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# TNPSC GROUP II / IIA MAINS SCERT - SCIENCE & TECHNOLOGY QUESTION WITH ANSWER

## 1. Application of Biotechnology in Medicine

- Applications of scientific & Engineering principle to the processing of material by biological agents to provide goods & Services.

### 1. Recombinant Human Insulin (RHI) :

1. Used in the treatment of 'Diabetes Mellitus' - decreased insulin secretion leading to high glucose level.
2. Earlier treatment :
  1. Insulin isolated from pigs & cows were used
  2. But it lead to allergic reaction in some patients.
3. 1970's - Production of insulin by Recombinant DNA Technology.
  - Recombinant DNA Technology - Extracting a gene from one organism and transferring it to the DNA of another organism - same / different species.
4. Production - Insertion of human insulin gene on plasmids of E coli Bacteria.
5. Insulin - 1st Pharma product of rDNA technology administered to humans.
6. Approval - 1982  
Marketed Name 'Humulin' - 1986

### 2. Interferons

1. Antiviral Substance produced by mammalian cells when infected with virus.
2. 1957 - 1st discovered by Alick Issacs & Jean Lindemann.
3. types -  $\alpha$ ,  $\beta$ ,  $\gamma$  Interferons - Based on structure.
4. Functions :
  - a) Stimulate Cellular DNA to produce antiviral enzymes.
  - b) Enzyme inhibit viral replication & Protects the cells.
5. Drawback - Enormous blood required to isolate Interferons.

6. 'Sanceharomyces Cerevisae' yeast is used to produce recombinant Interferons.
7. Treatment :
  - Cancer
  - AIDS
  - Multiple Sclerosis
  - Hepatitis C
  - Herpes Zoster
8. Out of reach for common Manclue to High cost of Production.

### 3. Recombinant Vaccines :

1. Uniform Quality & Less side effects than traditional vaccines.

2. Types :

- Subunit
- Attenuated
- DNA Vaccine

a) Subunit Recombinant Vaccine :

1. Components of pathogens used rather than whole
2. Proteins, Peptides & DNA - Components used
3. Advantage - Purity, Stability & Safe use.

Eg : Novavac - for COVID - 19 - Protein subunit vaccine

b) Attenuated recombinant Vaccine :

- Modified Pathogen (Bacteria / virus) to make them non pathogenic.

Eg : MMR Vaccine, Chicken Pox, Inhanasal - COVID 19

c) DNA Vaccine :

1. 1990 - Came into being
2. Immune response stimulated by DNA module
3. Easy & Inexpensive to design & produce

3. Advantages :

1. Long lasting Immunity
2. Trigger Immune response only against specific pathogens.