GENETIC ENGINEERING AND ITS APPLICATION

Sabirova Gulnaz

Annotation

Modern genetic engineering allows you to "turn on" and "turn off" individual genes, programming a new genotype, including the human one. This causes a lot of concern, although many discoveries have already benefited mankind. The following article is devoted to the study of genetic engineering and its application.

Key words: genetic engineering, biology, organism, hereditary property, RNA, DNA, molecule.

Genetic engineering is a modern area of biotechnology that combines knowledge, techniques and techniques from a whole block of related sciences - genetics, biology, chemistry, virology, and so on - to obtain new hereditary properties of organisms. Genotypes are rearranged by making changes to DNA (a macromolecule that provides storage, transmission from generation to generation and implementation of the genetic program for the development and functioning of living organisms) and RNA (one of the three main macromolecules contained in the cells of all living organisms).

If you introduce new genes into a plant, microorganism, animal or even human organism, you can endow it with a new desirable characteristic that it has never possessed before. To this end, today genetic engineering is used in many areas. For example, on its basis, a separate branch of the pharmaceutical industry was formed, which is one of the modern branches of biotechnology.

The history of development, origins

The foundations of classical genetics were laid in the middle of the 19th century thanks to the experiments of the Czech-Austrian biologist Gregor Mendel. The principles of transmission of hereditary traits from parent organisms to their descendants, discovered by him on the example of plants in 1865, unfortunately, did not receive due attention from contemporaries, and only in 1900 Hugo de Vries and other European scientists independently “rediscovered” the laws of heredity .

In parallel with this, the process of forming knowledge about DNA was going on. So, in 1869, the Swiss biologist Friedrich Miescher discovered the existence of a macromolecule, and in 1910, the American biologist Thomas Hunt Morgan discovered, based on the nature of the inheritance of mutations in Drosophila, that genes are located linearly on chromosomes and form linkage groups. In 1953, the most important discovery was made - the American John Watson and the British Francis Crick established the molecular structure of DNA.Where and how is genetic engineering applied?

The medicine

Already, human insulin (humulin), obtained by means of recombinant DNA, is actively used. Cloned genes for human insulin were introduced into a bacterial cell, where the synthesis of a hormone that natural microbial strains had never synthesized began. Since 1982, companies in the US, Japan, Great Britain and other countries have been producing genetically engineered insulin.

In addition, several hundred new diagnostic drugs have already been introduced into medical practice. Among the drugs under clinical study are drugs that potentially treat arthrosis, cardiovascular disease, oncology and AIDS. Among several hundred genetic engineering companies, 60% are engaged in the development and production of medicines and diagnostics.Agriculture

In agriculture, one of the most important tasks of genetic engineering is to obtain plants and animals that are resistant to viruses. Currently, there are already species that can withstand the effects of more than a dozen different viral infections.

Another task is related to the protection of plants from insect pests. By genetic modification of plants, it is possible to reduce the intensity of pesticide treatment of fields. For example, transgenic potato and tomato plants have become resistant to the Colorado potato beetle, cotton plants have become resistant to various insects, including the cotton bollworm. The use of genetic engineering has reduced the use of insecticides (drugs to kill insects) by 40–60%.

Thanks to genetic engineering, crops have become more resistant to climatic conditions, in addition, it has become possible to increase the amount of vitamins and nutrients in the product. For example, you can enrich rice with vitamin A and grow it in regions where people have a massive shortage of this element.

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With the help of genetic engineering, they are also trying to solve environmental problems. So, special varieties of plants with the function of cleaning the soil have already been created. They absorb zinc, nickel, cobalt and other hazardous substances from soils polluted by industrial waste.

Gene therapy

Gene therapy is the introduction, removal, or modification of genetic material, such as DNA or RNA, into a patient's cell to treat a specific disease.

There are three main strategies for using gene therapy:

- Replacing a mutated gene that causes a disease with a healthy copy.
- Inactivation or "knocking out" mutated genes that are not functioning properly.

The introduction of a new gene into the body that helps fight the disease.

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