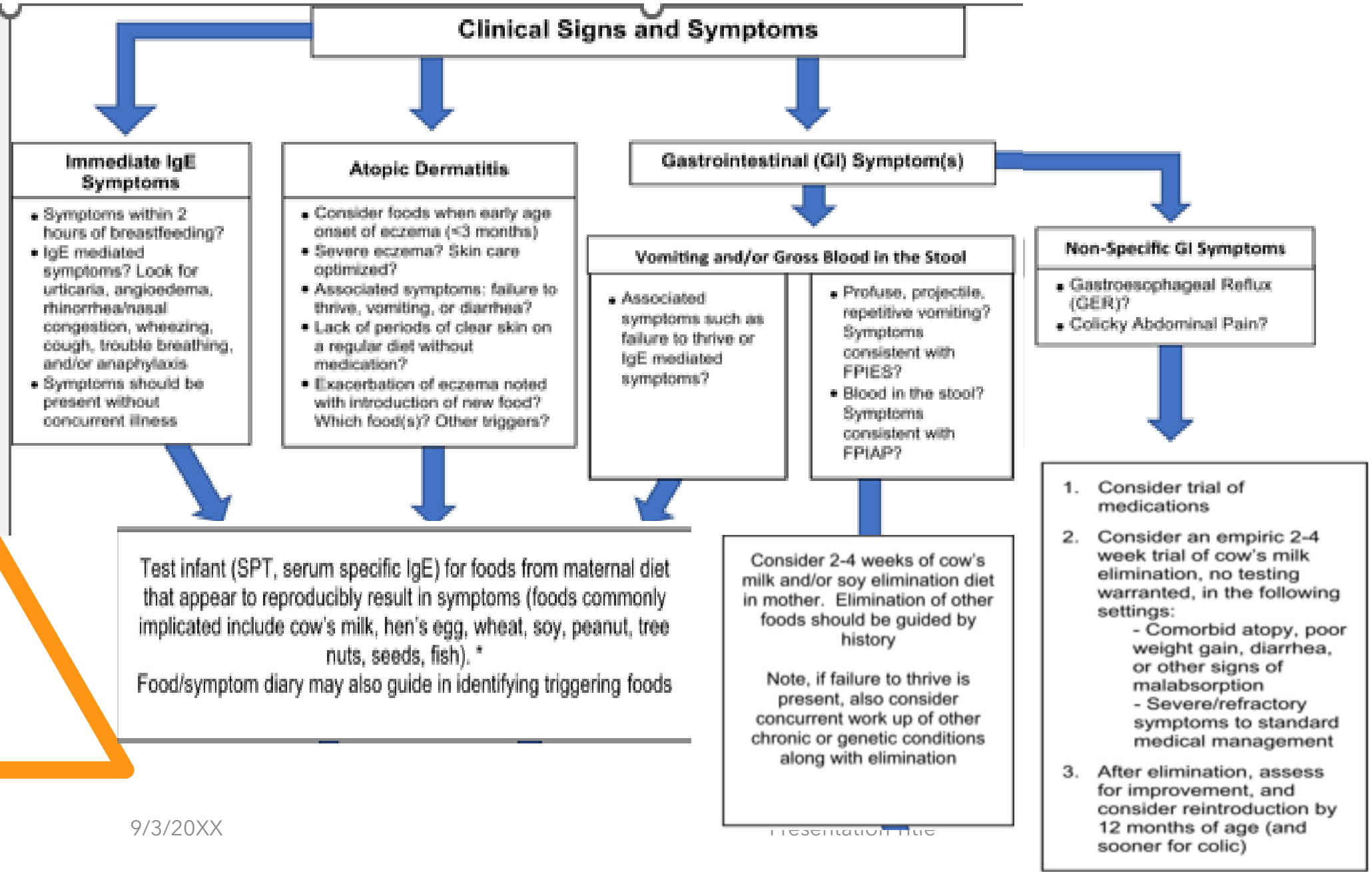
J Food Allergy. 2020; 2:131/141

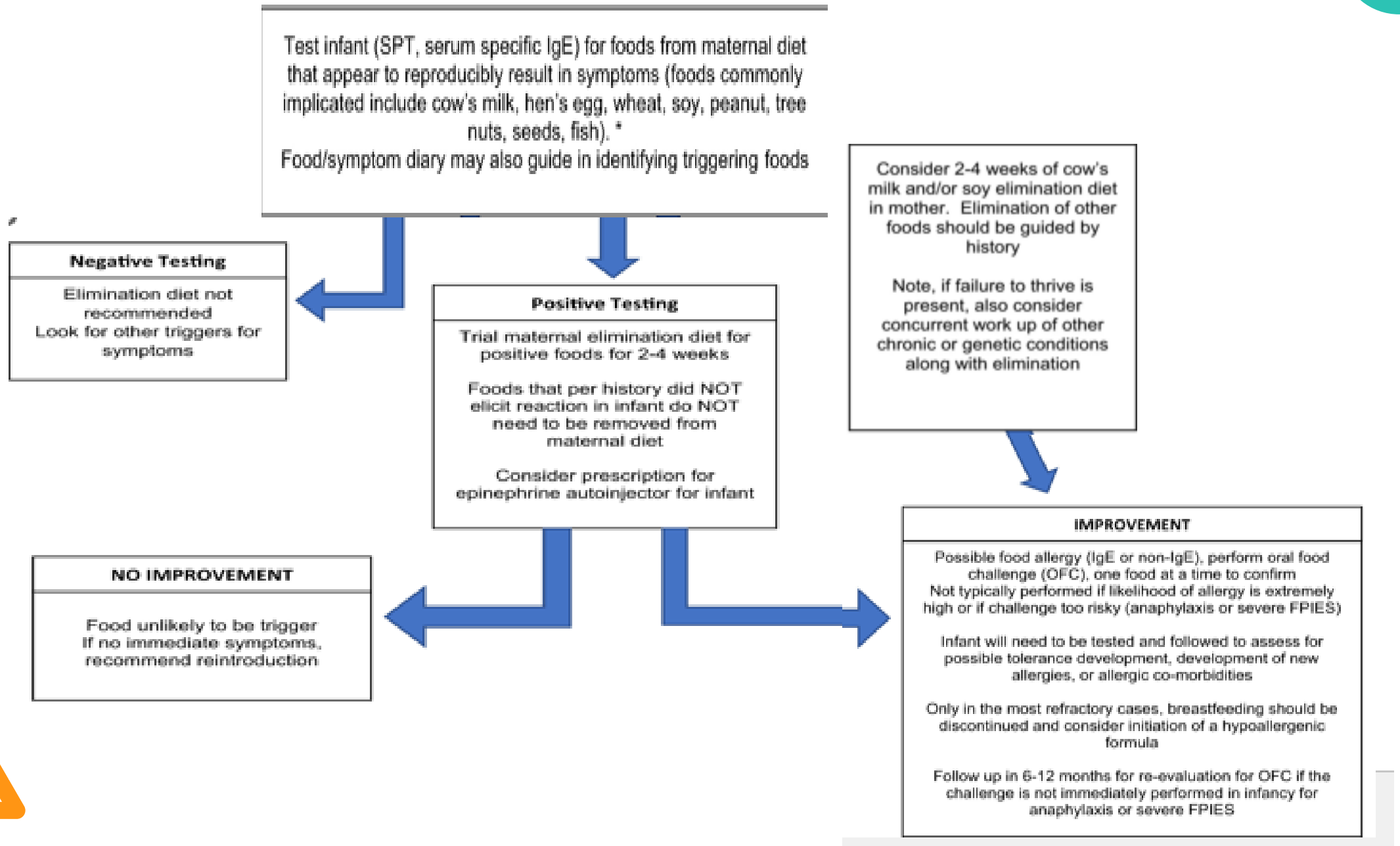
Significance of appropriate use

Diagnosis in Case Report	Rickets	FTT	Anemia	Kwashiorkor	Scurvy	Iodine and carnitine deficiency	Metabolic Alkalosis
Soy	✓	✓	✓				
Rice	✓	✓		✓			
Almond	✓	✓	✓	✓	✓	✓	✓

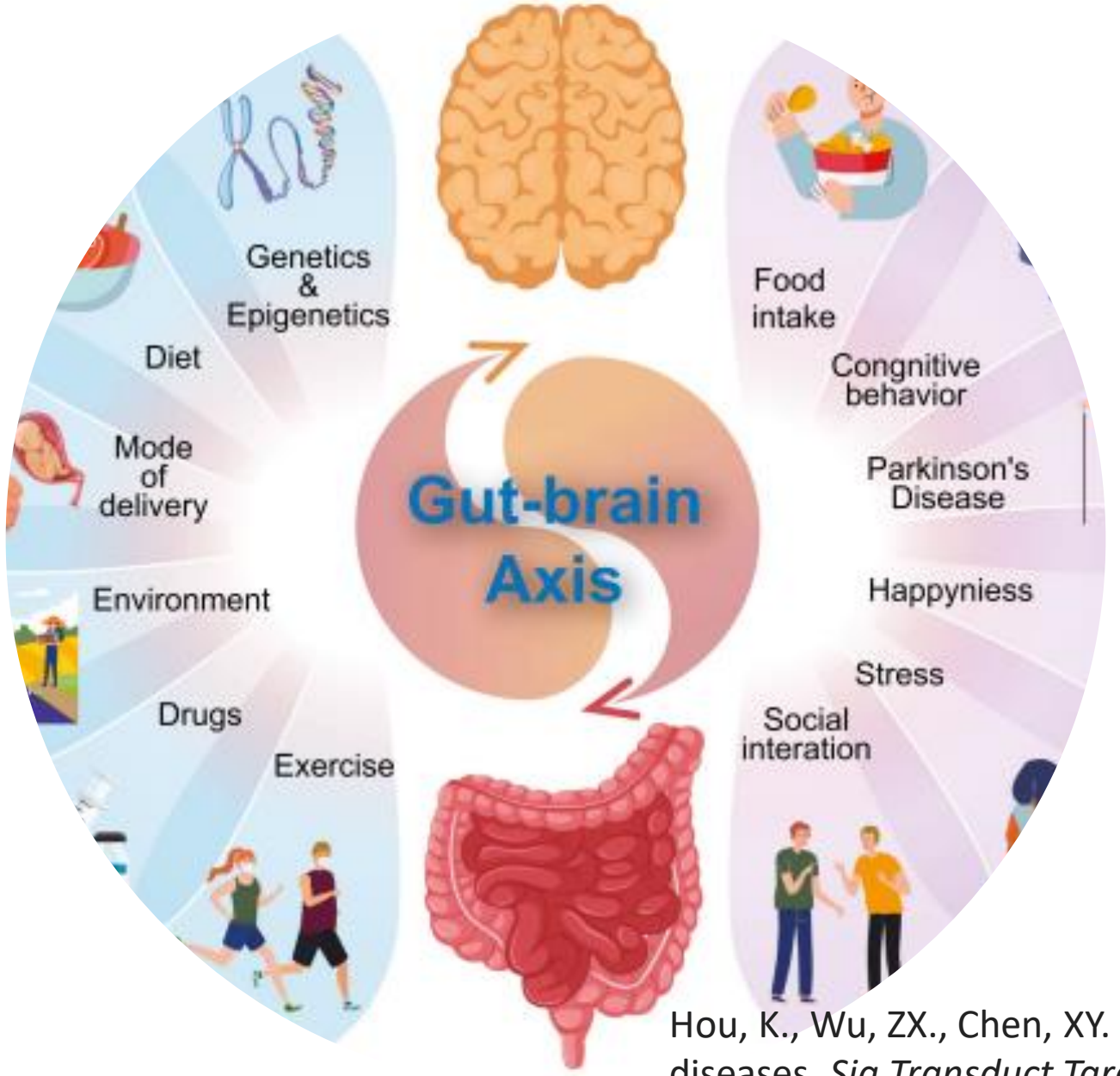
Case Reports regarding inappropriate use of plant-based "milk"

Adapted from: Vitoria, I. Nutr Hosp 2017;34(5):1205-1214


Clinical Signs and Symptoms
Immediate IgE Symptoms
• Symptoms within 2 hours of breastfeeding?
• IgE mediated symptoms? Look for urticaria, angioedema, rhinorrhea/nasal congestion, wheezing, cough, trouble breathing, and/or anaphylaxis
• Symptoms should be present without concurrent illness
Atopic Dermatitis
• Consider foods when early age onset of eczema (<3 months)
• Severe eczema? Skin care optimized?
• Associated symptoms: failure to thrive, vomiting, or diarrhea?
• Lack of periods of clear skin on a regular diet without medication?
• Exacerbation of eczema noted with introduction of new food? Which food(s)? Other triggers?
Gastrointestinal (GI) Symptom(s)
Vomiting and/or Gross Blood in the Stool
• Associated symptoms such as failure to thrive or IgE mediated symptoms?
• Profuse, projectile, repetitive vomiting? Symptoms consistent with FPIES?
• Blood in the stool? Symptoms consistent with FPIAP?
Non-Specific GI Symptoms
• Gastroesophageal Reflux (GER)?
• Colicky Abdominal Pain?
Test infant (SPT, serum specific IgE) for foods from maternal diet that appear to reproducibly result in symptoms (foods commonly implicated include cow's milk, hen's egg, wheat, soy, peanut, tree nuts, seeds, fish). *
Food/symptom diary may also guide in identifying triggering foods
Consider 2-4 weeks of cow's milk and/or soy elimination diet in mother. Elimination of other foods should be guided by history
Note, if failure to thrive is present, also consider concurrent work up of other chronic or genetic conditions along with elimination
1. Consider trial of medications
2. Consider an empiric 2-4 week trial of cow's milk elimination, no testing warranted, in the following settings:
- Comorbid atopy, poor weight gain, diarrhea, or other signs of malabsorption
- Severe/refractory symptoms to standard medical management
3. After elimination, assess for improvement, and consider reintroduction by 12 months of age (and sooner for colic)



Rajani, P, Martin H, Groetch M, Jarvinen K. Presentation and Management of Food Allergy in Breastfed Infants and Risks of Maternal Elimination Diets. JACI: IP 8:1, 52-67. 2020



Hou, K., Wu, ZX., Chen, XY. *et al.* Microbiota in health and diseases. *Sig Transduct Target Ther* **7**, 135 (2022). https://doi.org/10.1038/s41392-022-00974-4

Summary

Treat the skin first

Test only when necessary

A varied diet inclusive of highly allergenic foods is beneficial

Reach out anytime!

Raquel.Durban@gmail.com

To Receive Your CE Certificate

- A link to an evaluation will be sent within a day or two.
- Although completing an evaluation is not required, we truly appreciate your feedback.

  If you do not see the evaluation, look in your spam folder.
- CE certificates for RDs/RDNs/DTRs will be emailed to the address you used to register for those who attended the full program .

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Q&A

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