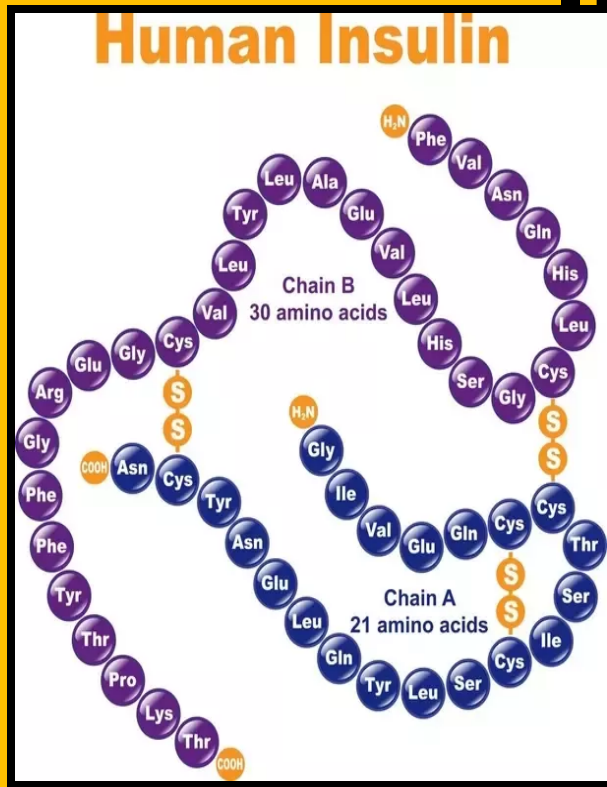


SHRIMATI INDIRA GANDHI COLLEGE

Endocrine Function of Insulin



By
S.Gomathi
Asst.professor
Department of biochemistry

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- Histology of Pancreas
- Pancreatic Hormone
- Synthesis of insulin
- Insulin Receptor
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Endocrine Gland



Adrenal gland



Pituitary gland



Pineal gland



Thymus

ENDOCRINE SYSTEM



Testicle



Thyroid



Pancreas

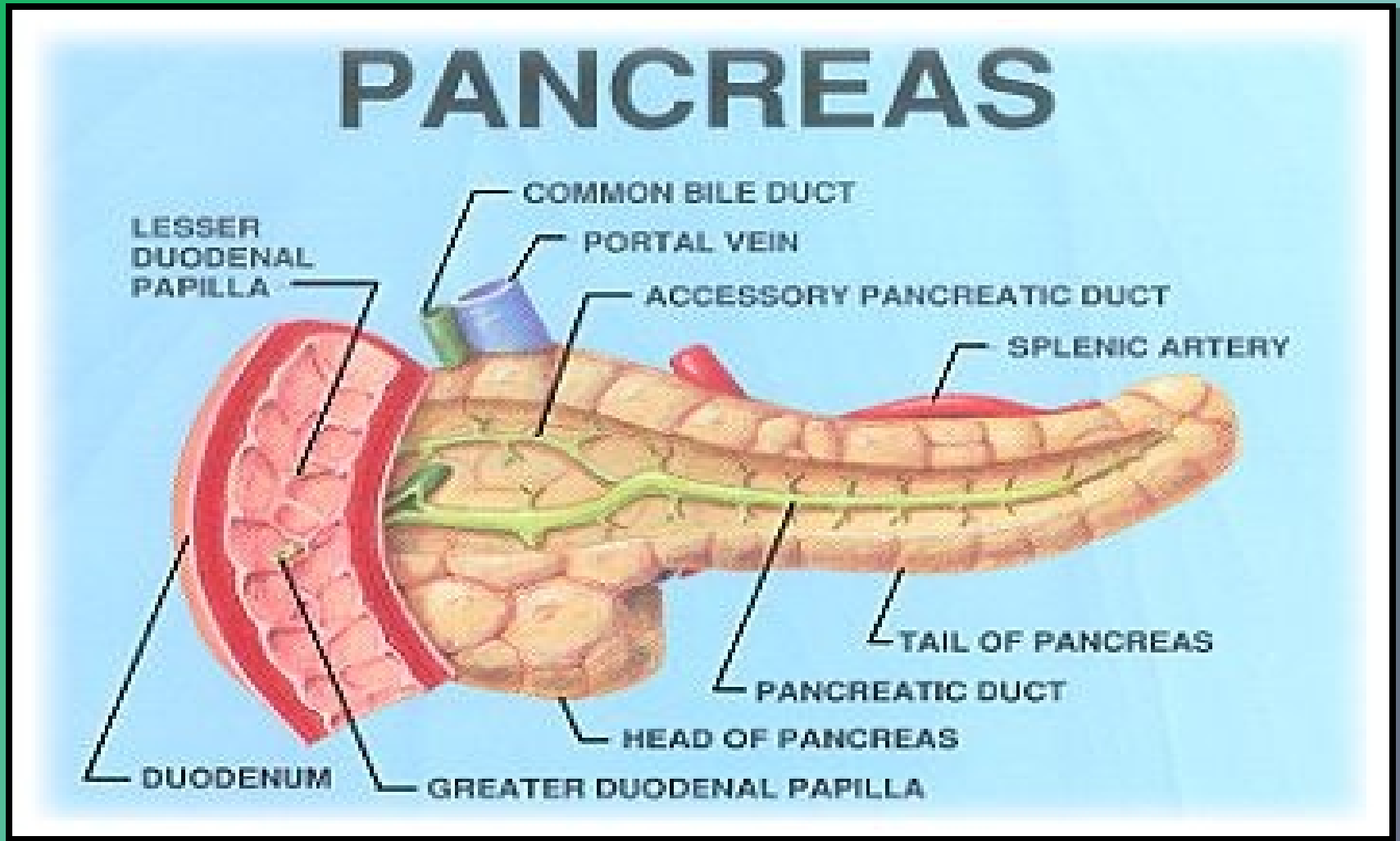


Ovary

Introduction

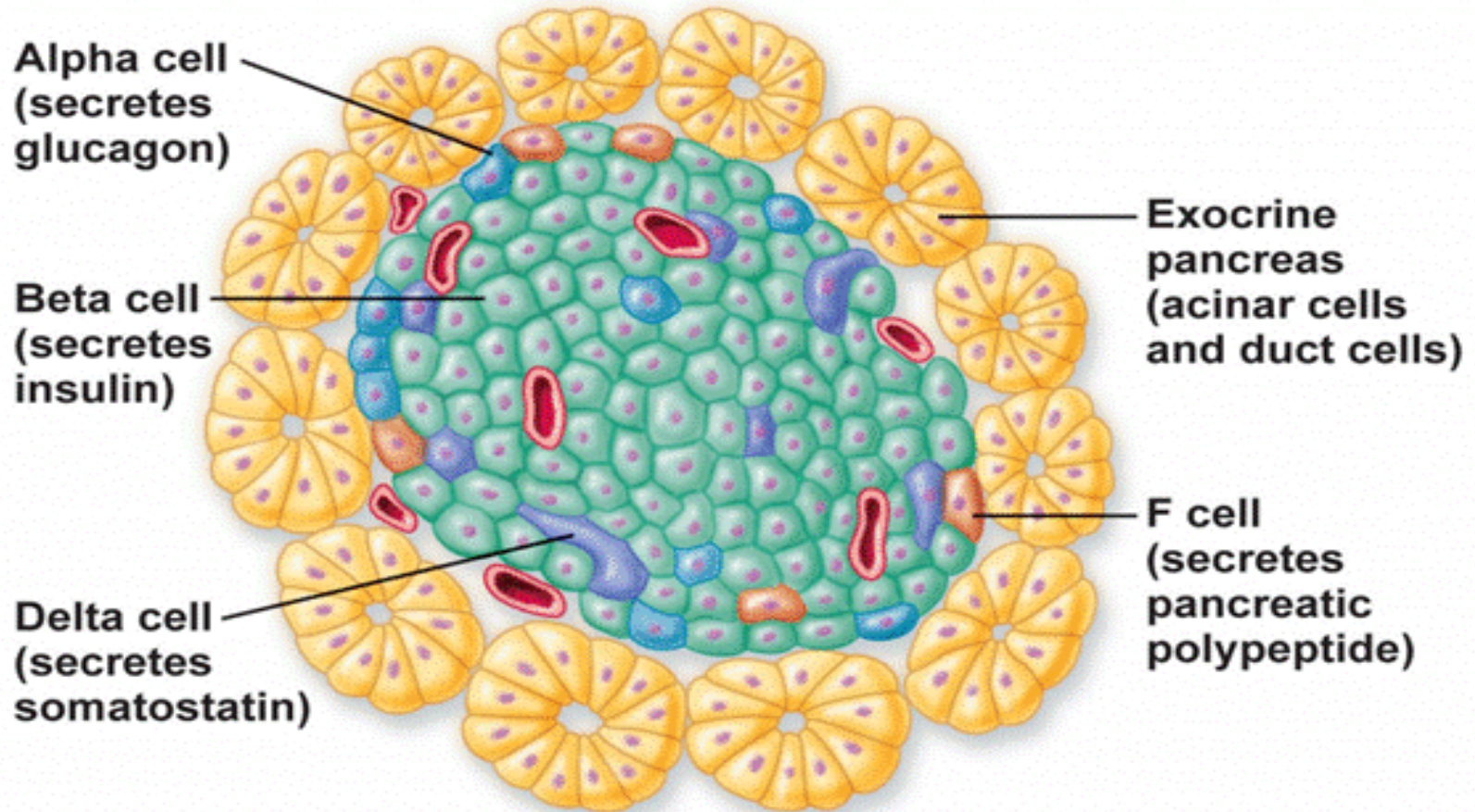
- The **endocrine system** is the collection of glands that produce hormones directly enter into the Circulatory System.
- Its regulate to function of metabolism, growth and development, tissue function, sexual function, reproduction, sleep and mood.

Anatomy of Pancreas



- The **pancreas** is a long slender organ, located at posterior to the bottom half of the stomach.
- Pancreas is considered as mixed gland.
- Its act as both exocrine and endocrine gland. The exocrine part secretes pancreatic fluid into the duodenum after a meal.

Histology of Pancreas



Types of Islets of Langerhans

- The endocrinal part secretes various types of hormones. The specialized tissue is called Islets of Langerhans.

Types of islets cells

- **A cells** – Glucagon -25%.
- **B cells** – Insulin -60%
- **D cells** – Somatostatin -10% .
- **F cells** – Pancreatic polypeptide -5%.

Pancreatic Hormone

Glucagon

- Glucagon stimulate glycogenolysis and gluconeogenesis.

Insulin

- Insulin stimulate glycogenesis and glycogenesis in liver and muscles.

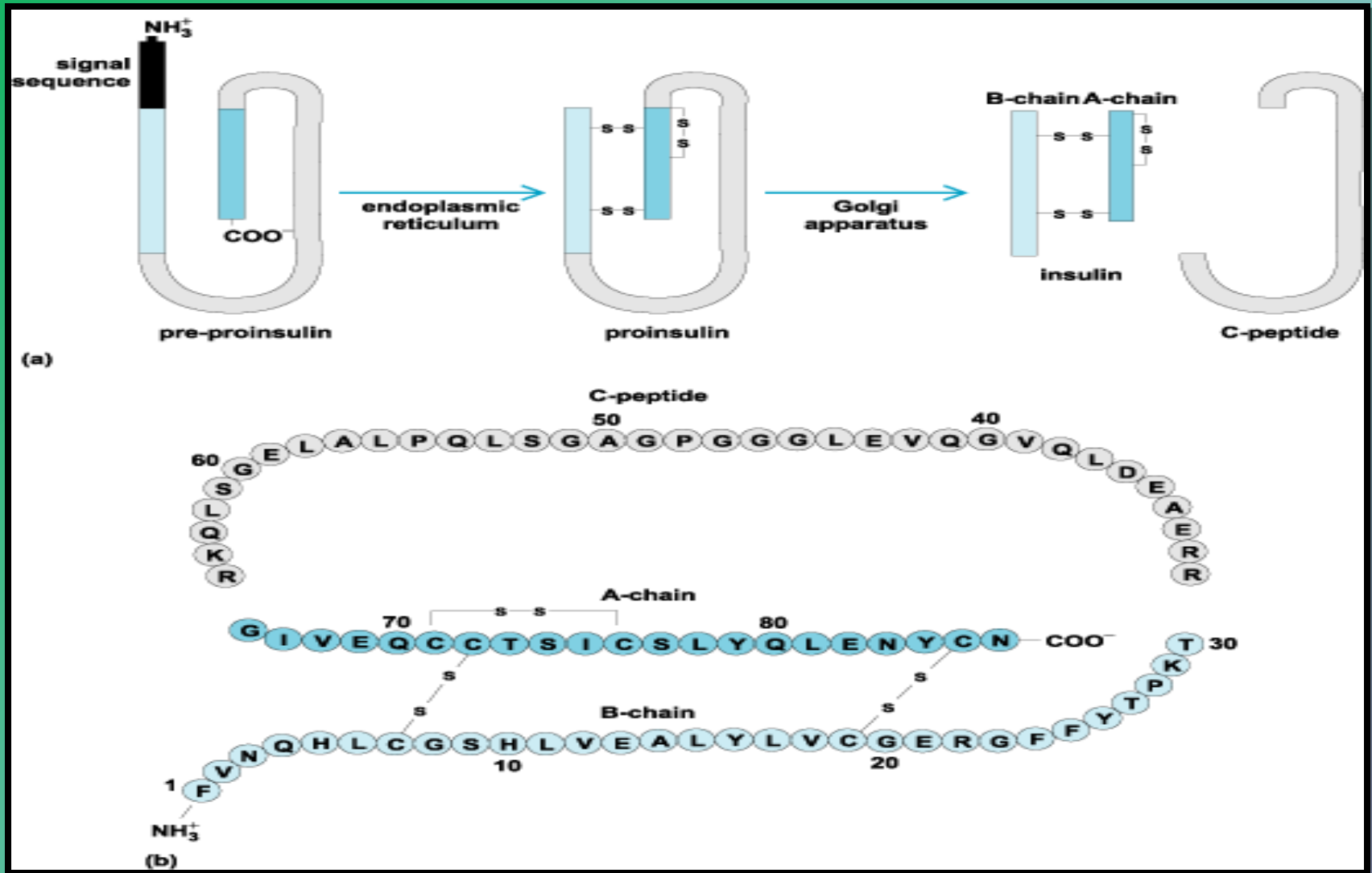
Somatostatin

- It inhibit the release glucagon of both glucagon and insulin.

Pancreatic Polypeptide

- It inhibit pancreatic exocrine secretion.

Synthesis of Insulin



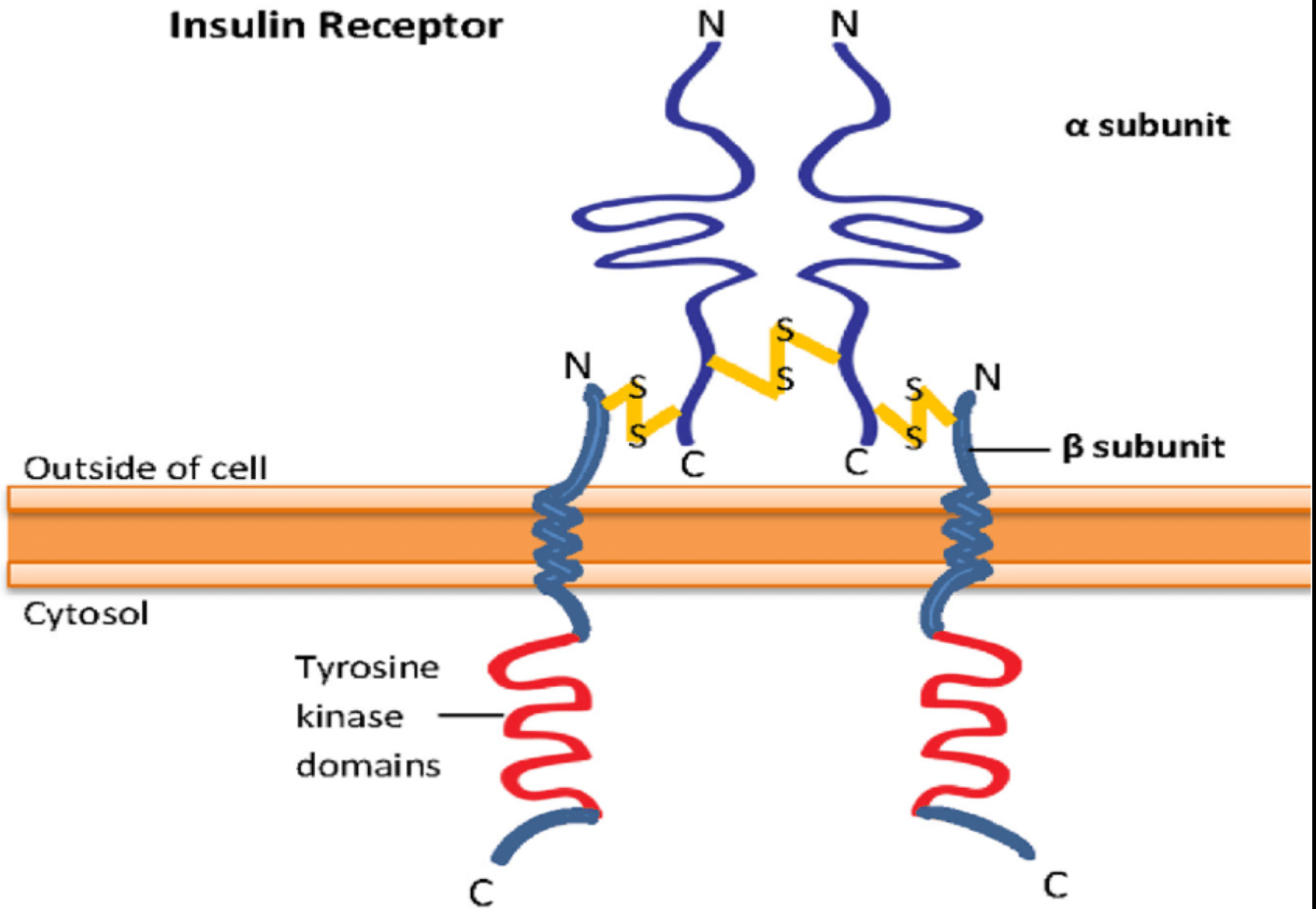
Synthesis of Insulin

- Preproinsulin mRNA is synthesised by transcription(RER) and converted into proinsulin.
- Proinsulin is transported through the Golgi apparatus and packaged into immature Catherin-coated granules.
- Proinsulin is processed into insulin and c-peptide. The immature granules can then become mature granules containing insulin.

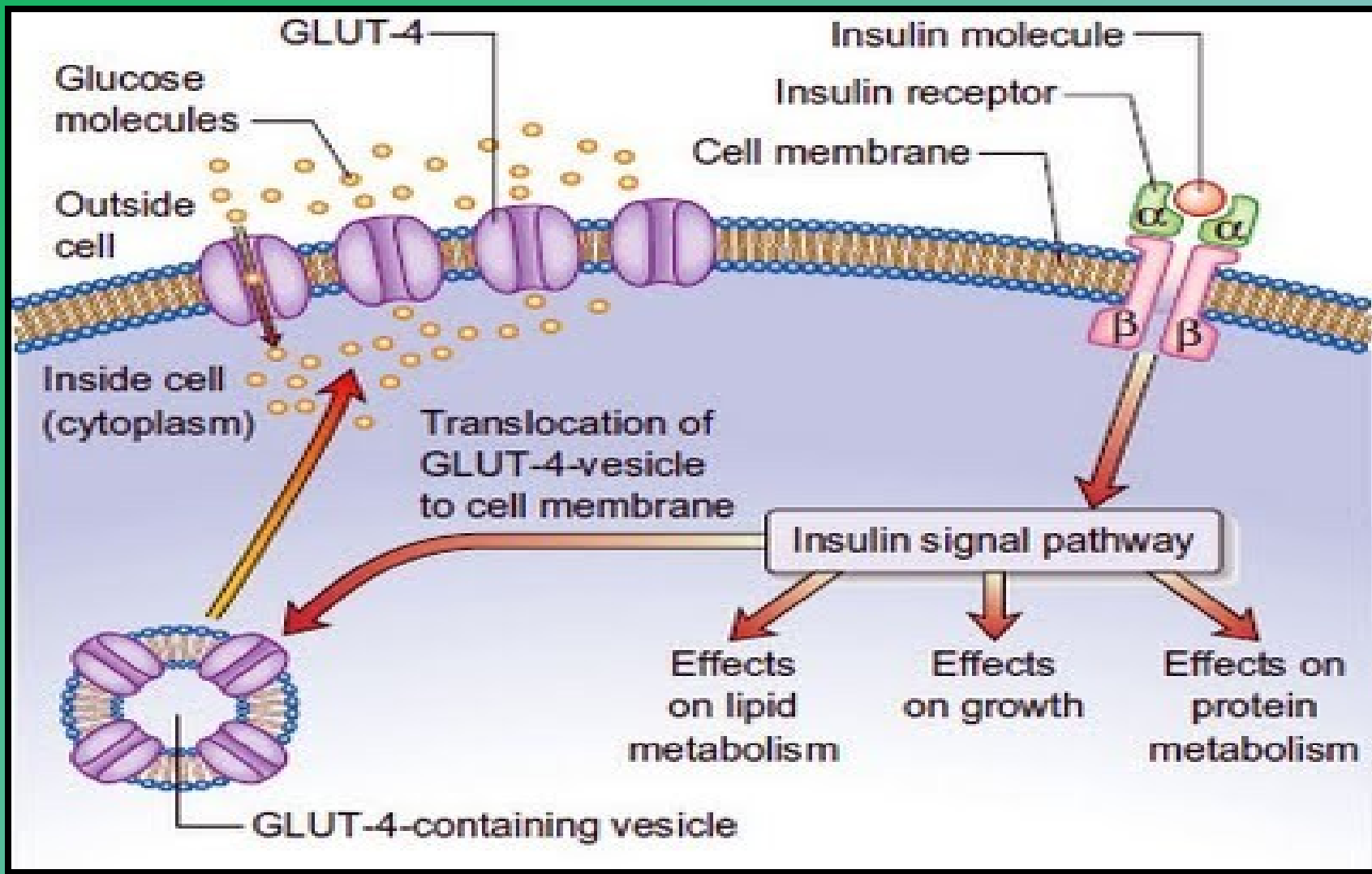
Insulin Receptor

- The insulin receptor is a tyrosine kinase and acts as an enzyme that transfers phosphate groups from ATP to tyrosine residues on intracellular target proteins and activates receptor.
- The activated receptor then phosphorylates a number of intracellular proteins, which in turn alters their activity thereby generating a biological response.

Insulin Receptor



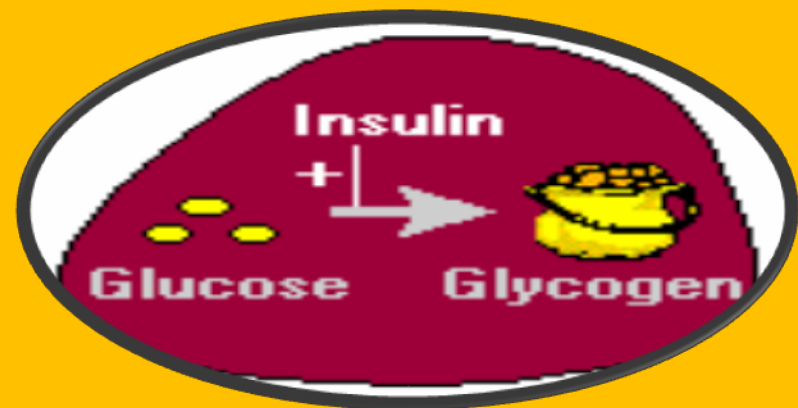
Mechanism action of insulin

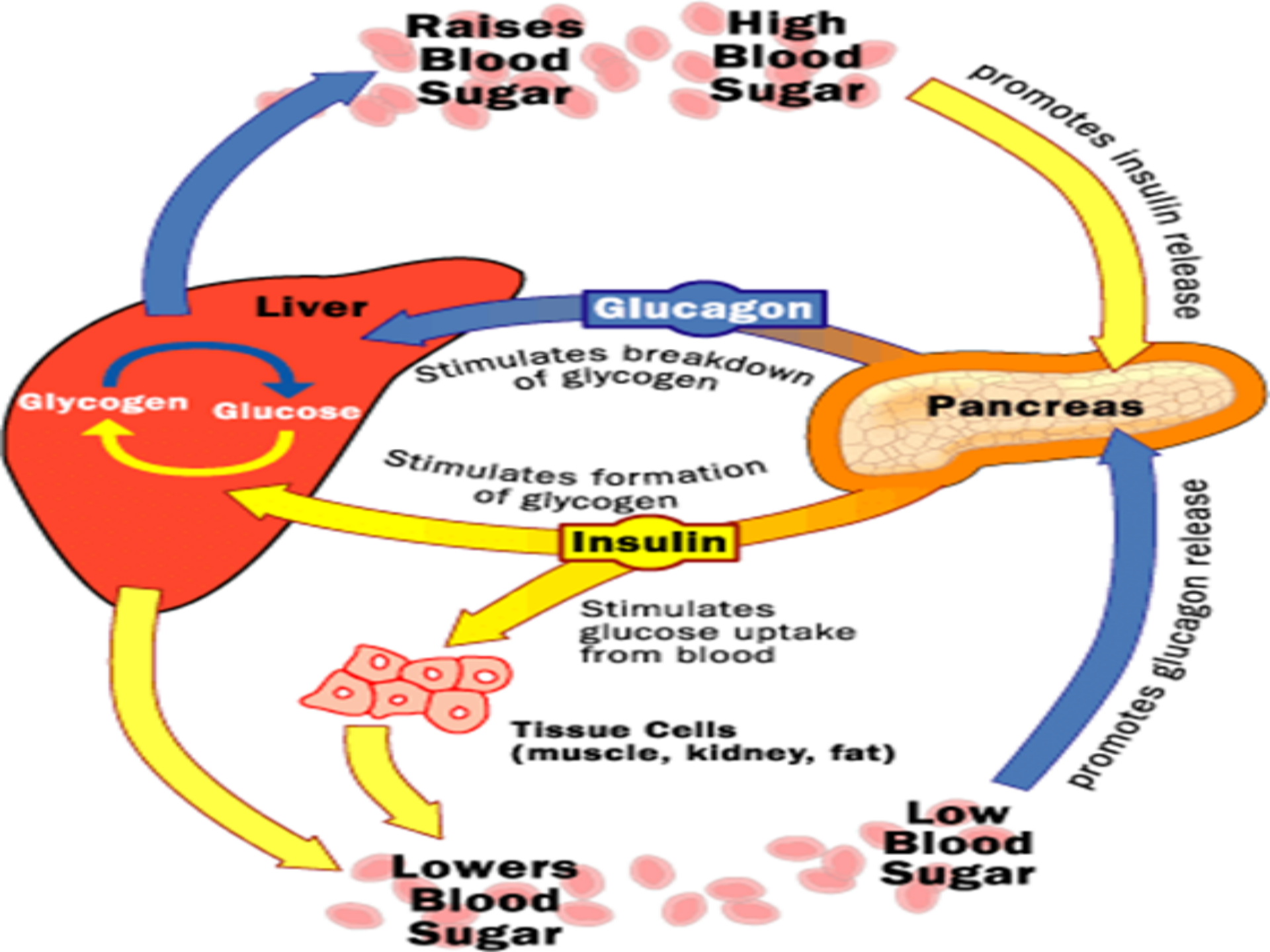


Effect on Carbohydrate Metabolism

It has the following effects

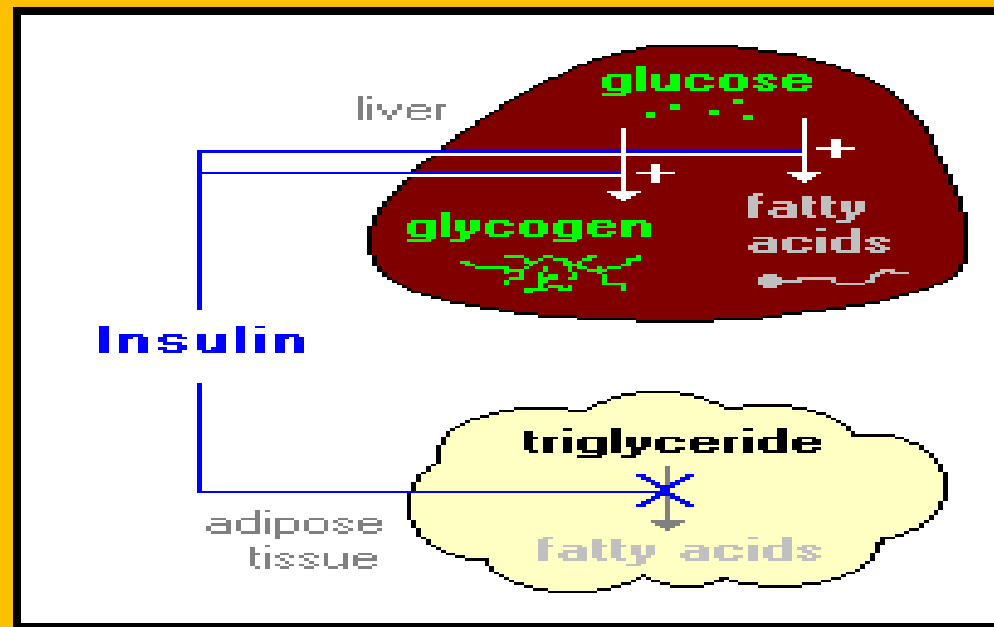
- Increases the rate of transport of glucose across the cell membrane in adipose tissue and muscle.
- Increases the rate of glycolysis in muscle and adipose tissue.
- Stimulates the rate of glycogenesis and decreases the rate of glycogenolysis.





Effect on Lipid Metabolism

- Insulin promotes synthesis of fatty acids in the liver.
- Insulin inhibits breakdown of fat in adipose tissue.



Effect on protein Metabolism

- It has the following effect on Protein metabolism:
- Increases the rate of transport of some amino acids into tissues.
- Increases the rate of protein synthesis in muscle, adipose tissue, liver, and other tissues.
- Decreases the rate of protein degradation in muscle and perhaps other tissues.
- Decreases the rate of urea formation

Deficiency Disease of insulin

- **Diabetes mellitus (DM)**, commonly known as **diabetes**, is a group of metabolic disorders characterized by high blood sugar levels over a prolonged period.
- **Type I diabetes**
- **Type II diabetes**
- **Gestational diabetes**



Major Complications of Diabetes

Microvascular

Eye

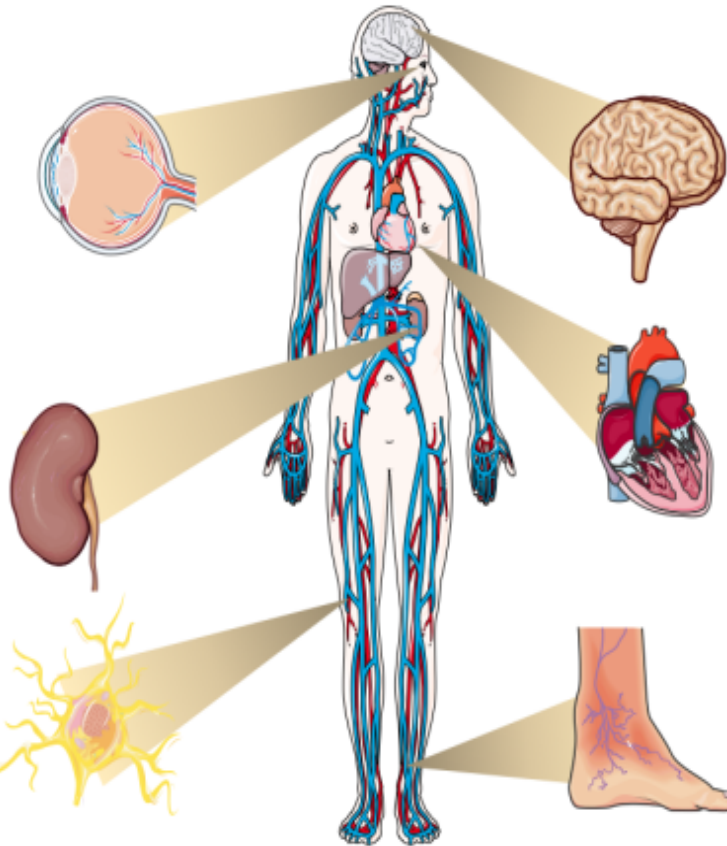
High blood glucose and high blood pressure can damage eye blood vessels, causing retinopathy, cataracts and glaucoma

Kidney

High blood pressure damages small blood vessels and excess blood glucose overworks the kidneys, resulting in nephropathy.

Neuropathy

Hyperglycemia damages nerves in the peripheral nervous system. This may result in pain and/or numbness. Feet wounds may go undetected, get infected and lead to gangrene.



Macrovascular

Brain

Increased risk of stroke and cerebrovascular disease, including transient ischemic attack, cognitive impairment, etc.

Heart

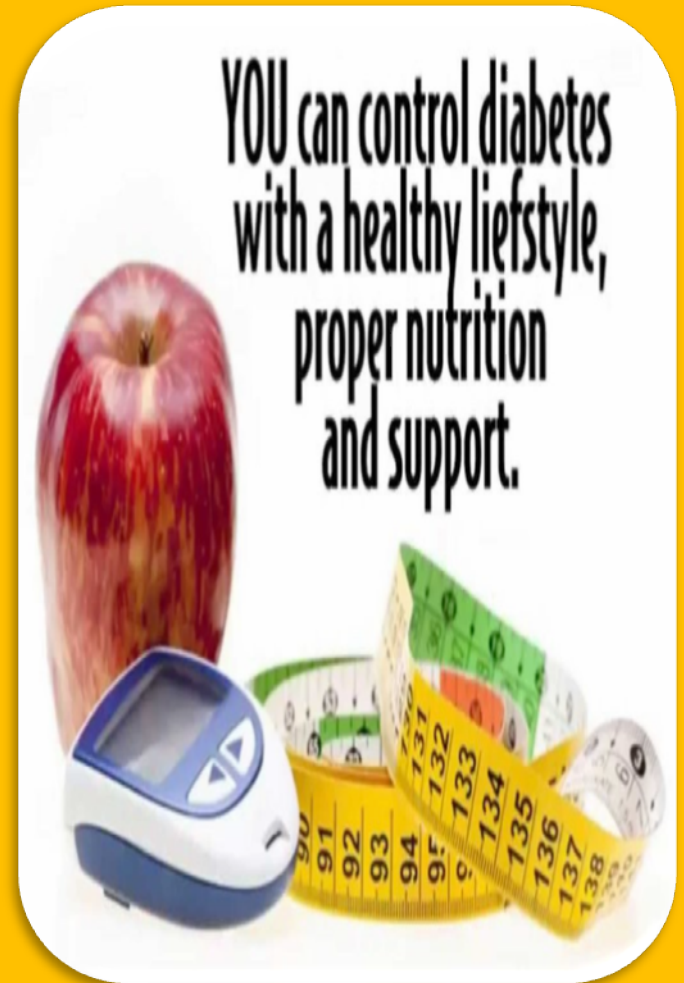
High blood pressure and insulin resistance increase risk of coronary heart disease

Extremities

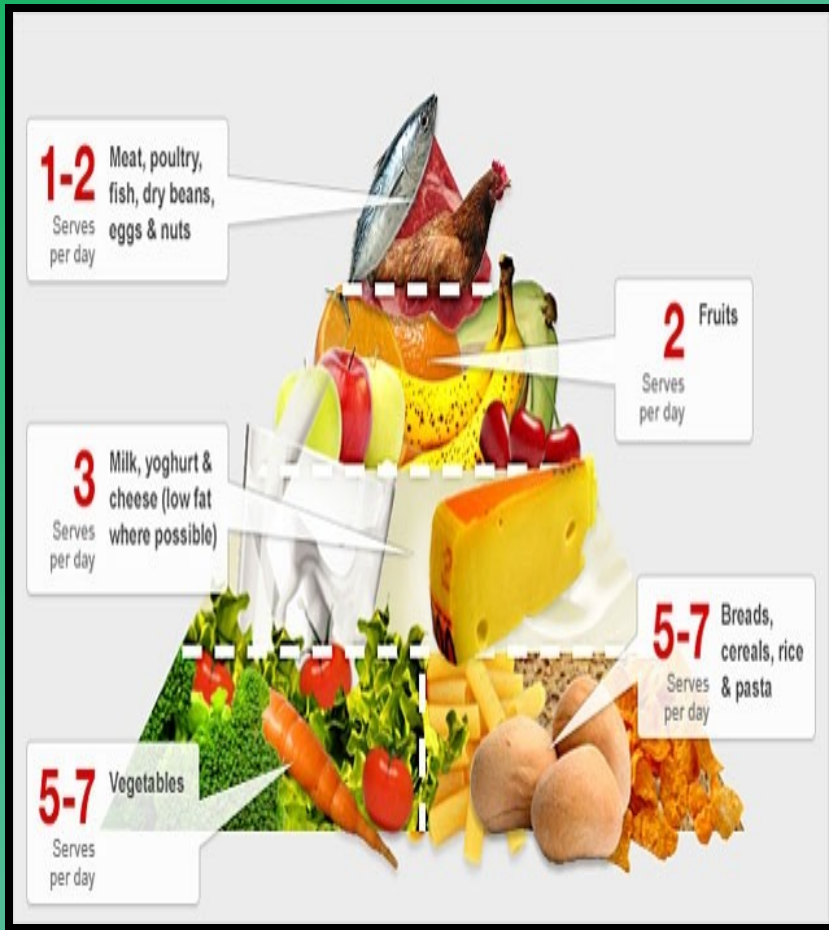
Peripheral vascular disease results from narrowing of blood vessels increasing the risk for reduced or lack of blood flow in legs. Feet wounds are likely to heal slowly contributing to gangrene and other complications.

Treatment

- **Diet**
- **Exercise**
- **Oral Diabetic Drug**
- **Insulin Therapies**



Diet & Exercise



Insulin Therapies & Oral Diabetic Drug



Questions?

- Explain-Pancreatic Hormone
- What are the type of pancreatic cell?
- Explain - the function of Insulin.
- Discuss about Insulin receptor.
- What are the deficiency diseases of insulin?
- Brief account on treatment of Diabetes Mellitus.



Thank
You