

ABSTRACT

The thesis is presented in 73 pages. It contains 5 appendixes and bibliography of 35 references. Forty one figures and 3 tables are given in the thesis.

Topic relevance. Human immunodeficiency virus (HIV) infection is a major cause of morbidity and mortality worldwide. Today, about 35 million people living with HIV. In recent years, treatment strategies have progressed very far and although a vaccine against HIV still appears some time, use a combination of antiretroviral drugs known as highly active antiretroviral therapy (HAART) make it possible to influence the clinical course of HIV infection, improve quality and increase life expectancy patient.

HIV infection leads to progressive dysfunction of the immune system. In the absence of proper treatment of the disease within 8 to 12 years usually leads to acquired immunodeficiency syndrome (AIDS) and death. The first acute stage of the disease, which lasts six to eight weeks the infected person is highly contagious, and then comes the long asymptomatic latent phase, which precedes the stage of AIDS. This natural progression of the disease can be slowed using HAART significantly limiting the reproduction of the virus in the body and thus slows the suppression of the immune system. The risk of transmission depends on the viral load - the number of viral particles circulating in the blood. Therefore, early initiation of HAART has the potential to reduce the risk of infection.

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 aim of the thesis is to show the possibility of using a systematic approach to modeling the HIV / AIDS epidemic in Ukraine as a dynamic system models to evaluate economic indicators, forecasting the development of disease in the future.

Object of research of research is data of HIV / AIDS infection.

Subject of research is modeling the spread of diseases in populations, information technologies prediction of HIV / AIDS infection.

Methods of research. To solve this problem used the following methods: methods of mathematical statistics for the analysis of initial data populations methods for curves fitting and the method of least squares to find transitions matrix Markov chain, system dynamics.

Scientific contribution consists of the following:

- the first time the task of constructing a mathematical model of the spread of morbidity and prevention of HIV / AIDS and its consequences for Ukraine available statistical data;

- the mathematical model of the i morbidity prevention of HIV / AIDS and its consequences, taking into account the possible consequence influensess in implementing preventive reviews;

- found economic indicators of HIV infection is estimated optimum period of exposure to infection prevention;

- made test systems for resistance and found equilibrium point system;

Approbation of the thesis results.. Based on the constructed model can perform forecasts of the development of the disease, develop future strategies to combat it, to assess the economic effect of HIV infection receiving time necessary for qualitative influence methods of treatment / testing.

Keywords: System dynamics, HIV, mathematical model, least squares method, a system of differential equations.