

Hormones

Intercellular messengers and the molecular logic of biological balance.



Essential Vocabulary

Intercellular Messenger

Molecules produced by endocrine glands that travel via the bloodstream to act on specific target sites.

Endocrine Gland

Ductless glands that pour hormones directly into the blood stream for rapid, systemic transport.

Glucocorticoid

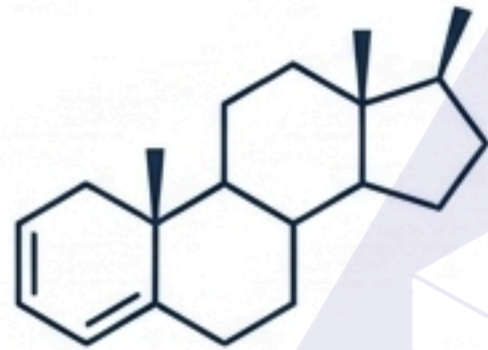
A steroid hormone from the adrenal cortex that controls carbohydrate metabolism, modulates inflammation, and mediates stress reactions.

Mineralocorticoid

A steroid hormone from the adrenal cortex that controls the level of excretion of water and salt by the kidney.

Chemical Classification of Hormones

Hormones are structurally diverse, falling into three primary chemical architectures:



Steroids

Examples: Estrogens, Androgens (Testosterone, Estradiol, Progesterone).

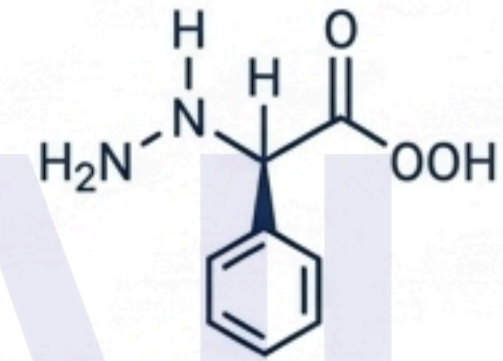
Source: Produced primarily by the adrenal cortex and gonads.



Polypeptides

Examples: Insulin, Endorphins.

Role: Includes critical systemic regulators (e.g., insulin for blood glucose).



Amino Acid Derivatives

Examples: Epinephrine, Norepinephrine, Thyroxine.

Note: Thyroxine is specifically an iodinated derivative of the amino acid tyrosine.



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The Opposing Pull: Blood Glucose

INSULIN (Polypeptide)

Trigger: Released in response to a rapid rise in blood glucose level.

Action: Pulls glucose levels DOWN to baseline.

**Optimal Blood
Glucose Limit**

GLUCAGON (Polypeptide)

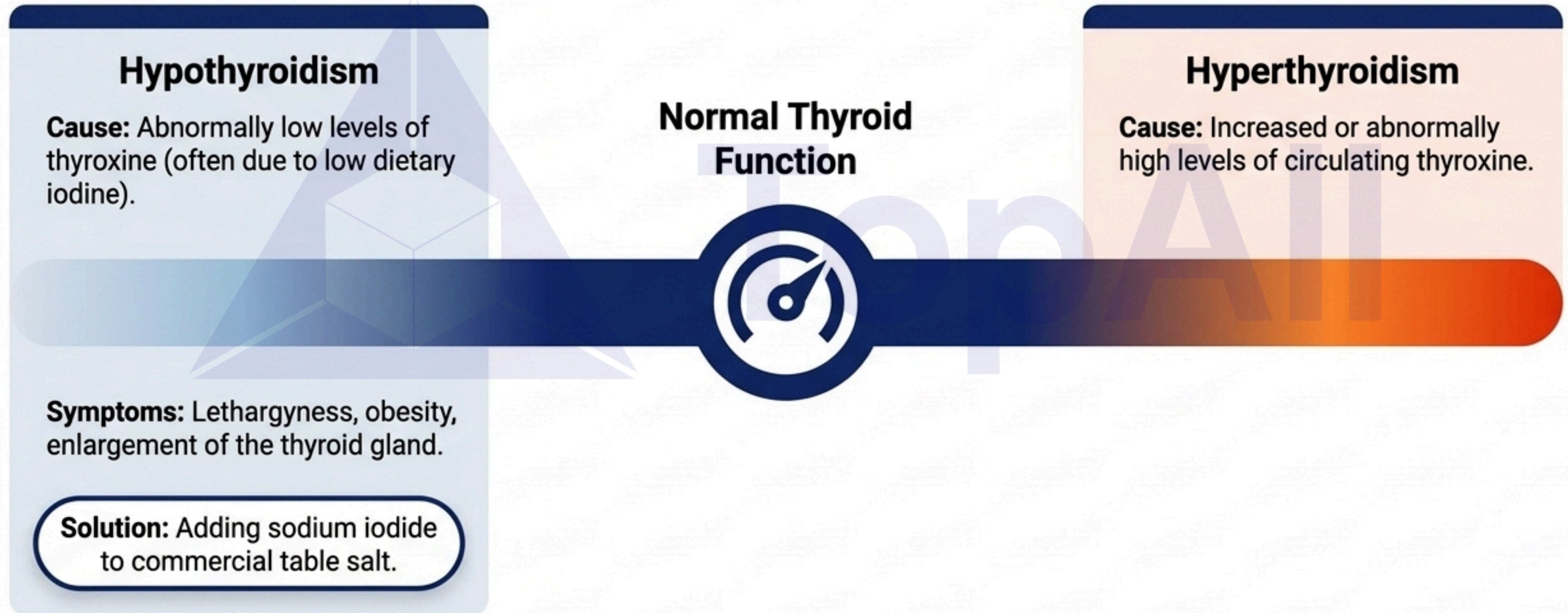
Trigger: Released in response to a drop in blood glucose level.

Action: Pulls glucose levels UP to baseline.

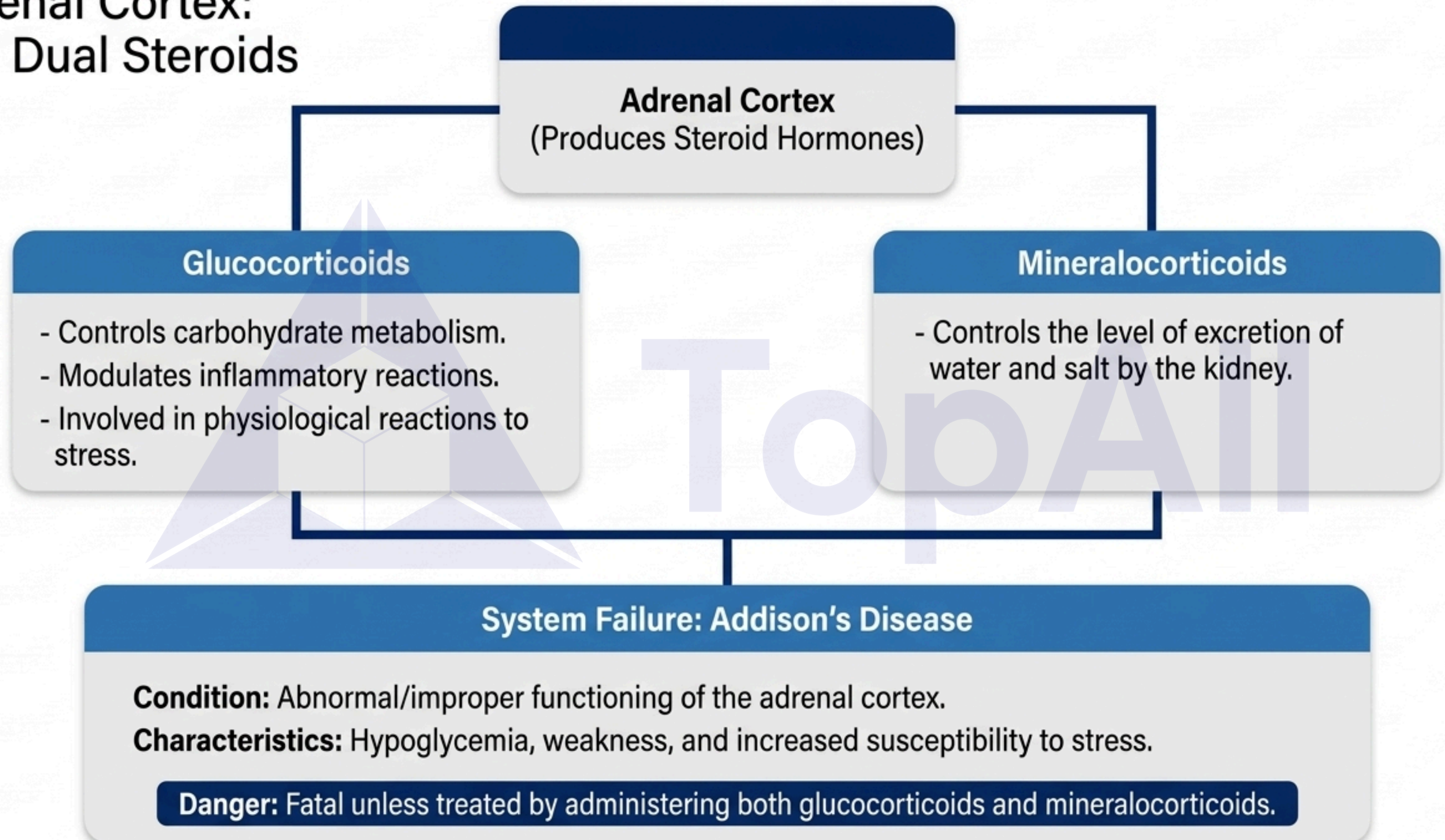
Together, these two hormones regulate and maintain the blood glucose level within a very narrow, safe limit.

The Thyroxine Spectrum

Thyroxine is an iodinated derivative of tyrosine, produced in the thyroid gland.



Adrenal Cortex: The Dual Steroids



Concept Check

⚠ Watch for this: Merging Opposing Pairs

Exam questions often try to trick you by mixing the functions of the body's opposing hormone pairs. Keep them strictly separated in your mind:

Pair 1: Insulin vs. Glucagon	→	Strictly manages Blood Glucose.
Pair 2: Glucocorticoids vs. Mineralocorticoids	→	Manages Carbohydrate Metabolism/Stress vs. Water/Salt Excretion.

Note: A drop in blood sugar (hypoglycemia) is a symptom of Addison's disease, but Insulin and Glucagon remain the primary direct regulators of glucose, not the adrenal steroids.

Key Takeaways

- Hormones act as intercellular messengers and are classified into three distinct chemical groups: steroids, polypeptides, and amino acid derivatives.
- They frequently operate in opposing pairs (like insulin and glucagon) to maintain biological homeostasis, and glandular failure leads to severe systemic conditions (like Addison's disease or hypothyroidism).



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