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BIOLOGICAL AND MEDICAL ROLE OF SULFUR IN THE HUMAN BODY

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Sulfur is one of the most abundant and practically significant elements of the chalcogen group (Group VI of the Periodic Table), second only to oxygen. It is an essential component for the proper functioning of numerous enzymes and plays a key role in antioxidant defense, notably through the formation of the powerful antioxidant glutathione.

According to literature sources, sulfur holds a crucial position in both chemistry and biology. It is classified as a macronutrient in the human body and as a nonmetal. Sulfur is vital for living organisms, as it forms an integral part of many proteins (e.g., the amino acid methionine), vitamins, cartilage tissues, nails, and hair. Sulphur deficiency can cause structural tissue integrity disorders, manifested by increased brittleness of nails and bones, as well as weakened hair growth and hair loss.

In terms of chemical properties, sulfur exhibits both reducing and oxidizing properties. This enables it to participate in numerous biochemical reactions, including the formation of disulphide bonds that stabilize the spatial structure of proteins. In addition, sulfur compounds play a key role in maintaining redox homeostasis by participating in the neutralization of active forms of oxygen. It is also part of coenzymes and antioxidant systems that protect cells from oxidative stress and regulate metabolic processes.

The estimated daily requirement for sulfur in adults is approximately 4 grams, although there is no officially established dietary allowance for this element. This amount is considered necessary to support the integrity of mucous membranes, maintain the health of hair, nails, and blood vessels, and assist in the body’s detoxification processes.

The body of an average adult weighing about 70 kg contains approximately 1.4 g of sulfur, which emphasizes its significant presence in biological structures.

From a topographical point of view, sulfur is localized in connective and cartilage tissues, where it provides flexibility, elasticity, and mechanical stability; it is a component of B vitamins, in particular thiamine and biotin; it is part of some hormones that regulate various functions of the body; it restores the elasticity of blood vessels, the elasticity of the skin and ensures the conductivity of nerve impulses. Cerebroside sulfate is an integral component of the myelin sheaths surrounding the axons of neurons and plays an important role in

maintaining the integrity and functional stability of nervous tissue. Its presence helps to ensure optimal nerve impulse conduction velocity and maintain neurophysiological balance.

Sulfur plays a key role in a number of vital biochemical processes, including blood clotting, enzyme synthesis and the formation of energy compounds. It is also necessary for the biosynthesis of collagen, the main structural protein of connective tissue, which ensures the strength and elasticity of organs and tissues. Sulfur has pronounced anti-allergic properties, and participates in the regulation of a number of physiological processes. It contributes to the optimization of neurofunctional activity, supports the detoxification capacity of the blood, activates cellular respiration, and ensures proper liver function, particularly in bile secretion processes.

In modern medicine, inorganic medicinal products containing sulfur are used. In the form of ointments, precipitated sulfur is used. To treat diseases such as seborrhea, psoriasis, etc. Purified sulfur is used as an antihelminthic agent when taken orally and externally for certain skin diseases. A solution with a mass fraction of 1% sulfur in sunflower oil is used in the form of injections in the treatment of certain forms of schizophrenia. A solution of sodium thiosulphate $Na_2S_2O_3$ with a mass fraction of 30% is used for severe allergic diseases, poisoning with chlorine, compounds of arsenic, mercury, lead, hydrocyanic acid and cyanides, and its solution with a mass fraction of 60% is used to treat scabies; when it interacts with hydrochloric acid, it causes the antiparasitic properties of sodium thiosulphate.

Thus, sulfur is an indispensable macroelement that ensures the structural integrity of proteins, enzymes, and tissues, and also participates in key biochemical processes in the body. Due to their wide range of physiological effects, sulfur compounds are used in medicine for the treatment of dermatological, mental, and toxicological conditions. In modern medicine, sulfur is considered a promising component of complex therapy that can increase the effectiveness of treatment for chronic and systemic diseases. Ensuring an adequate intake of sulfur through diet is an important condition for maintaining metabolic balance, nervous system function and effective detoxification mechanisms.