Commentary

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Drivers of Antibiotic Resistance Genes in Biotechnology

Jayanthi Muralidhar*

ICAR-Central Institute of Brackishwater Aquaculture, Chennai, India

***Corresponding author:** Jayanthi Muralidhar, ICAR-Central Institute of Brackishwater Aquaculture, Chennai, India, Email: muralidhar_j@gmail.com

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Description

Today, medical science uses biotechnology to determine the most radical manifestations of the disease. With the discovery of the complete sequence of the human genome in 2001, biotechnologists are going to find genes in different traits and defects. Many genes that cause the development of diseases have been identified so far including Cancer, cardiovascular, respiratory, mental disease. Highly selective and effective medications (tailormade) to cope with disease are provided by detection of individual genes and their derived proteins. However future of the biotechnology is clear and it will surely see important strides that will be used for study and product development.

Medical biotechnology are mainly as follows each of which requires a complete description: Gene therapy, recombinant vaccines, DNA vaccines, bioinformatics, genomics, proteomics, Biopharmaceuticals and Biomedicines. Today, advances in medicine are rapidly growing by the help of biotechnology. Traditional medicine will be gradually replaced by molecular medicine. No disease will remain unknown and no disease mechanism will be uncontrollable in near future. Traditional medicine was mainly looking for signs and symptoms of disease to prove a disease and pathogen.

Traditional Medicine

In some cases, traditional medicine fight against signs and symptoms of diseases because of the unknown factors of diseases, mechanisms and their control systems. Today, medical science uses biotechnology to determine the most radical manifestations of the disease. With the discovery of the complete sequence of the human genome in 2001, biotechnologists are going to find genes in different traits and defects. Many genes that cause the development of diseases have been identified so far including Cancer, cardiovascular, respiratory, mental disease. Highly selective and effective medications (tailormade) to cope with disease are provided by detection of individual genes and their derived proteins. These medications involve protein levels and phenotypes. Another method is to use gene therapy and Antisense. Many genetic diseases are currently considered as candidates for gene therapy. Nearly each of us has a number of incomplete genes in our bodies some of which have not revealed their properties on our phenotype while other genes have revealed more or less their characteristics in our phenotypes. Approximately one out of every 10 people has a manifestation genetic disorder. Disease including cystic fibrosis, Duchenne muscular dystrophy, Huntington's disease of nervous system, thalassemia, hemophilia, sickle cell anemia, Lesh Nayhan syndrome, phenylketonuria, etc. is among candidates for gene therapy. In gene therapy, more attention is paid to genetic - metabolic diseases in which incomplete gene causes lack of synthesis ,incomplete synthesis of one protein or lack of a chemical process. The process of gene therapy may be conducted on somatic cells and germ cells. In this case, corrected trait is transmitted to the next generation.

Synthetic Gene Fragments

Usually the normal synthetic gene fragments are used in gene therapy process. Another applicable technology is antisense in which nucleic acids fragments of DNA and RNA are used. Therefore, the probable connection of these fragments to the desired location inhibits incomplete gene expression or harmful protein production. Vaccines are part of a pathogen that can be used in attenuated or killed forms. Vaccine disturbs Humeral and cellular immune system that causes resistance to the pathogen. Many diseases that cause mortality in human societies were controlled or eradicated including smallpox, polio, measles and tetanus. Vaccine technology has long been used. Ancient Chinese used layers of patient's smallpox ulcer for immunization of healthy individuals. But the modern vaccination was begun in 1798 by Edward Jener using cowpox virus to immunize humans.

Biopharmaceuticals are proteins nucleic acids used for treatment or diagnostic purposes with a biological source. Human recombinant insulin was the first approved treatment. The greatest biotechnology legacy of the twentieth century was Alexander Fleming's discovery of penicillin from the mold penicillin. However, biosynthetic insulin was the first biopharmaceutical material made by recombinant DNA technology in 1982 that entered the market. In the late 1990s, many developments in the field of production and biopharmaceutical process occurred including recombinant DNA and hybridisms technologies.

It can be said that biotechnology techniques are used and will be used in the production of all types of vaccines. However, the pinnacle of potentials of modern biotechnology can be observed in the fourth generation of recombinant vaccines (and also DNA

vaccines). So far, the vaccine of attenuated or killed microorganisms or their components has been used. This caused significant side effects in patients. But with the development of recombinant DNA techniques, a fourth-generation vaccine produced in which the effective ingredient in inducing immunity (immunogenic) of microorganisms is used such as Hepatitis B vaccine. A recombinant vaccine production process is very long and complex. First, biotechnologists should detect the most immunogenic component of the microorganisms according to long and complex processes. Second, after identification the location and sequence of the gene in the genome of the microorganism, they attempt to replicate the gene and put amplified fragments into special cloned plasmids. Next, transfer of recombinant plasmid into the host cell for the production of protein will be performed. A cell bank, a bank of cells with the recombinant plasmid and the plasmid constructs are prepared if there is a economic success in the production of a protein candidates for vaccine. They will be used for next steps. Many process must be followed (may be for several years) to approve this vaccine effectiveness, efficiency and harmlessness to humans. A large investment is required for industrial and commercial production of vaccines. Some part of this investment should be allocated to create a standard environment in accordance with the GMP (Good Manufacturing Practice), facilities and installations in accordance with GMP standards, professional trained staff and create a system to maintain stable quality. The first recombinant vaccine licensed to be used for humans was hepatitis B vaccine. This vaccine was obtained with colonization of hepatitis virus B surface antigen gene and its expression in yeast cells. It is indicted that recombinant hepatitis B vaccines produce protective antibodies. This covers 250 million carriers of hepatitis B worldwide.