Regulation of Water Content in the Human Body

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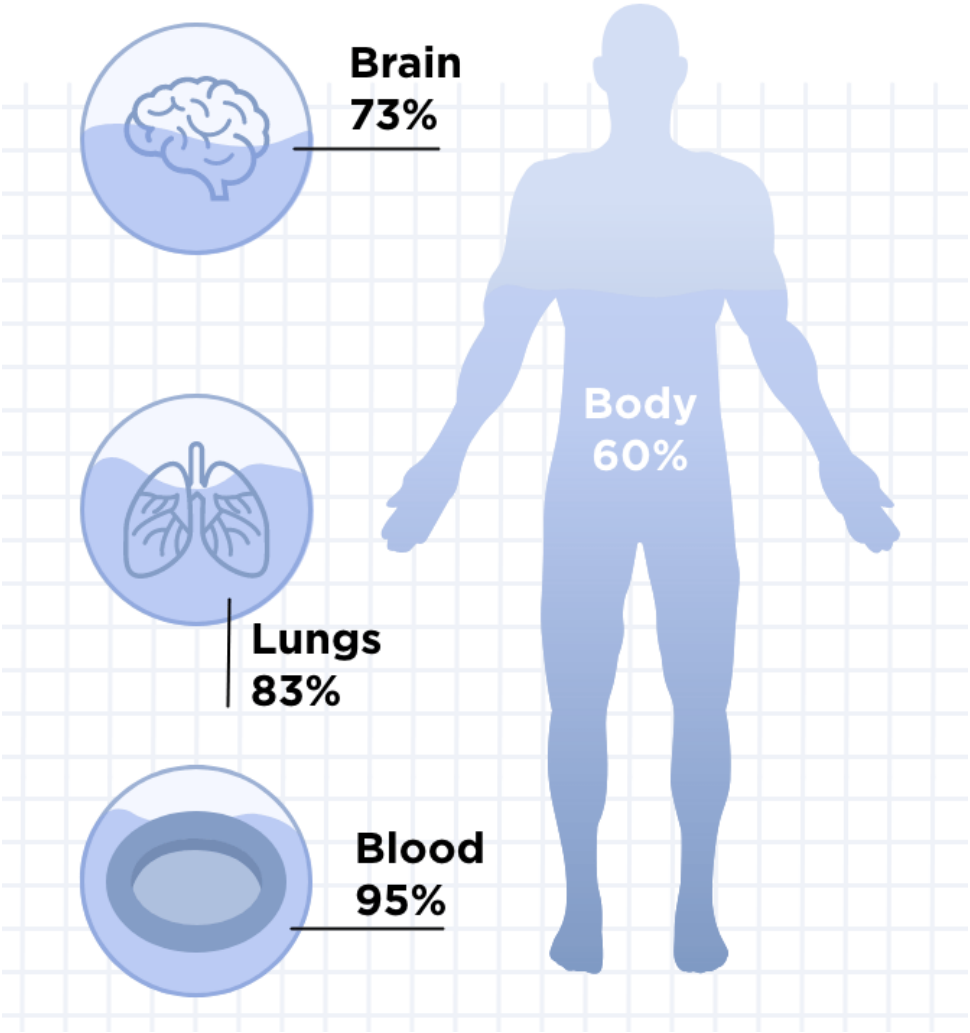
Importance of Water

Key Points:

60% of body weight is water.

Vital for blood circulation, cell function, and waste removal.

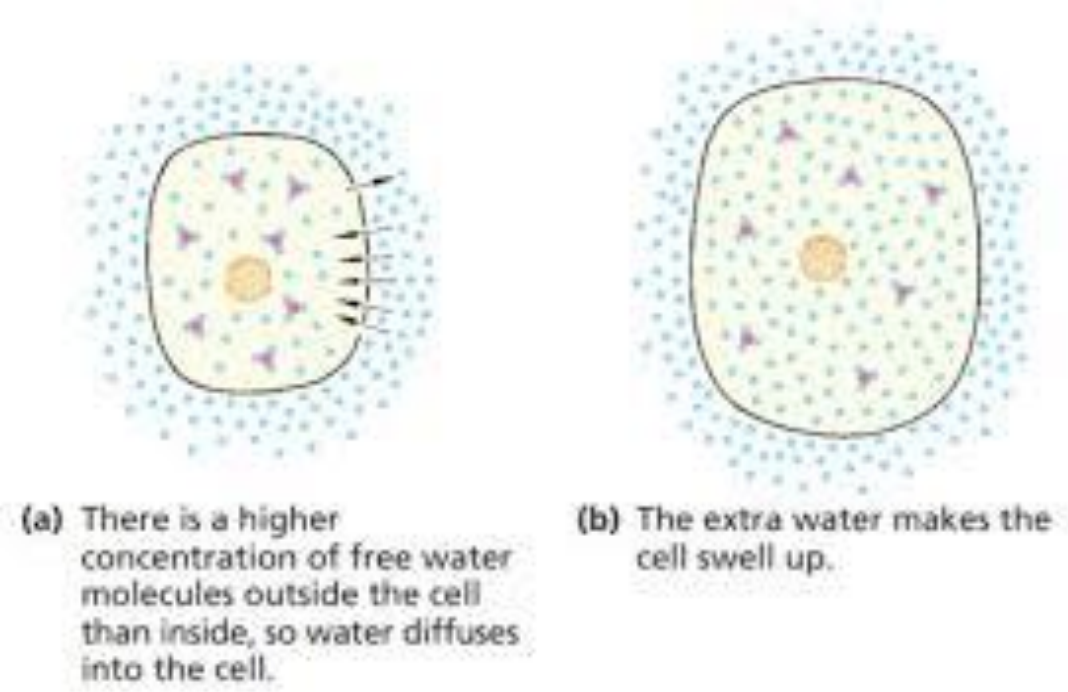


Osmosis & Blood Water Balance

What Happens When Balance is Lost?

High Blood Water: Cells swell/burst (hypotonic).

Low Blood Water: Cells shrink (hypertonic).



(a) There is a higher concentration of free water molecules outside the cell than inside, so water diffuses into the cell.

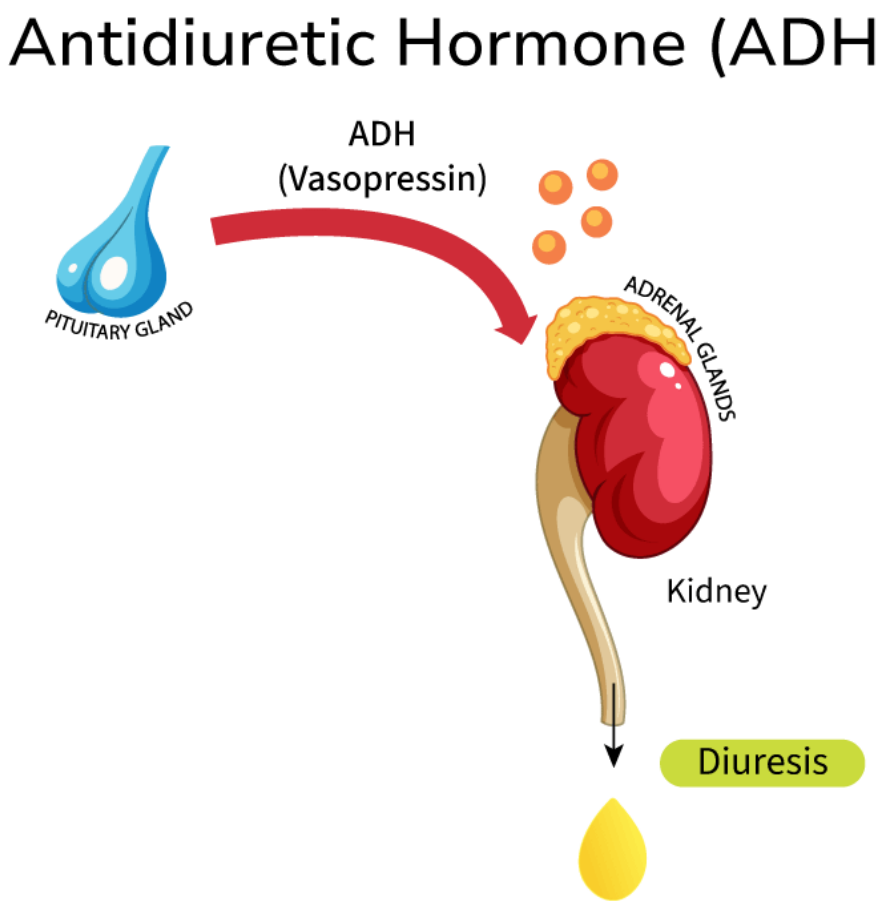
(b) The extra water makes the cell swell up.

Role of Kidneys and Brain

Key Organs:

Kidneys: Filter blood, adjust urine concentration.

Brain: Monitors blood, controls ADH via pituitary gland.

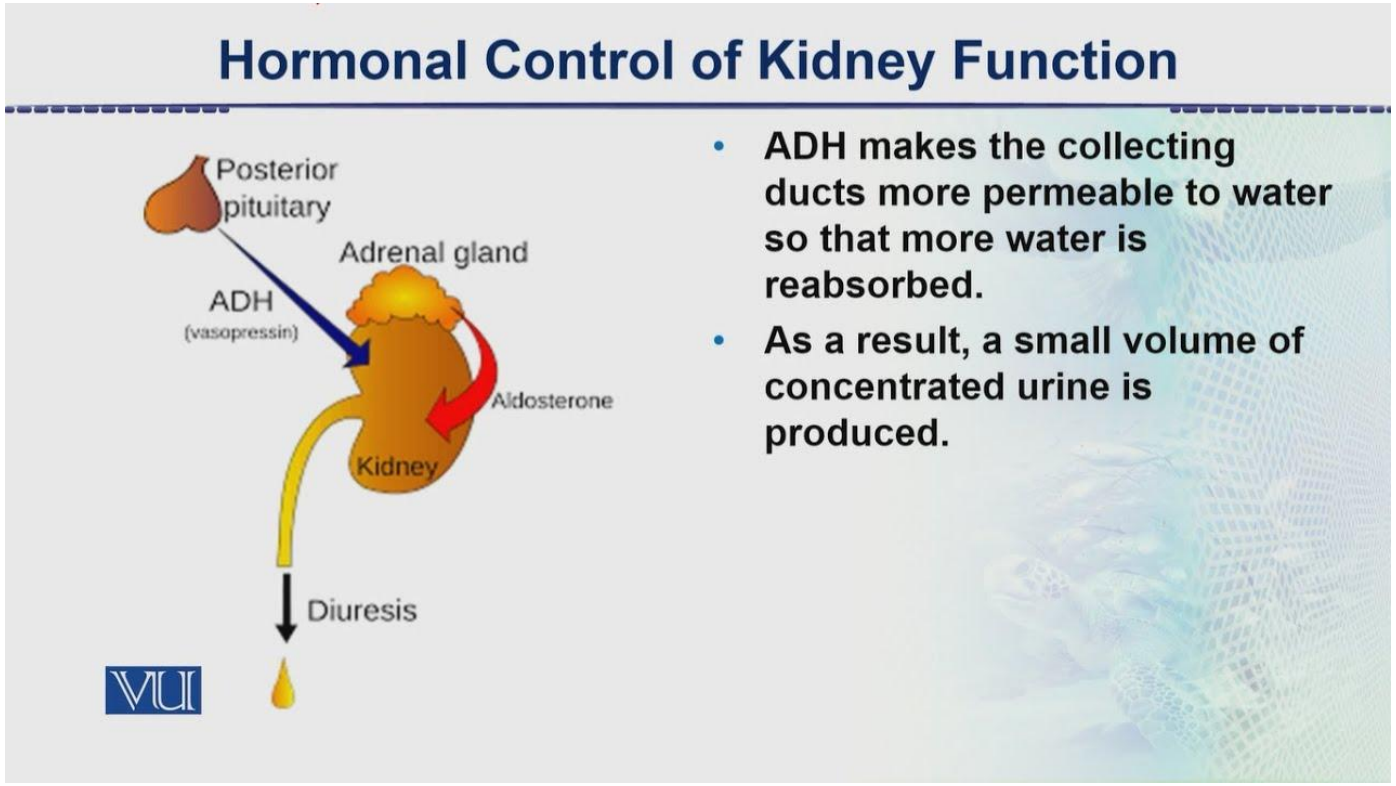


ADH (Antidiuretic Hormone)

Function:

Makes kidney nephrons permeable → reabsorbs water.

Less ADH = dilute urine; More ADH = concentrated urine.



Factors Affecting Blood Concentration

Triggers:

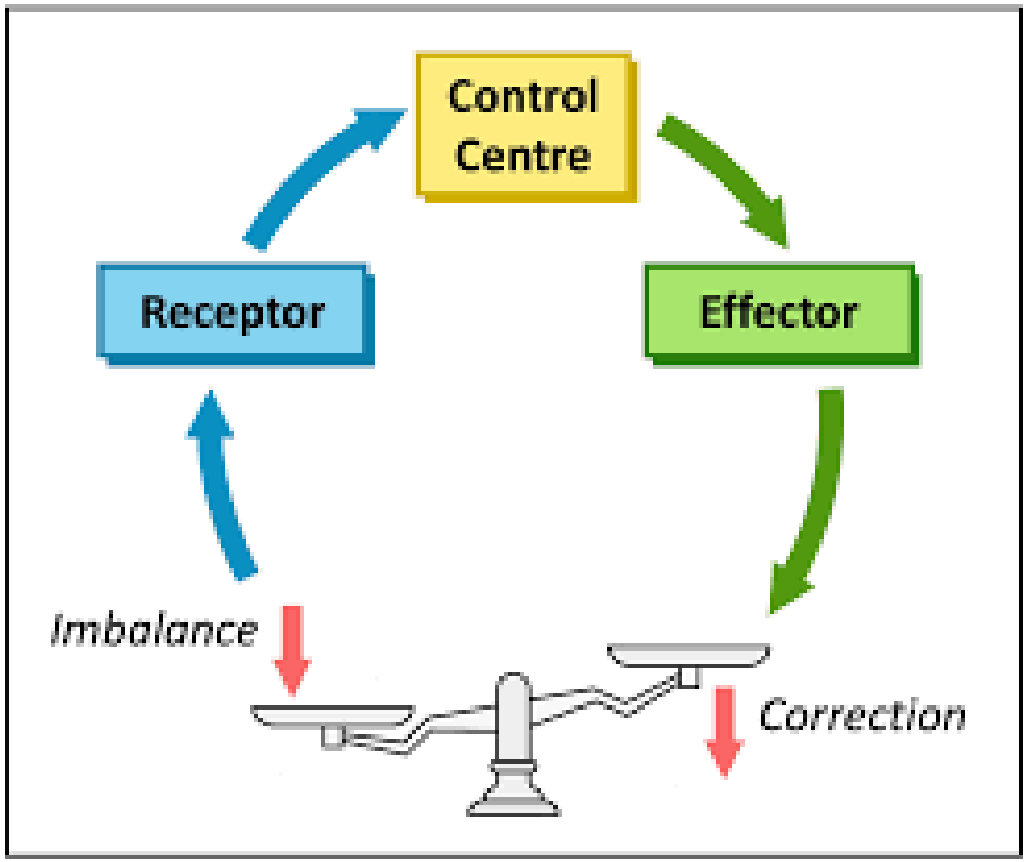
↑ Water: Drinking fluids.

↓ Water: Sweating, salty foods

Negative Feedback System

Definition: Self-regulating process to maintain balance.

Visual: Circular flowchart icon (→ receptor → brain → effect →).



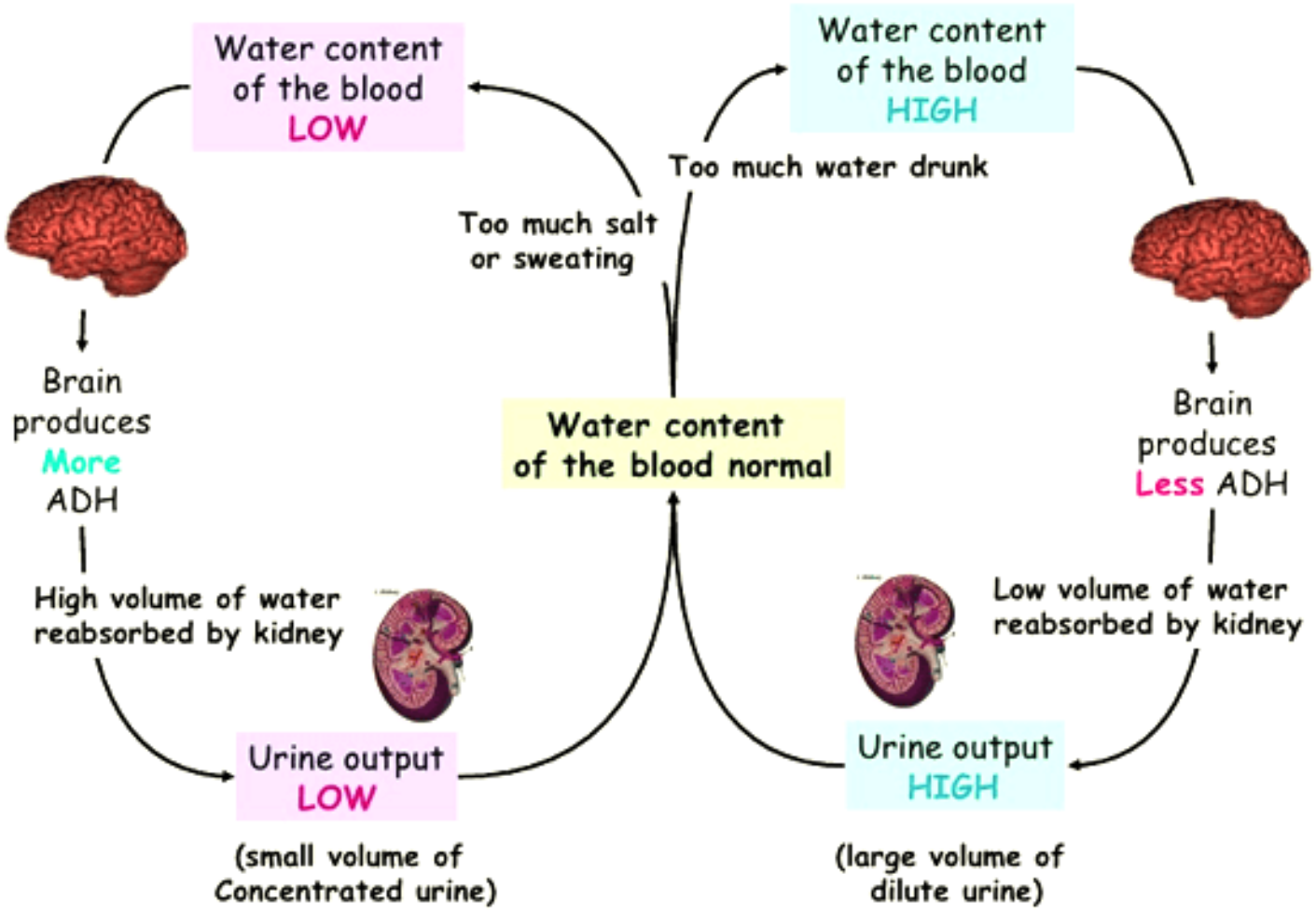
Low Blood Water Scenario

Steps:

Brain detects low water.

Pituitary releases ADH.

Kidneys reabsorb water → concentrated urine.



High Blood Water Scenario

Steps:

Brain detects excess water.

Reduces ADH.

Kidneys excrete dilute urine.