Animal physiology

Endocrinology

MSc.Students

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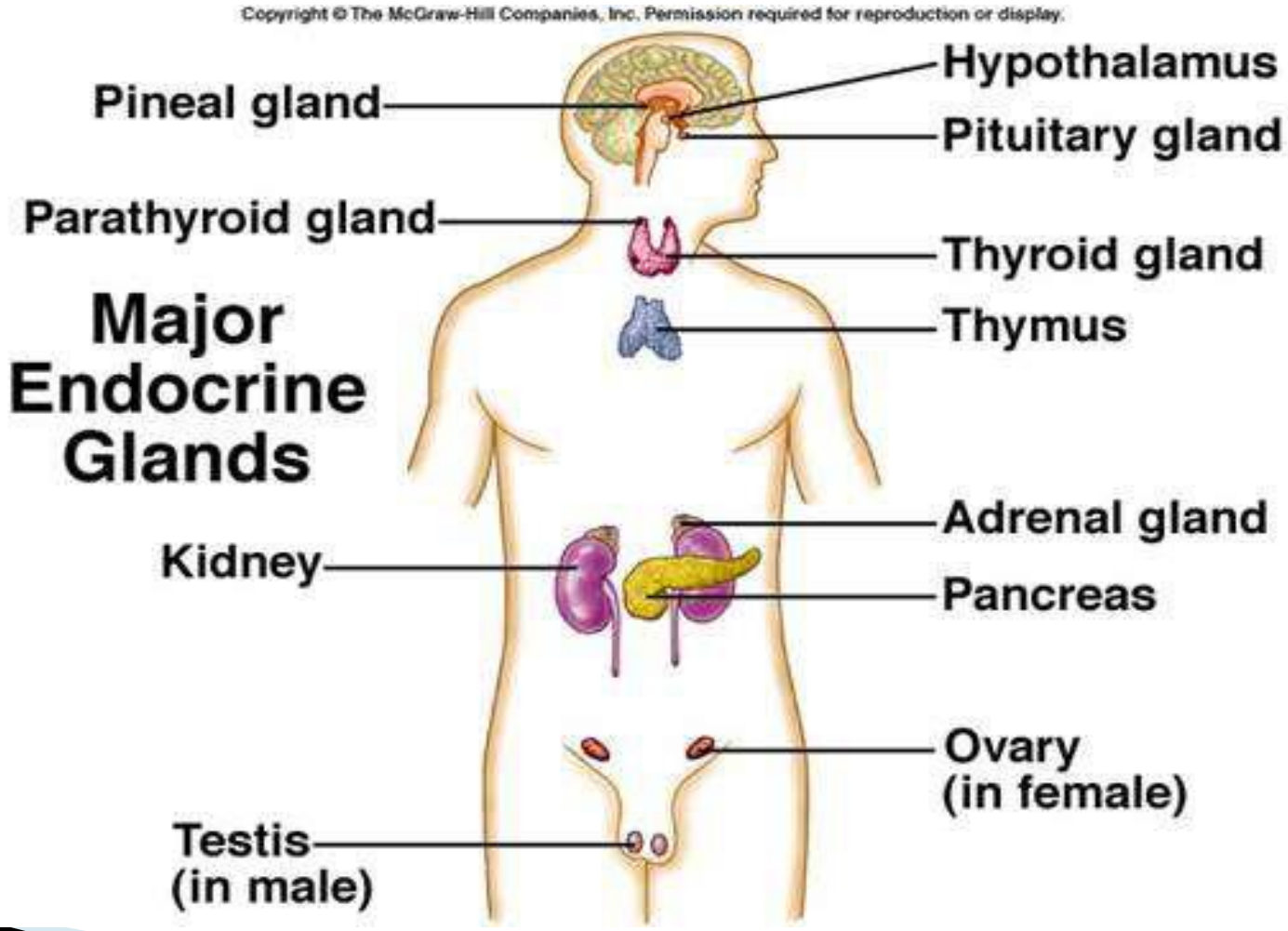
Endocrine glands

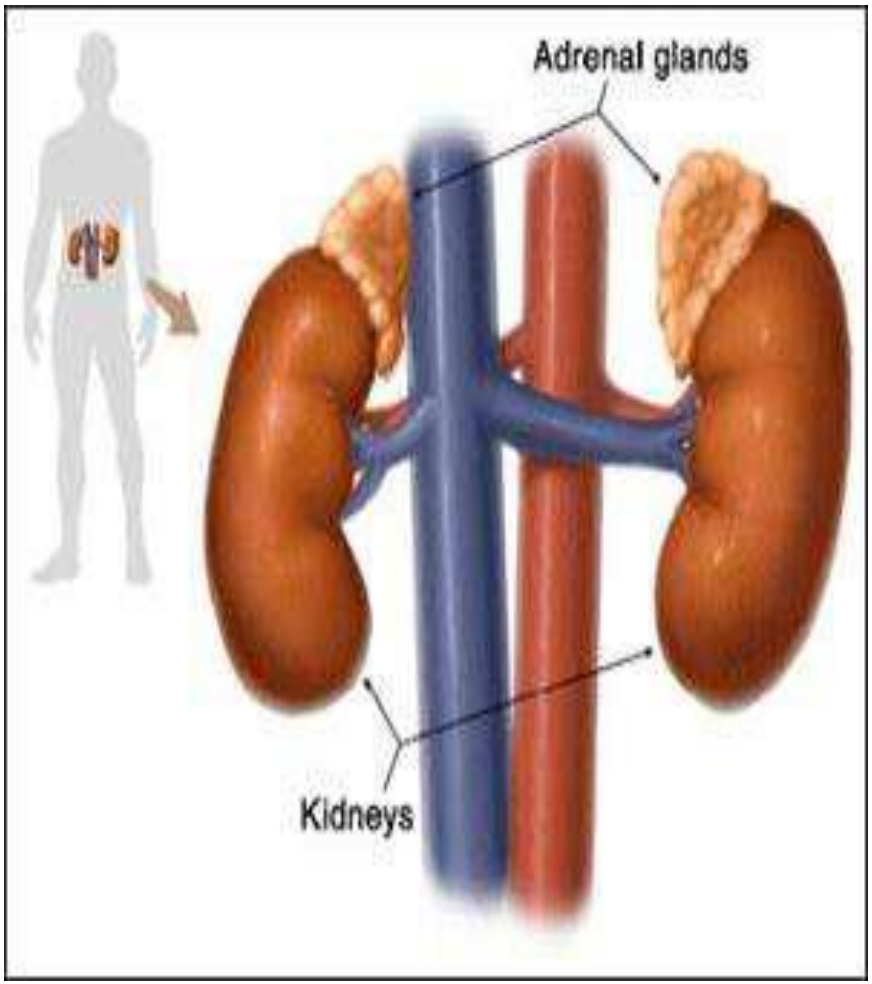


Adrenal gland

Adrenals

(a) Cortex =
Glucocorticoids (hydrocortisone)
Mineralocorticoids (aldosterone)
Sex steroids (dehydroepiandrosterone)

(b) Medulla =
Adrenaline,
Noradrenaline

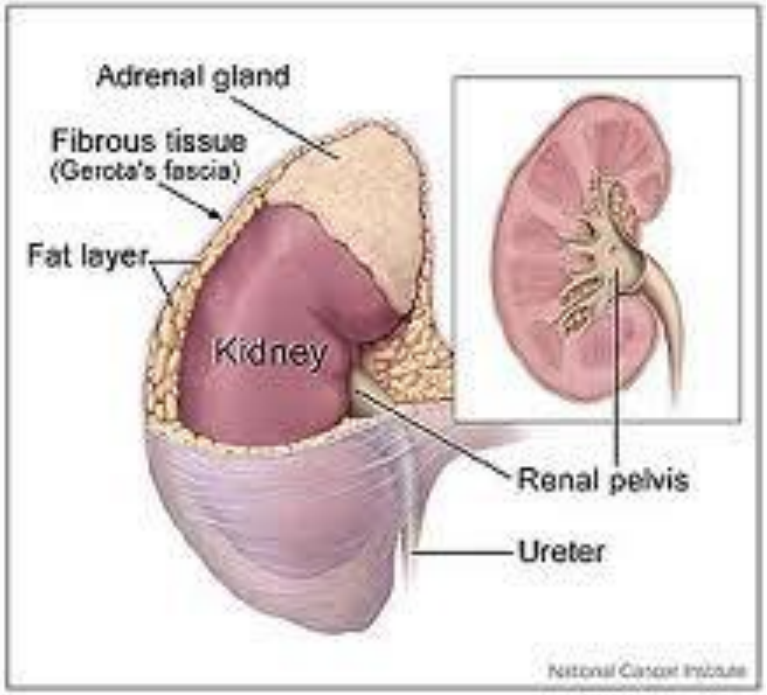


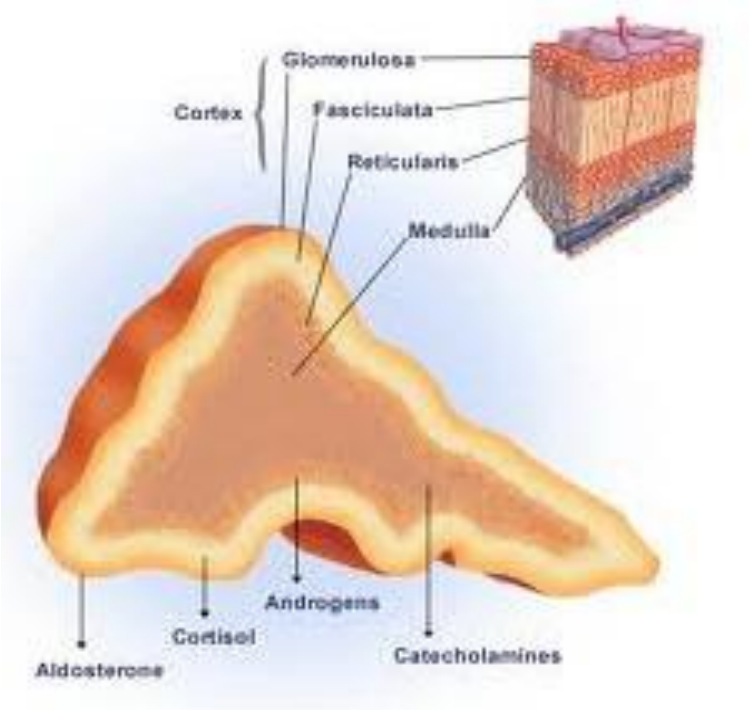
Adrenal gland

- The **adrenal glands (also known as suprarenal**
- **glands) are endocrine glands that sit atop the**
- kidneys; in humans, the right suprarenal gland is
- triangular shaped, while the left suprarenal gland is
- semilunar shaped.
- It is pyramidal in structure and weights about four grams.

- These hormones control many important functions in the body, such as:
- 1. Maintaining metabolic processes, such as managing
- blood sugar levels and regulating inflammation
- 2. Regulating the balance of salt and water
- 3. Controlling the "fight or flight" response to stress
- 4. Maintaining pregnancy
- 5. Initiating and controlling sexual maturation during childhood and puberty

Adrenal gland Anatomy





- Each adrenal gland has two distinct structures, the
- adrenal cortex and the medulla, both of which
- produce hormones.
- The cortex mainly produces cortisol, aldosterone and
- androgens, while the medulla chiefly produces
- epinephrine and norepinephrine

Adrenal cortex

- It is divided into 3 zones in the adult gland:
- 1. Zona Glomerulosa,
- 2. Zona Fasciculata,
- 3. Zona Rericularis.
- ▪ Is divided onto 4 zones in the fetal gland.
- ▪ The three zones of the permanent cortex constitutes only 20% of the fetal gland's size. The remaining zone (fetal cortex) comprises up to 80% of gland's size during fetal life.

Glomerulosa

- The outermost layer, the zona glomerulosa is the
- main site for production of mineralocorticoids,
- mainly aldosterone,

- ・Aldosterone is largely responsible for the longterm
- regulation of blood pressure.

- ・Complete failure to secrete aldosterone leads to death (dehydration, low blood volume).
- ・Hyperalsdosterone states: Contribute to
- hypertension associated with increased blood
- volume.

Fasciculata

- Situated between the glomerulosa and reticularis,the zona fasciculata is responsible for producing glucocorticoids, chiefly cortisol in humans.
- ・The zona fasciculata secretes a basal level of cortisol but can also produce bursts of the
- hormone in response to adrenocorticotropic
- hormone (ACTH) from the anterior pituitary

Reticularis

- The inner most cortical layer, the zona reticularis produces androgens, mainly dehydroepiandrosterone (DHEA) and DHEA sulfate (DHEA-S) in humans

Cortisol effects body responses to stress

- 1.Permissive effect on glucagon
- 2. Memory, learning & mood
- 3. Gluconeogenesis
- 4. Skeletal muscle breakdown
- 5. Lipolysis, calcium balance
- 6. Immune depression
- 7. Circadian rhythms

Cortisol role in diseases and medication

- Use as immunosuppressant
- ·Hyperimmune reactions (bee stings)
- ·Serious side effects
- ·Hypercortisolism (Cushing's syndrome)
- ·Tumors (pituitary or adrenal)
- ·Iatrogenic (physician caused)
- ·Hypocortisolism (Addison's disease)

Adrenal Gland Disorders

- Adrenal gland disorders occur when the adrenal glands don't work properly.
- ・Sometimes, the cause is a problem in another gland that helps to regulate the adrenal gland.
- ・In other cases, the adrenal gland itself may
- have the problem.

Adrenal Gland Disorders

- Cushing's Syndrome
- The treatment for Cushing’s syndrome depends
- on the cause. If the excess cortisol is caused by
- medication, your health care provider can
- change dosages or try a different medication to
- correct the problem.
- ・If the Cushing’s syndrome is caused by the
- body making too much cortisol, treatments
- may include oral medication, surgery, radiation, or a combination of these treatments.