Endocrine secretions of Pancreas

Endocrine secretions from islet of Langerhans

- Insulin- β cells
- Glucagon- α cells
- Somatostatin- δ cells
- Pancreatic Polypeptide – F cells

Insulin

- First isolated by Banting and Best in 1922
- Insulin is a polyopeptide containing 2 amino acid chains linked by di-sulfide linkage
- It is synthesized in RER as preproinsulin
- It is cleaved into proinsulin

Effect of insulin on carbohydrate metabolism

- Promotes muscle glucose uptake and metabolism
- Storage of glycogen in muscles
- Promotes liver uptake, storage and use of glucose

- **Inactivates liver phosphorylase**
- **Increases activity of glucokinase**
- **Increases activity of glycogen synthesis**

- Promotes conversion of excess glucose into fatty acids and inhibits gluconeogenesis in liver

Effect of insulin on Fat metabolism

- Promotes fat synthesis and storage
- **Increases transport of glucose into hepatocytes**
- **Pyruvate is converted to acetyl co-A**
- **Fatty acids synthesized are used to form triglycerides**
- Insulin activates lipoprotein lipase in the capillary walls
- Insulin deficiency causes lipolysis of storage fats and release of free fatty acids

Effect of insulin on Protein metabolism

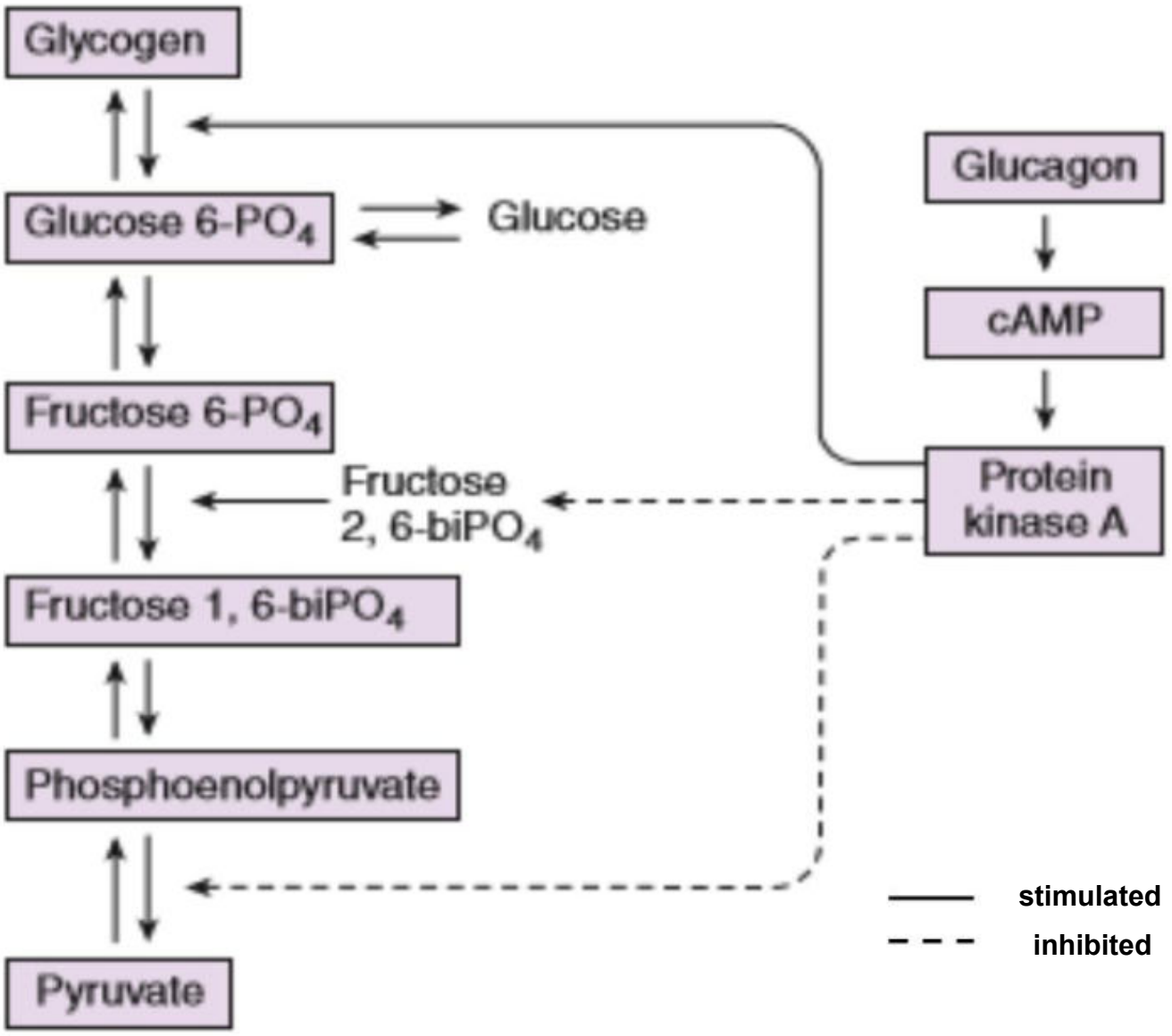
- Promotes protein synthesis and storage
- Stimulates transport of amino acids into the cells
- Increases translation of mRNA
- Increases rate of transcription
- Inhibits protein catabolism
- Depresses gluconeogenesis
- Insulin and growth hormone interact synergistically to promote growth

Glucagon

- It is a large polypeptide secreted by α-cells of islet of landerhans
- It is called as **hyperglycemic hormone**
- It is glycogenolytic, gluconeogenic, lipolytic and ketogenic
- It acts via Gs to activate adenylyl cyclase and increase intracellular cAMP

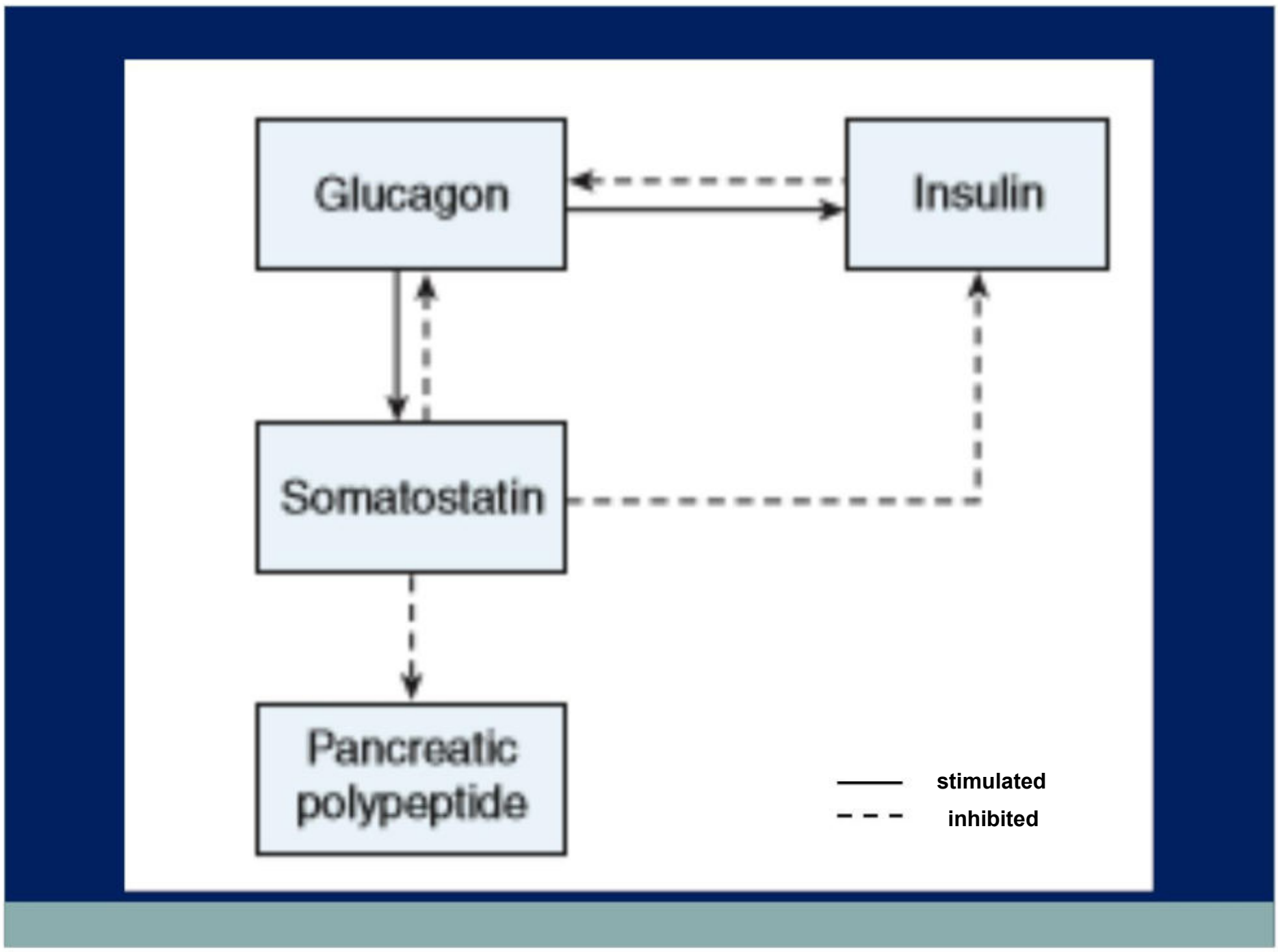
Glucagon

- Glucagon does not cause glycogenolysis in muscle
- It increases gluconeogenesis in liver and elevates metabolic rate
- It increases ketone body formation
- The calorigenic action of glucagon is not due to hyperglycemia but due to hepatic deamination of amino acids
- Large doses have inotropic effect on heart



Insulin-glucagon molar ratios

- Insulin is glycogenic, antigluconeogenetic, antilipolytic and antiketotic
- Glucagon is glycogenolytic, gluconeogenetic, lipolytic and ketogenic



- Hypoglycemic unawareness
- Functional hypoglycemia
- Persistent hyperinsulinemic hypoglycemia of infancy
- Macrosomia
- Diabetes Mellitus Type 1 and Type 2