

Which illnesses may be affected by raising glutathione?

Many disease states are characterized by low glutathione levels. Immunocal has been developed as a strategy to help sustain glutathione levels. Glutathione deficiency states include, but are not limited to: AIDS and cancer muscle wasting, chemical and infectious hepatitis, radiation poisoning, malnutrition states, strong physical stress, and acetaminophen toxicity. Many other problems including cardiovascular, lung, digestive and kidney disorders are associated with glutathione deficiency and are cited in numerous medical references.

Health benefits from regular consumption of Immunocal

by Wulf Droge, PhD

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Dr. Dröge is a world-renowned scientist with more than forty years in basic and clinical research and more than 280 publications. After postdoctoral fellowships at the Max Planck Institute and Harvard University, Dr. Dröge has spent 3 years as a scientific member at the renowned Basel Institute of Immunology and 29 years as professor of cell biology at the University of Heidelberg and head of a department at the National Cancer Research Center of Germany (Deutsches Krebsforschungszentrum). He continues to write scientific articles and gives lectures at McGill University

Immunocal contains several different proteins with special structural and functional properties which collectively provide a combination of important health benefits.

The name Immunocal refers to its effect on immune functions. The claim stating that Immunocal is effective in maintaining a strong immune system has been officially allowed by Health Canada. Most people know that modern medicine is still relatively helpless in the face of viral epidemics such as HIV, SARS or the flu virus. In the time of globalization and increasing international travel activities it is only a question of time that a new epidemic will spread around the globe and eventually reach North America. Moreover, irrespective of these global threats, each of us is confronted with a constant barrage of colds and flus. The decisive

question is whether the first encountered viruses will be eliminated by our immune system or stay and manifest themselves as a disease. This decisively depends on the strength of our immune system regardless of whether this moment is any time soon or in the more distant future. Someone who is taking Immunocal every day is best prepared for this moment.

The effect of Immunocal on the immune system is mainly mediated by its high cysteine content. Cysteine is the limiting precursor for glutathione, which plays a key role in the function of the immune system. Most notably it plays a critical role in the proliferation of lymphocytes, i.e. the cells that mediate specific immune responses. Cysteine and glutathione concentrations show a strong and progressive age-related decline which starts at the age of 30. Older people are therefore more likely to feel the benefits of taking Immunocal. Healthy young adults have usually adequate levels of cysteine and glutathione for most of the time but occasionally experience episodes of low glutathione levels. These episodes are possibly caused by unnoticed, symptomless viral infection and render even these otherwise strong persons vulnerable towards subsequent infections as their low glutathione level compromises the immune system. Healthy young adults thus typically realize the benefits of taking Immunocal only after longer periods of time.

By supporting glutathione biosynthesis Immunocal enhances also the detoxifying function in the body. Without noticing it we are constantly exposed to environmental toxins such as heavy metals in low quality foods, in the increasingly polluted air which we breathe or in the water that we drink. The body is therefore constantly engaged in the important task of eliminating such toxins. One of the most important detoxifying mechanisms involves glutathione which binds to certain toxins and forms a water-soluble complex that is ultimately excreted in the urine or bile as waste. In extreme cases such as in the case of poisoning by excessive doses of certain medicals drugs this process severely depletes the glutathione levels in the liver and can lead to life-threatening conditions. These patients are typically treated and rescued by a glutathione-promoting drug to replenish the glutathione pool and to detoxify the victim.

Glutathione is best known for its antioxidant function which indirectly is also enhanced by Immunocal. At all times living organisms are internally generating oxygen radicals and hydrogen peroxide, both of which cause massive oxidative tissue damage and other forms of oxidative stress unless neutralized by glutathione. By scavenging oxygen radicals and hydrogen peroxide, glutathione normally controls the oxidative stress and protects the structural constituents of the cells against the damaging effects of these molecules. Without glutathione the cells would rapidly be destroyed. Other antioxidants, such as vitamin A,

vitamin C or vitamin E have also a protecting function but glutathione is by far the most abundant antioxidant in cells and tissues. Insufficient amounts of glutathione can therefore not be compensated by these antioxidant vitamins.

The age-related decrease in glutathione plays, therefore, an important role in aging and oxidative stress-related disease conditions. Several independent studies in animals have shown that cysteine supplementation causes a decrease in protein oxidation and reverses the age-related decline in various biochemical functions. As the cognitive decline is one of the most devastating consequences of aging, it was particularly interesting to see that cysteine supplementation reduces the rate of oxidative structural damage in the brain and ameliorates the decline of memory functions in animals.

Glutathione is clearly the most important antioxidant in the body and has been the object of intense research during the last 30 years. Presently, more than 80,000 scientific articles on glutathione are listed on **PubMed** (www.pubmed.gov) and this number is increased by approximately 3-5,000 new articles every year. Glutathione consists of the three amino acids, glutamate, cysteine and glycine and is synthesized from these precursors within the cells and tissues. The production of glutathione is typically limited by the availability of cysteine. The sulfhydryl (thiol) group of cysteine serves as an electron donor and is responsible for the biological activity of glutathione. However, taking supplements of the free amino acid cysteine is not advisable because cysteine is oxidized on the shelf and in the digestive tract. In order to raise the cellular glutathione level, it is far better to use a supplement with “stabilized” cysteine residues such as Immunocal.

The effect on muscle function and energy is another important health benefit from regular consumption of Immunocal. Due to its special composition and structural properties, Immunocal can help to ameliorate the loss of skeletal muscle mass and muscle function which is one of the hallmarks of aging. This process is called sarcopenia which starts in the fourth decade of life and accelerates as we age. As the loss of muscle mass is associated with the loss of muscle function, it increases the risk of falls and fractures, compromises the ability to visit friends or to maintain other social functions, and ultimately contributes to the loss of quality of life in old age. As skeletal muscle tissues represent about half of the protein mass in the human body, the loss of muscle mass means above all a net loss of protein. Physical exercise, notably resistance training, is the best investigated method shown to increase muscle mass and muscle function even in elderly persons. This effect of physical exercise can be strongly enhanced by Immunocal. The undenatured cysteine- and leucine-rich whey protein was found to be more effective than casein or soy protein, and is

therefore the ideal dietary protein source to support the maintenance of skeletal muscle mass and muscle function. Immunocal consists of a combination of several proteins which are rapidly digested and therefore lead to a rapid increase of its constituent amino acids in the blood plasma with a peak at about two hours after protein consumption. The most important amino acids for the enhancement of muscle functions in the elderly are leucine and cysteine which are contained in Immunocal in relatively high amounts. Ideally, Immunocal should therefore be consumed immediately after physical exercise because the maximum availability of the amino acids in the blood coincides in this case with the time window of maximum exercise induced skeletal muscle protein synthesis. Ideally, a person of 80 kg body weight should consume about 10g-30g Immunocal after exercise. An additional small amount of Immunocal (e.g. 10g) may be consumed in the morning to account for the relatively low plasma cysteine and intracellular glutathione levels at the end of the night. The rest of the daily protein intake may be distributed over the day.

Most of the clinical studies and complementary animal studies on the effects of cysteine supplementation on oxidative stress, muscle functions, and immunological functions have been performed with another cysteine derivative, N-acetylcysteine, because this agent allows the investigator to identify cysteine as the causative agent. However, if an amount of 10-30g leucine- and cysteine-rich Immunocal per 80 kg body weight per day is regularly used to improve muscle protein synthesis and muscle function, this is also sufficient to meet the increased need for cysteine to ameliorate the age-related oxidative stress and to maintain a strong immune system. Any additional consumption of N-acetylcysteine or Alpha-lipoic acid as complementary supplements may not only be unnecessary, but also disadvantageous. N-acetylcysteine, for example, can cause certain adverse effects. Moreover, oral consumption of N-acetylcysteine typically leads to a relatively high temporary increase in cysteine/N-acetylcysteine concentrations in the blood, a large proportion of which is converted within the oxidative environment of the blood into the corresponding disulfide which is essentially useless for cells and tissues, and a substantial proportion is simply catabolized and converted into metabolic acids. Alpha-lipoic acid has the unique property of travelling through lipid membranes and is therefore capable of shuttling oxidative and reducing equivalents across membranes. It is contained in moderate amounts in most cells and tissues and plays an important physiological role in this context. If present at relatively higher concentrations, it shuttles oxidative equivalents from the oxidative environment of the blood into the cells and tissues and thereby effectively acts as an oxidant for cells rather than an antioxidant.

Taken together, Immunocal helps the body to defend itself against several common health hazards which are becoming increasingly important as one gets older. Immunocal does this by strengthening four key functions which may be easily remembered by the four letters:

A – FOR ANTIOXIDANT DEFENSE

I – FOR IMMUNE FUNCTIONS

D – FOR DETOXIFICATION

Plus

E – FOR MUSCLE FUNCTION *and* PHYSICAL ENERGY

Go on www.pubmed.com

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And read articles about Immunocal.

The screenshot shows a Windows Internet Explorer browser window with the address bar displaying <http://www.ncbi.nlm.nih.gov/sites/entrez>. The page title is "Immunocal - PubMed Results". The search bar contains "Immunocal" and the results are displayed as a list of four articles. The first article is titled "Biodegradation of Inion fast-absorbing biodegradable plates and screws" by Losken HW, van Aalst JA, Mooney MP, Godfrey VL, Burt T, Teotia S, Dean SB, Moss JR, Rahbar R. The second article is "Bringing evidence to complementary and alternative medicine in children with cancer: Focus on nutrition-related therapies" by Kelly KM. The third article is "Improved glutathione status in young adult patients with cystic fibrosis supplemented with whey protein" by Grey V, Mohammed SR, Smountas AA, Bahlool R, Lands LC. The fourth article is "Effects of long-term supplementation with whey proteins on plasma glutathione levels of HIV-infected patients". The browser's taskbar at the bottom shows several open windows, including "Inbox - Micro...", "Immunocal - ...", and "http://den-a...". The system tray shows the time as 9:35 PM.

[Biodegradation of Inion fast-absorbing biodegradable plates and screws.](#)

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