

# Food Allergies and Breastfeeding

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## Objectives

- Explain how foods in the parental diet play a role in the risk of food allergies in breastfed infants.
- Discuss symptoms of food protein induced allergic proctocolitis (FPIAP) in a breastfed infant
- Describe the presentation of food protein induced enterocolitis among breastfed infants
- Identify the risk of early cow's milk-based formula supplementation in the risk of cow's milk allergy.

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<h3>Role of Parental Diet in Preventing/Causing Childhood Allergies</h3>	<h3>Infant Reactions to Foods in the Parental Diet</h3>	<h3>The Impact of Formula Feeding on Risk of Childhood Cows' Milk Allergy</h3>
<p>Does eating certain foods during lactation prevent childhood allergies to those or other foods?</p>	<p>What are the different ways that infants demonstrate reactions to foods in the parental diet?</p>	<p>Does formula introduction increase or decrease the risk of childhood cows' milk allergy?</p>

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## Breastfeeding Protects From Non-Food Allergies

- Exclusive breastfeeding protects from
  - Eczema in the first 2 years of life
  - Asthma for the first 5-10 years of life
    - Children born via cesarean have a higher risk of asthma at 6 years of age
      - Breastfeeding protects from the effect of cesarean birth
- HMOs in breastmilk alter infant gut microbiome => affects allergy expression

Mennini Curr Opin Allergy Clin Immunol 2021, 20:00

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## What is the Definition of Food Allergy?

'Food Allergy'- classic signs of wheezing, swelling, hives, itching, diarrhea, drop in blood pressure, death.

- Also known as IgE reactions
- Demonstrates + skin testing
- Considered a severe, or life-threatening allergy
- Often recommended to carry an epinephrine pen and strict avoidance of the food

Abrams Allergy, Asthma & Clinical Immunology 2022 18:36

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## Who is at Risk for a Classic Food Allergy?

Infants who are at higher risk for food allergies:

- Demonstrate 'atopy'- eczema, wheezing
- A parent or sibling with either asthma, allergic rhinitis, food allergy, or eczema
- Already diagnosed with 1 food allergy
- Infants who are low risk can develop food allergies

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## Most Compelling Evidence to Prevent Food Allergies is Early Introduction of Complementary Foods

- LEAP trial – Introducing peanut at 4-11 months reduces childhood peanut allergy by 80%
- PETIT study- egg introduction by 4-6 months reduces childhood egg allergy
- EAT trial- no difference in food allergies if peanut, cow's milk, sesame, fish, wheat, egg were introduced at 3 mo vs 6 mo of age.

Lerodiakonou systematic review JAMA 2016 316(11) p.1181-92)

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## Role of Parental Diet in Preventing Infant/Childhood Allergies

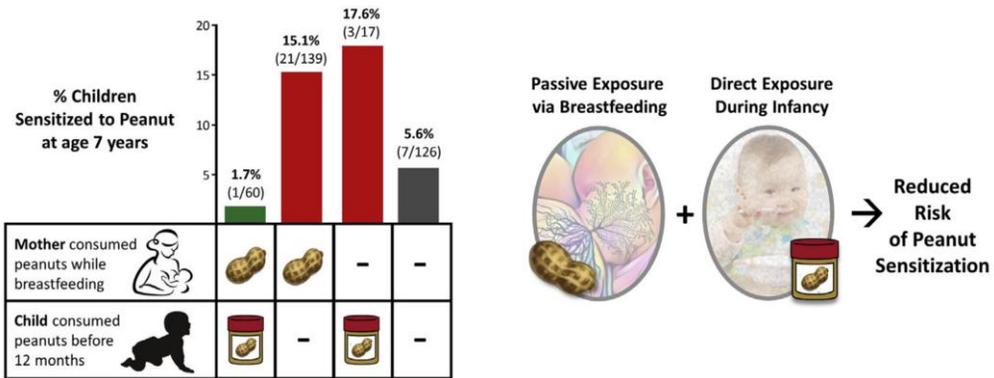
Systematic reviews don't support recommendations to change the diet during pregnancy or lactation to prevent infant/childhood food allergies. But... individual studies show:

- Peanut in the maternal diet during lactation protects from peanut allergy (CHILD Cohort)
- Dairy in maternal diet protects from infant food allergies

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## CHILD Cohort- Peanut Exposure Thru Breastfeeding and Early Exposure



Pitts\_Azad J Allergy Clin Immunol 2018;141:620-5.

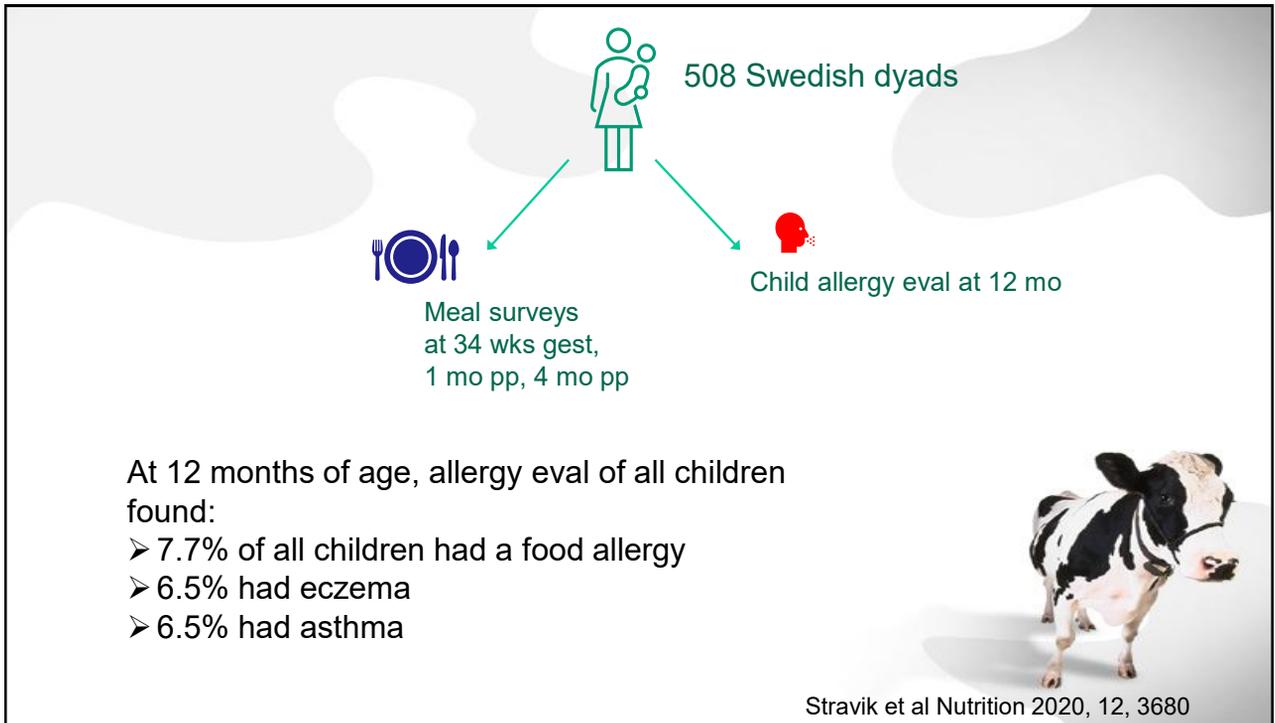
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Cow's milk protein intake during lactation is associated with a decreased risk of infant food allergies



Stravik et al Nutrition 2020, 12, 3680

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## Results

(after adjusting for family history of allergies)

- Higher intake of dairy associated with lower risk of all food allergies at 12 mo of age
  - Especially with a higher intake of pizza at 4 mo pp and cheese during pregnancy
  - Strongest association between dairy intake and lower infant allergies was at 4 months.
  - Dairy intake was confirmed by levels of fatty acids pentadecanoic acid and heptadecanoic acid that are specific to dairy intake
    - These fatty acid biomarkers are made in cow's gut



Stravik et al Nutrition 2020, 12, 3680

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## Why would dairy be protective from allergy?

- Dairy, like other animal fats, are saturated fats
- Saturated fats in the diet during preg and lactation is associated with lower risk of childhood allergies
- Exposure to food allergens during lactation may help to establish tolerance



Stravik et al Nutrition 2020, 12, 3680

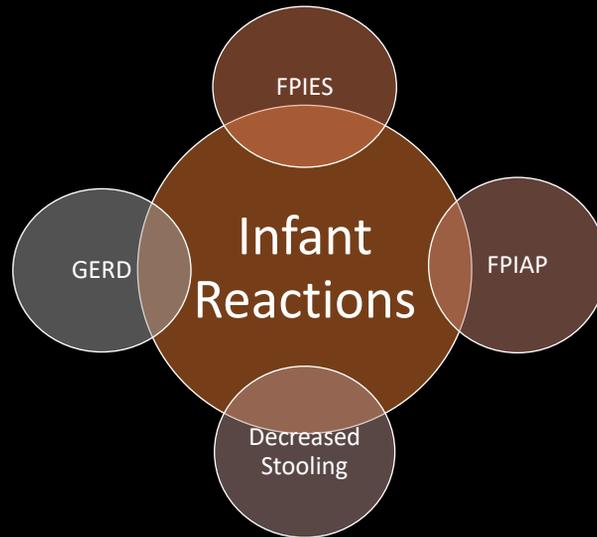
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## Conclusions

- Breastfeeding can protect from non-food allergy symptoms such as asthma and eczema
- The strongest evidence to prevent infant IgE mediated food allergies (classic food allergies) is early exposure to highly allergenic foods such as fish, egg and peanut.
- The strongest evidence to prevent peanut allergy is early exposure + exposure of peanut in breastmilk.
- Dairy intake during lactation might decrease the infant's risk of all food allergies.

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## Infant Non-IgE Reactions to Foods in the Parental Diet



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### What is Food Protein Induced Allergic Proctocolitis? (FPIAP)

- An immune-mediated hypersensitivity GI disorder
  - Sores seen in the large bowel (sigmoid/rectum)
  - Elevated eosinophils in crypts of rectosigmoid mucosa
  - Blood-streaked stools with mucous



J Allergy Clin Immunol 135(5) May 2015

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**What are typical symptoms of  
allergic proctocolitis?  
When does it usually start?**



7/24/2025

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## Clinical Presentation of Allergic Proctocolitis

- The infant tends to look fine
  - + Typically gains weight well
  - + Usually not fussy, not vomiting
  - Labs usually normal
  - + Possible increase in blood count eos
  - + Possible increase in platelets

Diagnosis based on blood in stool, and resolution with removal of offending food proteins



World Allergy Org J (2020)13:100471

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## Demographics of Allergic Proctocolitis

- ? 0.16% in healthy infants- few studies
- + 18-64% of cases among infants with bloody stools
- + Typical age of onset is 2 weeks-5 months of age
- 60-80% are exclusively bfed
- In one study, more common in males (66.6%) (JPGN 2015; 61)



Allergol Immunopathol (Madr) 2018;46 (1): 1-2

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## What Other Illnesses Can Cause These Symptoms?

- Gut infection
- Volvulus
- Anal fissure
- Coagulation disorder
- Necrotizing enterocolitis
- Inflammatory bowel disease
- Intussusception

World Allergy Org J (2020)13:100471



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## What do you think are the Most Common Offending Agents for FPIAP?

- Most likely due to cow's milk
- Other proteins
  - + Soy
  - + Eggs
  - + Corn
  - + Chicken
- Can occur with hydrolyzed formulas

World Allergy Org J (2020)13:100471



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## Role of Gut Flora in Bloody Stools

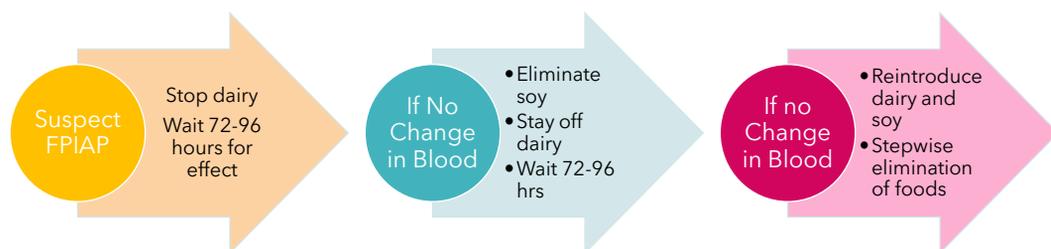
- + Food protein induced enteritis syndromes not well understood
- + Gut microbiome plays a major role in gut maturity and immunity
  - Increased inflammation w/aberrant gut flora
- + Gut microbiome differs between babies with bloody stools and controls
  - Less bifidobacteria in babies with bloody stools

Pediatr Res 2014 Oct 21  
 Folia Microbiol. **54** (2), 167-171 (2009)  
 Microbiol Immunol 2012; **56**: 657-663



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## Maternal Elimination Diet for Food Protein Induced Proctocolitis



1. Consider involving a dietitian to help with diet resources
2. Prolonged improvement may be due to 'mistakes' in diet
3. Food elimination needs to be 100%- a tiny amount can trigger proctocolitis
4. 12% cannot be identified thru maternal food elimination

World Allergy Org J (2020)13:100471

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## What if Nothing is Done?

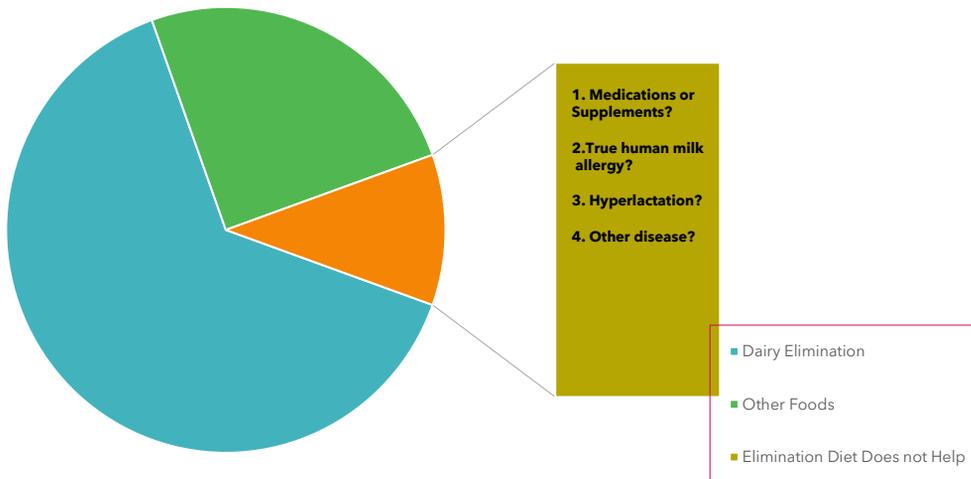
- + 20% spontaneously resolve without maternal dietary intervention
- + Consider no maternal diet restriction if mild symptoms
- + Long term prognosis is excellent
  - Risk of anemia is low

Mennini World Allergy Org J (2020)13:100471



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## What About the 12% Who Don't Respond?



Most current recommendations advise switching to an elemental formula if bloody stools don't resolve with food elimination trials



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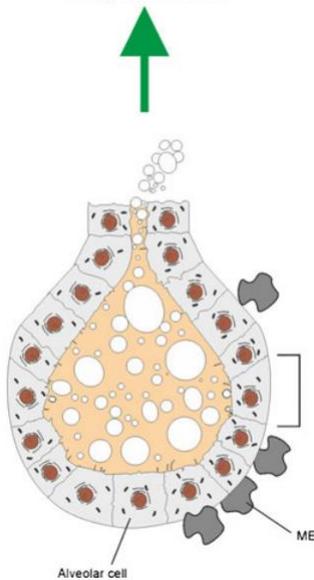
## Hyperlactation In Association With Bloody Stools

- + Common clinical observation
  - + Frequent stools
  - + Mucousy, blood-streaked stools
  - + Foamy, green stools and gassy
  - + Infant fussiness
- + No data
- + If blood-streaked stools are not resolving with stopping cows milk protein, address hyperlactation, especially if infant has typical sx



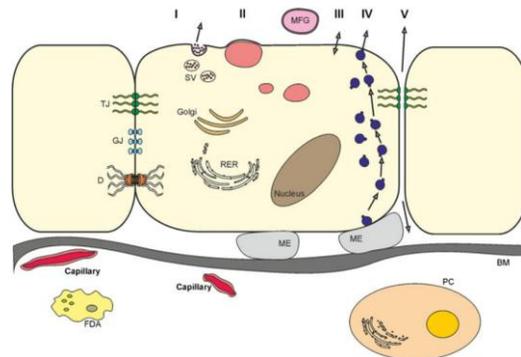
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Milk expulsion from the duct



### Why Would Hyperlactation Be Associated With Bloody Stools?

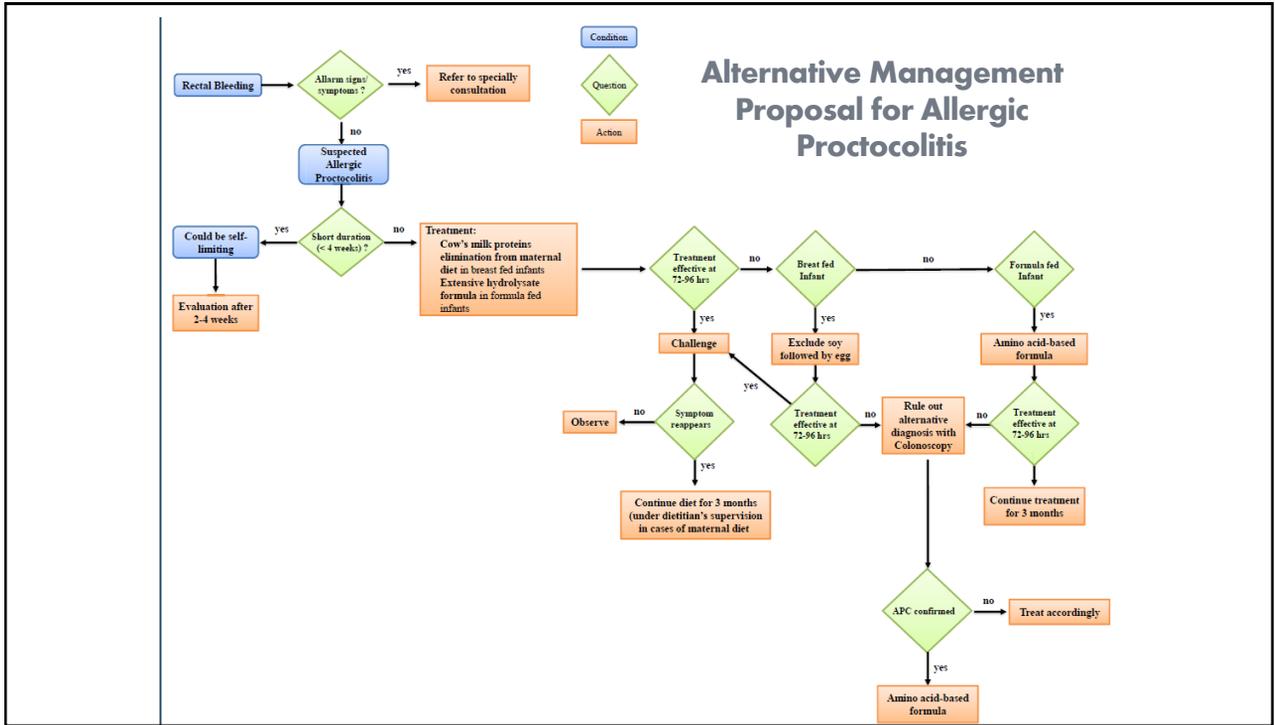
**Fig. 3** Alveolar cell from lactating mammary gland. *TJ* tight junction; *GJ* gap junction; *D* desmosome; *SV* secretory vesicle; *FDA* fat-depleted adipocyte; *PC* Plasma Cell; *BM* basement membrane; *ME* cross section through process of myoepithelial cell; *RER* rough endoplasmic reticulum. See text for explanation of secretory pathways *I* (exocytosis), *II* (lipid), *III* (apical transport), *IV* (transcytosis) and *V* (paracellular pathway)



Mobasher J Mammary Gland Bio and Neo (2014) 19:91-102



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## When to Rechallenge?

### No set guidelines

- Unclear why they eliminated exclusively breastfed infants
- 28.6% of subjects were breastfed (likely not exclusively)
- When challenged for diagnosis, 40/58 had no recurrence of sx

Lemoine A, Lemale J, Aroulandom J, Tounian P. *Clinical and Experimental Allergy*, Wiley, 2021.

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## Re-introducing Allergens for FPIAP

- + Consider allergy testing if other allergic symptoms; eczema, wheezing
- + If baby otherwise well
  - Reintroduce offending allergens 2-6 mo after resolution of symptoms, or at 12 mo of age
  - Rarely persists past age 1



Mennini World Allergy Org J (2020)13:100471, JPGN 2015; 61: 69-73

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## Elimination Diets



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## Online Resources for Elimination Diets

### Reading labels, learning substitutions, recipes

- Food Allergy Network - <https://www.foodallergy.org/>
- Asthma and Allergy Foundation of America- <https://www.aafa.org/>
- Kids with Food Allergies- <https://www.kidswithfoodallergies.org/>
- Food Allergy Canada <https://foodallergycanada.ca/>
- FIG app- <https://foodisgood.com/>



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## Breastfed Babies Receiving Formula Supplementation

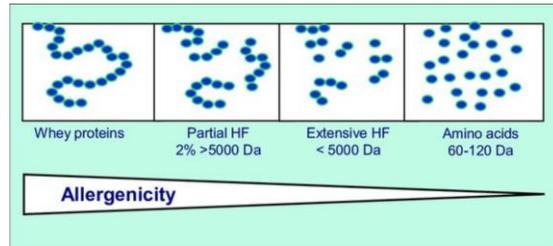
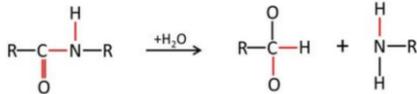
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- + Change to a hydrolyzed formula
- + If sx are severe and persistent, an amino acid-based formula is preferred over hydrolyzed cows milk formula.



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## What is hydrolyzed formula?



Kiewiet G, Faas MM, Nutrients 10(7):904 July 2018

Schouten B, van Esch B et al Internat Arch All Immun 147(2): 125-34

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## Choosing Formula

### Partially Hydrolyzed

Enfamil Neuro Pro

Gentlease

Gerber Good Start

Similac Pro-Total  
Comfort

### Extensively Hydrolyzed

Enfamil  
Nutramigen

Enfamil Pregestimil

Similac Alimentum

Similac Expert Care

### Amino Acid Based

Neocate

Ele-Care

PurAmino

Alfamino

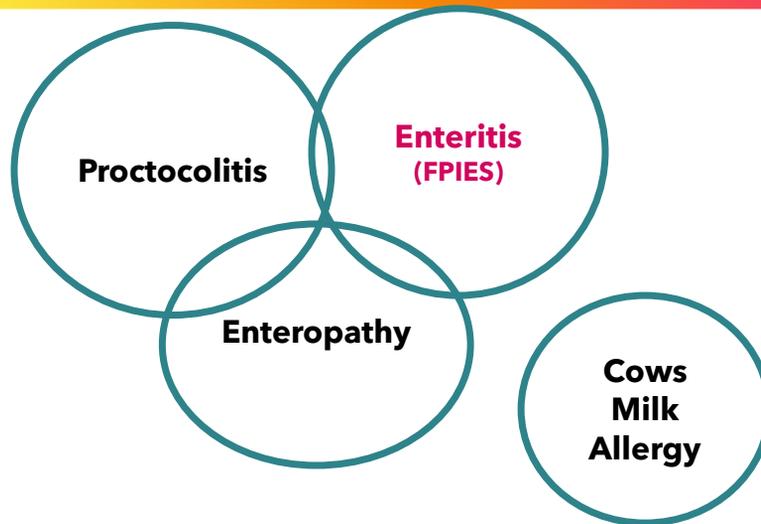


<https://www.kidswithfoodallergies.org/formula-options-for-infants-with-food-allergies.aspx>

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## Food Protein Induced Allergic Diseases



J Allergy Clin Immunol 135(5) May 2015

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**A lactating parent calls you at 3 pm because she is running late for her 3:30 pm lactation appointment to discuss weaning from pumping at work.**

**She was just in the emergency room that morning with her 10 month old infant because of the stomach flu. She mentions that this is the third time this month that the baby has been to the ER or the doctor's office with the same symptoms of intense vomiting, about 3 times in a row, accompanied by a major blow out diarrheal stool and lethargy. The baby spent the morning in the ER, and was discharged at 2:45 pm, after her baby improved and was able to breastfeed and not vomit. She wonders if the baby is allergic to something in her breastmilk.**



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**Table 2** Diagnostic criteria of acute FPIES (from reference [1], modified)

The diagnosis of acute FPIES requires the presence of vomiting (1–4 h after the ingestion of the suspected food) and the absence of classic IgE mediated allergic skin respiratory symptoms (**major criteria**), plus at least three of the following **minor criteria**:

A second (or more) episode of repetitive vomiting after eating the same suspected food

Extreme lethargy with any suspected reaction

Marked pallor with any suspected reaction

Need for Emergency Department visit with any suspected reaction

Need for intravenous fluid support with any suspected reaction

Hypotension

Hypothermia

If only a single FPIES reaction has occurred, it is strongly recommended to perform a diagnostic food challenge

## Diagnostic Criteria for Acute Food Protein- Induced Enterocolitis Syndrome (FPIES)



Ital J Pediatrics 2020 46; 144

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## Typical Case of FPIES

- + 1-4 hrs after eating, child vomits extensively
- + Profuse diarrhea occurs 5-10 hours later
  - May be bloody diarrhea
- + Parents assume stomach flu
- + In severe cases:
  - Child appears pale, ill, lethargic
  - Brought to the ER
  - Child is worked up for causes of shock
  - All tests are negative and child is fine the next day
- + Can mimic sepsis, gastroenteritis
- + Overall, sx can be mild, moderate, or severe



Allergy Clin Immunol 2017; 139:111-1126

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## Chronic FPIES

- + No diagnostic criteria
- + Occurs when the problem food is ingested frequently
  - Progressive vomiting
    - Child might appear and grow fine
  - Diarrhea
  - Poor growth



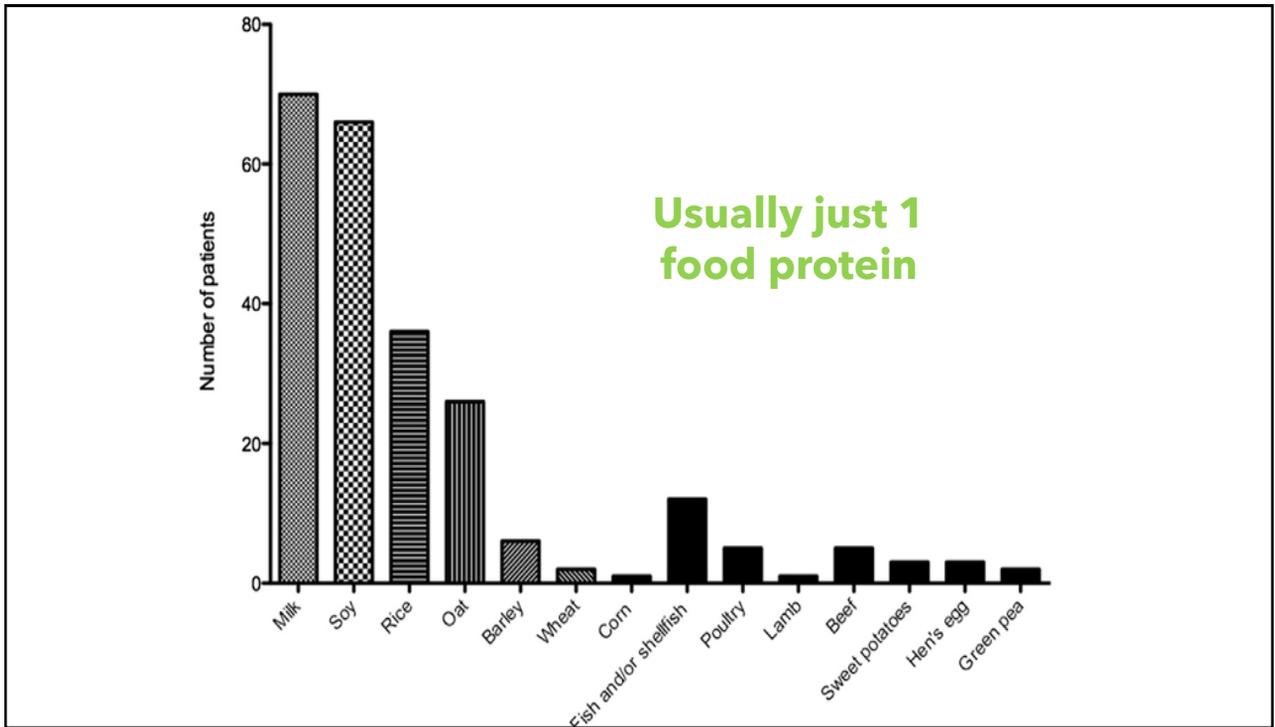
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## Food Protein Allergies in FPIES

- + Usually asymptomatic during exclusive breastfeeding
  - Breastmilk seems protective
- + Epidemiology not known
  - Few studies, from 15/100,000 to 3/1000
  - + Likely more common due to under-reporting, mis-dx, mild presentations
- + Need higher amounts of food proteins than in breastmilk



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## Diagnosing Food Protein-Induced Enterocolitis Syndrome (FPIES)

- + No diagnostic test available
  - Rule out infectious disease or toxin exposure
- + Milk/soy FPIES rare in exclusively bfed infants
  - Most common in formula fed infants
  - Bfeeding is protective



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## Characteristics of FPIES Patients

- 0.28% of individuals in the USA
- Median age at onset = 9 months of age
- Median age at diagnosis = 12 mo
- 27.5% + h/o eczema
- 11.8% + h/o asthma
- 18% have FPIES to > 1 food
- Most common culprit for adults=shellfish

J Allergy Clin Immunol Pract 8(5) 2020;1717-1720



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## Management

- + Manage symptoms
  - Oral or IV fluids
  - Ondansetron
  - Possibly hospitalize
- + Diagnosis based on ruling out other causes of symptoms
- + Avoid offending food(s)
  - OK for breastfeeding mother to ingest them
- + Allergy eval to r/o possible IgE role
- + Oral food challenges under medical supervision, IV in place
  - Try every 12-24 mo
  - Higher risk with IgE Ab

Allergy Clin Immunol 2017: 139:111-1126



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## Prognosis of FPIES

- + 24% of subjects had IgE antibodies to the FPIES-inducing food(s)  
Less likely to grow out of a reaction
- + If no IgE antibodies, median age of outgrowing FPIES:
  - Rice- 4.7 years old
  - Oats- 4 yo
  - Soy- 6.7 yo
  - Milk- 5.1 yo



Allergy Clin Immunol 2017; 139:111-1126

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HOME ABOUT FPIES RESOURCES GET INVOLVED ABOUT US BLOG

FPIESfoundation.org

## The FPIES Foundation

<p><b>Emergency Care</b> Learn how to identify, manage and seek help for acute FPIES reactions</p>	<p><b>Toolbox</b> Your one-stop-shop for getting started with your family's FPIES journey</p>	<p><b>Providers</b> Resources and support for providers caring for patients affected by FPIES</p>	<p><b>FPIES Registry</b> Join the Global FPIES Patient Insights Network, adding your voice to FPIES research</p>
<p><b>School Smart</b> Tools to navigate school for kids, parents, and the teacher's who support them</p>	<p><b>For Kids</b> Kid-specific FPIES resources for affected kids, as well as their siblings and friends</p>	<p><b>Connect</b> Support and connect with other families affected by FPIES in a private forum</p>	<p><b>Learning Library</b> Expand your knowledge of FPIES with FREE online and printable resources</p>

Has your child experienced severe episodes of vomiting after eating infant cereal and/or first foods, or after drinking formula?  
Do you question whether or not a specific food or foods may be contributing to your infant's worsening symptoms of periodic vomiting, chronic diarrhea, reflux and/or failure to thrive?

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## Conclusions

- Food protein induced allergic proctocolitis (FPIAP) is a common food sensitivity reaction largely characterized by blood streaks in the stool.
- FPIAP is most often caused by cows milk in breastmilk.
- If blood streaks do not resolve with elimination of the most common food proteins, consider that hyperlactation plays a role.
- Food protein induced enterocolitis (FPIES) is more likely to occur after solids are introduced, and the foods usually don't need to be eliminated from the parental diet.

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**A parents reports at the 2 mo well child visit that their exclusively bfeeding baby tends to be fussy, strains with stooling, fusses with feeding 24 hours a day. No spitting up. Reasonable advice includes:**

- 
- A. This is normal colic behavior, it will improve
  - B. This is likely due to GERD, suggest famotidine tx
  - ➔ C. Stop cows milk protein in mother's diet
  - D. Gripe water for fussiness/colic



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## Association of FP Induced Allergic GI Syndromes with Infant Constipation, GERD, Fussiness

- + Cows milk allergy assoc with gastric motility disorders, e.g. constipation, reflux, delayed gastric emptying
- + 28-78% success rate in resolving constipation by eliminating dairy

Increased eosinophilic infiltration of anal sphincter causes increased anal pressure at rest (due to CM allergy)



J Allergy Clin Immunol 135(5) May 2015

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## Cows' Milk Exposure and Functional Constipation

	Functional constipation		P-value
	Yes (N = 242)	No (N = 809)	
Type of infant feeding: n (%)			
Exclusive breastfeeding	26 (10.7)	226 (27.9)	<0.001 <sup>†</sup>
Predominant breastfeeding	35 (14.5)	394 (48.7)	
Mixed breastfeeding	26 (10.7)	32 (4.0)	
Infant formula	106 (43.8)	129 (15.9)	
Whole cow's milk	49 (20.2)	28 (3.5)	
Existence of bathroom in the house: n (%)			
Yes	236 (97.5)	799 (98.8)	0.166 <sup>†</sup>
Enjoyment of drinking water: n (%)			
Yes	171 (70.7)	729 (90.2)	<0.001 <sup>†</sup>
Demanding to drink water: n (%)			
Yes	154 (63.6)	660 (81.6)	<0.001 <sup>†</sup>
Water intake (L/day): mean (SD)	0.9 (0.5)	1.1 (0.5)	<0.001 <sup>†</sup>
CEBQ: mean (SD)			
Food responsiveness (FR)	1.4 (0.6)	1.8 (0.9)	<0.001 <sup>‡</sup>
Emotional overeating (EOE)	1.0 (0.4)	1.0 (0.5)	0.119 <sup>‡</sup>
Enjoyment of food (EF)	1.8 (0.7)	2.1 (0.8)	<0.001 <sup>‡</sup>
Desire to drink (DD)	1.4 (0.6)	1.4 (0.6)	0.644 <sup>‡</sup>
Satiety responsiveness (SR)	2.3 (0.9)	1.8 (0.8)	<0.001 <sup>‡</sup>
Slowness in eating (SE)	1.8 (0.7)	1.7 (0.7)	0.002 <sup>‡</sup>
Emotional undereating (EUE)	1.5 (0.7)	1.4 (0.7)	0.135 <sup>‡</sup>
Food fussiness (FF)	3.8 (0.7)	2.2 (0.9)	<0.001 <sup>‡</sup>



Barbosa de Oliveira\_ JPGN 2021;73: e50–e56

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## Formula Supplementation of the Breastfed Infant and Cows Milk Allergy

Urashima JAMA Pediatr 2019 Dec 173(12)



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### Study Methodology Japan

- Inclusion criteria were infants at risk for allergy (family history)
- 312 bfed newborns randomly assigned to one of 2 groups:
  - Breastfeeding with no CMF for at least the first 3 days. Can have only AA formula the first 3 days, then switch formula to CMF if needed.
  - Breastfeeding with at least 5 ml/day of CMF from birth, and at least 40ml/day starting at 1 mo-5 mo



Urashima JAMA Pediatr 2019 Dec 173(12)

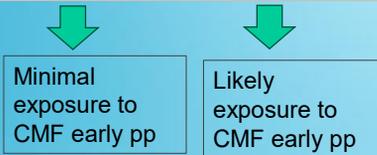
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## Results

Serum IgE to CMF for infants who received CMF in the first 3 days vs those who didn't

Table 2. Effects of Avoiding CMF at Birth on Antigen-Specific IgE Levels<sup>a</sup> At 24 months

Subgroups	Study Group, No. (%) of Infants			RR (95% CI) <sup>b</sup>
	Total	BF/EF	BF Plus CMF	
Cow's Milk-Specific IgE Level $\geq 0.35$ U <sub>A</sub> /mL				
Overall (n = 286) <sup>d</sup>	70 (24.5)	24 (16.8)	46 (32.2)	0.52 (0.34-0.81)



Urashima JAMA Pediatr 2019 Dec 173(12)



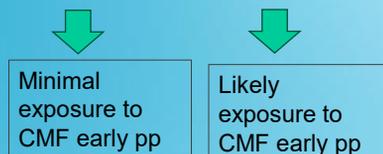
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## Results

Risk of any sort of food allergy\* by 2 years of age increased in the group that received CMF in the first 3 days

Table 3. Effects of Avoiding CMF at Birth on Immediate and Anaphylactic Types of Food Allergy

Effects	Study Group, No. (%) of Infants <sup>a</sup>			RR (95% CI) <sup>b</sup>
	Total (n = 302)	BF/EF (n = 151)	BF Plus CMF (n = 151)	
Immediate Type of Food Allergy				
Cumulative incidence by the second birthday	67 (22.2)	22 (14.6)	45 (29.8)	0.49 (0.31-0.77)



\*Egg, wheat, walnuts

Urashima JAMA Pediatr 2019 Dec 173(12)



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## Author's Conclusions

- Avoiding cows milk protein in the first 3 days of life prevents allergic reactions to foods at age 2, including cows milk, egg, wheat and walnuts.
- The amount of cows milk formula given in either group after 3 days of age didn't seem to correlate with cow milk or other food allergies.



Urashima JAMA Pediatr 2019 Dec 173(12)

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## Other Data

- COMMEET study in Israel- Occas early CMF exposure among breastfed infants increases the risk of cow's milk allergy. (Lachover-Roth et al Ann Allergy Asthma Immunol 2022)
- A multidisciplinary professional group in Spain and Portugal recommends hydrolyzed formula for dyads intending to exclusively breastfeed, for short term use early pp (Dias et al Nutrients 2022, 14, 4016)



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# Conclusions

- Cow's milk protein sensitivity can manifest as decreased frequency of stooling, GERD, and general fussiness.
- Early limited cows milk formula exposure in the first few days postpartum followed by exclusive breastfeeding increases the risk of cow's milk allergy.
- If early supplementation is needed, consider donor milk or hydrolyzed formula.