NANOTECHNOLOGY IN MEDICINE

M.E.Shukurova, assistant;

Sh. Davronov, assistant;

F.E. Kodirov, a student;

Karshi branch of Tashkent University of Information Technology named after Muhammad al-Kharazmi

Introduction

Before talking about the possible risks and prospects of nanotechnology in medicine, I must say, what is it? For this concept there is no exhaustive definition. "Nanotechnologies" are technologies that operate on the order of magnitude of a nanometer. This is a negligible value, hundreds of times smaller than the wavelength of visible light and comparable to the size of the atoms. The development of nanotechnology is conducted in 3 directions:

- manufacturing electronic circuits the size of a molecule (atom);

- development and manufacture of machines;

- manipulation of atoms and molecules [1].

What is Nanomedicine? "Nanomedicine" is tracking, correcting

development, design and control of human biological systems

at the molecular level, using the developed nanorobots and nano-

structure (R. Freitas) [2,4].

At present, nanomedicine does not exist, there are only projects,

the embodiment of which will lead to nanomedicine. A few years later,

where the first nanorobot will be created, the knowledge accumulated by nanomedicine,

will be realized. Then in a few minutes you will get rid of the virus

influenza or from early atherosclerosis. Nanorobots can return even

a very old man in the state in which he was in his youth. From

The operations on the organs will go over to the operation on the molecules and we, we become "immortal" [3].

Nanomedicine. Prospects for development and possible risks

Scientists say that the day will come when, with the help of nanotechnology, it is possible to integrate microscopic sensors into human blood cells, treatment or development of the disease. The projected period of imple mentation is the first half of the 21st century [4], but for now journalists and the public are arguing: can nanosensors affect perniciously the human body? After all, it is not known how the body reacts to the foreign bodies introduced into it. As E. Drexler put it: "The invisible weapons of the world revolution that cover
the earth" gray slug "(graygoo)" - a tiny reason for the end of the world [5].

Is it possible that nanotechnology can cause the end of the world?

or is it just a rich fantasy of some scientists? Ordered in one way, the atoms make up homes and fresh air; ordered by another, they form ash and smoke. Coal and diamonds, cancer and healthy tissue: variations in the ordering of atoms have distinguished the cheap from the precious, the sick from the healthy.

Considering a single atom as a brick or "detail"

nanotechnologists are looking for practical ways to design from these parts materials with specified characteristics. Many companies already know how to assemble atoms and molecules into certain structures. In the future, any molecules will be assembled like a child's constructor. For this purpose it is planned to use nanorobots (nanobots). Any chemicall

y stable structure that can be described

can be constructed.

Since the nanobot can be programmed for the construction of any structure, in particular, for the construction of another nanobot, they will be very cheap. Working in large groups, nanobots can create any objects with low costs, and high accuracy [5,6].

In medicine, the problem of using nanotechnology is the need to change the structure of the cell at the molecular level, i.e. to carry out "molecular surgery" with the help of nanobots. It is expected to create molecular robotic physicians who can "live" inside the human body, eliminating all arising damage, or preventing the occurrence of such. By manipulating individual atoms and molecules, nanobots can repair cells. The projected period for the creation of robotic doctors, the first half of the 21st century [4].

In fact, nanomedicine does not yet exist, there are only nanoprojects, the embodiment of which in medicine, ultimately, and will allow the abolition of aging. Despite the existing state of things, nanotechnology - as a cardinal solution to the problem of aging - is more than promising. This is due to the fact that nanotechnology has a great commercial potential for many industries, and accordingly, in addition to serious public funding, research in this direction is conducted by many large corporations [7].

Nanobots or molecular robots can participate (either along with or in lieu of genetic engineering) in redesigning the cell's genome, changing genes, or adding new ones to improve cell functions. An important point is that such transformations in the future can be performed on the cells of a living, already existing organism, changing the genome of individual cells, in any way, transform the body itself! [8].

The description of nanotechnology may seem far-fetched, perhaps because its capabilities are so limitless, but nanotechnology experts note that to date there has not been published any article criticizing Drexler's technical arguments.

Nobody managed to find an error in his calculations. Meanwhile, investments in this area (already amounting to billions of dollars) are growing rapidly, and some simple methods of molecular production are already in full use. Nanotechnologies can lead the world to a new technological revolution and completely change not only the economy but also the human habitat. Within the framework of this article, we consider only the promise of these technologies for the abolition of aging people. It is possible that after the improvement to ensure "eternal youth" nanobots will no longer be needed or they will be produced by the cell itself. To achieve these goals, it is necessary to solve three main tasks:

1. Develop and create molecular robots that will be able to repair the molecules.

2. Develop and create nanocomputers that will manage nanomachines.

3. Create a complete description of all the molecules in the human body, in other words, create a map of the human body at the atomic level.

The main difficulty is the creation of the first nanobot. There are several promising areas. One of them is to improve the scanning tunneling microscope or atomic force microscope and achieve positional accuracy and capture force. Another way to create the first nanobot is chemical synthesis. Can be designed A group of nanotechnologists from the Institute of Foresight said that the rapid growth of nanotechnology is getting out of control, but unlike Bill Joy, instead of simply banning the development of research in this field, they proposed establishing government control over research. Such supervision can prevent an accidental catastrophe, for example, when nanobots create themselves (to infinity), consuming as a building material everything in its path, including factories, pets and people.

Ray Kurzweil argues that by 2020, it will be possible to place billions of nanobots in a circulatory system in the size of a cage. According to Robert Freitas, the leading scientist in the field of nanomedicine, this will happen no earlier than in 2030-2035. These nanobots can

inhibit the aging process, heal individual cells and interact with individual neurons. So they practically merge with us.

Scientists from the state of Michigan argue that with the help of nanotechnology it will be possible to integrate microscopic sensors into human blood cells that will warn about signs of radiation or the development of the disease. In the US, at the suggestion of NASA, the development of such nanosensors is underway. James Bayner imagines a nanorail with cosmic rays: before the start, the astronaut, using a syringe for subcutaneous injections, injects into the bloodstream a transparent liquid saturated with millions of nanoparticles, during the flight he inserts a small device (like a hearing aid) into his ear. During the flight this device will use a small laser to search for luminous cells. This is possible, because cells pass through the capillaries of the tympanic membrane. By wireless communication, the cell information will be transmitted to the main computer of the spacecraft, and then processed. In which case, the necessary measures will be taken [11].

All this can come true in about 5-10 years. Scientists have been using nanoparticles for more than 5 years. Now, sensors thinner than a human hair can be 1000 times more sensitive than standard DNA tests. American scientists who developed these nanosensors, believe that doctors will be able to conduct a range of different analyzes, using only one drop of blood. One of the advantages of this system is the ability to immediately transfer the results of the analysis to a handheld computer. Researchers believe that it takes about five years to develop a fully functional nanosensor model that physicians can use in their daily work. With the help of nanotechnology, medicine can not only fight any disease, but also prevent its appearance, can help human adaptation in space [12].

Can "obsolete the experience" affect a person? When the mechanism completes its work, the nanoconcusors will have to remove nanorobots from the human body. Therefore, the danger that the "obsolete nanorobots" that remain in the human body will not work properly is very small. Nanorobots should be designed to avoid malfunctions and reduce medical risk. And how will the nanorobots be removed from the body? Some of them will be capable of

self-elimination from the human body through natural channels. Others will be designed in such a way that they can be removed by physicians. The process of removal will depend on the device of this nanorobot [11,12].

What can be done wrong during treatment with a human nanorobot? It is believed that the paramount danger to the patient will be the incompetence of the attending physician. But mistakes can occur in unexpected cases. One of the unforeseen cases can be the interaction between robots in their collision. Such malfunctions will be difficult to determine. An illustration of such a case is the work of two types of nanorobots A and B in the human body. If the nanorobot A removes the consequences of the work of the robot B, it will result in the repeated work of A, and this process will continue indefinitely, that is, the nanorobots will correct each other's work. In order to avoid such situations, the attending physician should constantly monitor the work of nanorobots and, if necessary, reprogram them. The qualification of a doctor is an important factor [13].

How will the human body react to nanorobots? As is known, our immune system reacts to foreign bodies. Therefore, the size of the nanorobot plays an important role, as does the surface roughness and mobility of the device. It is argued that the problem of biocompatibility is not very complicated. The solution to this problem will be the creation of robots based on diamondoid materials. Due to the strong surface energy and its strong smoothness, the outer shell of the robots will be chemically inert [14].

Nanotechnology is already used in medicine. The main areas of its application are: diagnostic technologies, medical devices, prosthetics and implants. Bright About four dozen people passed through the method of deep brain stimulation. Many colleagues of Aziza say that this method is not effective and can have negative consequences. The professor is convinced that the method is effective. Neither one is proved now.

Another revolutionary discovery is the biochip - a small plate with DNA or protein molecules applied to it in a certain order, used for biochemical analyzes. The principle of the biochip is simple. On the plastic plate, certain sequences of segments of the cleaved DNA are applied. In the analysis, the test material is placed on the chip. If it contains the same kind of genetic information, then they are bound. The advantage of the biochips is a large number of biological tests with significant savings in the material under study, reagents, labor and time for analysis [15].

conclusions

Prospects for the development of nanotechnology are very great. Currently used nanotechnology are harmless. Examples are nanochipes and sunscreen cosmetics based on nanocrystals [16]. And such technologies as nanorobots and nanosensors are still in the process of development. Conversations that because of the endless process of self-reproduction of nanorobots a thick layer of "gray mucus" can cover the entire Earth, are so far only a theory not confirmed by any data. Nanotechnology is a field of science that is subjected to severe criticism before introducing any innovations. NASA scientists say that they successfully tested nanorobots on animals. But is it worth it to believe? Everyone decides this for himself. The use, for example, of such nanotechnologies as nanosensors, can be risky. After all, any, even the simplest system can fail, what can we say about such advanced technologies as nanorobots? And, in addition, we must take into account the individual physiological characteristics of each person.

So, the prospects for the development of nanotechnology are great. In the near future with their help it will be possible not only to overcome any physical illness, but also to prevent its occurrence. But scientists do not say anything about risks. There are only countless articles in the yellow press that people under the influence of nanorobots will become uncontrollable, like zombies.

So the public needs to pay more attention to this issue:

so that scientists not only considered "both sides of the coin," but also made the society aware of this.

REFERENCES:

1. Игами М., Оказаки Т. Современное состояние сферы нанотехнологий: анализ патентов // Форсайт. — 2008.- № 3 (7). —с. 32-43.

2. Robert A. Freitas Jr. Current Status of Nanomedicine and Medical Nanorobotics//

Journal of Computational and Theoretical Nanoscience.—2005.— V. 2.— P.1-25.

3. Roco M.C. National nanotechnology initiative: Past, present and future // Hand-

book on nanoscience, engineering and technology. Ed. Goddard, W.A et al. CRC, Taylor and Francis, Boca Raton and London.—2007.— P.3.1-3.26.

4. Robert A. Freitas Jr. // Nanomedicine, Basic Capabilities. LandesBioscience, Aus-tin.— 1999.— V. 1. P.7-20.

5. K. Eric Drexler. Nanosystems: Molecular Machinery, Manufacturing and Compu-tation.//John Wiley and Sons, NY, 1992.