

Gut Bacteria and Pediatrics Part II



Healthy Gut



**IMPACT of INTRAPARTUM ANTIBIOTIC
PROPHYLAXIS & OTHER PERINATAL
INTERVENTIONS on the INFANT GUT
MICROBIOME: findings from the CHILD
Canadian birth cohort**

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Quote From Researcher

Although we are far from understanding what constitutes a “healthy infant gut microbiota,” normal colonization occurs when the infant is born full term by vaginal delivery, is not exposed to antibiotics and is exclusively breastfed during the first six months of life.



CHILD – a 6-year study of 3,300 children

In-utero - **recruitment:** Maternal, paternal studies; clinical, stress, nutrition and environment questionnaires

Delivery - **delivery:** outcomes, cord blood, meconium (related to babies first feces)

3 months - **home visit:** health questionnaires, home inspection, dust sampling, breast-milk, urine, nasal swab, stool, infant lung function, stress (sub-cohorts)

6 months - questionnaire follow-up

1 year - **clinic:** skin tests, blood, lung function, infections, urine, nasal swab, stool; maternal studies

CHILD – a 6-year study of 3,300 children

1 ½ years - questionnaire follow-up

2 years - questionnaire follow-up 2 ½ years - questionnaire follow-up

3 years - **clinic:** questionnaires, clinical assessment, skin tests, lung function, urine

4 years - questionnaire follow-up

5 years - **clinic:** questionnaires, clinical assessment, skin tests, lung function, blood, physician assessment

IAP

Intrapartum antibiotic prophylaxis – the period between onset of labour to the end of third stage of labour

Bacteroidaceae abundance is lower and Clostridiaceae is higher with IAP (penicillin G) in vaginal delivery versus no IAP

Bacteroidaceae abundance is substantially lower with IAP (cefazolin) in elective CS compared to no IAP (& IAP vaginal)

After emergency CS, mothers and newborns were more likely to receive antibiotics



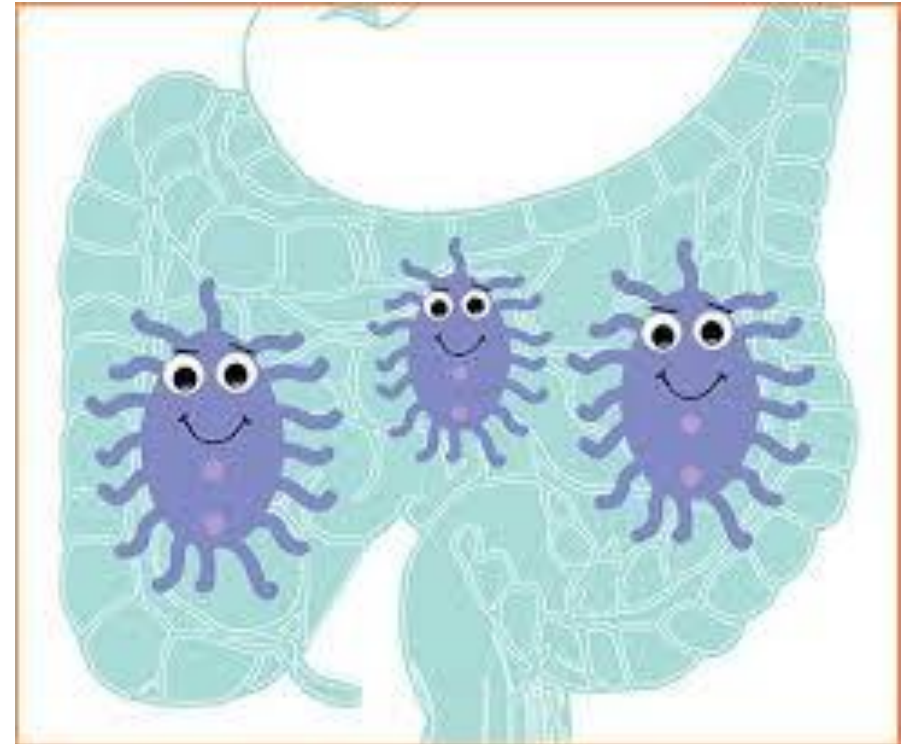
Is it due to IAP or cesarean section?

Lower abundance of Bacteroidetes microbiota in the infant gut following cesarean section (CS)

Changes to gut microbiota seen before infant weaning

Elective and emergency CS are frequently grouped

CS can interfere with breastfeeding, with the potential to affect infant gut microbiota



Summary of Findings

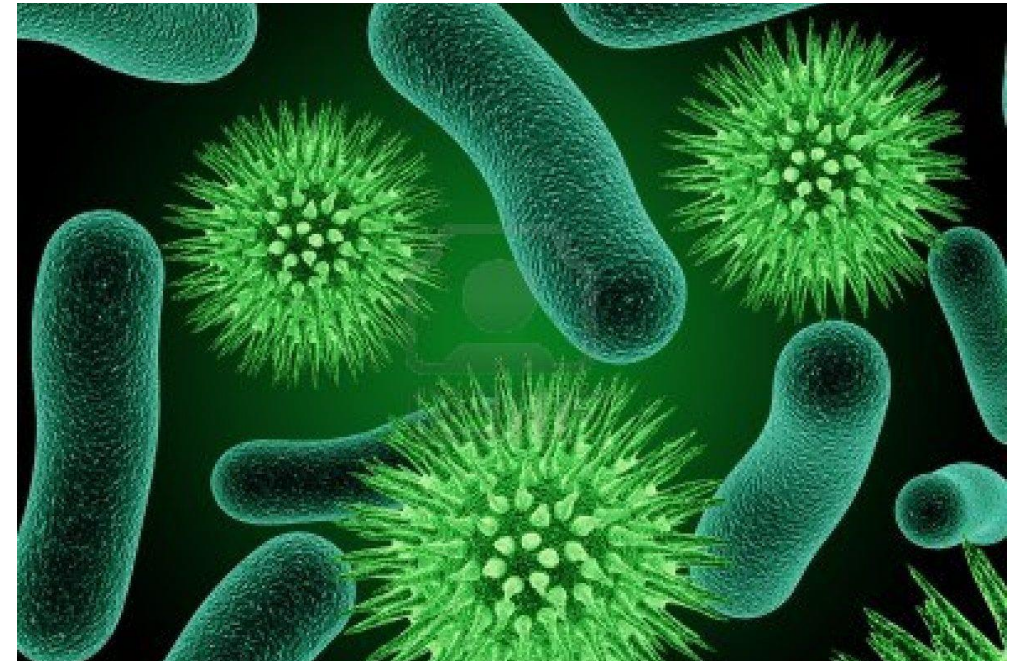
Bacteroidaceae were reduced at 3 months in IAP

Significant differences at the genus level with all CS types

Genus level differences did not survive multiple correction in IAP vaginal delivery

Clostridium & Enterococcus higher in emergency CS, consistent with resistance to beta-lactam antibiotics - Trend for higher Clostridium in other IAP

Exclusive breastfeeding at 3 months yields comparable levels of Bacteroidaceae & Clostridiales at 1 year in IAP exposed infants



Comparison of findings to the human literature

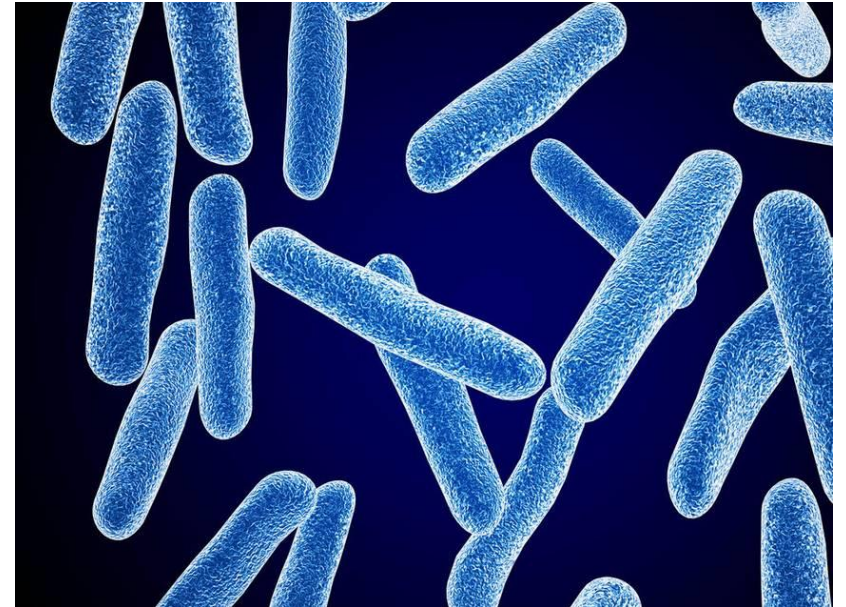
IAP and infant gut microbiota composition Lower bifidobacteria counts 7 days after maternal IAP for GBS (Alosio et al. Appl Microbiol Biotechnol 2014;98)

Lower Bacteroides in gut microbiota at 6 weeks of age with IAP/postnatal antibiotic treatment according to maternal report (Fallani et al. J Pediatr Gastroenterol Nutr 2010;51)

No IAP-postnatal associated changes in infant gut microbiota post weaning (Fallani et al. Microbiology 2011;157)

CS and infant gut microbiota composition: Reduced Bacteroides abundance following CS delivery (Jakobsson et al. Gut 2014;63, Azad et al. CMAJ 2013;185)

Enterobacteriaceae and Veillonella more abundant at 2 months after acute/elective CS (Hesla et al. FEMS Microbiol Ecol 2014;90)



Diets

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



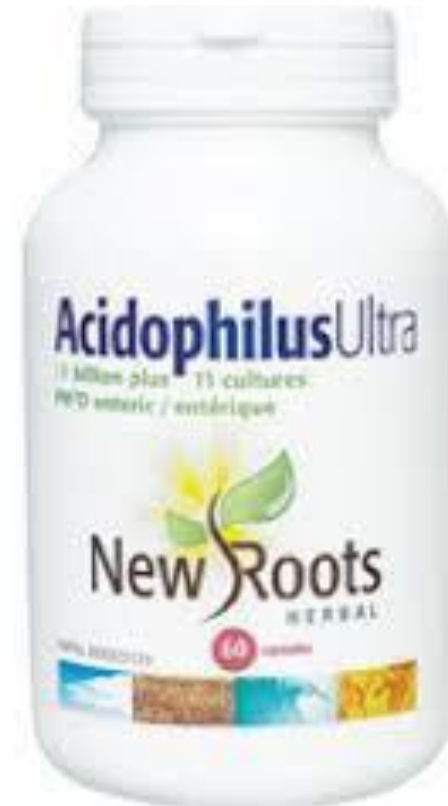
Building Mother's Residential Bacteria

- 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 and collagen-rich foods (bone broth)
- 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



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- 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
- Chamomile and ginger tea are safe
- Glutamine – had shown benefits for baby in animal studies – little is known 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
- Psyllium 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 nutrition professionals, we should work with MDs or midwives before recommending supplements other than probiotics



Other Nutrients

Colostrum – no studies but a number of sites say it is safe for pregnant mother and other say no

Some products for women contain it

No recommended for babies under the age of six months (has not been studied)

Collagen – not studies for pregnant women



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



Fermented Foods For Baby

Traditionally, fermented foods have been introduced to babies

However, a 2014 study of caregivers found that they were reluctant to feed fermented foods due to their lack of knowledge about the foods

Lactobacillus Rhamonosus GG may reduce respiratory infections in daycare (according to one study) and another found similar results with *L. reuteri* and *B. lactis*



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- Fermented-milk formulas may help gut flora and immune tolerance
 - Studies of traditionally cultures compared to western cultures find greater diversity in children and higher consumption of fermented foods

[Goat Milk Formula](#)



Foods To Feed Children

- Milk kefir made with Russian kefir grains (32 good bacteria and yeast strains)
- If child already has a dairy allergy and does not tolerate the milk kefir, then try coconut kefir (must be made, details in Module 4) but see if dairy kefir is tolerated first



Kefir

To start baby – place some on the tip of finger and place on baby’s tongue

For feeding older children. Start with a small amount and work up (easy to hide in a smoothie – one tablespoon is good – if child likes it – more can be had

If child wants to eat more than they eat daily – let them – could be their natural intuition kicking in



Fermented Grains

- Starting baby with a fermented or “soured” porridge is also traditional
- Fermenting grains can be done simply by mixing oats, for example, with clean, non-chlorinated water and leave them to ferment for at least 24 hours



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- This will make them more digestible by starting the digestion process
 - Feeding children sourdough bread is another way to help prevent sensitivities and allergies to grain products
 - More discussion of this in Module 4



Cultured Vegetable Juice

- The crunchiness of the a cultured vegetable is too much for a baby
- If the food can be purred easily (like zucchini or tomato), then it may be acceptable
- The juice of cultured vegetables is another option – especially sauerkraut juice
- Can they be cooked? Yes



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- Put it on babies tongue – let them get used to the taste
 - Helps develop a taste for sour and bitter so kids will not be so picky
 - Cultured juice can also be added to regular baby food
 - Water kefir (must make) also great for adding to existing foods or juice



Raising Healthy Children

- The key to preventing allergies is to feed the children good gut health foods and give extra thought and care as to how to get whole foods into their diet
- This is an education process for parents
- Help clients find and/or make fun foods for their kids that contain prebiotics and probiotics



Teach parents why this is important

If children already have allergies, then the goal is improve gut health to restore immune tolerance

There is not known protocol but supplementation may be required



Children With Allergies

In a recent study of children with peanut allergies, 82% were unreactive as compared to the control group (3.6%)

Both the experimental and control group participated in a de-sensitization program

The experimental group received a probiotic - lactobacillus rhamnosus CGMCC1.3724 while the control received a placebo



This means there is a pathway for restoring immune tolerance but there is still a lot of research to be done

In the meantime – feeding children with allergies prebiotics and probiotic foods and trusting the power of the body to repair itself can help until more definitive answers are available.



In General

- Educating mothers about not being afraid of bacteria is important and help them create an environment for diversity
- Fathers contribute (as do pets) to gut diversity as families tend to evolve similar diversity from living together
- Probiotic and prebiotic strategies can be planned based on looking at the pre-existing circumstances



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

