*PHA210*

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*18/MHS07/040*

*Pharmacology*

*Medical biotechnology is the use of living cells and cell materials to research and produce pharmaceutical and diagnostic products that help treat and prevent human diseases. Most medical biotechnologists work in academic or industrial settings. Most medical biotechnologists work in academic or industrial settings. In academic laboratories, these professionals conduct experiments as part of medical research studies; industrial biotechnologists work toward developing drugs or vaccines. The medical biotechnology field has helped bring to market microbial pesticides, insect-resistant crops, and environmental clean-up techniques.*

*Biotechnology is commonly used to improve medicines due to the advantages and pieces of knowledge it provides such as understanding the genetic composition of the human species, foundational structure of hereditary diseases manipulation and repairing of damaged genes to cure diseases. In medical biotechnology, one learns how diseases affect the human body at the cellular level. Its aim is prevention and treatment of the disorders, thereby increasing the lifespan of an individual; for example- improving the accessibility for people with disabilities. They use living cells as well as cell materials in their research and develop pharmaceutical and diagnostic products, which will be useful for the treatment and prevention of diseases – thus offering a lot of scope for a Career in Medical Biotechnology.*

*Medical biotechnology is also called Red biotechnology because of its application in the manufacturing of pharmaceuticals like vaccines, enzymes, antibiotics, etc.; as well as for molecular diagnostic purposes. These applications offer a lot of careers in Medical Biotechnology. Medical biotechnology is a combination of different science-oriented subjects, namely Cell Biology, Genetics, Nanotechnology, Bioinformatics, etc., to carry out advancements in the field of medicine. It makes use of recombinant DNA technology in different therapeutic forms. In medical biotechnology, one learns how diseases affect the human body at the cellular level. Its aim is prevention and treatment of the disorders, thereby increasing the lifespan of an individual; for example- improving the accessibility for people with disabilities. They use living cells as well as cell materials in their research and develop pharmaceutical and diagnostic products, which will be useful for the treatment and prevention of diseases – thus offering a lot of scope for a Career in Medical Biotechnology. The most significant advantage of using this technique is that it can overcome the problems of graft rejection. One of the typical examples is the production of insulin. During the initial days, insulin was made from the pancreas of pigs and cattle, which lead to immunological reactions. Still, Medical Biotechnology solved this problem by producing insulin from E. coli by genetic engineering.*

*There are Various applications of medical biotechnology which include;*

*Pharmacology: One of the new and growing fields is pharmacology in combination with biotechnology. It includes the principles of biotechnology for the development of drugs. A vast number of therapeutic drugs that come in the market are bio formulations like nucleic acid products, antibodies, and vaccines. These bio formulations are developed in multiple steps i.e. it includes considering the principles related to health and disease, the molecular mechanism conducted in relation to function of biomolecules, their synthesis, and purification, determining the shelf life of the product, their stability, immunogenicity and toxicity, drug delivery systems, clinical trials as well as patenting.*

*Gene therapy: It involves the use of DNA as a pharmaceutical agent to treat a particular disease. Mainly it involves replacing a mutated gene with a therapeutic gene. Gene therapy has made significant advances over the past two decades. Within a short duration, it has transformed from a theoretical stage to a technological phase as well as clinical trials against a variety of deadly diseases. The most notable advancement included gene therapy for many genetic disorders like Severe combined Immunodeficiency, Chronic granulomatous disorder, Hemophilia, Cancer, Parkinson’s disease, Influenza, HIV, and many more acquired diseases. For a Career in Medical Biotechnology – thorough knowledge of this filed is a must.*

*Agriculture: applications of biotechnology have proved the most controversial. Some activists and consumer groups have called for bans on genetically modified organisms (GMOs) or for labeling laws to inform consumers of the growing presence of GMOs in the food supply. In the United States, the introduction of GMOs into agriculture began in 1993, when the FDA approved bovine somatotropin (BST), a growth hormone that boosts milk production in dairy cows. The next year, the FDA approved the first genetically modified whole food, a tomato engineered for a longer shelf life. Since then, regulatory approval in the United States, Europe, and elsewhere has been won by dozens of agricultural GMOs, including crops that produce their own pesticides and crops that survive the application of specific herbicides used to kill weeds. Studies by the United Nations, the U.S. National Academy of Sciences, the European Union, the American Medical Association, U.S. regulatory agencies, and other organizations have found GMO foods to be safe, but skeptics contend that it is still too early to judge the long-term health and ecological effects of such crops. In the late 20th and early 21st centuries, the land area planted in genetically modified crops increased dramatically, from 1.7 million hectares (4.2 million acres) in 1996 to 160 million hectares (395 million acres) by 2011.*