GUT BACTERIA AND PEDIATRICS

- Is it possible to improve the outcome for baby with interventions for mother and baby?
- Possibly – the research is starting to paint a picture
- The key is to improve the health of the mother during pregnancy and during breast feeding and providing the best start for baby – no matter the circumstances of

In A Perfect World

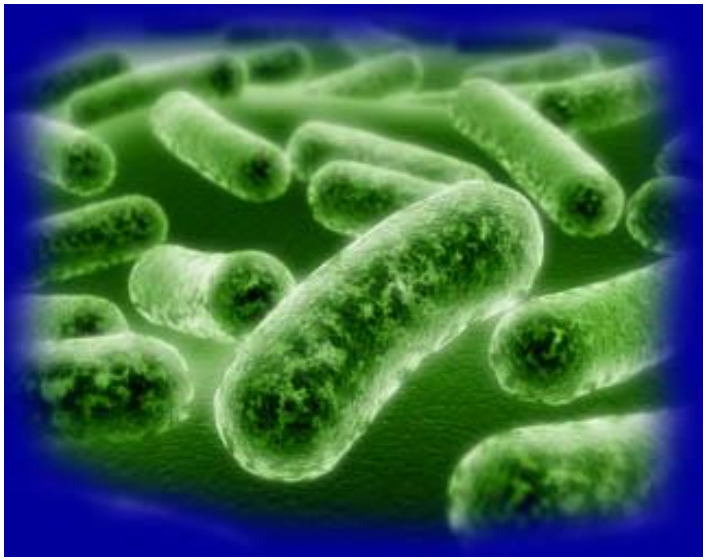
- We would work with women six months before conception
- We would correct the gut dysbiosis, detox them, have them eat a healthy diet to prepare them for pregnancy
- We would then give them a healthy protocol with a focus on gut health and a follow-up protocol for after the baby is born for both mother and baby
- Unfortunately, this is just not the way we tend to get them.

What We Need To Know

- The newborn infant is sterile (from a microbe perspective) – the newborn is the perfect microbial habitat – food, warmth, moisture.
- The good bacteria that the baby needs is received from the environment both as and after the baby is born into the world

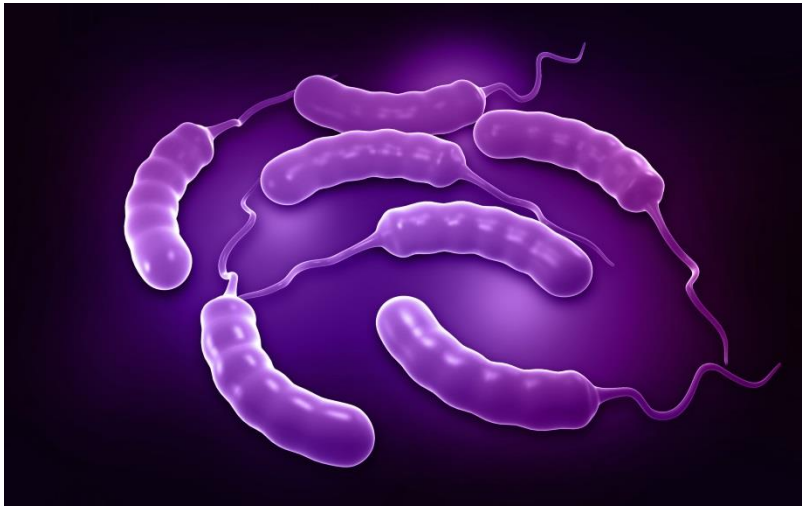
First Exposure

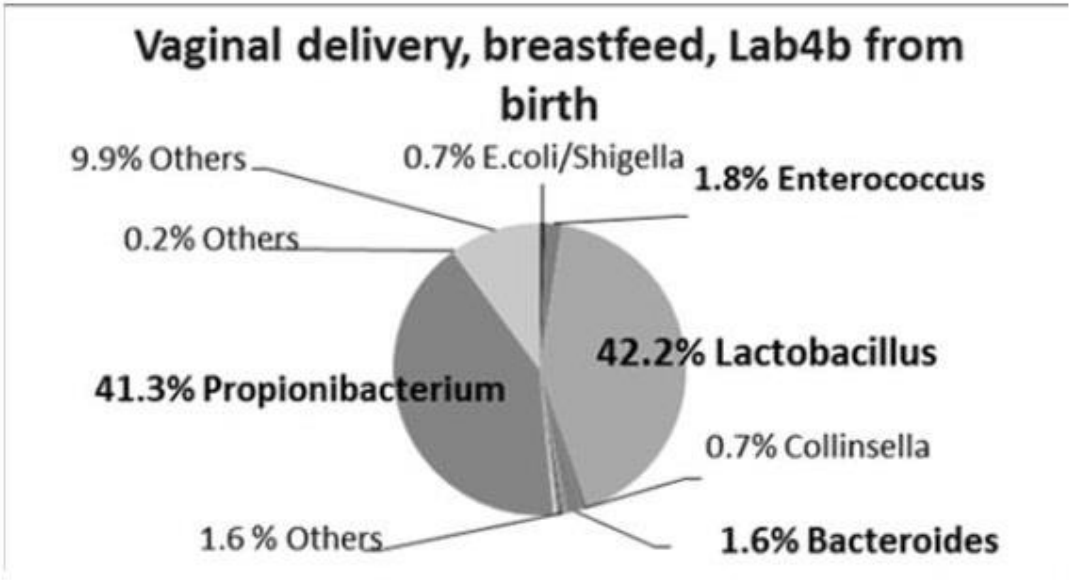
- Vaginal Birth: First exposure is skin, vaginal canal, and rectal micro flora from the mother
- Strains: Mainly Lactobacilli (mainly acidophilus types), streptococci non haemolytic, Enterobacteria: various types including E coli.
- Minor Colonisors : Bifidobacteria, bacteroides, clostridia

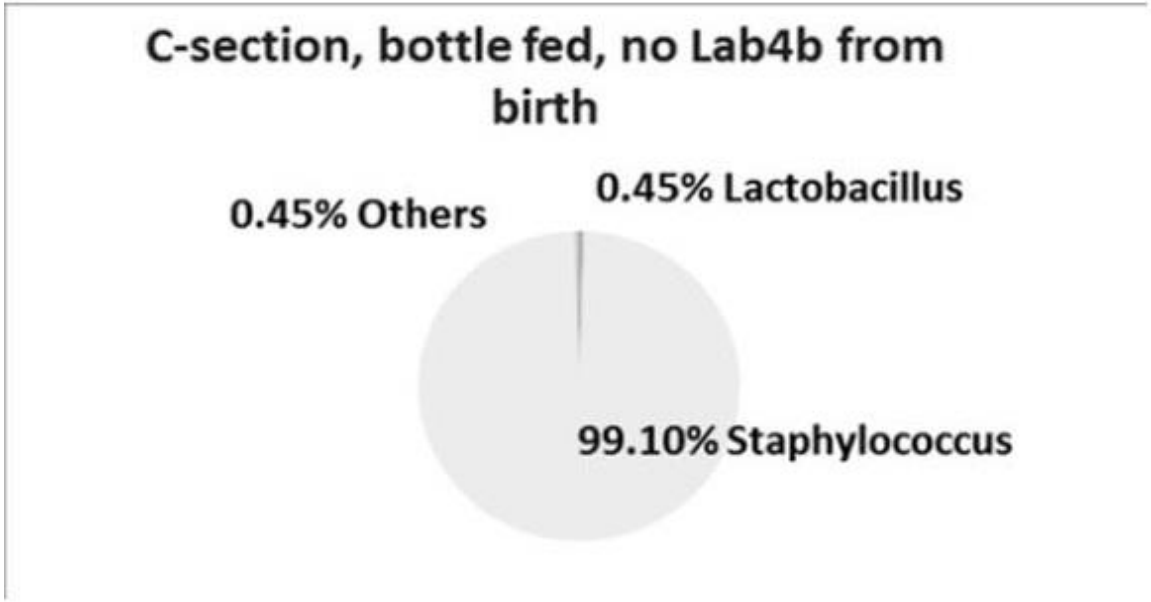


First Exposure

- C-section: First exposure is from skin and hospital environment
- First Strains: Staphylococci (aureus) (MRSA) Enterococci, enterobacteria. Minor Colonisors : Lactobascilli
- Minor Colonisors : Bifidobacteria, bacteroides, clostridia.




Vaginal delivery, breastfeed, Lab4b from birth
9.9% Others
0.7% E.coli/Shigella
1.8% Enterococcus
0.2% Others
42.2% Lactobacillus
41.3% Propionibacterium
0.7% Collinsella
1.6 % Others
1.6% Bacteroides


C-section, bottle fed, no Lab4b from birth
0.45% Lactobacillus
0.45% Others
99.10% Staphylococcus

Breast Milk

- Until recently, breast milk was thought to be contaminated from skin, nipple ducts –
- Now it is known that small number of good bacteria is collected by dendritic cells and macrophages from small intestines
- It is transferred to the breast tissue, via the lymph system

Breast Milk

- Numbers are low – 10,000 – 1 million CFU per 100 ml breast milk but significant given the timing and the sterile condition of the baby
- This starts during the third trimester and stops when breast tissue returns to normal after breast-feeding stops. Proves baby get mother intestinal flora through breast milk
- Gut microflora growth and diversity continues in infants until the age of two - this will represent the nature of the residential bacteria the a baby will have for life.
- Newborns need – need 570-900 ml breast milk per day (19- 30 oz)

Building Gut Bacteria

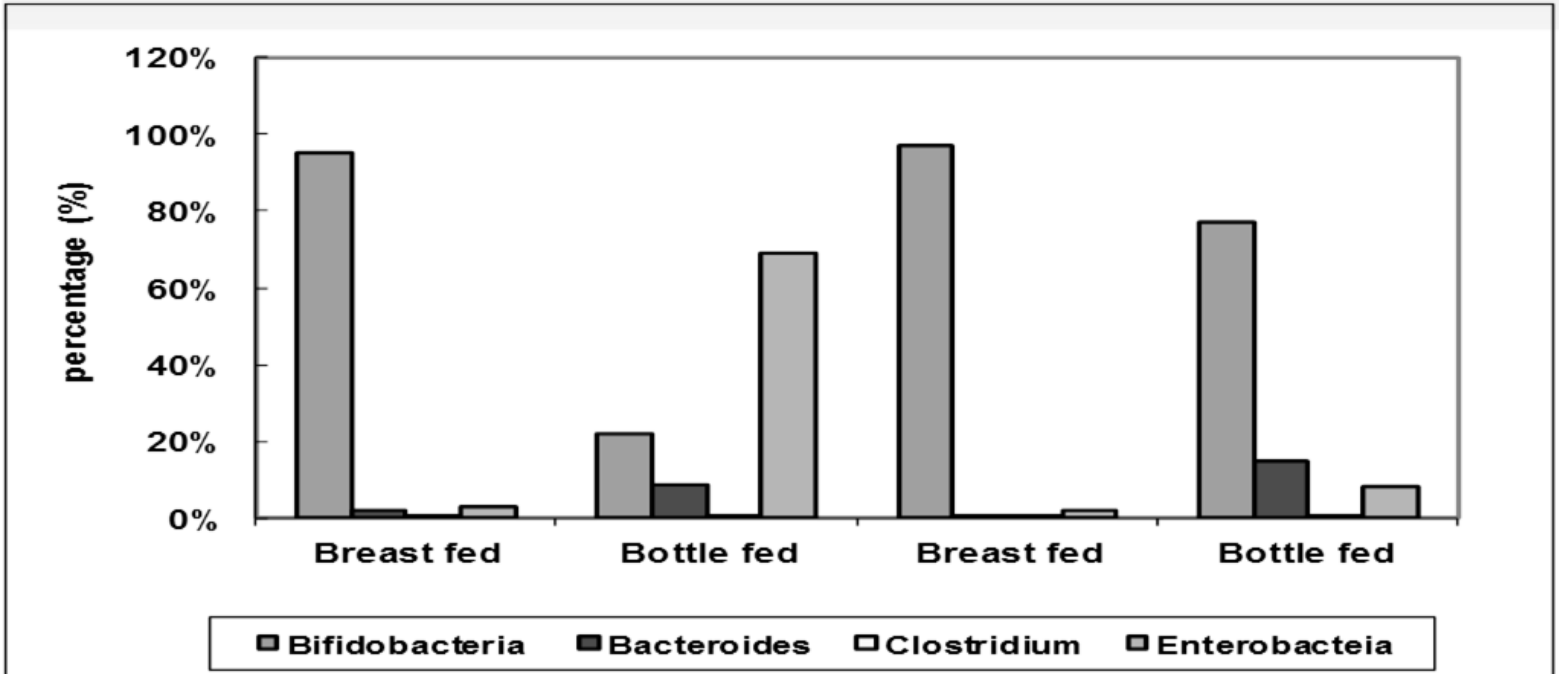
A 1 Week

- Bacteria in breast fed is 95% bifidobacteria and 3% enterobacteria whereas the
- Bacteria in bottle fed only has 22% bifidobacteria and 69% enterobacteria

At 19 weeks,

- The breast fed baby is still at 95%
- Bottle fed is 77% bifidobacteria with enterobacteira at 2% and 8 % respectively

	Microbiota at 1 week		Microbiota at 19 weeks	
	Breast fed	Formula fed	Breast fed	Formula fed
	(log cfu/g)		(log cfu/g)	
Bifidobacteria	9.0 (95%)	7.8 (22%)	9.8 (>95%)	9.7 (77%)
Bacteroides	7.3 (2%)	7.4 (8.7%)	7.5 (0.5%)	9.0 (15%)
Clostridium	3.5 (<1%)	5.1 (<1%)	4.9 (<1%)	6.6 (<1%)
Enterobacteria	7.5 (3%)	8.3 (69%)	8.1 (2%)	8.7 (8%)

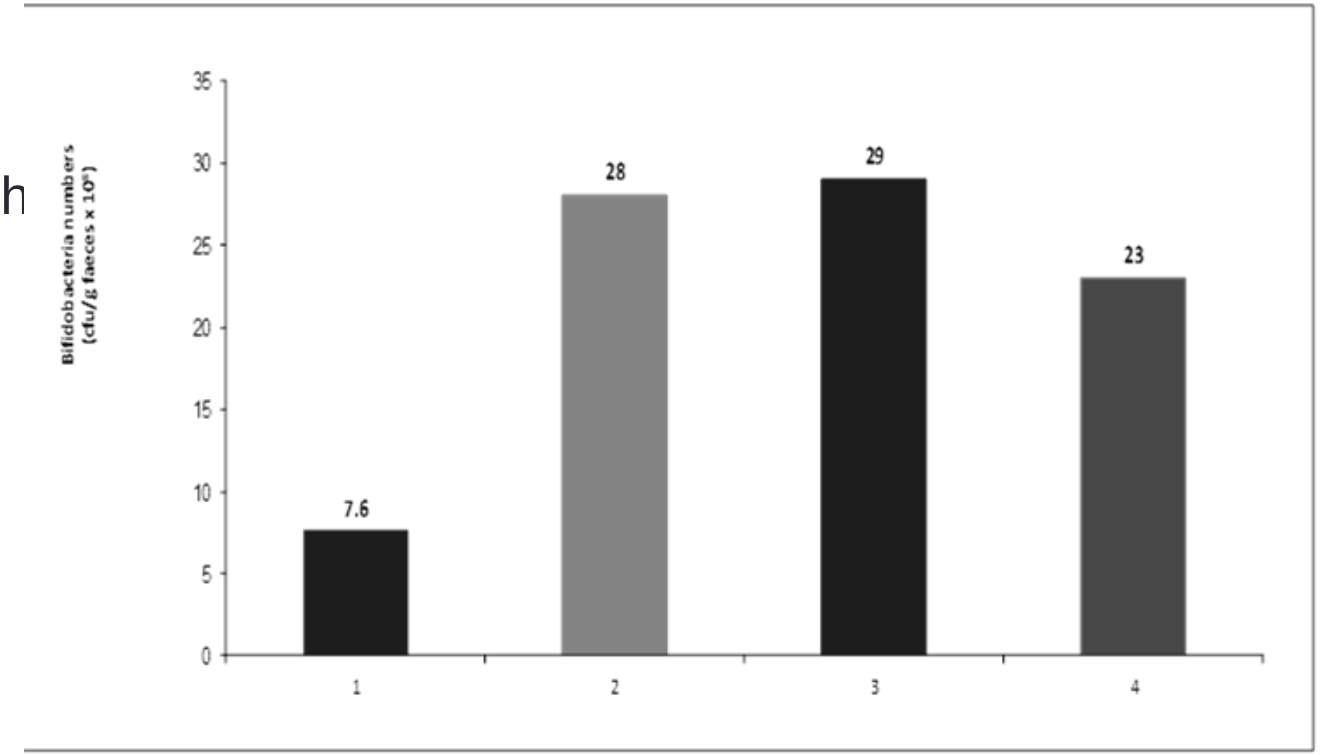


Prebiotics

- Breast milk contains prebiotics mainly galactose oligosaccharides (GOS) which causes the increase production of bifidobacteria at 1 week.
- Study: One group: Adding prebiotics to formula 900 mg GOS 100 mg FOS)
- Another group fed bidifobacteria to mother 2 weeks before birth and feeding baby bifidobacteria for 2 months after birth
- Plus one bottle fed only group and one breast feed group

Study

1. Bottlefed
2. Breastmilk fed
3. Formula fed with GOS/FOS
4. Formula Fed with Probiotics (B. Lactis) given to mother 2 weeks before delivery and 2 months after delivery



Allergy in Children

- Delay in the compositional development of and in the amount gut microflora was a general finding in allergic children
- Alterations in intestinal microflora have been detected both in infants suffering from allergies and in those later developing the disorder.
- Good bacteria can induce the production of IL-10 and transforming growth factor-beta, which possess an important regulative role in the development of allergic type immune response
- Probiotics also strengthen gut defence barrier mechanisms and reduce antigen load in the gut.

Study #1

- In one study, 215 infants aged 6-12 months were divided into two groups:

- 1) Received *L. fermentum* plus GOS supplemented formula milk and
- 2) Received GOS only supplemented formula milk
- Infants in group 1:
- 46% reduction in the incidence rate of GI infections
- 27% reduction in the incidence rate of URTI
- 30% reduction in total number of infections at the end of study period compared to infants in the group 2

Study #2

- 1223 pregnant women received 4 probiotic strains or a placebo starting at the 36th week of pregnancy
- The baby receive probiotics and prebiotics for six months.
- The results showed no significant difference in allergies – however the symbiotic group had less eczema and less 1gE related conditions.
- However, there was a significance difference in the development of allergy in the placebo vs symbiotic group that were delivered by Cesarean

Study #3

- In an another study of infants 6-12 months all with eczema and a suspicion of cow milk allergy – three groups – one received L.Rhamnosus GG, one group received 4 bacteria mixture and the third a placebo.
- Significant reduction in eczema with the greatest reduction in the L.Rhamnosis GG group especially in those infants who had not been on antibiotics during the study period

Allergy Studies

- Although 9 studies have been published on the potential of probiotics to prevent allergic diseases in childhood (Table 2), only one, Kalliomaki's study, was fully successful, while four studies reported no significant effect.
- The issue is that the studies generally have short term interventions
- The goal is to craft a protocol that serves long term goals

Issues For Optimal Gut Health for Baby

- Is baby breast fed or formula fed
- Is baby delivered vaginally or cesarean
- Condition of mother pre-conception, during pregnancy and while breast feeding
- Has the baby received an early course of antibiotic – before the age of 2
- Quality of mothers diet during pregnancy and while breast feeding

Diet

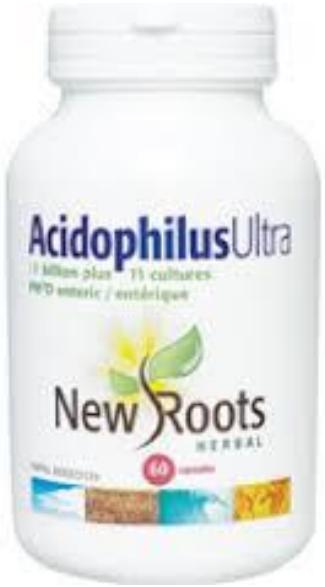
- High sugar, fat and protein diets are all associates with dysbiosis
- Mothers need a high complex carbohydrate diet, healthy fats and low is refined sugars and poor quality fats
- Reasonable amounts of animal protein (if not vegetarian) – consider digestive enzymes if needed

Building Mother's Residential Bacteria

- Mother should be on probiotics for entire duration of pregnancy and breast feeding
- The probiotic should contain GOS and if not then GOS should be added to the dietary protocol (dairy, legumes)
- FOS and other prebiotics can be obtained from diet and should be a priority in a protocol
- Mother should also consume fermented foods and glutamine-rich foods
- Once baby is born, the mother needs to continue this protocol – if breast feeding

Probiotic During Pregnancy

- Generally consider safe
- Meta-analysis study revealed no adverse reactions or issues with mother or baby
- Most companies will have a product they recommend for pregnant women - if not stated in their literature then ask
- Ideally, they would contain prebiotics or there can be a focus in diet with prebiotic foods



Study

- 256 women randomized into 3 groups during the first trimester – one received dietary counseling , one group received dietary counseling and probiotics and the third was a control group
- 13 % of the probiotic group developed gestational diabetes vs 36% of the counseling only group and 34% for the control group
- The counseling group had lower birth weight – (link to the later development of Diabetes II
- Similar study regarding weight gain in mothers given probiotics/counseling at 12 months after birth 25% central fat vs 43% for counseling group and 40% for the control

Other Gut Health Nutrients

- Aloe vera is contra–indicated for pregnancy
- Camomile and ginger tea are safe
- Glutamine – had shown benefits for baby in animal studies – little is know about it in humans
- Marshmallow has not been studied but traditional sources say it can be taken during pregnancy

Other Nutrients

- Slippery Elm is considered safe but has also not been studied and some herbalists think it could cause miscarriage
- Citrus pectin studies –inconclusive
- Psyillum considered safe but discuss with MD
- MSM is considered safe during pregnancy but it can pass into breast milk (which contains it naturally) – discuss with MD

- As holistic nutritionists, we should work with MDs or midwives before recommending supplements other than probiotics

For Baby

- Probiotics and prebiotics are provided through breast milk
- If baby is formula fed – then formula needs to have GOS and FOS
- Baby can start probiotics with prebiotics at 6 months
- Formula with GOS - Similac Go and Grow Omega 3 and 6 or Enfalac A+ Stage 1 - neither have FOS

As Practitioners

- Develop your protocol with an education element for the mother
- Women need to be educated about what a healthy gut can do to help them and how it can help their baby
- Increase your focus on gut health for children (especially those under two)
- Right now there is a lot of misinformation so everything we can do to help them would be appreciated