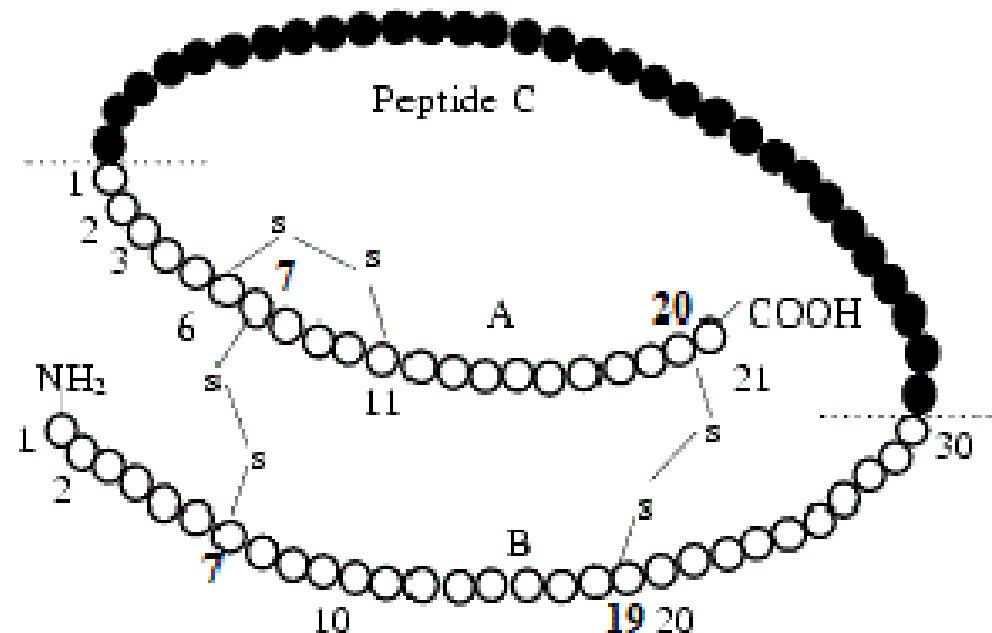


# Insulin

- Insulin was discovered in 1921 by banting and best.
- It is a peptide hormone produced by beta cells of the pancreatic islets; it is considered to be the main anabolic hormone of the body.
- It regulates the metabolism of carbohydrates, fats and protein by promoting the absorption of carbohydrates, especially glucose from the blood into liver and skeletal muscle cells.

## Structure of insulin

- The human insulin is composed of 51 amino acids, and has a molecular mass of 5808 Da.
- It is a dimer of an A-chain and a B-chain, which are linked together by disulfide bonds.
- The A and B chain are held together by two disulfide bonds and a third disulfide connection occurs within the chain A.



# Insulin preparations

The commercial preparations of insulin are derived from beef and pork pancreas.

According to onset/ duration of action insulin preparations are categorised as

- **Short acting insulin preparation**

## Regular insulin

Regular insulin is a clear, colourless solution with rapid onset of action and short duration of action.

It is administered intravenous, subcutaneous or intramuscular route.

Its onset of action is 0.5-1 h and duration of action is 6-8h.

## Prompt insulin zinc suspension

It is a sterile suspension of insulin in buffer water for injection modified by the addition of zinc chloride in a manner such that the solid phase of the suspension is predominately amorphous.

Its onset of action is 1-1.5 h and duration of action is 12-16 h.

## Intermediate acting insulin preparation

### Insulin zinc suspension / Lente insulin

- It is a sterile suspension of insulin in buffer water for injection modified by the addition of zinc chloride in a manner such that the solid phase of the suspension consists of a mixture of crystalline and amorphous in 7:3 ratio.
- Its onset of action is 1-2 h and duration of action is 20-24 h.
- It is administered only by subcutaneous route.

### Neutral protamine hagedron (NPH) / Isophane insulin

- It is a sterile suspension of zinc insulin crystals and protamine phosphate in buffer water for injection, combined in a manner such that the solid phase of the suspension consists of crystals composed of insulin, protamine and zinc.
- Its onset of action is 1-2 h and duration of action is 20-24 h.

## Long acting insulin preparation

### Extended insulin zinc suspension / Ultralente insulin

- It is a sterile suspension of insulin in buffer water for injection modified by the addition of zinc chloride in a manner such that the solid phase of the suspension is predominately crystalline.
- Its onset of action is 4-6 h and duration of action is 24-36 h.

### Protamine zinc insulin (PZI)

- It is a sterile suspension of insulin in buffer water for injection modified by the addition of zinc chloride and protamine sulfate.
- Its onset of action is 4-6 h and duration of action is 24-36 h.