

How Do Antioxidants Protect You?

by JAMES F. BALCH, M.D.

AN ANTIOXIDANT DEFENSE SYSTEM PROTECTS YOU ON FOUR LEVELS.

First, an antioxidant blocks oxidants (free radicals) from forming. It also stops certain metals (i.e., copper, cadmium, mercury and lead) from initiating oxidation. What does this mean? As a rough analogy we could think of our bodies as like lead pipes. Expose a lead pipe to oxygen and it rusts; expose our bodies to oxidants without antioxidants and we essentially "rust" inside and our bodies break down. When a human body starts to break down, logically it is in a weakened state (the immune system is less effective) and we unwittingly open up ourselves to a number of degenerative diseases.

Second, in the real living body the antioxidant defense system intercepts oxidants that manage to form and puts the brakes on chain reactions to stop the spread of numerous other oxidants. An easy analogy here is dominoes. Once the first domino falls, it is difficult to catch all of the others before they go down as well. Once our body is in a weakened state and starting to degenerate due to oxidation, unless we take curative and preventive steps (eating foods rich in antioxidants and/or taking antioxidant supplements), it may be difficult to slow down or stop an oxidation chain reaction.

Third, our antioxidant defense system intercepts damage caused by the oxidants that do not get intercepted. The human body is a truly marvelous thing. It has the ability to wipe out dangerous oxidants in your system and then check and double-check to see that these toxins have been eradicated. By keeping a sufficient amount of antioxidants in your body, you are helping it maintain its second and third lines of defense against diseases.

Fourth, the antioxidant enzymes that are the most active part of our antioxidant defense system eliminate and replace molecules that have been damaged beyond repair, then remove undesirable substances generated by its activities. They not only fight and protect you against possible diseases and various forms of destruction to your body, antioxidant enzymes also clean up the battlefield afterwards.

Antioxidants in general:

An antioxidant is anything that destroys free radicals in the body. Three of the best antioxidants are vitamins C and E and beta carotene, which have been

proven to protect the body against oxidative damage. Another antioxidant, lycopene, is also rapidly gaining respect in the mainstream medical community. Some of the most impressive clinical studies on antioxidants of late have involved all natural tomato lycopene, which you'll read more about later. Each of these antioxidants is found in many types of food, especially fruits and vegetables.

Beta carotene, vitamin A, vitamin C and vitamin E: These nutrients, known collectively as "protectors," provide the body with important antioxidant protection. These protector nutrients are the body's first line of defense against oxidative damage.

Vitamin C is the most studied antioxidant, so it should not be surprising that we know more about what it can do. Vitamin C boosts the body's immunity by strengthening the thymus and lymph glands. The best sources of vitamin C are tropical fruits such as acerola, papaya and kiwi, but the more readily available citrus fruits, like grapefruit and oranges, are good sources of vitamin C as well.

Perhaps because of vitamin E's reputation of increasing sexual stamina, some people literally go "nuts" for it. All kinds of nuts, but especially almonds, are an excellent source of vitamin E, as are sunflower seeds. Cooking oils sometimes contain even more of this essential vitamin than nuts, but they are high in calories and too much too often can lead to or add to a weight problem.

Orange and yellow fruits and vegetables are the best sources of beta carotene. Try brightening up your meals with squash, pumpkin, mangos and carrots in addition to green leafy vegetables like kale and spinach.

Can people get enough antioxidants from food?

Many experts doubt you can get enough vitamin E without supplements, unless perhaps you consume too many fatty foods such as oil and salad dressing, but you can get the recommended 30 milligrams of beta carotene and 250 to 500 milligrams vitamin C in a healthy diet if you choose your foods wisely. However, eating enough of the right foods may not always be feasible for the elderly and other people who have problems with chewing, digestion and absorption. These people should consider a nutritional supplement.

GRAPE SEED EXTRACT

According to Michael Murray, a leading expert and author of *The Healing Power of Herbs*, the key uses of grape seed extract are:

- ♦ antioxidant supplementation
- ♦ atherosclerotic prevention
- ♦ capillary fragility and easy bruising
- ♦ diabetes
- ♦ retinopathy
- ♦ varicose veins
- ♦ wound healing.

All proanthocyanidins are similar, no matter their source, whether grape seeds, cranberries, pine bark or others. The difference is in the varying concentrations in the different sources. Grape seed extract proanthocyanidin seems to yield the greatest concentration, at least 10 percent higher than obtained from pine bark.

Both the seeds and the skins of grapes contain proanthocyanidin, which is the molecule responsible for the protective and healing benefits. The most concentrated source of this bioflavonoid is in the seeds of white and green grapes.

So what does grape seed extract do?

It does the following:

▼ It crosses the blood-brain barrier, scavenging free radicals within the brain.

▼ It protects against radiation, pesticides, chemical pollution and heavy metals, all of which produce free radicals.

▼ It is assimilated into the body within seconds, enhancing the effectiveness of other nutrients in a synergistic fashion, such as vitamins A, C and E.

▼ It inhibits the formation of certain enzymes that break down collagen and are the direct or indirect causes of allergies and inflammation. This inhibition prevents the production of histamine and thereby reduces allergic reactions.

▼ It improves the collagen matrix of blood vessels, thereby reducing leakage and improving circulation. Capillaries are able to carry more oxygenated red corpuscles to tissues, expediting soft tissue healing.

The recommended dosage of grape seed extract is 150 to 200 milligrams per day.

SELENIUM

Selenium is a metal you may not have heard much about. It occurs all over the world but in very small quantities, and it is usually combined with other metals. It is seen as a pollution threat, not because it is toxic, but because it likes to combine with sulfur to make all kinds of nasty stuff.

Selenium is found in many common household items, such as transformers that convert alternating currents to direct currents (for Nintendo games, or cordless phones). Selenium has the unique ability to transform energy from one form to another. It is used in solar energy panels because it can convert sunlight directly into electricity.

The number one benefit derived from selenium as an antioxidant is that it is required for the production of the enzyme glutathione peroxidase. The important truth about this enzyme is that it stops the oxidation of fats, especially LDL cholesterol.

That means there will be less stuff clogging arteries, less heart disease, less death. This is a good thing. Study after study has shown that where there is heart disease, there is not enough glutathione peroxidase and often there is not enough glutathione peroxidase because there is not enough selenium available to keep production up. Selenium supplements turn it all around. The results of an experiment by Dr. Aviram of the Rambam Medical Center in Haifa, Israel, released in January 1998, showed that selenium supplements caused about 33 percent more glutathione activity, which led to a 46 percent decrease in LDL oxidation. In other words, selenium cut the amount of cholesterol ready to form arteriosclerotic plaque by half. When there is enough selenium, glutathione does its job and the conditions that caused the cardiovascular disease can be reversed. Unfortunately, the damage done by a cardiovascular crisis cannot be reversed as easily, so do not wait for a problem to come up. If this were the only reason to use selenium, it would be more than enough to justify any cost for supplementation.

But that is not the only thing selenium does for us. Working together with vitamin E

it strengthens our immune system and thyroid functions and keeps our heart, liver and pancreas healthy. Add zinc to that combination and it reduces an enlarged prostate. It has even been found to protect the livers of alcoholics from cirrhosis. Since it is highly concentrated in sperm cells, it can also be linked to fertility.

You can get too much selenium, but the symptoms of selenium toxicity are easy to spot: brittle hair and nails, garlicky breath, metallic taste in the mouth, hair loss, liver and kidney trouble and jaundiced skin. If this should happen, you should reduce the dosage. Doses of as much as 700 micrograms daily have proven safe, even for extended periods. A normal dosage should be 200 micrograms per day and unless you are eating a couple of acres of parsley each day, you are not getting it from your diet.

LYCOPENE

Who would have ever thought it? Spaghetti sauce, ketchup and tomato paste can decrease your chances of developing certain types of cancers. Research at Harvard University involving nearly 50,000 men over a six-year period revealed that those who ate these tomato-based products had up to a 45 percent less likelihood of developing prostate cancer. What's the secret tomato ingredient? The answer is lycopene, a carotenoid akin to beta carotene, a potent antioxidant that contributes to the bright red color of a quality tomato. In fact, S. Franceschi wrote in the *International Journal of Cancer* (October 1994), "Dietary intake of tomatoes which contain high levels of lycopene appeared to protect against cancer of the mouth, pharynx, esophagus, stomach, colon and rectum in over 5,000 cancer patients and controls."

Although it is not totally understood, processed tomato products provide the most abundant source of lycopene in the American diet and it seems to be more easily absorbed by the body when eaten in foods like spaghetti sauce, tomato paste, pizza sauce and ketchup. Processing seems to concentrate the lycopene and the small amounts of fat found in the processed

DIETARY SUPPLEMENTS

products may increase lycopene absorption since it is fat soluble.

Doctors recommend that adults consume at least five servings of lycopene per day for maximum benefit. Foods rich in lycopene include tomato sauce, ketchup and tomato juice, among others. The human body does not produce lycopene on its own so it is vital that people, especially smokers, drinkers and others in cancer risk groups, be conscious of eating a lycopene-rich diet.

I also recommend that smokers, drinkers, those exposed to radiation, and those at risk for prostate cancer take more lycopene than the average recommended amount. It is important for people in risk groups, and those who don't get enough dietary lycopene, to take an all-natural tomato lycopene supplement, such as *Lyc-O-Mato*™. It is vital that people choose an all-natural supplement, because it is much more readily absorbed by the body than synthetic versions.

The anticancer properties of tomatoes

The anticancer properties of tomatoes are being researched because of the well-known fact that prostate cancer is less common in the southern Mediterranean countries (Italy and Greece) where tomato-based foods are the dietary norm.

Lycopene, a major oxygen free radical, has been found to be even more potent than beta carotene in quenching singlet oxygen, a major oxygen free radical, and researchers expect it to have a protective effect against many other cancers besides prostate cancer. For example, researchers at the University of Illinois reported that women with the highest lycopene levels have a five-fold lower risk of developing precancerous signs of cervical cancer than women with the lowest lycopene levels.

Ongoing clinical research is now focusing on three key areas: lycopene's efficiency as an antioxidant, lycopene's control over cancer cell growth and lycopene's specific role in enhancing communications between cells in human organs and tissues. Evidence is accumulating that lycopene has potent antioxidant properties that could well play a role in cancer prevention. Studies presented by Dr. Yoav Sharoni and Joseph Levy of Ben Gurion University in Israel show that lycopene is more potent in reducing cancer growth than either alpha- or beta carotene, especially the cancers with fast-growing cells. It appears that the lycopene interferes with cancer cell communications so that both cell growth and cell movement were delayed in breast, lung and endometrial cancer cells. They discovered also that lycopene increases cell differentiation, the process by which cells in the human body become specialized (i.e., become a liver, muscle or heart cell).

LUTEIN AND ZEAXANTHIN

The *Journal of the American Medical Association* pre-

sented a study in November 1994 by J.M. Seddon in which investigators at five U.S. eye centers examined the role of carotenoids in preventing macular degeneration. Macular degeneration is the major cause of blindness today and occurs when the macula (the place on the retina where light focuses) deteriorates. Nearly a thousand patients and controls were studied and the carotenoids lutein and zeaxanthin were found to give the most protection against macular degeneration. Dr. Kathleen M. Egan of the Harvard University School of Medicine has also presented evidence supporting dietary carotenoid's ability to protect older people from macular degeneration.

Zeaxanthin was found to block the activity of the peroxide radicals and consequently protect cell membranes from this and other free radical damage (*Journal of Biochemica et Biophysica Acta*, June 1992).

GARLIC

On occasion, patients will ask me, "If I could take only one supplement, what should it be?" The question may come because they are concerned about the cost of a multitude of vitamins and minerals. Or it may simply be intended to clarify priorities in what needs to be taken. Inevitably, no matter what their condition is, my answer is garlic.

What are garlic's positive health effects?

Garlic has the following positive health effects:

- ▼ acts as a super antioxidant
- ▼ lowers blood pressure
- ▼ boosts the immune system
- ▼ balances blood sugar
- ▼ prevents heart disease
- ▼ assists in fat metabolism
- ▼ relieves intermittent claudication and
- ▼ aids in cancer prevention.

Why is garlic considered a powerful antioxidant?

The reason garlic is such a powerful antioxidant is because it is loaded with most of the phytonutrients we consider to be the super antioxidants. It contains manganese, selenium, germanium, vitamin A, vitamin C and zinc.

GREEN TEA

What is green tea?

Green tea is the antiviral, anticancer super antioxidant. It is the most popular of Asian drinks and has been known for centuries to have a long list of health benefits. Interestingly, after water it is the most widely consumed beverage on the earth.

Dr. Earl Mindell states, "The antioxidants specific to green tea are polyphenols, bioflavonoids that act as super antioxidants by neutralizing harmful fats and oils, lowering cholesterol and blood pressure, blocking cancer-triggering mechanisms, inhibiting bacteria and viruses, improving digestion and protecting against

ulcers and strokes. The specific type of polyphenol found in green tea is called a catechin."

This catechin is similar to the substance found in grape seed extract that is the primary constituent of the proanthocyanadin class of molecule. The active polyphenols in green tea are the EGCG (epigallocatechin gallate).

Other ingredients in green tea include the green chlorophyll molecules, but also important are the proanthocyanadins similar to those found in grape seed extract, pine bark, bilberry and ginkgo. The specific tea is a variety called *Camellia sinensis*. *Camellia sinensis* in the West is known as black tea, such as Earl Grey tea, orange pekoe tea or English breakfast tea.

The antioxidant properties of green tea

The antioxidant properties of green tea are responsible for its most important benefits. The Chinese always claimed that tea slows aging but it was not until we understood the role of oxidation in aging and the antioxidant function of flavonoids that we knew how this mechanism might work. In trying out a new computerized system for measuring chemicals, researchers at University of California-Berkeley found that green tea extract was the best at scavenging the deadly hydroxyl radicals. It was followed by grape seed extract, pycnogenol, ginkgo biloba and other commercial flavonoid blends. The three diseases that we will focus on regarding green tea are heart disease, AIDS and cancer.

GREEN FOODS

The protective qualities of natural green foods

It is well known now through modern research that green foods are rich in vitamins, minerals and enzymes. They help protect against cancer, heart disease, digestive problems and many other modern disorders. Green vegetables are excellent sources of complex carbohydrates, dietary fiber, beta carotene and chlorophyll. Possibly most important of all, they have potent antioxidant activity. Besides, they are low in fat and high in nutrients, an excellent combination.

The Importance of Green Foods

The importance of green foods in the diet is now being validated scientifically worldwide. It is amazing how long it takes us to discover that foods were made correctly in the first place. They contain exactly what we need in their natural state. We have to find a way to take advantage of the whole foods naturally made and most of us are not doing that presently with our diets. In fact, it would be

difficult for anyone to eat green plants to equal the amount of nutrition in concentrated green food supplements. So until you are ready to sidle up to a five-pound salad of spinach, watercress, alfalfa, and kelp, the concentrated supplements mentioned here are probably your best source for the vital nutrients you need from green foods.

HERBS

There are many herbs that contain antioxi-

dants. The most potent of these herbal antioxidants are known as flavonoids, substances found in almost all plants. There are some who would go so far as to say that the flavonoids are even more potent than vitamin C. According to Donald J. Brown in an article from *Herbs for Health*, Sept./Oct. 1997: "Four herbal antioxidants have been so extensively researched that we have established a general 'tissue-specific effect for them.'"

Continued on page 30.

Discover the Power of Glutathione

One of the most powerful antioxidants in your body is glutathione peroxidase. Your body makes glutathione peroxidase with the help of several nutrients. Glutathione Booster is designed to provide the body with the nutrients needed to maintain and elevate healthy glutathione peroxidase levels.

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Herbal Antioxidants and the Tissues They Protect

♦ First is hawthorn, also given the antioxidant names oligomeric procyanadins and vitexin; protects the heart and the circulatory systems.

♦ Second, bilberry, also known as anthocyanosides; protects the eyes and the circulatory system as well.

♦ Third, ginkgo, given the medical names glycosides, ginkgolides and bilobalides; protect the brain, the nervous system and the cardiovascular system.

♦ Finally there is milk thistle, given the name silymarin; protects the tissues of the liver and the gallbladder.

Beneficial effects of the flavonoids found in three herbs—ginkgo, bilberry, and milk thistle—are well documented. Hawthorn is not as well known to the general public but research into its heart-benefiting antioxidant is promising and may soon bring this herb into the spotlight.

PYCNOGENOL

Pycnogenol is not a chemical, but a complex of at least 40 different substances extracted from the bark of maritime pine trees (*Pinus maritima*) found in the Quebec providence of Canada and in southern France. All of these substances are water-soluble flavonoids that occur naturally in plants. The advantage of pycnogenol is that it has a wide and important variety of many different micronutrients in one supplement. Pycnogenol is well absorbed and readily bioavailable, considered nontoxic and is well tolerated.

According to Dr. Morton Walker, "Pycnogenol has been found to neutralize free radical pathology, which in large measure is responsible for such human difficulties as dysfunctional capillaries, bruises, malignancies, allergies, heart disease, peripheral vascular disease, arthritis, varicose veins, diabetes, cancer, cataracts, scleroderma, multiple sclerosis, muscular dystrophy, Parkinson's disease, amyotrophic lateral sclerosis (ALS) and other forms of human tissue degeneration."

What makes pycnogenol so great? Some scientists would like to break it all down and see exactly which of its 40 plus molecules make the biggest difference. But Dr. Lester Packer, a leading researcher in the field of cell biology at the University of California says, "I think, in this case, pycnogenol's collective effect (synergistic effect) may be much more potent." It is

the way all of the different flavonoids in pycnogenol work together that makes it effective in so many different ways.

While pycnogenol is a great antioxidant, it is not a cure-all. No matter how good the antioxidant pycnogenol might be, all the research suggests that we need a broad spectrum of antioxidants from a wide variety of food sources and that they tend to work synergistically in helping out one another.

ALPHA LIPOIC ACID (ALA)

Lipoic acid may be the ideal anti-aging antioxidant. It is an essential coenzyme factor in the production of energy and a power antioxidant on its own. Not only does lipoic acid improve one's metabolism, it protects from the harmful oxidative by-products of the metabolism.

Lipoic acid can go anywhere in the body because of its unique characteristic of being both water and fat soluble. Because it directly and indirectly helps in the protection of every body component from oxidative stress, lipoic acid deserves to be called "the universal antioxidant."

Lipoic acid interacts synergistically with vitamins C and E, potentiating and conserving them. When the body is deficient in lipoic acid, the other antioxidants do not work as well together.

Lipoic acid is good for the diabetic, normalizing the blood sugar and even more important, protecting against glycation, which causes many of the disorders associated with diabetes. Used in Europe for decades, it is proven to reduce retinal disease, cataract formation and peripheral nerve and heart damage. A dose of 300 to 600 milligrams per day may be necessary to control elevated sugar. If you take drugs or insulin, monitor your blood sugar closely. The normal dose as a preventive supplement is 20 to 50 milligrams per day. ALA also offers protection against arteriosclerosis and cancer and is an efficient detoxifier for neutralizing toxic metals.

Lipoic acid may be the ideal anti-aging antioxidant. It is an essential coenzyme factor in the production of energy and a powerful antioxidant on its own. Not only does lipoic acid improve your metabolism, it protects you from the harmful oxidative by-products of that metabolism. *

This article is adapted from *The Super Antioxidants* by James F. Balch, a physician and surgeon as well as co-author of the best-selling *Prescription for Nutritional Healing*. In *The Super Antioxidants* Dr. Balch explores in detail the various agents that the body can use to fight free radicals and the oxidative damage they cause. It includes information on every known form of antioxidant, how they can help reverse the effects of aging and help prevent or fight cancer, diabetes, heart disease and others. An excellent resource and worthy successor to *Prescription for Nutritional Healing*, *The Super Antioxidants* continues James Balch's extraordinarily thoughtful and comprehensive work in the field of health and well-being. You can order copies by calling 1-800-462-6420.

