THE ROLE, FUNCTIONS AND IMPORTANCE OF GLUTAMIC ACID IN THE HUMAN BODY

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Abstract. *Glutamic acid (glutamate) is one of the most important amino acids in the body. It is part of proteins and is involved in many physiological processes. This acid is also important as a neurotransmitter in the central nervous system. Glutamic acid is naturally synthesised in the body and is found in various foods.*

Keywords: *Glutamic acid, nervous system, metabolism, a multifunctional amino acid, cancer and critical illness.*

Chemical structure and properties

The chemical formula of glutamic acid is $C_5H_9NO_4$ and it has two carboxyl groups (-COOH) and one amino group ($-NH_2$). It is a polar and hydrophilic amino acid.

Biological Functions

Protein Component: Glutamic acid is one of the 20 essential amino acids that make up proteins. It is essential for protein synthesis in the body.

As a neurotransmitter: Glutamate is the main excitatory neurotransmitter in the central nervous system. It is involved in the transmission of impulses between the brain and nerve cells.

In energy metabolism: In some cases, glutamic acid can be used as an energy source like glucose, especially by brain cells.

Significance in medicine

Neurological diseases: Elevated levels of glutamate can lead to some nervous system diseases such as epilepsy, Alzheimer's disease and Parkinson's disease. Therefore, it is important to control the amount of it.

Nutritional supplements: In athletes and people under stress, glutamic acid and its derivative glutamine help to restore energy and maintain muscle mass.

Sources of Glutamic Acid

Glutamate is found naturally in the following foods:

Meat products (beef, chicken)

Fish

Cheese and cottage cheese

Peanuts, almonds

Tomato, carrots, spinach

In its artificial form, it is often used in the form of monosodium glutamate, which is used in the food industry as a flavour enhancer.

Glutamic acid affects metabolic processes in the following ways: Glucose production: Glutamate is used in the liver in the process of gluconeogenesis (glucose synthesis). Krebs cycle: Glutamate contributes to intracellular energy production (ATP synthesis) by being converted to α-ketoglutarate. Ammonia elimination: Glutamate combines with ammonia to form glutamine, which helps to neutralize nitrogenous waste in the body.

Glutamic acid plays an important role in muscle recovery.

In catabolic (breakdown) states, such as after intense exercise, glutamine is formed from glutamic acid, which accelerates the recovery of muscle tissue.

For this reason, glutamine supplements are sometimes recommended for athletes.

As an anti-inflammatory, glutamic acid and glutamine may have anti-inflammatory properties. Gut health: Glutamine is a major energy source for intestinal lining cells (enterocytes), which supports gut health. Cancer and critical illness: In some cases, the body's use of glutamic acid increases (especially in cancer cells), making it important to keep it under control.

Summary of Content

Glutamic acid is a multifunctional amino acid that is essential to the body. It is not only part of proteins, but also plays an important role in the functioning of the central nervous system, energy metabolism and cleansing the body of toxins. Also, its excess or deficiency can lead to negative health consequences, so it is very important to maintain a balance of glutamic acid.

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