fills the cleaned out cavity with a filling material. By closing off spaces where bacteria can enter, a filling also helps prevent further decay. Nowadays the following types of fillings used. Old fillings are made to order in a laboratory and then cemented into place. Gold inlays are well tolerated by gum tissues, and may last more than 20 years. For these reasons, many authorities consider gold the best filling material. However, it is often the most expensive choice and requires multiple visits. Amalgam (silver) fillings are resistant to wear and relatively inexpensive. However, due to their dark color, they are more noticeable than porcelain or composite restorations and are not usually used in very visible areas, such as front teeth. Composite (plastic) resins are matched to be the same color as your teeth and therefore used where a natural appearance is desired. The ingredients are mixed and placed directly into the cavity, where they harden. Composites may not be the ideal material for large fillings as they may chip or wear over time. They can also become stained from coffee, tea or tobacco, and do not last as long as other types of fillings generally from three to 10 years.

Results and discussion. Exiting filling materials fall into three groups: for provisional fillings; cavity liners; for permanent fillings. Provisional fillings serve for closing the tooth cavity for 1 to 2 weeks. Artificial dentin is the most widely spread material for provisional fillings. The powder consists of 90 to 95% of sulphate and zink oxide with a 3:1 ratio, the remaining part being kaolin. This powder is mixed with water. The setting time is 1.5 to 2 minutes. Ready-to-use dentin paste is also used as filling material for provisional fillings. The paste hardens at the body temperature in 2 to 3 hours. Liner materials are represented by treatment and isolating liners. Materials for permanent fillings fall into three groups of filling materials: amalgams and composites. Two indicators are accounted for when using composite filling materials: the filling setting mechanism and the size of the filler.

Conclusion:

1- There are many occupational health problems still persist in modern dentistry.

2- The Amalgam (silver) fillings is a type of the dental filling

3- The Sore spots or cankers in the mouth is a one problem of the aesthetic dentistry

DIFFERENTIAL EQUATIONS – A WAY TO FIGHT CANCER

Paliy E. A.
Scientific supervisor: doc. Zhovtonyzhko I. N.
National University of Pharmacy, Kharkiv, Ukraine
sonya.paliy.09@gmail.com

Introduction. The world of differential equations is almost as rich as the real world is diverse. Differential equations describe various evolutionary processes and phenomena. They solve problems in various sciences, such as physics, chemistry, medicine, pharmacy, ecology, economics, etc. And they also arise themselves in solving these problems.

Aim. To draw the reader’s attention to the fact that, the use of differential equations have become an integral part of scientific and technological progress in the modern world. They became widely used not only in mathematics, but also in other leading branches of mankind.

Materials and methods. Thus for the first time, the scientists from the cancer research Institute in London were able to «date», using mathematical methods of modeling the various stages of cancer progression. Also, the outstanding American doctor-oncologist Larry Norton constantly expresses the opinion that oncology lacks mathematical methods. He says that much more time should be devoted to the development and analysis of equations describing the rate of tumor growth and the frequency of metastases. Due to his opinion, most cancer researchers are searching for the mutations that give rise to it, and not the compilation of differential equations. Although quantitative approaches have already made changes to cancer treatments. Mathematical observations of tumor growth led to the discovery that the effectiveness of chemotherapy increases significantly from a simple change in the frequency of procedures. The fact that differential equations are necessary proves and American doctor of science Irina Kareva proves the fact of differential equations necessity. She creates mathematical models that describe the mechanisms of cancer, in order to create new drugs tumors destruction of tumors. «The power and beauty of mathematical modeling is that it gives you the ability to very clearly organize the knowledge that you have,» – says Kareva. «Mathematics can show us the right way or, on the contrary, tell us that we have reached a dead end.» In the end, all you need is the ability to put the right questions and translate them into the equations language and vice versa. To her opinion, a key aspect of mathematical modeling is that it doesn't matter to us what things are; we care about what they do. We investigate the relationships between individuals: cells, animals or people, and how they interact with each other and the environment. She gives the example. What do foxes and immune cells have in common? They are predators. Only foxes eat rabbits, and immune cells eat invaders, such as cancer cells. But from the mathematical point of view, the same system of predator-prey equations (picture1) can serve to describe the relationship between a fox and a rabbit, and between cancer and immune cells.

Let x(t) – be the number of foxes, y – be the number of rabbits at time (t). Then the number of foxes will grow until they have food (i.e. rabbits). If there is not enough, the number of foxes will decrease and then, from some point, the number of rabbits will increase.

The model of this example looks like this:

$$\begin{cases} \frac{dx}{dt} = -ax + bxy \\ \frac{dy}{dt} = cx - dxy \end{cases}$$

(picture1)

a,b,c,d are positive constants.

bxy expresses the dependence of foxes number increase from and rabbits number, and -dxy – reducing the number of foxes from rabbits.

On the example of this model – fox-rabbits (picture1), we can make the appropriate model – immune cells – cancer cells or tumor (picture2).

$$\begin{cases} \frac{dx}{dt} = -kx + gxy \\ \frac{dy}{dt} = fx - exy \end{cases}$$

(picture2)

k,g,f,e are positive constants.

gxy expresses the dependence of the immune cells growth from cancer cells number, but in the case when we reproduce the necessary environment for these cancer cells, and -exy expresses a decrease in the immune cells number from the cancer cells number, in the case when cancer cells will «eat» the nutrients of immune cells.

Results and discussion. This system of equations will help to investigate and compare the environment of the immune system and the tumor. It can also help to develop a hypothesis and simulate a scenario of safe therapy for humans, but vicious to cancer.

Conclusions. Therefore, mathematical modeling can answer questions that are directly related to human health, because mathematical modeling is the key to personalized medicine.

COMPUTER MODELING OF RANDOM PROCESSES

Parkhomenko S. A.
Scientific supervisor: professor Kokodii N. G.
National University of Pharmacy, Kharkiv, Ukraine
kokodiyng@gmail.com

Introduction. Monte Carlo method is used at research of many processes in physics, chemistry, biology. This method is basing on the use of random numbers. Nuclear reactors settle accounts by this method, it is widely used in geophysics, economy, biology, ecology – for the solving of those tasks, wherever the analytical or numeral methods are not work from the high degree of complication.