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GENETIC ENGINEERING
ГЕННАЯ ИНЖЕНЕРИЯ

АННОТАЦИЯ. В то время как биотехнология растений была использована на протяжении веков для улучшения растений, микроорганизмов и животных в пищу, только в последнее время она позволила себе передачу генов от одного организма к другому. Тем не менее, в настоящее время широко распространены споры по поводу вредных и полезных веществ генной инженерии.

ABSTRACT. While plant biotechnology has been used for centuries to enhance plants, microorganisms and animals for food, only recently it has allowed to transfer genes from one organism to another. Yet there is now a widespread controversy over the harmful and beneficial effects of genetic engineering to which, at this time, there seems to be no concrete solution. The aim of this work is to reveal some facts concerning genetic engineering, its weak and strong points (if any).

КЛЮЧЕВЫЕ СЛОВА: биотехнология, гены, генная инженерия, растение.

KEY WORDS: biotechnology, genes, genetic engineering, plant.

What is genetic engineering?

Genetic engineering is a laboratory technique used by scientists to change the DNA of living organisms.

DNA is a blueprint for the individuality of an organism. The organism relies upon the information stored in its DNA for the management of every biochemical process. The life, growth and unique features of the organism depend on its DNA. The segments of DNA which have been associated with specific features or functions of an organism are called genes.

Molecular biologists have discovered many enzymes which change the structure of DNA in living organisms. Some of these enzymes can cut and join strands of DNA. Using such enzymes, scientists learned to cut specific genes from DNA and to build customized DNA using these genes. They also learned about vectors, strands of DNA such as viruses, which can infect a cell and insert themselves into its DNA.

With this knowledge, scientists started to build vectors which incorporated genes of their choosing and used the new vectors to insert these genes into the DNA of living organisms. Genetic engineers believe they can improve the foods we eat by doing this. For example, tomatoes are sensitive to frost. This shortens their growing season. Fish, on the other hand, survive in very cold water. Scientists identified a particular gene which enables a flounder to resist cold and used the technology of genetic engineering to insert this 'anti-freeze' gene into a tomato. This makes it possible to extend the growing season of the tomato. At first glance, this might look exciting to some people. Deeper consideration reveals serious dangers.

Techniques

There are 4 types of genetic engineering which consist of recombinant engineering, microinjection, electro and chemical poration, and also biolistics.

r-DNA technology

The first of the 4, recombinant engineering, is also known as r-DNA technology. This technology relies on biological vectors such as plasmids and viruses to carry foreign genes into cells. The plasmids are small circular pieces of genetic material found in bacteria that can cross species boundaries. These circular pieces can be broken, which results with an addition of a new genetic material to the broken plasmids. The plasmids, now joined with the new genetic material, can move across microbial cell boundaries and place the new genetic material next to the bacterium's own genes. After this takes place, the bacteria will then take up the gene and will begin to produce the protein for which the gene codes. In this technique, the viruses also act as vectors. They are infectious particles that contain genetic material to which a new gene can be added. Viruses carry the new gene into a recipient cell driving the process of infection that cell. However, the viruses can be disabled so that when it carries a new gene into a cell, it cannot make the cell reproduce or make copies of the virus.

Microinjection

The next type of genetic engineering is referred to as microinjection. This technique does not rely on biological vectors, as does r-DNA. It is somewhat of a simple process. It is the injecting of genetic material containing the new gene into the recipient cell. Where the cell is large enough, injection can be done with a fine-tipped glass needle. The injected genes find the host cell genes and incorporate themselves among them.

Bio ballistics

This last technique is a projectile method using metal slivers to deliver the genetic material to the interior of the cell. These small slivers, which must be smaller than the diameter of the target cell, are coated with genetic material. The coated slivers are propelled into the cells using a shotgun. After this has been done, a perforated metal plate stops the shell cartridge but still allows the slivers to pass through and into living cells on the other side. Once inside, the genetic material is transported to the nucleus where it is incorporated among host cells.

Genetic engineering in medicine

The pros of genetic engineering:

Among the many achievements of genetic engineering, which found application in medicine, the most significant W the availability of human insulin on an industrial scale.

All well and notorious for such disease as diabetes, when the human body loses the ability to produce the physiologically important hormone W insulin. As a result builds up in the blood sugar and the patient may die. Insulin has long been obtained from animal organs and used in medical practice. However, long-term use of animal insulin leads to irreversible damage of many organs of the patient due to immunological reactions caused by the injection of alien to the human body of animal insulin. But even needs in the animal insulin not until recently met only 60 to 70%. So, in 1979, 6 million patients worldwide, only 4 million were receiving insulin. Without insulin treatment the patients died. And when you consider that among patients with diabetes many children, it becomes clear that for many countries this disease is becoming a national tragedy.

Genetic engineers as a first practical problem, it was decided to clone the insulin gene. Cloned genes for human insulin were introduced with the plasmid into a bacterial cell where the synthesis of the hormone, which natural microbial strains never synthesized. Since 1982 firms in the United States, Japan, Britain and other countries are producing genetically engineered insulin. The problem is solved. From 1000 liters of bacterial culture will receive approximately 200 g of insulin that is equal to the number obtained from 1600 kg of animal pancreas. In parallel solved the problem of immunological destruction of organisms of diabetic animals with insulin.

Manufacture and sale of insulin for the first time the us firm Eli Lilly. The global insulin market is currently more than 400 million, the annual consumption of about 2500 kg.

More than twenty companies in Japan and several American firms have developed another very important medical drug W the interferon, which are effective

in various viral diseases and malignant tumors. The first of these compounds the market received alphainterferon, then beta-interferon.

Another effective anti-cancer drug interleukin W W is made in Japan and the USA. It is interesting to note that today the American market of medical preparations, obtained by genetic engineering, can be compared with other bulk drugs like antibiotics. By 2000, the value of products produced in the United States on the basis of genetic engineering will reach 50 billion dollars a year.

About 200 new diagnostic products already introduced into medical practice, and more than 100 genetically engineered drugs are under clinical study. Among them are medicines, cures arthritis, cardiovascular diseases, certain neoplastic processes, and perhaps even AIDS. Among several hundred genetic engineering firms 60% working on the production of medicinal and diagnostic products.

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