

# **Glutathione**

## **What Is Glutathione?**

"Glutathione is a very interesting, very small molecule that's [produced by the body and] found in every cell," says Gustavo Bounous, MD, director of research and development at Immunotec and a retired professor of surgery at McGill University in Montreal, Canada. "It's the [body's] most important antioxidant because it's within the cell."

Antioxidants -- the most well known of which are vitamins C and E -- are important for good health because they neutralize free radicals, which can build up in cells and cause damage. Because glutathione exists within the cells, it is in a prime position to neutralize free radicals. It also has potentially widespread health benefits because it can be found in all types of cells, including the cells of the immune system, whose job is to fight disease.

Glutathione occurs naturally in many foods, and people who eat well probably have enough in their diets, says Dean Jones, PhD, professor of biochemistry and director of nutritional health sciences at Emory University in Atlanta. Those with diets high in fresh fruits and vegetables and freshly prepared meats are most likely just fine. On the other hand, those with poor diets may get too little.

## **What Does Glutathione Do?**

The strong antioxidant effect of glutathione helps keep cells running smoothly. Bounous and another glutathione expert, Jeremy Appleton, ND, say it also helps the liver remove chemicals that are foreign to the body, such as drugs and pollutants.

Appleton is chairman of the department of nutrition at the National College of Naturopathic Medicine in Portland, Ore., and senior science editor for Healthnotes, a database on complementary and alternative medicine available at newspaper stands and health food stores.

Evidence for the important role that glutathione plays in health comes from studies in people who are severely ill.

"If you look in a hospital situation at people who have cancer, AIDS, or other very serious disease, almost invariably they are depleted in glutathione," says Appleton. "The reasons for this are not completely understood, but we do know that glutathione is extremely important for maintaining intracellular health."

## **How Should Glutathione Be Taken?**

Glutathione is probably not well absorbed into the body when taken by mouth. One way to get around that is to take it by vein. A more practical solution is to take the precursors -- that is, the molecules the body needs to make glutathione -- rather than glutathione itself. While there is no solid proof this works, the consensus among experts is that that doing so will increase the amount of glutathione in the cells.

## **Who Does Glutathione Help?**

Animal and laboratory studies have demonstrated that glutathione has the potential to fight almost any disease, particularly those associated with aging, since free radical damage is the cause of many of the diseases of old age.

Nevertheless, people have tried glutathione for the treatment of a whole host of conditions, including cancer, high blood pressure, Parkinson's disease, Alzheimer's disease, cataracts, and male infertility.

The best studies have been conducted in cancer. One study involved women with ovarian cancer who were being treated with chemotherapy. Some of the women were also treated with intravenous glutathione. Those given the glutathione not only had fewer side effects from the chemotherapy but also had better overall survival rates.

### **What Are the Risks?**

Overall, taking glutathione or its precursors in reasonable amounts appears to be quite safe, although it should be avoided in people with milk protein allergies and in those who have received an organ transplant. There is also some concern, however, about the safety of taking glutathione for the one condition for which there is the greatest evidence of its usefulness: cancer.

Appleton recognizes this possibility but says "there's no evidence that supplementing with glutathione, even intravenously, is in any way going to make any cancer worse. In fact, the evidence we have suggests the opposite. It suggests that glutathione and other antioxidants, far from interfering with the activity of chemotherapy, appear to reduce side effects without decreasing efficacy and may, in fact, improve the efficacy of the chemotherapy in fighting cancer."

The upshot? The experts disagree on who should take glutathione or its precursors. Bounous says everyone should take it in order to optimize overall health. Appleton would reserve it for people with cancer. Jones says it might only prove beneficial for those who eat poorly and are thus unlikely to be getting much glutathione or its precursors in their diet.

They all acknowledge that people with severe diseases known to be associated with low glutathione levels, such as AIDS, may well benefit from the supplement, although there is no proof to this effect.

### **Medical Professionals on the Benefits of Glutathione**

"We literally cannot survive without this miraculous antioxidant," according to Dr. Earl Mindell, *What You Should Know about the Super Antioxidant Miracle*

"No other antioxidant is as important to overall health as glutathione. It is the regenerator of immune cells and the most valuable detoxifying agent in the body. Low levels are associated with early aging and even death." *The Immune System Cure*, Lorna R. Vanderhaeghe & Patrick J.D. Bouic, Ph.D.

"Without glutathione, other important antioxidants such as vitamins C and E cannot do their job adequately to protect your body against disease." *Breakthrough in Cell Defense*, Dr. Allan Somersall, Ph.D., M.D. with Dr. Gustavo Bounous, M.D. FRCS(C)

"Your life depends on glutathione. Without it, your cells would disintegrate from unrestrained oxidation, your body would have little resistance to bacteria, viruses and cancer, and your liver would shrivel up from the eventual accumulation of toxins." *Glutathione: Essential Health AID - Antioxidant. Immune Booster. Detoxifier*, Dr. Jimmy Gutman, MD, FACEP

"A review article published in the Annals of Pharmacology stated that glutathione is important in DNA synthesis and repair, protein and prostaglandin synthesis, amino acid transport, detoxification of toxins and carcinogens, enhancement of the immune system, and protection from oxidation and enzyme activations." The Immune System Cure, Lorna R. Vanderhaeghe & Patrick J.D. Bouic, Ph.D.

"Glutathione has potent anti-viral properties - if you raise the glutathione level you can stop the replication of most any, at least, intracellular pathogen....but glutathione deficiency produces a pro-viral effect." Dr. Paul Cheney, transcribed from a workshop presentation on the clinical management of Chronic Fatigue Syndrome

"Glutathione levels also diminish as we age and many diseases normally associated with aging have been linked to glutathione deficiency." Glutathione: Essential Health AID - Antioxidant. Immune Booster. Detoxifier, Dr. Jimmy Gutman, MD, FACEP

"Clinical evidence links low glutathione levels to the most common illnesses of our time as well as newly emerging diseases." Glutathione: Essential Health AID - Antioxidant. Immune Booster. Detoxifier, Dr. Jimmy Gutman, MD, FACEP

"Because all other antioxidants depend upon the presence of glutathione to function properly, scientists call it 'the master antioxidant'." Glutathione: Essential Health AID - Antioxidant. Immune Booster. Detoxifier, Dr. Jimmy Gutman, MD, FACEP

"Healthy people also benefit from elevated glutathione levels through an enhanced ability to fight off toxins, infectious disease, pre-cancerous cells and the aging process itself." Glutathione: Essential Health AID - Antioxidant. Immune Booster. Detoxifier, Dr. Jimmy Gutman, MD, FACEP

"Many world-class athletes are discovering that well-maintained glutathione levels give them the edge over their competitors, bringing greater strength and endurance, decreased recovery time from injury, less muscle pain and fatigue, and muscle-promoting activity." Glutathione: Essential Health AID - Antioxidant. Immune Booster. Detoxifier, Dr. Jimmy Gutman, MD, FACEP

It is well known that aging is accompanied by a precipitous fall in glutathione levels. Lower glutathione levels are implicated in many diseases associated with aging, including cataracts, Alzheimer's disease, Parkinson's, atherosclerosis and others.  
Journal of Clinical Epidemiology 47: 1021-26 1994

Low glutathione levels have been associated with neuro-degenerative diseases such as MS (Multiple Sclerosis), ALS (Lou Gehrig's disease), Alzheimer's disease and Parkinson's disease, among others.  
The Lancet 344: 796-798, 1994

Glutathione plays a role in eliminating many carcinogens and also maintains an optimized immune function, providing stronger anti-tumor defenses.  
Cancer Letters 57: 91-94 1991

Low glutathione levels correspond to poor survival in AIDS patients. Much documentation demonstrates the role of enhanced glutathione levels in AIDS.

Proceedings of the National Academy of Science, USA 94: 1967-72, 1997

Raised glutathione levels fight the oxidation of circulating fats in the bloodstream, including cholesterol, retarding the process of plaque formation in the arteries - the underlying cause for most heart disease and stroke.

Nutrition Reviews 54: 1-30, 1996

Diabetics are prone to infections and circulatory problems leading to heart disease, kidney failure and blindness. Glutathione protects against the complications of diabetes.

Clinical Science 91: 575-582, 1996

Doctors have used glutathione-promoting drugs to treat many lung diseases including asthma, chronic bronchitis and emphysema. Newer potential therapeutic roles can be found for cigarette smoke damage, pulmonary fibrosis and other illnesses.

American Journal of Medical Science 307: 119-127, 1994

Glutathione protects the body from the inflammation of gastritis, stomach ulcers, pancreatitis and inflammatory bowel disease including ulcerative colitis and Crohn's disease.

Gut 42: 485-492, 1998

The liver is the major storehouse for glutathione. Glutathione is impaired in alcoholic hepatitis as well as in viral hepatitis A, B, and C. Raised glutathione levels restore liver function.

American Journal of Gastroenterology 91: 2569-2573, 1996

Glutathione detoxifies a variety of pollutants, carcinogens and poisons, including many found in fuel exhaust and cigarette smoke. It also retards damage from radiation exposure due to the eroding ozone layer.

Annual Reviews of Biochemistry 52: 711-760 1983

Raised glutathione levels help increase strength and endurance. Those interested in physical fitness can benefit from a definite athletic edge.

Journal of Applied Physiology 87: 1381-1385, 1999

Strong muscular activity, such as that experienced by athletes, generates oxyradicals [free radicals] leading to muscle fatigue and poorer performance.

Glutathione neutralizes these radicals.

Sport Medicine 21: 213-238, 1996

Lymphocytes, cells vital for your immune system, depend on glutathione for their proper function and replication.

IMMUNOLOGY 61: 503-508 1987

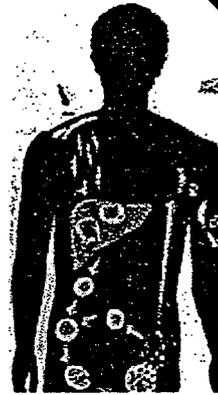
Antioxidants are well documented and known to possess vital roles in health maintenance and disease prevention. Glutathione is your cell's own major antioxidant. Maintaining elevated glutathione levels aids the body's natural antioxidant function.

Biochemical Pharmacology 47: 2113-2123 1994

# GLUTATHIONE AND AGING RESEARCH

Glutathione's synergism with the antioxidant nutrients vitamin E and selenium attracted experimental interest in aging research. It is interesting to note that glutathione levels of aged cells are 20-30 percent lower than young cells. Research efforts are underway to attempt to discover if there is a cause and effect relationship.

Glutathione has many roles and in none does it act alone. It is coenzyme in various enzymatic reactions. Glutathione (especially in the liver) binds with toxic chemicals in order to detoxify them.



We are likely to be exposed to many of the pollutants glutathione detoxifies: radiation, pesticides, herbicides, fungicides, plastics, nitrates, cigarette smoke, and birth control pills.

Glutathione also detoxifies from heavy metals such as lead, cadmium, and mercury.

In addition to glutathione's direct chemical detoxifying reactions and its indirect detoxifying reactions teaming with glutathione peroxidase, it also improves the immune system's ability to destroy bacteria and remove "debris". It is also important in red and white blood cell formation and throughout the immune system. Special white blood cells called phagocytes have improved function and are less subject to chemical inhibition when well-nourished with glutathione.

## GLUTATHIONE AND CANCER

The detoxifying properties of glutathione, especially its ability to destroy highly carcinogenic epoxides and peroxides has drawn early attention by those experimenting with cancer protection. But recent research is examining the possibility that glutathione may destroy liver cancer. An article was published in Science in 1981 that indicated glutathione destroyed aflatoxin-induced liver cancer in laboratory rats. Other scientists are now duplicating this research for confirmation. As Dr. A. Novi, a German scientist reported in Science, "the effect of glutathione, a harmless natural product, on (induced liver cancer) in rats strongly suggests that this antioxidant merits further investigation as a potential antitumor agent in humans."

## GLUTATHIONE, NITRIC OXIDE AND CIRCULATION

"Glutathione peroxidase increases the inhibitor effect of nitric oxide on platelet aggregation by reducing hydroperoxides. Moreover, other authors have shown that glutathione favorably influences the coronary circulation. I

fact, the intracoronary infusion of reduced glutathione improves endothelial vasomotor response in subjects with coronary risk factors and potentiates the vasodilator effect of nitroglycerin.”

## **GLUTATHIONE EFFECTS LIVER AND BRAIN DETOXIFICATION**

Glutathione is one of the most important components of the liver's detoxification system.



Of special interest is the liver protection provided by glutathione against alcohol.

While the ability to detoxify various chemicals to which we are exposed is different for each individual, those, whose detoxification pathways are blocked are at far greater risk to the brain damaging effects of a wide variety of toxins.

**Giving glutathione is one of the most effective techniques for enhancing liver and brain detoxification.**

The concept of enhancing cellular receptor sensitivity has become quite familiar in medicine today.

Glutathione has the unique ability to make certain areas of the brain more sensitive to the neurotransmitter, called dopamine.

**Increasing of glutathione level decreases free radical and mitochondrial damage, which can lead to neuronal degeneration.**

Glutathione is a critically important brain chemical. It is clearly one of the most important brain antioxidants. That is, glutathione helps to preserve brain tissue by preventing damage from free radicals – destructive chemicals formed by the normal processes of metabolism, toxic elements in the environment, and as a normal response of the body to challenges by infectious agents or other stresses.

**In addition to quenching dangerous free radicals, glutathione also acts to recycle vitamin C and vitamin E, which because of their antioxidant activity, also reduce free radicals in the brain.**

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