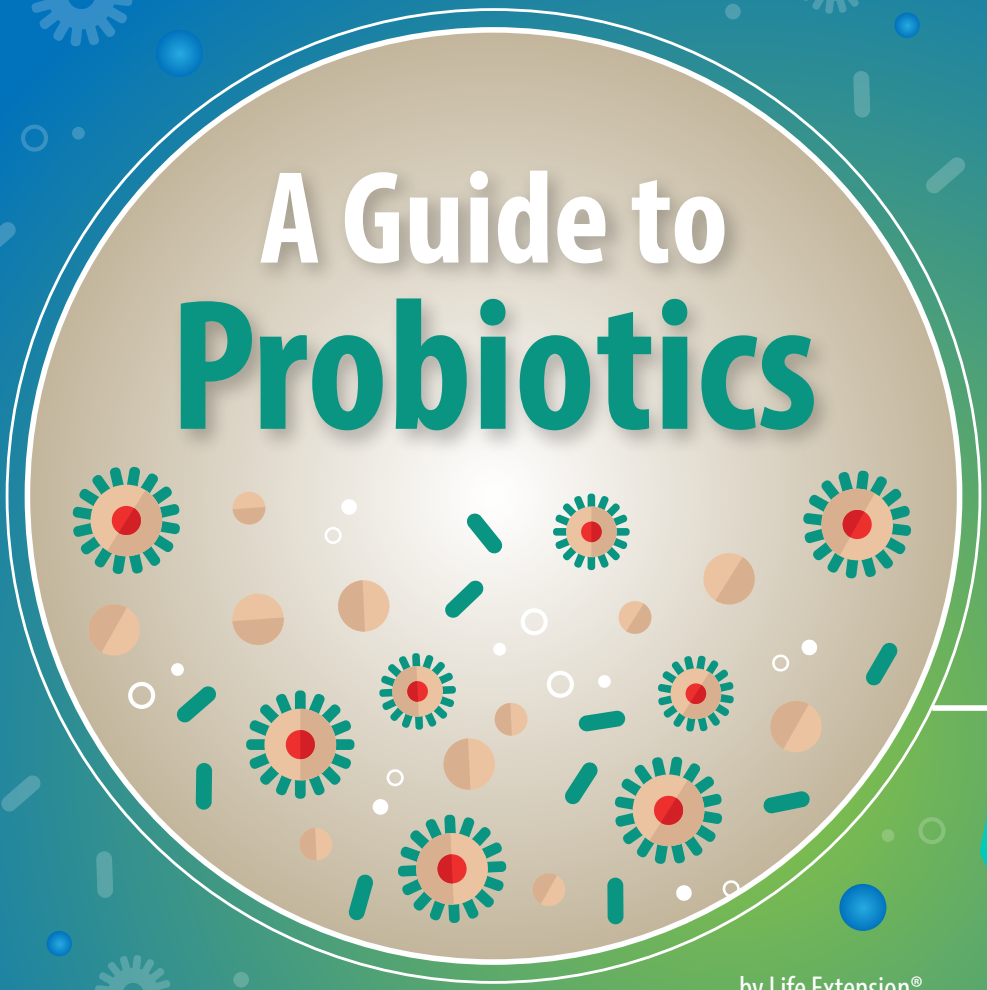
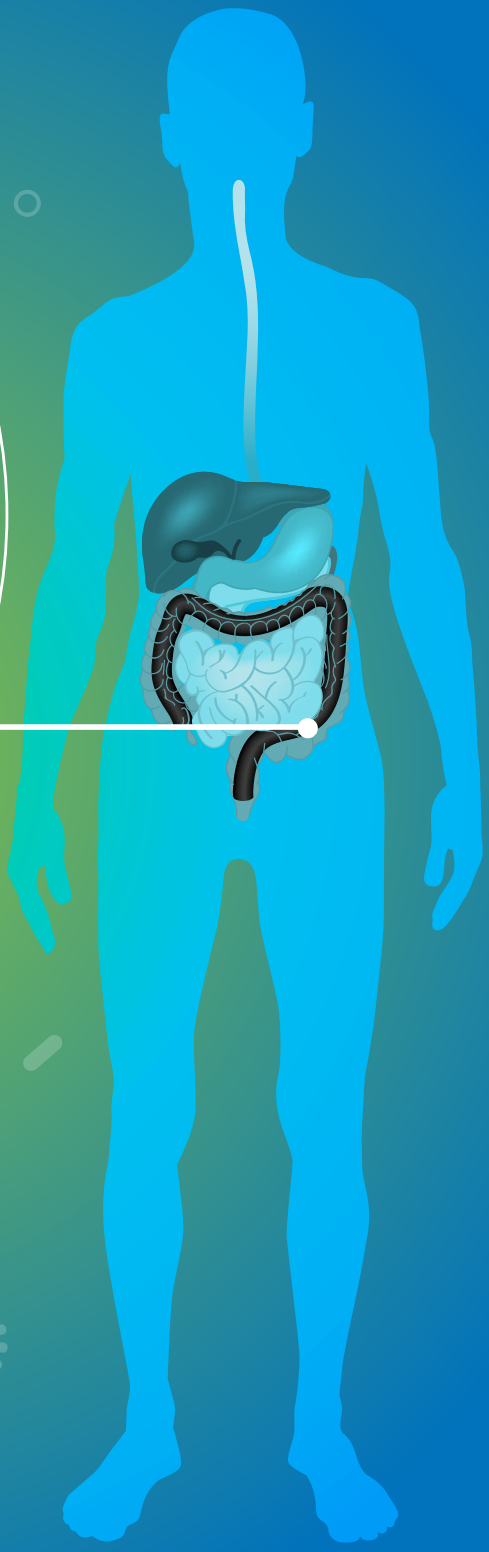
A Guide to Probiotics





by Life Extension®

LifeExtension®
Stay Healthy, Live Better

#1

The Wonders of Probiotics

Keeping an optimal level of healthy bacteria in your gut can have whole-body benefits. It actually exemplifies the word "probiotic" — healthy bacteria seeded throughout your body are "pro-life."

We're covered in bacteria.

From top to bottom, and from the inside and out, we're literally covered in them. By conservative estimates, we're talking about trillions of bacteria. This means that we're made up of more bacteria than our own cells!

Most of them live in our gastrointestinal tract. The normal adult gut is estimated to consist of up to 100 trillion microorganisms, comprising somewhere between 500 to 3,000 species.[1] They play a crucial role in maintaining a healthy digestive system. But their effects go way beyond just gut health.

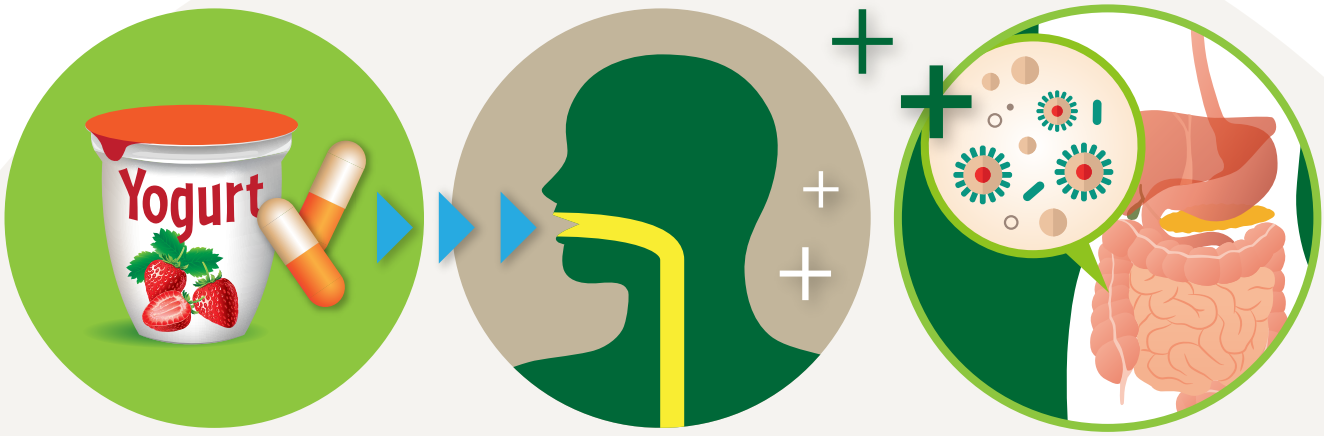
Keeping an optimal level of healthy bacteria in your gut can have whole-body benefits. It actually exemplifies the word "probiotic" — healthy bacteria seeded throughout your body are "pro-life."

We'll get into more of this later. For now, let's dig in a little bit and discuss where these beneficial gut bacteria come from and how we, unfortunately, lose them.

There are three terms or phrases industry experts, doctors, and nutritionists refer to when teaching about the trillions of microorganisms colonizing our bodies.

- **Healthy gut bacteria or healthy gut flora**
- **Microbiome or microbiota**
- **Probiotics**

Since a picture is worth a thousand words, here's our way of teaching the meaning of them:



Food sources and supplements that contain healthy bacteria are called probiotics.

When ingested, they can replenish and balance the healthy gut bacteria—or "flora" or "microbiome".

Birthdays and Mother's Milk

The day you were born was obviously a big day — not just for you, but also for your gut bacteria. Research teaches us that while you were developing inside the womb and during delivery, your gut was colonized with the necessary healthy bacteria. This collection of bacteria in your gut is called a microbiome.

Following your entrance into the world, it didn't take much time for you to get hungry. Most likely your hunger was satisfied with your mom's milk — for the first few days it's known as colostrum, but it eventually becomes mature milk. Besides providing carbs, fats, proteins, and immune factors, mother's milk also provides healthy bacteria.

As time passes, other things influence your microbiome composition, things like the local water, food sources, and the home environment. As you grew, the number of species populating your microbiome continued to increase (from about 100 species in the gut of young infants to upwards of 3,000 in adults), and its makeup continued to change.

Parents and family members also had a big influence on your microbiome composition. While microbial populations vary a lot, even among family members, relatives and people living together tend to have more similar microbiome than strangers.

By age three, however, your microbiome resembled an adult's, and it became much more stable. And then life happened …

Life is Hard on Healthy Gut Bacteria

Despite changing in response to events like illness, disease, antibiotic treatment, fever, stress, injury, your microbiome tends to shift back to a "baseline" state. But today's world full of toxins, stress, and medicines can really do a number on the quality and quantity of healthy gut bacteria.

We really should do everything we can to replenish our healthy gut bacteria with high-quality probiotic sources. This can have a profound effect on our health and well-being.

Remember … probiotics are the "pro of feeling good!" So let's start by discussing some food sources of beneficial bacteria.

There's debate about whether mother's milk is a true probiotic source. Some believe that although human milk contains a few species of bacteria, it's really the sugars in human milk that act as food for gut bacteria already there.

However, a comprehensive review published in 2015 concludes that human milk is a true probiotic. The authors wrote, "In summary, a growing literature suggests that human milk, like all other fluids produced by the body, indeed contains viable bacteria. As such, and recognizing the extensive literature relating breastfeeding to optimal infant health, we propose that human milk should be considered a probiotic food."[2]

#2

Food Sources of Probiotics

Food is a great place to start for replenishing a healthy microbiome.

Interestingly, it was Dr. Ilya Metchnikoff who in 1910 first hypothesized that we could increase longevity by manipulating gastrointestinal bacteria using fermented foods. He is also credited with the original concept of the term "probiotic," although the term wasn't actually used until 1965.

In keeping with his hypothesis, the following "fermented" foods are considered good sources of probiotics.

Yogurt

Kefir

Soft cheeses

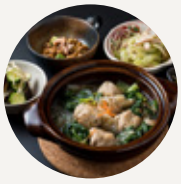
Kombucha

Natto

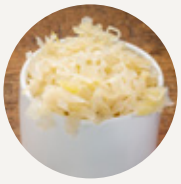
Kimchi

Sourdough Bread

Miso



Fermented Vegetables



Sauerkraut

What are fermented foods?

A fermented food or beverage is made by extensive microbial growth. These foods are nothing new. They've been around for thousands of years. To understand how they are made, let's use yogurt as the example.

Yogurt is a fermented food made from milk. Lactic acid-producing bacteria grow on milk sugar, or lactose, and ferment it into lactic acid. As they multiply, the bacteria produce compounds that change the flavor, texture, consistency, and nutrients in the milk to give us what we know as yogurt.

Eating yogurt provides not only the nutrients created during fermentation, but also some of the viable bacteria that created the yogurt.

The nutritious value of fermented foods includes the live bacteria, improved food taste and texture, increases in nutrients such as vitamins and bioactive compounds, and improved shelf life.

What is a PREBIOTIC?

When shopping for a probiotic, you might come across products and advertisements for prebiotics. Simply, prebiotics are **non-digestible fiber compounds that are food sources for probiotics**.

More specifically, prebiotics are special dietary fibers that are fermented by beneficial bacteria for energy. This is interesting when you think about it—we could improve our intestinal microbiome by increasing their prebiotic intake.

Prebiotics help your good bacteria grow, improving the good-to-bad bacteria ratio. This ratio has been shown to have a direct correlation to your health and overall well-being, from your stomach to your brain.

Some prebiotics can be found in beans, onions, garlic, bananas, Jerusalem artichokes, asparagus, whole grains, and other fruits and vegetables, but usually in very small amounts. Prebiotic supplements are available, and some foods, like bread, can have them added. However, the supplement or food label will rarely list the word "prebiotic." Instead, they usually are listed as:

- **Galactooligosaccharides (GOS)**
- **Fructooligosaccharides (FOS)**
- **Oligofructose (OF)**
- **Chicory fiber**
- **Inulin**

#3

Choosing a quality probiotic supplement

Choosing a Quality Probiotic

Choosing a quality probiotic can be done following three easy steps. So let's get started!

Step 1: Know the reason you're taking a probiotic

Are you taking a probiotic for general digestive health or for a specific condition? This is important to know because each supplement is composed of different kinds of probiotic strains.

For example, if you're taking a probiotic for antibiotic-associated diarrhea, then you'll want to buy products with various strains of *Lactobacillus*, *Bifidobacteria*, and *Saccharomyces boulardii*.

The following table highlights specific strains and species of probiotics and the corresponding conditions that they might be able to help.

Lactobacillus	
Specific Strain	**Best for**
L. acidophilus[3,4]	*Vaginal health, acne*
L. rhamnosus[5,6]	*Digestive support, skin conditions*
L. plantarum[7]	*General inflammation*
L. casei[8,9]	*Cognitive and mood support, infectious diarrhea*
L. reuteri[10]	*Heart health*
L. helveticus[11-13]	*Healthy mood*

Bifidobacteria	
Specific Strain	**Best for**
B. lactis[14]	*Immune support*
B. longum[11-13]	*Healthy mood*
B. bifidum[15]	*Immune function, digestive support*
B. breve[16]	*Digestive support*

Streptococcus	
Specific Strain	**Best for**
S. thermophilus[17]	*Digestive support*
S. salivarius[18,19]	*Throat and oral care*

Step 2: Read the Label

Every label should include:

1. **CFUs or Colony Forming Units** — a measurement of live, viable bacteria in one serving of the product.

2. **Probiotic Storage Information** — Since probiotics are full of live organisms, they obviously require proper handling to preserve their viability when stored on retail shelves and at your home.

3. **The Expiration Date** — Because bacteria can't live forever, an expiration date should be clearly printed on the label.

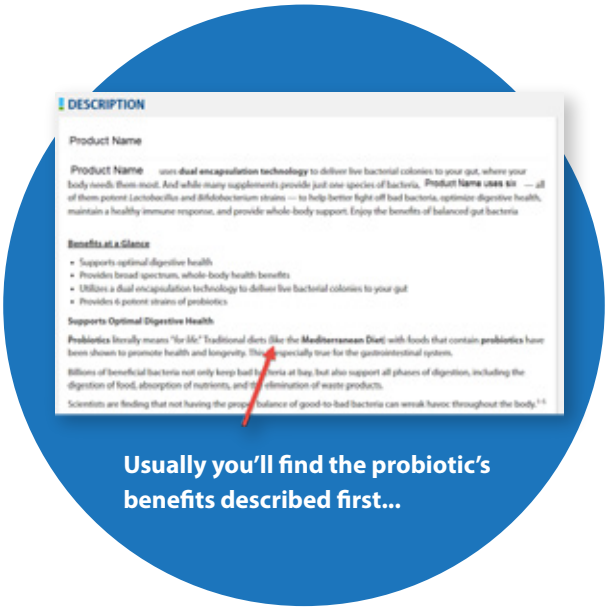
4. **The Probiotic Species** — Don't buy a product that lacks information about the species it contains. You have no assurance you'll be getting any useful organisms.

Step 3: Look for Published Studies Supporting the Probiotic Strains in the Product

If there's a tough step in choosing a quality probiotic, this is it. But it's really not that bad. It just requires a little extra "investigating" on your part. But it's worth it.

Here's what you do for any probiotic you're thinking about buying: Visit the product's web page and look for published references supporting the use of the strains that it contains. See, that's not so bad, considering many of us have smartphones.

Here's an example of what to look for:



The Probiotic Journey

As beneficial as probiotics are, they have to be able to reach your intestines in order to work and that requires remaining intact as they pass through the harsh, acidic environment of the stomach.

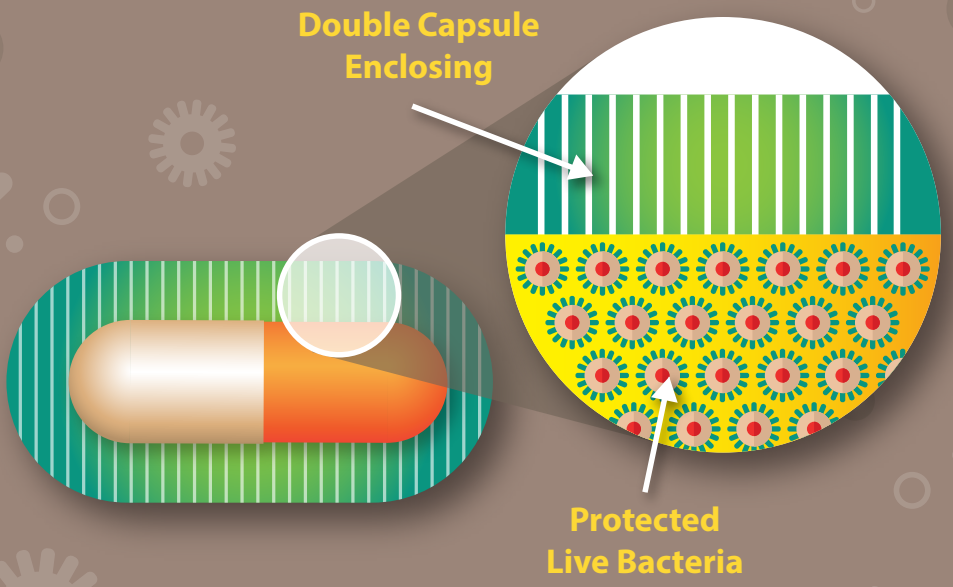
This can limit the number of live microbes that reach their destination and, in turn, limit their beneficial effects. Additionally, many of the living organisms contained in probiotic products don't even survive the high heat and pressure common to the manufacturing process.

All too often, the remaining live cells die quickly while the product sits on the shelf, or they cannot survive exposure to stomach acid or bile in the gut so that they may go on to colonize the colon. This is why it is very important to read labels when choosing a probiotic product.

A new technology called dual-encapsulation is now available. Providing a capsule within a capsule, it keeps the capsule that contains the probiotic intact longer to ensure the probiotic strains reach the intestines safely.

As a result, the probiotic can deliver unprecedented numbers of live colonies to exactly where your body needs them to rebalance your microbiota for optimal health.

Life Extension® takes advantage of this technology in our main line of probiotic products.



#4

Reading a Probiotic Label

Some companies only list the total number of bacteria in grams, a measurement of weight. This type of measurement is not adequate for probiotics as it doesn't always reflect the number of live bacteria available in the supplement.

When purchasing a probiotic in a retail store, take a look around. Is the product exposed to heat or moisture? If so, choose a different product.

If you are purchasing online, contact the product's manufacturer (their phone number is usually on the back label) to see how they are shipping it. Think of probiotics as a live, dairy product — how would you want it delivered to you?

Reading a Probiotic Label

By looking for and identifying specific label information, you can easily gain confidence in buying a quality probiotic. When reading a probiotic label, look for the following information:

1. CFU or colony forming units
2. Storage information
3. Expiration date
4. The probiotic species

1. CFU or Colony Forming Units

The CFU is a measurement of live, viable bacteria in one serving of the product. However, the CFU is assuming that product is stored and used properly.

So when it comes to deciding between a probiotic that contains 5 billion CFUs to another that has 15 billion, you're more likely to opt for the latter option.

The American Academy of Family Physicians believes that for adults, 10 to 20 billion CFUs is optimal.[20] Less than 10 billion and experts begin to question if there's enough viable bacteria to colonize your intestines. Over 20 billion CFUs is fine too, but some experts believe that figure is not necessary unless you're treating a specific ailment.

2. Probiotic Storage Information

Since probiotics are full of live organisms, they obviously require proper handling to preserve their viability when stored on retail shelves and at your home.

Manufacturers of probiotics should take this part of the label very seriously. They're selling a live product and "handle with care" instructions should be clearly displayed and easily understood.

Generally, probiotics need to be kept away from heat, air, and moisture. By the time you take the product, it could have a very low CFU, much lower than what is stated on the label.

Most manufacturers will give instructions to store probiotics in a cool place or refrigerate them. Remember, this is a live product and you should "handle with care."

3. The Expiration Date

Because bacteria can't live forever, an expiration date should be clearly printed on the label. The CFUs will naturally decrease as the expiration date is approached. This is why some manufacturers list the CFUs expected at the time of expiration versus at the time of manufacture. So if you need to, call the manufacturer and ask if the CFUs listed are at the time of expiration.

Regardless, a quality probiotic should contain a healthy population of living bacteria for the product's entire shelf life. Knowing when its shelf life expires is very important.

By the way, most quality probiotics have a 12 to 18 month shelf life.

4. The Probiotic Species

Don't buy a product that doesn't tell you what species are included. You have no assurance you'll be getting any useful organisms. Clinical studies have shown that several types of bacteria make especially powerful and useful probiotics.

Key bacterial species to look for on the label, although you don't have to see all of them, are:

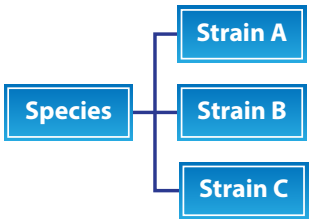
Lactobacillus

- *Lactobacillus acidophilus*
- *Lactobacillus bulgaricus*
- *Lactobacillus casei*
- *Lactobacillus helveticus*
- *Lactobacillus lactis*
- *Lactobacillus paracasei*
- *Lactobacillus plantarum*
- *Lactobacillus reuteri*
- *Lactobacillus rhamnosus*
- *Lactobacillus salivarius*

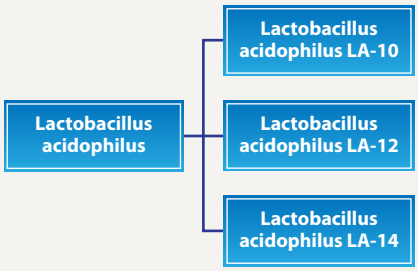
Bifidobacterium

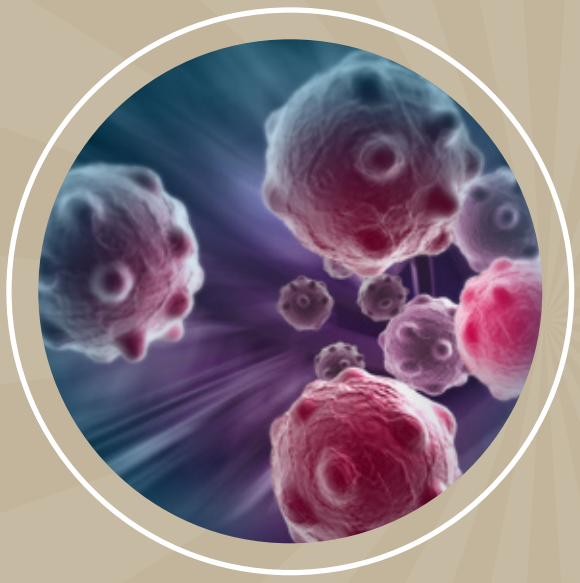
- *Bifidobacterium bifidum*
- *Bifidobacterium breve*
- *Bifidobacterium lactis*
- *Bifidobacterium longum*

A group of bacteria consisting of similar genetics and characteristics make up a species. Within the species, there are genetic variants that make up a strain. Although all strains within a species are similar, slight differences mean they can produce slightly different effects. Here's a flowchart of a species and its strains:



Using the example of *lactobacillus acidophilus*, the strains look like this:





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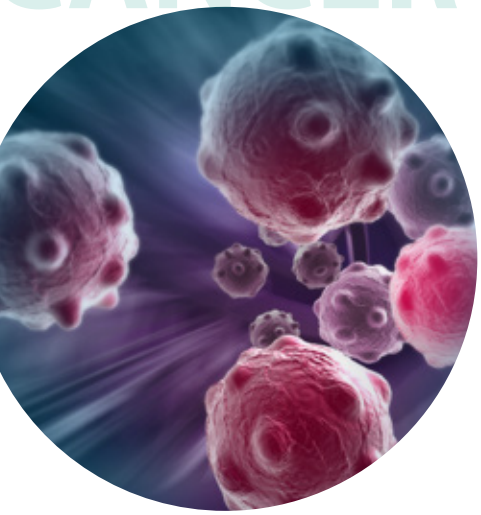
Treating disease with probiotics



Scientists now believe that probiotics help prevent many of the diseases of aging.

Treating disease with probiotics

Probiotics are popularly thought of as an aid to good digestion. But scientists are discovering that probiotics and the resulting healthy balance of gut bacteria confer a broad spectrum of previously unrecognized health benefits.[21]

So while supplementing with good bacteria has been seen as providing defense primarily against intestinal conditions, scientists now believe that they help prevent many of the diseases of aging as well.

The Powerful Role of Probiotics in Cancer

As an example, take just one deadly disease: cancer. Scientists have demonstrated that probiotic organisms switch on several mechanisms that help protect against or even treat this dreaded disease.

Probiotics have been shown to:

- Bind to potential carcinogens, promoting their excretion.[22]
- Decrease enzymes implicated in the development of carcinogens.[22]
- Up-regulate immune signaling molecules to battle the early stage of cancer.[23]
- Boost populations of immune cells that play a role in tumor inhibition.[23,24]

Probiotics Help Control Diabetes

Diabetes continues to be a serious problem for too many Americans. Chronically elevated blood sugar is devastating to just about every organ in your body, especially the heart, kidneys, nerves, and eyes.

Two species of probiotics, *Lactobacillus* and *Bifidobacteria*, have demonstrated improvement in insulin resistance — a hallmark of type 2 diabetes — and significant reductions in blood sugar levels.

In a six-week study of patients with type 2 diabetes, fasting blood sugar and hemoglobin A1c (a measure of long-term blood sugar control) were significantly improved through consumption of a probiotic yogurt containing *Lactobacillus acidophilus* and *Bifidobacterium lactis*.[25]

Controlling Weight is Possible with Probiotics

OBESITY

An interesting benefit of probiotics was first noted when the association between antibiotics (drugs that kill or inhibit bacterial growth, including the healthy ones!) and obesity came to light.[26]

This lead many researchers to test probiotics and their effects on weight and body composition. These studies soon demonstrated that probiotic supplements can indeed help us to lose weight and body fat accumulation.[27-29]

Additionally, probiotic supplements given to mothers prenatally (meaning from at least one month before birth and continuing up to six months after birth), subsequently reduced excessive weight gain in the mothers — and their children![30,31]

Does all of this mean that probiotics are weight loss supplements? Not likely. However, probiotics may help people reach their goals when used in conjunction with an established weight loss plan.

Probiotics May Reduce Vascular Inflammation

DIABETES

A mixture of eight bacterial strains recently showed beneficial effects in reducing inflammation along the wall of arteries. This is wonderful news!

We've known for a long time that cardiovascular disease often begins with damage to the inside lining of the arteries. And the damage is often caused by inflammation. However, reducing vascular inflammation with conventional medicine is not easy and usually has mixed results.

But it appears that beneficial bacteria may be an answer. After 12 weeks of administering the eight strains of bacteria to a mouse model that's prone to develop arterial plaque, the researchers found reduced levels of two, pro-inflammatory adhesion (sticky) molecules — ICAM-1 and VCAM-1.[32]

These adhesion molecules play a role in the development and progression of arterial plaques. So decreasing them by using probiotics, in mice prone to develop plaques, is a significant finding.

What You Need to Know

Loss of healthy gut bacteria can trigger disease while replenishing them with probiotics may actually treat disease.

Evidence shows that supplementing with key species restores the proper balance of beneficial bacteria — in turn restoring your body's natural, intestine-based protection against a host of non-intestinal diseases!

6 MOST-STUDIED Probiotic Strains

Although research tying specific probiotic strains and species to particular diseases is still in its infancy, scientists have identified a few disease-treatment benefits for six of the most studied probiotic species:

Lactobacillus acidophilus

- Increased HDL (good) cholesterol.
- Improved markers for metabolic syndrome, inflammation, and heart disease.
- Improved markers for ulcerative colitis and inflammatory bowel disease.

Lactobacillus rhamnosus

- Reduced allergic response to milk in milk-sensitive patients.
- Improved markers for ulcerative colitis and inflammatory bowel disease.

Lactobacillus paracasei

- Enhanced therapeutic management of minimal hepatic encephalopathy (MHE).
- Improved markers for ulcerative colitis and inflammatory bowel disease.

Bifidobacterium lactis

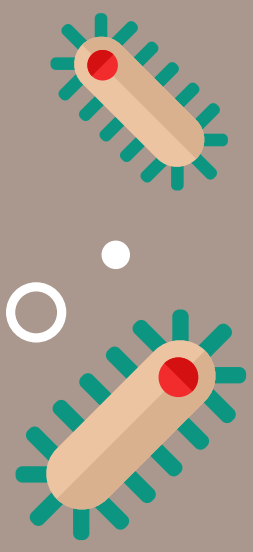
- Improved immune function in healthy, elderly individuals.
- Greater weight gain and less gut inflammation in preterm infants.
- Improved immune response and respiratory symptoms from birch pollen allergies in children.

Bifidobacterium bifidum

- Improved markers for liver inflammation and damage in alcohol-related liver disease.
- Improved inflammation profiles in ulcerative colitis and inflammatory bowel disease.

Bifidobacterium longum

- Reduced diarrhea and improved bowel function in cases of radiation-induced enteritis.
- Increased HDL (good) cholesterol.
- Improved markers for ulcerative colitis and inflammatory bowel disease.



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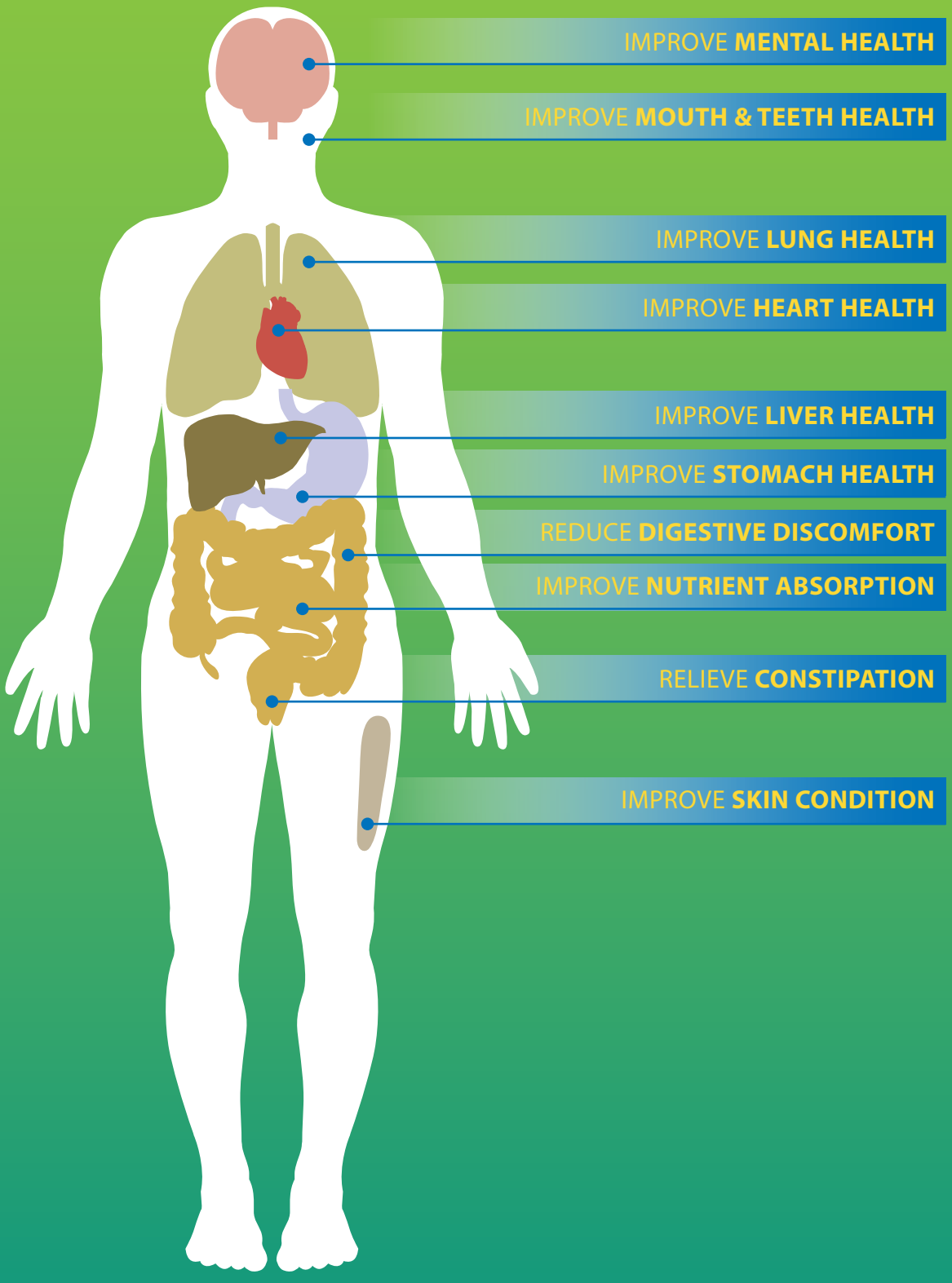
Whole-body benefits of probiotics



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