

Probiotics, They're alive & they cure.

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Bottom line at the top: Healthy bacteria, taken as a supplement, may aid recovery from infectious diarrhea and other medical conditions characterized by an imbalance of organisms in our bodies.

Common events, like food poisoning, excess laxatives and antibiotic use, can disrupt our colon's healthy balance of bacteria and interfere with normal colonic function. One way of restoring the bowel's function and bacterial balance is to use probiotics.

Probiotics are a group of non-pathogenic, living microorganisms which may confer a health benefit. They are now available in capsules. Some contain only one bacterial species, such as *Lactobacillus acidophilus*, while others contain mixtures.

Probiotics are not new, only the name is. Before the probiotic revolution we prescribed yogurt, which is a form of probiotic, containing live *Lactobacillus* bacteria. These bacteria ferment milk to make yogurt and give *acidophilus* milk its name.

How they work: Probiotics regulate the balance of bacteria in the colon and interfere with the ability of pathogens to cause infection. They make colonic contents more acidic, which is a good thing. They secrete proteins which directly kill other bacteria, or stimulate the immune system to do so.

Probiotics block pathogens' ability to bind to and establish themselves in crypts and folds of colonic tissue. The question is, how? Since a few billion probiotic bacteria in a capsule are vastly out-numbered by the colon's bacteria, the likelihood that they work by direct interference or replacement is miniscule.

Instead, their major contribution to colonic health probably resides in widespread effects on the intestinal immune system. They regulate the good and bad 'cytokines', molecules that influence inflammation. They also stimulate helpful lymphocytes and suppress the inflammatory ones, thus regulating the immune response to viruses and bacteria. Some of these properties are observable only with living organisms, while others can be accomplished even if they have died, probably because of released proteins.

Because of the multiple effects on different cells and cytokines in the intestinal immune system, we cannot attribute probiotics' beneficial effects to a single mechanism. In turn, different probiotic bacteria differ from each other, and no single probiotic bacterium is capable of all potential probiotic beneficial tasks. The differences probably relate to their unique surface molecules and products they secrete. Thus, each probiotic might prevent disease by some pathogenic bacteria but not others.

Further variability relates to the host (i.e., you). Each person's response to a given probiotic formulation will vary. At least some of an individual's response depends on the types of bacteria already living in their colon, with which the probiotic must interact.

Uses: Probiotics have proven benefit for infectious diarrhea, including that caused by food poisoning, rotavirus and travelers' diarrhea. Probiotics also help some people with recurrent vaginal yeast or bladder infections. "Pouchitis", an inflammation of a remnant pouch created after removal of the colon, improves with probiotics.

At times antibiotics can disrupt the healthy bacterial balance in the colon, so that a toxigenic bacteria, *Clostridium difficile* may grow, causing a type of antibiotic-associated colitis. A probiotic containing *Lactobacillus casei*, *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, taken for 2 weeks longer than the course of antibiotics, reduces the chance of this happening.

Probiotics may alleviate irritable bowel syndrome symptoms (see related article, *Irritable Bowel*, this issue). In one study a probiotic mixture reduced gas passage, abdominal distention, pain and borborygmi (I've always liked that word – it means loud bowel sounds).

Lactobacillus species normally exist in our stomachs and are relatively able to resist killing by stomach acid. They might contribute to suppression of *Helicobacter pylori*, a water organism that causes gastritis and stomach ulcers. Some strains of *Lactobacillus* and *Bifidobacterium* used in probiotics are able to keep *Helicobacter* in check and block it from causing disease. Probiotics do not eradicate *Helicobacter pylori* by themselves, but aid antibiotics in accomplishing the goal.

Probiotics are often used as adjuncts to treatment of inflammatory bowel disease, including Crohn's colitis and ulcerative colitis. In these diseases the colon's bacterial and immune balance is upset, leading to inflammation, pain, diarrhea, bleeding, bowel obstruction and abscesses. Probiotics help to restore a healthy balance and counter the inflammation. They work best in mild disease rather than severe, established disease, in which their effect may be overwhelmed by an ongoing and robust inflammatory response. Probiotics also prevent relapse in patients whose disease has temporarily abated.

Stress may put us at risk for intestinal inflammation. Rats subjected to chronic psychological stress have dysfunctional colons, in which the lining is less able to block out bacteria and is more likely to become inflamed. Probiotic exposure helps to prevent the breakdown.

Claims that probiotics cure a myriad of other diseases abound. We are in the phase of discovery, in which excitement about potential probiotic uses exceeds the speed with which studies can be done. In the meantime, promoters tout extraordinary and widespread benefits of this 'new' therapy before studies can verify them. The claim that probiotics reduce symptoms of food allergies and lactose malabsorption fall into this category of claims.

Caution: Probiotics are not always healthy. Live bacterial probiotics should not be used in patients with acute pancreatitis. A recent study showed they cause death due to loss of circulation to the bowel (ischemic colitis). Those people whose job it is to make recommendations have suggested we avoid probiotics in critically ill patients with compromised small bowel function, generalized inflammation or poor circulation.

Formulation: Typical bacteria used in probiotic combinations include various species of *Lactobacillus* (abbreviated L.), *Bifidobacteria* (abbreviated B.), *Streptococcus* and *Saccharomyces*. Not all species within these genus' are safe as probiotics. The following have been studied, with beneficial effects in at least some disease conditions: *Streptococcus thermophilus*, *L. acidophilus*, *L. salivarius*, *L. helveticum*, *L. rhamnosus GG*, *L. casei*, *L. johnsonii*, *L. paracasei*, *L. reuteri*, *L. gasseri*, *B. adolescenti*, *B. lactis*, *B. infantis*, *B. breve*Bb99, *Saccharomyces boulardii*, and *Propionibacterium freudenreichii* ssp. *shermanii* JS.

The labeling of many probiotic products is substandard, so it's often not clear how much of which bacteria are in the mix. A label will say how many billion bacteria were put in the capsule, but give no estimate of how many are still alive over time. There is no standardization for reference dose or the dose that may be effective for any given condition. I usually recommend a probiotic with multiple different bacterial species, because one bacterial type usually does not accomplish all desired effects.

Dose: Capsules generally contain billions of bacteria. There is no way to tell which bacterial types you need or whether you need the 'live' capsules that require refrigeration or not. Take with meals, about three times a day, usually until symptoms abate.