

ABSTRACT

The thesis is presented in 87 pages. It contains 2 appendixes and bibliography of 33 references. Four figures and 20 table are given in the thesis.

Topic relevance. Coronary heart disease in Ukraine is a leader in the structure of causes of death by disease. According to the World Health Organization among the countries of the European Union, the CIS and other European countries - Ukraine is one of the first places among mortality from coronary heart disease. For example, in terms of sudden cardiac death from coronary heart disease aged 0 to 64 per 100 000 population - Ukraine ranks first among these countries (143.78 / 100 000 population). From this we can conclude that effective treatment of coronary heart disease should be at the first sign of the disease.

Modeling functional reserve would allow humans to see the big picture of the human condition by different parameters. To ensure the most effective treatment can be assessed the use of a time adjusting therapy and course of treatment. Model functional reserve, which will include the equation of kinetics of biochemical changes of an organism with specific coefficients of influence of the drug, can help predict the human condition after treatment and thereby show efficacy. Comparison of the human body after treatment in the application of different drugs will be able to compare and determine which treatment regimen is more effective and better, allowing for the human body.

Thesis connection to scientific programs, plans, and topics. The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” and within a retrieval research “Optimization strategies for diagnosis, prevention and treatment of topical viral infections based on clinical laboratory and pharmacoeconomic and pharmaco epidemiological studies” (№ state registration 0115U002161)) P.L. Shupyk National Medical Academy of Postgraduate Education .

Research goal and objectives. The goal of this thesis is to develop mathematical model of organism functional reserve in patients with coronary artery disease by building equations of biochemical kinetics.

To accomplish this goal, the following objectives were reached:

- systematize existing methods of modelling the functional reserve of the body;
- build the equation of the biochemical kinetics for different measures of functional reserve of the body ;
- build a system of equations for each of the indicators of the functional reserve of the body by using experimental data;
- perform and to select the method of determining the coefficients of influence of drugs on the indicators of the functional reserve of the resulting systems of equations;
- present the equations of biochemical kinetics the influence of drugs with defined coefficients;
- conduct experimental studies models of functional reserve of the organism on the basis of equations of biochemical kinetics using the sample data about the initial condition of patients

Object of research is methods for modeling the functional reserve of the human body to determine the effectiveness of treatment of patients with coronary artery disease.

Subject of research is using of equations of biochemical kinetics and determine the impact of drugs on the body metrics for modeling the functional reserve of the human body.

Methods of research. To solve the task, the following methods were used: methods of constructing equations of kinetics (for development of a model of functional reserve of the organism on the basis of equations of biochemical kinetics); regression analysis (to develop methods of solving systems of equations of biochemical kinetics); methods of the theory of algorithms and programming (for implementing the developed algorithms); methods of probability theory and mathematical statistics (for carrying out experiments).

Scientific contribution consists of the following:

- for the first time, the task of modeling the functional reserve of the human body in the treatment of patients with coronary heart disease, which is in contrast to previously proposed is more focused and thus more focused on the problem of IBS;

– for the first time, proposed the construction of a model of functional reserve of the organism on the basis of equations of biochemical kinetics core indicators, taking into account factors of influence of certain drugs, namely those that are most often used as a treatment for IBS;

– proposed to determine the coefficients of influence of drugs using the methods of regression analysis from the sample of real data about patients treated for CHD, thereby ensuring precise matching of the coefficients of the influence of the drug.

Practical value of obtained results. The proposed model of the functional reserve of the organism, based on the equation of the biochemical kinetics that make possible to predict how a particular therapy will affect the patient records, with information about its original state. The use of the developed approach is possible with the use of other drugs. Determining the equation of kinetics for different treatment regimens to compare their impact on the patient and choose the most effective treatment. Thus, the model can be used by a physician in practice when making therapeutic decisions.

Approbation of the thesis results. Basic ideas and results of the research were presented at the International conference SAIT (System Analysis and Information Technology) (2017) and at a scientific conference "Applied mathematics and computing" (2017).

Publications. Thesis results are published in 2 scientific works:

in 2 papers in proceedings of international scientific conferences.

Keywords: coronary heart disease, functional reserve, equations of biochemical kinetics, regression analysis, least squares method, impact factor.