

PROBIOTICS REVISITED—Jon Barron

Let's face it; probiotics are hot. Yes, it's true that for many years they were confined to the outer fringes of the alternative health market -- restricted to yogurt, sauerkraut, and the small dedicated market that regularly purchased probiotic supplements on faith. In fact, when I first started writing about their importance 20 years ago, you could count on one hand the mainstream authorities who promoted them. But oh my! How things have changed over just the last 18 months. Suddenly, probiotics are the second coming -- frequently pitched by those in the functional food industry as the next Omega-3.

- * Probiotics the New Trend for Children**
- * Dannon Activa with Bifidus Regularis**
- * Probiotic Food Bars**
- * Breakfast Cereals with Added Probiotics**
- * Probiotics Added to Meat -- No Really, I'm Not Kidding**

In this two part series, we'll take a look at the truth behind the hype. We'll discuss what probiotics are and explore the positives and the negatives (yes, there are "potentially" some negatives) behind supplementation. And we'll discuss how to choose an effective supplement for your own personal health program. In Part 1 of the series, we'll explore exactly what probiotics are and what benefits you can expect from supplementation.

What are probiotics?

The simple definition of probiotics is that they are live, naturally-occurring microorganisms (usually bacteria) that function internally to promote healthy digestion, boost the immune system, and contribute to general health. But the more complete definition is far more interesting.

acidophilus

Before you were born, your intestines were free of microorganisms. They were virtually sterile. From the moment you passed through the birth canal, however, bacteria, both beneficial and harmful, entered through your mouth and began a fight for dominance destined to continue until the day you die. If you were breast fed, somewhere between days four and seven after you were born, the "good guys" decisively turned the tide of battle and staked their claim to virtually every square inch of your digestive tract -- from your mouth to your anus. (Note: the same battle is fought in the vaginal tract, the nasal cavities, and in the mouth.) The formal battle, however, is not decisively won until around age 6, at which point your immune system is fully trained. If for any reason your intestinal flora are severely compromised (such as being subjected to a round of antibiotics) before that age, it can negatively impact your health for the rest of your life.

Truth be told, it's a battle that's never totally won; the harmful bacteria are never completely eliminated. But in a healthy body, the bad guys never get a chance to gain a foothold -- to colonize -- to reproduce exponentially and cause illness. One of the problems, of course, is that every second of every single day, we are constantly being exposed to billions and billions of potentially harmful microorganisms with every breath we take or every bit of food that we swallow or swig of water that we drink. (Researchers now realize that one of the chief reasons breast-fed babies get so many fewer infections than formula-fed babies is that mother's milk tends to promote the growth of beneficial bacteria in the gastrointestinal tract, whereas store-bought formulas have no such beneficial effect.)

Anyway, the net result is that in a breast-fed baby, beneficial bacteria (such as acidophilus and bifidobacteria) control over 90% of the intestinal tract. These microorganisms, in turn, produce a large amount of essential byproducts in the intestines, which act as a barrier to the growth of dangerous pathogenic microbes that can cause disease and infection.

When you're healthy, over 100 trillion microorganisms from some 400 different species flourish in your intestinal tract, aiding in digestion, absorption, and the production of significant amounts of B vitamins, vitamin K, and enzymes. (Just as a side note, there are some 40 different types of bacteria resident in a healthy mouth alone.) But even more importantly, these beneficial bacteria cover virtually every square inch of available surface space from your mouth to your anus, thus crowding out all harmful bacteria -- allowing them no place to gain a foothold.

Unfortunately, the levels of beneficial bacteria decline dramatically as the human body ages. Some of the reasons for this decline include:

- * Over time, the colonies of friendly bacteria just naturally age and lose their vitality. (Think of it like a royal family that eventually fizzles out after years of inbreeding.)

- * Disruptions and changes in the acid/alkaline balance of the bowels can play a major role in reducing the growth of beneficial bacteria. In addition, these changes tend to favor the growth of harmful viral and fungal organisms as well as putrefactive, disease-causing bacteria.

- * Non-steroidal anti-inflammatory drugs (NSAIDS) like Advil, Motrin, Midol, etc. are destructive to intestinal flora.

- * Chlorine in the drinking water not only serves to kill bacteria in the water; it is equally devastating to the colonies of beneficial bacteria living in the intestines. The problem is that nature abhors a vacuum, and harmful bacteria then move in to occupy the abandoned "plots."

- * Radiation and chemotherapy are devastating to your inner bacterial environment.

- * Virtually all meat, chicken, and dairy that you eat (other than organic) is loaded with antibiotics, which destroy all of the beneficial bacteria in your gastrointestinal tract.

* A diet high in meats and fats, because they take so long to break down in the human body, promotes the growth of the harmful, putrefying bacteria.

* Constipation, of course, allows harmful bacteria to hang around longer, which allows them to proliferate.

* Cigarettes, alcohol, and stress are also major culprits, as are some antibiotic herbs, such as goldenseal (if taken in sufficient quantity and/or used too frequently).

* And if you've ever been subjected to a round of "medicinal" antibiotics, you can kiss your beneficial bacteria goodbye. The problem is that antibiotics indiscriminately destroy both bad and good bacteria, allowing virulent, mutant strains of harmful microorganisms to emerge and run rampant inside the body. Antibiotics (both medicinal and in our food supply) are the number one culprit in the overgrowth of harmful pathogens in the gastrointestinal tract (a condition called dysbiosis).

Diseases associated with low levels of beneficial bacteria can include: acne, ADHD, allergies, arthritis, asthma, bladder and urinary-tract infections, breast pathologies, cardiac problems, chronic fatigue, colitis, colon cancer, compromised immunity, constipation, diarrhea, diverticulitis, ear and respiratory infections in children, eye, ear, nose and throat diseases, foul breath and body odor, gastritis, headaches, hormonal imbalances, IBS, liver and gallbladder problems, migraine headaches, ovarian and uterine cancers, PMS, sinus problems, spastic colon, stomach bloating, and vaginal yeast infections.

intestinal tract A properly functioning intestinal tract is one of your body's first lines of defense against invaders. In a healthy colon there are, on average, well over 100 billion beneficial bacteria per milliliter (about 1/5 of a teaspoon) that literally consume harmful bacteria and other invaders. In the typical American, because of poor diet and neglect of the colon, the beneficial bacteria count may be as low as four or five per milliliter. Just compare 100 billion to four (not four billion, just plain old four), and you'll have an understanding of the scope of the problem. Many researchers now believe that declining levels of friendly bacteria in the intestinal tract may actually mark the onset of chronic degenerative disease. The benefits of a probiotically optimized intestinal tract include:

- * Lower cholesterol.
- * Assists in the digestion of carbohydrates.
- * Helps prevent constipation.
- * Inhibition of cancer.
- * Protection against food poisoning.
- * Protection against stomach ulcers.
- * Protection against lactose intolerance and casein intolerance.
- * Enhanced immunity.
- * Protection against many harmful bacteria, viruses, and fungi.
- * Protection against Candida overgrowth.

- * Prevention and correction of constipation and diarrhea, ileitis and colitis, irritable bowel syndrome, and a whole range of other digestive tract dysfunctions.
- * Improvement in the health and appearance of the skin.
- * Better nutrition from improved absorption and the internal generation of B vitamins and vitamin K.
- * Protection against vaginosis and yeast infections.
- * By killing off invading pathogens and producing immune boosting bio-chemicals such as transfer factor and lactoferrin, beneficial bacteria are responsible for 60-70% of your immune system's activity.

Are there any studies to support the benefits of probiotics?

And the answer is: "sort of." Certainly, many doctors are skeptical concerning the benefits of probiotic supplements, pointing out that when you take a dose of lactobacillus, 99% are killed by the acid in your stomach before they even reach your gut. (More on this piece of nonsense in the next issue of the newsletter.) The truth, however, is far more nuanced -- and the true answer appears to be that, yes, probiotics do indeed provide the promised benefits (under certain conditions). And, as we will learn later, the negative studies are far less substantive than they might first appear. With that in mind, let's take a look at some of these studies.

Probiotics and irritable bowel syndrome (IBS)

Over the years, studies relating to the benefits of probiotics in dealing with intestinal disorders such as IBS and Crohn's disease have been ambivalent -- but over time, the scientific evidence in support of benefit is becoming preponderant.

For example, researchers at Dundee University tested a probiotic of their own creation on ulcerative colitis patients and found that virtually all benefited. But that was contradicted by a 2004 study in the Drug and Therapeutics Bulletin that found the benefits of probiotics in intestinal disorders inconclusive at best. Then again, other studies have shown that the ingestion of probiotics can play a demonstrably effective role in the prevention of colon cancer.

And just a few days ago, the results of several favorable studies were announced at the annual meeting of the American College of Gastroenterology. One study, in particular, clearly concluded that probiotics were "safe and significantly more effective than the placebo in alleviating IBS-related symptoms (abdominal pain/discomfort, bloating, and stool dysfunction) in children and teenagers."

Probiotics and the immune system

A 1995 study published in the Journal of Dairy Science concluded that Lactobacillus casei could prevent infections and that yogurt could inhibit the growth of intestinal carcinoma through increased activity of IgA, T cells, and macrophages.

Other research has shown that the intake of probiotics has a number of effects on the immune system such as increased production of IgA antibodies, increased macrophage activity, and increased phagocytosis. In addition supplementation of certain beneficial bacteria also decreases the number of inflammatory mediators like TNF-a and a -1-antitrypsin.

Then again, earlier this year, the journal *Clinical & Experimental Allergy* published the results of a study conducted by the Institute of Food Research that found that probiotic bacteria in a daily drink can modify the immune system's response to grass pollen, a common cause of seasonal hay fever.

And just this month, yet another study found that the DNA of so-called "good bacteria" that normally live in the intestines may help defend the body against infection. As reported by Yasmine Belkaid, Ph.D., and her colleagues in the Laboratory of Parasitic Diseases at the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health, "During an infection, we've found that commensals [probiotics] can break this balance in favor of an infection-fighting response."

In effect, Dr. Belkaid found that probiotics can boost the activity of T cells so they destroy invading pathogens.

Probiotics and colon tumors

The use of probiotics and prebiotics to prevent colon cancer has gained much attention due to positive outcomes from in-vivo and molecular studies. Various mechanisms have been proposed, including their anticarcinogenic effects, antimutagenic properties, modification of differentiation processes in tumor cells, production of short chain fatty acids, and alteration of tumor gene expressions. As with almost all studies on probiotics (as we've already mentioned), study results are mixed. This is not necessarily surprising considering the wide variety in probiotic cultures tested, not to mention the wide variety of strains even within a single culture. Nevertheless, the overwhelming evidence seems to demonstrate that the use of probiotic supplements can indeed offer a small but significant inhibition of colon tumors.

Probiotics and cholesterol

Numerous studies have found a positive link between the consumption of probiotics and improved serum cholesterol numbers. For example: according to a clinical trial published in the *European Journal of Clinical Nutrition*, women who eat yogurt every day may experience a statistically significant increase in the level of their "good" cholesterol. The study also noted that this beneficial effect can be magnified by supplementing the yogurt with probiotics and a prebiotic such as fructo-oligosaccharides.

Probiotics and constipation

In addition to hundreds of years of anecdotal evidence, there are a number of scientific studies on both the young and the old demonstrating the ability of probiotics to help relieve the symptoms of constipation.

Probiotics and Candida

Then there have been a number of studies that show that probiotic supplementation can be an effective adjunct to any program designed to control Candida overgrowth. Interestingly, the beneficial effects of probiotics on Candida appear to be multifaceted. It seems that probiotics can:

- * Inhibit the ability of the Candida to adhere to the intestinal wall**
- * Inhibit the actual growth of Candida**
- * Produce hydrogen peroxide, makes the gut (and the vaginal area) inhospitable to Candida**
- * Produce bacteriocins, which are antimicrobial compounds that kill yeasts such as Candida, in addition to viruses and bad bacteria**

Probiotics and Crohn's

And finally, just hours ago (literally between drafts of this newsletter), a French study was released that indicated that a shortage of naturally-occurring bacteria, *F. prausnitzii*, might actually be the determining factor in the onset of Crohn's disease. According to the researchers, *F. prausnitzii*, when present, secretes a biochemical that helps throttle down the body's immune system response in the gut, thereby helping control inflammation. If levels of the bacteria drop too low, inflammation (i.e. Crohn's) results.

While still only a theory, the research behind it, nevertheless, points once again to the importance of probiotics cultures in maintaining optimum health.

Probiotics and your appendix

appendixBefore we wrap up today's newsletter, there's a fun item that recently came to light. A new study has found a potential connection between your appendix and beneficial bacteria in your intestinal tract. It seems the appendix may not be quite as useless as doctors have assumed all these years. Actually, given enough time, it seems that doctors are finding that no part of the body is useless -- that all parts seem to have important (if sometimes obscure) health functions. (Actually, that sentence alone could be worth an entire newsletter when you think about it.)

So what is this newly hypothesized function of the appendix, its *raison d'être*?

Well, according to William Parker, Ph.D., assistant professor of experimental surgery, who conducted the analysis in collaboration with R. Randal Bollinger, M.D., Ph.D., "While there is no smoking gun, the abundance of circumstantial evidence makes a strong case for the role of the appendix as a place where the good bacteria can live safe and undisturbed until they are needed." In other words, it looks like the human appendix serves as a "safe house" for beneficial bacteria to grow and remain in reserve for such time as they may be needed in "re-inoculating" the colon in the event that the contents of the intestinal tract are purged following exposure to a pathogen. For example, the reserve of beneficial bacteria in the appendix can help the body ride out a bout of diarrhea that completely evacuates the intestines, thus flushing all beneficial bacteria from the gut.

It should be noted that researchers have known for some time the appendix contains immune system tissue. It now appears that the immune system cells found in the appendix are there to protect, rather than harm, the good bacteria.

In addition, this new research confirms the fact that in a healthy intestinal tract, beneficial bacteria are instrumental in creating a biofilm comprised of microbes, mucous, and immune system molecules that coats the lining of the intestines, thus literally preventing harmful bacteria from taking root. As Dr. Parker says, "Our studies have indicated that the immune system protects and nourishes the colonies of microbes living in the biofilm. By protecting these good microbes, the harmful microbes have no place to locate. We have also shown that biofilms are most pronounced in the appendix and their prevalence decreases moving away from it."

The case for probiotics

From what I've presented, it would appear that the case for supplementing with probiotics is very strong -- with many studies supporting their benefits. But then how do you reconcile all of the studies that claim inconclusive results? Are supplemental probiotics beneficial or not? In fact, most of the studies that claim inconclusive results are based on using a limited number of cultures (often one particular culture), further limited by the use of a single strain, and testing for a one predefined result that may or may not fall within that particular strains actual benefits. In other words, testing *L. salivarius* for its ability to lower cholesterol (which is not what it does) might lead to a blanket statement that probiotics are not helpful in lowering cholesterol -- whereas the same study using *Streptococcus thermophilus*, *L. acidophilus*, or *Bifidus* would most likely produce entirely different results. On the other hand, testing *L. Salivarius* for its ability to eat away encrusted fecal matter throughout the entire colon would produce positive results. Testing *L. acidophilus* for the same benefit -- not so much.

scales of justice

The problem is that after enough of these true but irrelevant studies get published in peer review journals, they acquire validity, as they say in law, by virtue of a

preponderance of the evidence. In other words, they appear true because there are so many of them. And in fact, it's interesting to note that virtually, every positive study on probiotics now has to begin with a disclaimer acknowledging the multitude of negative studies out there. For example, here's the background statement leading into a quite positive study on the results of probiotics and childhood constipation.

"Inconsistent data exist about the efficacy of probiotics in the treatment of constipation. Several studies in adults with constipation showed positive effects of probiotics on constipation. Inconsistent data exist regarding the effect of a single probiotic strain in constipated children. The aim of this pilot study was to determine the effect of a mixture of probiotics containing bifidobacteria and lactobacilli in the treatment of childhood constipation."

Don't be fooled. The preponderance of the evidence supports the use of supplemental probiotics for a wide range of health supporting benefits. The so-called inconsistency is a manufactured illusion.

Next newsletter on probiotics

In the next issue of the newsletter, we will conclude our series on probiotics by exploring those situations where using probiotics might not be advisable and by examining in detail how you should go about choosing a probiotic supplement.

Probiotics Revisited, Part 2

Date: 11/10/2008

In our last newsletter, we talked about what probiotics are and what the benefits of supplementation might be. In this issue, we conclude our examination of probiotics by exploring:

- * Those situations you need to watch out for when supplementing with probiotics.
- * Why subtle differences in probiotic strains matter -- hugely.
- * What to look for when choosing a probiotic supplement.
- * And some final thoughts on lifestyle choices you might be making that could compromise the benefits you expect to see when supplementing with probiotics.

Issues concerning probiotics

Ecclesiastes 3, verse 1 says, "To everything there is a season, and a time to every purpose under heaven." When talking about probiotics, this would seem to be particularly apt. While it is true that in an overwhelming number of cases supplemental probiotics are beneficial, there are indeed a handful of circumstances where they may not be recommended. Incidentally, these are things you probably haven't heard much about since they run counter to the probiotic hype currently sweeping the functional food market.

Probiotics and obesity

A study published last year in *Nature* rippled through the media. In summary, it said that "good" bacteria (from Phyla Firmicutes, which includes most of the bacteria found in probiotic formulas such as acidophilus) make people fat, whereas "bad" bacteria (Phyla Bacteroidetes) make people lean. To put it in simpler terms: according to the study, when it comes to losing weight, the bacteria that we normally call "good" (*L. acidophilus*, *L. salivarius*, *L. bulgaricus*, *L. plantarum*, etc) are "bad." And the bacteria that we used to think of as "bad" are in fact "good." Isn't that a head spinner?

But it gets even more interesting. In a companion study, they found that the ability to lose weight seems to be transferable -- at least in mice -- as evidenced by the results seen when transferring "bad" bacteria from the bowels of lean mice into fat mice. Based on this study, some medical authorities in the media were predicting a whole new way to treat obesity by transferring "bad" bacteria into the colons of overweight people. (Don't think about that too much. It can conjure up some rather unpleasant images.)

On the other hand, don't panic. These studies are not necessarily what they seem at first blush -- although they most assuredly give one pause. The simple truth of the matter is that beneficial bacteria can cause you to gain weight because they help you digest your food better. Only in America could getting more nutrition from your food be labeled a "contributing factor to the pathophysiology of obesity." (Check out that phrase. It actually makes better nutrition sound like a disease! That's pretty twisted.)

Probiotics and pancreatitis

According to a study published in *Lancet* in Feb 2008, in patients with severe acute pancreatitis, the use of probiotic supplements did not reduce the risk for infectious complications and was associated with an increased risk for mortality. Although the difference in infectious complications was not large, 30% in the probiotics group versus 28% in the placebo group, the difference in mortality rate was a notable 16% in the probiotics group versus 6% in the placebo group.

"Whether other (combinations of) strains might have resulted in different results is debatable, but, until the underlying mechanism is actually revealed, administration of probiotics in patients with predicted severe acute pancreatitis must be regarded as unsafe," the study authors concluded. "Most importantly, probiotics can no longer be considered to be harmless adjuncts to enteral nutrition, especially in critically ill patients or patients at risk for non-occlusive mesenteric ischaemia." [Translation: We don't recommend feeding probiotics directly into the stomach with a plastic tube in cases where someone has inflammation of areas associated with the small intestine.]

It should be noted that only one particular multi-species probiotic preparation was tested -- one, incidentally, provided by a company hoping to market that mix

specifically to help with pancreatitis...theoretically. This fact alone (along with other limitations acknowledged by the study's authors) limits the usefulness of the study in terms of making conclusions about probiotics in general, but at the very least it brings to mind Ecclesiastes, as I cited earlier. "To everything there is a season."

Probiotics can cause infection

Lactobacillus species are a rare but well-recognized cause of infection of the heart lining in adults (and other forms of infection in children). Several reports have directly linked cases of bacterial sepsis to the ingestion of probiotic supplements. Specifically, people with weak immune systems may be at risk of developing a serious infection when taking Lactobacillus acidophilus. People who have had an injury or illness of the intestinal wall; who have had illness that makes them prone to getting infections; who take prescription drugs, such as corticosteroids (prednisone), that may make them vulnerable to infections; who have had surgery to replace a heart valve; or who have a heart murmur should speak with a health care professional before taking acidophilus.

The DNA of probiotics

As we discussed in the last newsletter, our intestinal tracts are sterile when we're born, but even as we pass through the birth canal we begin swallowing bacteria and populating our intestinal tracts with colonies of bacteria. When we eat food, put our hands in our mouths, kiss someone, or eat fermented food, we are allowing new bacteria to enter our intestinal tracts and begin forming colonies. And this was even more true 100 years ago before modern supermarkets and the mass sanitation of our food supplies. We got beneficial bacteria from our raw dairy products delivered straight from the farm -- before pasteurization. We got bacteria from our fruits and vegetables plucked straight from the ground or off the vine. And once inside, these bacteria multiplied inside us by the trillions until they outnumbered the cells in our body.

The interesting thing, though, is that each person has a unique array of bacterial cultures in their gut -- influenced by whose hand you shook, the food you ate, and where your food was grown. A person who grows up in Kenya, Africa is going to have an entirely different probiotic system than a person who grows up in Wasilla, Alaska. Not necessarily better or worse, just different -- by virtue of exposure to different bacteria during the course of their lives. And even in those cases where the bacteria may be of the same species, Lactobacillus acidophilus for example, the strains are likely to be entirely different -- as is the DNA of that bacteria.

What this means is that the intestinal tract in Kenya is likely to be better at digesting ugali, a thick, polenta-style cornmeal porridge eaten by almost everyone in Kenya, whereas the Alaskan digestive tract is likely to be better at digesting moose and elk. This can affect everything from susceptibility to weight gain, allergies, and even many diseases. It has become increasingly clear that different bacteria provide people with different advantages and disadvantages. Certain bacteria (*H. pylori*) have been linked to the incidence of stomach ulcers, but take away those bacteria

with antibiotics, and you are likely to see a higher incidence of asthma, hay fever, allergies, and eczema. (One of the key reasons I prefer mastic gum for dealing with ulcers.)

The bottom line is that subtle differences in bacteria -- or even differing genes in similar strains of bacteria can play a major role in terms of which bacteria can help us or hurt us.

Perspective on probiotics

All in all, the potential benefits of probiotics far outweigh any negative potential -- with that potential being either theoretical or specific to people with excessively weakened immune systems or who are already suffering from particular infections such as pancreatitis. That means that if you are not under a doctor's care for any specific condition, then probiotic supplementation should be part of your regular health maintenance program. And if you are under a doctor's care, it doesn't mean that you shouldn't use probiotics -- just that you should check with your doctor first.

The bottom line is that for the vast majority of people, there can be no true health or recovery from disease unless you have colonies of over 100 trillion beneficial microorganisms flourishing throughout your intestinal tract, aiding in digestion, absorption, the production of significant amounts of vitamins and enzymes, augmenting your immune system, and working to crowd out all harmful bacteria -- allowing them no place to gain a foothold. Supplementation with a good probiotic is mandatory to raise your baseline of health.

A good probiotic formula is absolutely essential for long-term intestinal health and long-term parasite control. When choosing a probiotic, look for the following characteristics:

* As we've discussed above, not all strains of beneficial bacteria are created equal. For each type of bacteria, there are recognized super strains. (See below.) Choose a formula that uses only recognized super strains of beneficial bacteria. They will be identified as such on the label or in the company literature. If the strains are not identified, don't buy it.

Make sure the formula you choose was developed using full-culture processing so that the beneficial bacteria and its powerful supernatant are kept together. The supernatant, which is the medium the culture was grown in, contains a multitude of beneficial byproducts of the growth process, including vitamins, enzymes, antioxidants, and immune stimulators.

Then there's the question of how many live microorganisms are left in your formula when you actually use it. Pick up any probiotic formula, look at the label, and you'll see something like: "Contains 13 billion live organisms per capsule at time of manufacture." And that's the problem: "at time of manufacture." The die-off rate can be astounding. Most formulas will experience a die-off approaching log -3 (or down

to a paltry 13 million) within just 60 days of manufacture. Heat and moisture accelerate the process, which is why most manufacturers recommend that both you and the store from which you bought your formula keep your probiotic supply refrigerated. An alternative is to look for formulations that use tableting and encapsulation techniques that seal the bacteria from moisture. But even then, refrigeration is recommended.

Some manufacturers claim that you need to use enterically coated capsules to protect the bacteria from stomach acid, which kills the bacteria; but this makes no sense. If stomach acid universally killed beneficial bacteria, then no one who ate fermented foods over the centuries would have received any benefit from the bacteria they contained since all of the bacteria in those foods would have been destroyed by stomach acid. Nonsense! And in fact, those same manufacturers, in an astounding self-contradiction, usually cite the long lives of Russian peasants who eat these probiotic rich foods as proof of the value of their own formulas. Bottom line: beneficial bacteria do not need to be enterically coated. As long as you choose strains that have been specifically developed (or have naturally evolved) to survive stomach acid, they will indeed survive stomach acid quite nicely.

On the other hand, some modern strains of bacteria used in dairy products have been custom bred to optimize the fermenting of the dairy products -- in terms of speed and taste, for example, not to survive stomach acid. Think of commercial tomatoes as a comparison. The modern tomato has been bred for enhanced eye appeal, to resist cold temperatures in the field, and to have a thick skin so that it does not bruise when transported by the hundreds of thousands in giant bin trucks. In other words, the modern tomato is not bred for taste. So that's what you end up with -- rugged, red, tasteless tomatoes. And what does that have to do with probiotics? Quite simply, many strains have been bred to optimize the production of a product -- not to survive intact in the varying pH environments of the human stomach and gut. On the other hand, the DDS Acidophilus strain, for example, was specifically researched and developed to survive stomach acid, not to mention have better retention, multiply rapidly, and combat yeast and fungi. In summary, if you stick to recognized super strains that have been bred for use in supplements, you will have no problem.

What species and strains of probiotics do you want in your supplement?

At one time, this was a fairly easy question to answer. Not anymore. Thanks to the "buzz" surrounding probiotics, new strains are appearing almost daily. (Engineering new strains is fairly easy to do.)

Why so many new strains? It's because manufacturers are trying to isolate new beneficial features that can be used to provide a marketing advantage over the competition. For example:

* Dannon's Activa with Bifidus regularis was specifically created to "help naturally regulate your digestive system."

* Yakult, with L. casei Shirota was created to optimize the health of the intestinal tract and boost your immune system.

Are they good? Are they bad? Do they work?

Yogurt

The answer is somewhat mixed. Some work better than others. The biggest problem is that often the virtues of the new strains are promoted based on limited studies or short term observation. They don't necessarily have the long term track record that some of the more established species and strains have. That doesn't make them bad or useless -- just less proven. For example, although initial studies indicated that Activa was indeed helpful, subsequent reevaluation of those same studies were less positive and resulted in a class action lawsuit against Dannon for making false claims. As for Yakult, several million users attest to its benefits, but subsequent studies have not necessarily supported that anecdotal evidence -- at least as it pertains to boosting the immune system.

The bottom line on new strains is that they are unproven. Some may be highly beneficial -- often even better than their predecessors -- but they have not yet stood the test of time. For my part, when choosing a probiotic formula, or designing my own for that matter, I prefer to stick with the tried and true. Once a new strain has stood the test of time and demonstrated its benefits with no unexpected side effects, I'll then consider it to be one of the tried and true.

With that in mind, there are many beneficial bacteria that can be contained in a good probiotic, but two are preeminent. Look for a formula based on these two:

* *L. acidophilus* resides primarily in the small intestine and produces a number of powerful antimicrobial compounds in the gut (including acidolin, acidophilin, lactocidin, and bacteriocin). These compounds can inhibit the growth and toxin producing capabilities of some 23 known disease-causing pathogens (including campylobacter, listeria, and staphylococci), as well as reduce tumor growth and effectively neutralize or inhibit carcinogenic substances. There are three recognized super strains of acidophilus: DDS, NAS, and BT1386. It's also important to note that *L. acidophilus* is the primary beneficial bacteria in the vaginal tract. When the presence of the acidophilus is compromised, this allows the bad guys such as Gardnerella vaginalis or E. coli or Chlamydia to take over. This is particularly important to women to help prevent a whole range of vaginal infections.

* Many researchers believe that declining levels of bifidobacteria in the large intestine actually mark the eventual onset of chronic degenerative disease.

Bifidobacteria benefit the body in a number of ways. They:

- o Consume old fecal matter.
- o Have the ability to remove cancer-forming elements, or the enzymes which lead to their formation.
- o Protect against the formation of liver, colon, and mammary gland tumors.

o And in addition to all of that, bifidobacteria are substantial producers of a range of important B vitamins.

More is not always better. Too many beneficial bacteria in one formula may find the bacteria competing with each other before they can establish themselves in separate areas of the intestinal tract. On the other hand, there are several other bacteria that are extremely beneficial in any probiotic formula.

* *L. salivarius* is one of my favorites. It helps digest foods in the intestinal tract and makes vital nutrients more assimilable. It also works to eat away encrusted fecal matter throughout the entire colon; it helps repair the intestinal tract by providing needed enzymes and essential nutrients; and it adheres to the intestinal wall, thereby forming a living matrix that helps protect the mucosal lining.

* *L. plantarum* has the ability to eliminate thousands of species of pathogenic bacteria. It also has extremely high adherence potential for epithelial tissue and seems to favor colonizing the same areas of the intestinal tract that *E. coli* prefers -- in effect, serving to crowd *E. coli* out of the body. At one time, *plantarum* was a major part of our diets (found in sourdough bread, sauerkraut, etc.), but is now virtually nowhere to be found.

* *L. salivarius* and *L. plantarum* work well in tandem. They both flourish in the digestive tract and function as scavengers, working to eat up the hardened, "sludge" that has built up on the lining of the intestinal wall. They also work down in the bowel to loosen encrustations of fecal matter off of the colon walls. In addition, they destroy much of the *E. coli* bacteria found in the colon. Their partnership extends to the fact that *L. Salivarius* primarily targets bad bacteria, while *L. plantarum* targets viruses.

* *L. rhamnosus* is a powerful immune stimulator. It inhibits the growth of most harmful bacteria in the intestine. It can increase the natural killing activity of spleen cells, which may help to prevent tumor formation. It boosts the ability of the body to destroy foreign invaders and other harmful matter by three times normal activity; and has been shown to increase circulating antibody levels by six to eight times. *L. rhamnosus* supplementation has been associated with the prevention or alleviation of everything from lactose intolerance, diarrhea, constipation, inflammatory bowel disease, and food allergies. And finally, in animal studies, *L. rhamnosus* has been shown to inhibit the growth of colon tumors.

* Other important friendly bacteria you might find in a good formula include: *Streptococcus thermophilus*, *L. bulgaricus*, *B. longum*, and *L. casei*.

* Much has been written about the properties of the soil-based bacteria such as: *Bacillus subtilis*, *L. sporogenes*, and *B. laterosporus*. For many people, they can produce a powerful boost to the immune system, and I am not opposed to their use. But, in certain circumstances, they may become toxic. It's hard to argue with the great results that many people have had using formulations that contain these cultures. On the other hand, it's possible to get all of the same results using only the cultures that I've mentioned above.

* Note: a good probiotic formulation will usually contain fructo-oligosaccharides (FOS) which help promote the growth of beneficial bacteria. For some of these

bacteria, such as Bifidus, FOS can increase their effectiveness by a factor of 1,000 times or more!!

Other things to consider when supplementing with probiotics include:

*** Start slowly. When you first start using a probiotic supplement, there is a good chance that you will precipitate a die-off of bad bacteria in your intestinal tract. This can lead to excessive gas and stomach rumblings and cramping for 10-21 days. Start with one capsule (or even half) for several days. Build up slowly to the recommended dosage for your particular supplement.**

*** One final note: eating yogurt (unless you make your own) does not really help. First, the bacteria used to make most yogurt (*L. bulgaricus* and *S. thermophilus*) are not the key beneficial bacteria, although they are indeed helpful. (Some brands throw a small amount of acidophilus in after the fact -- just so they can put it on the label). Even more important, though, much of the yogurt that you buy in the store is now pasteurized after it is made. Pasteurization before the yogurt culture is introduced is essential to the making of yogurt; but pasteurization after the culture has been allowed to grow is done merely to increase shelf life and totally destroys all the benefits inherent in the yogurt. When choosing yogurt in the store, make sure that the cultures are still living. If it doesn't say "live, active cultures" on the label, don't buy it.**

*** A diet high in complex carbohydrates such as fruits, whole grains, and vegetables promotes the growth of bifidobacteria in the large intestine. Heavy meat consumption does just the opposite, and in fact promotes the growth of *E. coli*. If you eat meat, keep consumption to 3 ounces a day or less.**

*** Avoid antibiotics when possible. And if circumstances necessitate that you do undergo a round of antibiotics, always make sure to replenish your beneficial bacteria immediately upon completion of the antibiotics. Recolonize the good guys before the bad guys have a chance to take their place. Remember, nature abhors a vacuum. If you don't supplement with good bacteria, bad bacteria will move in, and you will suffer from dysbiosis.**

*** And of course, drinking chlorinated water, or eating meats or dairy produced with antibiotics, totally defeats any program you're on.**