THE ROLE OF BIOGENIC FACTORS IN THE DEVELOPMENT OF ALLERGIC REACTIONS

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Annotation: The article provides information on the role of biogenic factors in the occurrence of allergic reactions, antihistamines, the formation and importance of serotonin, the neutralization of biogenic amines.

Keywords: neutralization of antihistamines, serotonin, gamma-aminobutyric acid (GABA), histamine, putrestsin, cadaverine, ammonia.

Antihistamine drugs. When certain antigens (protein, polysaccharide antigens, several drugs) enter the body, the body develops a sensitized state (a type of hypersensitivity that occurs immediately). If the same antigen enters the body again within a few minutes, it leads to the onset of an acute reaction (anaphylactic and allergic reactions), which consists of an almost exact copy of the histamine shock. The mechanism of these reactions involves the release of histamine in fat cells, from which histamine is released as a result of antigen-antibody action on their surface.

Antihistamines are used to prevent and treat these reactions: sanorin, pipolfen, diphenhydramine, glucocorticoids and others.

Formation and importance of serotonin. Serotonin is formed from the decarboxylation of 5-oxytryptophan (by the decarboxylase of aromatic amino acids):

Serotonin is a highly active biogenic amine.

• it narrows blood vessels and raises blood pressure;

• Participates in the regulation of body temperature, respiration, renal filtration;

• is a mediator in neural processes in the CNS;

• Participates in the development of allergic reactions, dumping syndrome, fetal toxicosis, carcinoid syndrome and hemorrhagic diathesis.

Gamma-aminobutyric acid and its role in the conduction of nerve impulses. Gamma-aminobutyric acid (GABA) is formed from glutamate by the action of glutamate decarboxylase in brain tissue:

GAMK concentrations are very high in the brain and spinal cord. GABA (glycine) acts as a mediator in about half of all synapses in most brain neurons. These mediators cause inhibition in neurons, whereas other mediators act as both observers and inhibitors.

Neutralization of biogenic amines. Accumulation of biogenic amines can affect physiological processes and lead to adverse changes in the body. However, organs and tissues have a special mechanism that neutralizes them. Biogenic amines are deaminated and deoxidized by oxidation, resulting in the release of aldehydes and ammonia.

The enzymes that catalyze these reactions are called monoamino- (MAO) and diaminooxidease (DAO). The coenzymes of MAO are FAD, DAO - pyridoxal phosphate. MAO is located in the mitochondria and DAO is in the cytoplasm. MAO neutralizes primary, secondary and tertiary amines, DAO - histamine, putrestsin, cadaverine and partially aliphatic amines. The aldehydes formed are oxidized to organic acids by aldehyde dehydrogenase.

In particular, the deamination of monoamines by oxidation has been studied in detail. This enzymatic process is irreversible and takes place in two stages. The resulting hydrogen peroxide is then broken down into water and oxygen by catalase.

Ways to neutralize ammonia

Ammonia is formed in the body in the following processes:

1. deamination of amino acids;

2. deamination of biogenic amines;

3. deamination of purine bases;

4. Decomposition of pyrimidine bases:

5. Deamination of amide bases of amino acids (asparagine and glutamine).

The breakdown of 100 g of protein consumed per day produces 19.4 g of ammonia. Ammonia occurs in tissues mainly in the form of ammonia (NH4 +), which is in equilibrium with low concentrations of non-ionized ammonia. Low levels of ammonia in human body fluids and tissues; in the blood -25-40 μmol / l (0.4-0.7 mg / l). An increase in its concentration has a detrimental effect, especially on the nerve cells, there is a strong excitation of the nervous system: the person vomits, becomes restless and loses consciousness. There are several ways to neutralize ammonia:

1. formation of ammonium salts of organic acids
2. formation of amino acids;
3. transreaminirovanie;
4. creatinine synthesis
5. formation of urea;
6. formation of ammonium salts.

Formation of ammonium salts of organic acids (ammonium citrate, ammonium oxalate, ammonium fumarate).

Formation of amides of asparagine and glutamic acids. They are mainly forms of transport of ammonia. Ammonia is added to the first carbon atom in the presence of asparagine synthase, glutamine synthase enzymes and ATF to asparagine and glutamic acids.

Some ammonia is involved in the synthesis of new amino acids in tissues. These reactions are called reversible retransamination.

About 15% of ammonia is excreted as creatinine. The synthesis of this substance takes place in 3 tissues: kidneys, muscles and liver; 3 amino acids are involved: arginine, glycine and methionine. Creatine is synthesized by transmethylation.

Reaction 1 The enzyme glycine-amidinotransferase combines arginine and glycine to form guanidine acetate (glycocyamine) and ornithine, which pass through the kidneys and pancreas.

In stage 2, methylation of guanidineacetate is observed, S-adenosylmethionine is a donor of the methyl group, and passes into the liver and pancreas.

The resulting creatine travels through the blood to the muscles, is phosphorylated by the enzymes ATF and creatine phosphokinase, and forms creatine phosphate. This substance performs an energetic function in the muscles and produces creatinine as a result of dephosphorylation.

Approximately 2% of creatine in the body is converted to creatinine. The amount of creatine in the muscles is 25-55 g / kg, in the heart tissue - 15-30 g / kg, in the brain tissue - 10-15 g / kg. Creatine is excreted in the urine only in children; creatinine is released in adults at 4.4-17.6 mmol per day. There is a link between body muscle mass and creatinine release. If creatine is excreted in the urine, it is indicative of muscular dystrophy. This reduces the activity of the enzyme creatine phosphokinase in the muscles.

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