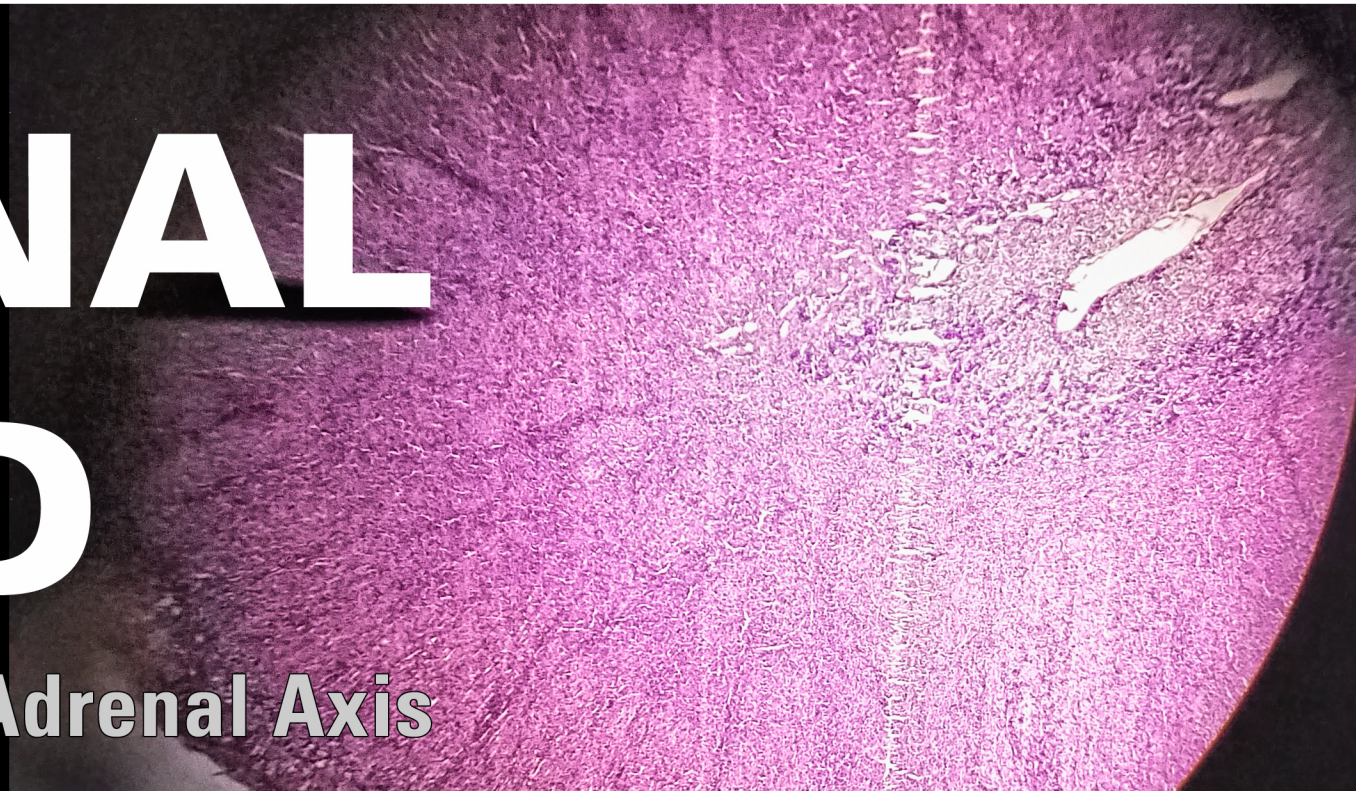


ADRENAL GLAND

Hypothalamic-Pituitary-Adrenal Axis



CELLS: Adrenal Medulla

SECRETION:

- Epinephrine (E, adrenaline)
- Norepinephrine (NE, noradrenaline)

STIMULATED BY:

Sympathetic Nervous System

TARGETS:

skeletal muscle fibers, adipocytes, liver, cardiac muscle fibers.

EFFECTS:

- In skeletal muscles, glycogenolysis.
- In adipose, lipolysis. Increase heart rate and force of cardiac contraction.
- Increase blood pressure.
- Enhance effects of sympathetic nervous system in stress response.

CELLS: Adrenal cortex: Zona Glomerulosa

SECRETION:

- Mineralocorticoids
- Aldosterone (may also be produced in heart and blood vessels).

STIMULATED BY:

Renin-angiotensin-aldosterone pathway (including dehydration, Na⁺ deficiency, or hemorrhage), decrease in blood volume, decrease blood pressure. Decrease in [Na⁺] in blood or decrease in blood volume, or decrease in blood pressure, or rise in [K⁺] in blood.

TARGETS:

Mainly kidney (principle cell of distal nephron), colon (epithelial cells), brain (stimulates centers involved in vascular system), cardiomyocytes, cardiac fibroblasts, and endothelial cells.

EFFECTS:

- Conservation/retention of sodium (prevent loss in urine, sweat, saliva, digestive secretions by increase reabsorption of sodium ions and water by kidneys).
- Elimination of potassium (targets kidney).
- Part of the Renin-angiotensin-aldosterone system (plasma Na⁺ concentration and arterial blood pressure).
- Increases sensitivity of salt receptors of tongue.
- Affect electrolyte composition of body fluids.

CELLS: Adrenal cortex: Zona Reticularis

SECRETION:

- Androgens (weakly in males; in females is converted to estrogen via Cytochrome P450 19A1 Steroid Aromatase).
- Dehydroepiandrosterone sulfate (DHEAS)
- Dehydroepiandrosterone (DHEA)
- Androstenedione
- Testosterone

STIMULATED BY:

Adrenocorticotrophic hormone, ACTH.

TARGETS:

Various body tissues/organs including reproductive organ, skeletal muscles, skin, gastrointestinal tract, genitourinary tract, bone, brain, cardiovascular system, placenta, and adipose tissues.

EFFECTS:

- Growth of axillary/pubec hair.
- Source of estrogens in females post-menopause.
- Libido in females.
- Cognitive function.
- Bone mineralization.
- Protect against mammary epithelial cell proliferation.
- Inhibitory effect on endometrial proliferation.

CELLS: Adrenal cortex: Zona Fasciculata

SECRETION:

Glucocorticoids

STIMULATED BY:

Low blood levels of glucocorticoids.

TARGETS:

Most cells.

EFFECTS:

- Release of amino acids from skeletal muscle (protein breakdown).
- Triglyceride breakdown in adipose.
- Promotes glycogen and glucose synthesis in liver via gluconeogenesis.
- Anti-inflammatory.
- Decelerate tissue repair and wound healing.
- Immunosuppressive.
- Attenuate physiological stress.
- Expression of glucocorticoid receptors.
- Strongly influence phenotype, survival and functions of monocytes/macrophages.
- Increase phagocytic potential.
- Abrogates production of pro-inflammatory mediators.
- Perform key functions in dendritic cells.
- Neutrophilia. Promote/attenuate neutrophil apoptosis.
- Promote T cells migration back to bone-marrow and lymph. Promote/trigger T cell apoptosis.
- Promote B cells.
- Act as immunomodulators.
- Regulate metabolic, cardiovascular, immune, and behavioral processes.
- Regulate magnitude and duration of HPA axis activation.

*Cortisol (hydrocortisone).

Stimulated by ACTH. Targets liver.

Effects: Increase rates of glucose synthesis and glycogen formation; raise blood glucose levels; anti-inflammatory effects (suppress WBC).

*Corticosterone.

Targets many types of tissue.

Effects: Cell signaling; part of C21-steroid hormone metabolism; fuel-energy storage/source; membrane integrity/stability.

*Cortisone (related to Corticosterone).

Targets liver.

Effects: Anti-inflammatory; used in replacement therapy for adrenal insufficiency; converted in liver to active metabolite hydrocortisone; suppression of immune system; cell signaling; fuel-energy storage/source; membrane component; membrane integrity/stability.