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Creation Pathogenetic the Determined Compositions of Amino Acids and their Derivatives for Practical Realization of the Regulating Effect of these Substances

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Abstract

The creation methodology pathogenetic the determined compositions of amino acids and their derivatives on the basis of their physiological concentration for practical application of regulatory effects of these substances is discussed.

Keywords: Free amino acids; Regulatory effects; Infusion solutions

Short Communication

Development and improvement of highly effective and selective methods of the amino-acid analysis allowed to define physiological concentration (10^{-9}–10^{-12} M) these substances and a wide range of their derivatives in biological objects [1,2].

The numerous results of definition of substances of this class received in the 70th years in liquids and tissues of peoples [3] allowed to systematize the saved-up data and to define areas of operation of their biological effect, first of all – in laboratory diagnostics and application in clinical practice as medicinal and preventive preparations.

It is natural that the most significant number of researches in this area is devoted to search of marker amino acids or their derivatives for diagnosis of various diseases. As free amino acids are presented by a wide range related on chemical structure and metabolic transformations of the connections forming amino-acid fund in physiological liquids and tissues is proved that quantitative definition of their pool promotes diagnosis of various diseases, including of hepatobilliary, vascular and immune systems pathology, oncopathology, alcoholism and diabetes.

It appeared that in the majority group shifts in levels functionally and metabolic connected amino acids and their derivatives, but not specific changes of concentration of separate connections of this class [4-9] have the diagnostic importance. Thus also character of amino-acid profiles of liquids and tissues of an organism of animals and the peoples, in particular - had rather high informational content at their comparison with application of methods of the multidimensional mathematical analysis and modeling [10].

At the same time, it is convincingly shown that elimination or correction of changes of an intermediate metabolism can be reached by use of separate amino acids and their derivatives, or their combination (compositions) as universal natural bioregulators – the substances influencing directly mechanisms of a cellular metabolism in physiological (endogenous) concentration [11-13].

Today there are proofs of the importance of amino acids not only and not so much as construction blocks for protein synthesis, but regulators of an expression of genes at the level of broadcast of mRNK per the mTOR-dependent mechanism, alarm molecules and modifiers of biological reactions, and also predecessors of a wide range of the bioregulators playing a key role in regulation and integration of the main metabolic processes [14-18].

From metabollomics positions the amino-acid pool of biological liquids and fund of free amino acids of tissues is estimated by us as uniform information whole, representing peculiar the "chemical projection" of a genome realized through the proteome [19].

Such approach not only develops ideas of a pool or fund of amino acids as to the dynamic system formed by receipt them from the outside and also due to endogenous synthesis, transport, degradation and removal, but also allows to reveal "key points" of an intermediate metabolism shift of balance in which can be reflected in ratios of endogenous levels of separate amino acids and related (metabolic related) substances [10,19].

Modern conditions in a complex of treatment of patients one of the leading places is occupied by infusion-transfusion therapy which cornerstone use of blood substitutes. At the same time, it isn't developed the effective transfusion environments capable is long to circulate in blood so far, to improve hemodynamic, microcirculation and at the same time to possess the directed metabolic (regulatory) action on key exchange reactions and functions. So, use for infusional therapy of the plasma substitutes containing amino acids in the quantities necessary for elimination of protein deficiency promotes realization of one or several tasks, leaving others, not less important, on the second plan that complicates the most adequate treatment. Recently the increasing preference is given in experimental and clinical transfusiology to development and use of multicomponent solutions of multifunctional action. The significant place in this direction is taken by solutions of artificial mixes of high cleaning substances of amino acids. Thus preparations on the basis of amino acids (Polyamine, (Russia), Aminosteril KE 10% (Germany), Vamin (Sweden), Friamin (USA) and many others are developed first of all on the basis of daily need for protein for maintenance of positive nitrogenous balance and are applied first of all with the replaceable purpose. Besides, on the basis of organ specifics and features of an

interorgan metabolism are developed for realization of biochemical reasonable effect of separate amino acids and the specialized compoundings of their artificial mixes combining conditions of parenteral nutrition and pathogenetic correction of pathology of a liver (hepaamino), kidneys (nefroamino) or application in pediatric practice (aminoped) are applied. Such amino-acid solutions contain significantly big (branched, sulfur-containing) or smaller (aromatic) amounts of separate substances of amino acids or include mainly (nefro) essential amino acids. [10,12,13].

The experience of clinical use of foreign and domestic preparations of separate high cleaning amino acids which is saved up by us ("Taurine", "Leucine", "Tryptophane") or their minicompositions ("Tavamin", "Tryptamin", "Neyramin") testify to possibility of use of multicomponent solutions of amino acids with the concentration of each connection calculated according to its metabolic profile in blood of the person at a concrete disease [19].

The methodology of development of new compoundings of multicomponent infusion solutions offered by us on the basis of amino acids and the related connections intended for correction of the metabolic imbalance arising at various diseases is based on application of results of research of regularities of formation of amino-acid fund in biological liquids and tissues of the person at the most various pathological states (more than 9000 surveyed) [10,19].

The structure and amounts of high cleaning amino acids in such infusion solutions has to be defined first of all their physiological (endogenous, regulatory) by concentration that distinguishes them from traditionally applied solutions of amino acids for parenteral food where the maintenance of their components pays off proceeding from daily need of a human body for them without due consideration of regulatory action of the entered substances [19].

The multicomponent infusion solutions offered by us for development on the basis of amino acids thanks to high degree of polyfunctionality, biocompatibility, lack of anti-gene properties and stable haemodynamic efficiency, have to possess complex action in the direction of "metabolic comfort" and, combining not only various functions of haemoproofreaders, to be absolutely safe, not causing development of allergic reactions, warning development of the complications caused by damages of various genesis.

The methodology of our development is based on:

1. Research of physiological concentration of free amino acids, their derivatives, predecessors and metabolites, and also marker biochemical parameters at almost healthy donors and patients at various pathology;

2. Creation of a uniform database on the studied indicators, creation of the empirical mathematical model including pathogenetic markers of concrete pathology and amino acid profiles;

3. To development of new compoundings of specialized compositions of infusion solutions on the basis of amino acids and their derivatives.

Thus, development and creation of new multicomponent domestic amino-acid mixes according to pathogenetic the determined changes of their physiological concentration for elimination of an amino acid imbalance and metabolic therapy according to concrete indications is one of elements of operation of regulatory action of substances of this class.

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