



# L-GLUTATHIONE – REDUCED FORM

Promotes healthy aging and reduces oxidative stress

## L-GLUTATHIONE FOR CELLULAR DEFENCE

In the modern world, the human body needs extra help to mitigate and repair the damage caused by stress, pollution, radiation, infection, drugs, poor diet, aging, and injury. People today are exposed to hundreds of chemical toxins that did not exist three generations ago. These chemicals produce free radicals that cause oxidative stress in the cells of the body. The resulting cellular damage is known to contribute to aging and a host of degenerative diseases, including cancer.

The body has natural antioxidant defences to combat oxidative stress. The most powerful and abundant antioxidant in human cells is L-glutathione and its primary role is to neutralize free radicals and remove toxins. L-glutathione is found in almost all fruits and vegetables, but it is difficult to get the amount needed for maximum benefit from food alone. Any illness (even a bad cold), chronic disorders such as asthma and rheumatoid arthritis, injury, or heavy exposure to pollutants can cause a glutathione deficiency.

Research has shown that L-glutathione levels in the cells can be dramatically depleted by excessive oxidative stress and by disease conditions. People who have chronic conditions such as diabetes, cancer, HIV, chronic fatigue syndrome, fibromyalgia, or Alzheimer's or who are chronically exposed to toxins, cigarette smoke, or alcohol typically have lower levels of L-glutathione. In turn, L-glutathione deficiency has been shown to contribute to oxidative stress and disease, resulting in a vicious cycle.

Clinical research has found that supplementation with L-glutathione can protect cells against oxidative stress, which is central in keeping the eyes, central nervous system, and immune system healthy and strong. Supplementation with L-glutathione has also resulted in immediate improvement in some disease conditions, including certain cancers, Parkinson's disease, and autoimmune conditions such as chronic fatigue syndrome and fibromyalgia.

## HOW DOES L-GLUTATHIONE WORK?

The biologically active form of L-glutathione is the reduced form and this nutrient plays many important roles in the body. L-glutathione is a water-soluble protein molecule found in every cell of the body. Almost all cells manufacture L-glutathione, however the greatest amount is made in the liver, where it supports the liver in eliminating toxins – a key mechanism in protecting the body from many diseases. L-glutathione is made from three amino acids: L-cysteine, L-glutamate, and glycine – three of the 22 amino acids which are the building blocks of all known proteins.

L-glutathione is involved in many vital functions. As an antioxidant, L-glutathione neutralizes free radical molecules. These molecules are missing an electron and cause oxidative stress by "stealing" an electron from another molecule. This oxidation can damage the molecular functioning of the cell. L-glutathione neutralizes the free radical molecule by "donating" an electron to it. By a similar process, L-glutathione also neutralizes peroxide molecules and other reactive oxygen species.

As a detoxifier, L-glutathione binds with heavy metals, toxic chemicals, and drug metabolites. This renders the toxins water-soluble so they can be flushed from the cell and expelled in the urine. L-glutathione is also essential in maintaining mitochondrial function and integrity, regulating cell proliferation, and supporting the immune system.

## ORAL L-GLUTATHIONE

Because even large doses of oral L-glutathione supplements do not appear in blood plasma, the authors of some studies have debated whether or not they are absorbed. One theory is that L-glutathione is destroyed by enzymes in the intestines. Another possibility is that L-glutathione may be so efficiently absorbed by cells throughout the body that none remains in the blood plasma. Other studies have measured an increase in L-glutathione in the blood when it is given as a chewable tablet. The L-glutathione is then absorbed through the mucous membranes of the mouth, bypassing the intestines (Valencia, Hardy).

A more effective method of measurement was used in a recent human study. The study measured the concentration of the oxidized form of deoxyguanosine (8-OHdG). The urinary concentration of 8-OHdG is used in research to determine the total oxidative stress in the body. In this study, 8-OHdG was measured in the urine before and after L-glutathione supplementation. Twenty males over the age of 40 were given 500 mg of L-glutathione in chewable tablets daily for four weeks. By the end of that period, the L-glutathione had produced reductions of approximately 20% in 8-OHdG concentrations. This demonstrates a significant effect in reducing oxidative damage to one of the key components of DNA (Human clinical trial, unpublished). This new research provides supportive evidence for the effectiveness of L-glutathione supplementation in the form of chewable tablets.

Natural Factors L-Glutathione is a naturally-produced form that delivers superior results over chemically produced, synthetic L-glutathione. It is manufactured through a yeast fermentation process that yields a high percentage of L-glutathione. Natural L-glutathione has been approved for use in Japan for over 40 years as an aid to healthy aging.

## THE MANY BENEFITS OF L-GLUTATHIONE

L-glutathione promotes healthy aging by supporting many critical intracellular functions, including the following:

- Detoxifies a range of harmful xenobiotics, chemicals from the environment that damage cells and lead to degenerative diseases.
- Neutralizes free radicals, thus reducing the oxidative stress that also leads to cell death and degenerative diseases.
- Balances the immune system, increasing its responsiveness when it is weak and moderating the response when it is overactive.

**L-GLUTATHIONE**

- Assists in other vital cell functions such as synthesis and repair of DNA, gene expression, protein synthesis, enzyme regulation, cell proliferation, and apoptosis (cell death).
- Plays a role in signal processing within the cell, which enables the cell to fulfill its functions in the body (Wu *et al*).

**HEALTHY AGING**

Studies have demonstrated that L-glutathione has the potential to fight age-related diseases, since it combats oxidative stress which is one of the causes of many of the diseases of old age. L-glutathione levels gradually decline after age 20 but a precipitous drop begins after age 45. Consequently, the onset of oxidative stress is accelerated and age-related diseases such as arthritis, Alzheimer's, Parkinson's, cancer, heart attack, stroke, liver disease, and diabetes proliferate (Townsend *et al*).

The brain is particularly susceptible to oxidative stress and links have been found between low L-glutathione levels and neurodegenerative diseases such as Alzheimer's and Parkinson's (Townsend *et al*). Researchers found that low L-glutathione levels contributed to a marked increase in oxidative damage to the mitochondrial DNA in human brain cells, and nerve cell death. This mitochondrial damage leads to a progressive reduction in the energy available to the cells and can result in a loss of stamina, memory, hearing, and vision.

About one percent of people over age 65 are affected by Parkinson's, a disease characterized by progressive degeneration of the neurons and impaired cognitive and motor functions. The damage occurs in the dopamine-producing cells of the substantia nigra region of the midbrain and results in dopamine deficiency. Hydrogen peroxide is a natural by-product of the normal functioning of these cells. But this powerful oxidizer damages the cells when there is insufficient L-glutathione to neutralize it. People with Parkinson's typically have low levels of L-glutathione. A clinical study showed that treatment with L-glutathione considerably improved some of the symptoms of Parkinson's, including tremor and impaired movement, coordination, and speech. In another experiment, patients were given 600 mg of L-glutathione twice a day for 30 days. They showed an average decrease in disability of 42% (Sechi *et al*).

Exposure to UV radiation from the sun or tanning salons can cause premature aging of the skin. Free radicals are generated in the skin when it is exposed to UV rays. Under these conditions, there is a reduction in the levels of antioxidants such as L-glutathione and vitamin E in the skin. The antioxidant balance can be overwhelmed by photo-oxidative stress, leaving the tissues susceptible to oxidative damage. Supplementing with L-glutathione can retard premature aging of the skin due to UV exposure (Emerit).

L-glutathione can also prevent or help with hyperpigmentation – a common condition in which patches of skin become darker in color than the normal surrounding skin. This darkening occurs when an excess of melanin, the brown pigment that produces normal skin color, forms deposits in the skin. Age or "liver" spots are a common form of hyperpigmentation caused by sun damage. L-glutathione helps to inhibit tyrosinase activity which then reverses melanin's metabolism, turning dark pigmentations (eumelanin) into light pigmentations (phaeomelanin).

**POWERFUL CELLULAR DETOXIFICATION**

L-glutathione is a powerful detoxifier of heavy metals, such as mercury, and of xenobiotics, such as dioxins, PCBs, organophosphate pesticides, and chlorinated hydrocarbon solvents. These toxins are chelated out of the body through a primary phase II detoxification route called glutathione conjugation. L-glutathione is able to bind to the toxin and ultimately convert it to a water-soluble form called mercaptate, allowing more efficient excretion via the kidneys. The effective elimination of fat-soluble toxins – especially heavy metals such as mercury and lead – is dependent on adequate levels of L-glutathione. The detoxification process consumes the L-glutathione in the cell, so if the toxic load is great, the cell can be left depleted of L-glutathione, which results in oxidative stress (Valencia, Hardy).

L-glutathione plays several roles in fighting cancer. It protects DNA from damage by detoxifying harmful chemicals and removing them from the body. L-glutathione also selectively stimulates the death of malignant cells while leaving healthy cells unaffected. Research has shown that people with malignancies have significantly lower levels of L-glutathione in their blood plasma. Some studies have shown that treatment with L-glutathione can reverse certain cancers, including leukemia, cervical carcinoma, and neuroblastoma (Rotstein, Slaga).

**POTENT ANTIOXIDANT PROTECTION**

L-glutathione is often referred to as the "master antioxidant" because of its multifaceted role in protecting the body against oxidative stress. The antioxidant capacity of L-glutathione enables the quenching of destructive free radicals by donating an electron and by creating glutathione peroxidase – an important antioxidant enzyme involved in enzymatic antioxidant defense mechanisms. L-glutathione also makes major contributions to the recycling of other antioxidants, including vitamin C and E so they can resume their antioxidant function. L-glutathione's powerful antioxidant properties help explain the cause-and-effect link between insufficient levels of L-glutathione and cancer, autoimmune conditions, HIV, and other diseases (Wu *et al*). One of the primary roles of antioxidants is to ensure optimal

energy metabolism. A lag in energy could compromise cellular health, leading to the development of disease. For instance, people with chronic fatigue syndrome, an autoimmune disease, have depleted levels of L-glutathione. Due to its role in energy metabolism, insufficient L-glutathione leads to fatigue, muscle weakness and pain. Early clinical trials of glutathione therapy with chronic fatigue syndrome patients are showing excellent results in reducing disease symptoms.

**DOSAGE**

One chewable 125 mg tablet, four times daily, or as directed by a health care practitioner.

**SAFETY**

Data from human and animal studies show L-glutathione to be very safe. Natural L-glutathione has been approved for use in Japan for over 40 years as an aid to healthy aging and is a very popular ingredient in functional foods and beverages, and dietary supplements.

*Pregnancy and lactation:* Suitable for pregnant or lactating women.

*Children:* Suitable for children at one half the adult dose.

*Drug interactions:* No known adverse interactions. L-glutathione decreases the toxic side-effects of certain chemotherapy drugs (Valencia, Hardy).

*Contraindications:* None known.

Oxidative stress is impossible to avoid because of the proliferation of environmental toxins and nutrient-poor foods. L-glutathione is a vital nutrient in helping to prevent and reduce the damaging effects of oxidative stress and is a critical factor in healthy aging and disease prevention. Daily supplementation with Natural Factors L-glutathione can help you look and feel younger and fantastic – whatever your age.

**KEY REFERENCES:**

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