For Education Purpose Only: The entire contents are not intended to be used as substitute for professional medical advice, diagnosis, or treatment. Always seek the advice of your physician or other qualified health provider with any questions you may have regarding a medical condition. Never disregard professional medical advice or delay in seeking it because of something you have read in this presentation. All statements in this article have not been evaluated by the Food and Drug Administration and are not intended to be used to diagnosis, treat, or prevent any diseases.
A study with 581 academically stressed undergraduate students received 3 billion cfu/day of probiotic L. helveticus, 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. **B. bifidum** 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 BI-07, and both groups were compared to the placebo group. A 5-month intervention showed that only the BL-04 BI-07 group had a significantly lower risk of URTI by 27% (risk ratio 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 could 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 antibiotics, 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**
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 postterm if breastfeeding. Infants were supplemented from birth until 2 years old.

At 2 years of age, the prevalence of eczema decreased by 49% (p<0.001) 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 skin prick tests (p=0.04), and 82 % less relative risk of rhinorrheoconjunctivitis (redness and red eye).

**“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 and is an important tool for probiotics, “human gut anchoring strain” function is actually 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 infantile crying time at 14 and 21 days.* 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.**

**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.* 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” stools in the control group.***

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

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**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.**

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

**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. S. boulardii could also reduce pro-inflammatory cytokine IL-8 expressed by C. albicans-infected intestinal cells.

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 improved tolerance.**

**Why Single Strain S. boulardii?**
Although combination probiotics with S. boulardii are available on the market, existing clinical trials have been utilizing single strain S. boulardii for their potential benefits like reducing the risk of fatal relapse and/or mortality rate and antagonizing *C. difficile* infection. Some studies showed that combination probiotics with S. boulardii may decrease the risk of *C. difficile* infection. 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.**

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