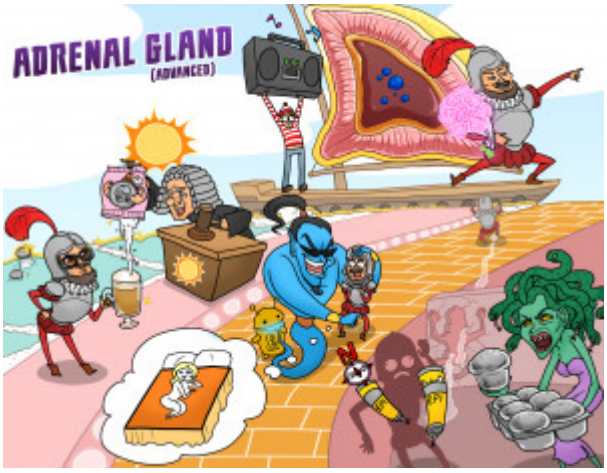
Adrenal Gland (Advanced)

The adrenal glands are endocrine glands that sit on top of the kidneys and take part in the stress response pathway, secondary production of androgens, and blood osmoregulation. The adrenal cortex runs along the outer edge of the adrenal gland and is the primary section involved in stress response. The cortex has three layers, the zona glomerulosa, zona fasciculata, and zona reticularis. The outermost layer, the zona glomerulosa, releases aldosterone, which increases water and salt retention in the kidneys. The middle layer, the zona fasciculata, produces and secretes glucocorticoids, including cortisol, which is involved in glucose metabolism and the stress response mechanism. The adrenal cortex is also a secondary source of male sex hormones, as the innermost layer, the zona reticularis, produces DHEA and androstenedione, which are sources of conversion to DHA and testosterone. For females, the zona reticularis is the only source of male sex hormones, while males can also produce them in the testicles. The adrenal medulla is at the center of the adrenal gland, and is connected to the sympathetic division of the autonomic nervous system. Within it are chromaffin cells, which release epinephrine, which takes part in regulating metabolism, heart rate, vasodilation and vasoconstriction. The chromaffin cells of the adrenal medulla also releases norepinephrine, which affects the amygdala, and impacts attention and responses. Both norepinephrine and epinephrine are part of the "fight-or-flight" response of the sympathetic nervous system.



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Characteristics

Adrenal Cortex
Adrenal Cortez
The adrenal cortex runs along the outer edge of the adrenal gland and affects the stress response through production of a variety of hormones. The cortex can be broken into three layers, the zona glomerulosa, the zona fasciculata, and the zona reticularis.

Zona Glomerulosa
Glowing-roses
The outermost layer of the adrenal cortex is called the zona glomerulosa. Here, aldosterone is produced.

Aldosterone
Aldo-stereo
Aldosterone is a steroid hormone that affects water and salt regulation in the body. It increases sodium ion and water reabsorption in the kidneys.

Zona Fasciculata
Fashion-latte
The zona fasciculata is situated between the glomerulosa and reticularis, and is responsible for synthesizing glucocorticoids. Cortisol accounts for the majority of all glucocorticoid activity and is therefore most important clinically.

Cortisol
Court-of-Sol
Cortisol is a steroid hormone that binds to the glucocorticoid receptor. It is the main hormone involved in the regulation of glucose metabolism and the stress-response mechanism.

Zona Reticularis
Rectangular-bed
The zona reticularis is the innermost layer of the adrenal cortex. The cells within this layer produce androgens, such as androstenedione, which is a precursor to testosterone.

Androgens
Android-genie
The zona reticularis produces male cortical sex hormones that affect the development of male secondary sexual characteristics in males. These cortical sex hormones are also present in females, and examples include dehydroepiandrosterone (DHEA), along with androstenedione (a precursor to testosterone).

Adrenal Medulla
Adrenal Medusa
The adrenal medulla is located in the center of the adrenal gland and is connected to the sympathetic division of the autonomic nervous system.

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Chromaffin Cells

Chrome-muffin

The cells of the adrenal medulla are called chromaffin cells, and are derived from neural crest cell origin. These cells are innervated by the splanchnic nerve and secrete norepinephrine and epinephrine into the bloodstream.

Epinephrine & Norepinephrine

North-epi-pen and Epi-pen

Norepinephrine is a stress hormone that affects the amygdala, impacting attention and responses. Epinephrine is a hormone and neurotransmitter that has many functions including regulating metabolism, heart rate, vasodilation and vasoconstriction. These catecholamines are secreted by the chromaffin cells of the adrenal medulla, affecting the "fight or flight" response of the sympathetic nervous system.

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