

What Exactly Is A Free Radical?

A free radical is a cellular killer that wreaks havoc by damaging DNA, altering biochemical compounds, corroding cell membranes, and destroying cells outright.

Scientists now know that free radicals play a major role in the aging process as well as in the onset of cancer, heart disease, stroke, arthritis, and possibly allergies and a host of other ailments. The link between free radicals and the "aging diseases" is the most important discovery since doctors learned that some illnesses are caused by germs.

In a very real sense, the free radical process in our bodies is much the same as the process that causes fuel to burn and oil to go rancid or an apple to turn brown if you slice it open and expose it to air. It is as though our bodies rust from the inside out. When the process gets really out of control, it can cause tumors, hardening of the arteries, and macular degeneration -- not to mention wrinkled skin -- to name just a few.

The bottom line is that we can think of free radicals as ravenous molecular sharks -- sharks so hungry that in little more than a millionth of a second, they can be making a frenzied attack on a healthy neighboring cellular molecule.

Why Are Free Radicals So Deadly?

A single free radical can destroy an enzyme, a protein molecule, a strand of DNA, or an entire cell. Even worse, it can unleash, in a fraction of a second, a torrential chain reaction that produces a million or more additional killer free radicals.

There are four primary sources of free radicals:

- The Environment:** Air pollution, cigarette smoke, smog, soot, automobile exhaust, toxic waste, pesticides, herbicides, ultraviolet light, background radiation, drugs, and even certain foods can all generate free radicals in the body.
- Internal Production:** Our bodies constantly produce free radicals as a byproduct of normal metabolism.
- Stress factors** such as: aging, trauma, medications, disease, infection, and "stress" itself all accelerate the body's production of free radicals -- by a factor of eight, or more.
- Chain reactions:** When a free radical steals an electron to balance itself, it creates a new free radical in the molecule from which it stole the electron. In many cases the new free radical will seek to balance itself by stealing an electron -- and on and on. **And remember, even one free radical is capable of destroying an entire cell, or a strand of DNA.**

Are All Free Radicals The Same?

There are many types of free radicals in the body. Four particularly nasty ones are:

- Superoxide radical:** This radical tries to steal its much-needed electron from the mitochondria of the cell. When mitochondria are destroyed, the cell loses its ability to convert food to energy. It dies.
- Hydroxyl radical:** This free radical attacks enzymes, proteins, and the unsaturated fats in cell membranes.
- Lipid peroxy radical:** This radical unleashes a chain reaction of

chemical events that can so totally compromise the cellular membrane that the cell bursts open, spews its contents, and dies.

- Singlet oxygen:** Not technically a free radical, this metabolite can nevertheless wreak havoc on the body.

Your body is constantly replacing and repairing free-radical damaged cells; but with the way we live and abuse ourselves, our bodies are bombarded with more free radicals than they can handle. By supplementing with antioxidants, we help our bodies keep up with the carnage. We can even get ahead of the game and reverse damage.

What Are Antioxidants?

Antioxidants are compounds that render free radicals harmless and stop the chain reaction formation of new free radicals.

Where Do They Come From?

There are three sources of antioxidants.

- Several metabolic enzymes produced by the body are extremely effective antioxidant scavengers. Unfortunately, the body's ability to produce these enzymes fades dramatically in our late twenties.
- Many foods and plants provide powerful antioxidants. Among these are: Vitamins E and C, Beta Carotene, and the Proanthocyanidins (including Pycnogenol®).
- Cutting edge research is continually uncovering new antioxidants.

What Are The Benefits Of Antioxidants?

*Many scientists now believe that free radicals are the **MAJOR** villain in both aging and disease.*

The amount of cells destroyed over the years by free radicals is enormous. Free radicals literally "eat away" the major organs of the body. Just one example: the size of a 25 year old's liver is often TWICE that of a person of 70.

The use of antioxidant supplements at a maintenance level may provide the ultimate defense against premature aging and a compromised immune system.

At therapeutic levels, antioxidants may actually play a significant role in reversing many of the effects of aging and disease.

How To Design An Antioxidant

Over the years, I have formulated a number of antioxidant formulas for various companies. In fact, this is my specialty -- the design of cutting edge nutritionals using standardized herbs and isolates. On the other hand, I have also become known as a strong advocate for the use of whole herbs and food complexes in all formulations. Why the apparent contradiction?

There is no question but that nature packages nutrients in "food complexes;" and that, in general, it is best to design supplements using only whole food complexes. Antioxidants, however, provide one of the few exceptions to that rule -- as long as a few provisos are followed.

The reason for the exception is that because no one antioxidant works on all free radicals and in every area of the body, you need to combine a number of antioxidants in one supplement to offer an effective defense. (In fact, many antioxidants reinforce and/or recycle each other.) For this reason, it is impossible to fit the variety you need (at adequate levels) into

one supplement unless you use some standardized herbs and isolates.

The trick is (1) to use only natural isolates -- no synthetics, (2) to offer as complete a complex as you can even when using isolates, and (3) to make sure you TAKE ADVANTAGE OF THE SYNERGISTIC EFFECT that a number of the antioxidants share with each other.

The Ultimate Antioxidant

I now present an antioxidant formula based on years of expertise in the field -- even including the amounts required for each antioxidant. (Note: as ways to incorporate whole-food complexes while still maintaining potency are developed, or new phytochemicals are discovered, this formula will change.)

Beta carotene -- 5,620 IU
Carotenoids are phytonutrients that protect plants from damage caused by UV radiation and other environmental factors. In humans, they have been shown to inhibit the proliferation of various types of cancer cells such as those affecting the lungs, stomach, cervix, breast, bladder, and mouth. They also have been proven to protect against atherosclerosis, cataracts, macular degeneration and other major degenerative disorders. The key carotenoids are: beta carotene, alpha carotene, lycopene, and zeaxanthin.

Probably the best known of the carotenoids, beta carotene is converted by the body into vitamin A as needed to strengthen the immune system and promote healthy cell growth. In addition, beta carotene is a potent antioxidant, offering particular benefits to the immune system and the lungs. (Note: synthetic beta carotene is to be avoided at all costs.)

Apha carotene -- 425 IU
Recent studies have shown that alpha carotene is one of the most powerful carotenoids and has a strong inhibitory effect on the proliferation of various types of cancer cells such as those affecting the lungs, stomach, cervix,

breast, bladder and mouth. It works by allowing normal cells to send growth-regulating signals to pre-malignant cells.

Lutein -- 8 mg
In addition to being a specific for the prevention of macular degeneration (lowering the risk by over 50%), lutein has also been shown to have strong anti-cancer properties. It's antioxidant effect is significantly enhanced by the presence of zeaxanthin, and bilberry. When combined with vitamin C, these three antioxidants have been shown to significantly decrease the risk of cataracts.

Lycopene -- 6 mg
Derived primarily from tomatoes (cooked with olive oil, not raw), lycopene appears to be one of the best defenses against prostate cancer and bladder cancer. When used in conjunction with d-alpha-tocopherol vitamin E and green tea extract, studies indicate that it inhibits prostate cancer proliferation by some 90%.

Zeaxanthin -- 300 mcg
Lutein and zeaxanthin are both part of a group of carotenoids known as xanthophylls, which are extremely beneficial to the eyes and help significantly in the prevention of macular degeneration

Sodium Selenate -- 75 mcg
Selenium is synergistic with glutathione and catalase in helping to protect the integrity of cell membranes. It stops the growth of tumors, and it protects the liver.

Specifically, low levels of selenium have been connected to death from heart disease, breast cancer, prostate cancer, colon cancer, and in fact cancer of all kinds. Some studies have shown that selenium may be 50-100 times more powerful than any other anti-carcinogen known.

Sodium Citrate -- 300 mg
Revitalizes collagen and elastin fibers to rejuvenate the skin and the collagen-rich connective tissue of the arterial walls.

N-Acetyl-Cysteine (NAC) -- 225 mg
One of the keys to a healthy immune

system is maintaining high levels of glutathione in the body. Unfortunately, supplementing with glutathione doesn't really help. Fortunately, there are alternatives. Supplementation with N-acetyl-cysteine (NAC) has been proven to substantially raise the body's glutathione levels. In addition, NAC supplementation is mandatory for all smokers and big-city dwellers as it protects against toxic aldehydes that enter the body through cigarette smoke and pollution.

☐ **L-Methionine -- 225 mg**

An essential sulfur amino acid, methionine is a powerful antioxidant and liver detoxifier -- where it assists in the normal detoxification processes. As an antioxidant, it provides powerful protection in the colon. And finally, methionine is involved in the synthesis of choline, adrenaline, lecithin, and B12, and it works as a powerful SAME precursor.

☐ **Quercetin -- 180 mg**

Quercetin is one of the class of antioxidants known as bioflavonoids. A prime role of quercetin is to protect the integrity of cell walls from free radical damage. In addition, quercetin prevents the release of histamines into the bloodstream, thereby helping to control food and pollen allergies.

☐ **Ginkgo biloba-- 180 mg (24/6%)**

Known as the brain antioxidant, ginkgo has been shown to increase brain functionality, which makes it useful in helping to improve concentration and memory. This makes it a specific for Alzheimer's, where it has the added benefit of helping to significantly reduce depression.

In addition, ginkgo oxygenates the blood, increases circulation, and strengthens blood vessels. And finally, it's anti-inflammatory, lung-relaxant properties have proven useful in the treatment of asthma, where it eases coughing and reduces tissue inflammation.

☐ **Curcumin -- 120 mg**

Curcumin is what gives turmeric its yellow color. Studies have shown that it can inhibit colon cancer cells by some 96% in a matter of hours. It also appears to have great potential

in countering the effects of prostate cancer and breast cancer. In a sense, curcumin can be thought of as natural chemotherapy -- with the ability to selectively kill cancer cells, while at the same time leaving normal cells alone. Note: Curcumin and green tea strongly reinforce each other.

☐ **Green tea extract -- 120 mg (83%)**

Green tea antioxidants are of the same family as grape seed and pine bark extracts. They are polyphenols, chief of which are the flavonoids called proanthocyanidins. In green tea, the main proanthocyanidins are the catechins, and the most powerful of the catechins is Epigallocatechin Gallate (EGCG), found in the highest concentration in green tea.

Green tea works to prevent tumors from developing the blood vessels they need to survive. It has been shown to inhibit metastasis. And it is the first known natural telomerase inhibitor. That is to say, it eliminates the "immortality" of cancer cells which is their trademark and which makes them so deadly. Green tea is particularly effective in destroying the causes of leukemia, prostate cancer, and breast cancer.

And the benefits of green tea don't stop there. It has also been shown to be effective in regulating blood sugar, reducing triglycerides and in reversing the ravages of heart disease. (Incidentally, the Japanese, who drink large amounts of green tea, have some of the lowest rates of cardiovascular disease in the world.)

Green tea seems to be able to almost totally prevent cancer causing DNA damage in smokers -- a possible explanation as to why the Japanese, who are among the world's heaviest smokers, have such a low incidence of lung cancer.

And finally, green tea has great benefits for the brain as well, serving as an effective MAO inhibitor, protecting against brain-cell death from glucose oxidase, over-production of nitric oxide, and lowering the amount of free iron reaching the brain (a bad

thing). The net result is that there are strong indications that green tea extract may play a major role in protecting against both Parkinson's and Alzheimer's disease.

Note: if you drink green tea, adding tea or milk to the tea seems to destroy all antioxidant benefits.

☐ **Bilberry -- 120 mg (25%)**

The anthocyanosides found in bilberry are known for their ability to help nourish and repair the tiny capillaries within the eye. In addition, the bilberry bioflavonoids are beneficial to the connective tissue that lines blood vessels and binds ligaments throughout the body.

☐ **Alpha lipoic acid -- 100 mg**

Sometimes called the "Mother" antioxidant, alpha lipoic acid (ALA) plays a major role in helping recycle vitamins E and C so that they can be used over and over again by your body. In its own right, ALA is one of the main boosters of glutathione levels in body cells, and is one of the key co-factors involved in generating energy in the cells mitochondria.

And finally, ALA has also been shown to significantly rejuvenate the cognitive skills of people as they age.

☐ **SOD -- 75 mg**

Superoxide dismutase (SOD) works along with glutathione to neutralize reactive oxygen molecules in the body. SOD specifically targets the superoxide radical, which, as we discussed earlier, attacks cell mitochondria. When mitochondria are destroyed, the cell loses its ability to convert food to energy. It dies. SOD also works in the cytoplasm of the cell to prevent the hydroxyl radical from attacking enzymes, proteins, and the unsaturated fats in cell membranes.

☐ **Tocotrienols -- 75 mg**

Derived from rice bran or palm oil,, tocotrienols are a unique vitamin E fraction that is 40 times more powerful than standard vitamin E. Tocotrienols are rich in the gamma tocopherol fraction of vitamin E that strongly inhibits both the estrogen-

responsive and the non-estrogen responsive breast cancer cells.

- Grape Skin extract -- 60 mg**
For several years, grape seed extract was all the rage. As it turns out, grape SKIN extract, also called Resveratrol, is equally powerful. In controlled studies, Resveratrol has been shown to reduce skin-cancer tumors by up to 98%, to stop production of leukemia cells. In addition, it works as a Cox inhibitor, thus halting the spread of cancer throughout the body.

- Grape Seed Extract -- 60 mg (84-93%)**
Similar to green tea, the active ingredients in grape seed extract are the proanthocyanidins (but in a different combination and ratio). The importance of the proanthocyanidins in grape seed extract is that they are water soluble and highly bio-available.

Above all else, grape seed extract is known as a defender of the circulatory system. It improves peripheral circulation, revives declining capillary activity by up to 140%, and increases vascular response by some 82%. It repairs varicose veins and aids in the prevention of bruising.

In addition, grape seed extract is synergistic with vitamin C, vastly increasing vitamin C activity and strengthening collagen activity -- including in the connective tissue of the arterial wall and the skin.

- Chaparral Extract -- 375 mcg**
The active antioxidant in Chaparral a lignan called Nordihydroguaiaretic Acid (NDGA) has been shown to specifically target virtually all forms of herpes virus -- and has been shown to be up to 97.5% effective. It also is an effective counter to radiation induced free radical damage. And there are strong indications it is an effective aid in the prevention of Alzheimer's and rheumatoid arthritis.
- Catalase -- 300 mcg**
Glutathione peroxidase, superoxide dismutase, and catalase are the primary three enzymes produced in the body as an antioxidant defense. Catalase is a specific for protection against tumors.

Other Antioxidants

There are other antioxidants that are well worth taking, but because of the quantity needed to be effective, make no sense to include as part of an overall formula. These include:

Vitamin E

In addition to protecting the cardiovascular system, d-alpha-tocopherol, is particularly effective in reducing the incidence and mortality of prostate cancer. When combined with lycopene, the synergistic effect is even more pronounced. 400 IU a day is recommended.

Vitamin C

The antioxidant benefits of vitamin C are invaluable. The trick is that almost all of the vitamin C sold today is virtually unusable by the body. You need 500-1,000 mg of vitamin C a day -- but it must be in a "living-food matrix," that is bound to food so your body can use it.

Methylation

Although technically not a free radical problem, the results of methylation (the exchange of methyl groups in the body) has similar effects. As we age, our body's ability to provide methyl donor groups declines. The bottom line is that everyone should be on a supplement to prevent homocysteine damage to the cardiovascular system, cancer, DNA damage, and deterioration of the brain. S-adenosylmethionine, also known as SAME is a popular alternative. But a less expensive choice is to purchase at any discount health store a formula that contains: 500 mg of trimethylglycine, 50 mg of B-6, 800 mcg of folic acid, 500 mcg of B-12 (best in the form of methylcobalamine, if you can find it).

Foods

Certain foods are high in antioxidants and should be a regular part of the diet. In fact, the US Department of Agriculture recently rated a large number of foods according to their Oxygen Radical Absorbance Capacity. The higher the number, the more powerful the antioxidant value. All ratings were based on 3

1/2 oz of the tested food. As a reference, carrots (high in the carotenoids) had a 207 rating.

- Broccoli florets, Brussels sprouts, Raw spinach, and Kale**
Broccoli carries a rating of 890, brussels sprouts 980, spinach 1,260, and kale 1,770. Be aware that these foods contain other phytonutrients that go well beyond their antioxidant value.

- Strawberries**
The key polyphenol found in strawberries is ellagic acid. Studies have shown that men who eat the most strawberries have the lowest rates of prostate cancer. Strawberries were rated at 1,540.

- Blueberries**
The antioxidants found in blueberries are called anthocyanins, which are particularly effective in increasing dopamine levels in the brain. This alone makes regular consumption of blueberries beneficial. Blueberries were rated at 2,400.

- Raisins**
Surprise! Raisins carry a value of 2,830.

- Prunes**
Whoa! The lowly prune is top rated at 5,770. Eat prunes daily!

- Soy Products**
Although not antioxidants, genistein and the other isoflavones in soy nevertheless reduce the risk of many kinds of cancer, stimulate bone formation, protect the kidneys, and inhibit deterioration of the cardiovascular system. Regular consumption of soy products makes sense for most people.

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Contains: Beta carotene, Alpha carotene, Sodium selenate, Sodium citrate, N-Acetyl-Cysteine, L-Methionine, Quercetin, Gingko, Curcumin, EGCG (green tea extract), Bilberry, Alpha lipoic acid, Superoxide dismutase, Tocotrienol, Grape skin extract, Grape seed extract, Lutein, Lycopene, Chaparral extract (NDGA), Zeaxanthin, and Catalase