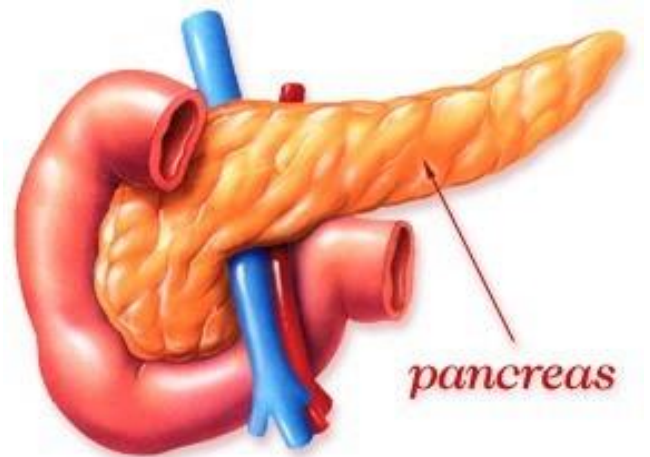
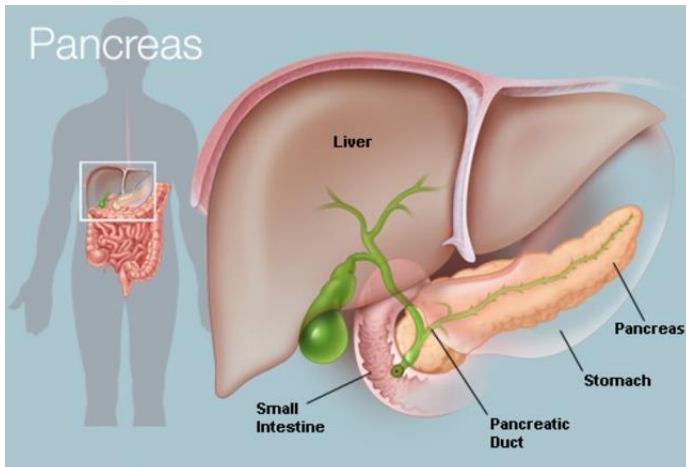




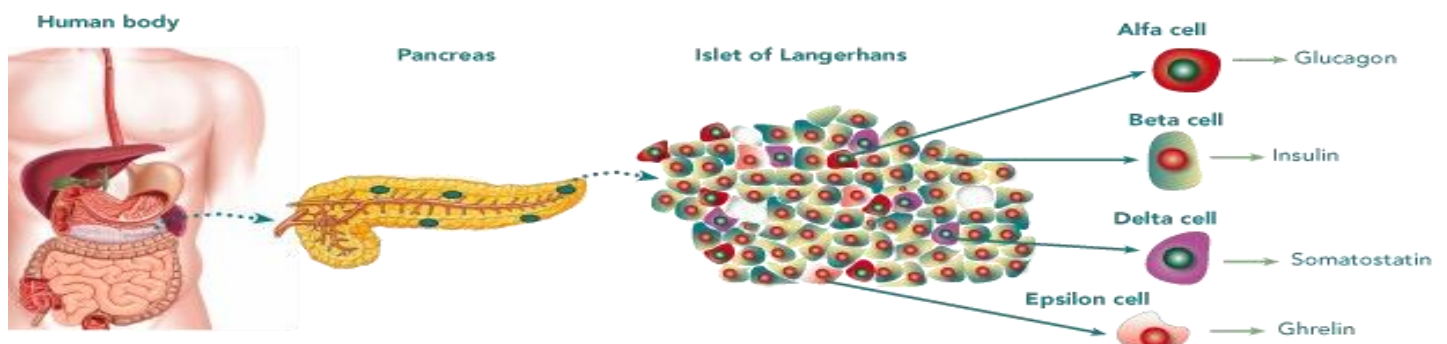
## HORMONES INVOLVED IN REGULATION OF BLOOD GLUCOSE

### PANCREAS



### HORMONES SECRETED IN PANCREAS

- ✓ Alpha ( $\alpha$ ) cells secrete glucagon, which elevates the level of glucose in the blood.
- ✓ Beta ( $\beta$ ) cells secrete insulin, which decrease the level of glucose.
- ✓ Delta ( $\delta$ ) cells secrete somatostatin, which regulates the  $\alpha$  and  $\beta$  cells.
- ✓ F cells secrete a polypeptide that inhibits the digestive enzymes produced in the pancreas.





## INSULIN

Insulin is a **peptide hormone** produced by **beta cells** in the **pancreas**.

It regulates the **metabolism** of **carbohydrates** and **fats** by promoting the absorption of **glucose** from the blood to **skeletal muscles** and **fat tissue** and by causing fat to be stored rather than used for energy.

### **Tissue of Origin**

Pancreatic  **$\beta$  Cells**

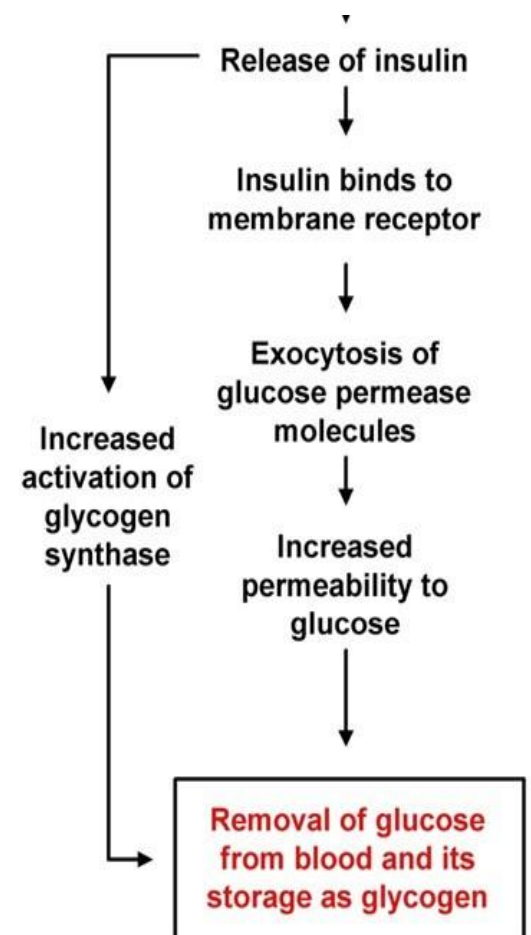
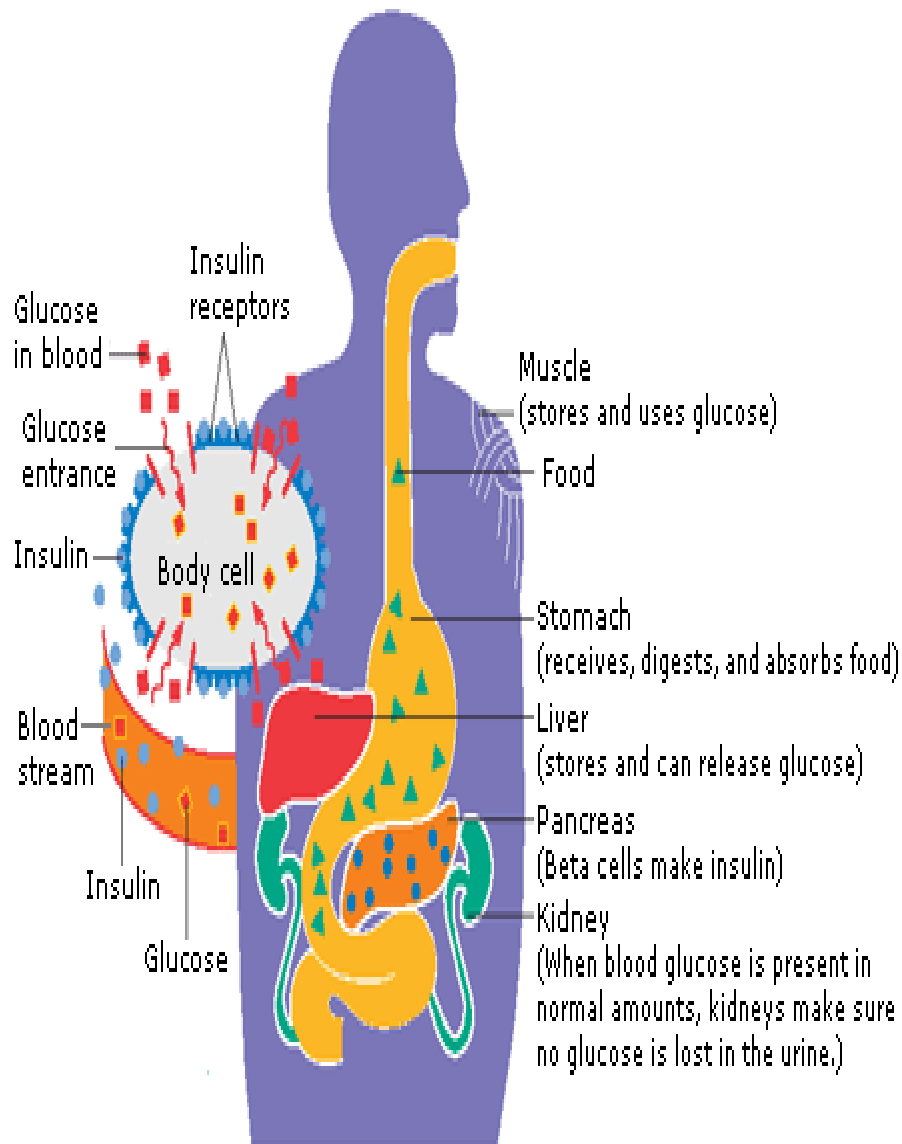
### **Metabolic Effect**

- Enhances entry of glucose into cells;
- Enhances storage of glucose as glycogen, or conversion to fatty acids;
- Enhances synthesis of fatty acids and proteins;
- Suppresses breakdown of proteins into amino acids, of **adipose tissue** into free fatty acids.

### **Effect on Blood Glucose- Lowers**



## ACTION OF INSULIN





## SOMATOSTATIN

Somatostatin (also known as growth hormone-inhibiting hormone (GHIH) or somatotropin release-inhibiting factor (SRIF) or somatotropin release-inhibiting hormone

- It is a **peptide hormone** that regulates the **endocrine system** and affects **neurotransmission** and **cell proliferation** via interaction with **Gprotein-coupled somatostatin receptors**
- Inhibition of the release of numerous secondary hormones.
- Somatostatin inhibits insulin and glucagon secretion.

### Tissue of Origin

Pancreatic  $\delta$  Cells

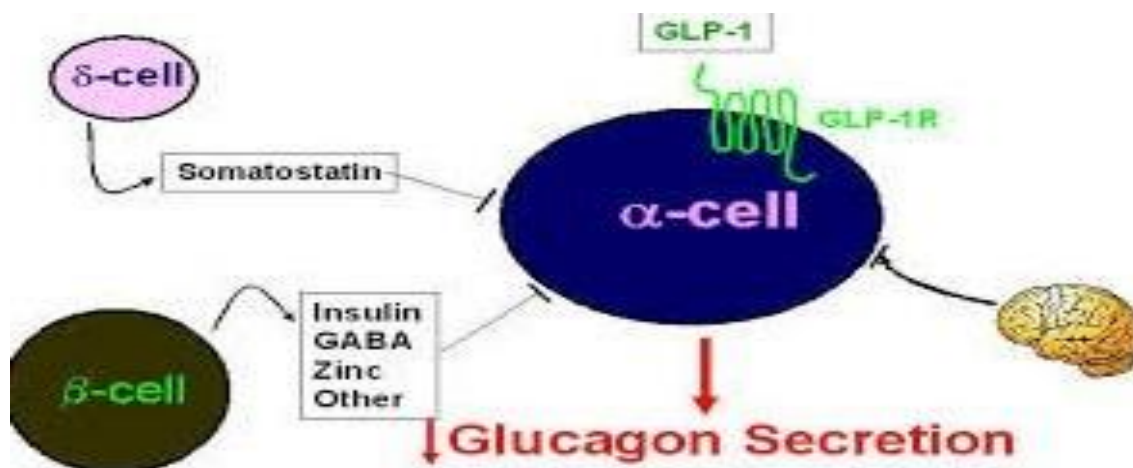
### Metabolic Effect

Suppresses glucagon release from  $\alpha$  cells (acts locally);

Suppresses release of Insulin, Pituitary tropic hormones, **gastrin** and **secretin**.

Effect on Blood Glucose- **Lowers**

### ACTION OF SOMATOSTATIN





## GLUCAGON

Glucagon is a peptide hormone, produced by alpha cells of the pancreas, which raises the concentration of glucose in the bloodstream.

Its effect is opposite that of insulin, which lowers the glucose concentration.

The pancreas releases glucagon when the concentration of glucose in the bloodstream falls too low. Glucagon causes the liver to convert stored glycogen into glucose, which is released into the bloodstream.

### **Tissue of Origin:**

Pancreatic  $\alpha$  Cells

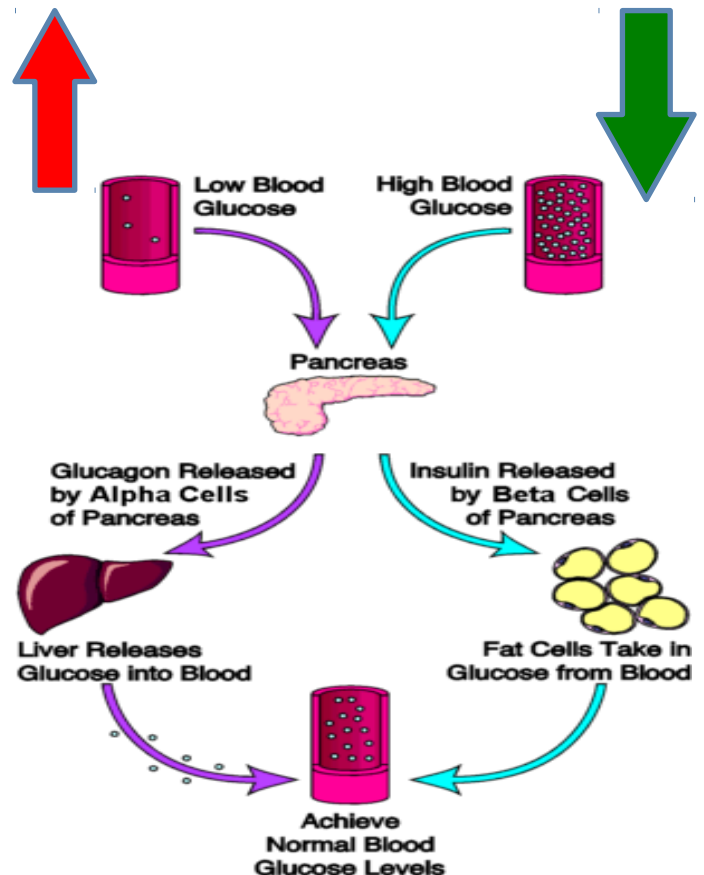
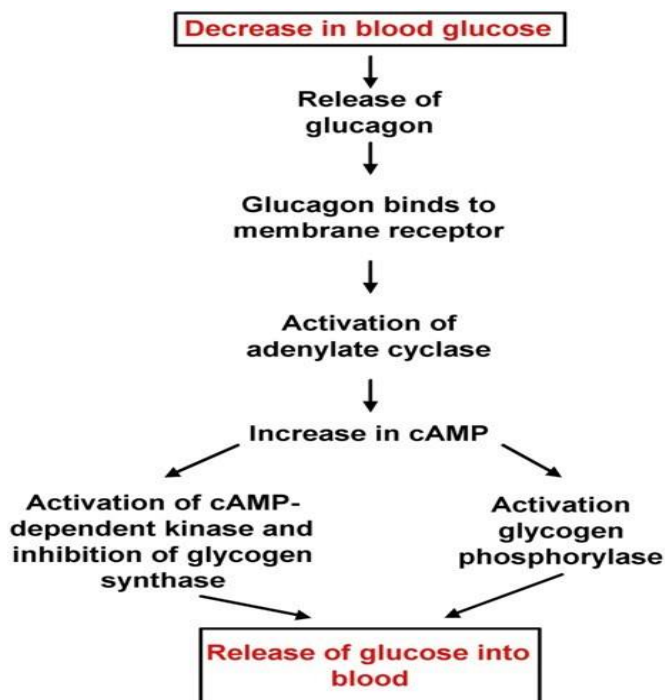
### Metabolic Effect

Enhances release of glucose from glycogen;

Enhances synthesis of glucose from amino acids or fatty acids.

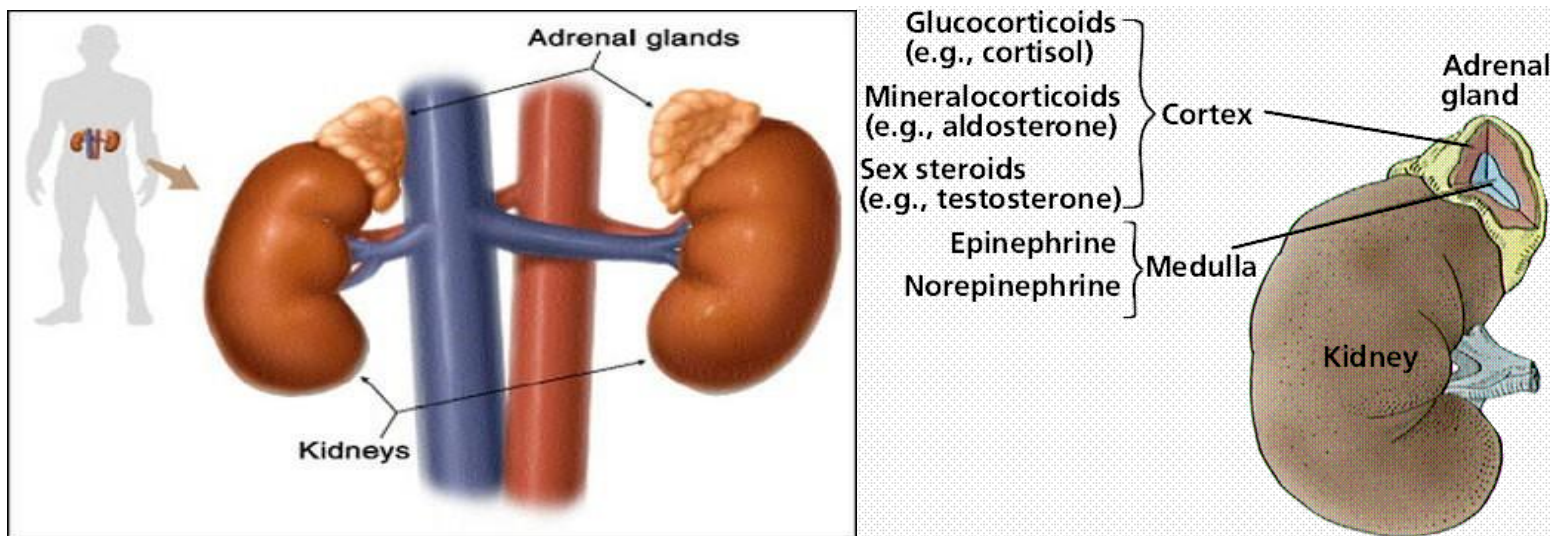
Effect on Blood Glucose- Raises

### ACTION OF GLUCAGON





## Hormones from adrenal glands



## EPINEPHRINE

Tissue of Origin

Adrenal medulla

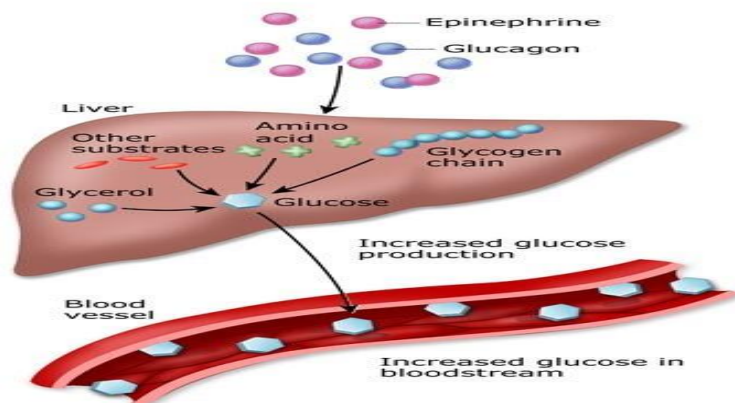
Metabolic Effect

- ✓ Enhances release of glucose from glycogen;
- ✓ Enhances release of fatty acids from adipose tissue.

Effect on Blood Glucose- Raises

## ACTION OF EPINEPHRINE

Glucose Counter-regulatory Hormones:  
Effect on Liver



## CORTISOL

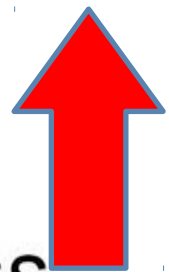
**Tissue of Origin**

Adrenal cortex

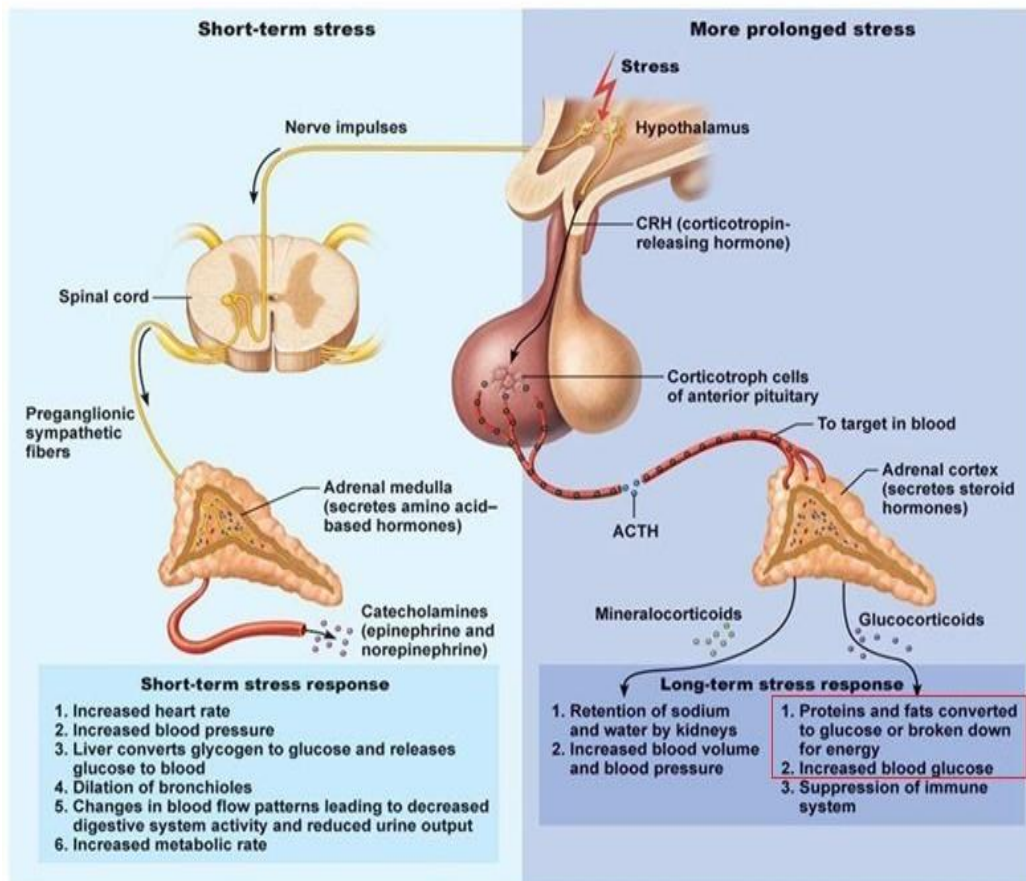
### Metabolic Effect :

- ✓ Enhance gluconeogenesis;
- ✓ Antagonizes Insulin.

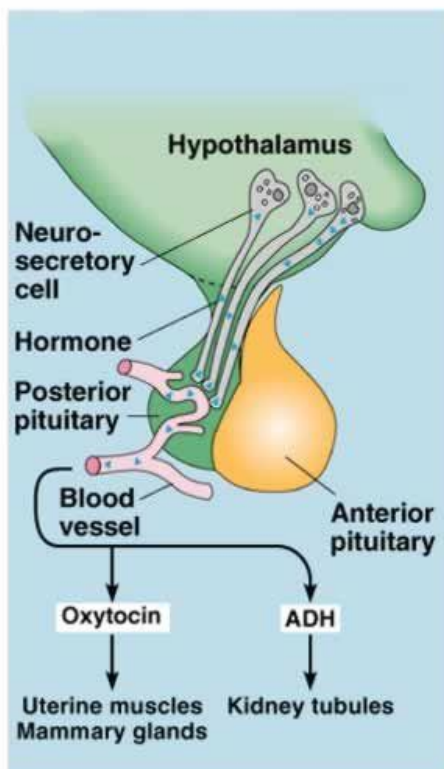
**Effect on Blood Glucose- Raises**



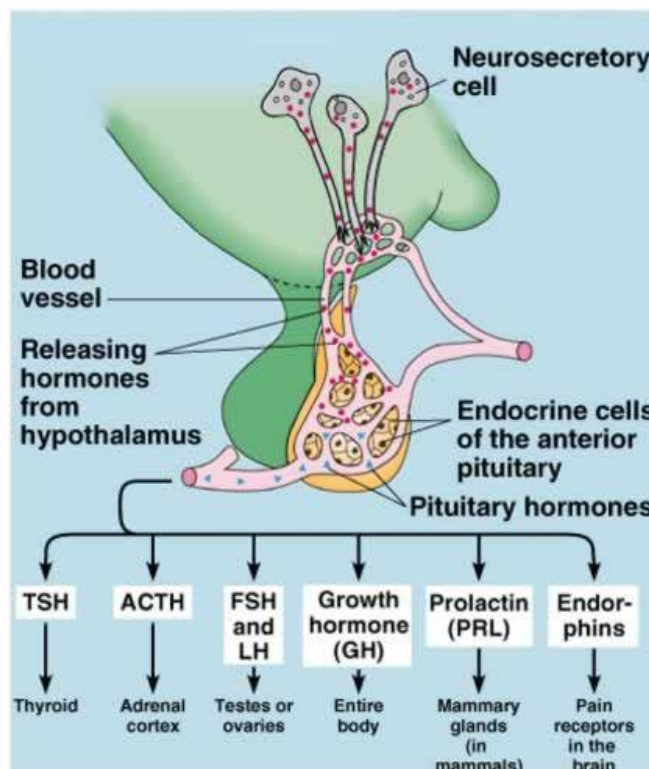
# Function of cortisol in stress



## HORMONES FROM ANTERIOR PITUITARY GLAND



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- ✓ Adrenocorticotrophic hormone (ACTH) and growth hormone(GH) is responsible for blood glucose regulation.

### Adrenocorticotrophic hormone (ACTH)

#### Tissue of Origin:

Anterior pituitary

#### Metabolic Effect

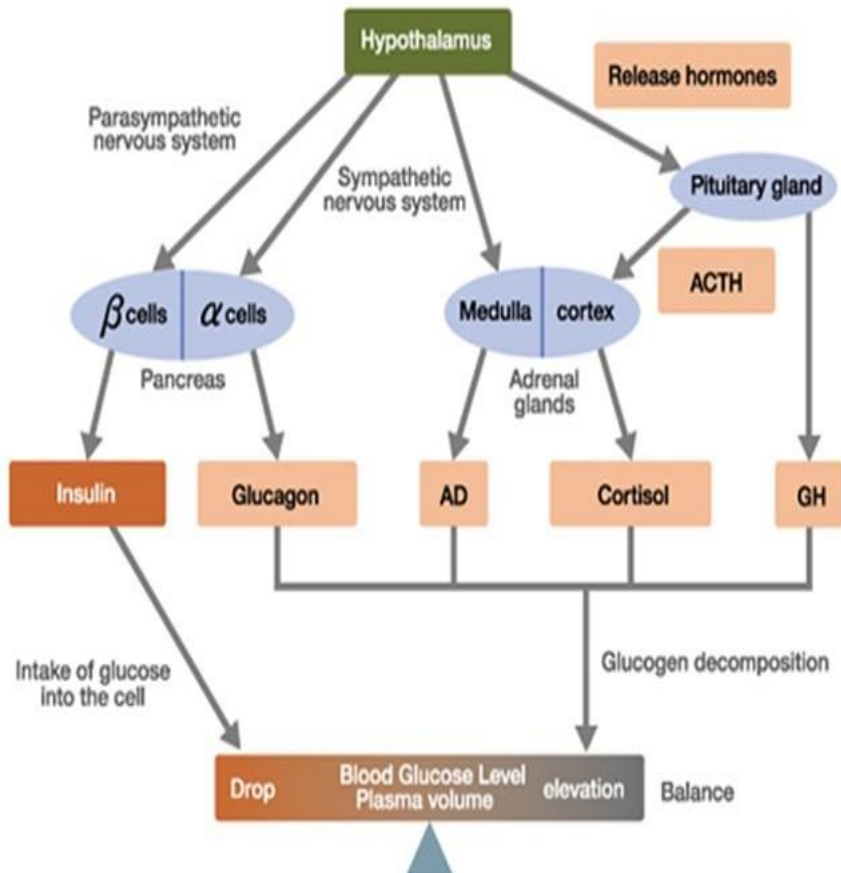
- ✓ Enhances release of cortisol
- ✓ Enhances release of fatty acids from adipose tissue.

**Effect on Blood Glucose- Raises**





Action of Adrenocorticotrophic hormone (ACTH)





## GROWTH HORMONE

**Tissue of Origin**

Anterior pituitary

**Metabolic Effect**

Antagonizes Insulin

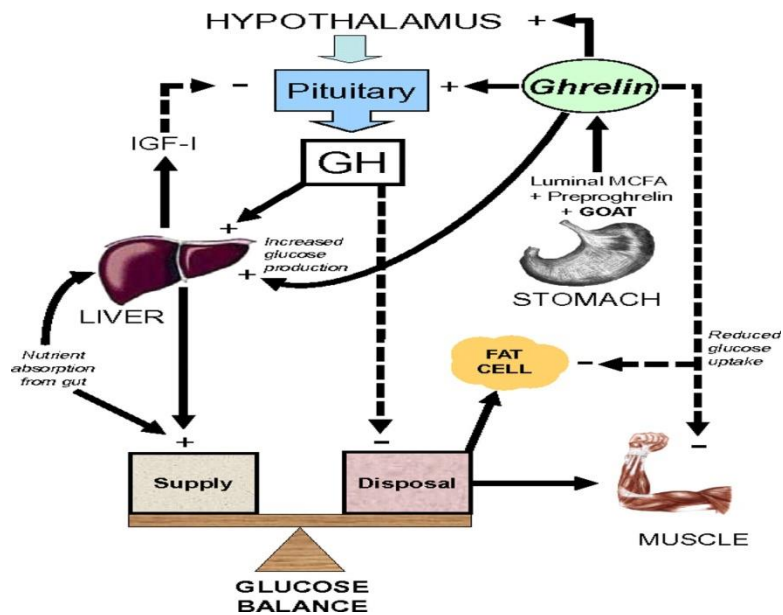
**Effect on Blood Glucose-** Raises

### ACTION OF GROWTH HORMONE

Reduction in the blood glucose level also promotes secretion of ACTH and the **growth hormone** from the pituitary gland through the hypothalamus.

**ACTH** acts on the adrenal cortex to promote **glucocorticoid** secretion (cortisol in humans).

Hyperglycemic hormones such as glucagon, adrenalin, cortisol, and the growth hormone act on the muscles and liver to promote glycogen decomposition and also inhibit glucose infiltration into the heart and muscles, which are organs that consume glucose.





## **HORMONE FROM THYROID GLAND**

### **THYROXINE**

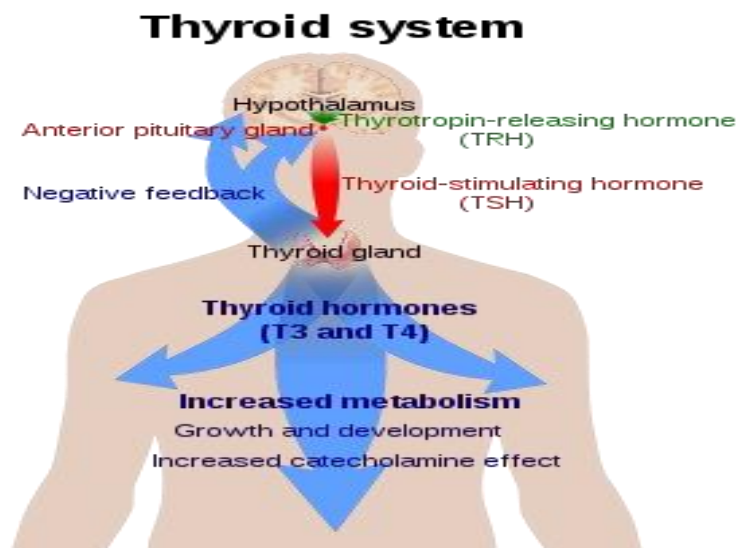
Tissue of Origin:

Thyroid

**Metabolic Effect**

- ✓ Enhances release of glucose from glycogen;
- ✓ Enhances absorption of sugars from intestine

**Effect on Blood Glucose- Raises**





## ACTION OF THYROXINE

