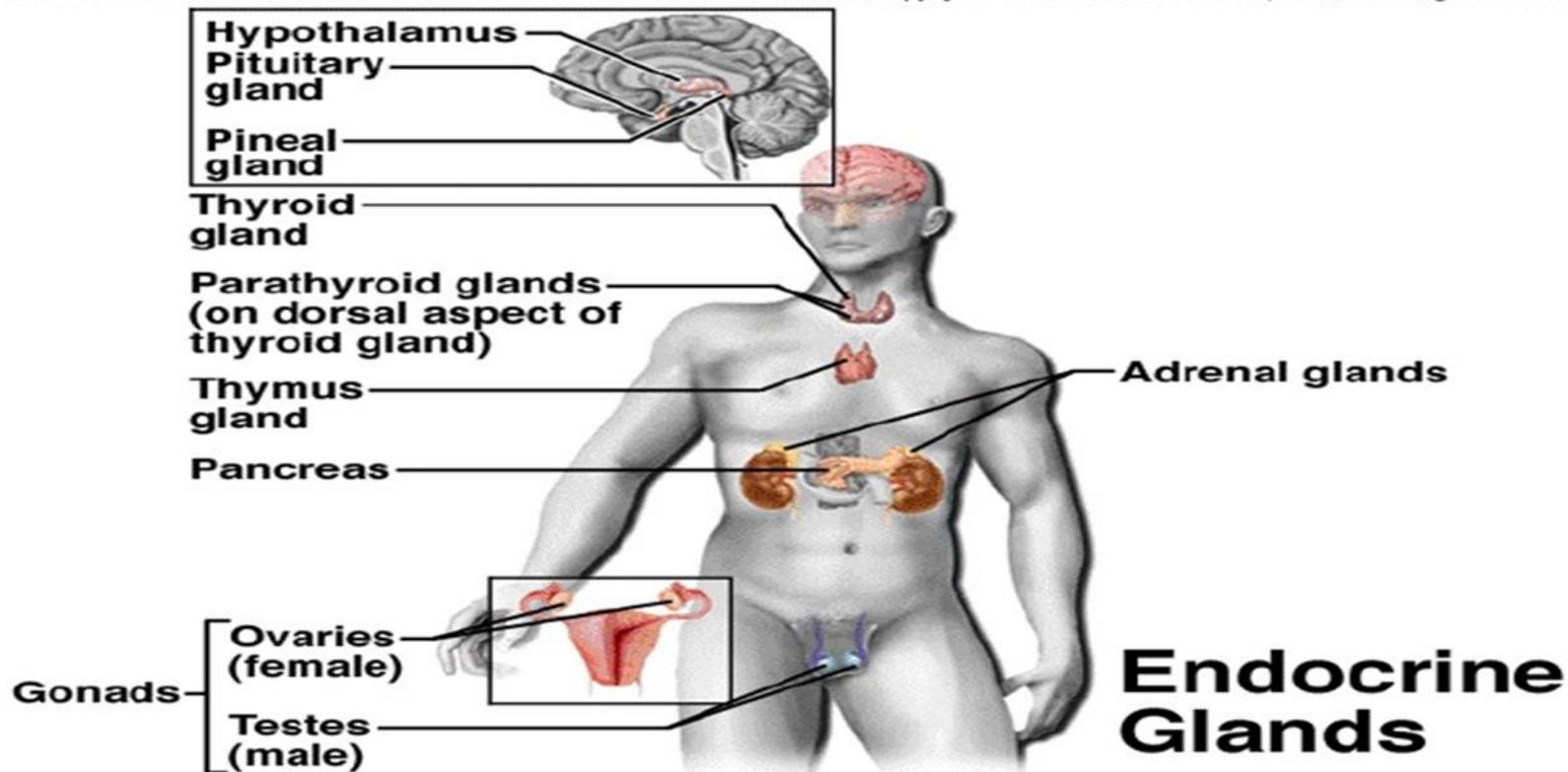


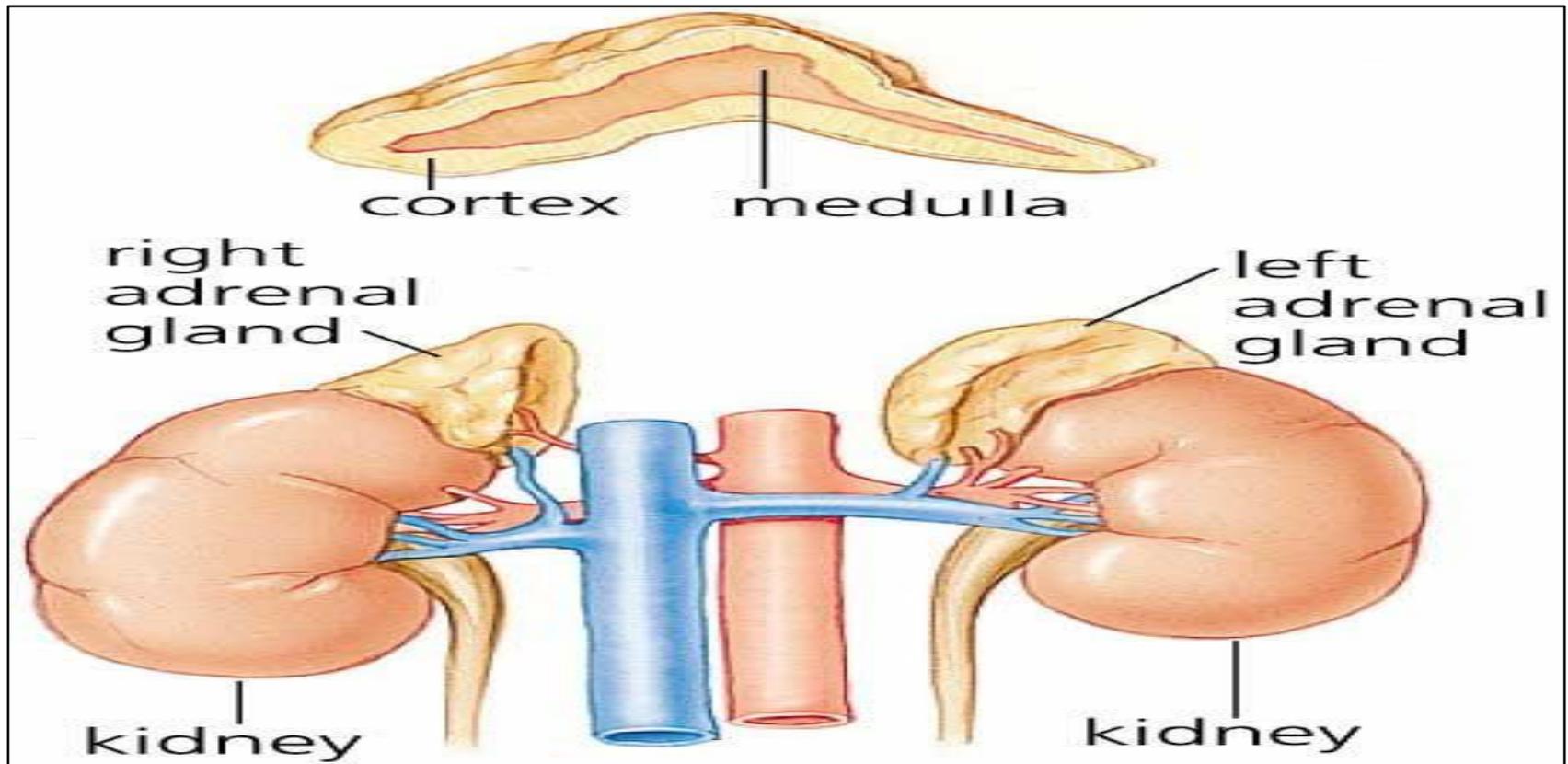
# Physiology of Endocrine System(3)

Second Stage/ University of Anbar-College of Dentistry  
 By : Dr. Rana Hazim  
 Ph.D. Human Physiology.  
 Dep. Basic Science



# Adrenal gland

There are two adrenal glands. Each gland is situated on the upper pole of each kidney.



# Adrenal gland

Because of the situation, adrenal glands are otherwise called **suprarenal** glands.

Each gland is made of two parts, the **adrenal cortex** and **adrenal medulla**.

**Adrenal cortex** is the outer portion forming **80%** of the gland.

**Adrenal medulla** is the central portion of gland forming **20%**.

# Hormones of Adrenal Cortex

The hormones secreted by adrenal cortex are collectively known as **adrenocortical** hormones or **corticosteroids**.

Based on their functions the corticosteroids are classified into three groups:

1. **Mineralocorticoids**
2. **Glucocorticoids**
3. **Sex hormones**

# Mineralocorticoids

Mineralocorticoids are the corticosteroids that act on the minerals (electrolytes) particularly **sodium** and **potassium**. The mineralocorticoids are secreted :

- 1. Aldosterone**
- 2. 11-Deoxycorticosterone**

# **Glucocorticoids**

- 1. Cortisol**
- 2. Corticosterone**
- 3. Cortisone**

# Adrenal Sex Hormones

- 1. Dehydroepiandrosterone**
- 2. Androstenedione**
- 3. Testosterone.**

# Endocrine System



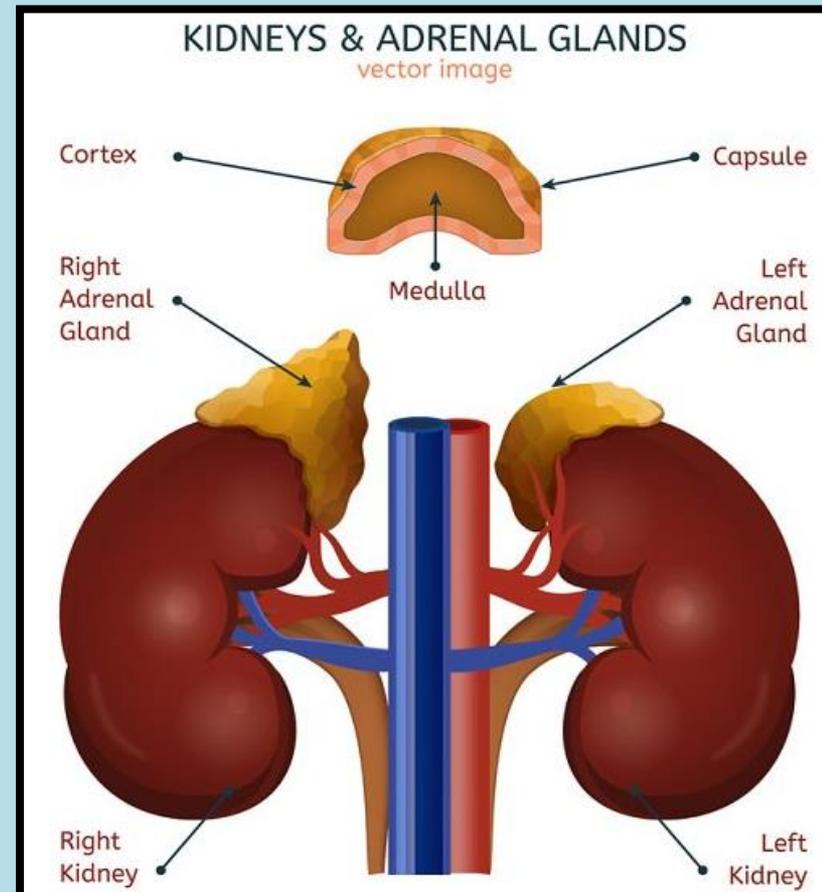
**Dr. Rana Hazim**  
**Ph.D. of Physiological**

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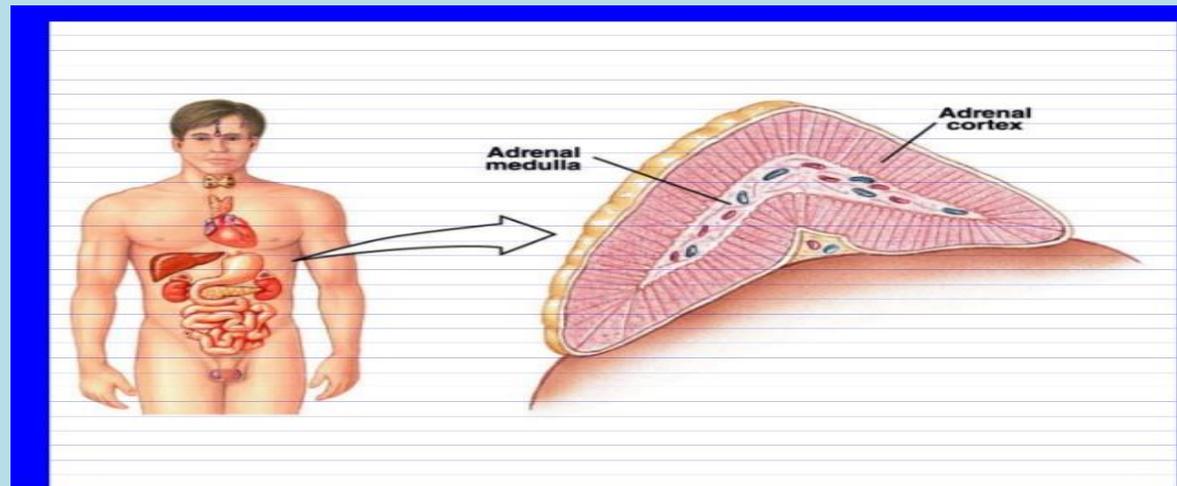
1. **Mineralocorticoids**
2. **Glucocorticoids**
3. **Sex hormones**



# Hormones of Adrenal Medulla

**Adrenal medullary hormones are the amines derived from catechol and so these hormones are called catecholamines. Three catecholamines are secreted by medulla:**

- 1. Adrenaline or epinephrine**
- 2. Noradrenaline or norepinephrine**
- 3. Dopamine.**



# Hyperactivity

## Cushing's syndrome

is due to the hypersecretion of glucocorticoids, especially cortisol.

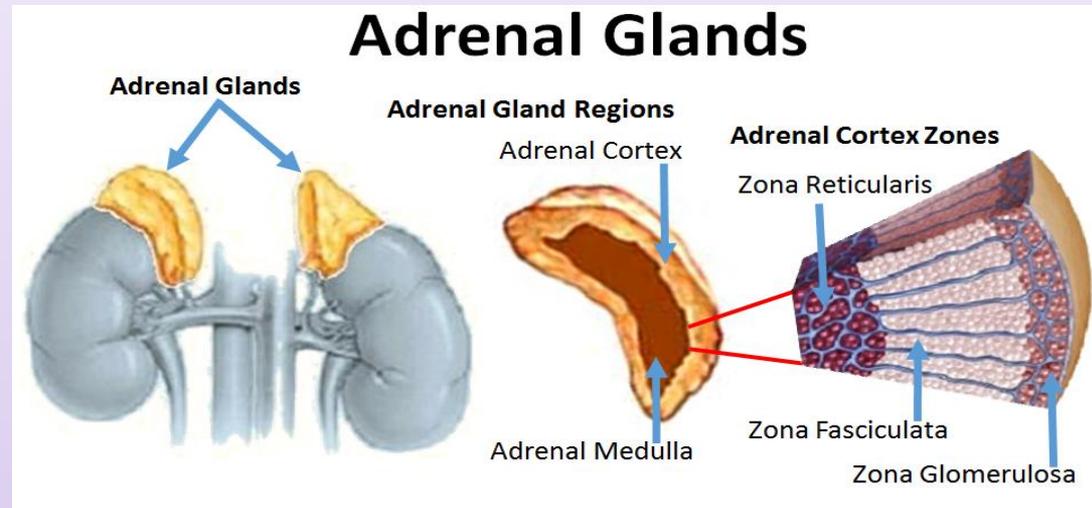
It may be due to either **pituitary origin** or **adrenal origin**:-

1- If it is due to pituitary origin it is known as **Cushing's disease**.

2- If it is due to adrenal origin it is called **Cushing's syndrome**.

# Hyperactivity

**Hyperaldosteronism :- Increased secretion of aldosterone, hyperaldosteronism is classified into two types:**



**Primary hyperaldosteronism which appear due to tumor in zona glomerulosa of adrenal cortex. It is otherwise known as Conn's syndrome**

**Secondary hyperaldosteronism which appear due to extra-adrenal causes such as congestive cardiac failure, nephrosis, toxemia of pregnancy and cirrhosis of liver**

# Hyperactivity

## Adrenogenital syndrome

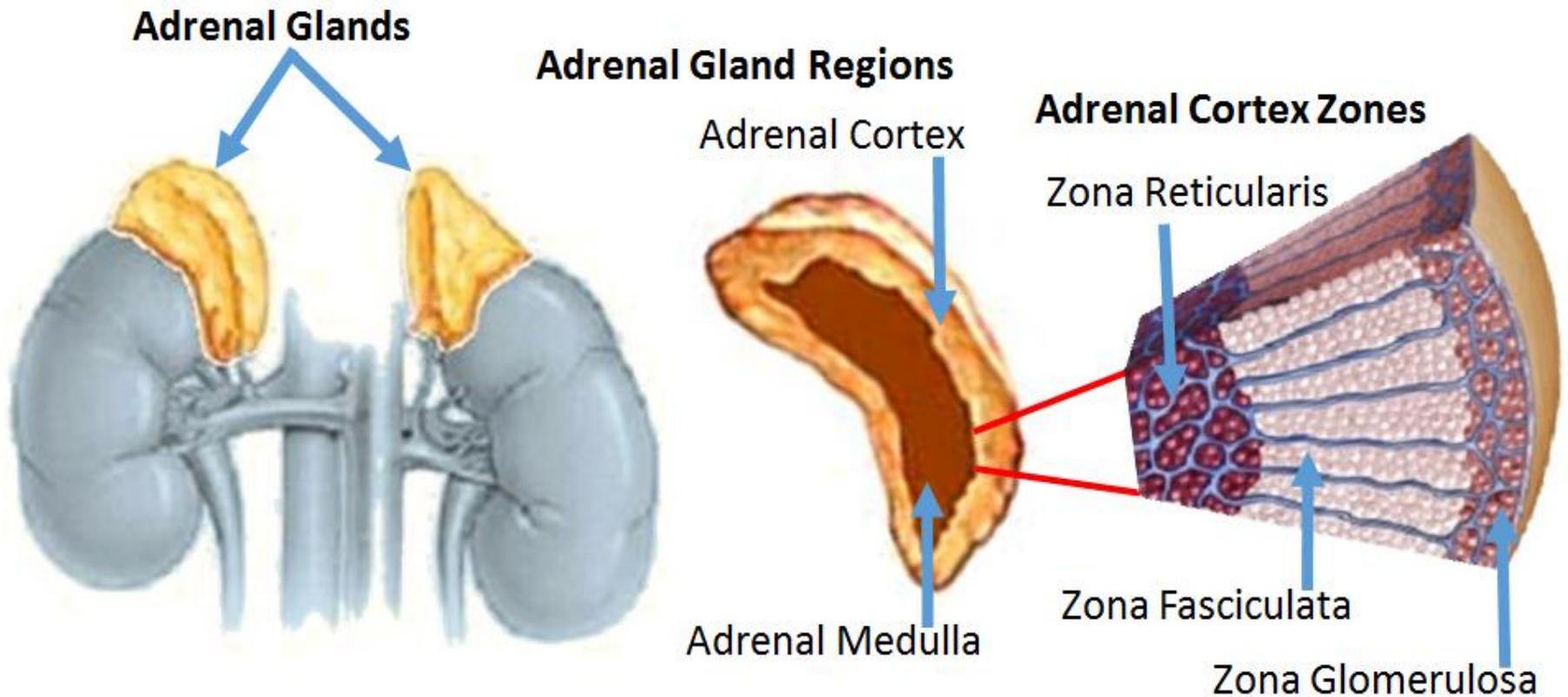
**Under normal conditions, adrenal cortex secretes small quantities of androgens which do not have any significant effect on sex organs or sexual function.**

**However, secretion of abnormal quantities of adrenal androgens develops adrenogenital syndrome.**

**Causes / It is due to the tumor of zona reticularis in adrenal cortex.**

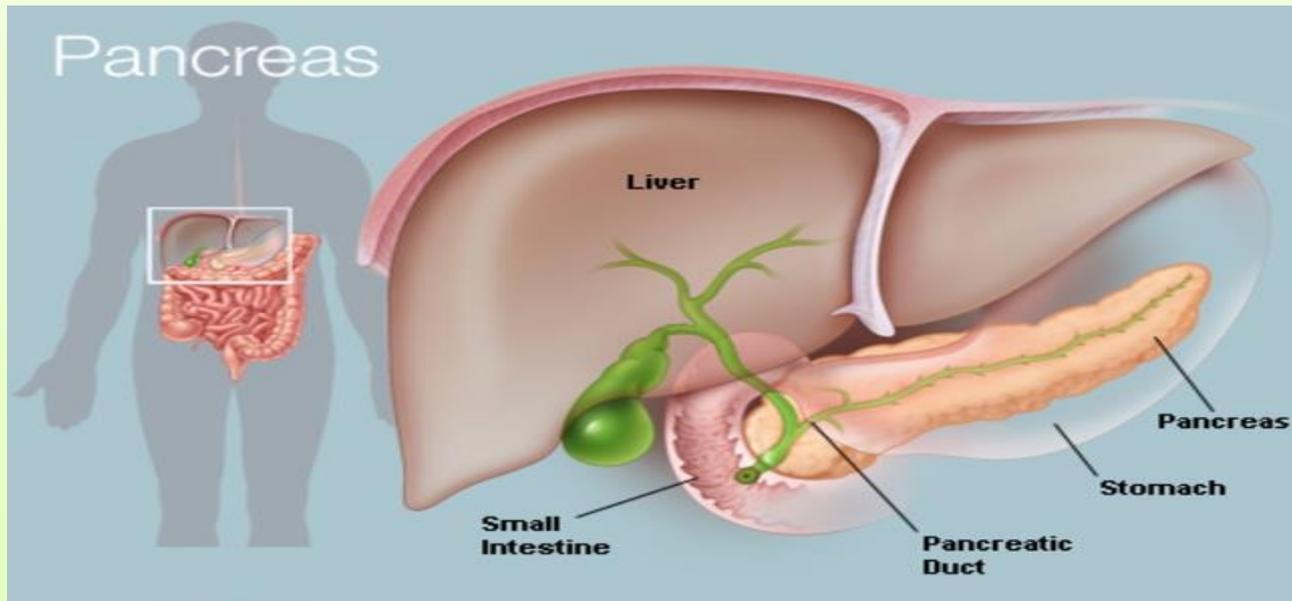
# Adrenal Cortex Zones

## Adrenal Glands



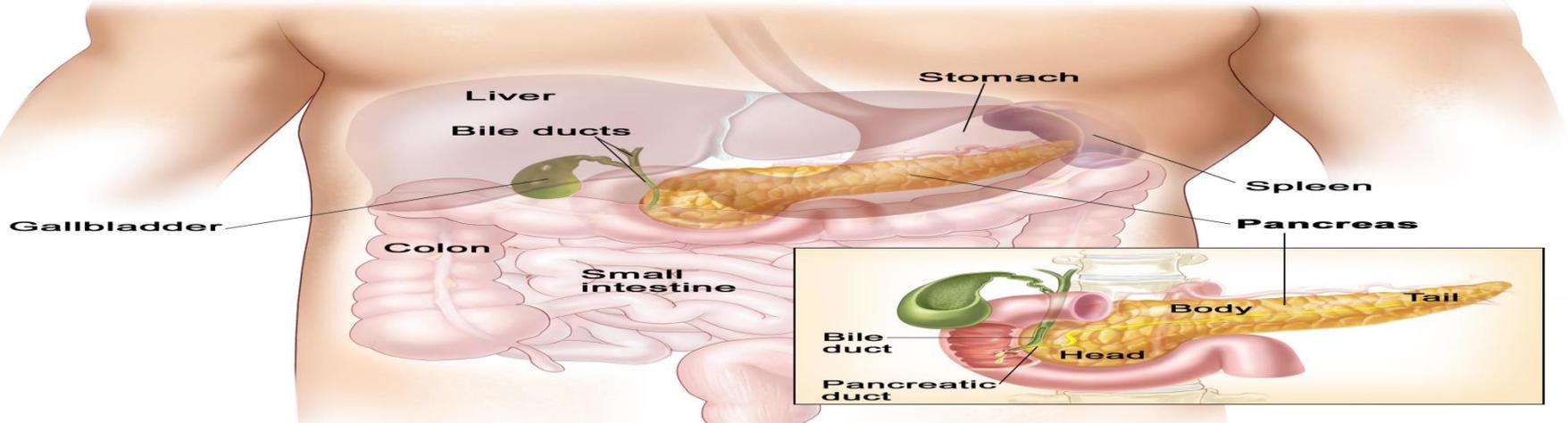
# Pancreas

**It contains both exocrine (GI enzymes) and endocrine cells. Pancreatic islets (islets of Langerhans) are populations of cells:**



**Alpha cells produce glucagon which is a hyperglycemic hormone.**

**beta cells produce insulin which is a hypoglycemic hormone.**



**Other cells produce somatostatin and pancreatic peptide (PP).**

**Regulation of glucagon is by humoral response to decreased circulating glucose**

**while regulation of insulin is by humoral response to increased circulating glucose.**

# **Glucagon effects**

- 1. Breakdown of glycogen to glucose (gluconeogenesis).**
- 2. Synthesis of glucose from lactic acid, fatty acids and amino acids (gluconeogenesis).**
- 3. Release of glucose from liver**

# **Insulin effects**

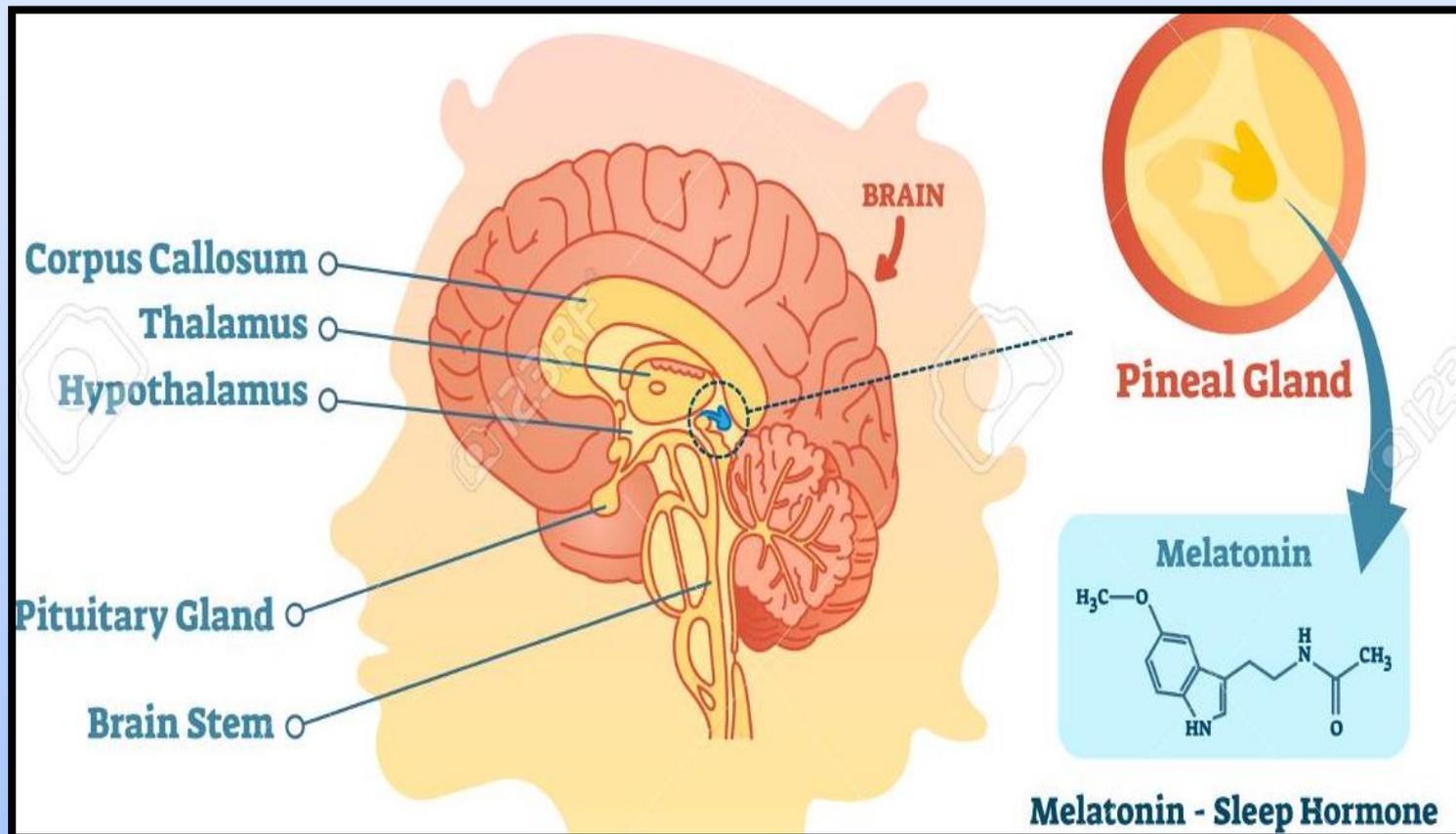
- 1. Lower blood glucose**
- 2. Alter protein and fat metabolism.**
- 3. Inhibits breakdown of glycogen.**

# Hyperinsulinism

**excessive insulin secretion results :  
in hypoglycemia,  
anxiety,  
nervousness,  
tremors,  
weakness,**

# Pineal gland

is located in diencephalic area of brain above the hypothalamus.



# **Pineal gland**

**In human, pineal gland has two types of cells:**

**1- Parenchymal cells, which are large epithelial cells**

**2- Neuroglia cells. In adults, the pineal gland is calcified. But, the epithelial cells remain and secrete the hormonal substance**

**Pineal gland has two functions:**

**1- It controls the sexual activities.**

**2- The parenchymal cells of pineal gland secrete a hormone called melatonin.**

**Actions:**

**acts mainly on gonads. Its action differs from species to species. In some animals, it stimulates the gonads while in other animals it inhibits the gonads. In humans, it inhibits the onset of sexual maturity by inhibiting the gonads.**

# Reference:-

**1-Essentials of Physiology for Dental Students. K Sembulingam and Prema Sembulingam ,2016, four Edition , Jaypee Brothers Medical Publishers.**

**2- Human Physiology. Stuart Ira Fox., TWELFTH EDITION,2017. Published by McGraw-Hill**

THANK

you