

ABSTRACT

Dissertation contains 88 pages, 3 applications, 17 figures, 3 tables and 27 references.

Topic Relevance. Development of a unified model of optimization of therapeutic food blends solves the problem of automatic creation of the mixtures for enteral nutrition, taking into account the individual characteristics of the human body and features of the interaction of micronutrients for the treatment of diseases of the gastrointestinal tract (GIT).

The ability to reach a balanced composition of enteral number of complicated mixture of factors that affect the requirements for this mixture. Among these factors, anthropometric parameters of the human body, the level and type of physical activity, type of disease, allergic reaction or idiosyncrasy of certain substances. Also important is that the assimilation of some micronutrients affect (positively or negatively) on the assimilation of others. Currently there is no system that would have made all the calculations automatically, taking into account the above factors.

Thesis connection to scientific programs, plans, and topics. The thesis was carried out according to the plan of research department of Applied Mathematics National Technical University of Ukraine "Kyiv Polytechnic Institute".

Research goal and objectives. The purpose of the study is to provide a recovery by creating human nutrient profile and its calculation of enteral formula for the treatment of gastrointestinal diseases based on individual parameters person.

To achieve the above stated goal was solved the following problems:

- examine existing practical and theoretical solutions and conduct comparative analysis;
- and a structural dynamic model of the system;
- adapt selected mathematical method to solve the problem;
- implement the system in the form of software;
- check the correctness of the established system and its effectiveness.

Object of research is a system of metabolic processes in the human body, the model definition of daily calories, especially the assimilation of vitamins and trace elements,

especially the impact of a person's age and type of physical activity on metabolic processes, optimization methods of enteral formula, dietary patterns in diseases of the gastrointestinal tract, the UML graphical tools for presentation of structural and dynamic models of existing solutions to generate recipes nutritional compounds, existing solutions for determining the daily allowance of nutrients.

Subject of research of the study is a unified model of optimization of therapeutic food mixtures for the treatment of diseases of the gastrointestinal tract as pancreatitis, cholecystitis and gastritis using genetic algorithms, taking into account the individual characteristics of the human body and features of the interaction of micronutrients.

Methods of research. To solve this problem used a genetic algorithm (to optimize the treatment of food mixtures and to take account of the interaction of micronutrients), formula Mifflin San Zheora (to calculate the daily value of nutrients).

Scientific contribution includes the following provisions:

– first developed a unified model of optimization of medical food formula that is taking into account peculiarities of interaction of micronutrients during joint use and subject to important individual characteristics of the human body: the type of disease, anthropometric indices, individual intolerances and allergies, the level and type of physical activity that allows you to create food mixtures to treat the individual;

– for the first time used a genetic algorithm to optimize the treatment of food mixtures, which is to select a set of ingredients mix as individuals in a population and minimize deviations nutrient of the current mix of nutrient profile person that allows you to quickly and efficiently calculate the optimum amount of each ingredient in the mixture;

– for the first time used a genetic algorithm to account for features of the interaction of micronutrients during joint use, which is to minimize the deviation values of micronutrients in the distribution of admission mixes several times from their values at a perfect distribution when micronutrients, synergy taken together and micronutrients antagonists - separately, giving maximize the useful effect of each micronutrient.

Practical value of obtained results. The developed model makes it possible to ensure effective recovery of rights through assistance in meeting the medical diet.

Approbation of the thesis results. The main provisions and the work presented at the VIII scientific conference of graduate and post-graduate "Applied mathematics and computing 'and MVP-2016 XVII International Scientific Conference SAIT 2016.

Publications. The results of the thesis presented in two scientific papers, including:

– VIII scientific conference of masters and PhD students "Applied mathematics and computing - PMC-2016." Abstracts "component model unified system optimization of mixtures for enteral nutrition";

– XVII International Scientific Conference SAIT 2016 "Component Model unified system optimization of mixtures for enteral nutrition".

Keywords: enteral nutrition, gastrointestinal tract, micronutrients, CPFC , genetic algorithm, population, mutation, descendant, crossing function devices.

