DOI: 10.6084/m9.figshare.5117098

LCC – QA 299.6-433:QP

MODEL ANALYSIS OF THE EATING PHYSIOLOGY

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Abstract. It is conducted a mathematical modeling of the digestive system changes depending on food consumed. Mathematical model shows changes at exponential levels when using food and bio - additives.

Keywords: mathematical model; food additives; supplements.

Introduction. Health depends both on factors: of the external environment, and on the person, his way of life, character of a delivery. One of the numerous directions of the program of increase in health of the population is an expansion of production and realization of dietary supplements to food (dietary supplement) which provide elimination of the existing deficiency of vitamins, macro - and minerals. However, except dietary supplement, there is also a group of nutritional supplements. Studying of their influence on a human body is a hot topic.

Objective. The purpose of work consists in studying of composition of nutritional supplements and it influences on activity of an organism. For achievement of goals of work it is necessary to solve the following problems:

- To construct model of impacts of additives on a human body on the basis of theoretical and experimental datas.

Materials and Methods. Research techniques are constructed on the basis of systems analysis, methods of calculus mathematics and dynamic model operation of fractal dimension.

Discussion. The following analysis is carried out on the basis of works [1, 2].

Theories of a delivery. According to the classical theory of a delivery, substances of such molecular structure which are compensated by an expense and power losss as a result of physiological activity of an

organism have to come to an organism. It is possible to speak about six main postulates of this theory:

1) A delivery at which intake of feedstuffs corresponds to their expense is considered ideal.

2) Intake of feedstuffs is provided as a result of destruction of food structures and an absorption of the useful substances - nutrients that is necessary for metabolism, plastic and energy needs of an organism.

3) Utilization of food is carried out by an organism.

4) The food consists of several components, various on physiological value - from nutrients, ballast substances (of which it can be cleared) and harmful, toxiferous connections.

5) Metabolism of an organism is defined by the level of amino acids, monosaccharides, fatty acids, vitamins and some salts. Therefore, it is possible to create so-called element (or monomeric) diets.

6) Many nutrients (the useful substances) are released as a result of enzymatic hydrolysis that occurs due to cavitary and intracellular digestion.

The theory of the balanced delivery allowed to give scientifically - reasonable norms of consumption of nutrients, and also to overcome many nutritive defects and diseases, the bound to a lack of vitamins, irreplaceable amino acids, fatty acids, minerals. On its basis various diets for all groups of the population taking into account an exercise stress, climatic and other living conditions are created. All production, agrotechnical and medical actions which come down to the fact that improvement of properties of foodstuff can be reached due to extraction of nutrients against the background of decrease of ballast substances are based on this theory. [3]

However, according to A.M. Ugolev, a few extremely serious mistakes were a corollary of the theory of the balanced delivery.

The improved food was created - at enrichment of the foodstuff substances which is immediately participating in exchange along with products ballast and harmful substances were removed. Therefore the modern bread, grain, oil, sugar, salt - are refined. But such clarification led to development of diseases of a civilization, especially at excess consumption of such products. Carry to them: a myocardial infarction, an idiopathic hypertensia, atherosclerosis, a varicosity, thromboses, chronic bronchitis, emphysema of lungs, diseases of digestive tract, an ulcer, gastritis, enteritis, an ulcer colitis, cholecystitis, bilious and nephrolithiasis, a lipidemia, pregnancy toxicosis, a depression, multiple sclerosis, diabetum.

So, the main lack of the classical theory of a delivery is an ignoring of a role of ballast substances and other factors, not falling into nutrients.

All this gave A.M. Ugolev and other researchers to the formulation of the new theory of a delivery, A.M. Ugolev called the theory of an adequate delivery. It arose as result of crisis of the classical theory of a delivery and under the influence of opening the lizosom's and membranous digestion of types, an enterin of system of hormones, under the influence of the facts about negative impact of element diets on a human

body, and also on the basis of the abacterial animals given about the functional features.

The theory of an adequate delivery (according to A. M. Ugolev).

1) A delivery supports molecular structure and refunds power and plastic expenses of an organism on basel methabolism, external work and body height. In other words, this postulate same, as in the classical theory of a delivery.

2) As necessary components of food serve not only nutrients, but also ballast substances.

3) A normal delivery is caused not by one stream of nutrients from digestive tract, and several streams nutritive and the regulatory substances having the vital value.

4) In metabolic and, especially, in trophic the relations the assimilative organism is considered as a superorganism.

5) There is an organism endoecology - the owner who is formed by a microflora of his intestines.

6) The balance of feedstuffs is reached as a result of release of nutrients from structures of food at enzimatic degradation of its molecules due to cavitary and membranous digestion, and also owing to synthesis of new substances, including irreplaceable. [4]

Further we will consider this problem on systemic and mathematical models. Systems approach is shown in fig. 1.

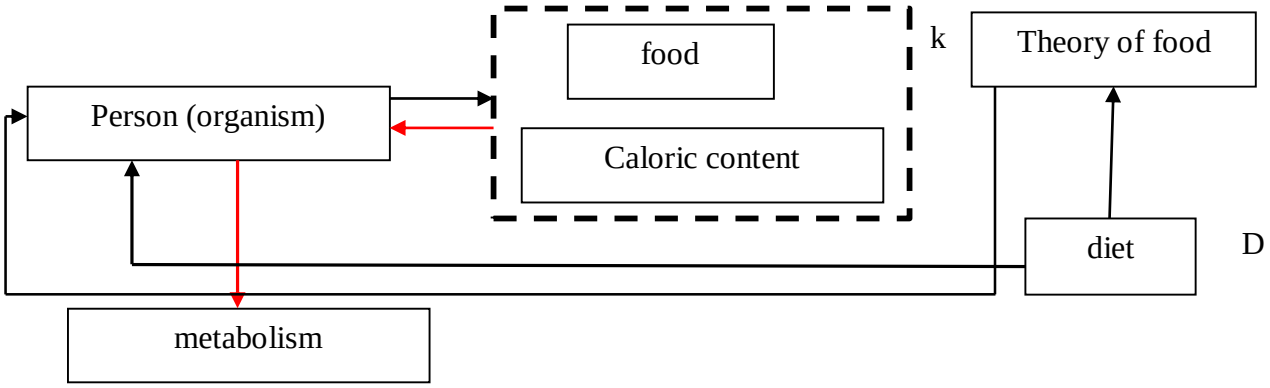

Fig. 1. Systems analysis of the theory of a delivery

The model (1) from work [2] will change the look due to emergence of the components reflecting a diet and caloric content of food that is:

$$R = kd_n \prod a_{(\eta-\gamma)\cdot c_q / bj}, \quad (1)$$

where n - considers a diet.

It is also necessary to consider amount of ballast substances and nutrients.

It is necessary to enter some component which will indicate normal work of a gastrointestinal tract in general. On the other side of components of the cq model (1) will consist of the sum of nutrients (*nu*) and ballast substances (*bth*). As we estimate work of all gastrointestinal tract, it is necessary to enter a generality quantifier. Thus, the formula (1) will take a form:

$$R = kd_n \forall \prod a_{(\eta-\gamma)\cdot c_q / bj} = Z, \quad (2)$$

where Z - the parameter indicating normal functioning of a gastrointestinal tract;

η, γ, c_q - consider the sum of ballast substances and nutrients.

Results. Systemic and the calculus of functioning of system of digestion is carried out. Model operation of change of functioning of system of digestion at consumption of nutrients and ballast substances by the person is carried out.

Conflict of interest statement: The author state that there are no conflicts of interest regarding the publication of this article.

Author Contribution: the work is completely carried out by Anastasia Novikova.

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