



SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

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DEPARTMENT OF PHARMACY

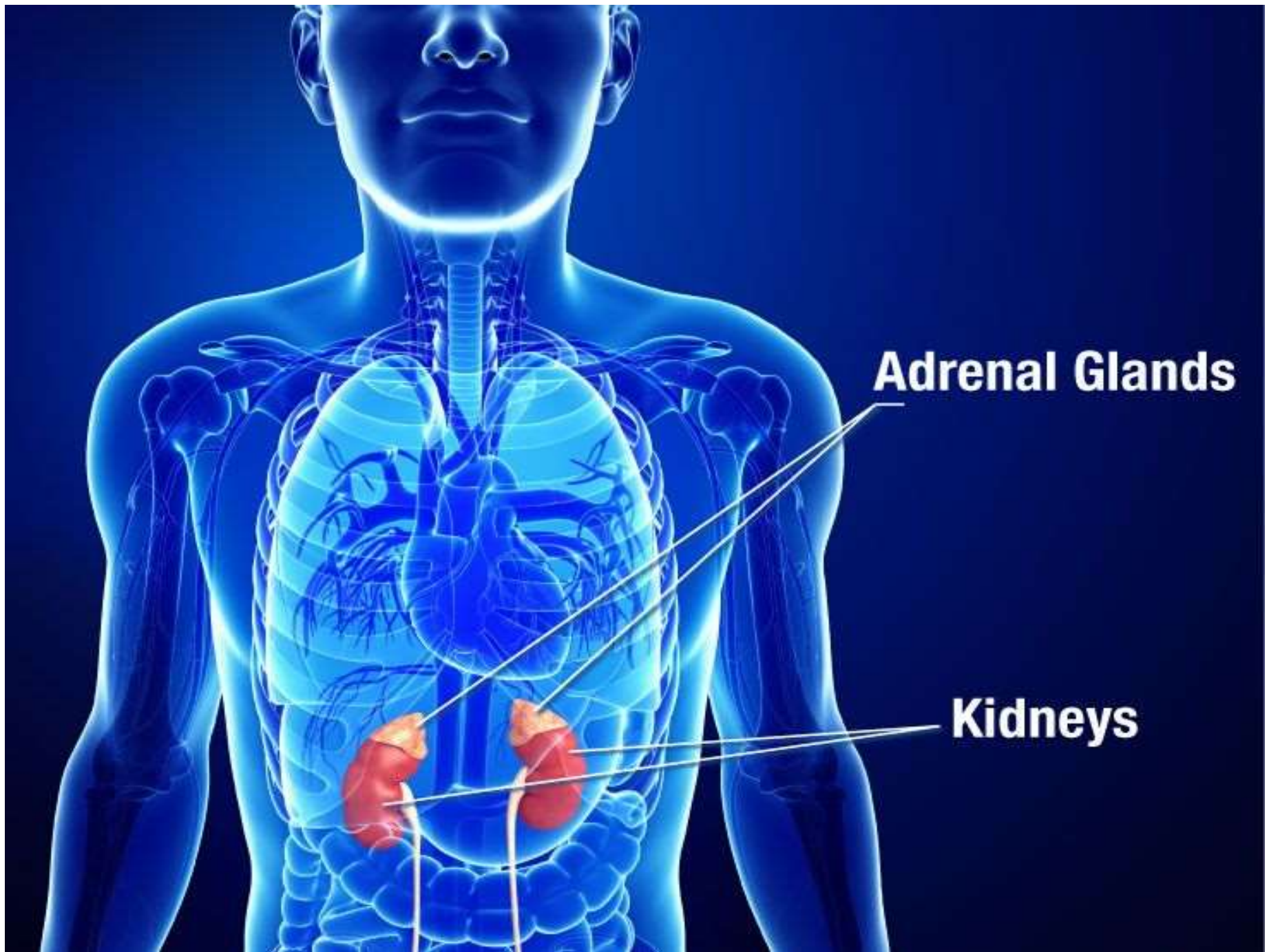
B.PHARMACY, I YEAR/ II SEMESTER

SUBJECT: HUMAN ANATOMY AND PHYSIOLOGY II

UNIT –IV(ENDOCRINE SYTEM)

TOPIC-ADRENAL GLAND





Adrenal Glands

Kidneys

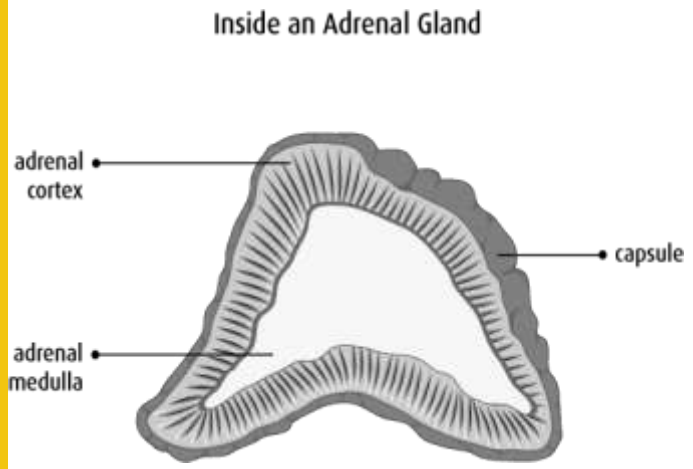
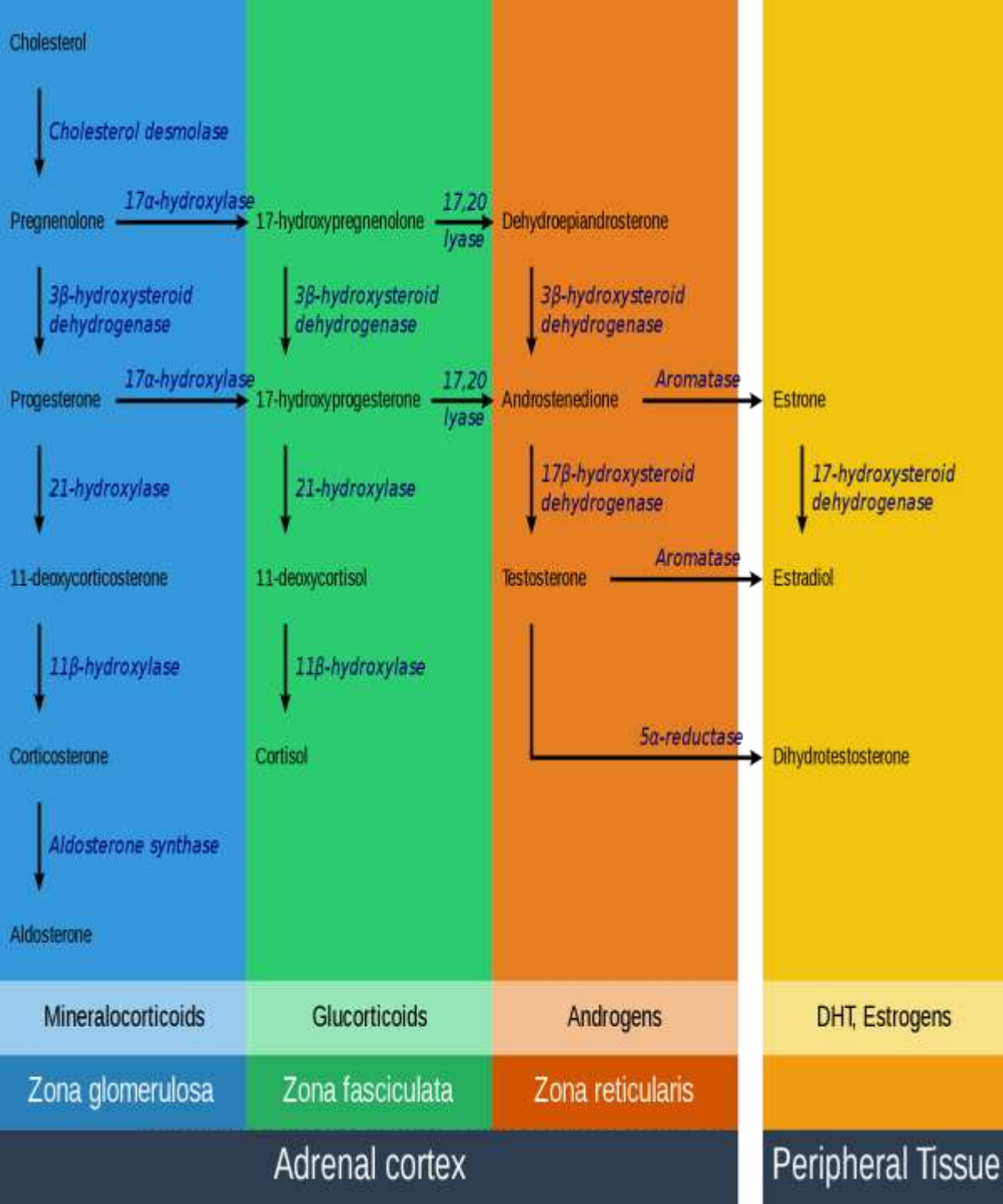
ADRENAL GLAND

Small, triangular glands loosely attached to the kidneys

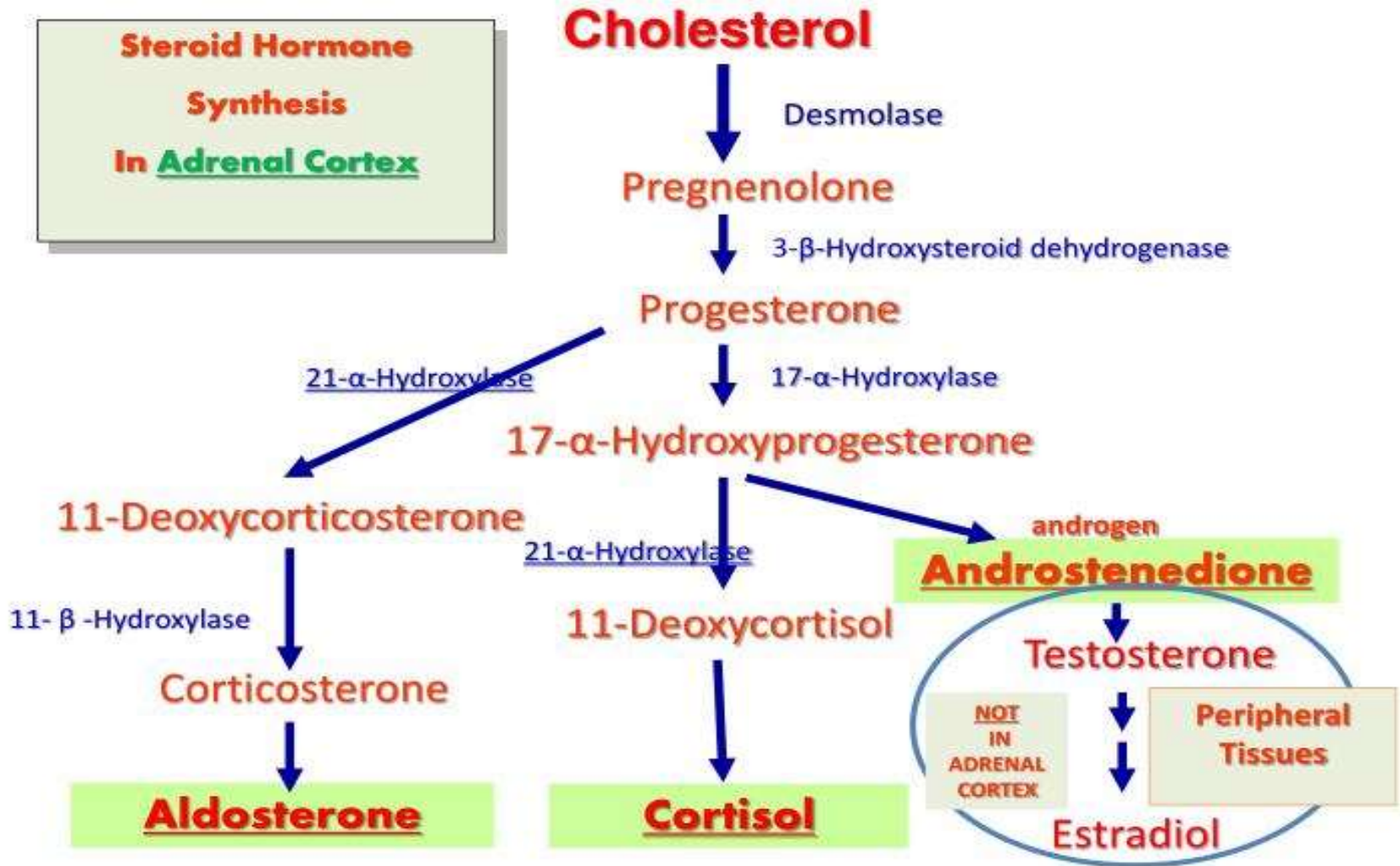
Divided into two morphologically distinct regions

- adrenal cortex (outer)
- adrenal medulla (inner)

The hormones are made in the outer layer of the adrenal gland (adrenal cortex) and in the inner layer of the adrenal gland (adrenal medulla). Each adrenal gland has a covering (capsule).



**Steroid Hormone
Synthesis
In Adrenal Cortex**



Adrenal cortex hormones

The adrenal cortex produces several hormones. The most important are aldosterone (a mineralocorticoid), cortisol (a glucocorticoid), and androgens and estrogen (sex hormones).

- **Aldosterone** helps the kidneys control the amount of salt in the blood and tissues of the body.
- **Cortisol** helps the body manage and use carbohydrates, protein and fat. It also causes changes in metabolism to help the body manage stress, and it suppresses the immune system.

➤ **Androgens** are male sex hormones. The adrenal glands of both men and women make androgens, but in different amounts. Androgens help the organs of the reproductive system grow, develop and function. Androgens also control the development of male physical traits, such as deep voice, body and facial hair growth and body shape. Androgens are needed to make estrogen.

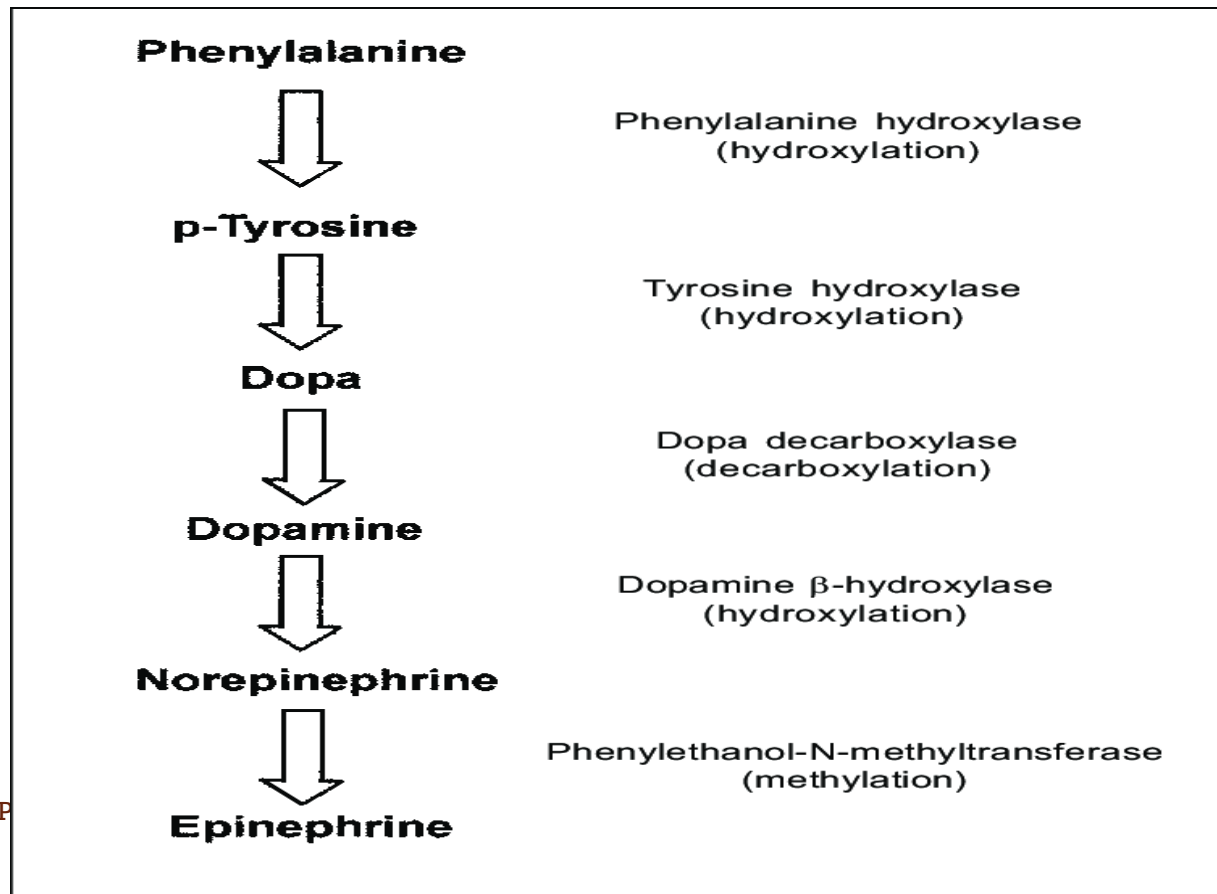
➤ **Estrogen** is a female sex hormone. It controls female reproduction and sexual development, including the development of female characteristics such as the growth of breasts.

Adrenal cortex:

- The adrenal cortex is made up of inner, middle and outer layers. Aldosterone is produced in the outer layer. Cortisol, androgen and estrogen are produced in the inner layer (active zone) and stored in the middle layer (storage zone). In times of stress, the storage zone shrinks and the active zone thickens to secrete more hormones.

Adrenal medulla hormones:

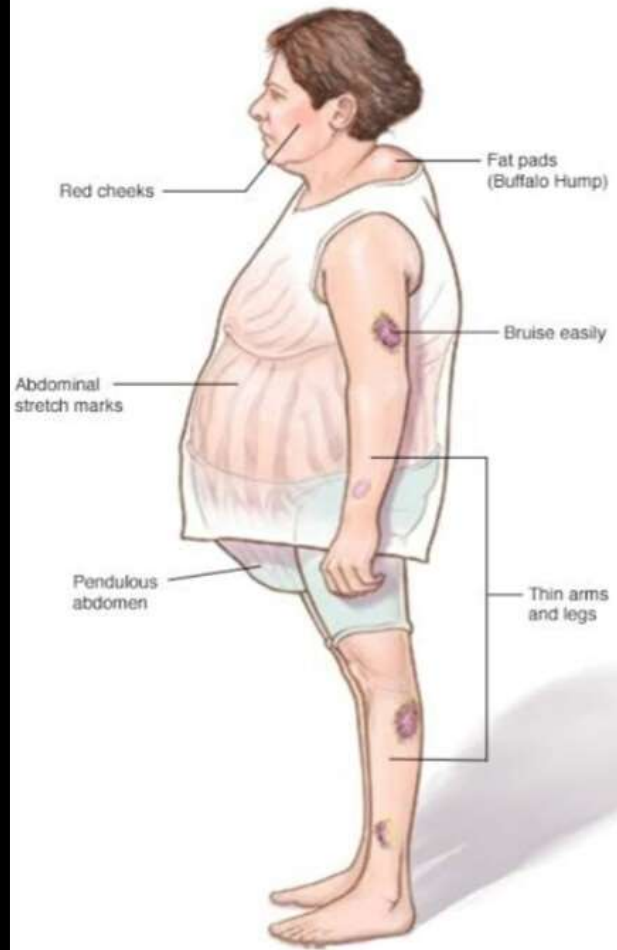
- The hormones produced by the adrenal medulla are called catecholamines. They act as hormones and as neurotransmitters (chemical messengers in the nervous system). They manage the body's response to stress. The 2 more important catecholamines are epinephrine and norepinephrine.



- **Epinephrine (adrenaline)** is released during times of short-term stress such as sudden shock or fear. It increases heart rate, blood pressure and blood sugar levels.
- **Norepinephrine (noradrenaline)** constricts blood vessels. Like epinephrine, it increases heart rate, blood pressure and blood sugar levels.
- The adrenal medulla also produces the protein chromogranin A, which is stored and secreted with epinephrine and norepinephrine.

DISORDERS

ADDISON'S DISEASE



DISORDERS

- **CUSHING SYNDROME**- Excess secretion of adrenal cortex h

Normal



Cushing's



ADDISON'S DISEASE(auto immune disorder)- Inadequate secretion of corticosteroids resulting from partial or complete destruction of the adrenal glands



THANK YOU