International Research Journal of Biotechnology
Vol.11 (5) pp. 1-2, Dec, 2021
Available online @http://www.interesjournals.org/IRJOB

Applications of Biotechnology in Medicine

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PERSPECTIVE

Biotechnology devices and procedures provide up new avenues for research into how solid bodies behave and what goes wrong when problems arise. Knowing the atomic basis of health and disease leads to more developed techniques for treating and preventing infections. Biotechnology goods in human medical services include faster and more exact analytic testing, therapies with fewer side effects, and new and more secure vaccines. Biotech diagnostic tools employ genetic information to assist clinicians in detecting and diagnosing illnesses more quickly and accurately. Doctors may now use genetic information to adapt illness prevention and therapy to specific patients.

As the world's population continues to grow, modern agriculture's main goal is to maintain a steady growth in output that keeps up with the growing number of mouths to feed. This may be accomplished in a number of ways, the most important of which is a large reduction in disease-related pre- and post-harvest losses. Different technological approaches, such as proteomics, transcriptomics, and metabolic analysis, have now been proven to be beneficial in illness diagnosis. The kind and causes of host resistance can also be determined via biotechnological approaches. In biotechnology, new techniques such as genetic engineering are used to multiply and manipulate genes in live creatures in order to create new species or products that may be utilised in a number of ways. Traditional plant breeding methods were employed to generate disease-resistant cultivars, but it was a time-consuming procedure. Marker aided breeding, on the other hand, has the potential to dramatically enhance the efficiency and efficacy of plant breeding when compared to traditional breeding. It is necessary to identify plant diseases in order to develop efficient management measures. Biotechnology has offered radical solutions to identify and quantify several illnesses in recent years.

Applications

Biotechnology has a variety of applications in the field of medicine. Some of the biotechnology applications in medicine include the following:

Recombinant insulin

Insulin is required by diabetic patients to remove excess sugar from the blood. Diabetic patients have a very low level of insulin or no insulin produced by the body. Therefore, they need external insulin to control blood glucose levels.

Later it was discovered that the insulin produced by the pancreas of the pigs can be used by humans. But there were not enough pigs to provide the quantities of insulin required. This led to the cloning of the human insulin gene.

The specific gene sequence that codes for human insulin were introduced in *E.coli* bacteria. The gene sequence altered the genetic composition of the *E.coli* cells. Within 24 hours several *E.coli* bacteria containing the recombinant human insulin gene were produced. The recombinant human insulin was isolated from *E.coli* cells.

Gene therapy

Gene Therapy holds the most promising answer to the problem of genetic diseases. Gene therapy is used to treat genetic disorders usually by the insertion of a normal gene or correct gene for the defective or inactive gene into an individual with the help of vectors such as retrovirus, adenovirus, and herpes simplex virus.

The normal gene replaces the defective or inactive gene and carries out its functions. The therapy has the highest chances of developing a permanent cure if introduced in the earliest stages of life.

Molecular diagnosis

Medical diagnosis is another application of biotechnology in the health sector. Many times the pathogen concentration increases by the time the disease is diagnosed. Hence, early diagnosis and knowledge of pathophysiology are essential for an effective cure. This can be achieved with the help of techniques such as Recombinant DNA Technology, Polymerase Chain Reaction (PCR) and Enzyme-Linked Immunosorbent Assay (ELISA), etc.

Pharmacogenomics

Pharmacogenomics has led to the production of drugs that

are best suited to an individual's genetic makeup. It can be applied in diseases such as cancer, depression, HIV, asthma, etc.

Edible vaccines

Vaccines are obtained by animals and cell cultures. These vaccines contain inactivated pathogens. The transgenic plants can produce antigens that can be used as edible vaccines. Antigenic proteins from several pathogens can be expressed in plants such as tomato and banana. Transgenic sugarbeet can treat foot and mouth disease of animals, transgenic banana and tomato can cure diseases such as cholera and hepatitis B.