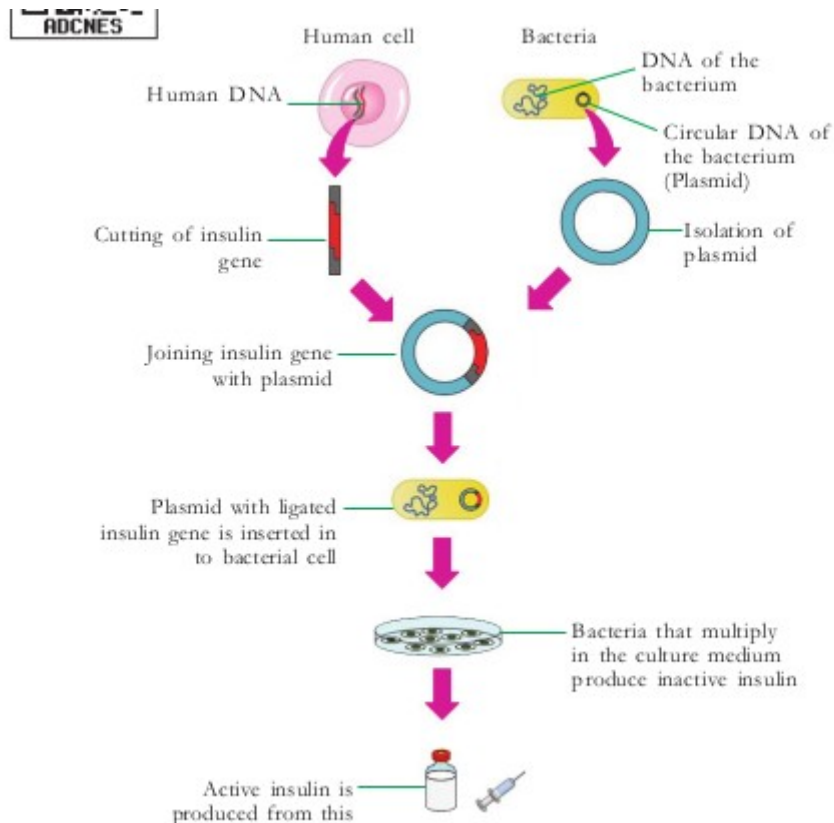


Chapter – 7
GENETICS OF FUTURE



➤ **How can the insulin produced by bacterium be used by humans?**

- Insulin-producing bacteria are created through Genetic Engineering.
- Cutting the gene responsible for the production of insulin from human cell
- Joining insulin producing gene with the plasmid (plasmid- circular DNA of the bacterium)
- The gene responsible for the production of insulin become part of the bacterial DNA.
- Plasmid with ligated insulin gene is inserted in to bacterial cell
- Bacteria that multiply in the culture medium produce inactive insulin
- Inactive insulin is converted into active form and utilized .

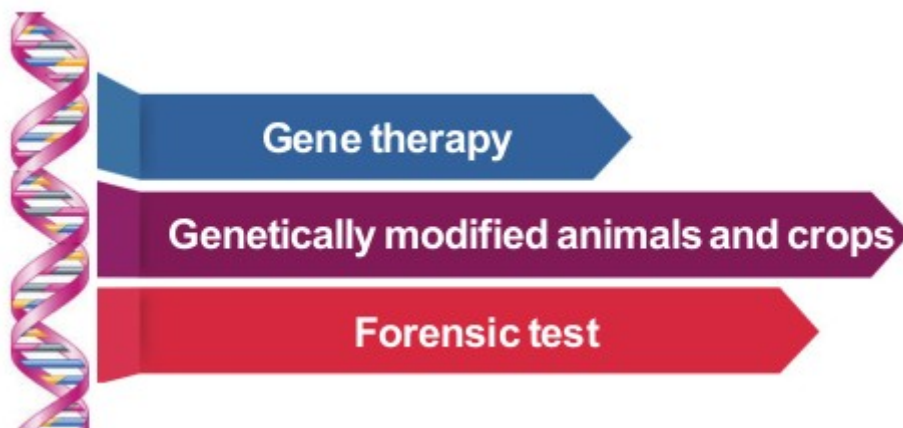


- The use of microorganisms and biological processes for various human requisites is called **Biotechnology**.
- From BC 4000 onwards organisms like yeast, a kind of fungus, were used to prepare food items like bread.
- The ability of fungi and bacteria to convert sugar into alcohol was utilised to make wine, appam and cake.
- These can be considered as traditional methods of biotechnology.
- Genetic engineering is the modern form of biotechnology.
- **Genetic engineering** is the technology of controlling traits of organisms by bringing about desirable changes in the genetic constitution of organisms.
- The basis of this is the discovery of the fact that genes can be cut and joined.

'Genetic scissors' and 'Genetic glue'.

- Enzymes are used to cut and join genes.
- The enzyme **Restriction endonuclease** is used to cut genes.
- This enzyme is known as '**Genetic scissors**'.
- The enzyme **Ligase** is used for joining.
- This enzyme is called '**Genetic glue**'.
- How was the insulin producing gene of humans transferred into bacteria?
- A gene from one cell is transferred to another cell by using suitable **vectors**.
- Vectors which contain ligated genes enter target cells.
- Example : Plasmids in bacteria

Scope of genetic engineering.



Gene therapy

- Genetic engineering has made a great leap in the treatment of genetic diseases.

- Gene therapy is a method of treatment in which the genes that are responsible for diseases are removed and normal functional genes are inserted in their place.
- This has triggered great hope in the control of genetic diseases like haemophilia

Human Genome Project

- Even though science has progressed a lot, we couldn't control genetic diseases.
- The reason for this is that we could not identify the exact gene responsible for a specific trait and its location.
- In 1990, the Human Genome Project was started as an attempt to solve this issue.
- As a result of experiments conducted in various laboratories around the world till 2003, the secrets of human genome Project were revealed.
- **Gene mapping** is technology that helped to identify the location of a gene in the DNA responsible for a particular trait.
- The complete genetic material present in an organism is called its **Genome**.
- In human DNA, majority of genes, except the genes that code for protein are non-functional. They are called **Junk genes**.

The logo of Human Genome project



The discoveries of the Human Genome Project:

- Human genome has about 24000 functional genes.
- Major share of human DNA includes junk genes.
- There is only 0.2 percent difference in DNA among humans.
- About 200 genes in human genome are identical to those in bacteria.

Prepared by SMITHA K T HST,
SSHS SHENI