

Probiotics for the Treatment of Adult Gastrointestinal Disorders

- **Basics**

Overview

- **What are Probiotics?**

Probiotics are currently defined by the World Health Organization as "live microorganisms which when administered in adequate amounts confer health benefits on the host." There are trillions of bacteria which live in our digestive tracts. More than 400 different species have been identified. Most of these are healthy bacteria while others have the potential to cause damage to our intestinal systems. The good bacteria keep the bad bacteria in check by limiting the unhealthy bacteria's ability to increase in numbers. The good bacteria can also secrete chemicals which break down toxins produced by the bad bacteria, and activate the immune system to help fight the bad bacteria. At times, an imbalance between the good and bad bacteria can lead to uncomfortable symptoms or illnesses, and simply put, probiotics are bacteria or yeast which may alleviate these common medical symptoms and illnesses. They are found in many commercial products including yogurt, juices, soy products, fermented milk, tempeh and other dietary supplements. They also come in capsule, tablet or powder formulations. In the United States there has been a significant increase in use of probiotics to promote general as well as gastrointestinal health.

- **How do Probiotics Work?**

Probiotic supplements are specifically formulated to assure that the bacteria are able to survive the acid environment of the stomach, attach to the cells of, and colonize the small intestine and/or colon. While the specific effects of each probiotic species likely differs, in general, these organisms have been shown to confer health benefits through a variety of mechanisms. Some have the ability to populate or modify the surrounding environment so that bad bacteria are unable to colonize or survive in the intestines. Many species release chemicals which break down the damaging toxins produced by unhealthy bacteria causing illnesses such as diarrhea. Some increase the number of infection-fighting cells in the gastrointestinal tract, while others have the ability to stop bad bacteria or their byproducts from leaving the gastrointestinal tract and entering the rest of the body. A few have been shown to modify pain perceptions.

- **Are All Probiotic Preparations Basically the Same?**

No. In fact it is important to note that most probiotics differ both in their bacterial composition and quantity. There are more than 100 commercially available probiotic supplements. Many of these are single species preparations while others contain either multiple strains of a single species, multiple species, or both. Furthermore, the concentration of bacteria in each preparation varies. Some contain hundreds of colonies while others billions. There is no evidence to support the claim that either preparations with multiple species/strains or higher concentrations of bacteria leads to improved symptom resolution. Furthermore, prior scientific testing has revealed that individual gastrointestinal illnesses respond differently to the various probiotic products. It is therefore essential that formal testing of individual preparations be performed and proof of beneficial effects identified for each specific digestive disorder.

- **How do I Know Which Probiotic to Consume for My Particular Gastrointestinal Illness?**

The best way to identify an appropriate supplement is to consult with your primary care doctor or gastroenterologist. Many of the probiotics available for purchase have never been scientifically tested and are not regulated by the Food and Drug Administration (FDA). Thus, there is no way to determine whether or not the supplement is beneficial or if the product is safe. Therefore, it is difficult for individuals to identify appropriate products for their specific sets of symptoms or diagnosed clinical illnesses. Many trials have been performed assessing the benefits of probiotics for treating gastrointestinal illnesses.

Some have identified beneficial preparations for treating individual disorders, while others have yielded conflicting results. Overall, there is general agreement that the data from these studies has to be interpreted in the context of each individual disorder. The following are disorders with studies suggesting potential benefits for probiotics.

Irritable Bowel Syndrome (IBS): IBS has been one of the most extensively studied disorders with multiple *Bifidobacterium* and *Lactobacillus* species tested both individually and in combination. More than 20 randomized controlled trials have been completed. Recently, two groups of experts evaluated all of the available data and while the reviews were performed independently, similar conclusions were reached: The use of the single strain probiotic *Bifidobacterium infantis* 35624 appears beneficial for treating IBS.

Antibiotic Associated Diarrhea (AAD): More than 25 trials and comprehensive reviews have suggested that the risk of AAD can be reduced by 50-60% if probiotics are co-administered with antibiotics. The individual probiotic strains found to be most effective include *Saccharomyces boulardii* (*S. boulardii*), a yeast, and *Lactobacillus rhamnosus* GG while many combinations of 2 or more bacteria have also proven beneficial. It does not appear that any of the aforementioned preparations have proven more efficacious than the others.

Infectious Diarrhea: More than 60 studies on this topic have been published, the vast majority assessing infants and children. The data for the use of probiotics in this setting is limited by the variety and doses of organisms tested, the underlying infections and populations being treated. It appears as though probiotics have a modest effect by decreasing the overall number of diarrheal episodes, and reducing the duration of an infection by approximately 1 day. The vast majority of studies used *Lactobacillus* strains, and while a specific probiotic cannot be recommended, this genus appear most effective.

Clostridium difficile Associated Diarrhea (CDAD): Data for the use of probiotics for the treatment of CDAD is limited, but they have been tested for both treatment and prevention. The strongest evidence suggests that adding the yeast *S. boulardii* to standard antimicrobial treatment may increase the likelihood of cure and reduce the rate of recurrence in patients experiencing mild repetitive CDAD infections. There is no evidence that the combination of a probiotic and antibiotic is effective in treating an initial CDAD infection, or that probiotics as single intervention therapies are beneficial in treating primary or recurrent CDAD. Patients who are considering using *S. boulardii* in combination with standard antibiotic therapy should do so judiciously and only with the recommendations of their physicians as this organism has the potential to leave the gastrointestinal tract, enter the bloodstream, and cause potentially life-threatening infections.

Inflammatory Bowel Disease (IBD): There is growing data suggesting that probiotics may be of some benefit in the treatment of two of three different IBD-related disorders: Ulcerative Colitis, and Pouchitis. The data for Crohn's Disease is less convincing.

- **Crohn's Disease (CD):** Data supporting the use of probiotics for treating CD is limited. Currently, there is no evidence that any single strain or combination probiotic alone or in combination with standard therapies is clinically effective for treating CD symptoms, improving chances for induction or maintenance of remission, or preventing relapses after surgery.

- **Ulcerative Colitis (UC):** Strong evidence suggests that using the multi-strain probiotic preparation, VSL#3, a combination of 4 strains of *Lactobacillus*, 3 strains of *Bifidobacteria* and *Streptococcus thermophilus* as an adjunct to standard therapy, has the potential to reduce symptoms and induce remission in patients with mild to moderate UC. Appropriate studies evaluating the benefits of probiotics as single therapies for inducing or maintaining remission are lacking.

Pouchitis: Many patients need to undergo removal of their colon as a curative treatment for their UC. In these instances, the last part of the small intestine is sometimes used to create a reservoir, or pouch, where stool is collected before it is expelled from the body. Pouchitis is a condition where the pouch becomes inflamed resulting in multiple symptoms including the passage of blood or mucus or an increase in frequency or urge to go to the bathroom. Within the first year after surgery, pouchitis is identified in approximately 20% of patients and by five years, 50% of patients have developed this

condition. Studies have shown that the bacteria in these pouches differ from those seen in the normal colon and it is surmised that these lead to the development of inflammation. This disorder is commonly treated with antibiotics, but the recurrence rate is high. Therefore, it makes sense that repopulating these pouches with healthy bacteria may alleviate symptoms. A single study revealed that VSL#3 given immediately after surgery reduces the chance of developing pouchitis in the first year. Two other small studies have shown that supplementation with VSL#3 after antibiotic treatment significantly decreases the likelihood of recurrence. Thus, limited data have shown benefits for VSL#3 in both the primary and secondary prevention of this disorder.

- **How Long Should I Continue Taking My Probiotic if it is Effective?**

We do not know. Most patients have not been monitored for long enough periods of time subsequent to their participation in clinical trials. In some cases a loss of effect can occur quickly. For example, in the VSL#3 trial for pouchitis, a decrease in healthy bacteria in the pouch was identified within one month of discontinuing therapy. While there is nothing wrong with stopping probiotics and monitoring for symptom recurrence, many people choose to continue their supplements indefinitely.

- **Are Probiotics Safe?**

In general, probiotics are considered safe and many have been used for more than 100 years. However, these supplements are not regulated by the FDA and therefore no demonstration of safety is required prior to marketing them. Patients with chronic medical conditions or receiving treatment for acute or chronic infections should discuss using probiotics with their healthcare providers as there are scattered reports of specific strains causing severe illnesses in certain medical settings. For example, several *Lactobacillus* species and *S. boulardii* have been shown to enter the bloodstream possibly causing severe life-threatening infections. Furthermore, in a study performed on patients with severe inflammation of the pancreas, the use of probiotics in attempts to decrease the risk of infection actually resulted in an increased risk of death. Overall, complications from probiotics are rare, but appear to occur more frequently in immunocompromised patients, or in patients with indwelling intravenous catheters, suffering from infections of the gastrointestinal tract, or who are sick enough to require hospitalization in an intensive care unit. Their use should be completely avoided in these situations. This includes patients with Crohn's disease or ulcerative colitis being treated with immune suppression. Discussion with your doctor about any supplements that you are considering is very important.

- **Are Probiotics the Same as Prebiotics?**

No. Prebiotics are non-digestible dietary compounds which promote the health of the beneficial bacteria. The majority of these products are carbohydrates such as soluble fibers or oligosaccharides found in onions, bananas, tomatoes, soy beans and other plants. It has been suggested that these products make their way through the digestive tract and stimulate the growth or activity of healthy bacteria naturally residing in the colon. In some instances prebiotics are added to probiotic supplements and these products are known as synbiotics.

- **What Questions Need Answering by Future Studies?**

Given the limited amount of information available regarding probiotic use, numerous questions remain unanswered. More information is necessary regarding optimal dosages, durations of therapy, the efficacy and safety of individual and combination probiotics, continued response rates after withdrawal, and the benefits, or lack thereof, of adding prebiotics to consumer preparations. Each of these issues must be addressed not only for the supplements themselves, but also within the context of each specific disease state.

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