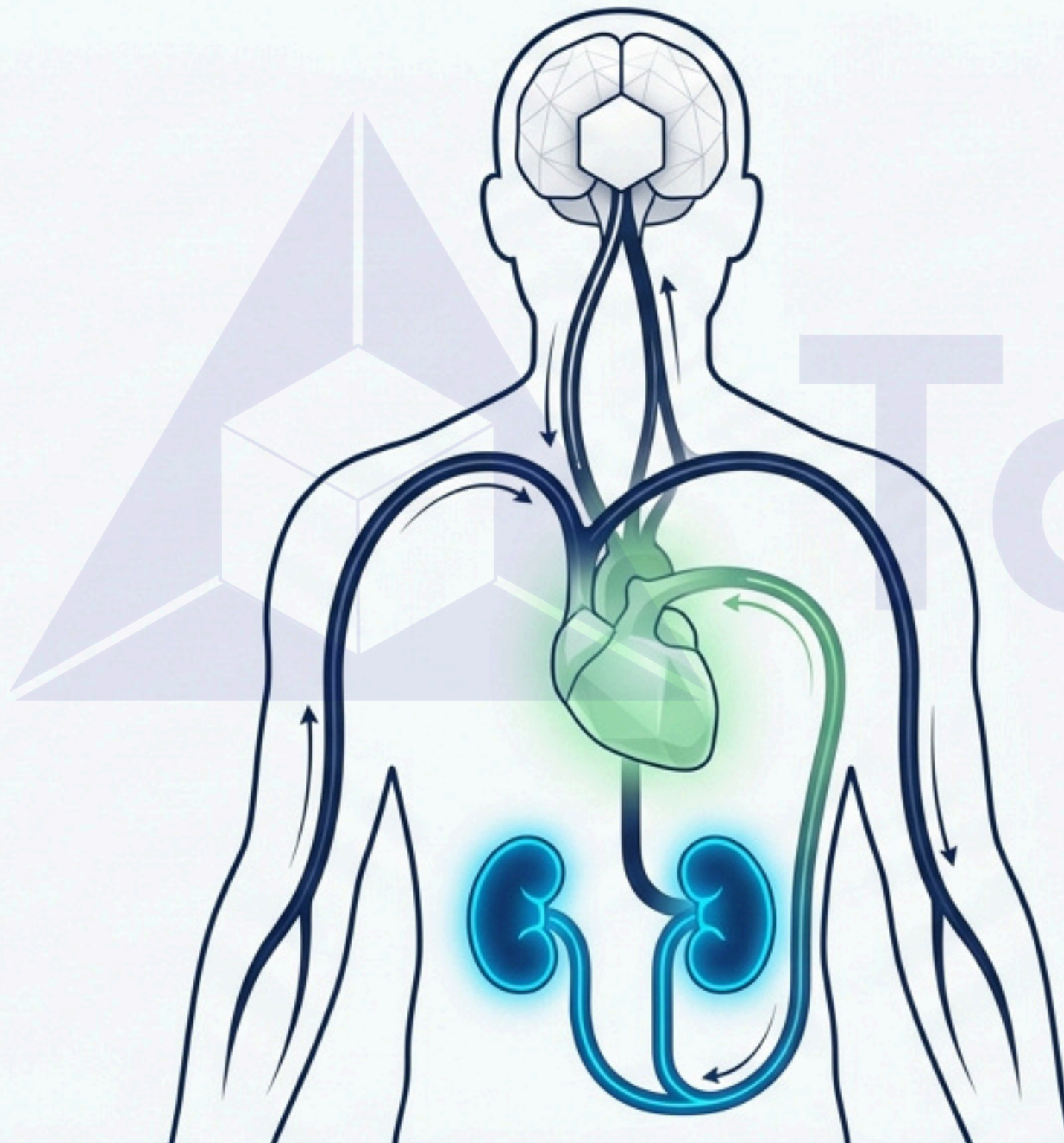
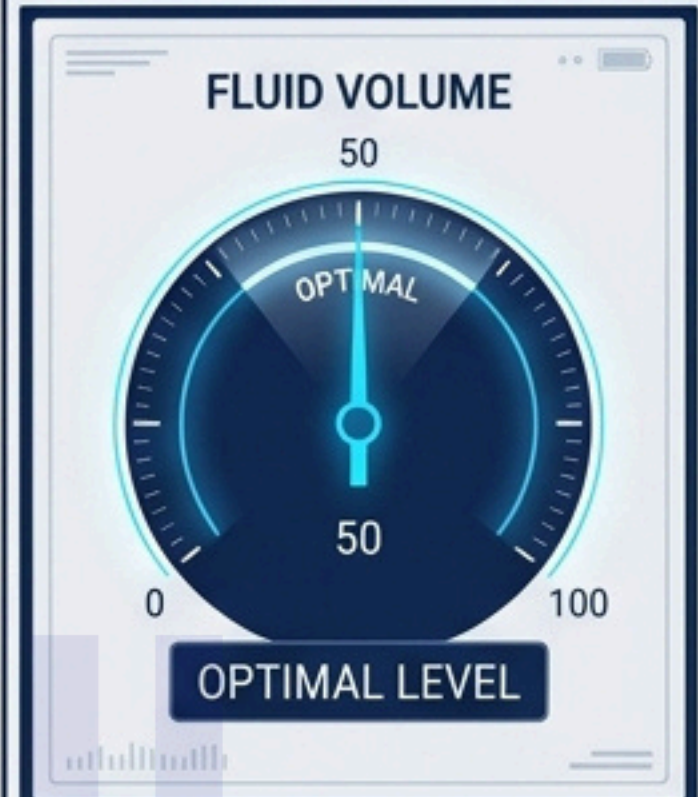


ADH, Renin and ANF Explained

The Body's Hydraulic Control System



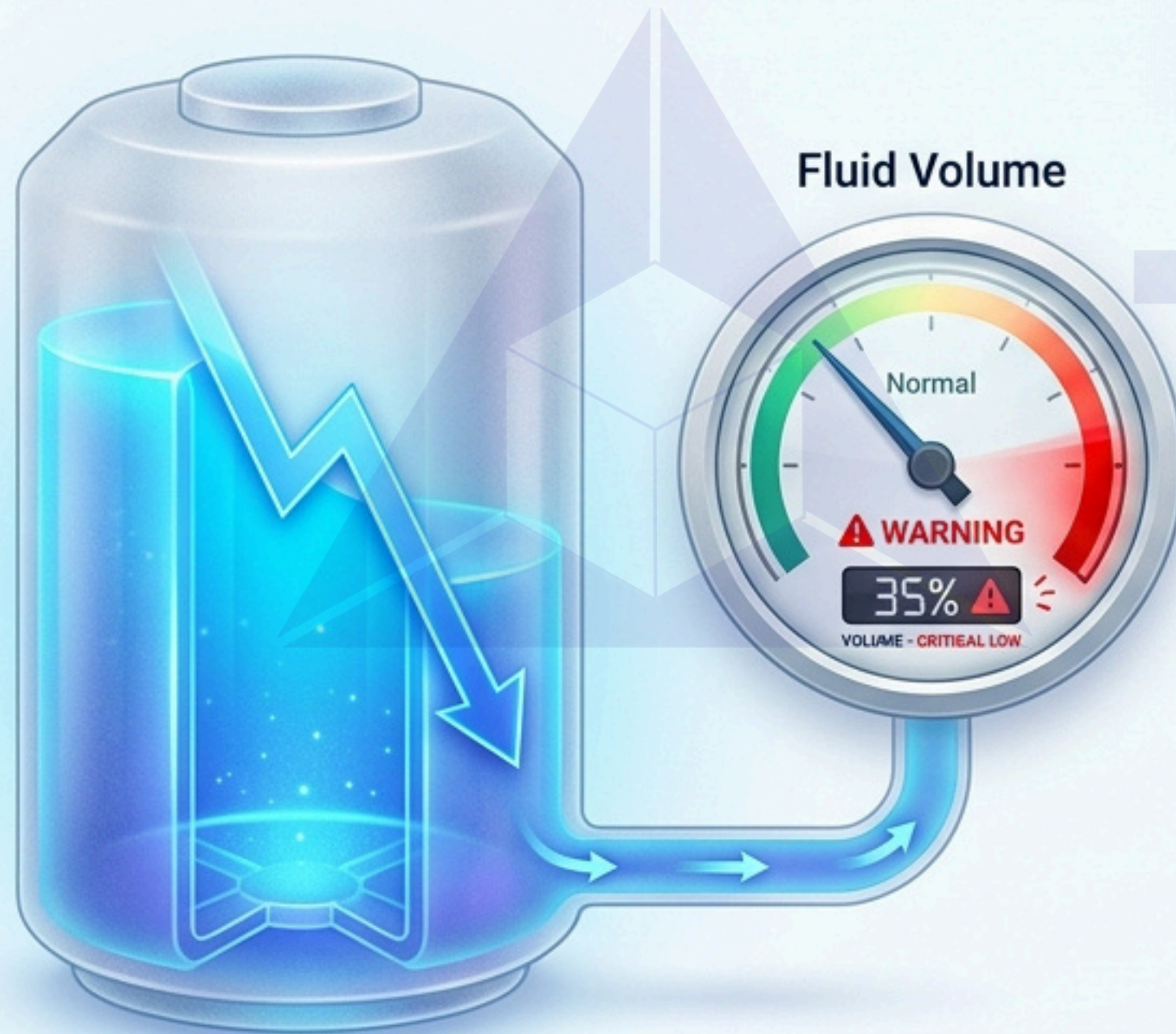
SYSTEM STATUS



Osmoreceptors Detect a Drop in the Tank

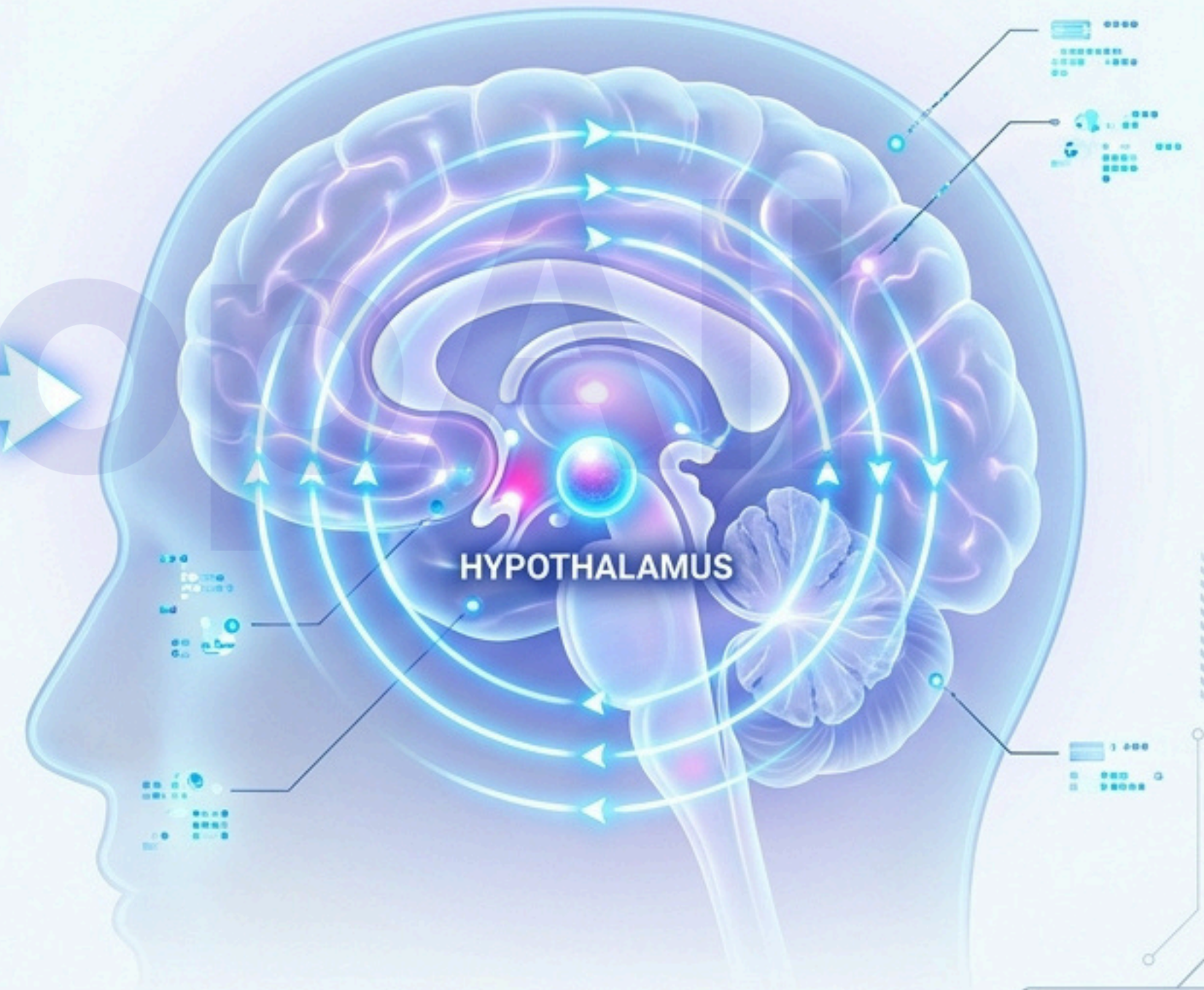
The Trigger

Excessive fluid loss alters blood volume, body fluid volume, and systemic ionic concentration.



The Sensor

Osmoreceptors in the body are activated by these drops, sending a distress signal directly to the hypothalamus to initiate water reclamation.



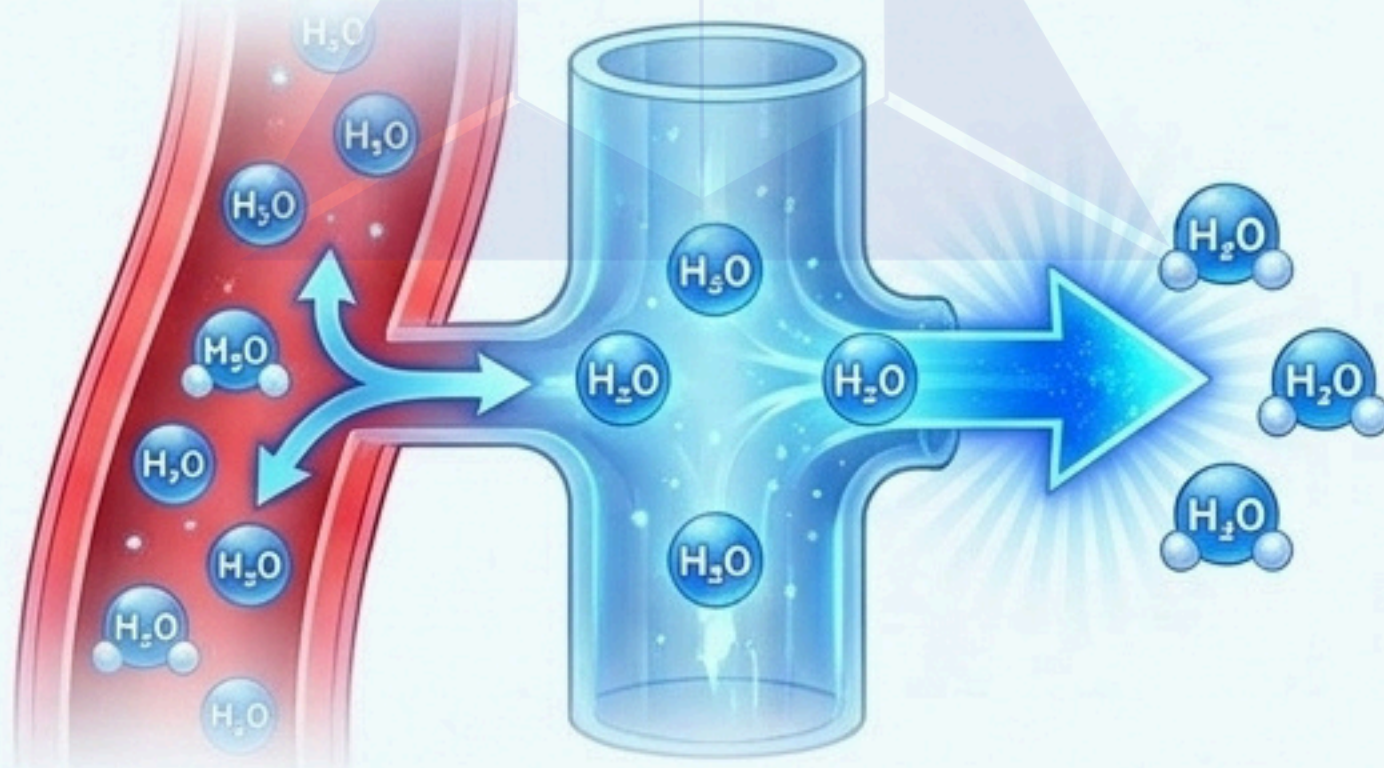
ADH (Vasopressin) Initiates Immediate Water Reclamation



Trigger: Hypothalamus stimulates the neurohypophysis to release Antidiuretic Hormone (ADH).

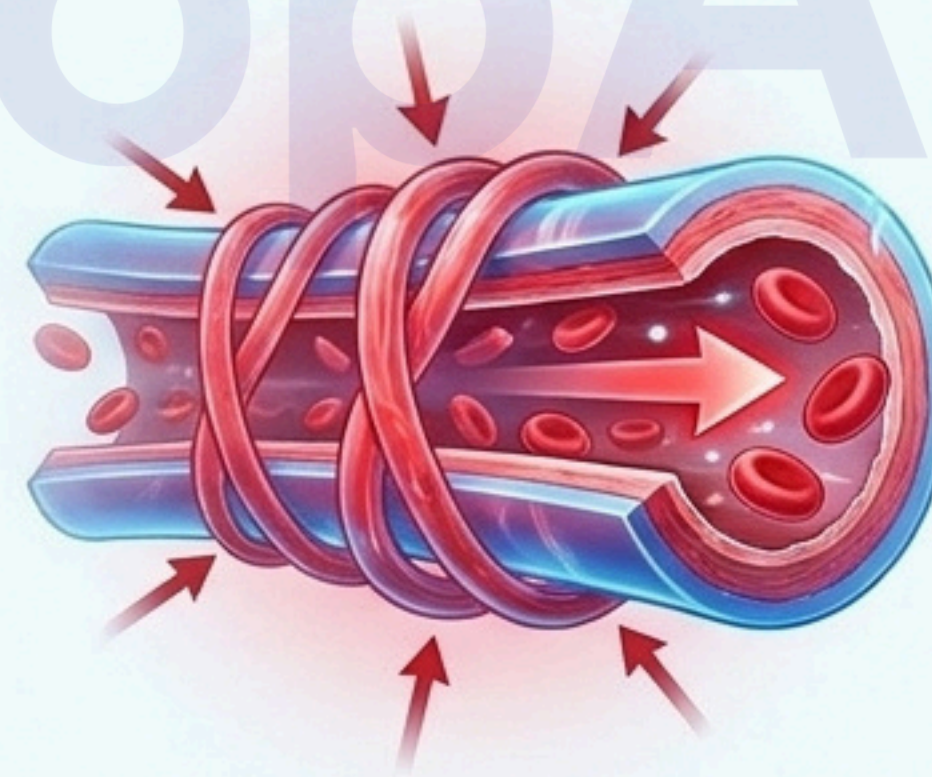
Branch 1: Water Recovery

Facilitates water reabsorption from latter parts of the tubule, preventing diuresis.



Branch 2: Pressure Stabilization

Constricts blood vessels to instantly increase blood pressure and glomerular blood flow.



Fluid Volume



Blood Pressure





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The JGA Registers Localized Pressure Drops

1. Sensor Activation

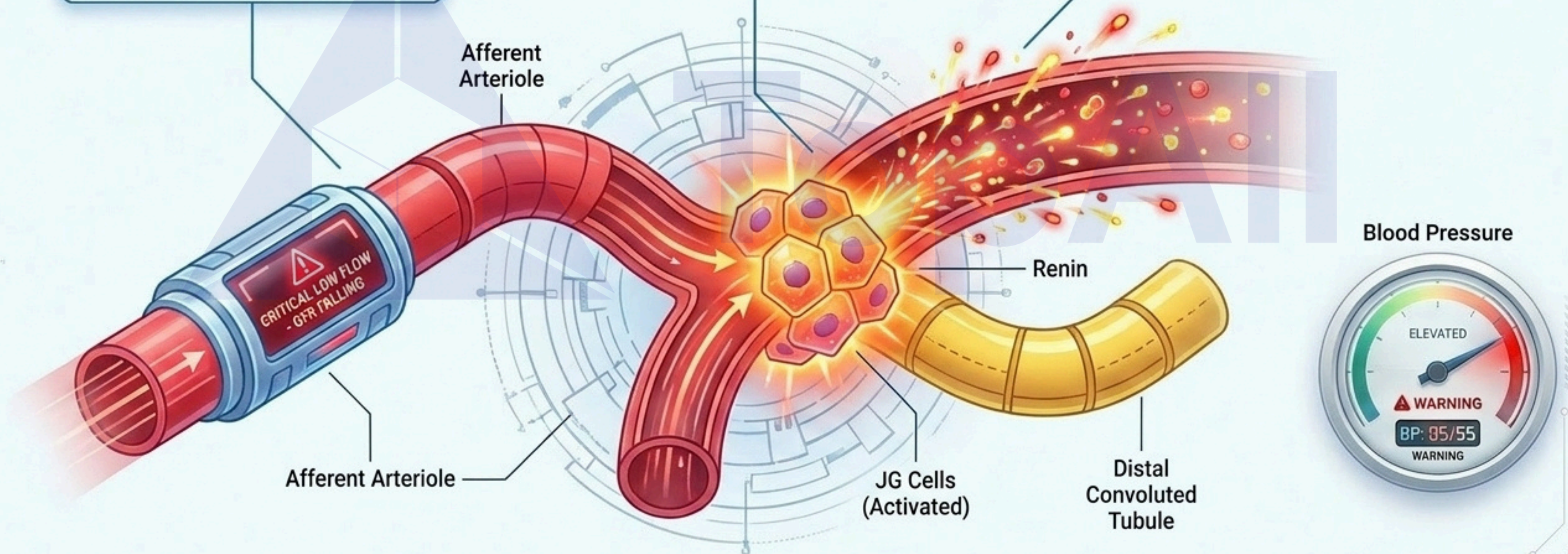
A digital flow meter on the afferent arteriole registers a critical fall in Glomerular Filtration Rate (GFR) and Glomerular Blood Pressure.

2. Cellular Response

The juxtaglomerular (JG) cells at the contact point activate.

3. Chemical Release

Renin is secreted directly into the bloodstream.



The Chemical Cascade

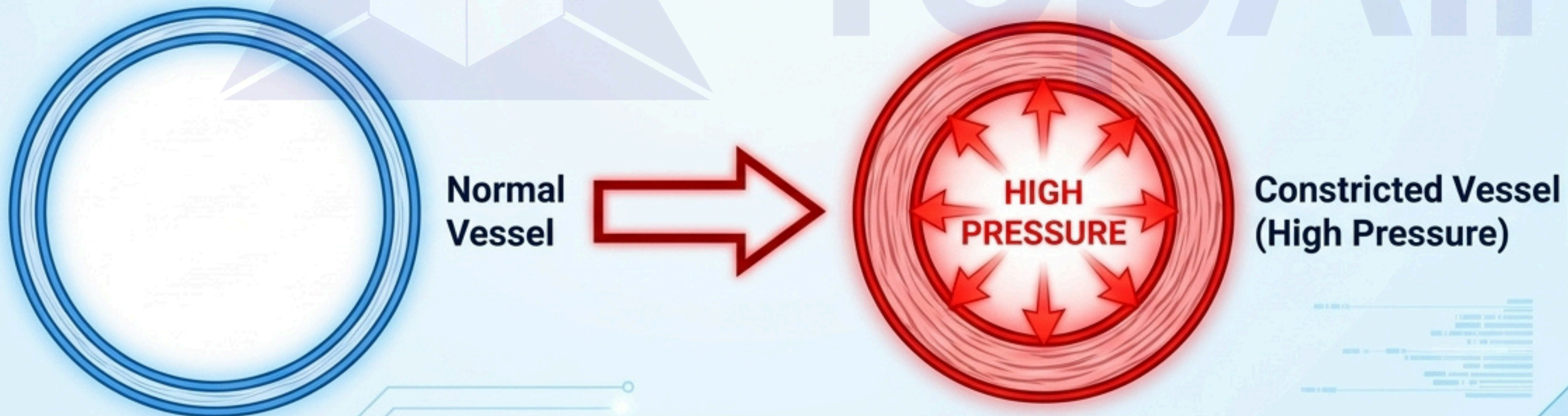


Blood Pressure



The Physical Effect

Angiotensin II acts as a powerful vasoconstrictor, drastically increasing glomerular blood pressure and bringing GFR back toward normal.



Aldosterone Actively Pumps Sodium and Water

The Trigger

Angiotensin II

Adrenal
Cortex

Aldosterone



TopAll

Angiotensin II activates the adrenal cortex to release the hormone Aldosterone.

The Action

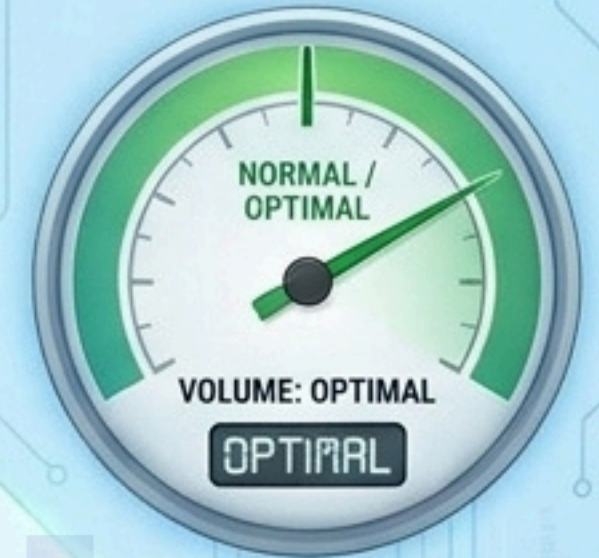
Distal
Tubule

Distal
Tubule

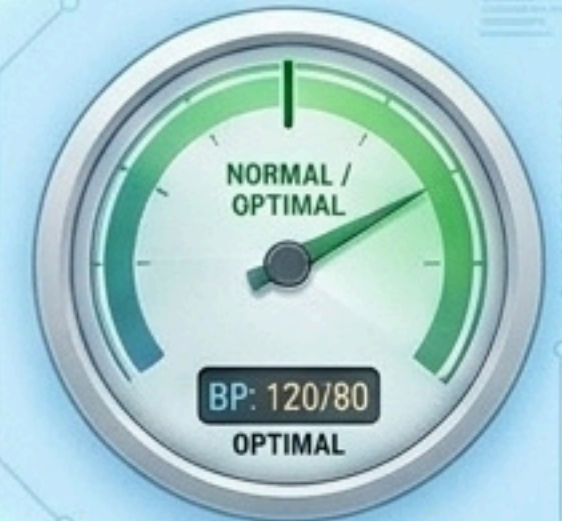
Bloodstream

Drives intensive reabsorption of Na^+ and water from the distal parts of the tubule, permanently raising blood volume and pressure.

Fluid Volume



Blood Pressure



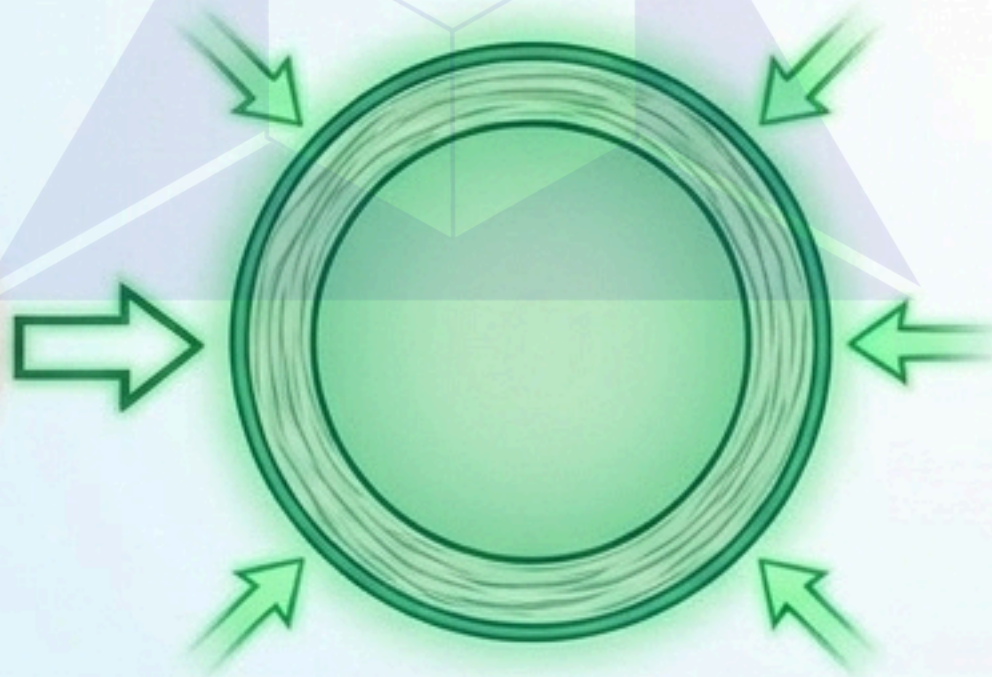
ANF: The Heart's Emergency Brake

Release

High blood flow to the atria triggers Atrial Natriuretic Factor (ANF).

Action

Causes profound vasodilation, actively decreasing blood pressure.



Vasodilation
(Low Pressure)

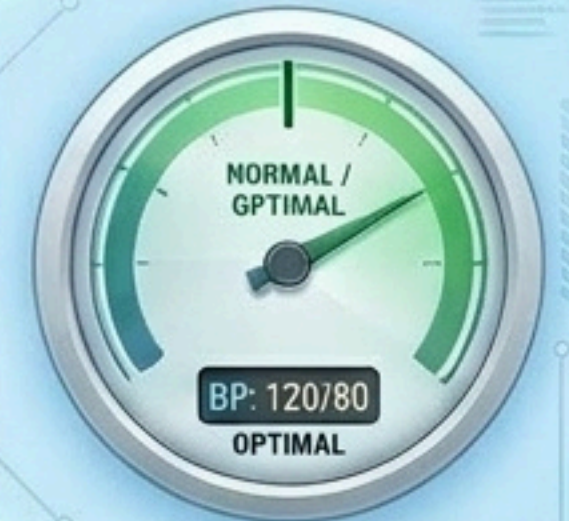
Systemic Role

Acts as the essential physiological check on the Renin-Angiotensin mechanism.

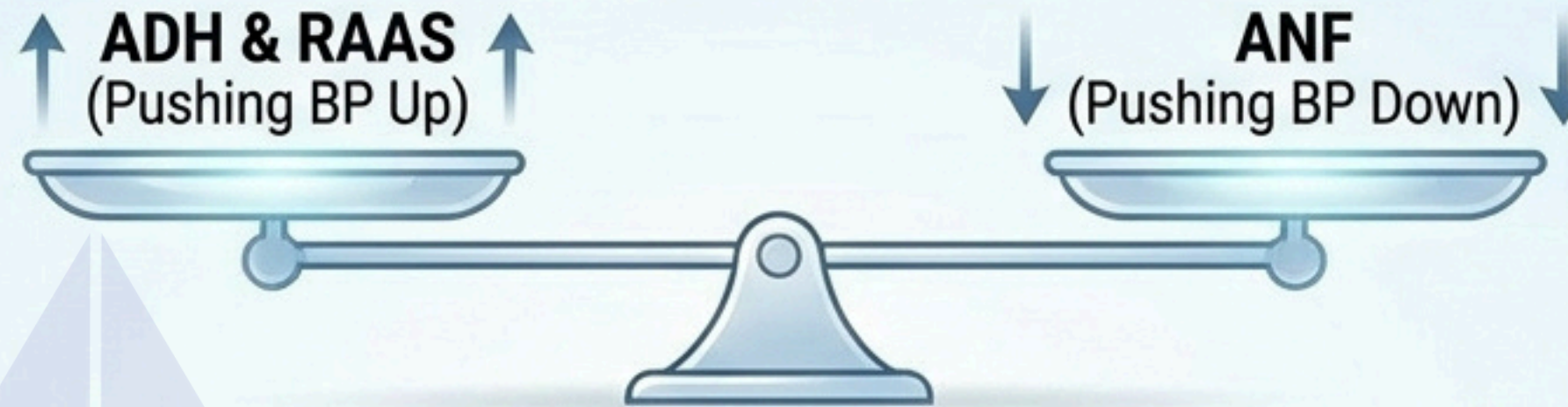
Blood Pressure



Blood Pressure



The Homeostasis Diagnostic Matrix



Mechanism	Trigger	Sensor	Vascular Effect	Net Result
ADH	Fluid/Volume loss	Hypothalamus	Constriction	↑ Volume, ↑ BP
RAAS (Renin)	Low GFR / BP	JGA (Kidney)	Constriction	↑ Volume, ↑ BP
ANF	High Atrial Flow	Heart Atria	Dilation	↓ BP

Systemic homeostasis requires the constant interplay between rapid volume reclamation and precise pressure de-escalation.



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