

Biotechnology as an Advanced Science

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ABSTRACT

Using of biotechnology has increased in recent times, in turn, the excessive use of molecular biology, biochemistry, cell biology, embryology, genetics, and microbiology to carry out this technique has also increased, as the sciences on which biotechnology is based. There is no doubt that the application of these sciences must leave fears or negative effects on living organisms and the environment. It should be noted that when the use of modern technologies increased, the emergence of incurable diseases such as cancer and congenital malformations has increased, which calls for caution in using this technology and not using it except in cases of extreme necessity.

Keywords: Biotechnology, Gene therapy, Genetically modified food, Medicine

INTRODUCTION

Biotechnology has been defined by many researchers, from these definitions are; biotechnology is refer to using living organisms to produce useful material from raw substances ⁽¹⁾, or biotechnology is the genetic improvement of living organisms, through the employment of industry in the exploitation of living organisms and bio systems for the benefit of humans ⁽²⁾, also, biotechnology is the improvement or development of living organisms for specific uses by using other organisms or even by using parts of these organisms ⁽³⁾.

It should be mentioned that molecular biology, biochemistry, cell biology, embryology, genetics, and microbiology are the basic science that are adopted by biotechnology

The science of biotechnology has gone through stages of development, where it began with agriculture by improving plant yield, and caring of animals, and using of yeast to ferment fruits that was appeared about 2500 BC in Egypt and other regions of the world. However, biological project started with cultivation of plants.

Traditional medicine to treat diseases, such as the use of honey to treat infection was established by the ancient Egyptians ⁽⁴⁾.

In 1928, penicillin was discovered in mold by Alexander Fleming, and in 1940, the treatment become available with using penicillin to treat infections of bacteria in humans ⁽⁵⁾, but chemotherapy with synthetic antibiotic was started in Germany by Paul Ehrlich in 1880s.

It was discovered that genes consist of DNA after 90 years of research to give birth to the era of modern biotechnology. In 1972, Herbert W. Boyer and Stanley N. Cohen succeeded in transferring genetic material to bacteria (The recombinant DNA technology).

The successive discoveries had a major role in providing different therapeutic materials for most diseases and cleaning the environment from most pollutants as a result of the emergence of genetic engineering, cloning, polymerase chain reaction and DNA fingerprinting ⁽⁴⁾.

Biotechnology involves positive and negative results, thus the use of this technology depends on the possibility of society to accept its positive and negative effects alike ⁽⁶⁾.

Applications of biotechnology: The biotechnology has been applied in several fields as:

A- Medicine: The most important applications of biotechnology is that related to treating human diseases, such as treating diabetes by manufacturing of insulin and subjecting of *Escherichia coli* to this purpose ⁽⁷⁾. It is also used in the diagnosis of genetic diseases and in determining paternity

It is worth noting that the most controversial area of genetic engineering is gene therapy, which is based on replacing the abnormal gene with the good gene ⁽⁸⁾ figure (1).

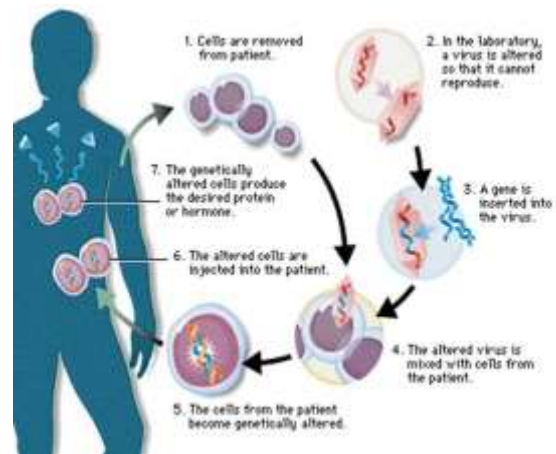


Figure 1: Phases of gene therapy ⁽⁹⁾

Biotechnology remains controversial in this field because it may conflict with ethical and moral foundations ⁽¹⁰⁾, Consequently, it is necessary not to use the biotechnology randomly without taking into account the specific and correct foundations of this science ⁽⁶⁾.

B Agriculture: Biotechnology was used to introduce a new fruits feature to cause so - called genetically modified crops ⁽¹¹⁾. Where plants can resist pests, diseases, insecticides, and harsh conditions due to the application of biotechnology ⁽¹⁰⁾.

However, there are many caveats about eating genetically modified crops, some believe that they are not as natural food, so they have restricted these modified crops ⁽¹²⁾, while other countries consider them as natural food, in other words they are not very different from the ordinary food ⁽¹³⁾ and allow them to eat, but every food must be examined ⁽¹⁴⁾, which means that their diffusion varies according to the laws of each country.

The use of this technology in the agricultural field leads to an increase in production, which requires providing good agricultural lands, which may require the seizure on private lands of other living organisms (decrease in other organisms), and providing money for the purpose of investment thus occurrence of defects in the economy by increasing the prices of foodstuffs ⁽¹⁵⁾

C Industrial: Useful industrial products such as paper, textiles, food, feed, biofuels and others are generated using microorganisms or parts of them ⁽³⁾. As industrial biotechnology is keen to move away from the petrochemical-based economy. The technique is used in this field is also called white biotechnology.

The products of this technology are inexpensive and close to what is natural ⁽¹⁶⁾. The industrial microbes that can be used in this field are *E. coli* and *Saccharomyces cerevisiae* ⁽¹⁷⁾.

D Environmental: As it is mentioned earlier, conducting of applications leaves negative effects on the environment and the

organisms that live in it, therefore, it is necessary to use environmental biotechnology, in order to reduce these negatives,.

Environmental biotechnology can be used to clean the environment by using microorganisms that have the ability to decompose wastes or dispose of these wastes using filtration ⁽¹⁸⁾.

CONCLUSION

The science of biotechnology is an advanced and widespread science with many benefits and it has ability to treat many diseases and improve many foods. However, its excessive application negatively affects the environment and the organisms that live in it, and may cause risks to organisms that eat or use modified or improved products, so it must be used in cases of extreme necessity.

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