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For IBS, candidiasis, celiac disease, food sensitivity/ leaky gut syndrome, dyspepsia, peptic ulcer disease, as well as prevention of acute infectious and antibiotic-associated diarrhea.

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Powdered, high-dose probiotic formula for easy dose adjustment. Also suitable when higher dose is desired, such as in inflammatory bowel diseases (IBD).

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Baby & Mom-PB15+ DF

Specifically designed to support the immune system for infants, toddlers, and pregnant/ breastfeeding moms. Contains effective strains to promote healthy development and prevent atopic disease for babies, and reduce the risk of gestational diabetes.

S. boulardii

Take with antibiotics to prevent antibiotic-associated diarrhea, acute traveller's diarrhea, *C. difficile* infections, and decrease side effects during *H. pylori* eradication treatment.

Clinical Evidence of Featured Strains

Bifidobacterium bifidum Bb-06 [1]

B. bifidum is proved to help reduce the risk of cold & flu as well as increase recovery time.

A study with 581 academically stressed undergraduate students receive 3 billion cfu/day of probiotic *L. helveticus, B. infantis, B. bifidum* or placebo for 6 weeks. The results showed that *B. bifidum* supplementation resulted in a higher proportion of healthy days and a lower percentage of students reporting a day of cold/flu.

Bifidobacterium lactis BL-04 [2]

B. lactis Bl-04 is effective in supporting the immune system and reduce the risk of respiratory infection in a clinical trial.

A total of 465 participants (241 males; 224 females) were randomly divided into 3 groups. One group had 2 billion cfu of *B. lactis* BL-04 only; the second group had 5 billion cfu of *L. acidophilus* NCFM + *B. lactis* Bl-07, and both groups were compared to the placebo group. A 5-month intervention showed that only the *B. lactis* BL-04 group had a significantly lower risk of URTI by 27% (risk ratio of 0.73; p=0.02) compared to placebo. BL-04 also delayed the first onset of URTI by ~0.8 months.

Antibiotic Resistance Test & Genome Database

Bacteria, including probiotics, are capable of sharing their genetic materials (e.g., plasmids); such nature could be problematic as the antibiotic-resistant genes from probiotics can potentially be passed onto the pathogenic bacteria. Antibiotic resistance test ensures that the probiotic strains are sensitive to at least 3 commonly used antibiotics, especially the last-resort ones such as Vancomycin, and Carbapenems. Moreover, all probiotics should have their genomes assayed and registered with public genome databases so that their safety and efficacy can continue to be monitored.

Lactobacillus rhamnosus (Lr-32, HN001, GG)

L. rhamnosus is part of normal human gut flora. Among many other benefits, L. rhamnosus is known to balance the immune system, as clinical trials have shown efficacy on the prevention/recovery of infectious disease, allergies, and atopic dermatitis.

Lactobacillus rhamnosus HN001

L. rhamnosus HN001 has been clinically shown to reduce the risk of allergies (skin and respiratory systems) in children, as well as gestational diabetes in pregnancy.

Eczema and Allergic sensitization: A 6-year RCT [3]

A double-blind, randomized, placebo-controlled trial of 316 mothers and their infants (placebo, n=159; HN001, n=157). Pregnant mothers were supplemented daily from 5 weeks preterm to 6 months post-term if breastfeeding. Infants were supplemented daily from birth until 2 years old.

At 2 years of age, the prevalence of eczema decreased by 49% (p=0.01) with supplementation. This effect persisted until 6 years of age with 44% lower prevalence (p=0.01). In addition, HN001 showed a 31% decreased the prevalence of positive skin-prick tests (p=0.04), and 62 % less relative risk of rhinoconjunctivitis (rhinitis and red eyes).

Gestational diabetes mellitus (GDM) risk reduction [4]

In an RCT, pregnant women were randomized at 14-16 weeks of gestation to receive 6 billion of HN001 (n=212) or placebo (n=211) daily. At 24-30 weeks, GDM prevalence was significantly lower in the HN001 group, 2.1 % (CI=0.6-5.2), vs. 6.5 % (CI=3.5-10.9) in the placebo group (P=0.03). A significant association of lower GDM was reported in women aged ≥35 years (RR=0.31; CI=0.12-0.81, P=0.009) and those with a history of GDM (RR=0.00; CI=0.00-0.66, P=0.004).

Lactobacillus rhamnosus GG

L. rhamnosus GG is by far the most studied probiotic strain. Studies have shown its effectiveness from general to severe GI/ respiratory/ dental infections, as well as reduce allergy and IBS in infants and children.

Gastrointestinal Health [5], [6], [7]

L. rhamnosus GG is known to be the most effective probiotic in reducing both severity and duration of acute onset infectious diarrhea (overall reduction 1.05 days). Several systemic reviews and meta-analysis studies also suggest a protective effect of *L. rhamnosus* GG against antibiotic-associated diarrhea, preterm neonatal Candida, Clostridium difficile induced colitis, vancomycin-resistant enterococci, and improves abdominal pain in children with IBS (NNT=4).

Respiratory and Atopic Diseases Prevention

In additional to GI conditions, *L. rhamnosus* GG was effective in reducing the risk of respiratory tract infection in preterm infants and hospitalized children, as well as in protecting hospitalized patients and patients with cystic fibrosis against Pseudomonas aeruginosa pneumonia.

Another area for *L. rhamnosus* GG application is in the pre- & post-natal period. Prenatal supplementation of *L. rhamnosus* GG was shown to promote a beneficial profile dominated by bifidobacteria in neonates. An RCT involving 105 infants fed standard infant formula supplemented with L. rhamnosus GG developed better than the control group.[8] Two meta-analyses provided the best evidence for *L. rhamnosus* GG supplementation in mothers and infants in the long-term prevention of atopic dermatitis.[9]

Oral Health

Milk containing *L. rhamnosus* GG has been demonstrated to reduce dental caries and lower streptococcus mutans levels from dental plaque and saliva. [10]

Lactobacillus reuteri 1E1

L. reuteri helps reduce the time of crying in infantile colic and promote recovery in acute infectious diarrhea.

"Human Strains" v.s. "Human Gut Anchoring Strains"

Humans are born sterile before they encounter a variety of bacteria from the surrounding environment. Therefore, even though "human strain" is one of the highly marketed features in probiotic formulas, there is no strain from human origin. Any strains of bacteria succeeded in colonizing in their host human become the "human strains". Probiotics' human-gut anchoring ability can actually be tested via their adhesion to human intestinal cell lines – HT-29 and Caco-2.

One meta-analysis of 3 RCTs on infantile colic (n=209) showed *L. reuteri* supplementation reduced risk of infant crying time at 14 and 21 days (NNT = 2). [11]

The other meta-analysis of 8 RCTs involving 1,229 children found that *L. reuteri* supplementation reduced the duration (25 hours) of acute infectious diarrhea and increased the cure rate on days 1 and 2. [12]

Bifidobacterium infantis Bi-26

B. infantis is passed from mother to baby during vaginal birth and is considered a superior colonizer of the infant gut due to its unique ability to digest oligosaccharides in human milk.[13]

Naturally, *B. infantis* helps with proper metabolic and immune development of the infants. However, with the growing practice of C-section, avoidance of breastfeeding, and exposure to antibiotics in mother's life, colonization of B. infantis has been mostly eliminated in babies born today, which leads to dysbiosis and detrimental consequences in the baby's life.

Preclinical data have shown that *B. infantis* has anti-inflammatory activity, and could decrease intestinal permeability in premature intestinal cells. In premature infants, *B. infantis* was found to decreases Enterobacteriaceae (e.g., Salmonella, E. coli, Klebsiella, and Shigella) and reduce the risk of necrotizing enterocolitis. Colonization with *B. infantis* is also associated with better weight gain, increased thymic index, and better response to vaccines.

In a phase I clinical trial, *B. infantis* supplement was safe and well-tolerated and showed fewer and better-formed stool in healthy term breastfed infants, compared to "frequent, watery" stool in the control group. [14]

Multiple clinical trials and a meta-analysis found *B. infantis* supplementation significantly relives many IBS symptoms (i.e., abdominal pain, gas/bloating, bowel dysfunction), as well as normalization of inflammation marker. The effect on bloating/ distension was more prominent with B. infantis in a composite formula.[15,16, 17,18]

Saccharomyces boulardii

S. boulardii is the most studied yeast probiotic. Research has documented efficacy of S. boulardii for the treatment of acute gastroenteritis, especially in children, and for the prevention of antibiotic-associated diarrhea, both in adults and children. There is also evidence supporting the use of S. boulardii to increase the eradication rate of Helicobacter pylori and decrease antibiotic side effects. [19]

Other clinical uses of *S. boulardii* include improved weight gain and feeding tolerance in preterm infants [20], reduced bacterial translocation and inflammatory markers in HIV patients [21], as well as a lowered coronary artery disease biomarker in patients with hypercholesterolemia. [22]

Yeast Probiotic vs. Yeast Infection

Some may have concern that taking yeast probiotic such as *S. boulardii* might lead to *Candida* infection in otherwise healthy individuals has not been substantiated by clinical evidence. In fact, preclinical data showed inhibitory effect of *S. boulardii* on the ability to form filaments and biofilms of *C. albicans* [25]; *S. boulardii* could also reduce pro-inflammatory cytokine IL-8 expressed by *C. albicans*-infected intestinal cells.[26]

In a clinical study of preterm infants with low birth weight, prophylactic *S. boulardii* is as effective as nystatin for the prevention of fungal colonization and invasive infection. Moreover, *S. boulardii* reduce incidence and number of sepsis attacks significantly more than nystatin and showed better feeding intolerance.[27]

Why Single Strain *S. boulardii*?

Although combination probiotics with *S. boulardii* are available on the market, existing clinical trials have been utilizing single-strain preparation. Possible **antagonism** may exist **between "the yeast & bacteria"** and decrease therapeutic efficacy.[23] In a RCT on children with acute rotavirus diarrhea, significantly shortened duration of fever & diarrhea was seen with single-strain *S. boulardii*, but not with combination of *S. boulardii* + other probiotics. [24]

Dairy Free Probiotic Size	Supreme-PB30+ 56 veg caps*	**Ultra-PB100+ 28 servings (1 tsp)*	Optimum-PB10+ 56 veg caps*	**Baby & Mom-PB15+ 56 servings (1/2 tsp)	S. boulardii 84 veg caps
Viable cells at time of manufacture (CFU)	**Up to 55 billion**	**Up to 200 billion**	**Up to 18 billion**	**Up to 25 billion**	
Lactobacillus acidophilus La-14	6 billion	15 billion	2.1 billion	1.5 billion	
Lactobacillus rhamnosus Lr-32	2 billion	15 billion	1 billion	1.5 billion	
Lactobacillus casei Lc-11	5 billion	10 billion	0.6 billion	1 billion	
Lactobacillus salivarius Ls-33	1 billion	8 billion	0.6 billion	1 billion	
Bifidobacterium bifidum Bb-06	1 billion	2 billion	0.4 billion	0.5 billion	
Bifidobacterium lactis Bl-04	5 billion	12 billion	1.6 billion	1.5 billion	
Streptococcus thermophilus St-21	2 billion	8 billion	0.5 billion	1 billion	
Bifidobacterium breve Bb-03	1.5 billion	5 billion	0.6 billion	1 billion	
Lactobacillus plantarum Lp-115	1.5 billion	15 billion	1.5 billion	1.5 billion	
Lactobacillus rhamnosus GG	3 billion	6 billion	1.2 billion	2 billion	
Lactobacillus rhamnosus HN001	2 billion	3 billion		2 billion	
Bifidobacterium infantis Bi-26		1 billion		1 billion	
Lactobacillus reuteri 1E1		1 billion		0.5 billion	
Saccharomyces boulardii					5 billion

*FOS and FOS-free formula available. **Powder form. Unit: CFU = colony-forming unit.