



Techniques used to produce Biotech Drugs

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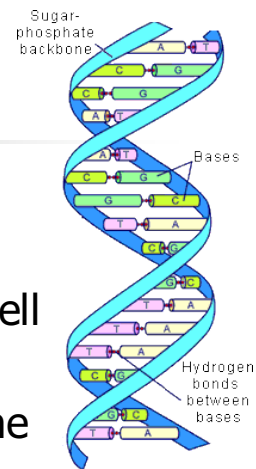
There are several techniques:

- 1) rDNA technology
- 2) MAb technology
- 3) Polymerase chain reaction
- 4) Gene therapy
- 5) Nucleotide blockade/Antisense
- 6) Peptide technology

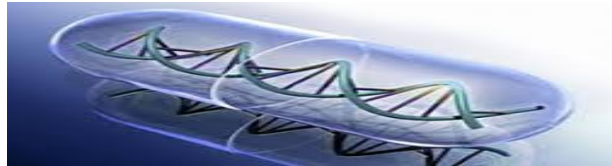
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Recombinant DNA

- DNA, deoxyribonucleic acid, has been called the substance of life.
- DNA constitutes genes, allowing cell to reproduce and maintain life.
- It also plays an essential role in the production of proteins for cellular maintenance and function.



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- For rDNA technology, it includes insertion of naturally occurring or synthetic nucleotide sequence (of interest) into a vector (plasmid) to form recombinant plasmid.
- This plasmid is introduced into a suitable host organism to ensure the efficient expression of the desired gene product.
- Human GH and insulin were the first rDNA products to become available for patient use.

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Generally, there are five Features for a Biotechnology Drug to be produced by rDNA technology:

1. Expression system of the gene.
2. Production system compatible with the microorganism.
3. Purification system.
4. Nature of the active product.
5. Pharmaceutical formulation

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1. Expression System: Vector + Host

Identify, isolate and clone the gene coding for the desired protein

Construct a vector containing:

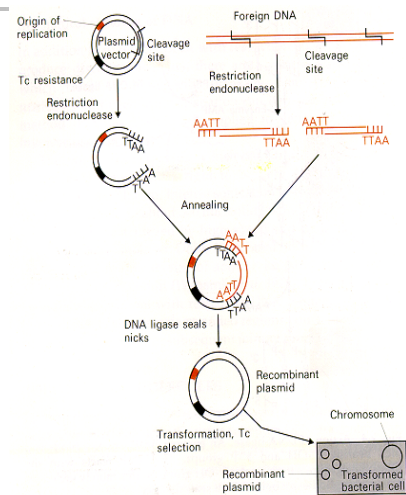
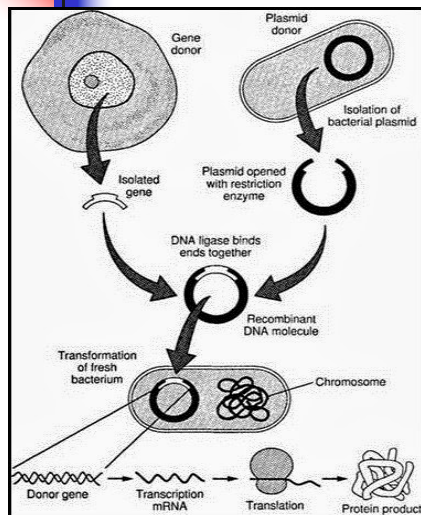
- The gene
- The expression controls (promoter, secretion signal...)

Insert the vector into the selected micro-organism

- *Escherichia coli*
- *Saccharomyces cerevisiae*
- Mammalian cells
- Genetically modified plants

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Expression System: Vector Construction + Host



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2. The Production System

Purpose

- Optimize survival conditions for the genetically modified microorganism, so that it produces the desired protein with acceptable yield.

Materials & Methods

- Selection of cell culture medium
- Selection of culture conditions
- Selection of culture equipment: like fermenter, incubator

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3. The Purification System

Purpose

- Extraction of protein from the complex growth medium with about 100% purity without altering the protein.

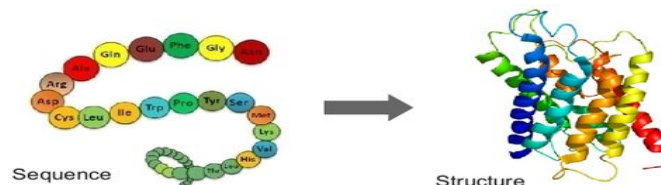
Materials & Methods

- Sequence of purification steps
- Filtration/ultrafiltration
- Precipitation/resolubilization
- Chromatography (ion-exchange, affinity, etc.)

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4. Nature of Active Product (characterization of proteins)

- With chains of amino-acids.
- The structure may be folded into 3-D conformation and maintains its biological activity.
- Host-dependent post-translational modifications (addition of sugars moieties or other from culture cell...) may affect the protein action or properties.



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5. Pharmaceutical Formulation

Purpose

- Maintain biological activity with suitable dosage form by maintaining active protein conformation in solution

Materials & Methods

- Stabilization (using as ex. albumin, glycerol)
- Storage at low temperature