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Just 1 TBSP a Day: An Easy Way to Lower Your Cholesterol, Blood Pressure and...

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What if consuming a tablespoon or two per day of a simple food could drastically lower your chances of developing cancer, heart disease or stroke, or of contracting a life-threatening virus such as HIV?

Would your interest be piqued?

There is a unique freshwater plant that has been of enormous interest to nutritional scientists over the past decade, and it shows promise for doing all of the above—and then some. It's one of the most nutrient-packed dynamos of the superfood world.

This simple food is spirulina.

I recently posted a report about the radioprotective effects of spirulina. But its health benefits go far beyond that application. But what exactly is spirulina? You may be surprised!

Spirulina: One of Nature's Near-Perfect Foods

Spirulina is similar to sea vegetables such as dulse, kelp, nori, Kombu, arame, and wakame. Along with its cousin [chlorella](#) (another one of my favorites), spirulina is a member of the "blue-green" family—but this family is actually not truly algae.

Although you will often hear the term "blue-green algae," spirulina and its kin are actually cyanobacteria. Cyanobacteria are classified as bacteria because their genetic material is not organized in a membrane-bound nucleus. Unlike other bacteria, they have chlorophyll and use the sun as an energy source, in the way plants and algae do.

Spirulina is primarily produced by two species: *Arthrospira platensis* and *Arthrospira maxima*.

One of the special traits of spirulina is its rich protein content—it's 50 to 70 percent protein by weight and contains all of the essential amino acids. Records of the Spanish conquistadors



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suggest that the Aztecs consumed spirulina as a food source, and the Kanembu people of Central Africa harvested it from what is now called Lake Chad.

Wild spirulina grows in the alkaline lakes of Mexico and on the African continent, although it is commercially grown and harvested all over the world. It reproduces quickly, and because the individual organisms tend to clump together, it's easy to harvest. Commercial production of spirulina is estimated to reach 220,000 tons by the year 2020. Japan is the largest producer of spirulina, as well as the largest consumer.

Spirulina Packs Quite a Nutritional Punch

Spirulina is one of the most nutritious and concentrated food sources on the planet. As a result, it's appearing more frequently all the time in natural foods and beverages, such as green foods and drinks, energy bars and oral supplements.

Spirulina consistently boasts an amazing protein level of 60 percent on average—even better than red meat, which is about 27 percent protein. And spirulina's protein is biologically complete, containing all of the essential amino acids needed for human health. Spirulina also contains a potent array of other beneficial nutrients, including the following:



B vitamins (including exceptionally high B-12), vitamin K, and other vitamins	Naturally rich in iodine	Minerals (including calcium, iron, magnesium, selenium, manganese, potassium, and zinc)
One of best known sources of gamma-linolenic acid (GLA, an important fatty acid for heart and joints)	Other essential fatty acids, including sulfolipids, which may be protective against HIV infection of T-helper cells	Phytopigments (phycocyanin, chlorophyll, and carotenoids)
Metallo-thionine compounds (proteins combined with metals that bind heavy radioactive isotopes)	Low in carbohydrates (15-20 percent)	Eighteen different amino acids

(For specific concentrations of the above-mentioned nutrients in spirulina, refer to Table 1 in [this spirulina report](#) by S. Thomas of Parry Nutraceuticals.) In addition to this rich nutritional blend, spirulina has the following special properties:

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- The proteins in spirulina are of a highly digestible type (83 to 90 percent digestible), due to the fact that it does not have cellulose walls, like yeast and chlorella do. Therefore, the net protein utilization (NPU) is high (between 53 and 61 percent) and requires no cooking to increase the bioavailability of its proteins.
- Studies confirm a very high "protein efficiency ratio" (PER) for spirulina, meaning your body will be able to efficiently use these amino acids.
- Gamma-linolenic acid is rarely this high in ANY food and normally has to be synthesized by your body from linoleic acid. GLA is a precursor to important biochemicals such as prostaglandins, leukotrienes, and thromboxanes, which serve as chemical mediators for inflammatory and immune reactions.
- Spirulina has no fatty acids with uneven carbon numbers and very low-level branched-chain fatty acids—two types of lipids that higher order animals, like you and me, cannot metabolize.
- Spirulina has about the same calcium, phosphorous, and magnesium content as milk, a vitamin E (tocopherol) level comparable to wheat germ, and four times as much vitamin B12 as raw liver!



Research-Based Health Benefits of Spirulina

Now that you have spirulina's nutritional overview, let's take a look at what this unique blue-green cyanobacteria can do for your health. The health benefits of spirulina continue to be widely researched. As a result, there is really no way to cover all of the literature related to its potential benefits because there are so many! There are scientific studies supporting spirulina's potential usefulness in preventing and/or treating the following health conditions:

ARMD (Age-related macular degeneration)	Type 2 Diabetes
Cardiovascular disease, including hypertension	NAFLD (Non-alcoholic fatty liver disease)
Liver health and decreased damage from heavy metal exposure	Cerebrovascular disease (including stroke)

Nutritional diseases, such as iron deficiency anemia, pernicious anemia (B12 deficiency), vitamin A deficiency, and kwashiorkor	Neurodegenerative disorders such as Parkinson's and Alzheimer's
Protection from HIV and other viruses	Reduced allergy symptoms
Cancer protection	Radiation protection (LINK to recent spirulina radiation article)
Bone marrow and blood health (especially during use of anticancer drugs)	Strengthening immune defenses and modulating inflammatory response
Reduced pain sensitivity by inhibiting prostaglandins, which contribute to pain and inflammation	Reduction of arthritis symptoms
Protection from the damage of ionizing radiation	

As you can see, the health benefits of spirulina are truly far-ranging. The remainder of this report will focus on how spirulina can address some of the diseases listed in the above table (the ones shown in bold).

Spirulina and Your Eyes

As the population ages, the prevalence of Age-Related Macular Degeneration (ARMD) is on the rise. ARMD is the deterioration of your macula (the region in your eye that controls acute vision), which typically occurs later in life. ARMD is the leading cause of blindness today.

Your eyes' macular membranes contain several carotenoid pigments called xanthophylls—lutein, zeaxanthin, and possibly astaxanthin, if you're getting it as part of your diet. These special pigments [help protect your eyes from damage](#) by slowing down ultraviolet-induced oxidation of lipid membranes, thereby helping prevent degeneration of your macula.

Additionally, xanthophylls may be effective in preventing cataracts. [Spirulina provides 3,750 to 6,000 mcg zeaxanthin per serving size \(3 grams\)](#). Eggs are another excellent source of both lutein and zeaxanthin (200mcg zeaxanthin per yolk). Astaxanthin is also another marine based nutrient that is in the carotenoid family and is also a potent preventor of ARMD.

Spirulina and Type 2 Diabetes

Type 2 diabetes is an epidemic in the Western world today. It is really a cluster of related pathologies, including insulin resistance, obesity, dyslipidemia and hypertension. Spirulina has been shown to benefit diabetics in the following ways:

- Reducing systemic inflammation. (Insulin resistance has come to be associated with a state of systemic low-grade inflammation.)
- Favorably altering your lipid profile by reducing serum triglycerides and increasing HDL.
- Improving vasodilation in those who are obese as a result of high fructose diets (which has benefits for diabetics, as well as for those with hypertension and cardiovascular disease).

Spirulina and Your Cardiovascular Health

Diabetes and cardiovascular health are intimately connected, so it's no surprise that spirulina shows great potential for people with cardiovascular disease, in terms of creating better lipid profiles, controlling hypertension, and increasing blood vessel elasticity. Diabetic patients given 2 grams per day of spirulina showed improved glycosylated hemoglobin and better lipid profiles in [this 2001 study](#). And in [this study of the Mexican population](#), 4.5 grams per day of spirulina significantly reduced serum triglyceride levels and total cholesterol, boosted HDL, and reduced blood pressure in test subjects.



It is thought that the lipid action of spirulina may be due to its phycocyanin content, which inhibits pancreatic lipase activity, and this in turn causes higher excretion of triglycerides through your feces.

In [one animal study](#), spirulina prevented hypertension and vasoconstriction in rats fed fructose-rich diets, but rats fed fructose-rich diets without spirulina had those adverse health effects. Hamsters consuming spirulina were protected from developing atherosclerosis in [this 2007 study](#).

Spirulina and Your Liver

The accumulation of fats in your liver is closely associated with metabolic syndrome and strongly raises your risk for dying from cardiovascular disease. Non-alcoholic fatty liver disease (NAFLD) is the most common cause of chronic liver disease in North America and notoriously difficult to treat, at least with traditional medical measures.

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Animal studies suggest spirulina can protect your liver, probably as a result of its high antioxidant properties and its ability to synthesize or release nitric oxide. Studies show that spirulina [does the following](#) for your liver:

- Prevents the buildup of triglycerides in your liver
- Inhibits lipid peroxidation
- Reduces liver inflammation
- Protects your liver from damage by heavy metals, like lead and mercury

Spirulina and Your Brain

The third leading cause of death in the U.S. is stroke. Diets high in antioxidants have been shown to lower your risk for stroke. Two studies (one in the [Journal of Agricultural and Food Chemistry](#), the other in the [British Journal of Nutrition](#)) showed that Spirulina reduces platelet aggregation, which plays an important role in vascular diseases by reducing your risk for thromboembolism.

In [another study](#), three antioxidant-rich diets (blueberries, spinach, and spirulina) were compared for their neuroprotective effects. Spirulina was found to have the highest neuroprotective effect, possibly due to its ability to squelch free radicals and reduce inflammation.

And in an [Oregon State University study](#) of rats that had induced strokes, the group fed spirulina showed brains lesions that were 75 percent smaller than those in control groups.

Oxidative stress is one major source of inflammation, and in your brain, it can result in loss of dopamine neurons and lead to neurodegenerative disorders such as Parkinson's and Alzheimer's. An enzyme complex called NADPH oxidase has been shown to play a role in these diseases, and the phycocyanin in spirulina can *suppress* NADPH oxidase, lowering your risk for these age-related brain diseases. (I will go into this further in the next section.)

In [animal studies](#), diets enriched with spirulina were found to reverse the inflammation that can lead to diminished neurogenesis (production of new neurons), which is another factor in degenerative diseases of the brain. [Bob Capelli, of Cyanotech Corporation said](#):

"Spirulina has long been associated with immune building and anti-viral properties, eye and brain health and cardiovascular health, but we now see that spirulina also has anti-inflammatory properties through this research on one of the principal constituents in spirulina, phycocyanin. [This study](#) isolates the mechanism of action for phycocyanin as an anti-inflammatory."



Let's look a little more at the antioxidant properties of spirulina—in particular, its special pigmented component, phycocyanobilin.

The Spirulina-Bilirubin Connection

Phycocyanobilin contained in spirulina is a close chemical relative of bilirubin. In mammalian cells, phycocyanobilin is converted into phycocyanorubin, a compound nearly identical to bilirubin. Bilirubin is the chemical responsible for the yellow color of bruises, urine, and jaundice and occurs as a breakdown product of your red blood cells (heme). When a newborn baby gets jaundice, he is placed under "bili lights" in the hospital nursery to prevent brain damage (kernicterus), if his bilirubin levels become too high. The lights break down the bilirubin so it can be excreted.

But bilirubin, at appropriate levels, has a strong free radical scavenging effect.

Until recently, scientists were not aware that bilirubin may actually have anti-inflammatory, antioxidant, and atheroprotective properties—and there is a growing body of scientific and clinical evidence to support this. From an evolutionary/biological perspective, it makes sense that nature would have [created a way for your body to break down heme](#), which can be toxic if it accumulates.

The way bilirubin is thought to provide these health benefits is through its ability to inhibit NADPH oxidase, a metabolic enzyme that is activated in a large number of pathological conditions and generates a great deal of oxidative stress in your body. In fact, NADPH overactivity appears to play a significant roll in a wide range of adverse health conditions, including but not limited to the following:

- Vascular diseases and vascular complications of other diseases (diabetes, kidney failure, blindness, heart disease, etc.)
- Insulin resistance
- Neurodegenerative disorders, like Alzheimer's and Parkinson's
- Many human cancers
- Glaucoma
- Pulmonary fibrosis
- Erectile dysfunction

NADPH seems to be a chemical that can be helpful or harmful, depending on how much of it is circulating at the time, so it needs to be carefully regulated by your body. For example,



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NADPH oxidase plays a key role in helping your immune system fight bacteria and helps your T-cells to function properly.

It follows then that preventing many chronic diseases would require finding a means of inhibiting or modulating NADPH oxidase.

Bilirubin is now believed to assist with this modulating effect.

People with Gilbert Syndrome comprise 5-10% of the population and illustrate this phenomenon very nicely—they are genetically predisposed to chronically elevated levels of unconjugated bilirubin. These individuals, having two to three times as much bilirubin as the rest of us, enjoy a greatly reduced risk for coronary artery disease, hypertension and carotid atherosclerosis, and [these protections are thought to be related to their high bilirubin levels](#). I happen to be one of those with Gilbert's and did not realize until reviewing the research for this article that my elevated bilirubin levels were actually a major benefit.

Since phycocyanobilin is a very close relative of bilirubin—and spirulina is a great source of phycocyanobilin—[spirulina has enormous clinical potential due to its NADPH oxidase inhibiting effect](#). This is why phycocyanobilin has been the focus of a large amount of research of late. Phycobilin extracts have been shown to inhibit NADPH oxidase activity in human aortic endothelium, aortic smooth muscle, and renal cell cultures. And bilirubin protects against diabetic nephropathy via downregulation of NADPH oxidase in rats.



Concluding Remarks

The scientific evidence for spirulina's health benefits is abundant, frequently showing remarkable clinical results. And spirulina's safety is equally impressive! Rodents show no ill effects when fed diets very high in Spirulina. And remember, it was a major component of the Aztec diet.

Spirulina is even good for your pet (be he dog, cat, bird, fish or reptile) promoting a strong immune system, a healthy coat, heart and joint health, and even fresher breath—which is why I now offer [SpiruGreen Superfood for Pets](#). It appears this is a near-perfect food for everyone in your family—one more natural way to take charge of your health.

Sources:

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- Phycocyanobilin: A Natural Revolutionary Approach to Oxidative Stress ([Valensa](#))
- [J Med Food 2007](#)
- [Pediatrics June 2004](#)

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