# Glutathione LGT 500+

## Glutathione LGT 500+ and the function of the active component in the organism

Glutathione LGT 500+ contains a unique compound, LGT - reduced glutathione - designed in particular to protect the organism from oxidative stress and various harmful substances, and to improve vitality. The ratio of its reduced and oxidized forms is important in the organism. Glutathione LGT 500+ is unique especially because of the amount and quality of reduced glutathione it contains, which enables it to properly perform its tasks in the organism. L-glutathione is above all an effective antioxidant, protecting cells and tissues from damage by oxygen radicals.
Glutathione is produced by the liver and is used in the synthesis and repair of nucleic acids in the organism, during protein and prostaglandine synthesis, transport of amino acids, elimination of toxins and carcinogens, proper function of immune system, cell oxidation stress prevention, and during the activation of numerous enzymes in the organism. Low levels of it in the body is associated with fast aging, skin discoloration, diabetes, lung and digestive tract diseases, convulsions, Parkinson's Syndrome, and other neurodegenerative disorders.

Glutathione is an important biomolecule which exists in animal cells, and is most frequently located in hepatocytes. It occurs in rather high concentrations, most frequently in the range 1-10 mmol/L. Its antioxidative function and its participation in cell protection are the predominant results of its biochemical activity.

## Glutathione and its biochemistry

Glutathione is chemically a tripeptide, gamma-glutamyl-cysteinyl-glycine. It exists in two forms – reduced and oxidized. In its reduced form it is a triol (GSH) and in its oxidized form it is a bisulfide (GSSG). With regard to its position in the whole of cell metabolism and its antioxidative effects, its biosynthesis is especially important from the biochemical perspective.

The biosynthesis of glutathione has two steps. In the first step, glutamic acid reacts with cysteine, and gamma-glutamylcysteine is formed during gamma-glutamylcysteine synthetase catalysis. In the second step of the biosynthesis, gamma-glutamylcysteine reacts with glycine and the reduced form of glutathione (GSH) is formed. The second reaction step is catalysed by glutathione synthetase. ATP is the energy donator for both reactions.

The principle of the antioxidative effect of glutathione is based on the fact that GSH is a weak reducing agent in view of the content of the sulfyhydryl group in the present cysteine. The mechanism of the effect during the action of free oxygen radicals consists in the oxidation of the sulfyhydryl group. A disulfide group is formed and dimer glutathionedisulfide (GSSG) is then formed from glutathione. The oxidized form of glutathione is transformed back to reduced glutathione (GSH) by the effect of glutathione reductase. Dehydroascorbate reductase also takes part in glutathione oxidation. The entire mechanism of the oxidative and reducing changes of glutathione is called the ascorbate-glutathione cycle.

This process can be conveyed schematically through the following equations:
1) the formation of the oxidized form of glutathione (GSSG)
2 GSH + H2 O2----------GSSG + 2 H2 O
2) the regeneration of the oxidized form of glutathione to its reduced form
GSSG + NADPH + H + ----------2 GSH + NADPH

In addition to its antioxidative role, glutathione performs other biochemical functions. In particular, the following metabolic processes are performed by glutathione:

- amino acid transportation to cells through a membrane in the kidneys by gamma-glutamyl transferase enzyme,
- cytosol redox potential,
- protection of cells against oxidative stress,
- protection of triol protein groups,
- detoxification of free radicals,
- inhibition of mutagenic components formation,
- active effect in the gastrointestinal tract,
- contribution to the activation of ascorbic acid in its reduced form,
- cofactor in chosen oxidoreductases,
- protection of DNA against oxidative damage.

**Glutathione and xenobiotic compounds**

Glutathione contributes to xenobiotic compounds detoxification. In relation to glutathione, the result is a change to the ratio of the reduced and oxidized forms. The increased formation of free oxygen radicals leads to increased environmental stress and there is a decrease in reduced glutathione in glutathione values. The detoxification process can be conveyed through the following equation:
R + GSH--------R – S – G, where R is an electrophilic xenobiotic and GSH is nucleophilic in this chemical process. Glutathione can thus be practically used as an indicator in external environment state monitoring.
During increased formation of oxygen radicals or environmental stresses on an organism from toxic compounds, there is a decrease in the amount of reduced glutathione in cells and consequentially in tissues.

**Glutathione and its use**

Glutathione can be used as an oxidative stress marker. 99% of reduced glutathione (GSH) content is intracellularly localized in a physiologic state.

From the perspective of practical use, it can be labelled a new stress marker as its molecule occurs in the majority of organisms and their organelles (cell nucleus, mitochondria, peroxisomes). Its transport function in relation to biomembranes serves for indicative usage. Another benefit is the dynamics of glutathione content changes during contamination by foreign compounds, indicating cellular redox situation evaluation.

Glutathione LGT 500+ was created in particular for its sufficiently high content of reduced glutathione, allowing it to effectively fight against organism stress caused by the formation of free radicals. This makes it unique and different from other preparations with much lower contents of the active component.

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