

WHAT IS GLUTATHIONE?

GLUTATHIONE IS A VERY SIMPLE MOLECULE THAT IS PRODUCED NATURALLY ALL THE TIME IN YOUR BODY. IT IS A COMBINATION OF THREE SIMPLE BUILDING BLOCKS OF PROTEIN OR AMINO ACIDS — CYSTEINE, GLYCINE AND GLUTAMINE.

The essence of its effectiveness is the sulfur (SH) chemical groups it contains. Sulfur is a sticky, smelly molecule and acts like fly paper that entraps the unwanted, toxic or excessive matter in the body, such as free radicals (ROS) and toxins like mercury and other heavy metals, chemicals, excess hormones etc.

Normally glutathione is recycled in the body, converted from homocysteine (formed from Methionine) found in your blood. Glutathione (GSH) is a powerful antioxidant and detoxifying agent that assists in slowing aging. GSH is found in the cytosol of cells, the liquid contained within all cells. The Cytosol performs several functions, such as most metabolic processes, transport of metabolites and is involved in signal transduction.

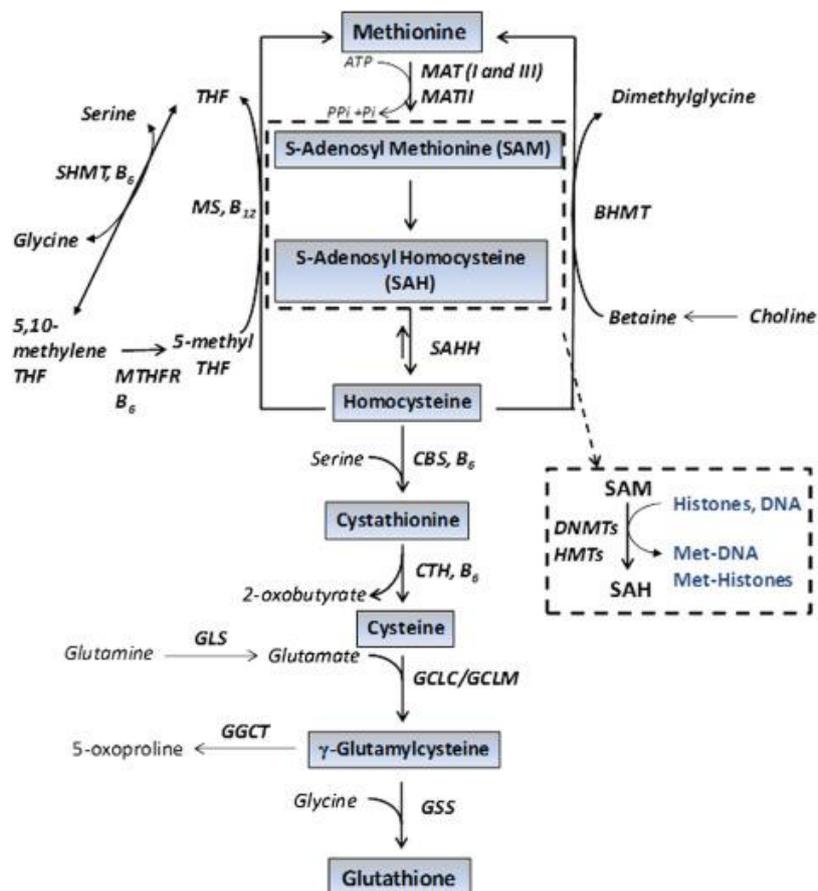


Figure 1 Remethylation of homocysteine to generate methionine requires Folate and Methylcobalamin, or trimethylglycine, and transsulfuration to cystathionine, which requires P5P.

Why is Glutathione important for your body

Glutathione is critical for one simple reason: It recycles antioxidants. To protect against the deleterious effects of ROS, our bodies have a complex system of endogenous antioxidant protection in the form of enzymes such as superoxide dismutase, catalase, and glutathione peroxidase. (1)

However, problems occur when we are overwhelmed with too much oxidative stress or too many toxins. Then the glutathione becomes depleted and we can no longer protect ourselves against free radicals, infections, or cancer because our ability to reduce the toxic load has been reduced. This leads to further sickness and soon we are in the downward spiral of chronic illness. Glutathione is also critical in helping your immune system do its job of fighting infections and preventing cancer.

This may be due to various factors, such as

- 1) inadequate intake of foodstuffs containing the antioxidants
- 2) excessive intake of pro-oxidants
- 3) exposure to noxious chemicals or ultraviolet light,
- 4) injury/wounds, and/or
- 5) intense exercise, especially eccentric exercise, the body's endogenous antioxidant system is not able to effectively remove excessive ROS production (2)

Glutathione is also the most critical and integral part of your detoxification system, with the toxins being mopped up by glutathione, which then carries them into the bile and the stool and assisted by plant fibre, eliminated from your body.

Glutathione levels may be reduced due to lack of one or more of the three required amino acids (from poor diet or malabsorption), stress, aging, and toxicity. Other health conditions commonly associated with low glutathione levels include, autoimmune diseases where, glutathione is low and toxins are freely circulating because of the body's inability to bind and excrete them, Th-17 may become upregulated.

Uncontrolled or inappropriate Th17 activation has been linked to several autoimmune and auto inflammatory pathologies. Indeed, preclinical and clinical data show that Th17 cells are associated with several autoimmune diseases such as arthritis, multiple sclerosis, psoriasis, and lupus

The upregulated Th-17 produces interleukin 17 (IL-17) and determines the severity of the autoimmune flare-up. Thus down-regulating Th-17 via increasing glutathione levels is something to be considered. (3)

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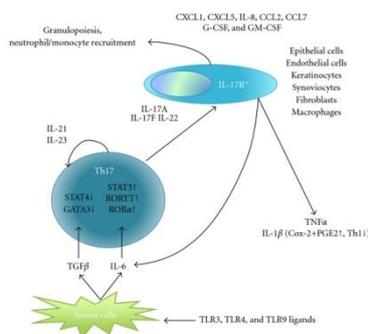


Figure 2 Implications of TH17 differentiation in the development of autoimmune responses

Glutathione also helps us reach peak mental and physical function. In recent years, aberrant GSH levels have been implicated in different psychiatric disorders, including stress-related psychopathologies. (4) Research has shown that raised glutathione levels decrease muscle damage, reduce recovery time, increase strength and endurance and shift metabolism from fat production to muscle development. You can boost your own glutathione levels by eating foods from the broccoli and garlic families. GSTM1, which helps the body rebuild its stores of glutathione, is a common deficient genetic SNP along with the GST gene and several other gene deficiencies (5)

The US Department Health and Human services describe Glutathione synthetase deficiency as a genetic metabolic disorder that affects the body's ability to produce an important substance called glutathione. People with glutathione synthetase deficiency do not have enough of the molecule called glutathione synthetase, which helps the body produce glutathione. People with glutathione synthetase deficiency can have mild, moderate, or severe disease. The signs and symptoms of the deficiency may include anaemia, the build-up of too much acid in the body (metabolic acidosis), frequent infections, and symptoms caused by problems in the brain including seizures, intellectual disability, and loss of coordination (ataxia).

Glutathione synthetase deficiency is caused by genetic changes (pathogenic variants or mutations) in the GSS gene. The deficiency is inherited in an autosomal recessive manner. Diagnosis of a metabolic disorder such as glutathione synthetase deficiency may be suspected when a doctor observes signs of the deficiency including metabolic acidosis. Tests to confirm the diagnosis include enzyme assays, urine analysis, and genetic testing. (6)

If you are sick or old or are just not in peak shape, you may find you have glutathione deficiency. For the glutathione in the body to be produced, you must have enough folate, B6, and B12 and the methylation train must run efficiently. (5)

SUPPLEMENTS THAT MAY BE UTILISED TO SUPPORT GLUTATHIONE PRODUCTION

- Curcumin – Selenium - Silymarin (milk thistle) - Vitamin C - Vitamin E – MSM – NAC - B vitamins - Glutathione cream - Oral glutathione

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FOODS THAT ASSIST THE PRODUCTION OF GLUTATHIONE

- Broccoli – Watermelon - Cauliflower – Parsley - Milk thistle - Whey protein - Curcumin - Raw milk - Kale - Raw eggs - Cabbage – Turmeric - Avocado - Red meat - spinach - organ meats - onion – garlic (7)

In fact, a British medical journal, the “Lancet”, found the highest glutathione levels in healthy young people, lower levels in healthy elderly, lower still in sick elderly and the lowest of all in the hospitalized elderly. (8) Multimorbidity is the most common clinical condition linked to aging; it affects more than 80% of people aged 65 years or older. Recent studies have detected an association between low levels of glutathione and specific chronic conditions such as diabetes mellitus, AIDS, cystic and pulmonary fibrosis, chronic liver injury and some neurodegenerative conditions such as Parkinson disease and Alzheimer’s disease. (9)

Glutathione is critical for immune function and controlling inflammation. It is the master detoxifier and the body’s main antioxidant, protecting our cells and making our energy metabolism run well.

GSH also participates in a series of immune processes, protecting host immune cells through its antioxidant mechanism and providing the optimal functioning of lymphocytes and other cells of the immune system. Endogenous GSH is essential for T-cell proliferation, dendritic cell functions, in which authors demonstrated that cysteine supplementation mediates the redox modelling of Tregs through the reduction of GSH synthesis in isolated dendritic cells from mice. In addition, they found that during T cell activation, GSH transport from the nucleus to the cytoplasm was blocked. GSH is also important for the activity of polymorph nuclear neutrophils (PMN). It was observed that when isolated leukocytes from healthy humans were treated with GSH-oxidizing reagents, phagocytosis was regulated in PMN through the inhibition of the assembly of microtubules and consequent reduction of H₂O₂ production in GSH homeostasis.

Even small changes in intercellular levels of Glutathione have been shown to have a negative impact on lymphocyte activity. Studies have shown an increase of T cell proliferation and IL-2 levels with restoration of GSH levels. Additionally it has been suggested that GSH may protect cells from immunological cell damage. (10)

Exercise for Your Way to More Glutathione. Exercise boosts your glutathione levels and thereby helps boost your immune system, improve detoxification and enhance your body’s own antioxidant defences. Start slow and build up to 30 minutes a day of vigorous aerobic exercise like walking or jogging, or play various sports. Strength training for 20 minutes 3 times a week is also helpful.

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