

## The Human Microbiome

**The human microbiome** is the aggregate of microorganisms, that reside on the surface and in deep layers of skin, in the saliva and oral mucosa, in the conjunctiva, and in the gastrointestinal tracts.

Probiotics are live microorganisms found in the human gastrointestinal and vaginal tracts. They are also known as “good bacteria.” Probiotic organisms in food and supplements may help to maintain the natural balance of the microflora in the gut.\* Probiotic-containing foods include yogurt, kefir, and other fermented edibles like sauerkraut, kombucha, kimchi, miso, and tempeh.

Probiotics serve many positive functions in the human body. They can optimize digestive function, limit the growth of harmful bacteria by providing competition, increase resistance to infection, and boost immunity.

The human intestines contain between 300 and 1000 different species of intestinal microflora! There are some estimates that our guts harbor one hundred billion, or one trillion bacteria per gram of colonic content. That is 10 times as many cells as are in the human body!

Probiotics should not be confused with “pre-biotics” which are complex sugars used as fuel by bacteria. Examples of prebiotics are FOS (fructo-oligosaccharides), inulin, lactulose, and lactitol. Prebiotics are used as a food source by probiotics.

Lactobacillus and Bifidobacterium species produce organic compounds that increase acidity of the digestive tract which serves to interfere with the reproduction of some pathogenic (“disease-causing”) bacteria. Probiotic microflora produce bacteriocins, natural antibiotics that kill harmful microorganisms.

Probiotics have a proven track record in improving diarrhea. There is ample research exploring the role of probiotics in antibiotic-associated and/or infectious diarrhea. Supplementing w/probiotics reduces the rate of intestinal infections, including childhood infectious diarrhea like rotavirus.



Probiotics may also reduce the symptoms of IBS (irritable bowel syndrome). IBS is a functional disease- the anatomy of the digestive tract appears normal but expresses functional irritability. In IBS, the smooth muscle function is characterized by spasms and excessive peristalsis even at rest. Patients experience alternating constipation & diarrhea because the autonomic nervous system doesn't cause the normal contraction and relaxation to propel stool smoothly towards its exit.

Symptoms of IBS include irregular bowel movements, abdominal distention, and abdominal pain. In one meta-analysis examining the use of probiotics in IBS, Nikfar and associates pulled appropriate trials from databases and found 8 randomized, placebo-controlled trials that met their criteria. The pooled data showed significant improvement using probiotics to add to standard therapy to treat IBS.

With regard to inflammatory bowel diseases (IBD) like Crohn's disease and ulcerative colitis, there is surprisingly little research showing substantial benefit. However, it is known that imbalanced bacteria may be a causative factor in the etiology of IBD and furthermore that the microbial system in the gut is modifiable. Since the problem is that there is a limited number of studies looking at the use of probiotics in Crohn's disease and ulcerative colitis rather than a preponderance of negative studies, and there is good theoretical basis for trying probiotics in this population, some doctors propose that probiotic supplements should certainly be tried in patients with inflammatory bowel disease. There are minimal side effects and complications from such use.



Breastfed infants have natural protection against many infections thanks to gut flora. Not only breastfeeding, but method of delivery also impacts the microbiome. Researchers have found differences in gut flora of infants born vaginally vs. by C-section. The fetal intestine is sterile in utero. The bacteria that come to colonize the infant's bowel are acquired during birth & shortly afterwards, a process that is clearly influenced by how a baby is born. These bacteria destined for the baby's gut originate primarily in the maternal birth canal and rectum. The newborn swallows these bacteria, they travel through the stomach, and colonize the intestines. Babies also get some flora from mom's skin with nursing and other contact. With babies born surgically instead of vaginally, bacteria from the skin and hospital environment quickly populate the bowel. Babies born by C-section have higher rates of childhood eczema and asthma. In fact, the epidemic rise in childhood obesity, allergies, asthma, Type 1 Diabetes, and Celiac disease may be related to the microbiome.

Intestinal microflora has been studied in relation to childhood asthma, allergies, and eczema. This triad of diseases is known as "atopy." Some studies comparing microflora of atopic vs. non-atopic infants show significant differences. Non-atopic, healthy infants have more intestinal colonization of Bifidobacteria and Lactobacillus, as compared to atopic infants who may show more colonization with Clostridia. It seems that intestinal microflora plays a pivotal role in the development of allergies. Qualitative, not just quantitative, differences have also been reported. Bifidobacteria from atopic infants were found to induce higher levels of pro-inflammatory mediators called cytokines, whereas Bifidobacteria from non-atopic infants promoted anti-inflammatory cytokines.

A 2012 article published in the journal *Immune Network* correlated hyper-immune disorders like asthma, allergies, and atopic dermatitis with the hygiene hypothesis: a lack of early childhood exposure to diverse microorganisms causing increased susceptibility to allergic diseases. This article noted that oral treatment with certain strains of probiotics prevented and improved eczema by down-regulating inflammatory cytokines or inducing immune regulatory mechanisms. The authors conclude that consumption of probiotics is beneficial to suppress the development of eczema by modifying the intestinal microflora and immune responses.

Another 2012 study showed that maternal use of probiotics during pregnancy and breastfeeding is effective in preventing eczema in high-risk infants. Mothers with a predisposition to atopy were randomized to receive placebo or various probiotic combinations beginning 2 months before delivery and during the 1st two months of nursing their newborns. The infants were monitored for 24 months and the study showed reduced rates of eczema in the babies whose mothers took probiotics.

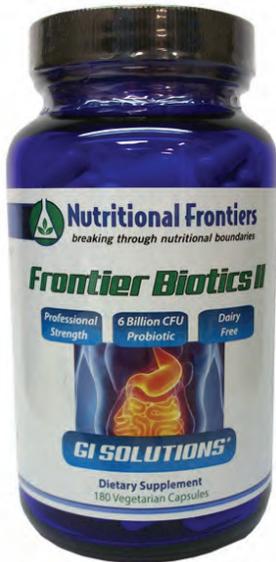
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## Frontier Biotics II

### Quality:

- 6 Billion CFU Probiotic per one cap (*Guaranteed at Expiration*)
- Dairy Free
- No FOS
- Glass bottle to maximize stability and freshness
- Flexible dosing
- Can be opened and used as a powder

### Formula Focus:

- Daily Multi for GI Tract
- Normalizing Digestion
- Supporting Regularity



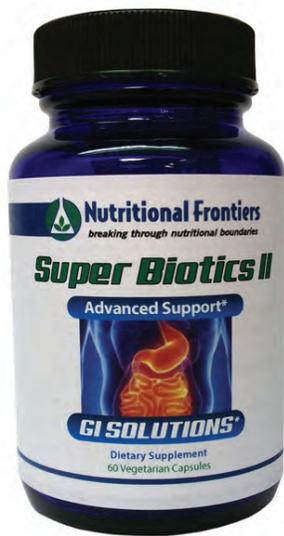
## SBC II

### Quality:

- 5 Billion CFU of Saccharomyces Boulardii (BioOptima™)  
(*Guaranteed at Expiration*)
- 2 Billion CFU of Bifidobacterium lactis (BI-04)  
(*Guaranteed at Expiration*)
- Dairy Free
- No FOS
- Glass bottle to maximize stability and freshness

### Formula Focus:

- Yeast Infections
- Diarrhea
- Gastrointestinal Balance



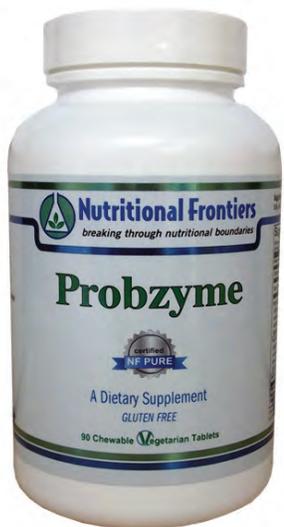
## Super Biotics II

### Quality:

- 50 Billion CFU (*Guaranteed at Expiration*)
- Dairy Free
- No FOS
- Glass bottle to maximize stability and freshness

### Formula Focus:

- Maximum Strength
- Auto Immune Support
- Support Bowel Regularity



## Prozyme

### Quality:

- 2.25 Billion CFU (*Guaranteed at Expiration*)
- Dairy Free
- No FOS

### Formula Focus:

Digestion  
Heartburn  
Reflux  
Lactose Intolerance

\*These statements have not been evaluated by the FDA. The products referred to are not intended to treat, cure, or prevent any disease.

- I) De Simone C, Vesely R, Bianchi SB, et al. The role of probiotics in modulation of the immune system in man and in animals. *Int J Immunother* 1993;9:23–8.
- Mel'nikova VM, Gracheva NM, Belikov GP, et al. The chemoprophylaxis and chemotherapy of opportunistic infections. *Antibiotiki i Khimioterapiia* 1993;38:44–8.
- II) O'Hara AM, Shanahan F. The gut flora as a forgotten organ. *EMBO Rep*. 2006 Jul;7 (7): 688–93.
- III) Kawase K. Effects of nutrients on the intestinal microflora of infants. *Jpn J Dairy Food Sci* 1982;31:A241–3.
- IV) Barefoot SF, Klaenhammer TR. Detection and activity of Lactacin B, a Bacteriocin produced by *Lactobacillus acidophilus*. *Appl Environ Microbiol* 1983;45:1808–15.
- V) Fernandes CF, Shahani KM, Amer MA. Therapeutic role of dietary lactobacilli and lactobacillic fermented dairy products. *FEMS Micro Rev* 1987;46:343–56.
- Phuapradit P, Varavithya W, Vathanophas K, et al. Reduction of rotavirus infection in children receiving bifidobacteria-supplemented formula. *J Med Assoc Thai* 1999;82:543–8.
- Saavedra J. Probiotics and infectious diarrhea. *Am J Gastroenterol* 2000;95:S16–8.
- VI) Nikfar S, Rahimi R, Rahimi F, et al. Efficacy of probiotics in irritable bowel syndrome: a meta-analysis of randomized, controlled trials. *Dis Colon Rectum*. 2008 Dec;51(12):1775–80.
- VII) Neuman MG, Nanau RM. Inflammatory bowel disease: role of diet, microbiota, lifestyle. *Transl Res*. 2012 Jul;160(1):29–44.
- VIII) Veerappan GR, Betteridge J, et al. Probiotics for the treatment of inflammatory bowel disease. *Curr Gastroenterol Rep*. 2012 Aug;14(4):324–33.
- IX) <http://www.scienceandsensibility.org/?p=4995>
- X) Ibid.
- XI) [http://www.npr.org/sec-tions/health-shots/2016/02/01/464905786/researchers-test-microbe-wipe-to-promote-babies-health-after-c-sections?utm\\_source=facebook.com&utm\\_medium=social&utm\\_campaign=npr&utm\\_term=nprnews&utm\\_content=20160201](http://www.npr.org/sec-tions/health-shots/2016/02/01/464905786/researchers-test-microbe-wipe-to-promote-babies-health-after-c-sections?utm_source=facebook.com&utm_medium=social&utm_campaign=npr&utm_term=nprnews&utm_content=20160201)
- XII) Hwang JS, Chang-Rok I, Sin-Hyeog I. Immune Disorders and its Correlation with Gut Microbiome. *Immune Netw*. 2012 August; 12(4): 129–138.
- Ouweland AC. Antiallergic effects of probiotics. *J Nutr*. 2007;137(3 Suppl 2):794S–797S.
- XIII) Hwang JS, Im CR, Im SH. Immune disorders and its correlation with gut microbiome. *Immune Netw*. 2012 Aug;12(4):129–38.
- XIV) Rautava S, Kainonen E, Salminen S, et al. Maternal probiotic supplementation during pregnancy and breast-feeding reduces the risk of eczema in the infant. *J Allergy Clin Immunol*. 2012 Oct 16. pii: S0091-6749(12)01464-9. doi: 10.1016/j.jaci.2012.09.003.