# ADRENAL DISORDERS

# PART 1

# اعتلالات الغده الكظريه


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# Proper Body Functions Need:

## *Neuroendocrine System=*

*To communicate Various Organs with Each Other*

## To Maintain

*Constant Internal Environment (= Homeostasis)*

## *Two Systems= Complement Each Other =*

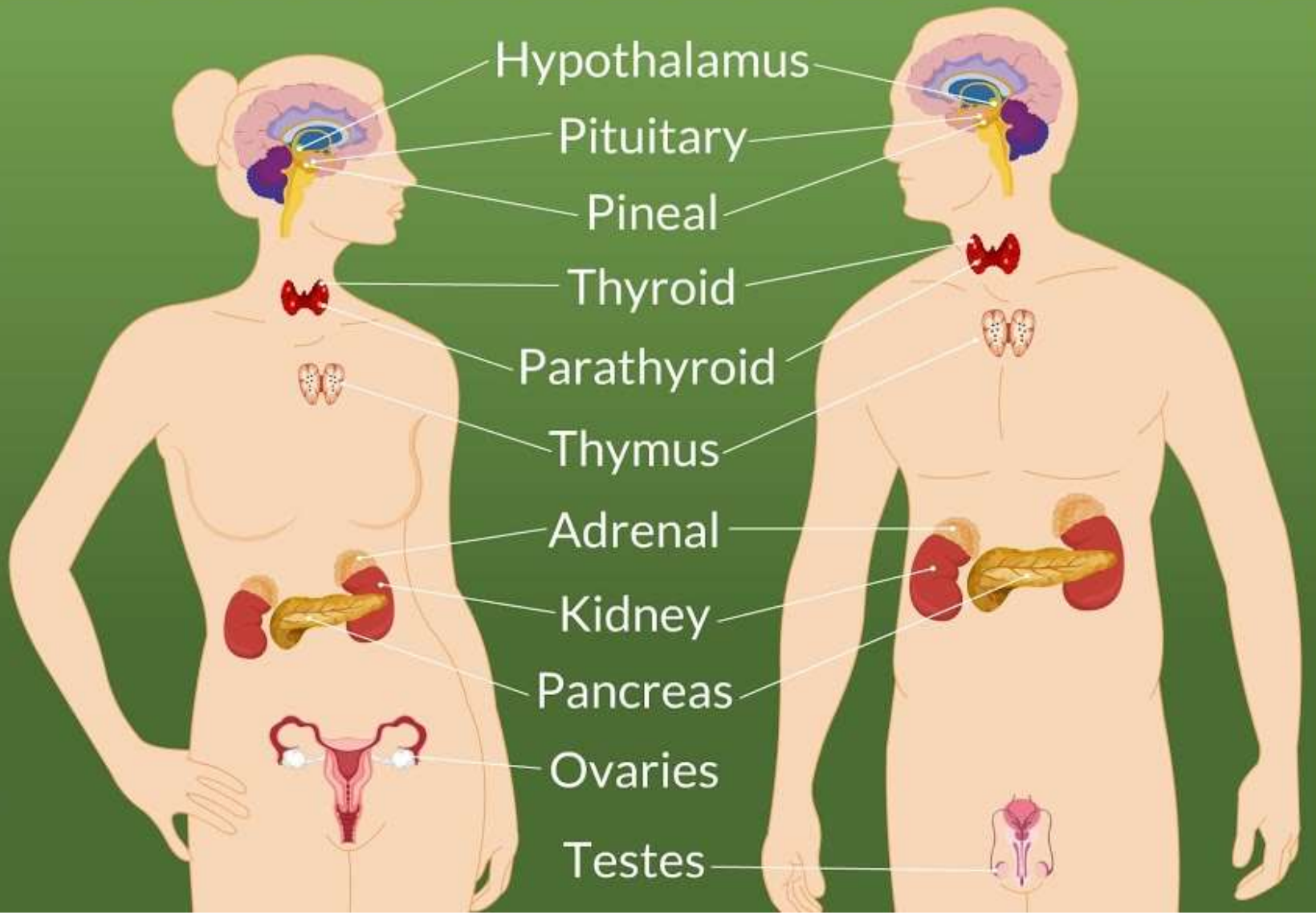
1. **Nervous system=**

**Allows rapid transmission of information between different body regions.**

2. **Hormonal system=**

**Allows longer lasting regulatory actions.**

# ENDOCRINE SYSTEM




# Endocrine Glands

= release Hormones in blood stream >>> carried to their *"target receptors"* that are located either on cell surface or inside the cells…

The interaction of Hormones + Receptors lead to chain of biochemical reactions in the target cell important to cell function or activity.

# Exocrine Glands

= Sweat Glands and Salivary Glands)= release their Secretions to the outside of the body (=sweat) or into a hollow space that is open to the outside (= saliva in the mouth).

# *Mechanism of Action of* Several Classes of Hormones

**=Different general molecular structures**

1. **Steroids**
2. **Amino acid derivatives**
3. **Polypeptides and Proteins**

# Different Mechanisms of Actions

1. **Steroids and amino acid derivatives = can enter the cell**
2. **Polypeptide and Protein hormones = cannot enter cells; But interact with receptors on the cell surface.**

# Hormone Systems

## 1.. Controlled Directly by Metabolic Pathways.

= Insulin and glucagon release by the pancreas directly controlled by Blood sugar levels .

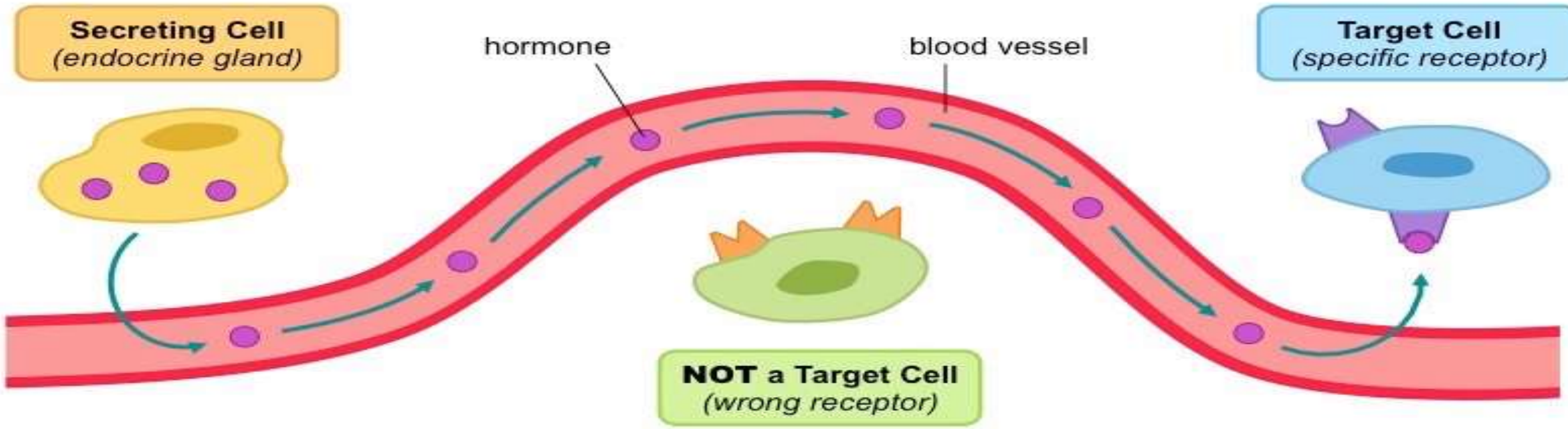
## 2..Produced by Target Glands & Regulated by Pituitary Hormones & in turn by Hypothalamic Hormones

### = Hypothalamic – Pituitary - Adrenal (HPA) axis.

Endocrine Gland

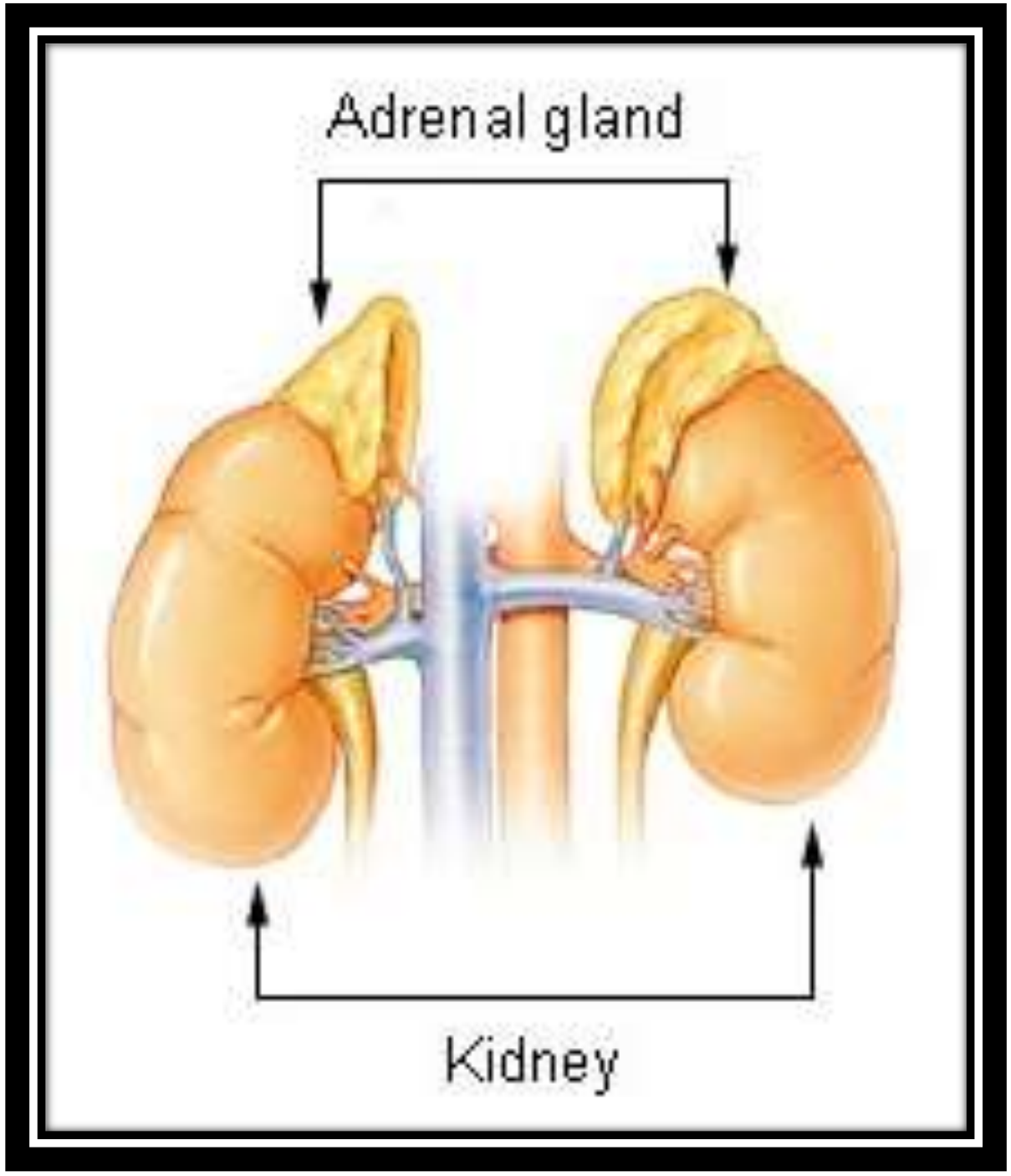
Hormones in bloodstream

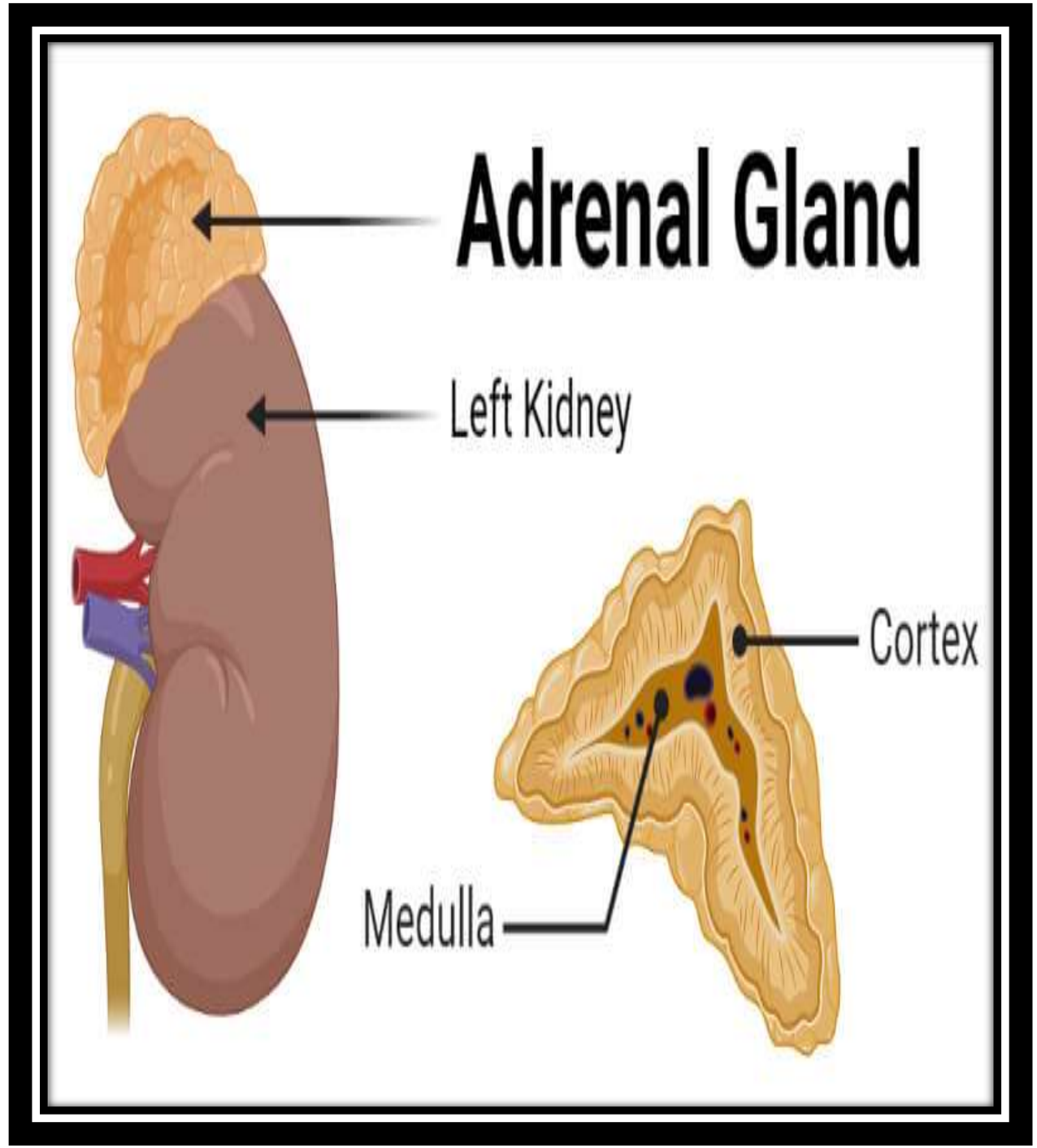
receptors inside target cell or on surface



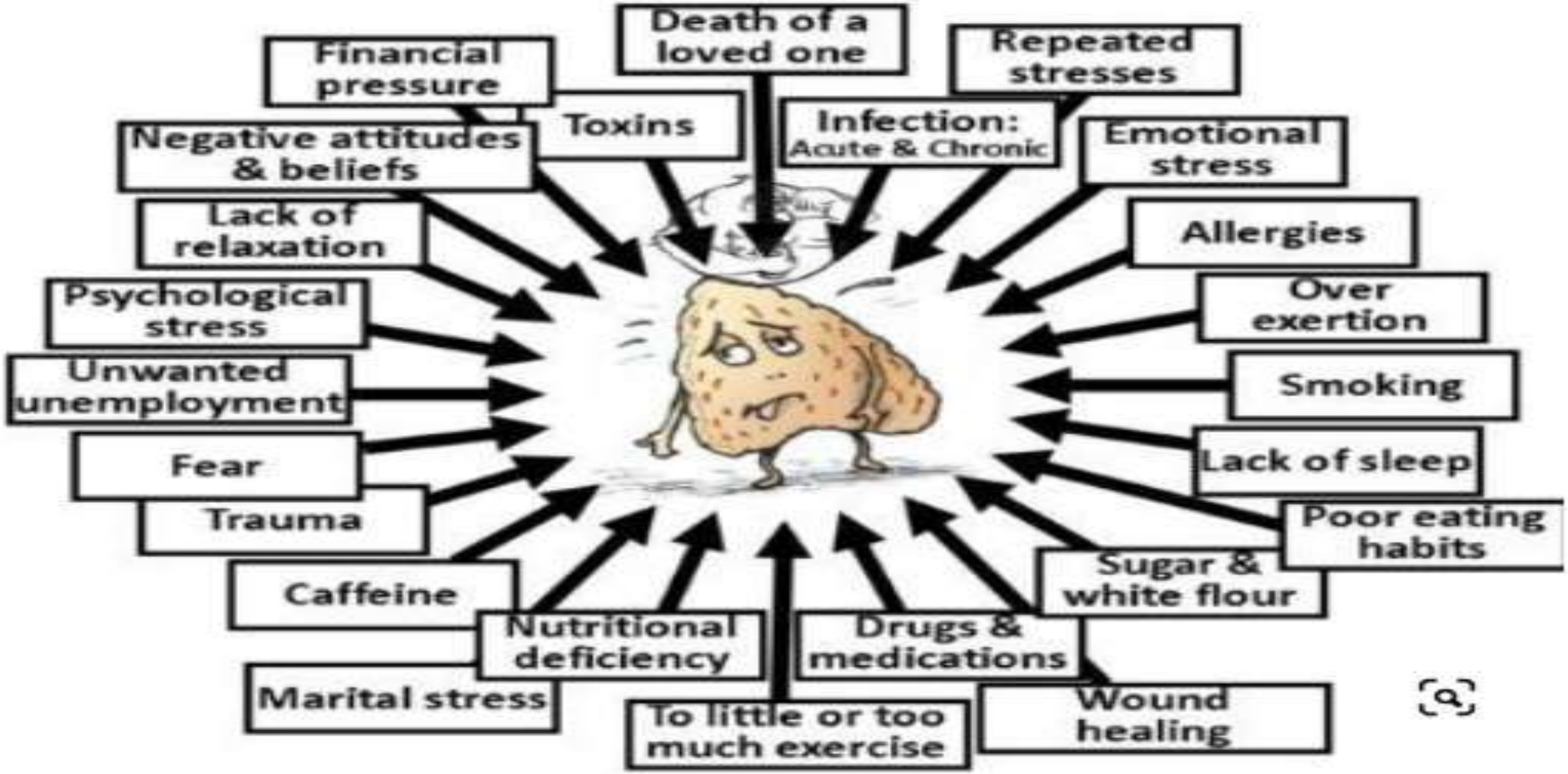
## Adrenal Glands= known as Supra Renal Glands:

- Small, triangular-shaped glands located on top of both kidneys.
- Adrenal glands produce hormones that help regulate the:
- Metabolism
- Immune system
- Blood pressure
- Response to stress
- Other essential functions.


Adrenal gland
Kidney

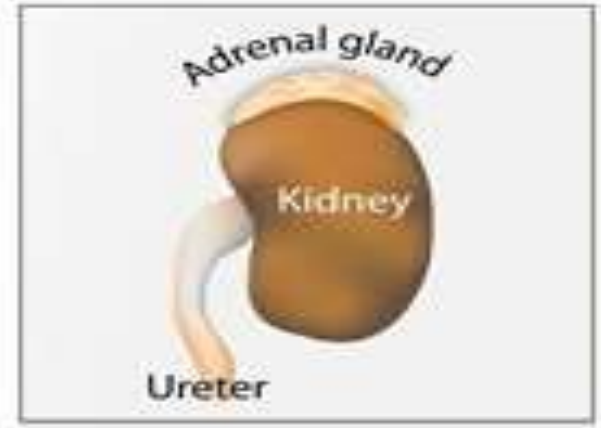

Adrenal Gland
Left Kidney
Cortex
Medulla

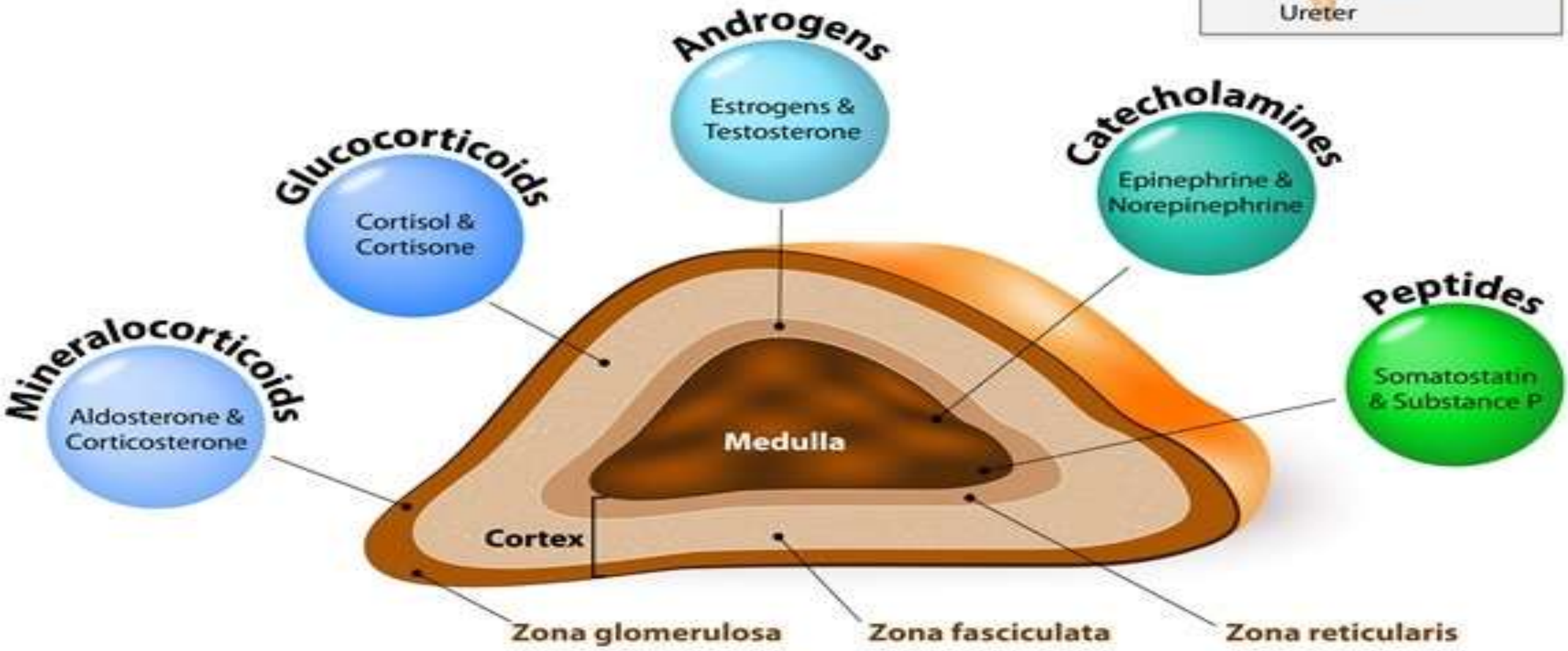
# Factors Affecting The Adrenals



# ADRENAL GLAND

(hormones)



## 1.. Mineralocorticoids:[Aldosterone]

**= Regulates physiologic levels of sodium and potassium**

= controlled primarily by another hormone system= **the renin-angiotensin system.**

# 2

# Glucocorticoids:

## [Cortisol]

- **Highest Levels are in the morning and lowest Levels in the middle of the night.**
- ***Metabolic Activities=*** **Cortisol helps control carbohydrate, protein, and lipid metabolism = cortisol increases glucose levels in the blood =** by stimulating gluconeogenesis and promotes the formation of glycogen (as the storage form of glucose) in the liver.
- ***Protect the body against the deleterious effects of various stress factors =*** including **acute trauma, major surgery, severe infections, pain, blood loss, hypoglycemia, and emotional stress=** lead to very highly increased cortisol levels in the blood.

# 3. Adrenal androgens:

*Mainly the Testosterone.*

**Important in Initiation the Puberty.**

# 4…Human Catecholamine:

*Most circulating Noradrenaline (Norepinephrine) is derived from sympathetic nerve endings.

*Noradrenaline is converted to Adrenaline (Epinephrine) in the Adrenal medulla.

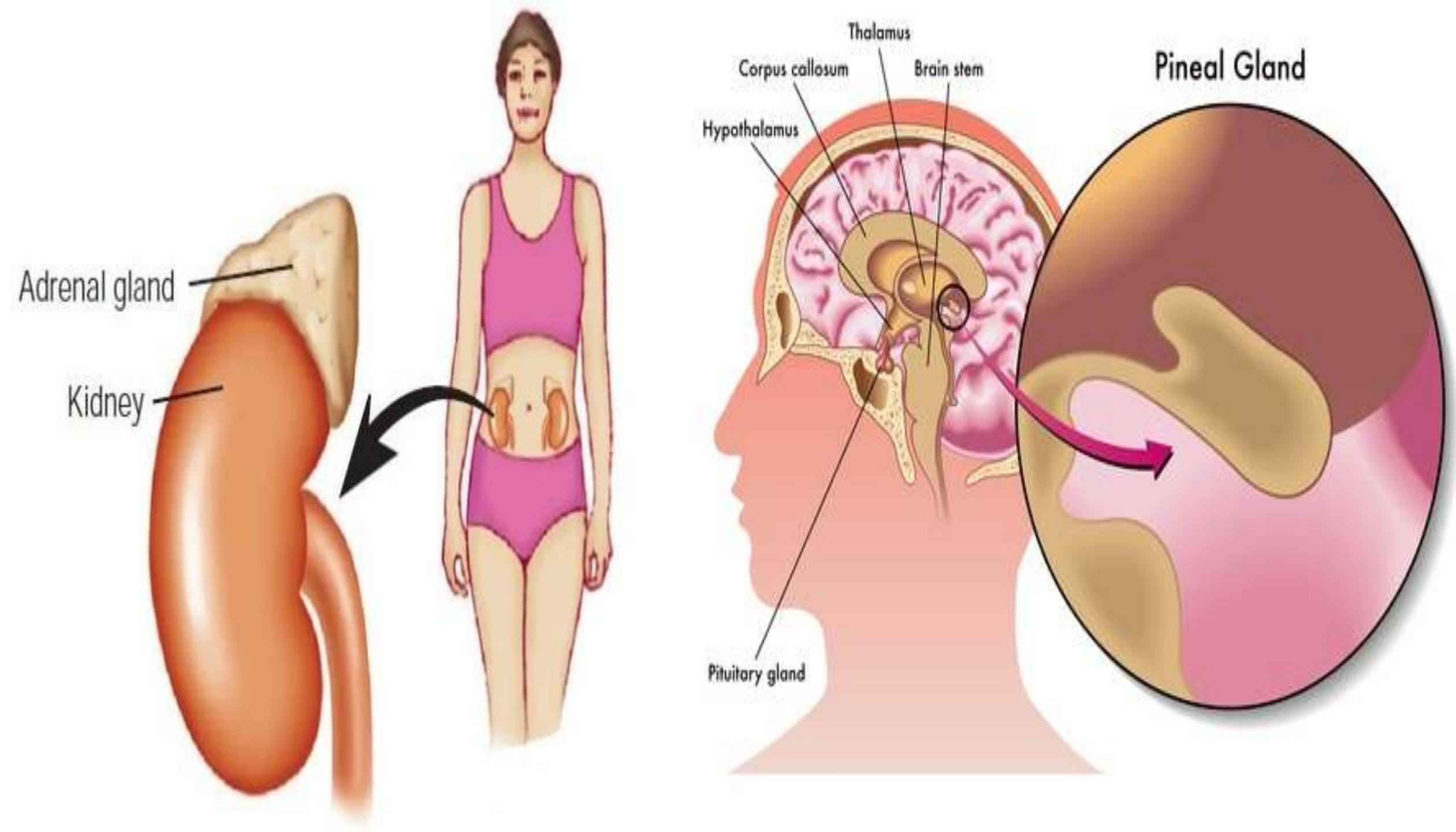
*The **Medulla** thus= Major Source of Circulating Adrenaline.

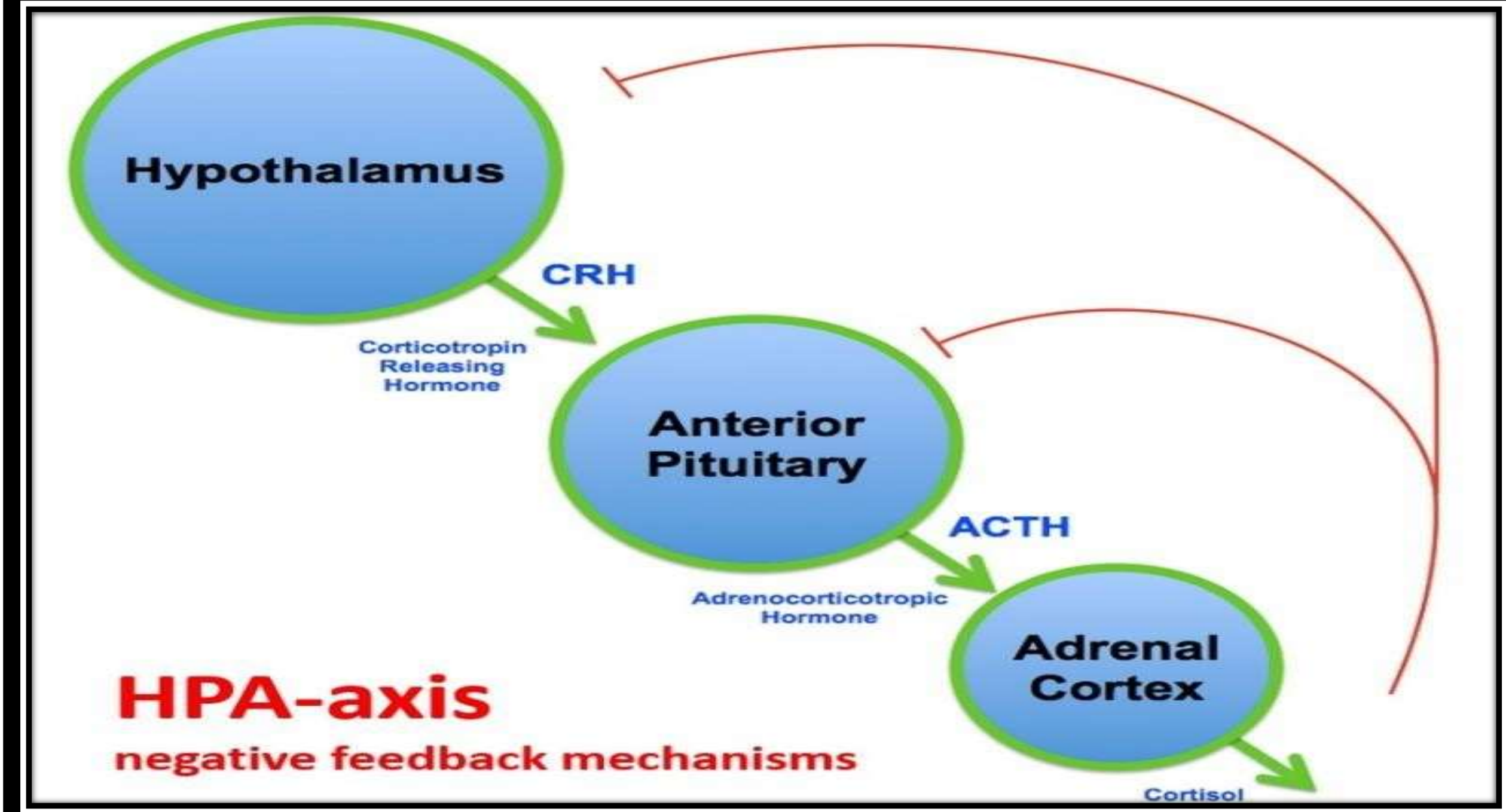
# The HPA Axis

- **The release of CRH (Corticotropin Releasing Hormone) from the hypothalamus initiated activation of the HPA axis = in response to various stimuli, including almost any type of physical or psychological stress.**
- **CRH then stimulates anterior pituitary >>>>>to produce ACTH (Adrenocorticotropic Hormone).>>>>ACTH, in turn, >>>>>>activates adrenal hormone production.**

- **Activity of the HPA axis Regulated by Negative Feedback Mechanisms>>>>>>**

- **So: increased cortisol levels repress تكبت أرسال / تقمع CRH release by the hypothalamus and repress ACTH release by the pituitary.**


Adrenal gland
Kidney
Thalamus
Corpus callosum
Brain stem
Hypothalamus
Pineal Gland
Pituitary gland


Hypothalamus
CRH
Corticotropin Releasing Hormone
Anterior Pituitary
ACTH
Adrenocorticotropic Hormone
Adrenal Cortex
Cortisol
HPA-axis
negative feedback mechanisms

# >>>>[HPA axis Disturbances<<<<<<<<<

# >>>>>>Serious Medical Consequences] <<<<<<<

- **Insufficient hormone production by the adrenal cortex causes Addison's disease.**

- **Excessive glucocorticoid production that results from excess ACTH release (Cushing's syndrome).**

- **Acute and Chronic Alcohol Consumption activate HPA axis, and some drinkers develop pseudo-Cushing's syndrome.**

# Management of Glucocorticoid Withdrawal:

## All Glucocorticoid Therapy Can Suppress HPA Axis

## *(Patients Must Avoid Sudden Withdrawal)*

**Adrenal Insufficiency Crisis due to sudden withdrawal of glucocorticoids occurs only after :**

**1)Prolonged use of glucocorticoids (> 3 weeks)**

**2)Receiving more than 40 mg per day prednisone (> 1 week)**

- ***Steroids withdrawal must be slow because HPA axis may take months to recover.***

Thank you