

BIOCHIPS

Biochips is a revolutionary achievement in biotechnology in recent years. An unusual device allows for a short time to identify several thousand allergens, oncogenes, and even genetic defects.

The biochip is a matrix – a tiny plate with a side of 5-10 millimeters, on which you can apply up to several thousand different microtests. Professionals call this media "platform." Most commonly, used glass or plastic platforms on which biological macromolecules (DNA, proteins, enzymes) are applied. Depending on which macromolecules are used, they distinguish different types of biochips: DNA chips (94 percent) and protein chips(6 percent).

How does a biochip work? A person's genetic code is stored in the form of a double helix of DNA formed by two polymer chains. Each of these chains is a long sequence formed of four nucleotides: adenine, guanine, thymine and cytosine. In this case, the sequence of one chain uniquely determines the sequence of another, since nucleic acids located at the same positions in different chains are complementary. When the two chains combine into a spiral, hydrogen bonds form between the complementary nucleic bases, which hold the chains together. During the reaction, complementary DNA chains interact: one of them (DNA probe) with a known nucleotide sequence is fixed on a substrate (plate), and the other single-stranded target DNA (probe) labeled with a fluorescent label is introduced into the DNA chip. When a biochip interacts with a test sample pretreated with a luminous (fluorescent) dye, a chemical reaction occurs in the corresponding cells, and then these cells begin to glow – the stronger, the more intense the process.

In fact, it is precisely in identifying and comparing the most brightly glowing cells that the operation of the biochip analyzer instrument is. Thus, various characteristics of the sample are determined - for example, the presence in the body of certain pathogens of infections or the presence of any altered genes in the genome.