Regulation of volume and water

RAAS, ADH and thirst

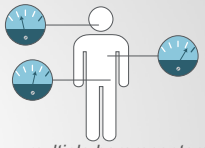
42 liters sloshing around in the body

that water is 285 mOsm/kg

Two systems regulate these two fundamentals of life

The renin-angiotensin-aldosterone-system

Monitors perfusion



multiple baroreceptors

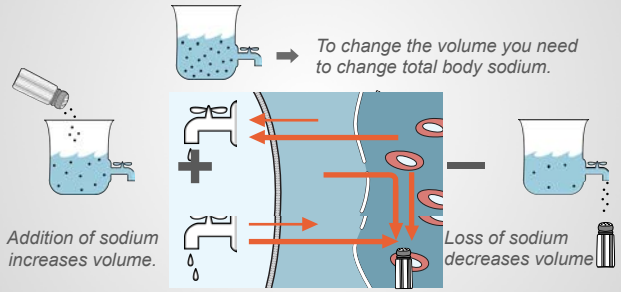
Water-ADH-Thirst Axis

Monitors osmolality

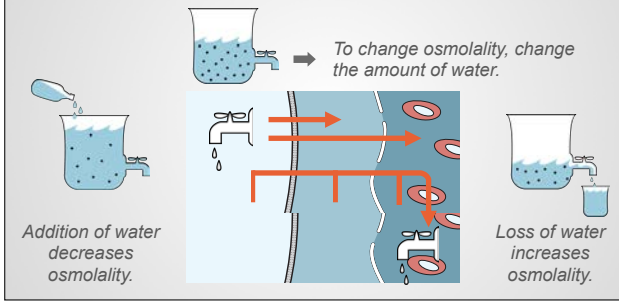
One osmoreceptor

hypothalamus

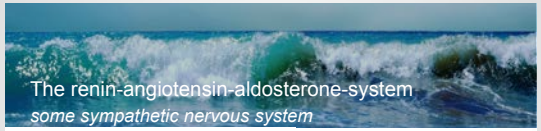
The renin-angiotensin-aldosterone-system



Water-ADH-Thirst Axis



Two systems regulate these two fundamentals of life

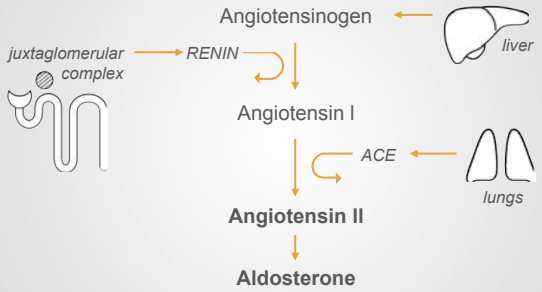


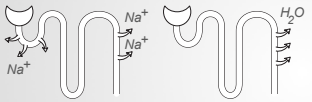
Water-ADH-Thirst Axis

Hypovolemia is detected by a number of baroreceptors and stretch receptors throughout the body.

Decreases in blood pressure stimulate the body to increase vascular volume.

- ➡ Renin Angiotensin Aldosterone System
- ➡ Sympathetic nervous system

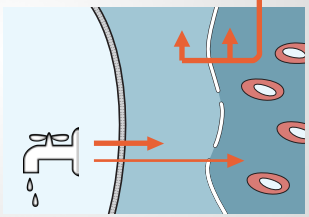


Plasma volume		Blood pressure	
Sodium resorption	Water resorption	Cardiac output	Vascular resistance
			
angiotensin II *aldosterone* *sympathetic activity*	*anti-diuretic hormone*	*sympathetic activity*	*angiotensin II* *sympathetic activity* *anti-diuretic hormone*

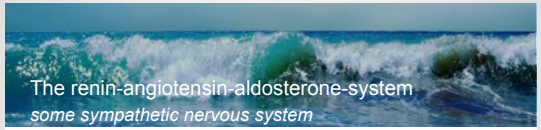
Increasing sodium retention by the kidney increases the osmolality in the extracellular compartment

Draws water from the intracellular compartment

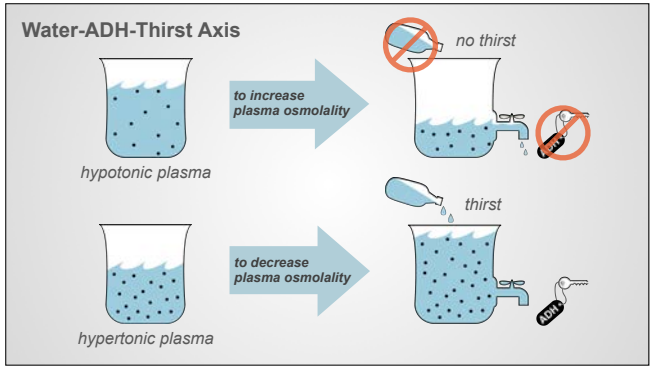
Increased the osmolality stimulates ADH and thirst

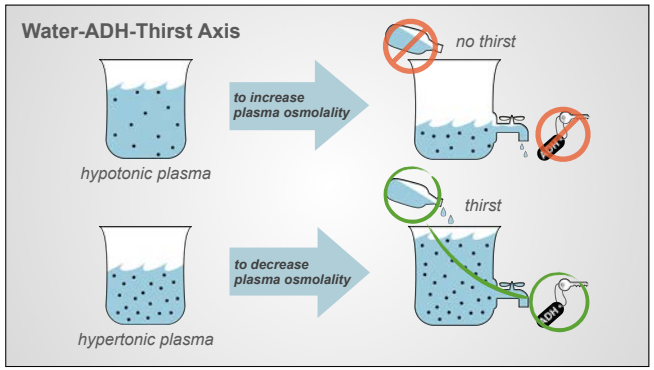


Two systems regulate these two fundamentals of life



Water-ADH-Thirst Axis


Water-ADH-Thirst Axis
no thirst
to increase plasma osmolality
hypotonic plasma
thirst
to decrease plasma osmolality
hypertonic plasma
ADH


Water-ADH-Thirst Axis
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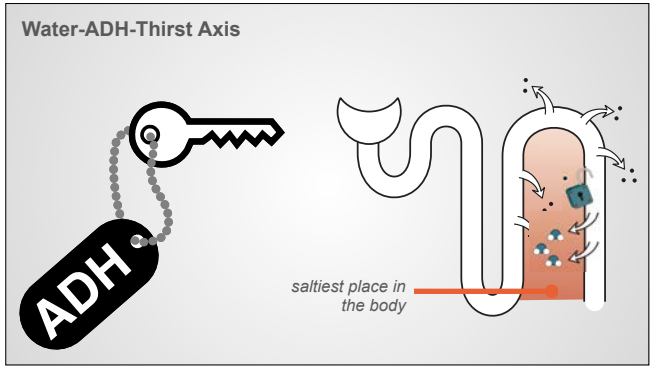
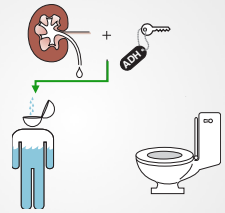
ADH

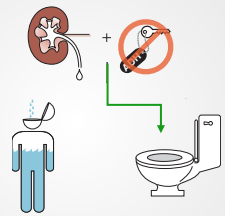

Water-ADH-Thirst Axis
ADH
saltiest place in the body

Increased osmolality stimulates ADH release



ADH causes the kidney to retain water ⇢lowering osmolality

Decreased osmolality suppresses ADH



Lack of ADH increases renal water loss⇢raising osmolality