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MICROCHIPS AS THE FUTURE OF MEDICINE

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The use of microchips is a rapidly developing area in medicine. Chips, also known as semiconductors, are often called as the brain powering modern technologies. They are important elements in necessary medical equipment, such as defibrillators, which can prevent sudden cardiac arrest, ultrasound devices that obtain information about the location, shape, size, structure and motor activity of internal organs and patient indicators that assess a patient's vital symptoms in the intensive care unit (ICU).

DNA microarray technology began with the Southern blotting technique in 1987. In 1995 miniature chips were used to determine gene expression patterns, and in 1997 a complete eukaryotic genome was placed on a microchip.

Microchips have found another application. With the help of chips, various drugs are able to enter the human body. They control their intake and can release the drug for a long time.

Conventional medicines in the form of pills and capsules are not able to maintain a constant concentration of this substance in the human body. So, there may be a problem of exceeding the efficiency threshold. The threshold of effectiveness is a condition in which the injected substance does not have the desired effect due to an excess of its concentration, but it does not cause a toxic effect. Microchips were used to solve this problem. Experiments confirming the effectiveness of microchips have been carried out recently.

These microchips consist of a large number of reservoirs that are filled with the necessary substances and medicines. The tanks are covered externally with an anode membrane, and cathodes are located next to them. They can be released when exposed to electrothermal factors.

The use of microchips in the treatment of diseases such as, for example, brain cancer or osteoporosis, where the necessary dosage of drugs is required at a certain time interval opens up new ways for the development of modern medicine.

In addition, microchips have also found their way into the field of molecular biology. They make it possible to analyze DNA or RNA, determining gene expression and other molecular characteristics. DNA microarrays contain many small, single-stranded molecules called DNA probes. Each probe has a strictly defined sequence of nucleotides and a place on the microchip. There are three basic types of microarrays: for gene expression analysis (GEM-microarray), for comparative genomic hybridization (MCGH), and for single nucleotide polymorphism detection (SNPM). Experiments are carried out in several stages: DNA/RNA isolation, DNA and RNA labeling, hybridization, washing, scanning and data analysis.

Thanks to the rapid development of technology in neurosurgery, subcortically implanted microchips have been created to provide novel, non-pharmacological approaches for managing nervous system disorders. Accessing subcortical regions without disrupting surrounding tissues remains a significant challenge, but observational, experimentally confirmed studies to evaluate their use have been carried out.

Microchips will allow humanity to significantly reduce the cost of treating all diseases, improve the quality of care for the population, and make it possible to treat several diseases at once. If this field of science is further developed, new and more effective approaches can be applied to treat brain diseases, tumors, mental disorders, such as depression and Alzheimer's or Parkinson's disease. Also, microchips will be able to eliminate chronic pain, help the paralyzed to move again and use their limbs, and the blind to see.