

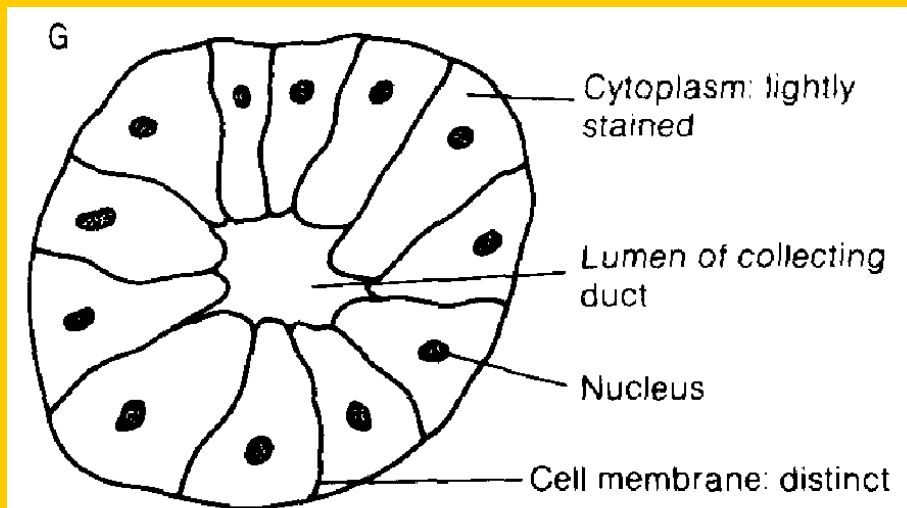
# Hormonal Control of Osmoregulation & Excretion

WALT

- That water concentrations are regulated by a hormone called ADH
- That ADH effects the permeability of the distal convoluting tubule and the collecting duct
- That aldosterone controls sodium concentrations in the blood

# The Collecting Duct

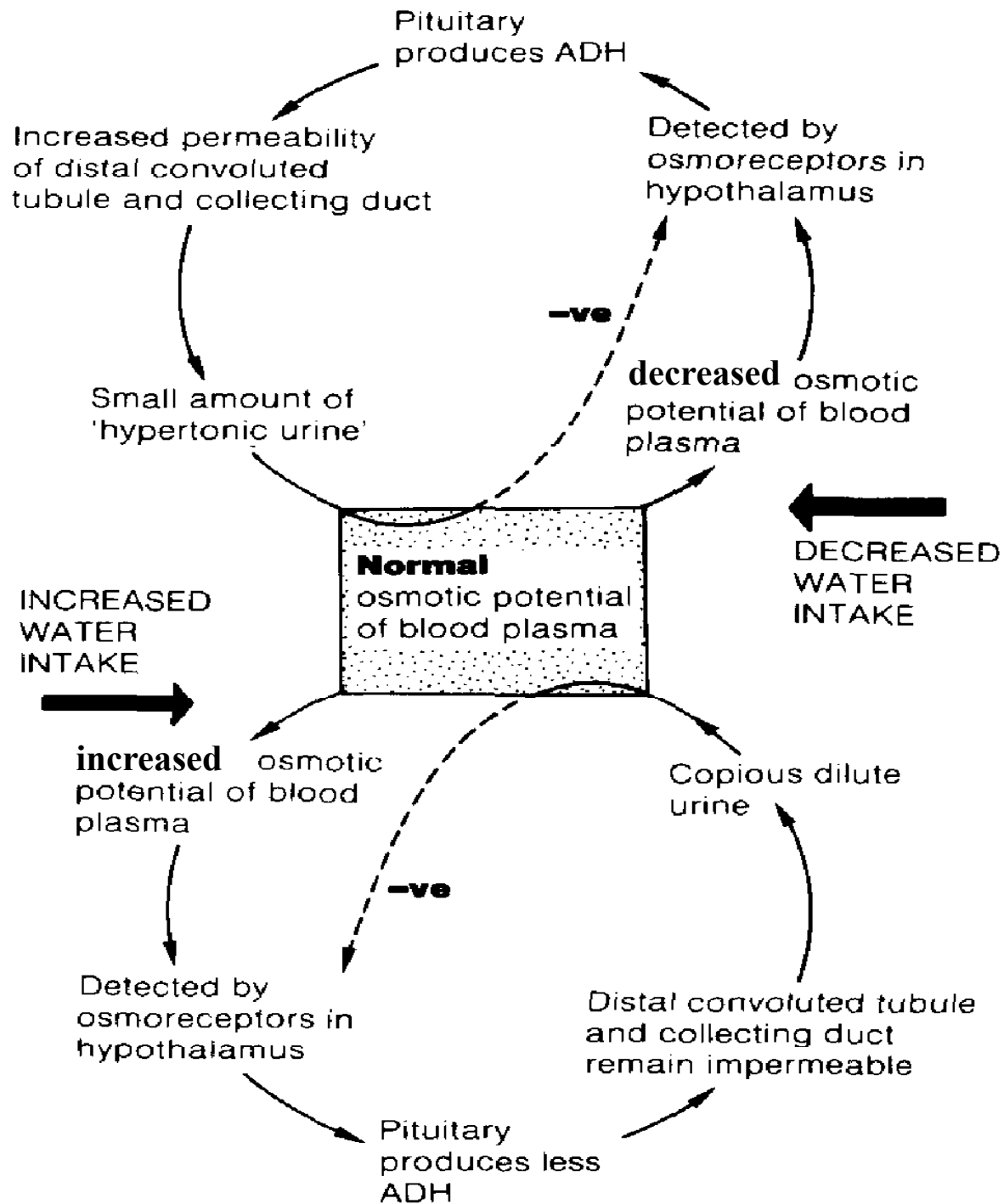
- Hormones control the permeability of the walls of the collecting duct.
- If the walls are water-permeable, water leaves the ducts to pass into the hyperosmotic surroundings and concentrated urine is produced.
- If the ducts are impermeable to water the final urine will be less concentrated.



# Antidiuretic Hormone and Aldosterone

## Antidiuretic Hormone (ADH)

- ADH affects the permeability of the distal convoluted tubule and collecting duct.
- A decrease in blood osmotic potential can be caused by:
  1. Little water is ingested
  2. Much sweating occurs
  3. Large amounts of salt are ingested



# Regulation of ADH production:

- osmotic potential ↓
- → osmoreceptors (in hypothalamus)
- → posterior pituitary gland
- → ADH ↑
- → permeability of distal convoluted tubule to water & collecting duct ↑
- → hypertonic urine is produced

# ADH

- ADH also increases the permeability of collecting duct to urea which passes into the medulla, decreasing the osmotic potential and causing more water to be lost from the descending loop of Henle.

If osmotic potential increases due to :

- 1. Much water is ingested
- 2. Little / no sweating
- 3. Little / no salt intake
- then ADH production is inhibited and the walls of the distal convoluted tubule and collecting duct remaining impermeable to water and urea  
→ hypotonic urine
- *diabetes insipidus*:(contrast to diabetes mellitus)  
a condition in which a person is unable to produce sufficient level of ADH, resulting in producing large volumes of very dilute urine.

# Aldosterone

- A hormone responsible for maintaining a more or less constant sodium level in the plasma and it has a secondary effect on water reabsorption.
- $\text{Na}^+ \downarrow \rightarrow$  blood volume  $\downarrow$ 
  - $\rightarrow$  juxtaglomerular complex (in nephron)
  - $\rightarrow$  renin – an enzyme (contrast to rennin)
  - $\rightarrow$  angiotensin – a hormone (in liver)
  - $\rightarrow$  adrenal cortex
  - $\rightarrow$  aldosterone secretion
  - $\rightarrow$   $\text{Na}^+$  actively reabsorbed from glomerular filtrate into capillaries around tubule
  - $\rightarrow$   $\text{Na}^+ \uparrow$  with water
  - $\rightarrow$  blood volume  $\uparrow$