PROBIOTICS:

BENEFICIAL BACTERIA FOR
HEALTH AND LONGEVITY

by

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Why Read This Book?

It is likely that you or a friend or family member suffers from a medical condition for which, as in my case, conventional therapies have failed. This is very common for the majority of chronic, nagging diseases that are treated by prescription and over the counter drugs. Or you may prefer a more natural approach that enables your body to actually heal rather than to just escape from symptoms. Regardless, this book is not intended for self-diagnosis, self-medication, or substitution for appropriate intervention by a health care professional, even one who is trained in complementary and alternative medicine. In fact, the best use of this book might be for you to take the knowledge you have gained from it to your physician so that, together, you can determine the best way for you to get and stay healthy.

This book also provides you with a tool to educate your doctor on the use of probiotics. Doctors do not learn about probiotics in medical school, and once in practice their continuing education depends largely on pharmaceutical sales people and promotional materials that tout the use of patented drugs. Doctors don’t have time to spend more than about 7 minutes with each patient, much less to find out about the broad base of clinical documentation on the uses of probiotics. The merits of probiotics are clear and well-supported in the medical literature, and your health may depend on your doctor’s knowledge and use of these organisms, which means that your health might depend on you educating your doctor about them.

Now you know the basic premise behind probiotic supplements. The remainder of this book explains why they are crucial for maintaining good health and for recovering good health when things go bad. The focus is on the science behind the importance of friendly bacteria in an amazingly broad array of human health issues.
Chapter 1. The Probiotic Decision: A Personal Story

As a university research scientist, I did not fully appreciate the value of probiotics for my own health until I was faced with the consequences of a chronic medical condition for which modern medicine had no cure. Because of my experience, I want you to know how I learned about probiotics and what brought me to write this book. It is a story of how my own health challenge became an opportunity for me to discover one of the greatest health secrets of all time, and how you can benefit from my scientific research, experience, and knowledge about it.

Development of a Health Disaster

My road to probiotics began with a series of disastrous developments involving 20 years of ulcerative colitis. These developments centered around the failure to diagnose my condition correctly, leading to years of ineffective treatment. By the time I finally heard the words, “ulcerative colitis,” I had already realized that modern medicine could only offer me a fancy name for a disease, without any idea on how to cure it. There was not even a safe and effective treatment for the symptoms.

Oh, sure, my doctors had drugs to prescribe for treating ulcerative colitis. One, called azulfidine, had been used since 1952, with only a small benefit as an intestinal anti-inflammatory. The other was prednisone, which is a dangerous corticosteroid. As with drugs in general, the benefits had to be weighed against potential side effects, so azulfidine was the choice for me. Although it offered little help, it also came with fewer side effects. I didn’t realize how ineffective my treatment had been until I reached a point where I almost died from anemia. It is still disappointing to realize that, after decades of research on ulcerative colitis, the options that I had so long ago have not been improved.

In hindsight, it is no surprise that my condition worsened over the years. It finally reached the point where my doctor decided that my colon was precancerous and had to be removed. Although I know better now, I submitted to this strategy out of fear of the consequences of not having the surgery and of ignorance about any possible alternatives. So, without further consideration by me, my colon was removed at the end of 1990. Now I have an internal pouch, called a J-pouch, that was constructed from the end of my small intestine, as a better-than-nothing replacement for my colon.
At first what I felt was a personal medical disaster instead became an opportunity for me to look outside mainstream medicine for ways to help me with my new health challenge. This is when I first learned about probiotics. What a godsend they have been.

My Discovery of Probiotics

One of the drawbacks of having a J-pouch is a condition that medical professionals have creatively named “pouchitis,” which just means that it becomes infected and inflamed by an overgrowth of the wrong kind of bacteria. It is a miserable problem that causes pain, bloody diarrhea, cramping, fever, frequent visits to the bathroom (sometimes every 10 minutes!), and embarrassing accidents when I don’t make it there in time. Even getting a good night’s sleep is simply not possible during bouts of pouchitis.

The conventional treatment for pouchitis is a particular antibiotic called metronidazole, which targets several types of infectious colon microbes, including one called *Clostridium difficile*. This is a type of bacterium that infects the colon when there aren’t enough of friendly bacteria to keep it in check. Side effects that are listed for metronidazole include a metallic taste (it is a lot worse than that), nausea, and diarrhea. Furthermore, the International Agency for Research on Cancer lists it as a cancer-causing drug.

The best strategy for dealing with pouchitis, in my mind, is to prevent it. So when I started looking for alternative therapies for prevention and treatment, I was pleased to find medical research on how probiotics – that is, dietary bacteria – can reduce the frequency of this infection and even relieve its symptoms when it does occur. It made perfect sense to me that enlisting friendly bacteria to fight against the infectious ones would be a big help, which it has been.

Once I discovered the importance of probiotics for addressing pouchitis, my main challenge became finding the best product from among numerous brands and from mountains of information about different strains, different doses, and different manufacturers. As a scientist I was able to sort out the good science from sales hype and choose what I needed. This was time-consuming and tedious, so I’ll save you the trouble of doing what I did by explaining later in the book how you can choose the best probiotics for your own use.
The Bonus for You

As I dug deeper into the scientific research on probiotics, I learned that chronic colon problems often respond well to probiotic supplements. I realize now that I could have slowed and maybe even stopped the degeneration of my colon and brought it back into a more functional, healthy state with the addition of probiotics to my diet when my symptoms first appeared. The bonus for you, therefore, is to benefit from my personal experience and my scientific expertise to learn what you can do to avoid a similar medical disaster.

As a result of my research, I now know that the power of probiotics extends well beyond ulcerative colitis. In fact, I believe that probiotics represent one of the greatest health secrets of all time. I am pleased that modern medicine has finally begun to recognize the role of probiotics for addressing many adverse health conditions. My mission is to enlighten others about this phenomenal natural approach to good health. This book is my way of accomplishing that mission.

Regardless of whether you have ulcerative colitis like I did, or any of a hundred other health disorders, your health will be better when you have a balance of friendly intestinal bacteria working for you. Daily intake of probiotics will support that balance. This is what I discovered, and this is what you will learn about in this book.
Chapter 2. Your GI Tract Does a Lot More Than You Think

Although your digestive system may seem to be simply a tube with the mouth as its entrance the anus as its exit, the wide variety of jobs that it has says more about how complex it really is and why the good bacteria that live there are so important. The main tasks of the GI tract, of course, are to break down bulk food, absorb nutrients, and eliminate waste. It also plays a major role in the immune system. The lining of the small intestine, in fact, houses an astonishing 70% of the immune-producing cells in our body. Furthermore, when digestion is working well and the immune system is strong, we find that the intestines also host more than 400 kinds of bacteria, amounting to several billion cells whose combined weight can reach about 3-4 pounds!

Are You Really What You Eat?

No. It would be more accurate to say that you are what you absorb. Here is how things are supposed to work. Imagine taking a bite out of something nutritious and delicious. Enzymes in your mouth go to work immediately, with the help of oral bacteria, to get the digestive process going before you even swallow. After swallowing, you have additional enzymes in the stomach that continue the process, again aided by friendly bacteria. Still more bacteria and enzymes get to work on this nutritious little bit of food after it moves out of the stomach and into the small intestine. If everything has gone well to this point, the nutrients that were once in your morsel will now begin to pass through your intestinal lining and on to wherever your body needs them.

Unfortunately, a huge glitch often fouls up this ideal scenario – chronic intestinal deterioration. Some of it comes naturally with age. Much of it comes from an imbalance in your community of intestinal bacteria, which is caused by toxins that you ingest. Nutritionists estimate that the rate that people absorb nutrients when the GI tract is healthy decreases by an average of 1% to 2% per year after the age of 25. Toxins that harm our microflora can accelerate this rate to as much as 5% per year. Deterioration that is this fast leads to a dysfunctional system that is in urgent need of repair.

What kinds of problems can you have when you don’t actually absorb the nutrients that you think you are getting from your food? In a nutshell, anything can go wrong. Cancer, cardiovascular disease, allergies, ulcers, anxiety, bad breath, osteoporosis, arthritis, skin problems, yeast infections (candida
overgrowth), poor sleep, and even neurological disorders such as Alzheimer’s disease and autism all have roots in and are made worse by poor nutrient absorption. This is a short list.

*The American Medical Association estimates that at least 85% of all chronic diseases are caused by poor nutrition.*

Enhancing the absorption of nutrients by a healthy and balanced intestinal microflora, therefore, is crucial for the nutrient absorption that you need for good health. Fortunately, in spite of almost constant abuse, your normal microflora can be supported by ingesting probiotics. When you consume good probiotics that help you maintain a well-tuned GI tract, you give yourself a solid foundation for good health.
Chapter 3. Benefits of Good Bacteria

How you feel, good or bad, depends on what you eat. So why would you eat bacteria? Look at it this way: Your digestive system houses bacteria from top to bottom, starting in your mouth and going all the way out the other end. Some of them are good for your health and some are bad. Doesn’t it make sense that having more of the good ones will help you be healthier and feel better? Of course it does, and that’s not all. Modern scientific research on the effects of good bacteria in your digestive system now shows that they are able to prevent, alleviate, and even cure a long list of diseases, including arthritis, food allergies, autism, irritable bowel syndrome (IBS), Crohn’s disease, ulcerative colitis, vaginal infections, eczema, chronic inflammatory disorders, stomach ulcers, and many more – more than 100 medical conditions overall.

Benefits of Eating Bacteria

Science continues to discover the health benefits of good bacteria because so many medical conditions are now linked to the poor health of our normal intestinal bacteria. Indeed, we now know that friendly bacteria – our “good bugs” – are not merely good for your health, they are absolutely required for it. Indeed, our bacteria are constantly doing battle on our behalf against infectious bacteria and other, not-so-friendly microbes. You can imagine it as a war zone, where you depend on a strong and vigorous army of microscopic soldiers to keep you healthy. Scientific research is very clear that, without this army, you would probably be chronically sick and not live as long and as well as you could by harboring a healthy population of friendly intestinal bacteria.

Your Gut Feelings

Normally your gastrointestinal system – that is, your GI tract or “gut” – harbors billions of living microorganisms. Fortunately, most of these microbes are good for you. Less than 1% of all known types of microbes are harmful. Yet they can multiply into overwhelming numbers, destroy the friendly ones, take over your body, and cause anything from mild distress to virulent disease and death.

When you eat the wrong kinds of foods, are exposed to harmful toxins or other dangerous environmental conditions, or otherwise damage the microecology of your gut, you endanger the balance of good bacteria that you depend on for good health. Imbalanced or depleted populations of these bacteria can create a
displeasing sensation, a gut feeling that something isn’t right. Your gut feelings are therefore a constant reminder that your GI tract is or is not working synergistically with your friendly bacteria in digesting your food and absorbing nutrients you need from it.

As you read this book, you will discover that a simple view of your GI tract and the bacteria that live in it is just the beginning for understanding the wide array of activities that happen when you eat. You will also discover that what you think of as your digestive system is much more complicated than just a food-handling operation. The role of probiotics for addressing more than 100 health conditions attests to the importance of the GI tract in almost every aspect of your health.

History of Probiotics

How long have people been benefitting from probiotics? Bacteria in people’s diets have been used for thousands of years, so the answer to this question begins with finding out how people have used them in the past. According to Persian history, one example is Abraham in the Old Testament, who lived a long and healthy life by drinking fermented milk. Another example comes from the 1500s, when King Francis I of France was said to have been cured of an illness after eating yogurt. The best current examples of the benefits of probiotics are from people in certain parts of the world who regularly live to be more than 100 years old and are far healthier than most of us. In a nutshell, they eat fermented food, such as yogurt, that contains lots of live, friendly bacteria. Of course, the notion that dietary bacteria, the probiotics themselves, explain the health benefits of these examples was unknown until the 20th century.

Linking Bacteria to Good Health

The idea of linking probiotics and health came from Dr. Elie Metchnikoff in the early 1900s. During a trip through Eastern Europe, Metchnikoff found that many Bulgarians were more than 100 years old and still in good health. By studying these people and their lifestyle, he determined that the live cultures of bacteria in their yogurt were a key factor in their health and longevity. Metchnikoff experimented on himself to verify this deduction. The result was that he experienced improved health and well-being with regular consumption of sour milk. He is quoted as saying, “When people have learnt how to cultivate a suitable flora in the intestines of children as soon as they are weaned from the breast, the normal life may extend to twice my 70 years.” Specifically, Dr.
Metchnikoff believed that lactic-acid producing bacteria could fight off disease-causing microbes, thus preventing illness and disease that shorten people’s lives.

As noted by Dr. Metchnikoff, the most common place to find probiotic bacteria is yogurt and sour milk. In fact, you may be eating probiotics already – just look at your yogurt container for the words “live cultures” and you will discover that every spoonful contains living bacteria. Yogurt is a food source for certain kinds of probiotic bacteria. Whether your yogurt is actually a health food, however, depends on the kinds of bacteria it contains, how many you get in a serving, and the additives that your particular brand has in it besides cultured milk. Most products that you will find in a typical supermarket contain sugar or artificial sweeteners and other additives that are great entertainment for your taste buds and not necessarily good for your health.

Also keep in mind that milk in the early 1900s was not pasteurized as it is today. Pasteurization easily kills probiotic bacteria, which have to be reintroduced into dairy products to make yogurt. Furthermore, certain kinds of undesirable microbes are not destroyed by pasteurization, which means that when pasteurized milk goes sour it is not good for your health like non-pasteurized sour milk used to be.

Because modern dairy products are so highly processed by pasteurization and the addition of sweeteners, dyes, flavorings and preservatives, they are no longer a good source of the bacteria that you need for replenishing your own intestinal microflora. That’s the main reason why probiotic supplements, in the form of capsules or powder, have become so important for your overall health.

Indeed, it is now possible for you to take probiotic supplements to harness the same old-fashioned simple and powerful strategy for a longer and better life than people used to get from eating naturally cultured dairy products.

Your Bacterial Balancing Act

Think of your GI tract as a battle zone between two armies of microscopic soldiers. One army consists of good bacteria that benefit your health, and the other army is made up of microbes that do you harm. When you have enough of the right good bacteria, they will win the battle and keep you healthy by keeping
the bad microbes (bacteria and yeasts) from making you sick.

How much of a bacterial army do you need? Modern science now holds that, for you to have optimum health, you would typically harbor more than 400 kinds of bacteria in your digestive tract, totaling about 3-4 pounds of bacterial cells. This is when you are healthy.

The bad news in modern times is that our normal gut microflora – that is, all of the friendly bacteria living in our GI tract – is under a continuous assault. This assault includes toxins in our food (especially antibiotics in meat), pollution, prescription drugs, chlorinated water, antacids, chemotherapy and radiation therapy, and nutrient-poor diets that are high in sugar and refined carbohydrates. Such an onslaught means that much more is at stake than the few digestive disorders that you could alleviate with fermented foods in the past. Scientists now believe that a multitude of chronic disorders probably start with and are made worse by an imbalance in our normal gut microflora.

The good news is that a balance of the right kinds and the right amounts of friendly bacteria is possible for everyone, regardless of whether they eat Bulgarian yogurt or any other kind of fermented food every day. This is because modern technology has developed probiotic supplements that are widely available, convenient to take, and cost-effective for good health. As you might expect, however, different probiotic supplements are of different quality, so be sure to read later in this book about how to choose the best ones for your own use.
Chapter 4. Why Are Probiotics So Crucial for Your Health?

Astounding -- that is the best word for describing the effectiveness of probiotics for addressing a huge number of increasingly common health problems that seem to be taking us over. This just means that a major factor for so much bad health is the poor condition of our normal microflora. A short list of health conditions that are associated with an unhealthy gut microflora, besides the usual digestive disorders, includes cardiovascular disease, cancer, the flu and other infectious diseases, so-called autoimmune disorders such as rheumatoid arthritis, and being overweight. There are many others, and you will find out about them later.

Roles of Healthy Microflora

Science has established the fundamental roles of your gut microflora to include a remarkably broad foundation of health benefits. The main roles are as follows

- Help keep harmful bacteria, viruses, and fungi under control
- Fight inflammation
- Promote good digestion, including absorption and elimination
- Prevent both diarrhea and constipation
- Protect the delicate lining of the intestines
- Support healthy immune function
- Provide resistance to infection
- Assist in the production of vitamins

In addition, harmful microbes are all around you, and your friendly bacteria do quite a lot to keep them from blooming at your expense. Friendly bacteria secrete antimicrobial biochemicals that inhibit the growth of the infectious ones, provide a barrier that helps you resist infection, and keep your immune system humming and ready to stop anything that gets by your first lines of defense.
Promoting good digestion is much more significant than it may seem at first. Poor digestion leads to diarrhea, constipation, and even inflammation. Your body suffers from inflammation when undigested food particles escape through your intestinal lining and into your bloodstream, where they don’t belong. Inflammation is at the root of almost all chronic disorders, so seemingly simple digestive help from a healthy microflora can stop a lot of problems before they get started.

Bacteria also enhance the nutritional value of your food by aiding the absorption of nutrients, which is a key to good health. As you age, you gradually lose your ability to absorb vitamins and minerals from food. Nutritionists have found that nutrient absorption can be as low as 10% as efficient at age 50 as it was at age 25. Bacteria are therefore crucial for getting the maximum nutritional value out of your diet. Moreover, whatever nutritional supplements you take will also be of greater value to you when your microflora is balanced and healthy.

Essential vitamins are those that we must get in our diet because our bodies don’t make them. One of these is vitamin B-12. We get a bonus of this vitamin from healthy gut microflora, because friendly bacteria do make it. This is especially important for vegetarians, since fruits and vegetables don’t contain vitamin B-12.

Aid Digestion

The foundation of your overall wellness depends on how well you absorb, retain, and utilize dietary nutrition. Probiotic bacteria are the engines that make this process work. They grow and flourish by absorbing and digesting whatever food you eat, thus providing predigested food as a ready-made source of energy. In order to do this, bacteria produce digestive enzymes for breaking down food and making our digestion more efficient.

Specifically, probiotic bacteria produce enzymes that break down all three of the major food groups. They produce lipases for breaking down fats, proteases for breaking down proteins, and several different enzymes for breaking down carbohydrates. These include lactase, which digests the milk sugar, lactose, in dairy products. One of the reasons that lactose-intolerant people have less trouble with fermented dairy products is because of the lactase that is produced by probiotic bacteria in milk. Lactase production by our small intestines declines with age, so without probiotic bacteria an increased amount of lactose passes into the large intestine, where it is digested by colon bacteria. Overgrowth of
colon bacteria is believed to account for the pain, diarrhea, and gas that characterize lactose intolerance.

Food intolerances and allergies to proteins, most commonly against gluten from wheat and other grains, is a commonly reported complaint whereby complex proteins are difficult to digest due to an imbalance in intestinal bacteria. Probiotic bacteria have been shown to break down these proteins, creating significantly higher levels of free amino acids and often alleviating the symptoms of poor protein digestion.

Promote Liver Function

Food additives, drugs, alcohol, and other foreign chemicals place a strain on the liver in its role to detoxify the bloodstream. Probiotic bacteria can detoxify bile and help eliminate these toxins. This detoxification also includes breaking down estrogens and other hormones, thereby reducing the likelihood of menopausal symptoms, bone loss, and other symptoms of estrogen dominance in women. This detoxification also counteracts estrogen dominance in men, whose symptoms include swollen prostate, loss of libido, and extra belly fat.

Enhance Calcium Absorption and Metabolism

Nutritional scientists have discovered that the absorption of calcium increases when it is taken as part of or as a supplement to food. The explanation for this observation is that food stimulates the stomach to secrete acid and enzymes for digestion. Probiotic bacteria add their own acid to the mix, thereby further increasing stomach acidity and, as a consequence, enhancing the absorption of calcium. As you will read later, antacids destroy this balance by counteracting the acidity that you need for proper digestion and absorption of foods. The bonus that you get from probiotics for your bone health includes the reduction of estrogen dominance, as mentioned above, and more bone-building effectiveness from the calcium in your diet.

Produce B Vitamins

Cultured dairy products contain a higher concentration of B vitamins than whole milk because probiotic bacteria synthesize this group of vitamins, especially folic acid and biotin. Niacin, pantothenic acid, and vitamins B-6 and B-12 are also
made by probiotic bacteria. This vitamin bonus from probiotic bacteria aids
digestion because B vitamins are biocatalysts for digestive enzyme activity.

Produce Vitamin K

One of the key vitamins produced by probiotic bacteria is vitamin K, which helps
blood to clot. Besides being known as a clotting factor, vitamin K has also
recently been discovered to work with a hormone called osteocalcin, which is
needed for binding calcium to bones. Probiotic bacteria therefore have a role in
promoting bone health by producing vitamin K.

This short list of the nutritional benefits of probiotic bacteria leads to a host of
positive affects on human health, many of which are explained later in this book.
As you will see, whatever you do to either harm or to promote the health of your
internal bacteria has a consequence to your health.
Chapter 5. How Are You Destroying Your Friendly Bacteria?

It should come as no surprise that we are surrounded by synthetic chemicals and processed foods that people were not exposed to as little as a century ago. Conservative estimates are that more than 80,000 chemicals have been introduced into our environment since then. We are sensitive to them, in part, because our bacteria are harmed by them. A short list of the kinds of chemicals that are harmful to our normal microflora includes the following:

- Food additives (colorings, “natural flavors”)
- Preservatives
- Chlorinated and fluoridated water
- Herbicides
- Hormones
- Oral contraceptives
- Pesticides
- Refined carbohydrates, especially sugar
- Steroids
- Artificial sweeteners
- Antacids and antibiotics (more on these below)
- Air pollution
- Household cleaners
- Toxic metals

The health of our normal intestinal bacteria is continually challenged by these and newer chemicals that appear constantly in our foods, new buildings, clothing,
cars, and just about everywhere that we live and breathe. It would be nearly impossible to avoid them, so our best strategy is to maintain a healthy population of friendly bacteria by daily supplementation with probiotics.

Environmental and Supplemental Estrogens

Hormones are necessary for the support of friendly bacteria in the gut. However, hormone replacement therapy, foreign chemicals that cause estrogen imbalance, and birth control pills all disrupt hormone balance, which is harmful to friendly bacteria. One of the benefits of probiotic bacteria is to promote liver function that enhances the breakdown of estrogens and other chemicals in bile, thereby helping you to maintain normal hormone levels.

By the way, estrogen dominance is also happening in men and is caused by some of the same things that lead to this imbalance in women -- that is, primarily toxic environmental chemicals. However, instead of having menopausal symptoms, men who are estrogen dominant have symptoms that include prostate problems, weight gain, and loss of libido. Probiotic bacteria are therefore equally important for maintaining hormone balance in men as well as in women.

Drugs

Intestinal bacteria are adversely effected by drugs of all kinds, regardless of whether they are prescription or non-prescription. The most harmful drugs are antacids and antibiotics, which you will read about below. Others include anti-inflammatory drugs, ulcer medications, immunosuppressants, steroid hormones, and drugs used for chemotherapy. In general, you can expect that synthetic chemicals of all kinds, particularly drugs, are harmful to your microflora. Probiotic bacteria are especially important for overcoming the destruction of your friendly bacteria when you are taking synthetic drugs.

Antacids

The biggest enemy of our normal microflora is antibiotics, so the next section will expand on this problem. Unfortunately, modern medicine also provides several other destructive forces against our friendly bacteria. The most rampant of these is undoubtedly the use of antacids.

One of the most common health problems today is an upset stomach. Stomach
upset doesn’t get a lot of notice in the media because it is not a killer, however one of the biggest sources of profits for drug companies is antacids and other treatments for digestive disorders. It is so lucrative that drug companies have succeeded in getting dangerous prescription drugs such as Prilosec and Zantac out on the open shelf, so now anyone can buy them without the advice of their doctor.

Although antacids provide temporary relief from indigestion, in the long run they aggravate the original problem terribly. They upset the pH balance of the stomach by reducing the acidity that we need for digesting food, which is harmful to our good bugs and therefore leads to further digestive problems. Such conditions even provide the opportunity for a takeover by the “bad bugs” that are constantly lurking in our stomach. One in particular, named *Helicobacter pylori*, causes ulcers. A separate section will be devoted to this nasty bug later in the book. Another is *Clostridium difficile*, which reproduces by forming spores that can be destroyed by sufficient acidity. Antacids reverse this acidity and enable spores to survive, leading to a *Clostridium* bloom that is often characterized by diarrhea – definitely an unwanted side effect of the overuse of antacids.

The two best natural approaches to getting yourself back on track after abusing your digestive system with antacids are simple and inexpensive: 1) drink plenty of water; and, 2) take probiotics to replenish the friendly bacteria that you have destroyed.

**Antibiotics**

The most damaging stressors of all, based on their effects against friendly bacteria, are antibiotics. This is such an important topic by itself that the next chapter is devoted to it. As you will learn, antibiotics are almost unavoidable in our environment, which has brought us to the edge of disaster.
Chapter 6. Antibiotics Everywhere – A Modern Crisis

Antibiotics, meaning “against life,” are chemicals that kill bacteria. Penicillin is the most famous one, since it is the best known of the “miracle drugs” that characterized the beginning of the antibiotic era in the early 1940s. Penicillin and its analogs signaled a new era in therapeutics, which was supposed to spell the end to fatal bacterial diseases. Indeed, over the decades since then, antibiotics have saved millions of lives from what used to be killer infections.

Now, more than a half a century later, we are drowning in a sea of antibiotics. Once called a miracle of modern medicine, these darlings in the battle against infectious diseases are now at the root of a health crisis. Why is this a crisis? Here it is in a nutshell:

The overuse and widespread misuse of antibiotics have fostered the development of antibiotic-resistant strains of all the major disease-causing bacteria.

Federal health agencies in the U.S. now estimate that antibiotics are used improperly 60% of the time in hospitals, and that at least half of doctors’ prescriptions for antibiotics are unnecessary. The overuse and misuse of antibiotics have become a case of too much of a good thing.

Antibiotics and the Rise of the Superbugs

One of the biggest worries in modern medicine is the development of antibiotic-resistant bacteria. Some strains have become so resistant to antibiotics that they are referred to as “superbugs” – some of which are resistant to multiple antibiotics.

Medical prescriptions are not the only source of antibiotics that get into your body. Depending on what you eat, you may also be consuming antibiotics in your food because of the routine use of these drugs in animal feed. About half of the antibiotics that are made each year end up being fed to animals. This is because modern agriculture has discovered that antibiotics not only keep cattle from getting infectious diseases, they also promote faster growth. So now we have meat, milk, cheese, poultry, eggs and other animal products that come with a bonus: antibiotics.
What does a steady diet of antibiotics do to your health? The biggest problem is that this frequent exposure to such drugs causes your intestinal bacteria to be continually out of balance. This means that your little internal army is unable to fight for you the way it is supposed to. You become more susceptible to infections, especially by superbugs, and to the side effects of antibiotic use.

MRSA: The Nastiest Superbug of All?

Regarding wound infections, the latest worry is a superbug called “MRSA,” whose abbreviation stands for the tongue-twisting name, “methicillin-resistant Staphylococcus aureus,” or more recently, “multiple-resistant Staphylococcus aureus,” is the cause of super-staph infections that are difficult to treat with antibiotics. It was first identified in the 1960s in hospitals, where the overuse of antibiotics has been most rampant. Since then, MRSA has escaped the hospital setting and become increasingly widespread in the community. In 2007 the Journal of the American Medical Association published an article estimating the number of deaths caused by MRSA in the U.S. to be greater than the number of deaths caused by AIDS.

MRSA is becoming so prevalent that antibiotics will eventually be completely ineffective against it. Since MRSA is already resistant to methicillin, penicillin amoxicillin, and oxacillin, the first alternate for treating MRSA infections has been another antibiotic, called vancomycin. True to form, strains of MRSA that are resistant to this antibiotic have now appeared. The combination of widespread staph bacteria and the overuse of antibiotics has, indeed, created conditions for the appearance of the nastiest superbug known to modern medicine. Different forms of MRSA have already spread to nursing homes and other healthcare facilities. Some of the latest occurrences even include football and wrestling teams, where common cuts and skin abrasions have offered opportunities for MRSA that have caused extraordinary trouble and even tragedy.

Research on probiotics and wound infections by MRSA is still at the idea stage. Professor Mark Spigelman, from University College London, recently wrote in the Annals of the Royal College of Surgeons that doctors might be better off washing their hands with yogurt, instead of relying on antiseptic soap-scrubbing. He also suggests that research should be carried out to investigate whether saturating skin wounds with 'good' bacteria would offer better protection against deadly germs.
Clostridium and Antibiotic-Associated Diarrhea

Perhaps the most common side-effect of antibiotic therapy is diarrhea, with 20%-40% of patients developing this condition. Antibiotic-associated diarrhea is related to destruction of the normal intestinal microflora, which enables a different kind of bacteria to take over. One species in particular is Clostridium difficile, which thrives in the face of most antibiotics. When this bacterium blooms, it secretes toxins that cause diarrhea and inflammation of the colon. This condition is especially problematic for people who are instructed to undertake a regimen of antibiotics in preparation for surgery. Ideally, this strategy is supposed to arm the patient with a defense against post-surgery infection. However, by disrupting the normal microflora and enabling a Clostridium infection, the resultant diarrhea, dehydration, and even immune suppression add up to doing just the opposite, especially in the face of the potential for acquiring a superbug infection. Fortunately, as reported in the British Medical Journal in 2002, supporting the good bacteria by supplementing with probiotics is successful in preventing the development of a Clostridium infection and the antibiotic-associated diarrhea that comes with it.

Clostridium and a Mother’s Nightmare

Regardless of how good it is, scientific research often seems complicated and impersonal. However, the importance of probiotics really hit home in 2001 for Dr. Kelly Karpa of the College of Medicine at Penn State University. Medical scientists like to call the treatment of a single patient a case study, and this case study came screaming right into her own family, challenging her both as a scientist and as a mother.

At that time, Dr. Karpa’s two-year old son had been diagnosed with a life-threatening bacterial infection in his gastrointestinal tract, Clostridium difficile, which did not respond to standard antibiotics. After nearly a year, his health had continued to worsen, even resulting in the development of an autoimmune illness. Driven to find a cure for her son, Dr. Karpa found research on probiotics in the medical literature and began the arduous task of finding a physician who was knowledgeable in prescribing probiotics for children. She finally found a pediatric gastroenterologist at Johns Hopkins University, whose probiotic treatment took fewer than 10 days to completely eliminate her son’s gastrointestinal symptoms. Furthermore, within three months his autoimmune problems had also disappeared.
Dr. Karpa is now a believer in the health benefits of probiotics and has used her experience and expertise to educate thousands of patients and health care professionals about the importance of consuming good bacteria. Indeed, she has become a national and international proponent for getting the life-saving and life-changing message about probiotics out to others.

Hospital Infections

The most widespread occurrence of the antibiotic-resistant superbugs is probably in hospitals, since this is where antibiotic usage is most common. This means that nowadays going to the hospital presents an added danger – that is, the chance of getting infected by a superbug. Typically, your immune system is already in trouble, whether you are in the hospital due to illness or for surgery or other treatment that can suppress your immunity. In addition, when you take antibiotics while there, you are also more susceptible to infection by your own bacteria. This is why pneumonia is so common after surgery. Regarding hospital infections, a study in 2001 in the *Journal of Pediatrics* reported that the use of probiotics led to the reduction of hospital-acquired diarrheal infections from 33% to 7% in children who were given a *Lactobacillus acidophilus* supplement.

Combining Probiotics and Antibiotics

At one time recommendations for using probiotics included taking them before and after using antibiotics, to make sure that the normal microflora would be as healthy as possible before and after the onslaught of antibiotics. According to probiotic researcher, Mairi Ross, this has now changed, as follows:

“(Regarding)...taking probiotics after antibiotics. That USED to be true, before the antibiotic resistant bacteria showed up. Before, it was thought people would be “safe” during the course of the antibiotics because they would kill off opportunistic pathogens that grew while the good flora was also killed off. Now the recommendation is to take it before, during the course to keep the gut from going completely sterile, and after. It can take up to three months for the normal flora to re-establish. Probiotics will not interfere with the action of the antibiotics. Because MRSA is getting to be a greater problem, some experts are now recommending..."
daily probiotics, especially for children attending schools where there might be a problem, people working in hospitals or having to go to a hospital."

This approach to using probiotics relies on introducing sufficient good bacteria into the digestive tract at times when the body is stressed by illness or by antibiotic treatment, when it is best to restrict digestive upsets to a minimum. During these periods, the negative bacteria in the intestines tend to multiply prolifically, which makes it essential to keep the levels of healthy bacteria as high as possible.

Antibiotics and Mercury Buildup

Mercury in dental fillings and other sources has attracted attention for possible role in several neurological and other disorders. The good news is that our friendly bacteria can take in, detoxify, and help eliminate mercury. On the other hand, this process can slow down when the microflora is depleted. Evidence for this notion comes from a 1984 study in the *Archives of Environmental Health*, where scientists showed that mice whose diets were supplemented with antibiotics had a depleted intestinal microflora, a reduction in the excretion rate of mercury, and an accumulation of mercury in several different tissues.

Are Antibiotics Still the Answer?

No. The answer to this question is becoming more apparent with the ever-growing failure of antibiotics to control infections by superbugs. Discovering new ways for addressing infections, either by prevention or by new treatments, has become a major goal for modern medicine. Everywhere that bacteria are being killed by synthetic chemicals, whether they be antibiotics or disinfectants, provides an opportunity for microbes to develop resistant strains. On the other hand, pitting probiotic bacteria against pathogens has already been successful in many different kinds of clinical conditions.
Chapter 7. Probiotics in Modern Medicine

Although Metchnikoff clearly established a relationship between the role of probiotics in health and longevity in the early 1900s, modern science has only caught on to the importance of probiotics as a subject for scientific research in the past few years. The research record begins in 1996 and as of the end of 2007 consists of just over 2,100 published articles. Public awareness of probiotics has grown alongside that of medical community. Spending by Americans on probiotics tripled between 1994 and 2003.

What the Science Says

Scientific understanding of probiotics and their potential for improving health is at an early stage and rapidly moving ahead. In November 2005, a conference that was sponsored by the National Center for Complementary and Alternative Medicine (NCCAM) and convened by the American Society for Microbiology explored this topic.

According to the conference report, uses of probiotics for which there is good evidence from the study of specific probiotic formulations include the following:

- To treat diarrhea (this is the strongest area of evidence, especially for diarrhea from a type of virus called rotavirus)
- To prevent and treat infections of the urinary tract or female genital tract
- To treat irritable bowel syndrome
- To reduce recurrence of bladder cancer
- To shorten how long an intestinal infection lasts that is caused by a bacterium called Clostridium difficile
- To prevent and treat pouchitis (a condition that can follow surgery to remove the colon)
- To prevent and manage atopic dermatitis (eczema) in children
Current Scientific Research

In addition to the above report by the NCCAM and the American Society of Microbiology, worldwide research on probiotics has produced more than 2,000 research articles between 1998 and 2008. More than 400 of these have been clinical trials. This research covers a broad range of human health problems, including autoimmune diseases, respiratory infections, cancer, weight loss, kidney stones, infections by antibiotic-resistant bacteria, children’s diarrhea in developing countries, and much more. All this means that the traditional health benefits of dietary bacteria, which have been known for more than a century, are attracting an increasing amount of attention from modern science.
Chapter 8. What Your Doctor May Not Know

Naturopathic doctors and other natural-based health practitioners have been using probiotics for years. However, the use of probiotics is not yet widespread among allopathic medical doctors. Indeed, a recent survey revealed that only 31% of medical doctors had any knowledge of probiotics. This is in spite of the following:

- The World Health Organization has stated that there is adequate scientific knowledge for the health benefits of probiotics.

- The medical journal, *Pediatrics*, published a commentary on probiotics in 2005, stating that, “Thus far, [probiotics] have shown particular promise in the treatment of acute infectious diarrhea and the prevention of antibiotic-associated diarrhea.” And, “Other conditions potentially treatable by probiotics include chronic diarrhea, inflammatory bowel disease, irritable bowel syndrome, and food allergy; potentially preventable conditions [through using probiotics] range from travelers’ diarrhea, necrotizing enterocolitis, urogenital infections, atopic diseases, and dental caries.”

- The International Study Group of New Antimicrobial Strategies, states that, “…maintenance of normal flora and their supplementation with probiotic flora preparations…,” is one of the strategies that they will promote to the medical profession to overcome the disastrous development of antibiotic-resistant bacteria.

- Finally, in 2003, a summary of the medical literature on probiotics, published in the journal *Clinical Microbiology Review*, stated that, “Based on the evidence to date, future advances with single- and multiple-strain [probiotic] therapies are on the horizon for the management of a number of debilitating and even fatal conditions.”

This is only a small indication of the value for probiotic supplementation in human health, and there is no excuse for your doctor to be ignorant of this topic. The history and current scientific foundation for the health benefits of probiotics is well-established.
Chapter 9. Babies and Bacteria: Getting the Right Start

Babies develop in a sterile environment in the womb, so their first exposure to bacteria is at birth. It is therefore crucial for making infants healthy that this exposure include good bacteria. Indeed, the mix of bacteria that is established during the first two years after birth is now known to influence the rest of a person’s life. This has become more obvious in the U.S. and other economically advanced countries, where hygiene is often overdone and inappropriate. Modern medicine has proposed what is now called the “hygiene hypothesis,” which states that the lack of early childhood exposure to parasites and microbes, including probiotic as well as infectious agents, increases the susceptibility to allergic diseases by hindering the development of the immune system.

A Landmark Study

Researchers at the University of Turku, Finland, have discovered that probiotics, specifically a bacterium named *Lactobacillus rhamnosus*, are effective in preventing atopic eczema. Atopic eczema is the name for a type of inflammation of the skin. *Lactobacillus rhamnosus* is part of the normal microflora of a healthy person. In this study, published in the *Lancet* in 2001, pregnant women were given a dose either of *L. rhamnosus* or of a placebo, 2 to 4 weeks before giving birth and continuing for six months afterward if breastfeeding. (Babies were given the bacteria or the placebo directly if not breastfeeding.) Two years after birth, infants in the probiotics group were found to have half the incidence of atopic eczema as those in the placebo group (23% vs. 46%). The researchers concluded that probiotic supplementation helps establish a healthy gut flora early in life, resulting in a decreased risk of developing allergies later on.

Before the Baby Arrives

Babies get their first dose of friendly bacteria as they pass through the birth canal. A mother’s good health, therefore, plays a significant role in providing the right amount and the optimal diversity of bacteria for a newborn. On the other hand, research also shows that a vaginal tract infection exposes an unborn child to harmful microbes that can have extremely serious affects. Studies in 1994 and in 2006 in the Journal of Clinical Microbiology both concluded that infectious vaginal microbes are often a causative factor in pre-term delivery.
Modern medicine has only recently recognized the relationship between a healthy colony of microflora in the birth canal and healthy, full-term babies. This fortunately means that pregnant women can protect their own health as well as that of their unborn children by taking supplemental probiotics daily.

Day One

Normally delivered babies pass are bathed with friendly, protective bacteria in the birth canal. The mother inoculates her newborn with bacteria such as *Bifidobacteria infantis* that are essential in building a foundation for the future of the baby’s health. Once these beneficial bacteria enter the baby's intestines through the mouth, they begin to occupy attachment sites on the gastrointestinal wall before other, not-so-friendly microorganisms can do the same.

A baby's first friendly bacteria go to work immediately, even taking on the special challenges that can happen with delivery in a hospital. Such challenges can come from harmful, drug-resistant bacteria that can thrive in hospitals, where antibiotics are commonly overused. This battle between the good bugs and the bad bugs will influence a baby’s overall health and future immunity to chronic infections and allergies. Bacteria will also determine how efficiently a baby digests food and absorbs nutrients as the digestive system matures.

The key to a good start, therefore, rests on what bacteria the mother passes on to the baby right at the moment of birth. As you will read below, several factors can influence the transfer and growth of good bacteria, each with potentially critical consequences.

Caesarean Birth

Unlike natural birth, birth by C-section happens in a highly sterilized environment whereby babies miss their first chance to be bathed in friendly bacteria in the birth canal. In addition, before delivery, mothers generally take antibiotics as a preventive against infection after surgery. As a consequence of these antibiotics and the sterile environment, babies that are delivered by C-section do not receive a healthy dose of the friendly microorganisms that natural-birth babies do. Indeed, in spite of the use of prenatal antibiotics, the chance of infection in the mother and in the newborn is higher, especially with an odd type of antibiotic-resistant bacteria called mycoplasmas. For example, according to a 2003 study in the Journal of Perinatal Medicine, mycoplasmas are associated with a 20-fold
increased risk of developing chronic lung disease in preterm infants that are delivered by C-section.

Besides being exposed to infectious bacteria, C-section infants are slower to grow their own colonies of the beneficial bacteria that they need for developing immune function and for preventing allergies. According to a fascinating study in the Journal of Allergy and Clinical Immunology in 2003, children born by C-section to allergic mothers are reported to have food allergies at least 7 times more often than are peers born vaginally. In addition, most children who develop life-threatening food allergies also have asthma, eczema, or hay fever.

Breast-Feeding vs. Formula

Breast-feeding is the next opportunity, after vaginal birth, for a newborn to build a flourishing intestinal microflora. Breast milk from a healthy mother intensifies the presence of bifidobacteria in the infant. These bacteria stimulate the wave-like contraction of the small intestines so that food keeps moving at the right pace through the digestive system. Bifidobacteria also acidify the stools, which inhibits the growth of disease-causing bacteria. These are crucial factors for the development of a robust digestive system and, therefore, the growth of a healthy child.

Manufacturers of infant formulas put a lot of effort into duplicating the make-up of human breast milk, and they fail miserably. Formulas based largely on cow’s milk or soy simply do not sustain the vitally important bifidobacteria colonies that a healthy baby’s bowel should have. On the contrary, as far back as 1980, the American Journal of Clinical Nutrition described how infants fed cow’s milk had different kinds of bacteria in their guts than breast-fed babies, including high levels of dangerous species that do not decrease as the child gets older.

All is not lost, however, when babies are fed infant formula instead of mother’s milk. A 1995 report in the Journal of Pediatric Gastroenterology and Nutrition showed that babies fed a whey-based formula with a probiotic supplement had a bacterial community similar to that of breast-fed infants at 1 month of age. In contrast, babies that were fed standard formula without the probiotic had significantly less colonization by friendly bacteria. Based on this research, probiotic supplementation for newborns is necessary when breast-feeding is not available.
Why Breast Feeding Is Not Enough

Breast milk is clearly better than standard infant formula. However, modern medical practices and our polluted environment have combined to diminish the benefits of breast-feeding by reducing the number of beneficial bifidobacteria in breast-fed infants over a period of decades. Anything that destroys the mother’s own bacteria will deplete what she can pass on to her breast-fed baby. Furthermore, toxins are now found in breast milk at higher levels than ever, so the longer that breast-feeding continues, the more toxins an infant will absorb. The combined effect of reducing the bifidobacteria while increasing the toxins in breast milk is a double whammy against the health of an infant.

One of the consequences of the diminished vigor of a baby’s microflora is an increase in the presence of disease-causing bacteria. This is now a worldwide trend that has led to the rise of uncontrollable diarrhea as one of the major causes of infant death. Although this problem is more common in underdeveloped countries, it is also a major cause of death in industrialized countries as well. In the United States, for example, over 1,000 infants under the age of 12 months die each year from the effects of diarrhea.

Intestinal illness in infants most often involves certain strains of E. coli that bloom in the small or large intestine. Invasion by Salmonella and Shigella can make matters worse. Fortunately, these and other bad bugs can be controlled by restoring the intestinal microflora back to health with the right kinds of bifidobacteria. One species in particular, \textit{Bifidobacteria infantis}, is able to cope with dangerous invading microorganisms.

Breast-fed babies certainly benefit from supplements that boost their bifidobacterial community in many ways besides increased resistance to infection. The acidic environment created by these friendly bacteria also enhances the absorption of calcium and the digestion of proteins and milk sugars. In addition, bifidobacteria are an important source of B-complex vitamins, which are crucial for early neurological development. These are all very important benefits that newborns are losing because of the continued depletion of bifidobacteria in breast milk.
Antibiotics

Just as with adults, the use of antibiotics for infants also depletes their normal microflora and leads to unhealthy intestines. An unbalanced intestinal flora can show up in the form of allergies and asthma. According to a study conducted at the Henry Ford Health System, babies who received just one course of antibiotics during the first six months of life are 2.5 times more likely than their peers to have developed asthma by age 7, and 3 times more likely to develop allergies, including eczema.

Combining the factors of a caesarian section birth, feeding the infant cow's milk rather than breast milk, and overusing antibiotics, a baby has a reduced chance of receiving the normal healthy flora that is crucial for optimal health. All of these factors can be alleviated by probiotic supplementation.

Vaccinations

Children in the U.S. routinely receive 21 vaccinations before they even enter kindergarten, which is more than twice as many as they received just a decade ago. The basic idea behind vaccines is to stimulate the immune system to build up antibodies against infectious microbes after exposure to non-infectious preparations of those same microbes. The antibodies then provide resistance to future infection.

Vaccines have prevented an enormous amount of human suffering. Nevertheless, fears about vaccines are justifiably at an all-time high because of the inherent danger of potential contamination by other disease organisms and by worries about mercury-based preservatives. Given that they are here to stay, what can parents of infants do to enhance the value of vaccines relative to their risks? Recent studies show that probiotics can, indeed, do exactly that. Research published in 2005 in the European Journal of Nutrition showed that probiotics boost the benefits of polio vaccine as much as 4-fold within 4 weeks of vaccination. This study is significant in part because it shows a direct positive effect on the immune system outside the digestive tract.

The ability of probiotics to enhance the effects of vaccine-induced antibodies against infectious microbes clearly boosts the value of vaccinations in providing resistance to disease.
Diaper Rash and Thrush

When a baby's microflora is slow to develop or becomes damaged by antibiotics, an overgrowth of Candida yeast will develop in the intestinal tract. Symptoms of this overgrowth include diaper rash and thrush. Diaper rash from yeast, in contrast to rash from chemicals in soaps, feces, or urine, is usually scattered in the groin area and appears as smooth, shiny, and bright red skin, with well-defined borders. Thrush appears as a white coating on the tongue and inside the cheeks. Both of these symptoms of yeast overgrowth are quite common in young babies.

Thrush in babies can cause pain when feeding for both mother and baby. Both the nipple area and the inside of the baby's mouth can be infected, and can re-infect each other. As you will see in the next chapter, problems with yeast overgrowth are not restricted to babies. Candida has become a common health challenge for adults, too.
Chapter 10. The Candida Epidemic

Focus on Candida (yeasts) in regard to probiotics has become important because this is the microbe that takes over when our bacterial defense becomes depleted. And when Candida is in control in someone’s digestive system, illnesses appear that weren’t there before, and any health problems that were already there get worse. A Candida bloom can make life miserable.

Just like bacteria, yeasts can be friendly or harmful. The well-known yeasts that we use for baking bread, fermenting beer, and making many other food products are obviously beneficial. However, the yeasts that live in our bodies are a different kind of microbe. They lurk around in our digestive system, waiting for an opportunity to take over, often with devastating affects on our health. Fortunately for us, a vigorous population of friendly bacteria can keep this takeover from happening.

The type of yeasts that we host are collectively called Candida, even though several species come under this umbrella name. The main culprit, however, is one particular species, which has the scientific name *Candida albicans*. The natural role ofandida seems to be as a parasite, meaning an organism that offers no benefit to its host.

Local Yeast Infections

In the “good old days” yeast infections were considered to be an occasional problem for women, causing vaginal itching and irritation. In addition, yeast infections were found to cause considerable pain in the breasts of lactating women. Young children also suffered from yeast overgrowth, which shows up as white patches on the tongue in a condition called thrush. Men came into the picture when yeast was named as the culprit for an itchy rash appearing in the inner thigh areas.

Yeast infections like these are termed “local” because they are isolated in one area of the body. They are well-known and easily treated with probiotics and dietary changes. Probiotics can restore the microbial balance that is important for controlling yeast overgrowth. Many studies have repeatedly shown this to be true. One example of such a study was conducted at the Long Island Jewish Medical Center in 1992. In this study, women who previously suffered frequent vaginal yeast infections ate probiotic-containing yogurt every day for 6 months. At
the end of the 6 month period, the yogurt group showed a three-fold average decrease in infections in comparison with a non-yogurt group. Moreover, the study was supposed to go for another 6-month period, with each group of women switching roles. However, the probiotic treatment was so good that more than a third of the women in the yogurt group refused to quit eating yogurt when it came their turn to be in the non-yogurt group.

Whole-Body Infections

Local yeast infections seem to be a relatively minor nuisance in a health landscape that is plagued with the abundance of diseases that we are faced with these days. What is a little itchiness here and there in comparison with cancer or cardiovascular disease? These and other serious diseases have now been linked to whole-body infections of Candida – that is, yeast that has escaped the GI tract and gone beyond local infections to be spread throughout the body.

We lose the internal battle to keep Candida under control when antibiotics or other toxins deplete our normal microflora. This offers an opportunity for Candida to bloom because, as a fungus, it is not directly affected by antibiotics. A chronic Candida bloom will eventually damage the intestinal lining, which then loses its effectiveness as a defensive barrier against toxins and infectious microbes. The medical term for this condition is “leaky gut syndrome” – which just means that harmful chemicals and microbes can get through our gut wall and into our bloodstream where they do harm. Candida is quick to spread when this happens, leading to a condition called candidiasis, which can then lead to a multitude of symptoms.

From these seemingly minor beginnings, candidiasis has now become recognized to be so prevalent that millions of people suffer from a dizzying array of symptoms that are associated with it. Some of the symptoms that are linked to candidiasis include:

- Depression
- Anxiety
- Irritability
- Fatigue
• Heartburn
• Bloating
• Constipation
• Mental fog
• Allergies
• Migraines
• Acne
• Rheumatoid arthritis
• Lupus
• Multiple sclerosis
• Type 1 diabetes
• Cancer
• Cardiovascular disease

Although this seems to be a long list of health problems, it is still incomplete. Indeed, many doctors are finally recognizing that many of the chronic health problems that defy diagnosis and treatment are associated with candidiasis. The pioneer for this change in medical thinking was William Crook, MD, who wrote “The Yeast Connection,” which is still the definitive book on this topic. Dr. Crook was also one of the first physicians to advocate the use of probiotics for treating candidiasis. More and more, probiotics offer a simple biological solution for chronic medical problems.

Do You Have Candidiasis?

Since no single symptom can be a perfect indicator of candidiasis, Dr. Crook
assembled a questionnaire that helps people determine the possibility that andida contributes to their health problems. It is a useful tool for talking with your doctor, and it offers you a list of symptoms that you can monitor as a simple way to evaluate the effects of probiotics on your health. This questionnaire is included in the appendix at the end of this book.

Probiotics for Men

The role of this special comment is to emphasize the following:

> With few exceptions, men have all the symptoms of bacterial deficiencies and yeast overgrowth that women have, and all the benefits of probiotics that you have just read about in the preceding chapters apply equally to both genders.

The old notion that yeast infections are solely a problem for women has been discarded by the medical community. Vaginal infection in women has its equivalent in prostate infection in men. Digestive issues, lactose intolerance, hormonal imbalance (including estrogen dominance), ulcers, cancer, autoimmune disorders, hospital infections, and more are equal opportunity health problems for both genders. Men benefit from probiotics just as much as women do, and any good nutritional strategy for men and women must include probiotics.
Chapter 11. Probiotics vs. Stress

The agents of stress come from many directions in our modern Western lifestyle. Anything that causes your body to react defensively can be called a stressor. Even emotions cause physical stress when we react by overproducing certain hormones that cause inflammation. Dozens of kinds of internal and external factors can cause stress. A short list of common stressors includes the following:

- Poor diet (“malnutrition stress”)
- Emotions
- Exercise
- Radiation therapy and chemotherapy
- Anesthesia and surgery
- Environmental radiation
- UV light
- Poor or insufficient sleep

Prolonged exposure to these and other stressors can shift the balance of friendly bacteria and pathogenic bacteria. Examples of research involving bacteria and stress are summarized as follows.

Psychological Stress

In 1999 researchers at the University of Wisconsin found that infant rhesus monkeys who were separated from their mothers harbored increased levels of pathogenic bacteria and suffered from more frequent infections than infant monkeys who stayed with their mothers. This study demonstrated a weakening of the normal microflora by the strong emotional reactions to disrupting the mother-infant bond. Psychological stress led to failure of the intestinal microflora to defend against pathogens, enabling the pathogens to bloom and cause disease.
Emotional Stress

In a 1978 article in the *Journal of Nutrition*, people under conditions of anger or fear showed a shift to fewer species of beneficial bacteria and more species of harmful bacteria. This study showed a direct link between the loss of normal microflora and emotional stress.

Athletic Stress

High level endurance athletes often suffer from depressed immune systems after periods of intense exercise. They are especially vulnerable to respiratory infections. However, in a study published in the British Journal of Sports Medicine in February, 2008, athletes taking a probiotic supplement more than doubled the number of symptom-free days in comparison with their fellow athletes who did not take probiotics. Furthermore, the probiotic group had less severe symptoms and double the amount of interferon gamma, an important component in the body’s immune response.

Nature provides us with a balanced bacterial population that helps us maintain good health. Stress disrupts that balance, and probiotics restore it. The need for probiotics, therefore, would not exist if we weren’t constantly destroying our friendly bacteria in the first place. This destruction seems almost unavoidable at times, since so many things cause harm to the microbes that we depend on.
Chapter 12. When Things Go Wrong

We have been gradually becoming more aware of the general benefits of probiotics for health and longevity starting almost a century ago. With the modern advent of so many things that damage our normal microflora, we are also becoming more aware of how many more health issues that are associated with a bacterial imbalance in our GI tract. This has been an awakening that has led medical researchers to find out whether these health issues can be prevented or reversed simply by restoring and maintaining this balance. The affects of probiotics on a few of these health issues are summarized below. It is a certainty that this list will continue to grow.

Traveler’s Diarrhea

Many kinds of microbes cause infectious diarrhea, including viruses and bacteria. The name “traveler’s diarrhea” is associated with such infections, although people suffer from them regardless of whether they are traveling. Children and the elderly are especially susceptible to traveler’s diarrhea.

The good news is that several studies have shown how probiotics can prevent or alleviate this malady. As recently as 2002, the British Medical Journal printed a review of all of the best studies on the prevention of traveler’s diarrhea and concluded that, in particular, Lactobacilli are especially effective for prevention. In addition, a 2004 article in Evidence-Based Nursing reviewed 23 studies that, overall showed the effectiveness of probiotics in shortening the duration of an infection. This latter article is especially important because about 76% of the more than 1900 people who were included in the review were children, for whom infectious diarrhea can be fatal. Each year there about one billion cases of diarrhea in children around the world. Out of that number, more than 3 million will die from it, including about 500 in the United States. Although these are small percentages, they represent disastrous outcomes that can be prevented by the simple addition of daily probiotic supplements to each child’s diet.

Ulcers, Stomach Cancer, and H. pylori

By now most people have heard of Helicobacter pylori (“H. pylori”) as the bad bug that causes peptic ulcers. Indeed, this bug is also associated with several types of stomach problems and may even be a risk factor for stomach cancer. Standard treatment often includes an antibiotic, which is detrimental to the
normal microflora. This is another example of antibiotics coming to the rescue and causing more problems than they treat. The growth of H. pylori in the first place already indicates that the normal intestinal microflora is out of balance. It is clearly a situation that calls for probiotics to reinvigorate our depleted microbial army so it can start taking on the H. pylori. Indeed, probiotics are even more important when antibiotics are being used, since they are harmful to our friendly bacteria as well.

The early expectation that probiotics would be helpful in warding off H. pylori is now supported by a substantial amount of recent scientific research. In sum, probiotics inhibit colonization in the stomach by H. pylori, interfere with the attachment of H. pylori to the stomach lining, and secrete lactic acid and natural antibiotics that stop the growth of H. pylori.

Sinus

We are often bombarded with infectious bacteria that end up in our respiratory tract, although our immune system keeps them under control most of the time. In addition to this natural defense system, a 2003 study in the *American Journal of Clinical Nutrition* shows that probiotics containing Bifidobacteria and Lactobacilli significantly reduce the number of infectious bacteria that inhabit the nasal passage.

Issues of the Colon

Ulcerative colitis, Crohn’s Disease, irritable bowel syndrome, and inflammatory bowel disease are just some of the names of a growing number of health issues that are associated with the colon. The good news is that, since they are all associated with an imbalanced microflora, they have the potential of responding to probiotic supplements without side effects. The journal *Gastroenterology* has published a series of articles detailing the positive affects of probiotics on these kinds of health issues, starting in about 2000.

Pouchitis is also relevant to include here, although strictly speaking it occurs in people who do not have colons. It occurs in the replacement pouch, made from the small intestine, for people who have had their colons removed. A study in *Gastroenterology* in 2000 showed that relapses in this condition occurred 100% of the time in the absence of probiotic supplementation and only 15% of the time with the use of probiotics. Furthermore, the use of a single strain of probiotic
bacteria did not show the same positive results as the use of multiple strains at very high dosages.

Special Note on Crohn’s Disease

Research published in the *Journal of Clinical Microbiology* in 2003 showed that 92% of patients suffering from Crohn’s Disease harbored a type of bacteria called *Mycobacterium avium paratuberculosis* (MAP), compared with 26% of non-Crohn’s patients who had MAP. The suspicion is that MAP causes Crohn’s Disease. Unfortunately for Crohn’s patients, a survey in 2005, published in the *Journal of Food Protection* found that almost 3% of samples of pasteurized milk in the United Kingdom contained living cultures of MAP. Pasteurization clearly does not kill all MAP, although it does eliminate probiotic bacteria. The battle between probiotic bacteria and MAP in Crohn’s patients probably explains the benefit of probiotics against this disorder that have been discovered in clinical research.

Cholesterol

In 2005 the *Journal of Applied Microbiology* reported that *Lactobacillus acidophilus* has the ability to remove cholesterol in laboratory conditions, and that this ability is enhanced by prebiotics such as FOS (see explanation about FOS in Chapter 15). This and other species of Lactobacillus have shown a capacity to absorb cholesterol, perhaps slowing down its reabsorption and leading to reduced amounts in blood serum.

Cancer

Lactic acid bacteria prevent the initial damage to cells that lead to cancer. Laboratory studies and human studies have shown that the amount of toxins are decreased and those that remain are inactivated in the presence of probiotics. In addition, animal studies show that the rate of the formation of colon tumors is lower in those receiving Lactobacillus strains.

Lactose Intolerance

Lactose is the main milk sugar that is found in dairy products. People who are born with or lose the ability to digest lactose - a condition called lactose intolerance – often have cramping, bloating, diarrhea, and nausea after
consuming dairy products. However, the addition of Lactobacillus, Bifidobacterium and Streptococcus to milk increases its digestibility. Indeed, research in 1983 in the *Journal of Dairy Science* showed that the beneficial effect occurred, not in the milk itself, but in the digestive tract after consumption of milk containing Lactobacillus.

**Allergy**

As explained earlier in the book, probiotics reverse intestinal destruction that leads to the leakage of toxins into the bloodstream. This reduces the amount of toxins that cause an immune response, thereby reducing allergies. In addition, a review of probiotics against human disease, in the *American Journal of Clinical Nutrition* in 2001, emphasized the role of probiotic bacteria in reinforcing our immune system against allergies.

**Autoimmune Disorders**

Rheumatoid arthritis, lupus, multiple sclerosis, and several other health issues are lumped into a category called autoimmune disorders, because they are characterized by an overactive immune system that seems to attack its own body. In 2004 the *Journal of Nutrition* showed a remarkable preventive and curative effect on arthritis using commercial yogurts that contain Lactobacilli. This study underscores the relationship between a normally functional immune system and probiotics. It comes as no surprise, since candidiasis, which was discussed earlier, is a causal agent for a number of autoimmune disorders. What this means is that candida is the problem, not autoimmunity, and that successful treatment has to include controlling Candida overgrowth with probiotics.

**Autism**

There's been an astronomical rise in the rate of autism over the last 10 years. This used to be a relatively rare disease, once thought to affect 1 in 10,000 children, which has increased to 1-2 cases per 1,000 in recent estimates. Some clinicians believe that autistic symptoms are made worse by the overgrowth of Candida. This yeast problem is driven by the use of large amounts of antibiotics in response to the frequent ear infections of autistic children. As with Candida overgrowth in general, this leads to a buildup of toxins that escape through a poorly functioning, leaky gut.
Typical treatments for autism include attempts to remove toxins that make the disorder worse. Dr. Mark Brudnak, in a 2002 article in *Medical Hypotheses*, suggests that probiotics should be included in any detoxification protocols for autism because friendly bacteria are the largest detoxification component of the body in the first place.

The Flu

Every year flu season seems to hit children and the elderly harder than before, and lately we even have the additional worries about a new strain of swine flu and something called the “bird flu.” Probiotics are already well-known to stimulate the immune system and to provide a good defense against viral infections of all kinds, so it stands to reason that a vigorous intestinal microflora would be helpful against flu viruses, too. It is too early to know the effects of probiotics on avian flu. However, recent studies at the Yakult Central Institute for Microbiological Research in Tokyo show that Lactobacilli protect against infection by influenza virus in infant mice. This is a good preliminary indication that probiotics can be helpful against flu viruses in humans.
Chapter 13. Probiotics to the Rescue

If so many health problems are related to a depleted microflora, what can you expect from using probiotics to support your own good bacteria? Let’s first consider what general benefits you can expect from probiotics and exactly what types of bacteria provide those benefits. Then, in the next chapter, you will learn how to evaluate formulas for finding the right one for you.

Expected Benefits

Our question might better be, “Which probiotics provide the benefits that we need for optimum health?” The strains that give us the following basic benefits are the ones that we want:

1) Normalized intestinal tract
2) Suppressed growth of disease-causing microbes
3) Prevention of Candida overgrowth
4) Resistance to infections
5) Production of natural antibiotics
6) Regulation of intestinal pH by the production of lactic acid, acetic acid, and butyric acid (these are called “organic acids”)
7) Manufacture of vitamins, such as B-complex (biotin, niacin, folic acid, riboflavin, pantothenic acid, thiamine, and vitamins B-6 and B-12) and vitamin K
8) Strengthen the immune system
9) Enhance overall digestive abilities of the GI tract
10) Provide resistance to damage from pollutants and radiation
11) Enhance nutrient absorption

Types of Probiotic Bacteria

Overall, the main types of bacteria that have probiotic activity can be classified into three main groups, as follows:

1) Lactobacillus Group: Lactobacilli strains primarily work in the small intestine to aid digestion and absorption. This group is named as such because most of its members convert lactose and other sugars to lactic acid. The production of lactic acid makes its
environment acidic which inhibits the growth of some harmful bacteria. Key probiotic strains of Lactobacilli include:

- *L. acidophilus*
- *L. brevis*
- *L. bulgaricus*
- *L. casei*
- *L. gasseri*
- *L. paracasei*
- *L. plantarum*
- *L. rhamnosus*
- *L. salivarius*
- *L. lactis*

2) **Bifidobacterium Group**: Bifidobacteria strains work in the large intestine to detoxify the colon and assist normal elimination. Bifidobacteria are the main inhabitants of the large intestine. One strain makes up to 99% of the entire flora of the bowel in breast-fed infants and adolescents. This group is especially powerful in the suppression of bad bacteria. There is strong evidence that the numbers and potency of bifidobacteria decline as a person ages or shows any decline in health. Key probiotic strains of Bifidobacteria include:

- *B. bifidum*
- *B. breve*
- *B. infantis*
- *B. lactis*
- *B. longum*

3) **Streptococcus thermophilus**: This strain works together with the Lactobacillus Group to produce such probiotic foods as yogurt. It produces large amounts of an enzyme called lactase, which breaks down lactose. Consumption of *Streptococcus thermophilus* is especially helpful to people who are lactose intolerant.
Chapter 14. Choosing the Right Probiotic Supplement

Scientific research on probiotics is continually adding new and better information to our knowledge base. The best companies pay attention to these changes and continually upgrade their products to be as good as they can be for your health. Generally this is difficult to find out for the lay person. In choosing a product for your own use, therefore, there are only a few things that you can find out easily for judging its quality. These are:

Potency

The potency of a probiotic is measured in live cells or colony forming units (CFU), which indicates the number of live bacterial cells. Typically, products will range as low as 1-2 billion cells, up to 16 billion.

Dosage

There is no generally accepted optimum recommended dosage, although many probiotics experts suggest a maintenance level of 8 to 30 billion cells daily. In checking the label on a probiotic supplement, you will find good products with dosages in this range and you will find products that have a fraction of this number. Keep in mind that probiotics are regarded as safe by the World Health Organization and by leading researchers, because higher daily amounts are not associated with any toxicity.

Sensitivity to Temperature

Until just a few years ago, all good probiotic products had to be refrigerated to maintain their potency. However, Dr. J.J. de Pablo at the University of Wisconsin has discovered a method for cold-processing bacteria and coating each cell with a protective layer that helps it resist heat. Probiotic products that are made by using this technology can be safely stored for up to two years at room temperature, and they will say something such as “No Refrigeration Necessary,” on the label. This indicates a product that contains temperature-stable bacteria, which is more convenient to use than one that has to be stored in your refrigerator. Temperature-stable products are also more travel-friendly, since they don’t have to be kept cold. Probiotics that are not processed to resist heat must still be refrigerated to prevent the bacteria from dying.
How Many Kinds of Bacteria?

Products containing a diversity of bacterial strains or different species would seem to be the most sensible for maintaining the health of a diverse intestinal microflora, and scientific research backs up this suggestion. A review of the scientific research on this topic, published in the *International Journal of Food Microbiology* in 2004, cites studies whereby probiotics containing multiple species were superior for reducing antibiotic-associated diarrhea in children. Based on their survey of all of the published research on this topic, the authors of this review encourage the use of multi-strain and multi-species probiotics.

What this means for you is that a greater diversity of strains offers a wider array of health benefits. Probiotic products are simple to evaluate for how many kinds of bacteria they contain, since each kind should be listed by name on the product label. Most products have one or a few. You will find that some products have as few as 1 to 3 strains, whereas the best ones have more than 10 different kinds, and even as many as 16. The main point is that more strains are better.

Acid and Bile Resistance

Probiotics must pass through the acid and bile of the stomach and reach the small intestine unharmed to be effective. Different products may accomplish this by sealing the capsule with an enteric coating that is supposed to slowly dissolve in the stomach, releasing the contents at just the right time for entering the small intestine. Be aware, however, that some enteric coatings are applied with heat that can destroy bacteria, and that some ingredients of enteric coatings are not acceptable to people who want an all-natural product.

Other products use strains that have been developed in the laboratory to be naturally resistant to the harsh environment of the stomach. This strategy mimics nature, since the bacteria that originally colonized our intestines had to already be strong enough to get through the stomach.

Special Formulas

Some products address specific groups of people or specific conditions based on different mixtures of probiotic strains. For example, women’s formulas contain strains with the most benefit for a healthy vaginal flora and urinary balance in the face of Candida overgrowth. Special formulas are also available in products for
infants and children for conditions where the normal microflora has not yet been built or where it has been damaged by antibiotics.

Sinus health also suffers from Candida overgrowth, which means that probiotics can be helpful for addressing sinus infections. High-potency probiotic formulas that are targeted for sinus conditions are available for supporting sinus and bronchial health.
Chapter 15. Product Research and Development

Research on probiotics has been increasing over the past couple of decades, which means that high quality products are appearing on the market more often as a result of good science. A small list of companies stand out in this regard because they employ internationally renowned scientists, collaborate with and provide funding for probiotics research at universities, and spend millions of dollars each year on the advanced research and development of probiotics.

Highly sophisticated research on probiotics now centers around the genes of friendly bacteria, particularly what they look like, what they do, and how they work. An understanding of exactly how these genes enable bacteria to do good things for human health and well-being is the foundation for discovering ways to make better probiotics.

One of the most important recent discoveries to come out of modern genetic research on probiotic bacteria involves a series of genes that help probiotic bacteria bugs to absorb a type of carbohydrate called fructo-oligosaccharide (FOS), which is not digestible by humans. The reason that this is important is that it shows how bacteria can take in FOS and other carbohydrates more efficiently than other, potentially harmful bacteria, including any bad bugs in the GI tract. This is like saying that probiotic bacteria can simply eat and grow faster than other bacteria, thereby not allowing the bad bugs a chance to get started.

As a consequence of this discovery, FOS has become regarded as an important dietary supplement for feeding our friendly bacteria. It is included in a class of foods that are now called “prebiotics,” based on their role in stimulating the growth of our friendly bacteria.

In addition to being a preferred food source for probiotic bacteria, FOS is now also known to have a beneficial side effect. Specifically, it combines with Bifidobacteria to bind toxins in the colon and hasten their excretion from the body. This activity replaces the need for indigestible fiber supplements.

Genetic Research

By learning about the genes of probiotic bacteria, scientists are now learning how bacteria can survive passage through the harsh environment of the
stomach, how they attach to the intestinal wall, and how they produce antibiotics that control the bad bugs without harming the good ones.

Genetic research is also showing how the partnership works between our microbes and our GI tract. On one hand, we join forces with our friendly bacteria to digest certain carbohydrates and proteins. On the other hand, good bugs digest some things for us that we don't, such as FOS. Bacteria also have genes for producing vitamins and other nutrients that can add up to 15% of our total dietary intake.

The Immune System: Our Best Defense

The fact that 70% of our immune cells come from our small intestine leads to current research on the role of intestinal bacteria in our immune system. So far, scientists have discovered that friendly bacteria enhance our immune system in at least two main ways. One is that they strengthen certain kinds of immune system cells, called lymphocytes, that are part of our GI tract. This action adds to the ability of our normal microflora to suppress the bad bugs, because lymphocytes also defend the body against bacteria. Lymphocytes also contribute to our defense against toxins and allergens.

The second way that our friendly bacteria help our immune system is more complicated. It seems that they have a communication system that tells immune cells outside the GI tract when to get busy. The way that bacteria do this, without even leaving the GI tract, is to cause the production of special chemicals that are released into the bloodstream. These chemicals act as little messengers that go straight to specific immune cells, with directions on where the cells are to go and what they are to do when they get there.

This communication system partly explains why our head-to-toe immunity against disease, toxins, and allergens begins with a healthy and vigorous population of friendly bacteria in our GI tract. Continued research on how this communication system works is the basis for improving probiotic formulas to make this communication system even better.

Viruses: Enemies of Our Friendly Bacteria

The idea that bacteria are like soldiers, fighting it out between the good guys and the bad guys, is a good way to think about how cells interact with one another.
However, viruses represent another level of the battle, whereby friendly bacteria fight for their own lives against viruses that can destroy them.

Viruses are odd in that they are not really living organisms. They can only reproduce by invading a living host and directing the host cell to make more viruses. This process destroys the host cell. When cultures of probiotic bacteria become infected with such viruses, the culture can be killed. Dead cultures provide no health benefits.

Research in this area mostly involves how to avoid or control viral infections during the manufacture of probiotic formulas. Fortunately, some bacteria have natural defenses against viruses, so current genetic studies are now providing ways to strengthen these defenses and to install them into other, less resistant bacteria.

The microbattle between host bacteria and their invading viruses also depends on how the genes of the viruses themselves work and how they change to overcome bacterial defenses. The genes of viruses can change so fast that they evolve faster than the defenses of bacteria can keep up with them. In studying the genes of viruses, therefore, scientists have discovered how to close the genetic mechanisms that viruses use to evolve new, more infectious forms. Probiotics that are manufactured with the benefit of this new genetic technology are cleaner and healthier than before.
APPENDIX A: Candida Questionnaire

This questionnaire has been modified from the one that was designed for adults by Dr. William Crook, author of *The Yeast Connection*. Section A asks about factors in your medical history that promote the growth of Candida, and Sections B and C ask about symptoms that commonly occur in people with yeast-connected illnesses. Although this questionnaire does not provide you with an absolute “Yes” or “No” answer, your results will provide you and your doctor with guidance on whether you have Candida overgrowth.

Section A: History

For each of the following, circle the point score for that question, if applicable:

1. Have you taken antibiotics for acne for at least one month? Point Score: 35
2. Have you taken antibiotics for any other purpose for 2 months or longer, or in shorter courses 4 or more times within a 1 year period? Point Score: 35
3. Have you ever taken an antibiotic drug even in a single course? Point Score: 6
4. Have you ever been bothered by persistent prostatitis, vaginitis, or other problems affecting your reproductive organs? Point Score: 25
5. Have you been pregnant
   2 or more times? Point Score: 5
   1 time? Point Score: 3
6. Have you taken birth control pills
   For more than 2 years? Point Score: 15
   For 6 months to 2 years? Point Score: 8
7. Have you taken prednisone or other cortisone-type drugs
   For more than 2 weeks? Point Score: 15
   For 2 weeks or less? Point Score: 6
8. Have you had athlete’s foot, ringworm, “jock itch,” or other chronic fungus infections of the skin or nails?
   Severe or persistent: Point Score: 20
   Mild to moderate: Point Score: 10

Total Score for Section A: __________

Section B: Major Symptoms

For each of the following, circle the point score for that question, if applicable.

1. Do you have symptoms from exposure to perfumes, insecticides, or other chemicals?
   Moderate to severe: Point Score: 20
   Mild: Point Score: 5

2. Are you bothered by memory or concentration problems, sometimes even feeling “spaced out?” Point Score: 20

3. Do you feel “sick all over” and your doctor doesn’t know why? Point Score: 20

4. Are your symptoms worse on damp, muggy days or in moldy places? Point Score: 20

5. Does tobacco smoke really bother you? Point Score: 10

6. Do you crave sugar? Point Score: 10

For each of the following, enter a point score in the blank beside it, if applicable, based on the severity score below:

3 points if a symptom is occasional or mild
6 points if a symptom is frequent or moderately severe
9 points if a symptom is severe or disabling

7. Fatigue or lethargy __________
8. Feeling of being “drained” __________
9. Depression
10. Numbness, burning, or tingling
11. Headache
12. Muscle aches
13. Muscle weakness or paralysis
14. Pain and/or swelling in joints
15. Abdominal pain
16. Constipation and/or diarrhea
17. Bloating, belching, or intestinal gas
18. Vaginal itching, burning or discharge
19. Prostatitis
20. Impotence
21. Loss of sexual desire or feeling
22. Endometriosis or infertility
23. Cramps or other menstrual irregularities
24. Premenstrual tension
25. Attacks of anxiety or crying
26. Cold hands or feet
27. Hypothyroidism
28. Shaking or irritable when hungry
29. Cystitis or interstitial cystitis

Total Score for Section B: __________

Section C: Other Symptoms

For each of the following, enter a point score in the blank beside it, if applicable, based on the severity score below:

1 points if a symptom is occasional or mild
2 points if a symptom is frequent or moderately severe
3 points if a symptom is severe or disabling

1. Drowsiness when not appropriate
2. Irritability
3. Low coordination
4. Mood swings
5. Insomnia
6. Dizziness or loss of balance
7. Pressure above ears, feeling of head swelling
8. Sinus problems, tenderness of cheekbones or forehead
9. Tendency to bruise easily
10. Eczema, itching eyes
11. Psoriasis
12. Chronic hives
13. Indigestion or heartburn
14. Sensitivity to milk, wheat, corn or other common foods
15. Mucus in stools
16. Rectal itching
17. Dry mouth or throat
18. Mouth rashes, including “white” tongue
19. Bad breath
20. Foot, hair, or body odor not relieved by washing
21. Nasal congestion or postnasal drip
22. Nasal itching
23. Sore throat
24. Laryngitis, loss of voice
25. Cough or recurrent bronchitis
26. Pain or tightness in chest
27. Wheezing or shortness of breath
28. Urinary frequency or urgency
29. Burning on urination
30. Spots in front of eyes or erratic vision
31. Burning or tearing eyes
32. Recurrent infections or fluid in ears
33. Ear pain or deafness

Total Score for Section C: 

GRAND TOTAL SCORES FOR SECTIONS A, B, AND C:
Interpretations of Grand Total Scores

Likelihood of Yeast-Based Health Issues

<table>
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<th>Women</th>
<th>Men</th>
<th></th>
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<tbody>
<tr>
<td>more than 180</td>
<td>more than 140</td>
<td>Almost certain</td>
</tr>
<tr>
<td>120-179</td>
<td>90-139</td>
<td>Probably present</td>
</tr>
<tr>
<td>60-119</td>
<td>40-89</td>
<td>Possibly present</td>
</tr>
<tr>
<td>less than 60</td>
<td>less than 40</td>
<td>Not likely</td>
</tr>
</tbody>
</table>

Your score is not just a predictor of yeast-based health issues. It is also an indicator of how far out of balance your intestinal microflora has become. In other words, it shows you how much your body needs and can benefit from probiotic supplements.
Dr. Dennis Clark holds a Ph.D. in plant chemistry from the University of Texas at Austin and is a leading expert on plant natural products chemistry and integrative medicine. He retired after nearly 30 years as a professor of plant biology at Arizona State University and is currently an adjunct professor at the Southwest College of Naturopathic Medicine in Tempe, AZ. He has also been visiting professor at the University of California and the University of Heidelberg in Germany. Dr. Clark is the author of a college-level textbook on botany as well as books on botanical medicine. He has received grants for his work from the National Science Foundation, the U.S. Department of Agriculture, and the Alexander von Humboldt Foundation.