Common Infant Digestive Health Concerns and Useful Support Strategies

Presented by
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Objectives

- Understand basics of infant gut health and the enteric nervous system
- Understand what normal intake and output patterns are
- Understand the physiological process of how allergens can pass from mother to baby
- Identify care plan ideas for infants coping with food sensitivities/allergies
- Describe how sensory and anatomical issues impact digestion
- Identify some useful care strategies for gut health related issues
- Identify "red flags" and when to refer

What is gut health?

The term 'gut health' is becoming increasingly popular. Gut health is understood in various ways by different cultures and healing modalities.
Per Stephan Bischoff's 2011 definition some aspects covered by the term include:

- Effective digestion and absorption
- Absence of GI illness
- Normal and stable intestinal microbiota
- Effective immune status
- State of well-being

Signs of a healthy vs. unhealthy infant gut

Healthy Gut	Unhealthy Gut
Stooling= Regular, easy, normal stooling	Stooling =Infrequent, strained, mucous/undigested food, gassy
Less prone to illness/inflammation, dermatological issues, etc	Rashes, eczema, yeast, frequently congested
Quality sleep, easy to fall/stay asleep	Restless sleep, wakes frequently/in pain
Calm, settled, no major gas/spit up issues	Frequent spit up, reflux, colic, fussiness, excessive crying
Nutrients absorbed, good weight gain	Malabsorption, poor weight gain, nutrient deficiencies, anemia, etc

What does a gut need to be healthy?

- To develop properly in the early stages of embryonic growth
- A healthy maternal gut since:
  - Baby's flora is primarily from their mother (prenatally and beyond)
  - Infants have a naturally 'leaky gut' due to immature epithelial mucosa; if mom has a 'leaky gut' she'll pass through bothersome proteins to an already susceptible baby.
- Adequate, small/frequent meals of human milk.
- A copious and balanced amount of beneficial bacteria, healthy motility and neuroimpulses
- Structural balance and lack of impingements

If the infant's gut does not develop properly or get what it expects we can expect health concerns to arise. We must cultivate awareness and holistic treatment strategies to help infants dealing with less-than-ideal gut health.

Development of the infant GI tract

- The young embryo's digestive tract (mouth to anus) begins to develop out of the ectoderm, mesoderm and endoderm layers of cells and is initially closed at both ends.

- By the 8th week in embryonic development the digestive tract tube is formed and is open from mouth to anus.

- Soon after, glandular organs (salivary glands, liver, gall bladder, pancreas) begin to bud out from the tube. Swallowing of amniotic fluid begins around week 10.

- During the early stages of midline formation and gut development, faulty gene expression and issues can occur resulting in clefts, fistulas, tongue/lip tie, atresia/stenosis, etc

Our second brain: The enteric nervous system

•The enteric nervous system (ENS) consists of millions of neurons embedded in the GI system's lining. (Sasselli, V., et al., 2012)
•The sensory neurons in the ENS help control peristalsis and the release of enzymes.
•The ENS usually receives input and help from the central nervous system (CNS) but it can function independently (even if vagus nerve is severed).
• The ENS develops in utero and is sensitive to maternal meds (antidepressants) nutritional status and gene expression. (Bates, M., 2002; Mi, k., Li, J., 2002; Nijenhuis, C., et al., 2012; Newgreen, D. & Young, H., 2002)
•The endocrine system works with the ENS. Over 90% of the body's serotonin and 50 % of its dopamine is found in the gut. (Pasricha, J., 2011; Furness, J., 2012; Waller, P., 2010)
•The ENS and related gastric motility can be impacted by nutritional factors and the quality of one's diet. (Baudry, C., et al., 2012) (field of nutrigenomics/nutrogenetics has some cool work!)

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The role of breastmilk in gut health

•Breastmilk promotes the growth of biofilms which coat and protect the gut (Zhang, A., et al., 2012)

•Breastmilk contains oligosaccharides which act as prebiotics, food for beneficial bacteria. (Boehm, G., 2003, 2005, 2008).

• Breastmilk contains secretory IgA which helps develop the gut mucosa, immune system and prevents bacteria passing through the epithelium. (Wold, A., & Adlerberth, I., 2000)

•Breastmilk contains various beneficial bacteria (Matin, V., et al., 2012)

•Exclusive breastfeeding helps protect infants against foreign dietary antigens that their gut is not ready for. (Oddy, W., 2002)

•Breastmilk contains numerous anti-inflammatory and neurotrophic (ENS) properties. (Wold, A., & Adlerberth, I., 2000; Fichter, M., et al., 2011)

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Gut Health Updates

Researchers have been discovering more and more about gut health in recent years. Here are just a few of their finds:

•The infant's gut health is NOT sterile at birth, depends on maternal gut health/flora prenatally, during birth and through breastfeeding (Jimenez, E., et al., 2008; Sanz, Y., 2011; Moore, et al., 2011; Buddington, R., et al., 2010; Rautava, S., et al., 2002, Kim, J., et al., 2010)

•Gut microbiota (bacteria, viruses, etc) interact dynamically and are impacted by many internal/external forces (diet, meds, genetics, etc). (Clemente, J., et a;, 2012; Rupa, P. & Mine, Y., 2012).

•Gut health plays a huge role in regulating inflammatory responses which are responsible for **many** health issues like metabolic issues, autism, IBS, eczema, asthma, allergies, autoimmune issues, cardiovascular issues, mood disorders and more. (Rupa, P. & Mine, Y., 2012; Zimmermann, K, et al., 2012; Grenham, S., et al., 2011; Backhed, F., 2010; Round, J. & Mazmanian, S., 2009)

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So why all these babies with digestive issues?

- Environmental toxins/chemicals may be causing subtle epigenetic changes that can predispose us to heightened inflammatory responses
- The standard western diet and overuse of certain medications has also compromised our gut flora and how are bodies handle toxins
- Generations may have passed on compromised gut flora
- Birth and feeding modes have dramatically shifted also compromising flora
- Don't blame moms…blame how we treat the environment and our health in general

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Basics of Infant Gut Health

How do you know if you are working with a baby dealing with gut health concerns?
Let's explore what is normal and what is not in regards to the following issues:

•Intake patterns
•Stooling patterns
•Impact of structure, feedings, sensory input
•Colic and reflux
•Food allergies and sensitivities

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Intake-what is normal?

A basic understanding of what is normal in regards to infant intake and growth is because an infant that is fussy because they are hungry (or over-full) is a different that an infant that is fussy for other reasons.

- The fetus drinks appox 10ml portions of amniotic fluid, newborn stomach capacity appox 10-15ml at birth and appox frequency of stomach emptying is every 60 min. (Bergman, N., 2011)
- Small, frequent feeds are the norm. The gut can be unhealthily stretched over time. Research shows that gastric relaxation and increased capacity begin to occur around day 3PP. (Zangen, S., et al., 2001)
- Beginning life with inappropriately sized and spaced feeds could set us up for a lifetime of gut health and appetite regulation issues

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Intake-what is normal?

According to infant stomach capacity/emptying and caloric needs, approximate ON DEMAND* intake is:

1st 24 hr: 2-10 ml per feed
Day 1-2: 5-15 ml per feed
Day 2-3: 15-30 ml/per feed
Day 3-4: 30-60ml/per feed
Week 1: 40-75 ml/per feed
Week 2: 60-80 ml/feed
Week 3: 75-90ml/feed
Week 4:75-120ml/per feed
Month 1 and on: remains steady at 24-32 oz/day (792ml-1056ml/day) avg 75-120ml/feed

*note- "on demand" for most babies equals appox 8-12++ feeds per day but frequency can greatly vary. Also varies by weight of baby.

Question the feeding practices of the baby getting 8oz bottles of anything!

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- **Diaper Duty -The Scoop on Poop**
  - Infants (and ALL people) should stool everyday
  - When does stooling begin? Some studies show 20-30% of healthy fetuses pass mec in utero, usually thought to be triggered by gut maturation and/or stress/infection but could this early motility be normal for some???
  - Motility and neuroregulatory patterns needed for gastric emptying are well developed by 30 weeks PMA. (Hassan,B., 2002)
  - The number of daily stools may plateau or decrease a bit overtime BUT for excl Bf babies, not stooling everyday is a sign of something going on.
  - Just because something is common does not been it is normal. The idea that babies "used up all the energy" or that "breastmilk is digested so well" there's nothing to excrete is not really based in science.

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Infant Stooling Frequency

Every day/every meal stooling for infants (and grown- ups) is the norm in most cultures where a traditional diet is eaten. Studies on the frequency of stooling in traditional societies may be a better reflection of normalcy than studies done within a population (most Western countries) where compromised gut health is sadly the norm.

- A 2009 Nigerian study showed that, amongst healthy, breastfed newborns: 31% stools at least 1x/day, 42% 2x/day and 24% 3+x/day. "Nearly all normal infants being breastfed should defecate at least once daily".
- A 1995 Thai study showed that: Health children had bowels movements at least 1x/day with an avg of 3.3 stools/day as newborns, declining to 1+x/day for 48-72 mos old. "In comparison with Western children, it seems that Thai children pass larger, softer, and more frequent stools. That difference in the bowel habits between the two ethnic groups may reflect the difference in the amount of natural fiber in their diets."

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Poop detective work!

- **Scant/delayed stooling**
  - Causes: not enough food, inflammation, poor motility
  - Fixes: Feed the baby, identify inflammatory triggers (maternal/infant diet? Gut flora?), liplement gut healing ideas (notes later)
- **Excessively mucousy stool**
  - Causes: Irritation, inflammation, proctocolitis, sometimes a virus or teething
  - Fixes: Identify source of irritation/inflammation
- **Specks of blood in the stool**
  - Causes: Irritation (usually food protein (s)
  - Fixes: Have PCP rule out any serious issues. 'hypoallergenic' formula is NOT the first step.) Examine maternal/infant diet, eliminate suspected triggers, etc
- **Green stool**
  - Causes: (first define green/appearance): Food sensitivity, rapid elimination, irritation, virus, teething, occasionally foremilk/hindmilk imbalance
  - Fixes: Be a good detective, identify issue, remove suspected irritants, adjust flow IF warranted
- **Pasty white, grey stool**
  - Causes: Lack of bilirubin excretion, possible a bile obstruction
  - Fixes: Seek help asap
- **No stooling….ever….**
- Causes: impaired innervation (Hirschsprung's), anal stenosis/atresia, etc
  - Fixes: Seek medical attention asap

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A pooping baby is a happy baby!

- **Colic-**The medical definition of colic is a condition of a healthy baby in which it shows periods of intense, unexplained fussing/crying lasting more than 3 hours a day, more than 3 days a week for more than 3 weeks. Although any periods of unexplainable crying are often labeled colic.
- A 2008 Tunc, et al. study looked at infant stooling frequency in relation to colic….guess what (big shocker)…babies with colic stooled less than 'happier' babies.
  - Results: 1st month of life median defecation = all babies 6x/day
  - 2nd month of life= 39.3% passed less than 1 stool/day, 60.7% = 1+x/day
  - 2nd month – 24 months = Stooling pattern that emerged in 2 mos of life remained steady!
  - Notes: intro of solids slightly changed stooling frequency, exclusively Bf babies stooled more frequently
  - STUDY CONCLUSION: Babies with colic symptoms in the first 2 mos of life had less frequent bowel movements in the first 2 years of life. The 2nd mos of life was a unique point where stooling patterns dramatically shifted in babies.
  - Take home message: Watch for shifts in babies' patterns, especially 2nd month, can also be predictive of issues the first 2 yrs…

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Why is the baby miserable? Common causes of digestive upset

- **Food allergies/sensitivities** – Infant and/or maternal gut health issues, IgG/IgE, etc sensitivities, gut flora imbalances
- **Anatomical and Health Issues** – Birth trauma, nerve impingements, midline defects, ankyloglossia, immature esophageal sphincters/reflux , malabsorption, congenital issues, poor gut motility, metabolic/endocrine issues, sensory integration issues, poor ANS regulation etc
- **Feeding Issues** – Flow rate, OAMER, positioning, latch, areophagia, too much/too little milk

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Impact on digestion: food allergies

- Researchers worldwide are noticing that food allergies are becoming increasingly common to the point of being called an epidemic

(Institute for Quality and Efficiency in Health Care [IQEHC], 2008; Prescott & Allen, 2011).

- Both allopathic and holistic practitioners alike view the causes of this epidemic to be our changing environment, changes in diet and predominant gut flora and radical shifts in epigenetics (changes in gene expression/function, not in DNA sequence).
- Food allergy is a substantial and evolving public health issue…. IgE-mediated food allergy now affects up to 10% of infants…. (Prescott & Allen, 2011).

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Allergy pathophysiology & manifestation

- The pathophysiology of GI related food allergy reactions is complex. There are variables in the sensitization process and how allergies manifest.
- The GI tract is the body's largest immunologic organ. It views ingested bacteria and foods as foreign. A normal response to these antigens would be the development of immune tolerance.
- Failure to develop immune tolerance can lead to the development of food allergy. Your body treats the offending allergen as a foreign invader and mounts an 'attack' in the form of an inflammatory response.
- The unique pathologic immune response that occurs characterizes the different allergic conditions.

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Is it an allergy or an intolerance?

Most common reactions	Body's response and Info
IgE (commonly considered an allergy) •IgE antibodies bind to antigen, signal mast cells to release histamine	•Immediate reaction (minutes to hours) •Immediate gastrointestinal hypersensitivity (vomiting, severe cramping, etc) •Oral allergy syndrome, skin reactions/hives, GI upset, airway /systemic inflammation, potential anaphylaxis
IgG and IgA (commonly considered an intolerance/sensitivity) •IgG antibodies bind directly to antigen as it enters bloodstream (no mast cells involved), creates immune response	•Delayed reaction (hours to days) •GI upset, fatigue, irritability, behavior/mood changes, headaches/congestion, skin issues (eczema), etc
Autoimmune • self-antigens drive the immune response, T Cell mediated destruction of specific cells	•Various symptoms and degrees of gut damage, ex: celiac (gluten, gliadin, etc) •Often genetic

Immune Mediated Gastrointestinal Disorders

Immune Response	Potential Reaction
IgE-mediated	Immediate gastrointestinal hypersensitivity Oral allergy syndrome
Occasionally IgE-mediated, sometimes considered non-IgE mediated	Eosinophilic Gastroenteritis Eosinophilic Esophagitis Eosinophilic Gastritis (increased inflammatory response, usually to a food, resulting in increased eosiniphils blood and GI system, may require steroids)
Non-IgE mediated (cell mediated)	Allergic Proctocolitis (inflammation of the lower part of the intestines) Dietary (Food) Protein-Induced Enteropathy Dietary (Food) Protein-Induced Enterocolitis Syndrome (FPIES) MSPI (milk soy protein intolerance)
Autoimmune	Celiac disease

http://infantproctocolitis.org/physicians/allergic-proctocolitis/

Allergies will be easy to recognize, right?

- If baby had allergies, it would have been identified already right?? NOT NECESSARILY!
- Non-IgE reactions often go unnoticed since they are not immediate and are often misunderstood. Many non-IgE reactions are gastrointestinal and delayed. (Iyonuchi, 2008)
- IgE reaction are usually more recognized because they are more acute but 50% of children affected by food allergies in the first 2 years of life have non-IgE-mediated reactions (National Institute for Health and Clinical Excellence [NIHCE], 2011, p. 15).
- It can take some time for baby to become sensitized enough to show outward signs of reactions
- Common non-IgE symtpoms are often viewed as 'normal' by some (ex: eczema, green poop, excessive spit up, colic, etc).

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Notes about non-IgE mediated food allergies…

- There is a lack of easily accessible testing making diagnosis difficult
- The gut mucosal barrier has a tough job…it has to digest and absorb nutrients without provoking immune responses while allowing healthy flora to flourish but defending against pathogenic microbes
- The first few years of life are the most critical for the gut as there is a tremendous expansion of gut associated lymphoid tissue (GALT). IgE and non-IgE mediated food allergy (FA) is frequently seen during this period
- The most common allergens are cow's milk and soy proteins. Just one more reason to promote breastmilk, especially in allergy prone families

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Food Allergy Development Factors in the Breastfed Baby

For breastfed infants, how do allergies develop anyhow?

- Maternal factors: gut health, flora and digestion
- Mode of delivery and feeding
- Genetic/Epigentic factors
- Neonatal gut development and enteric nervous system health
- Vitamin D levels

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Why moms' gut health matters...

- While it has been long thought that infants are born with a sterile gut, this myth has recently been debunked. We now understand that maternal gut flora pre-conception, during pregnancy and postnatally, all impact colonization of the infant's gut. (Hunzelon, 2012; Martin et al., 2012; Rautava, Kainonen, Salminen, & Isolauri, 2012).
- Maternal diet, existing gut flora, vit D levels, medication usage and other internal/external factors can impact the development of the infant's enteric nervous system and future gut health (Buddington, Williams, Kostek, Buddington, & Kullen, 2010; Clemente, Ursell, Parfrey, & Knight, 2012; Fichter et al., 2011; Jimenez & al., 2008).
- Breastmilk is made from maternal blood. When a mother has more digestive issues and 'leaky gut' gap junctions, more bothersome food proteins can pass into the bloodstream and into her milk

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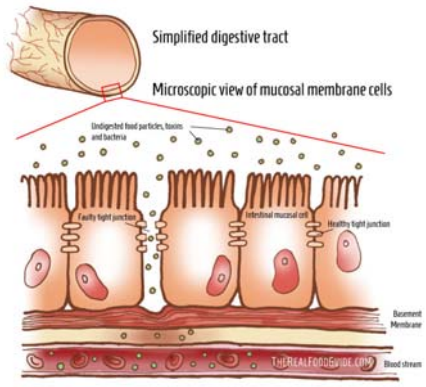

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It starts with sensitization...

- Sensitization is what causes food reactions in the breastfed baby. Sensitization to food allergens can occur in utero and beyond.
- Because sensitization can occur very early in life, measures already need to be taken by the mother during pregnancy and lactation, as well as for the newborn" (Lopez-Exposito et al., 2011,; ABM, 2011).
- Foods consumed by the mother can pass undigested proteins to the fetus through the placenta or to the infant through breastmilk. If the proteins are viewed as 'foreign invaders', the infant's immune system may mount an inflammatory response resulting in the infant becoming sensitized to the proteins in question. (Jarvinen, Makinen-Kiljunen, & Suomalainen, 1999; Suomalainen, 1992).
- Factors contributing to the sensitization process: maternal diet during pregnancy/lactation, exposure to smoke and/or alcohol pre-/postnatally, maternal consumption of antacid medications in pregnancy, antibiotic therapy, environmental triggers, early introduction of solid foods, being formula fed, mode of birth, epigenetic influences and maternal gut flora pre/postnatally.(Lucarelli et al., 2011; Pali-Scholl, Renz, & Jensen-Jarolim, 2009; Rautava et al., 2012; Sanz, 2011).

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Genetics and epigentics

- Food allergies have a genetic component. When one or both parents have allergies, 7 out of 10 children may develop food allergies as well (IQEHC, 2008).
- Epigenetic influences can increase risk of allergies. Influence of environmental factors (chemicals, endocrine disruptors, heavy metals, radiation, etc) may cause changes in gene expression (ex: histone structure, methylation pathways, cytokine expression ,etc).
- "Epigenetics has recently been considered as a potential mechanism involved in the development of…allergic diseases. …atopic dermatitis and food allergy are influenced by epigenetics. In fact, the exposure to environmental factors during early childhood may induce a long-lasting altered genetic state…"(Tezza et al., 2013)

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Probiotics along with prenatals please!

"The microbiota inhabiting the intestinal tract develop an array of physiologic roles within the human body, which influences both metabolic and immune functions, particularly during early neonatal life and possibly even in utero"

Transmission of bacteria from the mother to the neonate through direct contact with maternal microbiota during birth and through breast milk during lactation also seems to influence the infant's gut colonization, with potential health consequences….the use of probiotics during the perinatal and early postnatal period has been proposed as a possible dietary strategy to reduce risk of disease."
(2012,VELASQUEZ-MANOFF)

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Signs of Food Allergies/Sensitivities in Breastfed Infants

When infants are exhibiting any of these signs and symptoms, it is important that parents work with their providers to rule out food reactions.

- Rashes (hives, eczema, peri-anal redness, etc)
- Gastrointestinal issues (pain during/after nursing, bloody stool, reflux, vomiting, etc)
- Infantile colic, prolonged fussiness and discomfort
- Breast aversion/refusal
- Sleep disturbances (very frequent waking, often due to GI discomfort/reflux)
- Poor growth, nutrient malabsorption
- Wheezing/respiratory Distress
- Anaphylaxis

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Some Facial features of allergic disease

Author: V. Dimov, M.D., Allergist/Immunologist and AssistantProfessor at University of Chicago http://allergycases.blogspot.com/2012/02/facial-features-of-allergic-disease.html

Allergic shiners: Dark circles under the eyes are due to swelling and discoloration from congestion of small blood vessels beneath the skin in this area….

Dennie-Morgan lines: Young children with nasal allergies or atopic dermatitis have characteristic Dennie-Morgan lines. These are crease-like wrinkles that form under the lower eyelid folds (double skin folds).

Mouth breathing: Nasal congestion can result in chronic mouth breathing, associated with the development of a high, arched palate, an elevated upper lip, and an overbite.

Wheals: Small, red, raised 'bumps' that are indicative of allergic reaction.

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Conventional testing methods

- For suspected **IgE allergies,** some test options include:
  - **SPT: Skin prick test** -should only be carried out in a facility prepared to deal with an anaphylactic reaction, some mixed evidence about test validity under age 2, wheal size will be smaller recommended by The International Gasterointestinal Eosinophil Research Symposyium
  - **Patch test:** Can help identify delayed reactions in some children
  - **Blood tests:** measures specific allergen-related antibodies in blood, considered more sensitive that SPT
    - One example is ELISA: Enzyme-linked immunosorbent assay,
  - **Elimination diet test** – suspected food is avoided by mother/baby for a certain time frame to see if reactions disappear

(Devenney & Falth-Magnusson, 2000; Hill et al., 2004; Campbell et al., 1997)

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Skin prick test

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Skin test reactivity in infancy

- J Allergy Clin Immunol. 1985 Jun;75(6):646-51.
- Ménardo JL, Bousquet J, Rodière M, Astruc J, Michel FB.
- **Abstract**
- Skin tests represent a major tool in the diagnosis of allergy; however, their interpretation does not appear to be without difficulty in children under the age of 3 yr.
- Six infants were allergic and presented positive prick tests to either food or inhalant allergens. These tests were confirmed by serum specific IgE and a suggestive clinical history. The size of the allergen-induced prick test wheal ranged from 2 to 5 mm in diameter, suggesting that prick test wheals may be smaller in infants.
- This study confirms that prick tests can be performed and interpreted without difficulty in infants, keeping in mind the small wheal size induced by both positive control solutions and allergen-induced prick tests

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Combined skin prick and patch testing enhances identification of food allergy in infants with atopic dermatitis.

- J Allergy Clin Immunol. 1996 Jan;97(1 Pt 1):9-15. Isolauri E[1], Turjanmaa K.
- **METHODS:**
- The usefulness of skin prick and patch tests as indicators of cow milk allergy was evaluated in 183 patients ranging in age from 2 to 36 months with double-blind, placebo-controlled (n = 118) or open (n = 65) cow milk challenges.
- **RESULTS:**
- The oral cow milk challenges were interpreted as positive in 54% of both challenge types. Positive challenge rapidly elicited pruritus, urticaria, and/or exanthema in 49% of cases and delayed-onset eczematous lesions in 51%. **The skin prick and patch tests gave markedly discrepant results; prick tests were positive in 67% of the cases with acute-onset reactions to milk challenge, whereas patch tests tended to be negative. Patch tests were positive in 89% of those with delayed-onset reactions, although prick tests were frequently negative.**
- **CONCLUSIONS:**
- The observations indicate that IgE and T cell-mediated responses to cow milk can be distinguished in atopic dermatitis. **Parallel skin testing with combined prick and patch tests can significantly enhance the accuracy in diagnosis of specific dietary allergies in patients with atopic dermatitis**.

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What about testing for non-IgE reactions?

- This is the tricky part…there are no definitive diagnostics
- Even the Academy of Breastfeeding Medicine (ABM) says the "additional laboratory studies may be considered but are often unnecessary"
- Lab tests can be frustrating because fecal smears don't always show detectable leukocytes, eosinophils, etc are often aren't reliable enough and total and antigen-specific serum IgE concentrations are similar to those of non-affected infants
- Only in severe cases, not responding to maternal dietary modification, should endoscopic be considered (ABM, 2011)

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Proctocolitis: Cow's Milk Protein

- Anveden-Hertzberg, L., 1996
- Researchers examined 9 exclusively breast-fed, full-term infants with proctocolitis and mild rectal bleeding
- The mean age at the onset of symptoms was 5 weeks (range 1-8 weeks).
- Rectal endoscopy and biopsy babies showed inflamed mucosal tissue, bleeding and intra-epithelial eosinophilic granulocytes
- Allergy to cow's milk protein transferred to the infants via the breast milk was believed to be the cause of the inflammation.
- The intake of cow's milk protein was then restricted in seven mothers. Following this regimen, symptoms were relieved within 4 weeks in the six infants who were seen at follow up. One child recovered spontaneously without dietary restrictions.
- Considering the beneficial effect of the diet regimen in addition to the histological findings, allergy to cow's milk protein is possibly the etiology of the proctocolitis seen in these nine exclusively breast-fed babies, although no challenge tests were performed to confirm this suspicion.
- CONCLUSION: This report shows that proctocolitis occurs in exclusively breast-fed infants. It is speculated that allergy to cow's milk protein may have played a role in the pathogenesis.

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Holistic testing methods

- Maternal food journal - helps track patterns of food consumption and infant's reactions
- Maternal elimination diet - Can eliminate suspected trigger or several main triggers (2+ wks) before re-introducing them and note infant's response. Make sure to balance nutrients. Most cases improve in 72-96 hr (ABM, 2011).
- For suspected IgG or delayed reactions, alternative testing methods can be considered (blood tests like ALCAT, energy tests like EAV (electroacupuncture according to Voll) or NAET (nabudripad's allergy elimination techniques), muscle testing, etc. These tests have little evidence supporting validity but they are often non-invasive and can give families some guidance. Consult with qualified holistic practitioners like a naturopathic physician to learn about your options.

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Managing Food Allergies and sensitivities in babies

"People are fed by the food industry, which pays no attention to health, and are treated by the health industry, which pays no attention to food."—

Wendell Berry

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Management of Food Allergies in the Breastfed Infant

Perinatal ideas for allergy avoidance

1. In cases of strong family Hx of allergy, evidence points to considering perinatal avoidance of those foods but newer evidence points to early exposure! (evidence is mixed…take it case by case???)
2. Have mothers consider using probiotics in pregnancy and beyond, aim for optimal maternal gut health. Mode of delivery and feeding matter too.

If allergies/intolerances are suspected in a baby:

1. Maternal elimination of suspected food(s) for minimum of 2-4 weeks before re-introducing the food is the first line of defense. If reaction is seen again, elimination for at least 6 mos may be needed
2. Make sure to balance nutrients in maternal diet after elimination. Provide meal/snack ideas.
3. Consider conventional and/or holistic allergy testing methods if elimination is not enough
4. Consider maternal use of a pancreatic enzyme
5. The top 8 allergens are: milk, eggs, fish, shellfish, nuts, peanuts, wheat, soy. These foods account for about 90% of all food allergies.

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What about solids ???

- Two camps of thought…individualized approach suggested
- Some emerging evidence suggests introducing highly allergenic foods when babies reach solids readiness (4-6++ mos) including dairy, eggs, nut products, fish, soy, wheat, etc
- Before starting highly allergenic foods it is advised that families consult their provider if there is a known allergy or a strong family Hx of allergy (American Academy of Allergy, Asthma & Immunology, 2015)
- Take it case by case, realize information regarding allergies in babies is continuing to evolve.
- As evidence emerges and understanding grows, hopefully the allergy epidemic will die down.

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Trial run of 'hypoallergenic' formu good idea??

- Taking an infant off breast milk in order to identify a food allergy is usually never the answer. It would only be appropriate in the most severe cases of allergic reaction causing an acute medical issue.
- Addressing the food reaction through maternal food elimination is preferred when the infant is not experiencing a medical emergency due to food reactions.
- There is no such thing as a 'hypoallergenic formula'. Some have more hydrolyzed proteins, are amino acid based, elemental, almost all have corn, etc. All have the potential for reaction and exacerbating allergies.
- Balance risk vs. benefit when considering their use. We must always view breastmilk as the control group and anything else as the experimental group!

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One more reason for Vitamin D to shine!

- Vitamin D deficiency increased the risk of sensitization to food allergens, especially to milk and wheat.
- Atopic dermatitis may be more severe in infants with vitamin D deficiency (Baek, et. al, 2014)
- Lactating mothers receiving 6400iu will provide their infants with enough vitamin D to have normal levels (even compared with infants receiving their own 400iu/day) (Wagner, 2015)
- For babies getting their own D dose, consider the single drop types to avoid unnecessary ingredients

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Impact on Digestion: Structure and Anatomy

- How we swallow impacts digestion.
- Oral restrictions and poor oral tone- (ex: tongue/lip tie) impact feeds, bolus control, allow for excess intake of air, reflux, etc
  - In our study on tongue tie, 45% reported reflux symptoms pre-Tx, with a statistically significant improvement 1 week and 1 mos post Tx (Ghaheri et al, 2016)
- Structural/neuromuscular issues – Can cause discomfort that impacts feeds, vagal nerve impingement, nervous system dysregulation, etc




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Impact on digestion: Sensory issues

- Infants in 'fight or flight' may not be able to easily 'rest and digest'. State regulation is vital for good digestion!
- Infant with sensory issues may need nervous system regulatory support to support improved digestion.
- When sensory issues or disorganized behavior present, compression (therapeutic swaddling, bodywork, babywearing, etc) is shown to help re-organize the CNS and soothe. (Ohgi, S., 2004)
- Sensory stimulation aids in the proper release of GI hormones (gastrin, cholecystokinin) non-nutritive sucking, tactile stimulation are vital to growth and GI function. (Uvnas-Moberg, K., et al., 1987).
- Reconsider tools (pacifier, swaddler, etc) in light of digestive issues…

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Impact on digestion: Reflux

- Reflux - Gastroesophageal reflux (GER) or the more severe Gastroesophageal reflux Disease (GERD) occurs when the contents of the stomach go back up into the esophagus.
- GERD can irritate/damage esophageal tissue, cause feeding aversions, inadequate weight gain, aspiration, etc.
- Babies that once had "colic" are now often considered to have reflux
- Most reflux Dx are solely based on clinical findings/observations/family narrative rather than invasive pH probes, etc
- Reflux meds can be a blessing and a curse. However, more judicious use is warranted since their use has risks too.

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Conventional Reflux Treatment Ideas

- **Medication-**Two types of acid suppressors are used in babies: histamine2-receptor antagonists (H2RAs: Zantac, Pepcid, etc) and proton pump inhibitors (PPIs: Prilosec, Prevacid, etc), rarely prokinetics (reglan, etc) are also used to enhance gastric motility (Vartabedian, 2007)
- Rx benefits: If stomach acid is causing esophageal damage, pain, causing feeding aversions, etc then babies may get some relief, gain/feed better
- Rx cons: These meds don't stop the spitting up, just quell the production of stomach acid. Their use can increase overgrowth of bad bacteria in gut,increase illnesses, ingredients may cause more irritation (lactose, sucrose, etc), and can lose effectiveness over time
- **Non-med ideas –** Thickening feeds (controversial), upright positioning during/after feeds, surgery in severe cases (fundoplication)

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Is suppressing stomach acid the answer?

1. The release of gastrin (secreted when food reaches the stomach) stimulates release of gastric juice (hydrochloric acid, pepsinogen, mucus, water, intrinsic factor, gastric lipase) and increases gut motility
2. Pepsinogen activates into pepsin by hydrochloric acid and begins protein digestion
3. Hydrochloric acid stimulates secretion of cholecystokinin (CCK) and secretin, both which aid in the release of bile (emulsifies fats), pancreatic juice (digests starch, proteins, fats).
4. CCK is also a neurotransmitter (receptors in immune system and spleen) that helps us feel satisfied and quiets the immune system (lessens chance of attack on new food invaders). (Waller, P., 2010)

Holistic Gut Healing Options

Just eliminating the triggers is not enough; healing the gut is vital! Please work with someone that specializes in holistic pediatric care.

- **Herbs** -slippery elm, digestive herbs (Chinese herbals, chamomile, fennel, licorice, ginger, peppermint, etc) Valussi, 2012.
- **Supplements** – Vit D, glutamine (support gut tight gap junction health, heals epithelial lining, EFAs, zinc (appetite stim, reduces inflammation, helps heal epithelial lining of the GI tract, reduces diarrhea and aids in digestion/precursor to lactatase production), etc (see bibliography)
- **Homeopathics**- chamomilla (screaming/flailing), colocynth (want abdominal pressure), dioscorea (don't want pressure, like stretching, gassy), jalapa (cry all night w/ pain, daytime better, sour stool), lycopodium (bloated, gassy, worse 4-8pm, hate abdominal pressure, constipated), nux vomica (worse after eating, troubled in AM, sensitive to maternal diet) (Neustaedter, R., 2010)
- **Probiotics** – prenatally and after for mom/baby, specific and allergen free if needed, must replace and re-colonize! (see bibliography)
- **Digestive enzymes** – Take by the mother to help break down foods, especially pancreatic enzymes (ABM, 2011)
- **Bodywork and Chinese Medicine** –unwind neuromuscular impingements, TCM-heal stomach/spleen energy, reduces vagal nerve compression

Babies having digestive pain are still in pain…

- Babies coping with digestive issues are often uncomfortable and in pain
  - "The inability to communicate verbally does not negate the possibility that an individual is experiencing pain…Pain is always subjective. Each individual learns the application of the word through experiences… in early life".

http://www.iasp-pain.org/Taxonomy#Pain

What are short term consequences of painful experiences in the neonatal period?

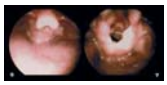
- The more painful episodes an infant is exposed to can amplify the consequences of pain in infants (Matthew & Matthew, 2003; Ranger& Graunau, 2014).
- Some short term consequences include:
  - Irritability
  - 'Fight or flight' response, autonomic nervous system dysregulation
  - Fear/mistrust in caregivers/impaired bonding
  - Sleep/wake cycle disturbance
  - Changes in BP/HR, metabolic changes
  - Reduced caloric intake
  - Increased gastric acidity
  - Poor healing, compromised immunological function

What are long term consequences of painful experiences in the neonatal period?

- "Emerging studies provide convincing clinical evidence for an adverse impact of neonatal pain/stress in infants at a time of physiological immaturity, rapidly developing brain microstructure and networks, as well as programming of the hypothalamic-pituitary-adrenal axis…" (Grunau, 2013).
- Long term consequences include:
  - Alterations in plasticity of developing pain pathways
  - Heightened present/future perception of pain
  - Persistent alteration of stress system programming (depressed/elevated cortisol levels, HPA axis alterations)
  - Metabolic changes that impact absorption of fat, protein, glucose
  - Lower pain thresholds, especially in regions of prior tissue trauma
  - Reduced brain size in frontal/parietal regions, reduced maturation of white matter and subcortical gray matter
  - Alteration in brain microstructure and functional connectivity
  - Neurodevelopmental alterations (cognitive, motor and behavioral), greater internalizing behaviors (depression/anxiety)

What can help soothe these babies in pain?

- Babies will have varying reactions to digestive discomfort. Some just want to nurse and sleep and don't seem terribly upset. Others seem to be quite irritable, upset and genuinely in pain sometimes even leading to feeding aversions. Here are some soothing techniques for babies that need it:
- Environmental interventions (light, sound, temp, etc)
- Nutritive/non nutritive suck
- Breastmilk
- Skin to skin contact
- Facilitated tucking, swaddling
- Massage, therapeutic touch
- Multisensory stimulation
- Music therapy



Not all fussing is a digestive issue

- Don't assume all fussiness issues are gut related! If basic management techniques aren't helping the situation refer as appropriate, look for "red flags"
- Respiratory, cardiac, endocrine/metabolic or other major health concerns may present as "fussy feedings". Lack of appropriate intake/growth, insufficient stooling, projectile spit up, excessive fussiness can be signs of a bigger issue.
- Visual and hearing impairments can cause fussy, disorganized behavior – newborn hearing screens, etc are vital
- Congenital issues, malabsorption issues, nutrient deficiencies, etc can show up as poor weight gain, fussy behavior, and be hard to Dx

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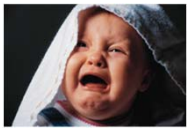
Case Study Time….



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Baby Max

- Baby max was born with achondroplasia (ACH, dwarfism), he was referred to me because feeding issues were suspected.
- Max was fussy with feeds, fussing getting worse
- Providers thought he may have tone issues or suck dysfunction secondary to ACH
- The parents have another ACH child who had no feeding issues early on so they are confused as to why Max may have issues
- Max has mostly been bottle feeding (1/2 EBM, ½ formula) since parents are worried that his fussing means he's not getting enough at breast.

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Baby Max

- Upon assessment, Max had no oral tone issues or suck dysfunction.
- He was able to latch to the breast and transfer actively and smoothly.
- Maternal milk supply had been down regulated and therefore he did need some supplementation
- Max was able to latch and transfer well so we decided to try supplementing at breast with a 5fr tube
- Once we added in the tube in he started to drink, he became increasingly fussy. We stopped the feed pulled out the tube and a little bit of formula dripped on Max's face.
- At once we knew why he had been so fussy during feedings, can you guess why???

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Here's why…..

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Baby Max conclusion

- Max had an intense, instant reaction where the formula touched his skin. He broke out in wheals/hives and became fussy
- Prior to trying the tube at breast he had mostly been bottle-fed so the family did not see a lot of spilled milk and therefore never saw a rash before.
- Max did not fuss with breastmilk and had no actual feeding issues. What he did have was a classic dairy allergy.
- The mystery of the fussy feedings were solved and we were able to integrate in a formula Max could tolerate while building moms milk supply to provide him with more breastmilk.
- When a child has a particular diagnosis or congenital issue, it can be easy to blame feeding challenges solely on that diagnosis and not look at the bigger picture. In Max's case, his dwarfism was not causing feeding issues but his allergies were! Remember to be good detective and not leave any stone unturned.

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Case Study #1: Fussy baby, sad mom

- M came to see me around 6 wk PP due to pain w/ Bf, M G3P2 (1st C – Hx reflux)
- B – mec asp, 2 d IV Abx
- B had a frenotomy at 2 wk PP, healed well, no major oral issues now
- Currently mostly bot feeding/pumping d/t pain
- 90% EBM, 10% dairy-based formula
- Copious voids/stools (some green, explosive)
- Spits-up frequently, fusses while eating, poor sleep cycles
- M overwhelmed, wants to Bf, (Ped suggests reflux Rx – mom wants to wait)
- M – Hx IBS like s/s on/off through life, feeling very gassy PP

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Case Study #1 Assessment

- We got mom/baby in a comfy position and did troubleshoot the Bf basics.
- After observing a feed it was clear baby has digestive distress (pulled on/off, wriggled, gas, etc), there were also some rough patches of skin (s/s pre-eczema) on face/body). Stool was green/mucousy.
- Some structural asymmetry noted
- Clear Dennie Morgan lines and 'allergic shiners' – M thought baby was just 'tired'
- The tugging on/off the nipple was not as much a latch issue as it was a clue to digestive issues. "I want to eat but I don't" behavior is classic.

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Case #1: Plan – 1st visit

- We discussed maternal diet and mother/baby gut health
- M decided to do a food log and start by eliminating dairy and changing formula type
- She added in fenugreek-free galactogoues in hopes of increasing supply and eliminating formula eventually.
- She added in dairy-free probiotics for M and B
- B begin to get CST Tx

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Case #1: Plan 2nd and 3rd visits

- With the added care strategies and galactogogues the mother was pain free and back to Bf full time
- Her food log revealed that she was doing a lot of eggs, nuts. She was still gassy herself. B was much better with dairy eliminated but still spit up/fussed on occasion.
- Next visit M had eliminated dairy, soy, eggs, nuts, gluten (we made sure to have nutrient dense meal ideas and replacement supplements). Also taking a digestive enzyme with meals.
- M reports B much happier, no spit up, better sleep, better skin. She'll begin to reintroduce some foods in a few weeks and also will explore holistic care for her own digestion.

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Case #2: MSPI (Milk Soy Protein Intolerance)

- M reports her 5mos old was Dx w/ MSPI (s/s blood in stool, anemic, eczema, poor wt gain, etc) and MD told M to stop Bf and use Neocate formula.
- M sought my help since she was a firm believer in Bf and did not want to wean.
- M was willing to change her diet and/or implement other care plan ideas as needed.
- As a team, here was our strategy…

Case #2: MSPI

- Maternal elimination of all sources (even trace) dairy and soy, replacement nutrients discussed
- Introduction of maternal and infant probiotics, plus M was interested in some pediatric herbs/supplements for gut healing, maternal digestive enzymes
- Plant based herbal iron drops for infant
- f/u iron level checks, fecal calprotectin test, etc done
- After 3 weeks of current routine, infant began to rapidly increase rate of growth, have normal iron levels, normal stool patterns, improved sleep and skin
- M continued to remain dairy/soy free for 1.5 years before baby weaned. B thrived, now can tolerate most dairy/soy as an older child.

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In Summary

- We are beginning to understand the complexities of how infant and maternal health are interwoven when it comes to digestive health
- Care providers can no longer casually think that taking a food-sensitive baby off the breast will do no harm.
- In almost all cases, continued breastfeeding coupled with maternal dietary antigen elimination and professional guidance, should be advised.
- Coping with a food-sensitive infant can be stressful for parents.
- It's not 'someone else's job'…it's OUR job!
- Healthcare providers must strive to keep up to date with their understanding of assessment and treatment of food allergies/sensitivities in the breastfed infant; the well-being of mothers, babies and our future generations depend on it.

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Thank you!

For questions or bibliography request, contact Melissa Cole: melissa@lunalactation.com
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