Introduction

We are living in an era of transformation and miracles happen each day. Biotechnology is the combination of two words “technology and biology”. The domain of Biotechnology is very wide in which cells or cellular parts, biological pathways and organisms are used to develop new innovative technologies. Novel procedures, tools and products are developing day by day, which are used in research, agriculture, industry and the health care system.

Pharmaceutical Biotechnology is the application of biotechnology principles and procedures in the development of drugs. Pharmaceutical biotechnology is the quite innovative, dynamic and rapidly emerging field and driving a global alteration from illness to wellness. Since last few years, pharmaceutical biotechnology has played a key role in drug research and development, and innovatory changes have been happening in health care setups, especially in field of oncology, infectious diseases and metabolic disorders.

Due to the Pharmaceutical Biotechnology, a groundbreaking transformation is occurred in the field of drug discovery. Various biotechnology techniques (i.e. cell culture, genetic modeling and immunochemistry) use in drug discovery and have also paved the way to explore new avenues of drug discovery that are beneficial to the mankind.

The aim of using these techniques is to search for the potential chemical candidates (i.e. proteins, peptides, genes) which have therapeutic activity. In current market majority of therapeutic drugs
are bioformulations (i.e. proteins, nucleic acids, vaccines, antibodies etc.). By the help of Pharmaceutical Biotechnology various therapeutic products (Biotech Drugs) are produce, for example:

**Insulin**

Insulin is used for the management of diabetes. Previously, insulin was obtained from procaine and bovine sources and causes immunological reactions due to change in number and sequence of amino acids.

Now insulin is produced by the help of “Recombinant Biotechnology Technique”, in large quantities and causes no immunological reactions (as the number and sequence of amino acids remain same).

Example(s) i.e. Humulin and Novolin (1).

**Glucagon**

Glucagon is used for the management of hypoglycemia. By the help of biotechnology, glucagon is also produced and benefit of using this that there is no chance of spongiform encephalopathy as compared to the glucagon obtained from the bovine and procaine sources.

Example(s) i.e. GlucaGen (2).

**Human Growth Hormone**

This hormone is produced by the anterior pituitary gland and responsible for controlling human metabolism and development. The lack of growth hormone may results into the growth retardation. Now Human Growth Hormone successfully produced with the help of biotechnology.

Example(s) i.e. Somatrem (3).

**Follicle Stimulating Hormone**

Follicle stimulating hormone also produced by the help of biotechnology and its effects include increases the ovarian follicular growth and spermatogenesis.

Example(s) i.e. follitropin alpha (Gonal-F), Follitropin beta (Follistim) (4).

**Cytokines**

Cytokines i.e. hematopoietic growth factors (various interleukins) are being manufactured by the biotechnology techniques and clinically use in the treatment of various diseases, for example erythropoietin is used for the treatment of anemia.

Example(s) i.e. Epoetin alfa Epogen (5).
Interferons
Interferons are used for the treatment of cancers and viral infections. The alpha, beta and gamma interferons are successfully synthesized with the help of biotechnology.

Example(s) i.e. Roferon A used in treatment of leukemia and Interferon Alfa-n1 used for the Hepatitis C treatment (1, 6).

Vaccines
Biotechnological techniques are also used for production of different vaccines. Example(s) i.e. Recombivax and Energix B used in treatment of Hepatitis B (HBV), LYMErix and COMVAX used against the lyme disease and H.inflauanzae respectively (6).

Monoclonal Antibodies
Monoclonal antibodies are used in the treatment of various cancers and can be synthesized with the help of biotechnology. Example(s) i.e. Rituximab used for treatment of non Hodgkins lymphoma, Gemtuzuma used for myeloid leukemia treatment, Alemtuzumab use for chronic lymphocytic leukaemia and Infliximab used for Crohn’s disease treatment(7).

Blood Clotting Factors & Anti-Coagulants
A variety of blood clotting factors and anticoagulants are manufactured by the aid of biotechnological procedures. Example(s) i.e. Lepirudin used as anti-coagulant. Tissue plasminogen activator, Clotting factor IX and factor VIII used for the treatment of blood clotting disorders.

Gene therapy, tissue engineering and personalized drug therapy have opened the new horizons in medical field.

Investments in sustainable high technology such as biotechnology are of vital importance. Globally, the pharmaceutical companies have given the keen interest to expand the utilization of biotechnology. Today, biotechnologies are influencing pharmaceutical growth, as most major pharmaceutical companies look towards the biotechnology for their future financial progress. This financial success has also created the multifarious issues related to cost of biopharmaceutical and patient access. The current challenges that biotech’s face include considerably increasing drug development costs and controversial regulatory issues worldwide.
In parallel to this, drug discovery and research will continue to evolve throughout the next decade to better meet the needs of patients and clinicians for such drugs (8).

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**REFERENCES**


