

# FREE FEED™

Helping Parents Navigate Food Allergies



# Helping Parents Navigate Food Reactivity and Reach Their Feeding Goals

Differentiate between IgE and non-IgE mediated **food allergies** & intolerances



Understand how dietary foods **transfer to the breast** and maternal health plays a role



Comprehend the various **elimination diet and reintroduction** strategies



# My Story



# Identifying Food Reactivity in Children

Skin Rash

Chronic Congestion

Reflux/Vomiting

Sleep Disturbances

Tummy Pain

Slow Weight Gain

Feeding Aversions

Abnormal Stools

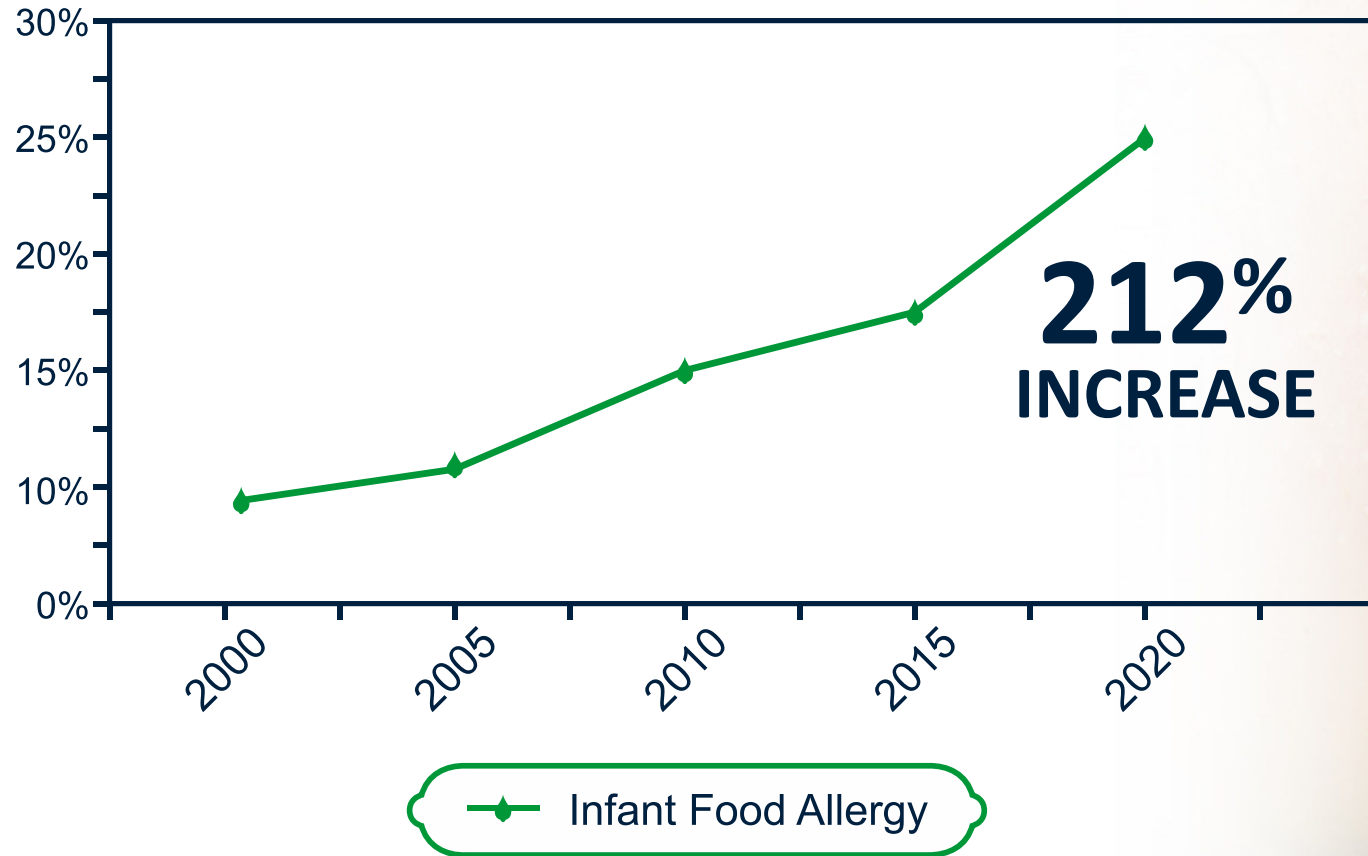
Lethargy

Colic



# Global Food Reactivity

35 Million Infants/Year



# Food Intolerance

Inability to properly digest a food, often due to an enzyme deficiency

## Proteases

Break down protein into amino acids and peptides

## Lipases

Break down fat into three fatty acids and a glycerol

## Amylases

Break down carbs into simple sugars

Can be diagnosed  
via blood, breath,  
&/or biopsy testing

## Lactose Intolerance

Inability to properly break down lactose due to lactase deficiency

- Congenital: incredibly rare (only reported in a few infants worldwide) & caught immediately
- Neonatal: developmental amylase deficiency until at least 34 weeks gestation
- Secondary: caused by invasive GI surgery or severe malnutrition seen in developing countries

# Allergy Categories

1

**IgE**

Immunoglobulin E



2

**Mixed IgE & Non-IgE**

**EoE**

Eosinophilic Esophagitis

**AEDS**

Atopic Eczema/Dermatitis  
Syndrome

3

**Non-IgE**

**FPIES**

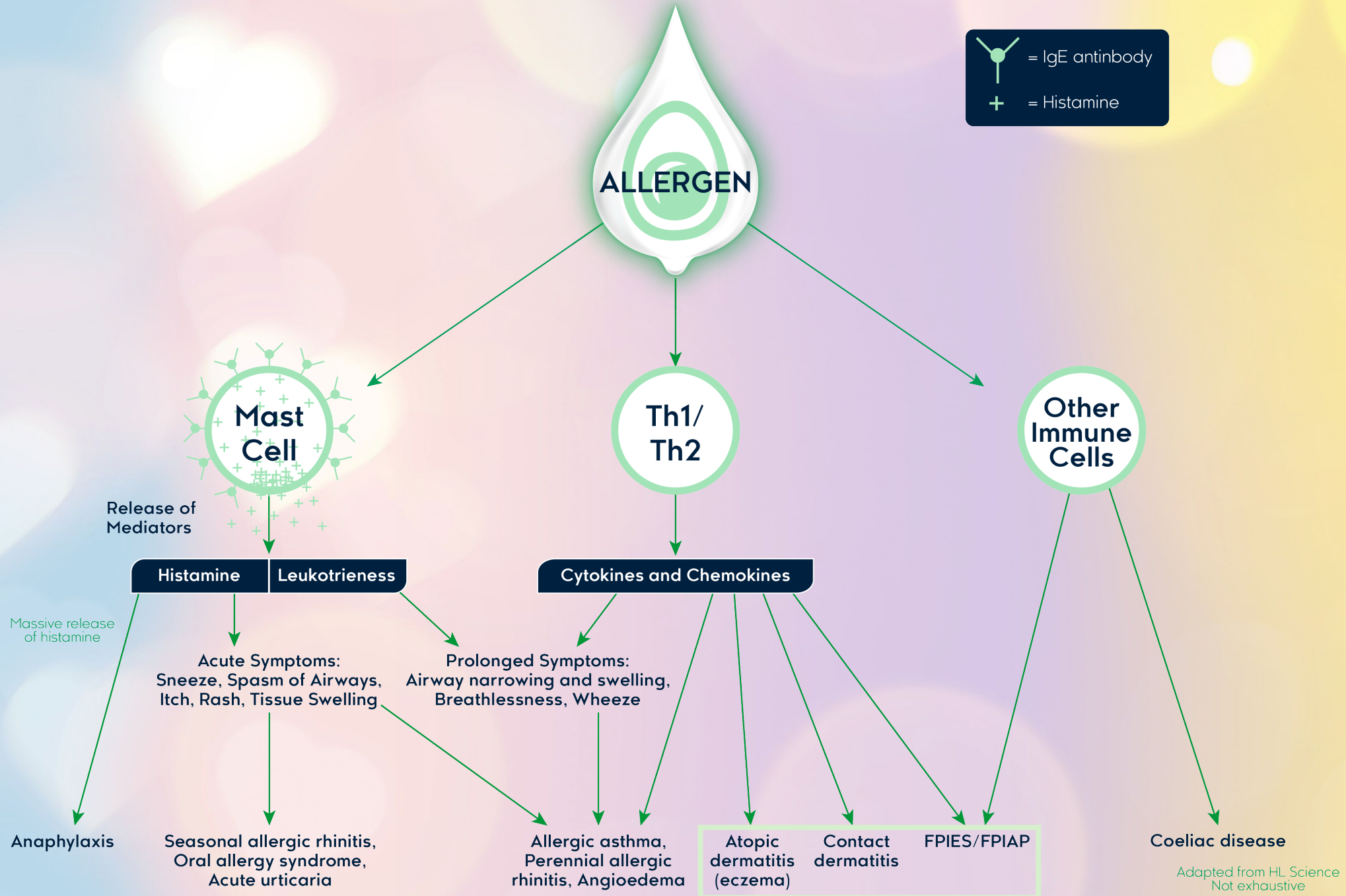
Food Protein Induced  
Enterocolitis Syndrome

**FPIAP**

Food Protein Induced Allergic  
Proctocolitis

**FPE**

Food Protein Induced  
Enteropathy



Adapted from HL Science  
Not exhaustive



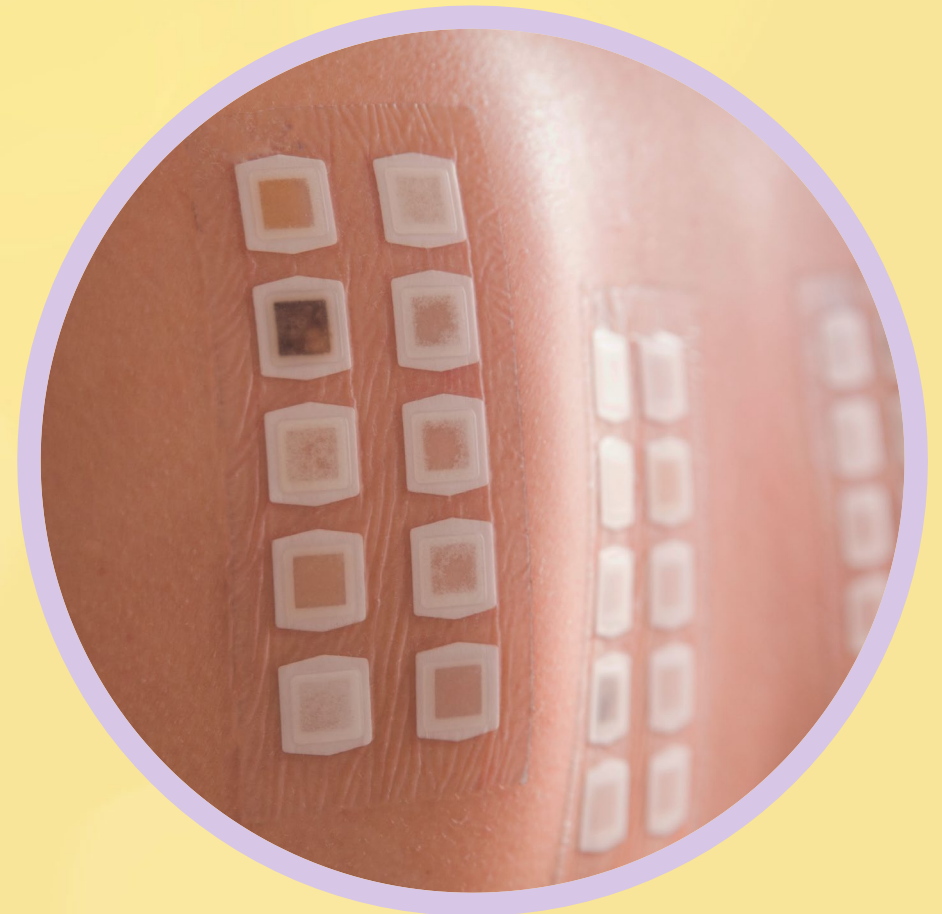
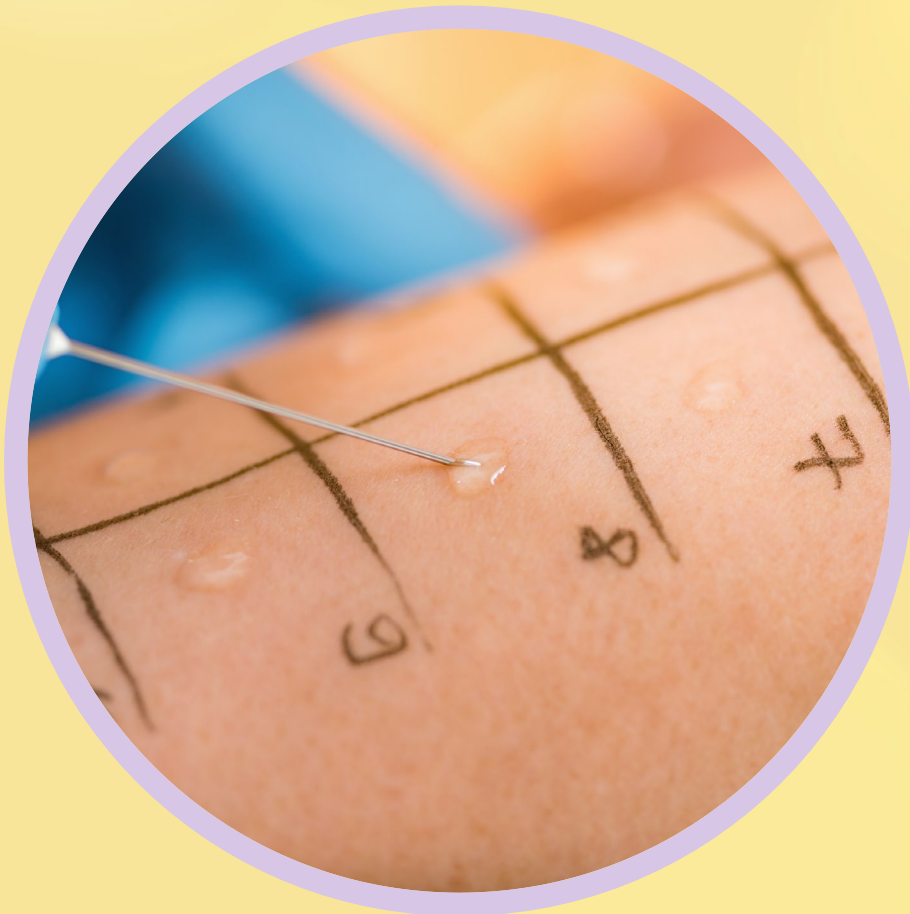
# Diagnostic Tests

Skin prick or patch (IgE)

Blood test (IgE, EoE)

Oral food challenge (FPIES, FPIAP, FPE)

Biopsy (EoE)



# IgE Mediated Allergy

**Skin:** “hives” (red blotches or welts that itch), swelling

**Eyes:** tearing, redness, itch

**Nose:** clear discharge, itch, congestion

**Mouth:** itch, lip swelling, tongue swelling

**Throat:** tightness, trouble speaking, trouble inhaling

**Lungs:** shortness of breath, rapid breathing, wheeze

**Stomach:** vomiting, nausea, abdominal pain, diarrhea

**Heart and circulation:** weak pulse, loss of consciousness

**Brain:** anxiety, agitation, loss of consciousness



A Phase 1, Randomized Study Evaluating the Safety Tolerability, Pharmacokinetics (PK) and Pharmacodynamics (PD) of Single Ascending Doses of Epinephrine Prodrug 109 Sublingual Film (AQST-109) in Healthy Male Volunteers

John Oppenheimer, MD FAAAAI • Steve Wargacki • Rajesh Kainthan, PhD • Shawn Berg • Cathie Leister • Mark Lepore, MD FAAAAI



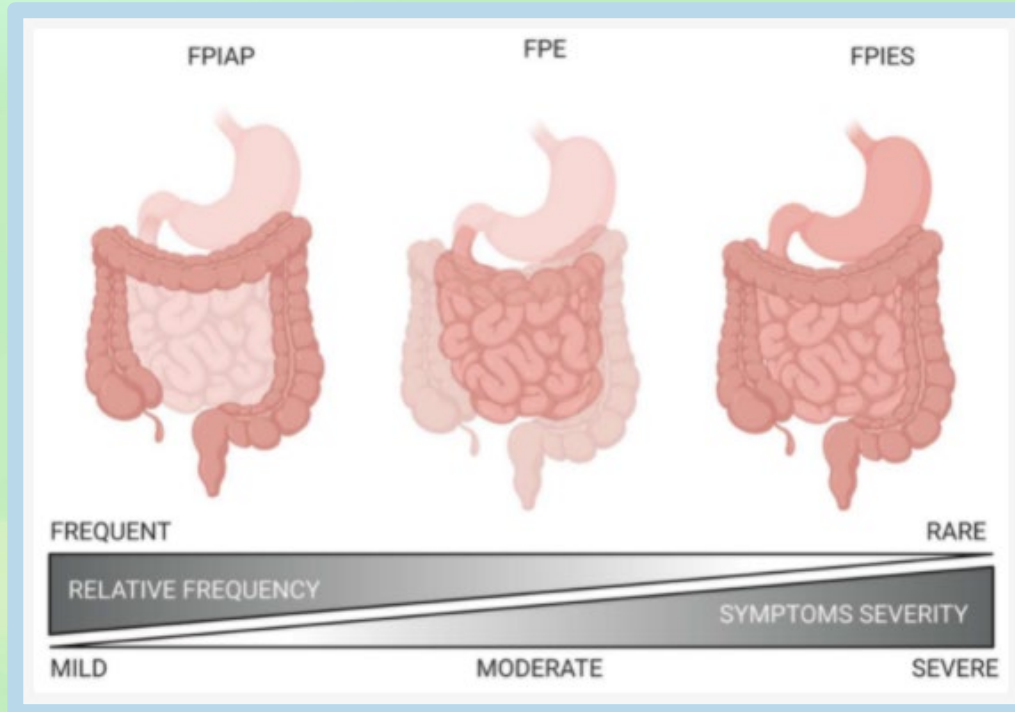
## Sublingual

Rapid onset of action with direct entry into systemic circulation

**Epiphasst by Aquestive**

# Non-IgE Mediated Allergy (GI)

EoE: vomiting, abdominal pain, difficulty swallowing, gagging, reflux



Secondary symptoms:  
Weight gain issues, “colic”,  
feeding aversions, sleep  
disturbance, lethargy,  
dehydration, shock

FPIAP & FPE: bloody stools, mucous stool, diarrhea

FPIES: diarrhea, vomiting, reflux, bloody stool

# Upper GI Reactivity

Deciphering between anatomical or lactation issues versus allergy

Causes physical  
discomfort

Large volumes  
(one large or many small)

Accompanied by  
other symptoms

Delayed by an  
hour or more

Contains significant  
amounts of mucus

Mimicking factors: oral restrictions, oversupply, congenital defects, poor latch, teething, illness

# Lower GI Reactivity

Deciphering between anatomical or lactation issues versus allergy

Causes physical  
discomfort

Diarrhea  
(8+ BM/Day)

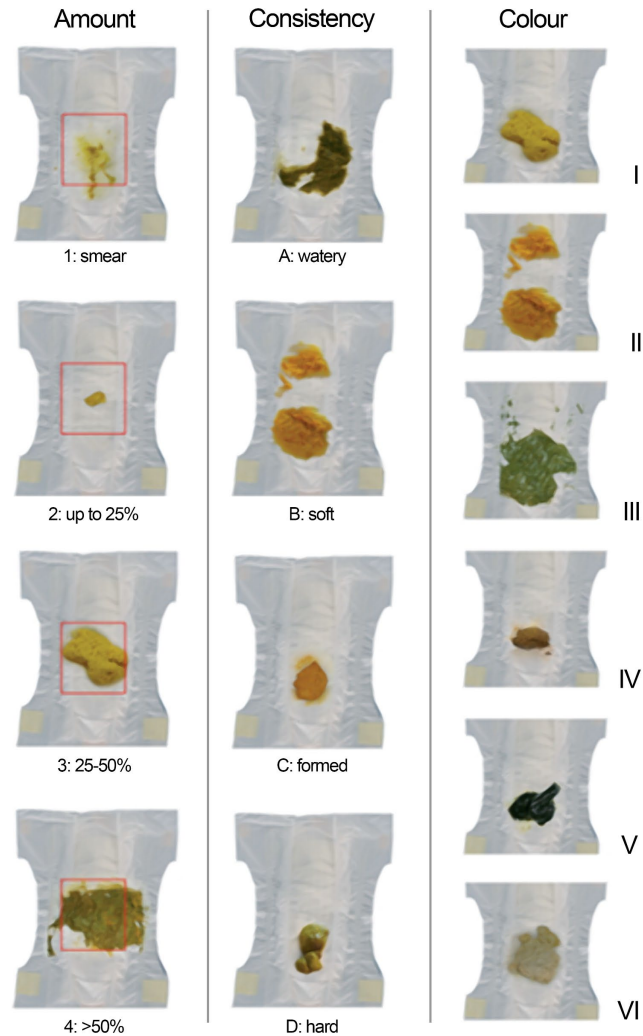
Constipation  
(Painful/Hard)

6-48 hours  
post-ingestion

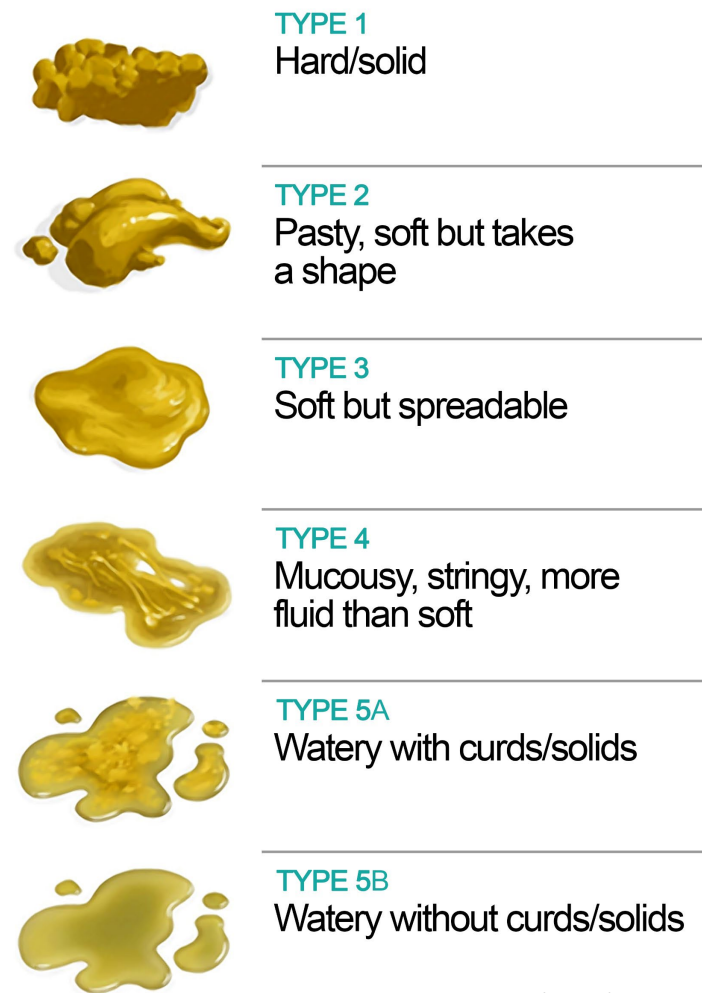
Contains significant  
amounts of mucus  
&/or blood

Mimicking factors: oral restrictions, oversupply, congenital defects, poor latch, teething, illness

# Infant Stool Charts



**Amsterdam Stool Form**



Gustin, et.al. (2018)

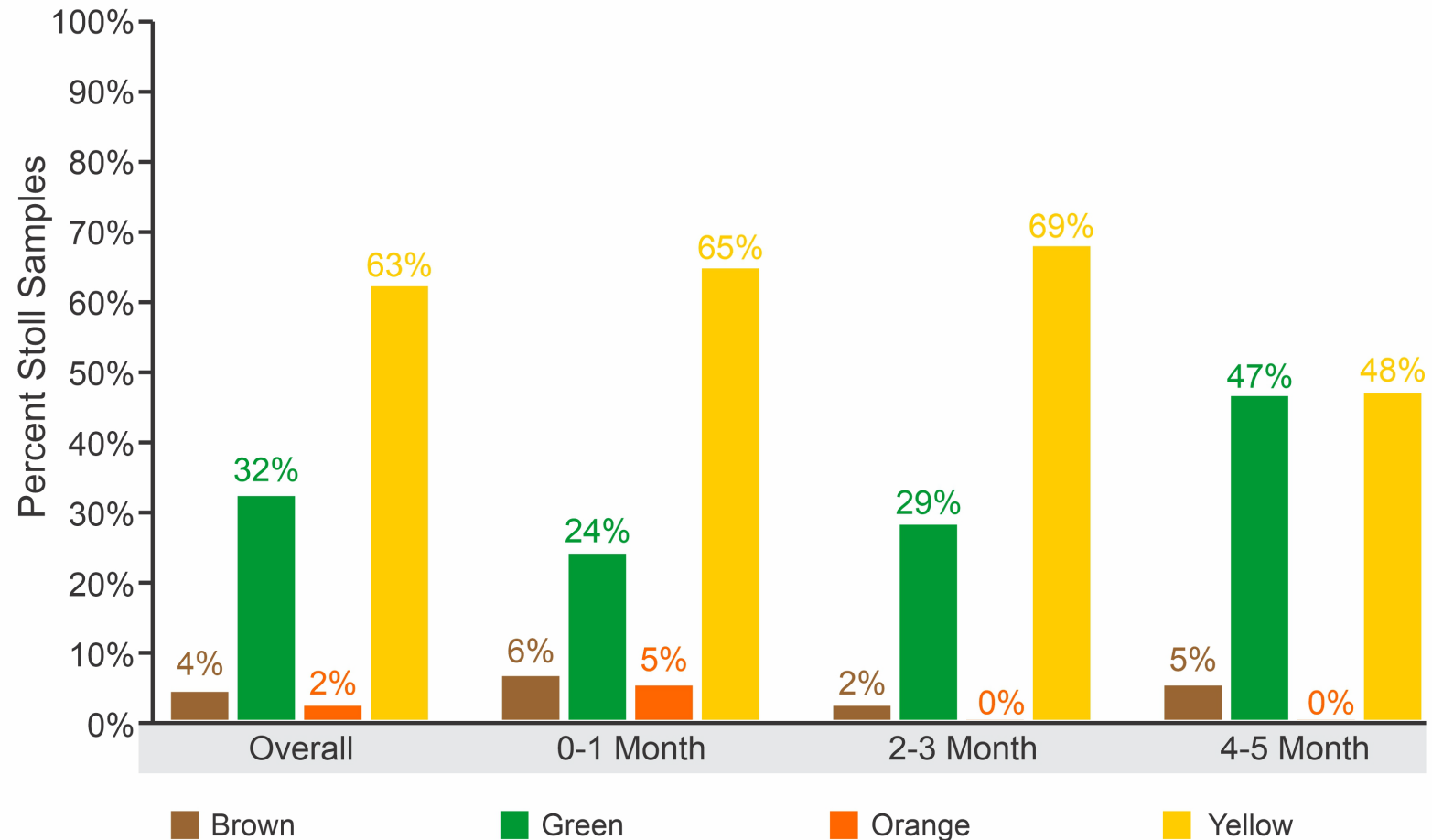
**Diapered Infant Stool Scale**

# “Normal” Infant Stool?



# Infant Stool Color

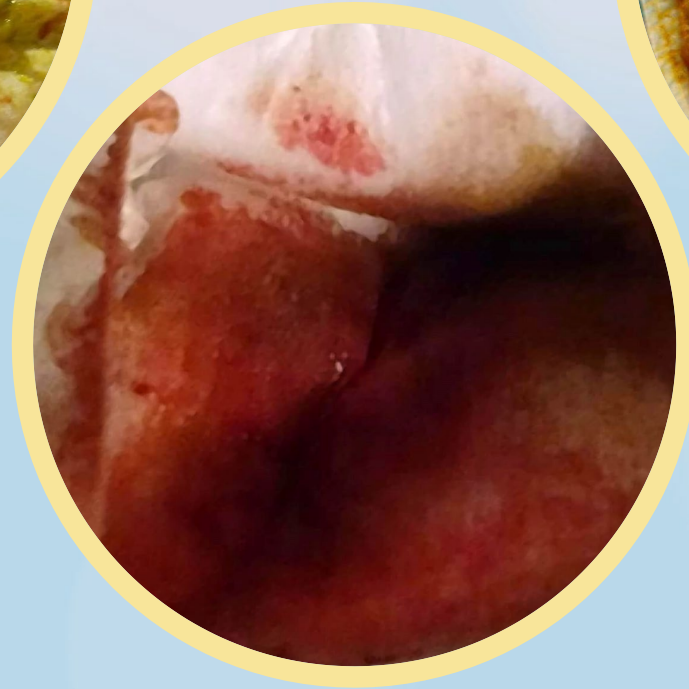
## STOOL COLOR ACROSS AGE GROUPS



Gustin, et.al. (2018)

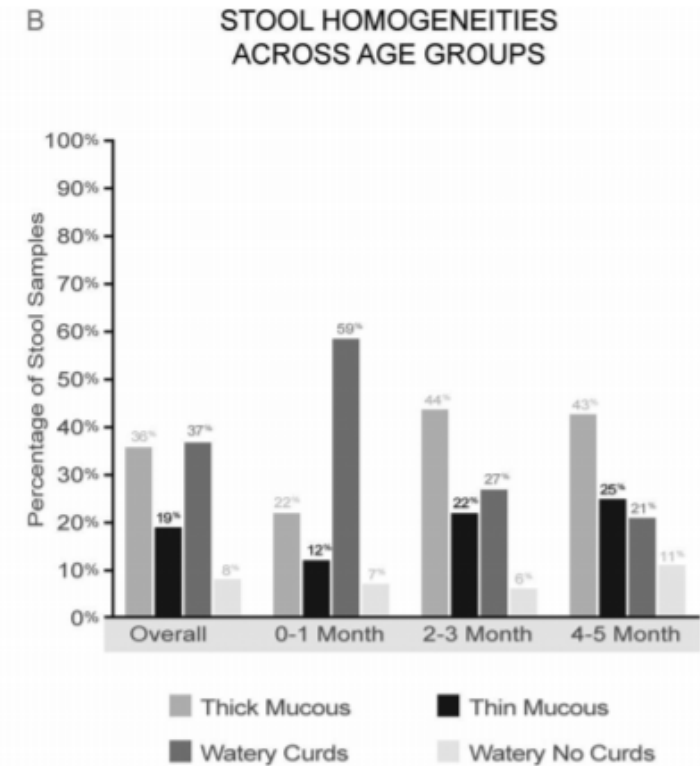
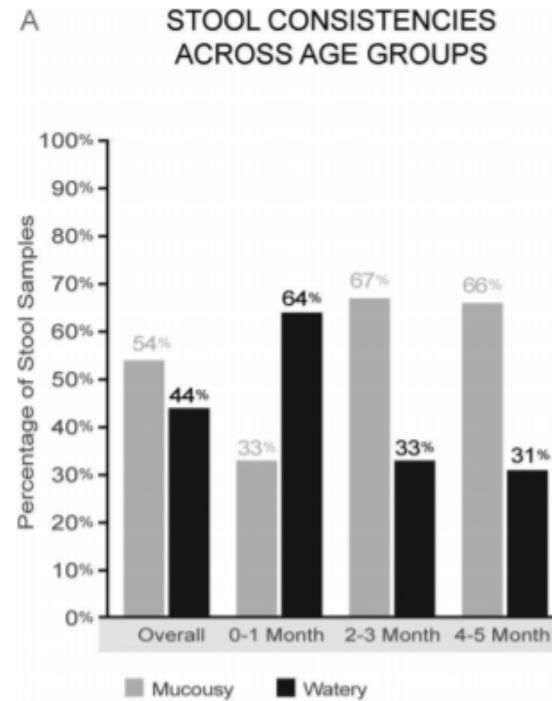
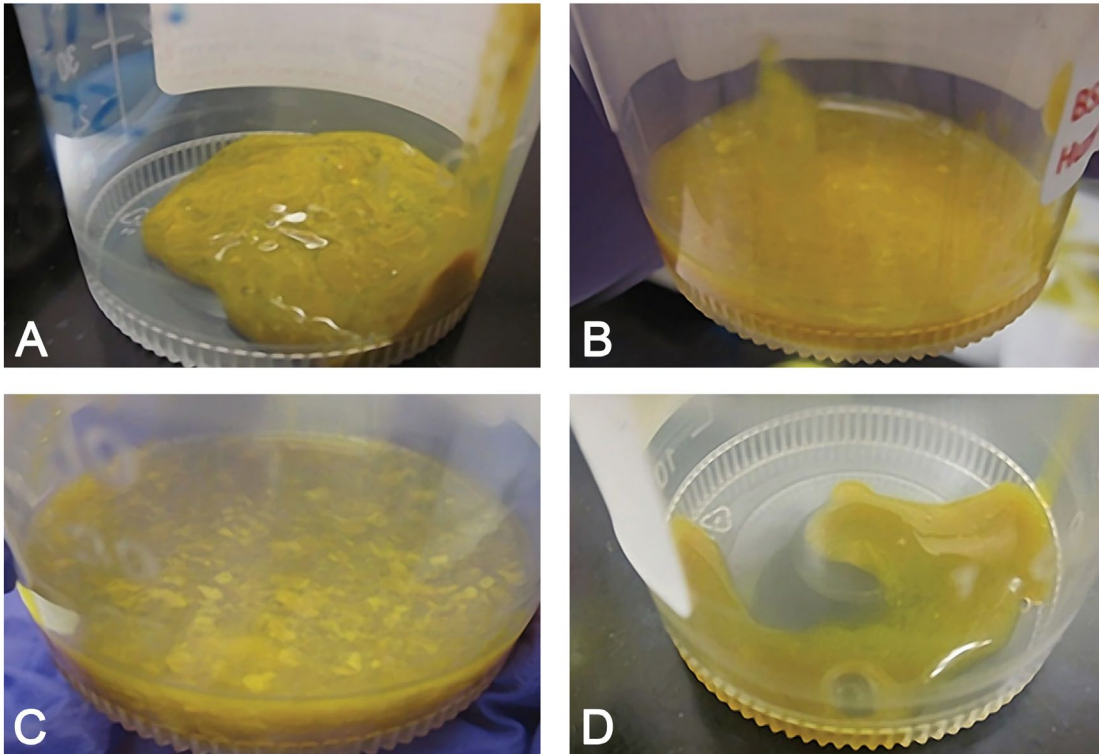


# Infant Stool Color - Red



Mimicking factors: cracked nipples, anal fissure, food particles, “seedy” stool

# Infant Stool Consistency



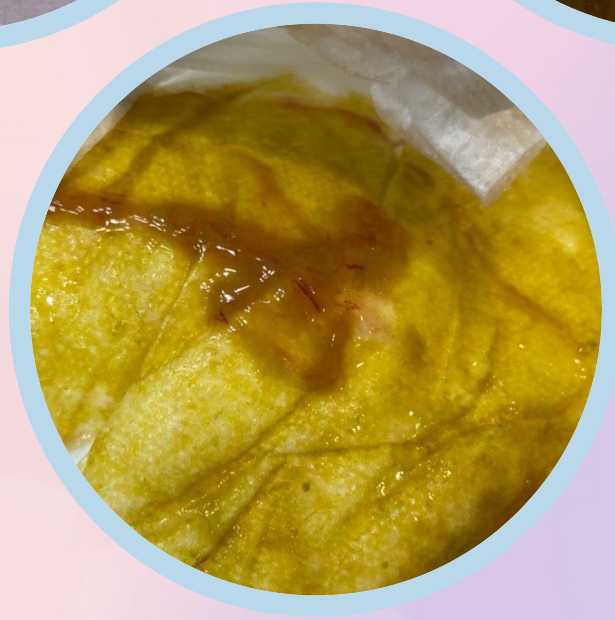
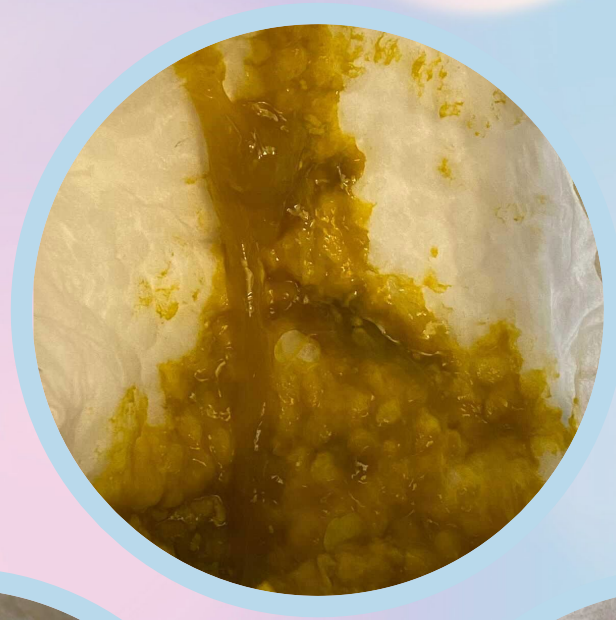
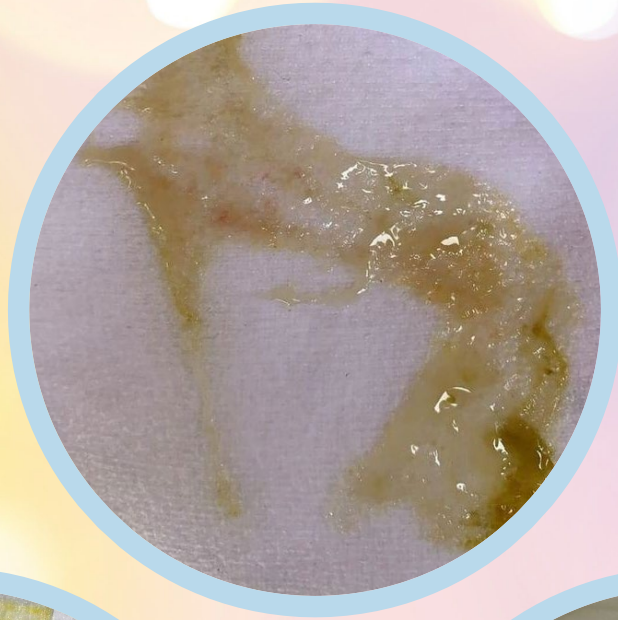
Gustin, et.al. (2018)

Mimicking factors: oral restrictions, oversupply, congenital defects, poor latch, teething, illness

# Infant Stool Consistency



# Infant Stool Reaction Examples



# Fecal Testing Options

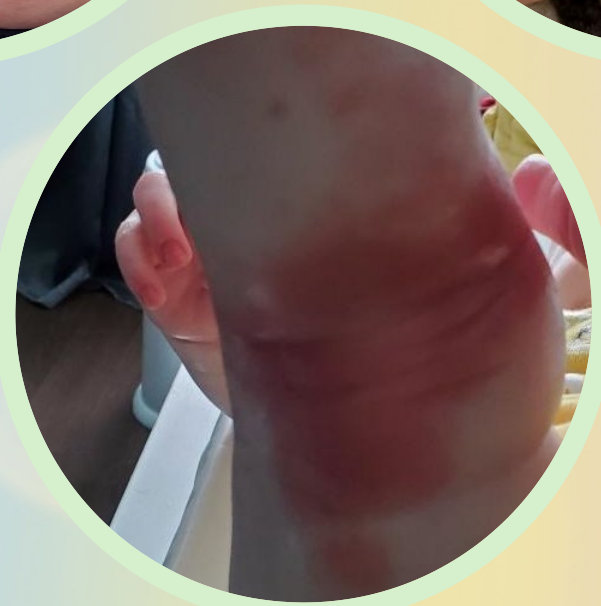
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- Fecal occult blood test (FOBT) will tell you if there is blood that cannot be seen with the naked eye.
- Calprotectin looks for white blood cells in the stool which is also indicative of inflammation.
- Fecal fat stain informs doctors if there is a malabsorption issue based on the amount of fat left in stool.
- Other various analysis can be completed for parasites, infections, bacteria, and more.

Mosli, et.al. (2015)



# Skin Reactivity



Mimicking factors: environmental reactivity, teething, heat, irritation

# Symptom Takeaways

All journeys are valid & will naturally vary



Most children will not present with all the symptoms discussed



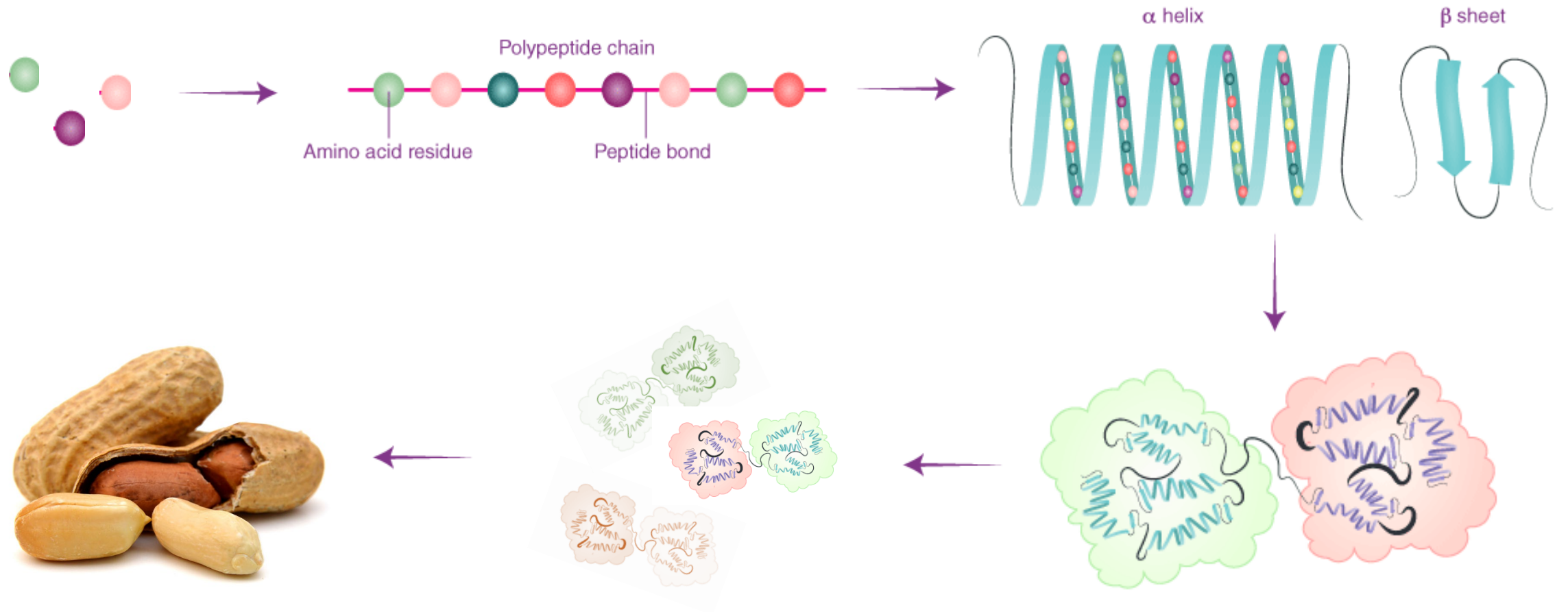
Any food can be a trigger, and each can elicit a different response



There is no one thing that rules out food reactivity IE weight gain

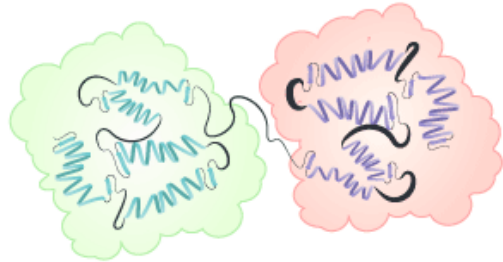


# Triggering Components

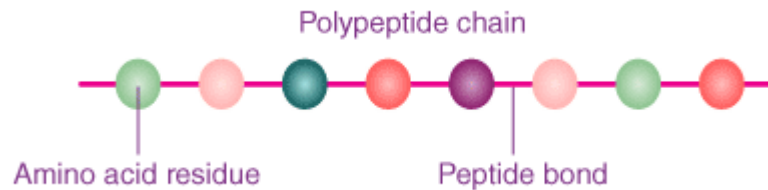




# Triggering Components in Formula



Non-Specialized Formulas

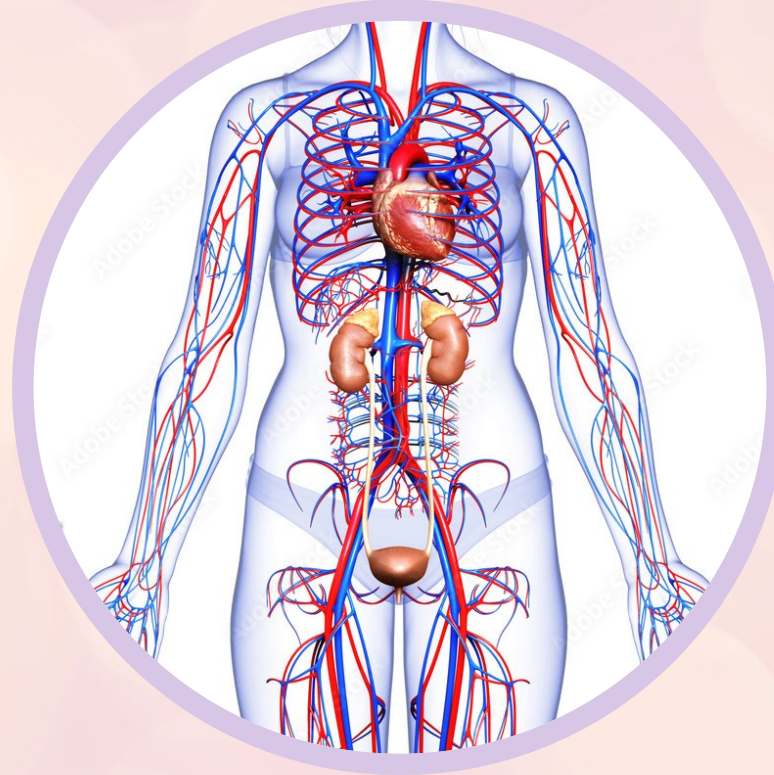
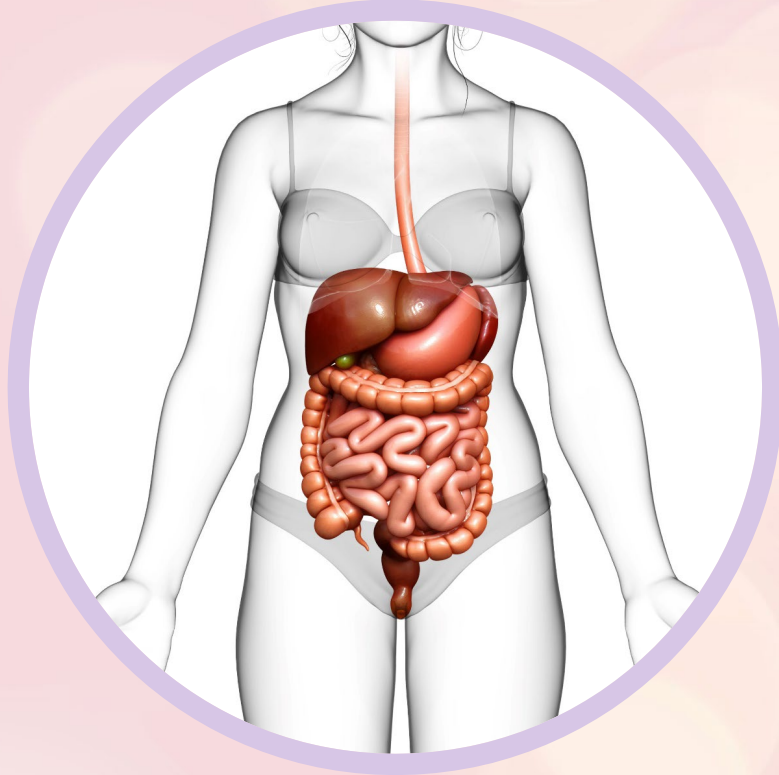


Hydrolyzed Formulas

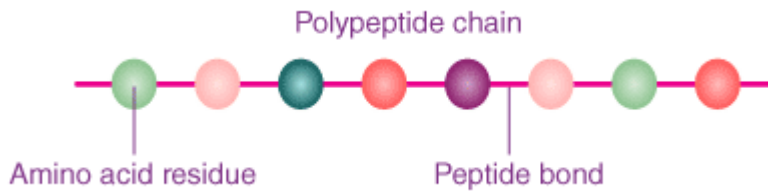
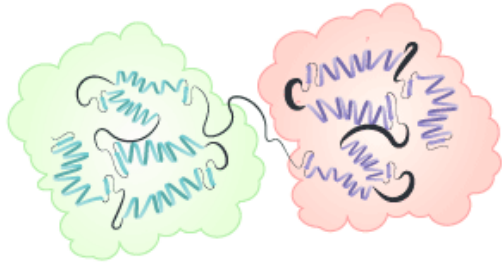


Amino Acid (Elemental) Formulas

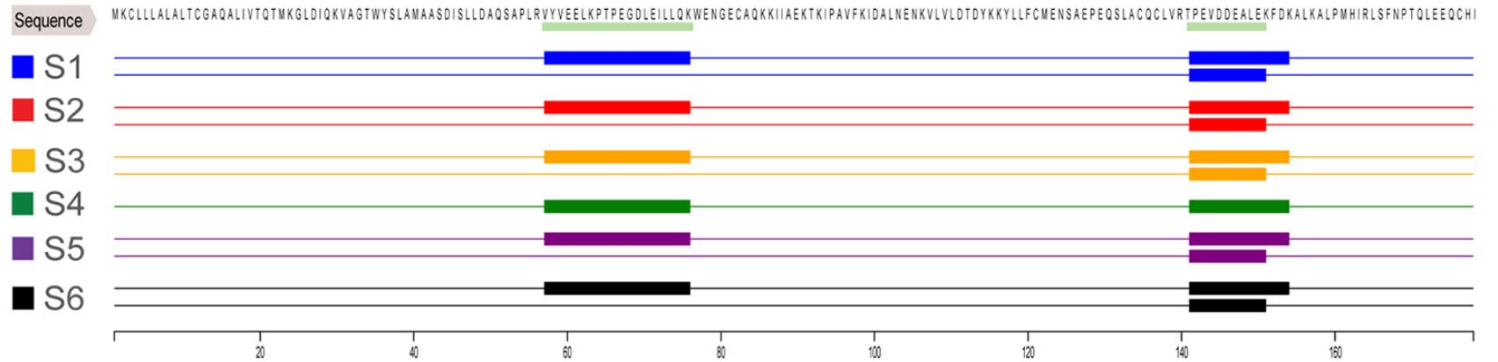
# Pathway from Lactating Parent to Child



# What is Found in the Breast?

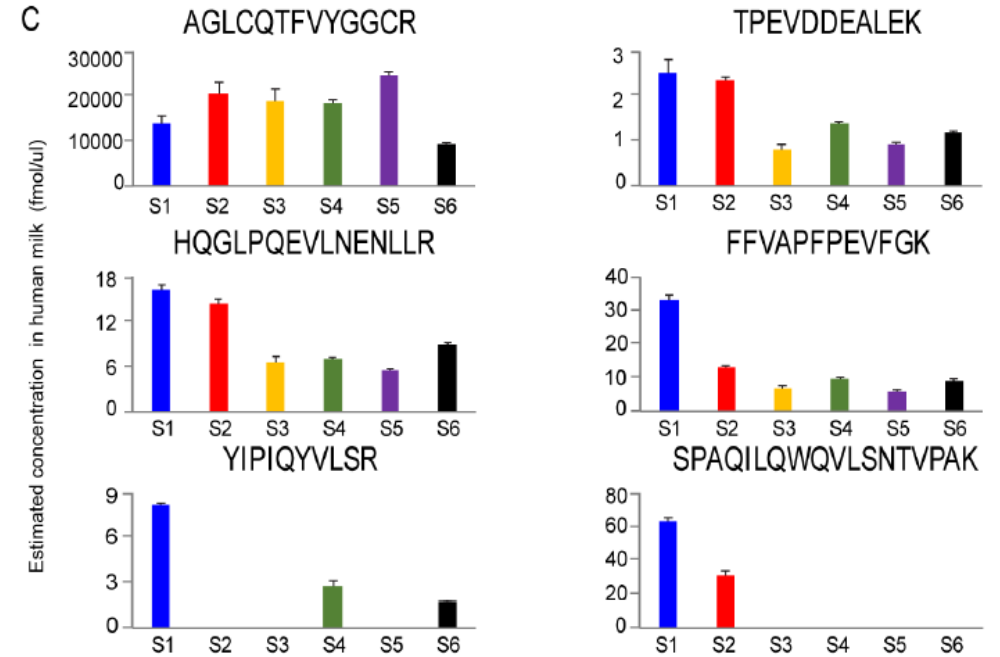
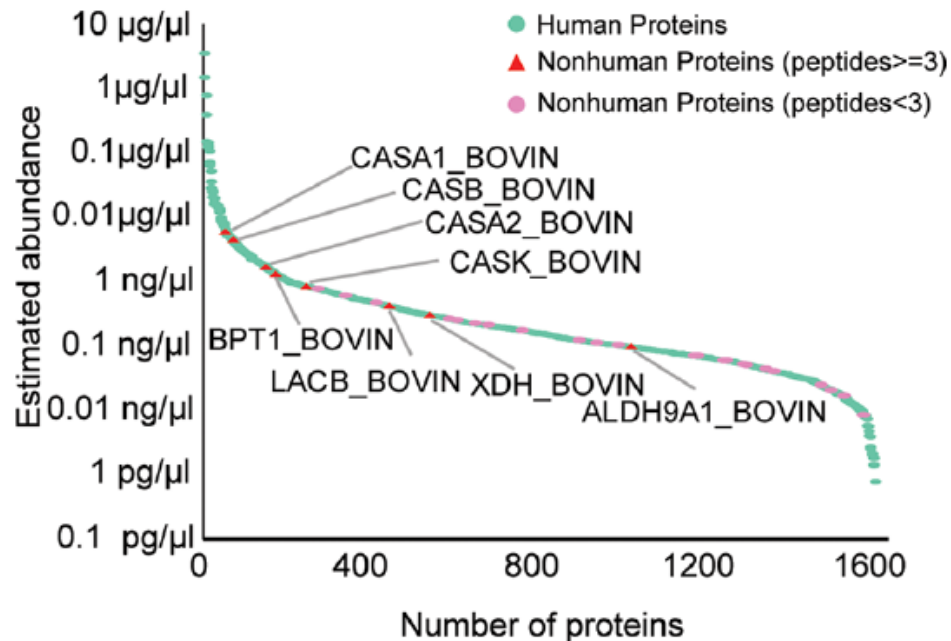


sp|P02754|LACB\_BOVIN Beta-lactoglobulin OS=Bos taurus GN=LGB PE=1 SV=3



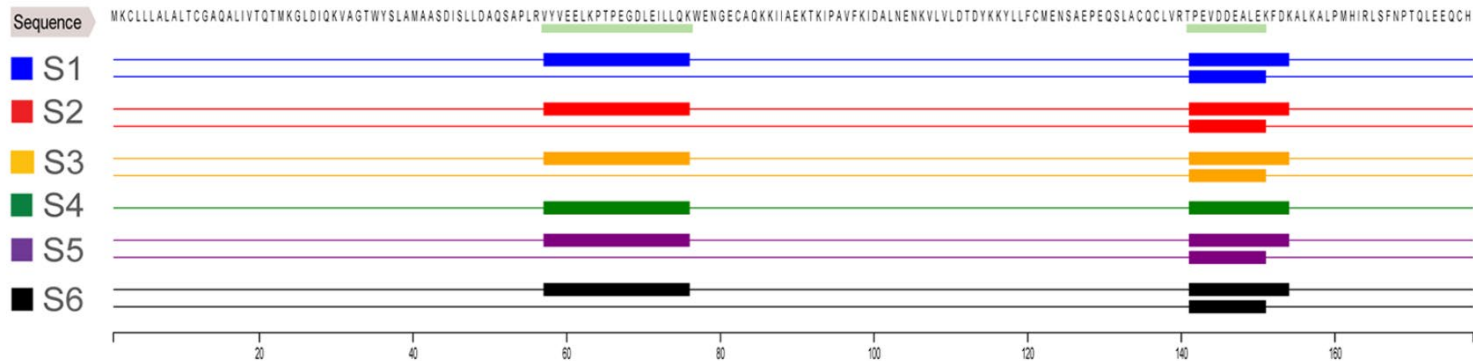
Zhu, et.al. (2019)

# Peptide Concentrations



sp|P02754|LACB\_BOVIN Beta-lactoglobulin OS=Bos taurus GN=LGB PE=1 SV=3

Zhu, et.al. (2019)



# Transferability Timing

## Breastfeeding: Maternally Transferred Allergens in Breast Milk: Protective or Sensitizing?

Frauke Schocker  Uta Jappe

First published: 26 May 2022 | <https://doi.org/10.1002/mnfr.202200066>

**Table 2.** Synopsis of studies demonstrating allergens in human milk measured by sensitive and specific detection techniques.

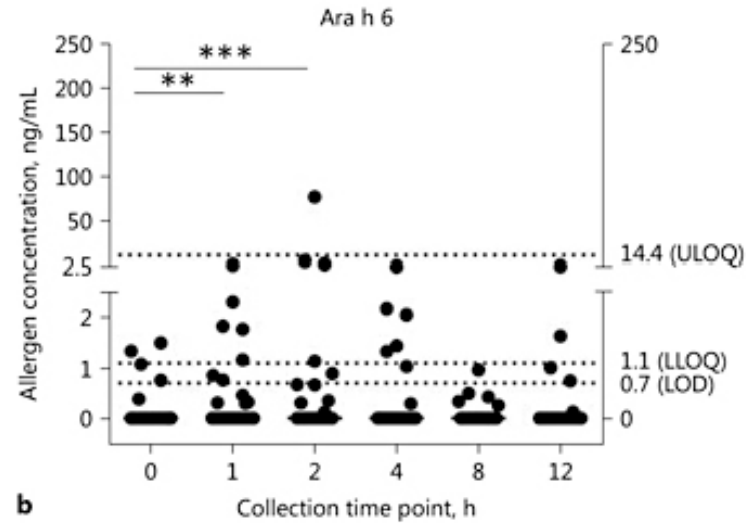
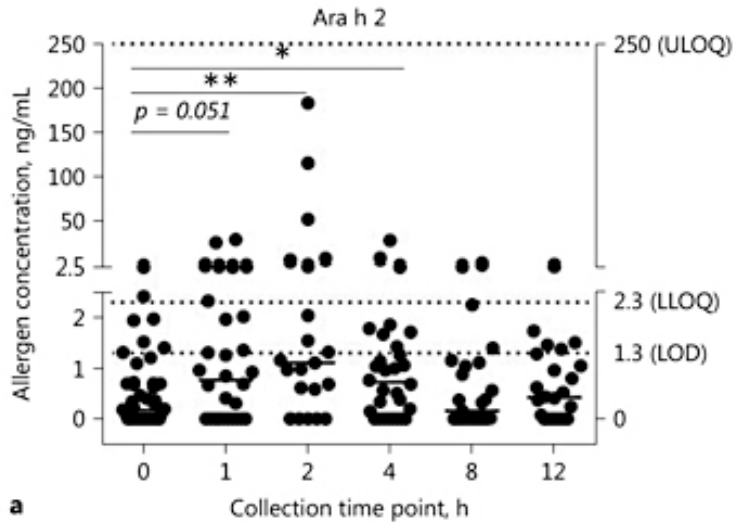
Allergen source/allergen	Concentration	Time course	Frequency	Included subjects (n)	References
<b>MILK/β-Lactoglobulin</b>	110 pg–6.4 ng mL <sup>-1</sup>	4–6 h	53%	19	Kilshaw and Cant <sup>[52]</sup>
	0.01–7.84 μg mL <sup>-1</sup>	1–2 h	75%	53	Sorva et al. <sup>[53]</sup>
	(1 h)/0.01–2.34 μg mL <sup>-1</sup> (2 h)				
	5–800 μg mL <sup>-1</sup>	No data	40%	25	Axelsson et al. <sup>[54]</sup>
	0.9–150 μg mL <sup>-1</sup>	4–24 h	95%	20	Host et al. <sup>[55]</sup>
<b>WHEAT/Gliadin</b>	0.1–16.5 μg mL <sup>-1</sup>	No data	62.5%	24	Fukushima et al. <sup>[56]</sup>
	0.41–3.80 ng mL <sup>-1</sup>	3, 6, 24 h; 3 days, 7 days	100%	15	Matangkasombut et al. <sup>[57]</sup>
	5–95 ng mL <sup>-1</sup>	2–6 h	68%	53	Troncone et al. <sup>[58]</sup>
	5–1,200 ng mL <sup>-1</sup>	No data	100%	49	Chirido et al. <sup>[59]</sup>
	<b>EGG/Ova</b>	0.2–4.0 ng mL <sup>-1</sup>	2–6 h	74%	19
0.1–1,200 ng mL <sup>-1</sup>		No data	35%	68	Vance et al. <sup>[61]</sup>
0.12–1,258 ng mL <sup>-1</sup>		No data	35%	68	Palmer et al. <sup>[62]</sup>
0.2–4.0 ng mL <sup>-1</sup>		2–6 h	74%	19	Kilshaw and Cant <sup>[52]</sup>
0.7 ng mL <sup>-1</sup>		1–3, 4–8, and 9–15 h	8.3%	2	Fukushima et al. <sup>[56]</sup>
<b>Ovomucoid</b>	0.25–14.03 ng mL <sup>-1</sup> (ingestion of 1 cooked egg)	2–8 h	68%	41	Palmer et al. <sup>[63]</sup>
	150 pg mL <sup>-1</sup> (median after 3 months)	No data	49%	88	Verhasselt et al. <sup>[64]</sup>
	173 pg mL <sup>-1</sup> (median after 6 months)		45%		
<b>PEANUT/peanut allergens (not specified)</b>	120–430 ng mL <sup>-1</sup>	1–3 h	48%	23	Vadas et al. <sup>[66]</sup>
<b>Ara h 6</b>	10–3,370 pg mL <sup>-1</sup>	10 min - 26 h	100%	2	Bernard et al. <sup>[67]</sup>
<b>Ara h 2 and DRP<sup>®</sup>-Ara h 2</b>	46–2,602 ng mL <sup>-1</sup>	1–12 h	26%	32	Schocker et al. <sup>[68]</sup>
<b>Ara h 2, Ara h 6</b>	<b>Ara h 2:</b> 2.3–184 ng mL <sup>-1</sup> <b>Ara h 6:</b> 1.1–9.7 ng mL <sup>-1</sup>	<b>Ara h 2:</b> 1–12 h <b>Ara h 6:</b> 1–12 h	<b>Ara h 2:</b> 35% <b>Ara h 6:</b> 22.5%	40	Schocker et al. <sup>[69]</sup>

# Transferability Timing

## Detection of the Peanut Allergens Ara h 2 and Ara h 6 in Human Breast Milk: Development of 2 Sensitive and Specific Sandwich ELISA Assays

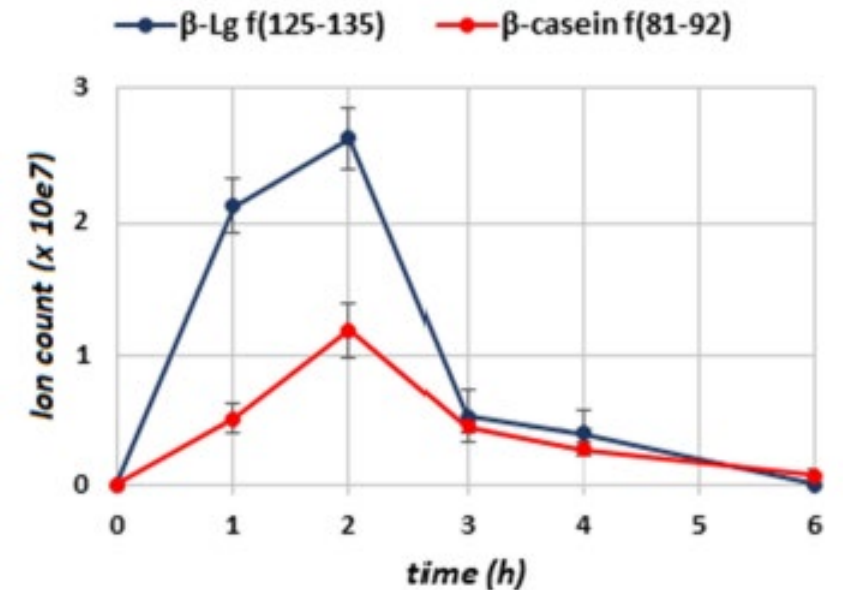
Frauke Schocker<sup>a</sup> Alexandra Scharf<sup>a</sup> Skadi Kull<sup>a</sup> Uta Jappe<sup>a, b</sup>

<sup>a</sup>Division of Clinical and Molecular Allergology, Research Center Borstel, Priority Research Area Asthma and Allergy, Airway Research Center North (ARCN), German Center for Lung Research (DZL), Borstel, and <sup>b</sup>Interdisciplinary Allergy Outpatient Clinic, Department of Internal Medicine, University of Lübeck, Lübeck, Germany



## Excretion of Dietary Cow's Milk Derived Peptides Into Breast Milk

Gianluca Picariello<sup>1\*</sup>, Maristella De Cicco<sup>1</sup>, Rita Nocerino<sup>2,3</sup>, Lorella Paparo<sup>2,3</sup>, Gianfranco Mamone<sup>1</sup>, Francesco Addeo<sup>4</sup> and Roberto Berni Canani<sup>2,3,4,6\*</sup>

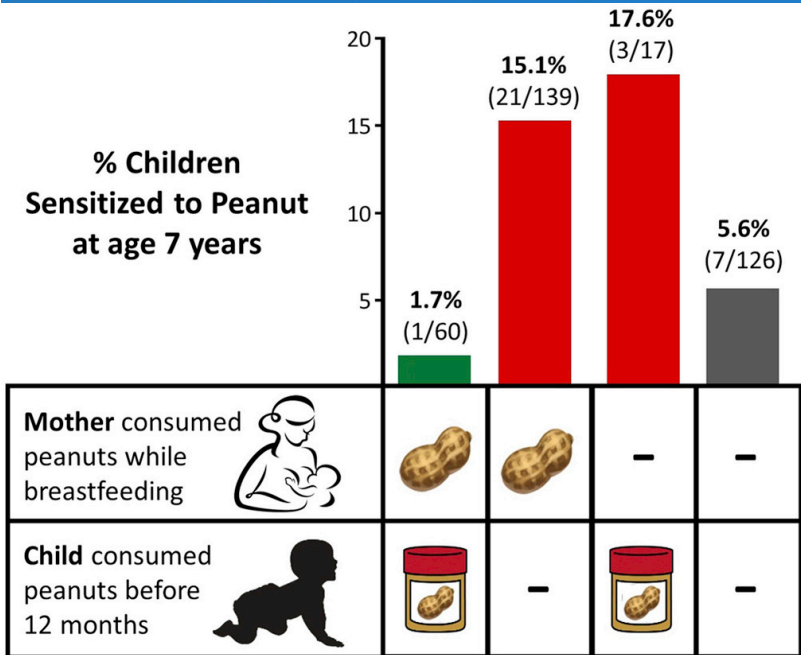


# Tolerance Induction through Transfer

FOOD ALLERGY AND GASTROINTESTINAL DISEASE | VOLUME 141, ISSUE 2, P620-625.E1, FEBRUARY 01, 2018

## Reduced risk of peanut sensitization following exposure through breast-feeding and early peanut introduction

Tracy J. Pitt, MD • Allan B. Becker, MD • Moira Chan-Yeung, MD • ... Wade T.A. Watson, MD • Rishma Chooniedass, MN • Meghan B. Azad, PhD Show all authors



FOOD ALLERGY AND GASTROINTESTINAL DISEASE | VOLUME 145, ISSUE 5, P1416-1429.E11, MAY 01, 2020

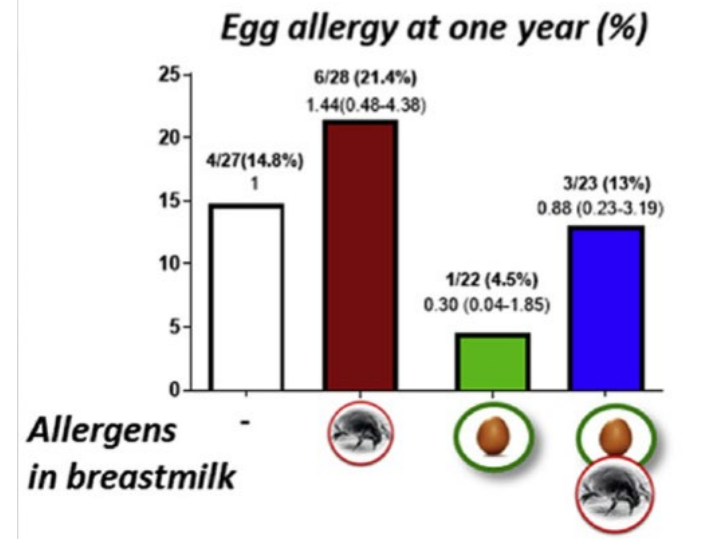
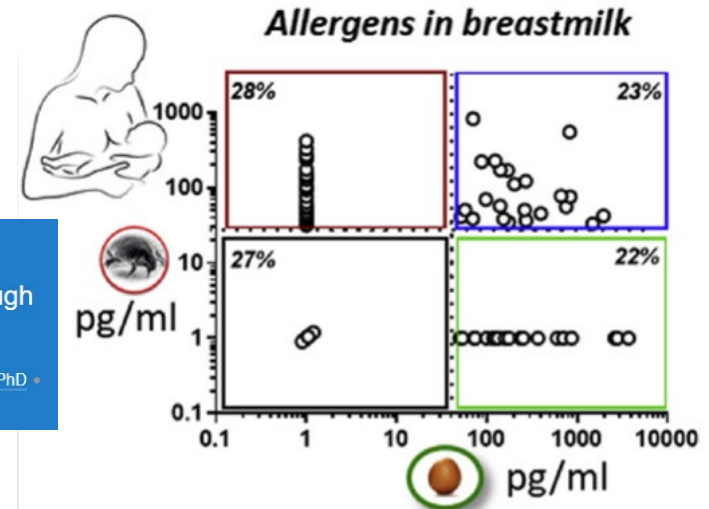
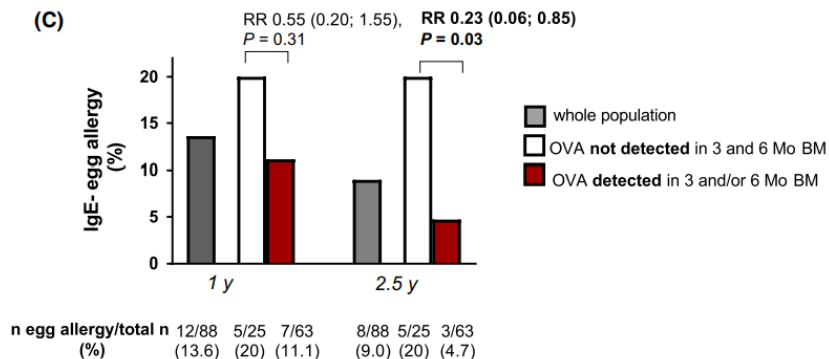
## A role for early oral exposure to house dust mite allergens through breast milk in IgE-mediated food allergy susceptibility

Akila Rekima, PhD • Chrystelle Bonnard, PhD • Patricia Macchiaverni, PhD • ... Debra J. Palmer, PhD • Susan Prescott, MD, PhD • Valerie Verhasselt, MD, PhD Show all authors • Show footnotes

## Ovalbumin in breastmilk is associated with a decreased risk of IgE-mediated egg allergy in children

Valerie Verhasselt Jon Genuneit, Jessica R. Metcalfe, Meri K. Tulic, Akila Rekima, Debra J. Palmer, Susan L. Prescott

First published: 06 December 2019 | <https://doi.org/10.1111/all.14142> | Citations: 15



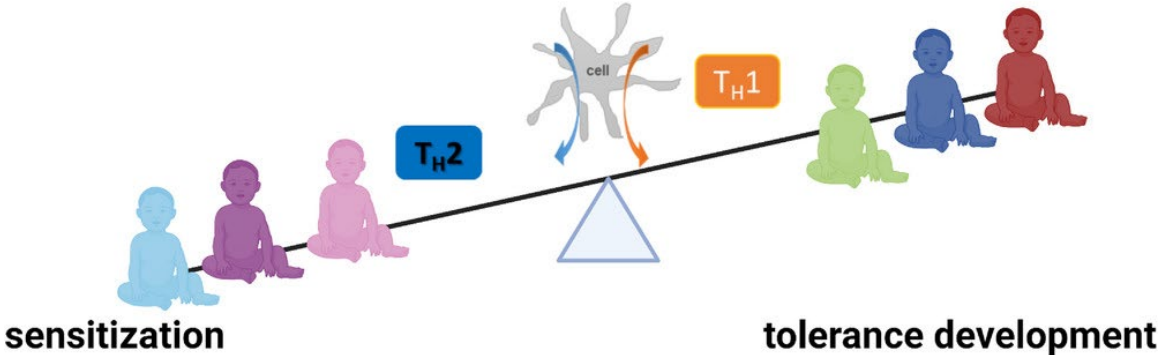
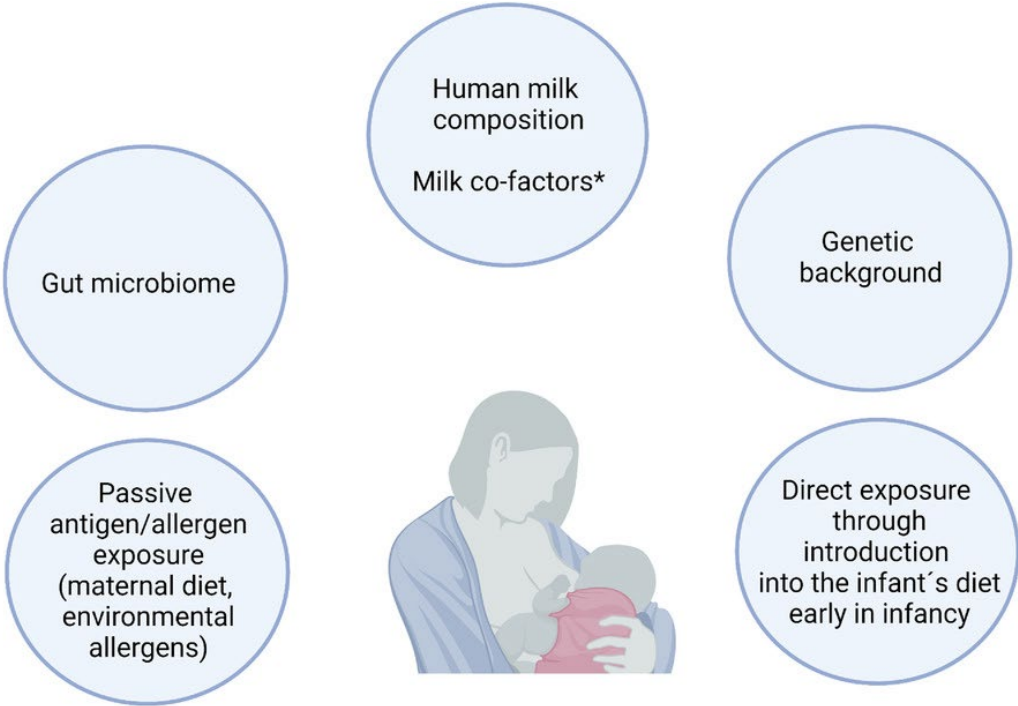
# More to the Story

Review | Open Access | © | | |

## Breastfeeding: Maternally Transferred Allergens in Breast Milk: Protective or Sensitizing?

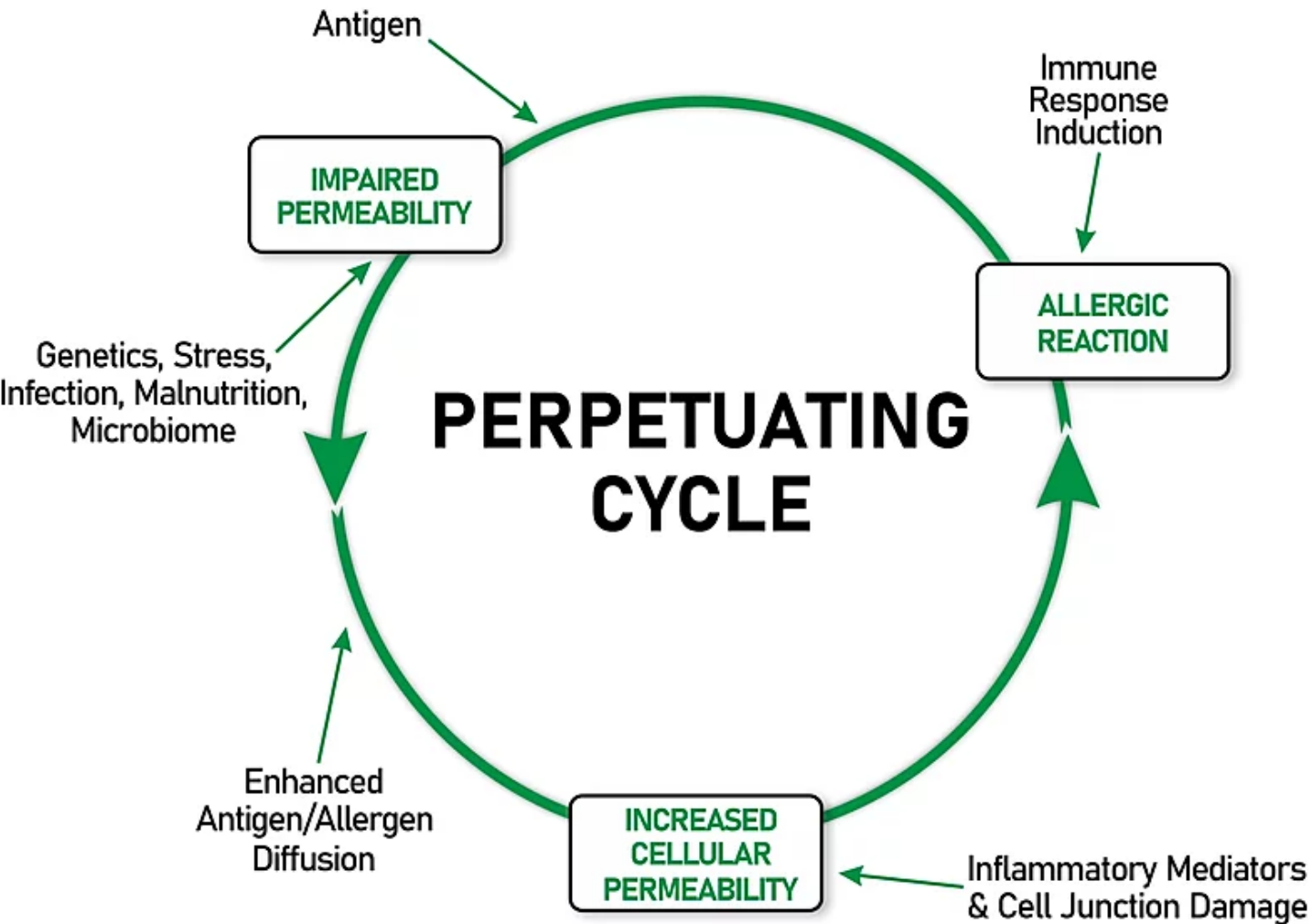
Frauke Schocker | Uta Jappe

First published: 26 May 2022 | <https://doi.org/10.1002/mnfr.202200066>





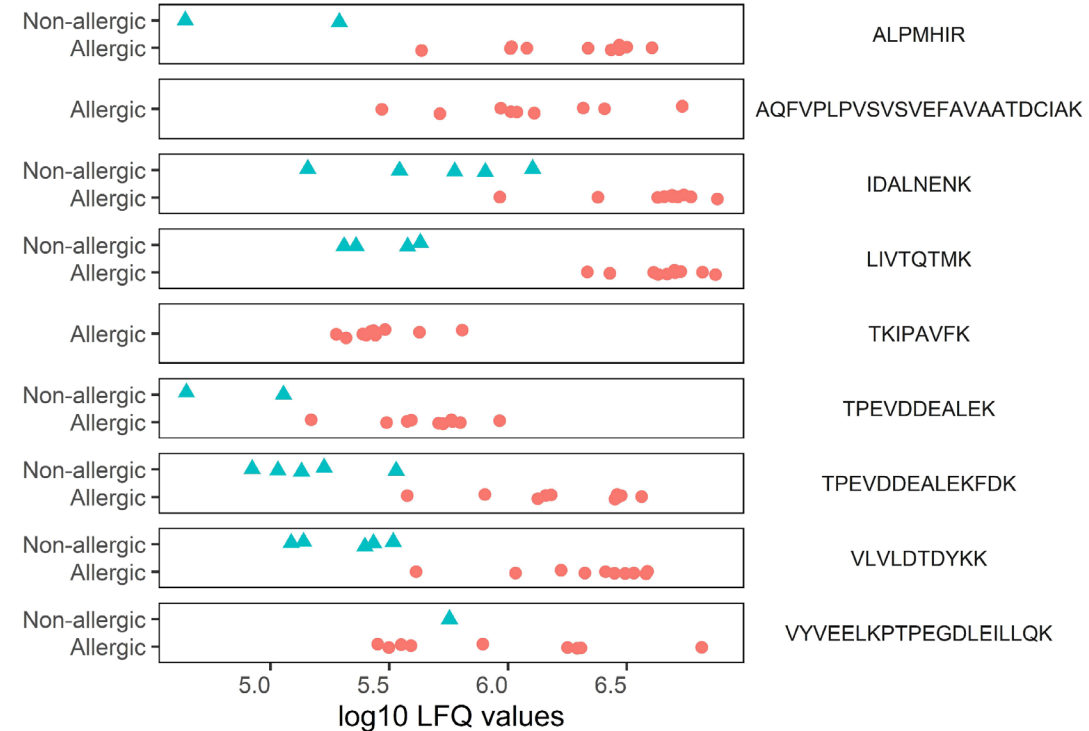
# Factors Involved



Article

## Maternal Allergy and the Presence of Nonhuman Proteinaceous Molecules in Human Milk

Pieter M. Dekker <sup>1,2</sup>, Sjeff Boeren <sup>2</sup>, Alet H. Wijga <sup>3</sup>, Gerard H. Koppelman <sup>4,5</sup>, Jacques J. M. Vervoort <sup>2</sup> and Kasper A. Hettinga <sup>1,\*</sup>



# Transfer Factor Takeaways

It is NOT the parents fault this is occurring



Cortisol levels play an important role so consider stress reduction practices



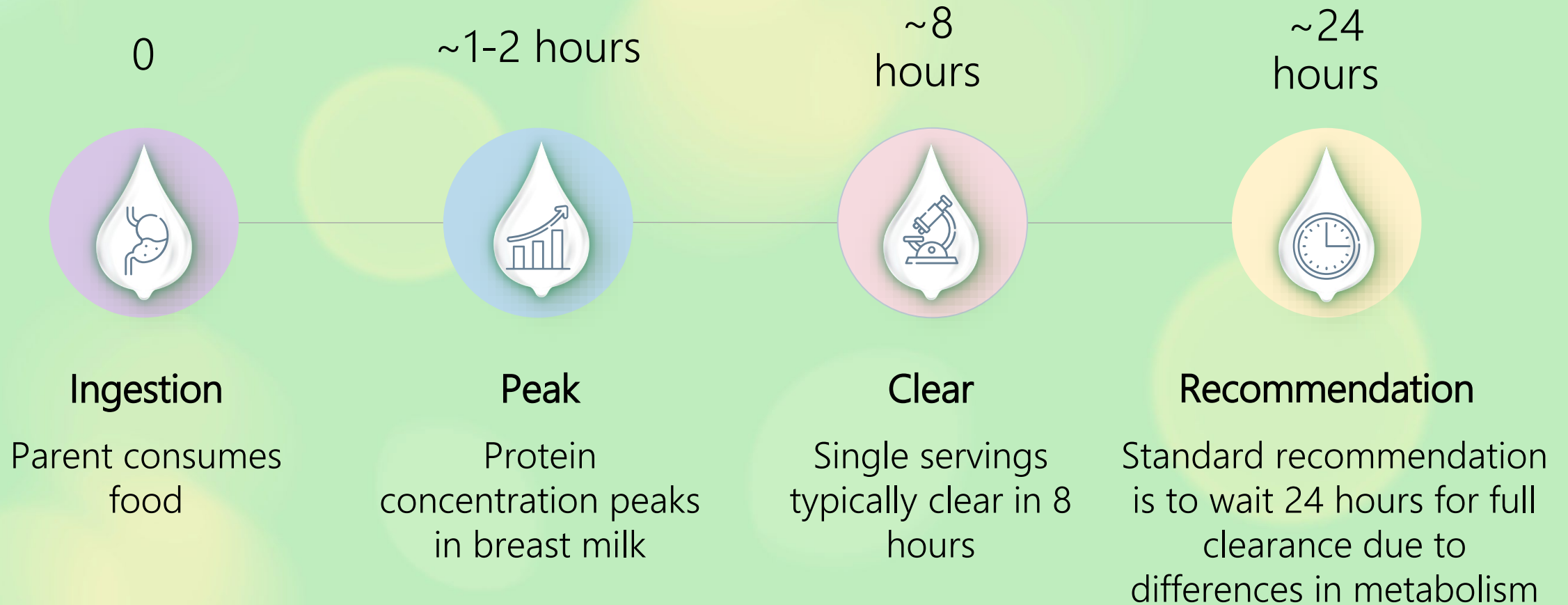
Parent needs to consider limiting foods that elicit them a response



Minimum parent intake of 100 ounces of water each day



# Diet to Breast Transfer Timing



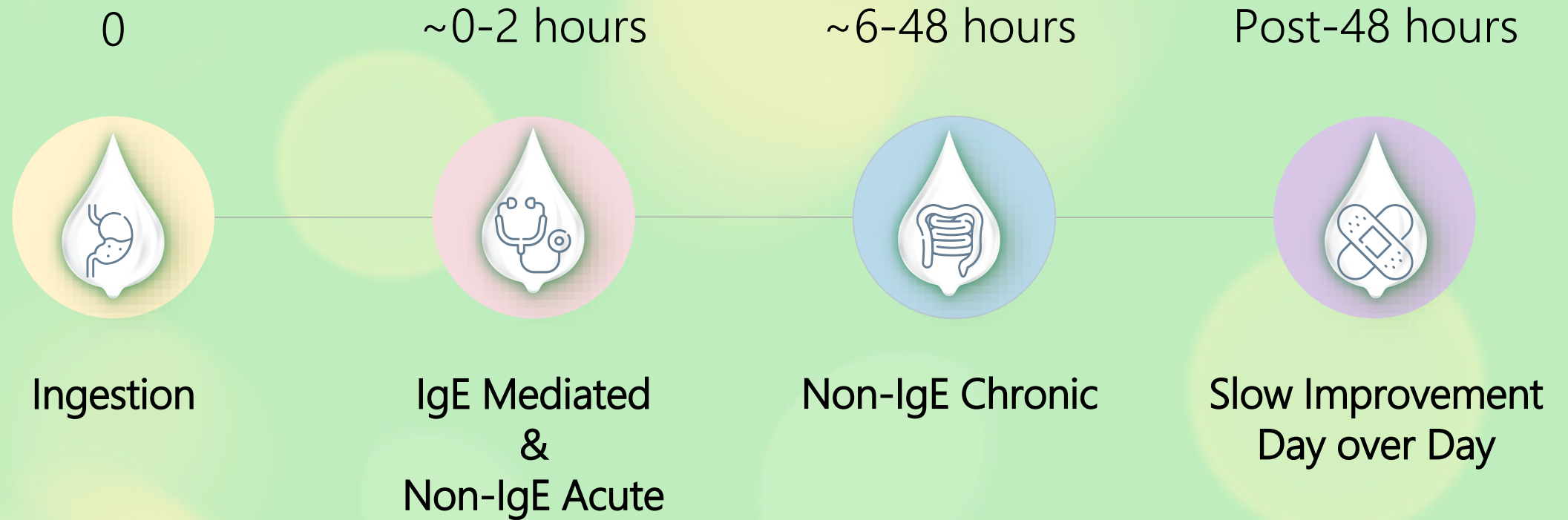
A woman with dark curly hair, wearing a yellow sweater and large hoop earrings, is shown in profile nursing a baby. The baby is wearing a white long-sleeved shirt. The background is softly blurred, suggesting an indoor setting with warm lighting.

# Child ingests nonhuman protein fragments through nursing or expressed milk

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If the immune system is responsive to that portion of the protein transferred, it will elicit a reaction in that child

# Infant Reactivity & Healing



# Elimination Diet

Eliminating food groups/items from lactating parents diet

Allows for removal of that item from breast milk

Strategies:

- One item at a time
- Several items together
- Total Elimination Diet (TED)

Goal: Reach "baseline"



# Elimination Strategies

	PROS	CONS
<b>One item at a time</b> <ul style="list-style-type: none"><li><input type="checkbox"/> Typically start with cow's milk protein</li><li><input type="checkbox"/> Remove additional items if mother has noted a specific pattern</li></ul>	Easier Culprit Known	Slower Don't "Swap"
<b>Several items together</b> <ul style="list-style-type: none"><li><input type="checkbox"/> Remove most top culprits all at once</li></ul>	Faster	Harder Culprit Unknown
<b>Total Elimination Diet (TED)</b> <ul style="list-style-type: none"><li><input type="checkbox"/> Remove all but 5-7 foods</li></ul>	Fastest	Hardest

*Not Recommended Long Term*

# Which Elimination Strategy?

## Symptomology

- FPIES, FPIAP, EoE, IgE, other
- Mild versus severe

## Dietary Ability

- Nutritional needs and availability

## Mental Health

- Dietary restriction vs. symptoms





# Mental health considerations

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Postpartum depression & anxiety

Obsessive compulsive disorder

Food allergy PTSD

History of disordered eating

Family & professional support



# Light at the End of the Tunnel

Approximately 80% of food allergies occur before first birthday  
Many non-IgE cases will resolve themselves within 9-12 months

## Study of 117 non-IgE milk allergic infants

Wood, et.al. (2003)

- 56% tolerant by 1
- 87% tolerant by 3
- 95% tolerant by 5

IgE allergies are much less likely to develop tolerance

- Do not reintroduce IgE mediated triggers  
(get testing)

# Reintroduction

Bringing foods back into the diet after a period of removal (for non-IgE)

Confirmation Reintroduction:

- Occurs after baseline is achieved to pinpoint triggers

Trigger Reintroduction:

- Occurs after proper elimination period

Different from starting solids



# Reintroduction Ladders



# Reintroduction Strategies

## Direct Introduction

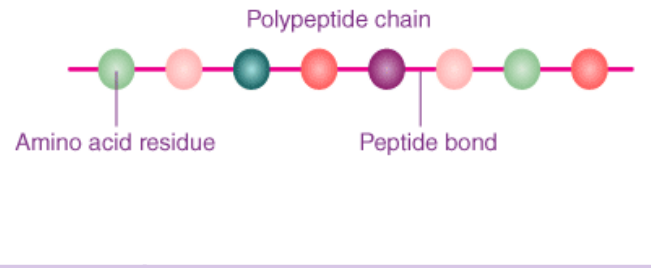
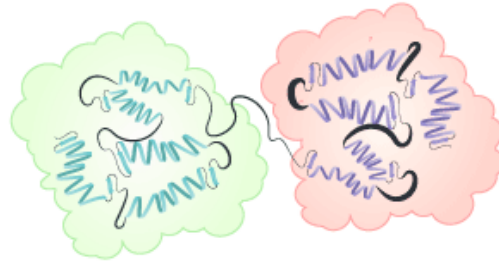
- Trigger item given directly to child
- Pro: Exact time and concentration known
- Con: Child won't eat solids, possibly stronger reaction

## Indirect Introduction

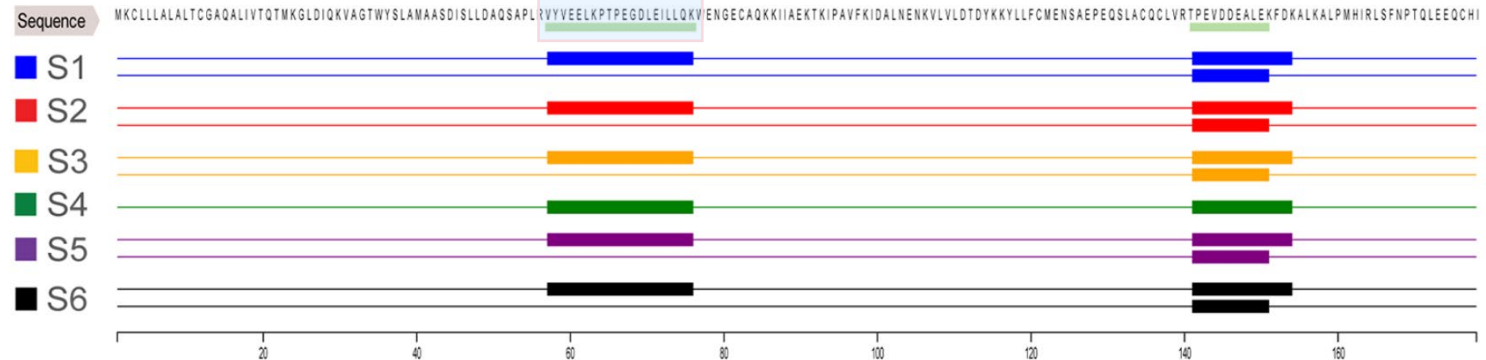
- Trigger item trialed through breast milk
- Pro: Breastfeeding child doesn't need to do anything new
- Con: Unknown if item made it to breast milk

# Direct versus Indirect Proteins

Child consumes whole form of protein **directly**



Child consumes partial form of protein **indirectly**

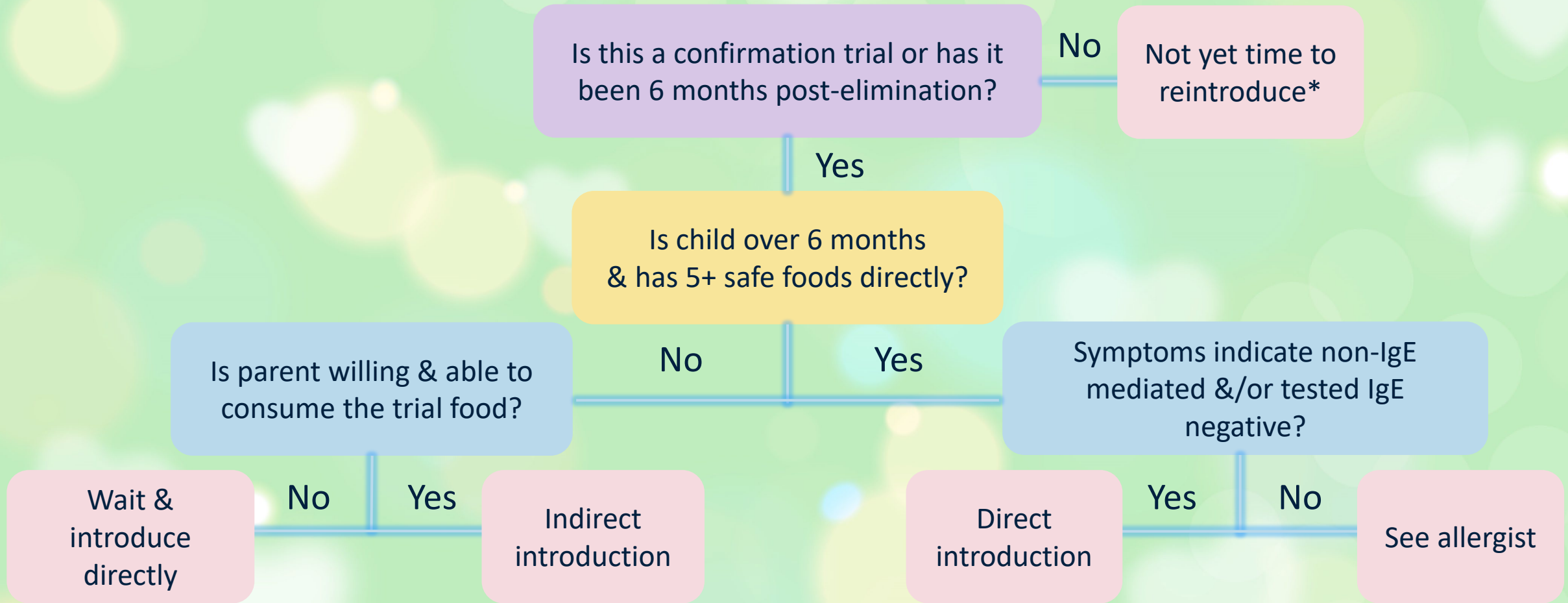


Indirect pass  
≠  
Direct pass



Direct pass  
=  
Indirect pass

# Reintroduction Decision Tree





# Elimination & Introduction Strategies: Takeaways



Child presents with one or more food allergy symptoms



Rule out other possible contributing factors for those symptoms



Determine best elimination diet strategy & timeline



Provide resources for tracking, nutrition, & community



At baseline, complete confirmation reintro if necessary



Re-evaluate nutrients post-confirmation & establish solids plan

*Investigating  
Parentally Reported*  
FOOD-REACTIVITY  
SURVEY STUDY



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Helping Parents Navigate Food Allergies



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