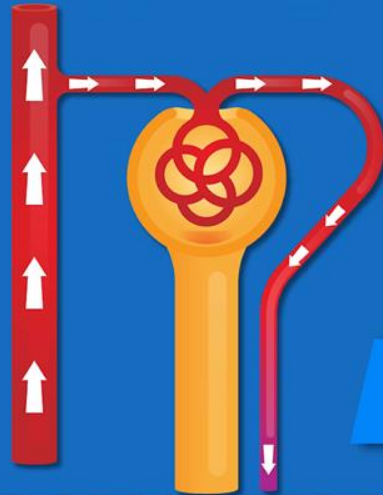


EXCRETORY PRODUCTS & THEIR ELIMINATION - L3



ZOOLOGY



PUSHPENDU SIR

ANTHE

AAKASH NATIONAL TALENT HUNT EXAM

— **Your Gateway To Success** —

For Class VII to XII

Current Students & Passouts



MON – SAT
4PM – 8PM

DROPPERS
BATCH

MON – FRI
2PM – 4PM



NEET

**STUDENTS'
SURVEY**

 **LINK IN
DESCRIPTION**

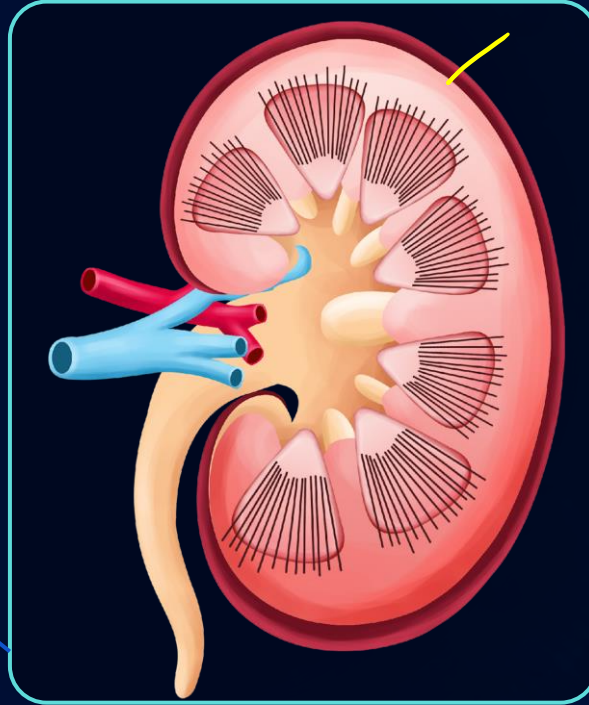
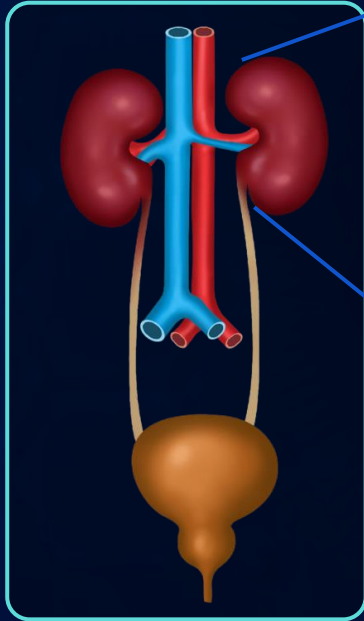




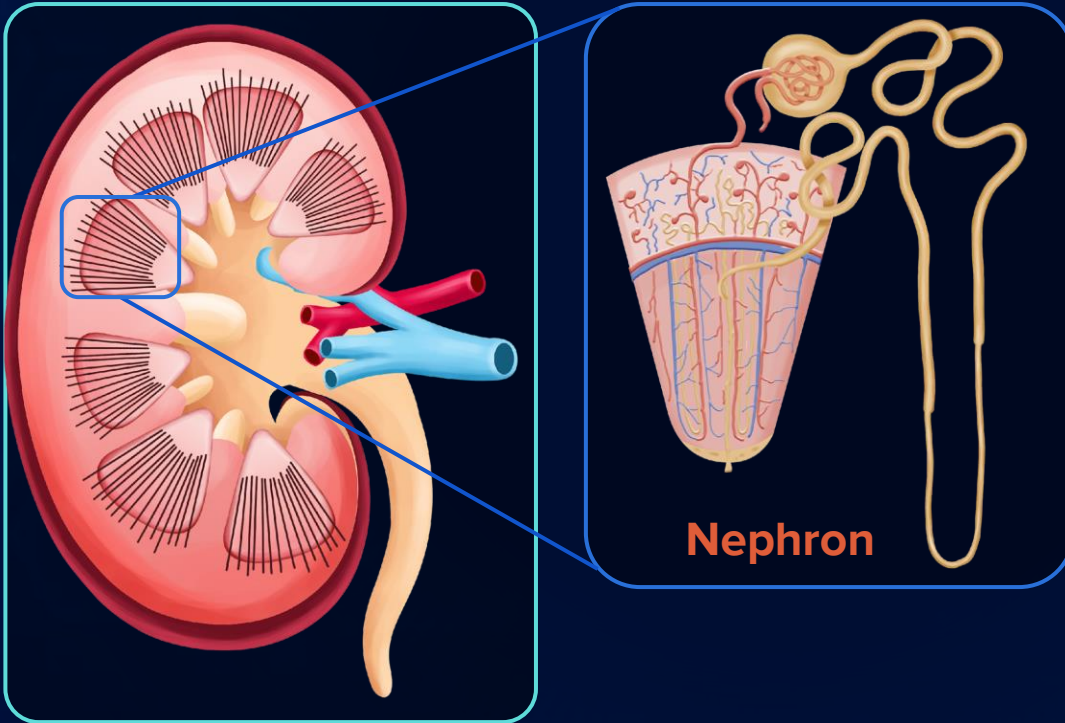
<https://t.me/neetaakashdigital>



Recall: Human Excretory System



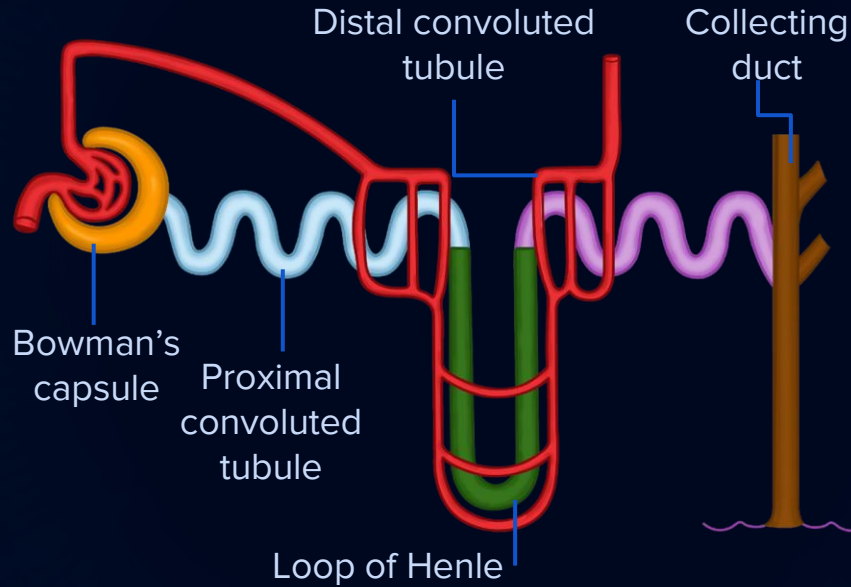
Recall: The Nephrons



Recall: Purifiers of the Body



**Filters of
water purifier**

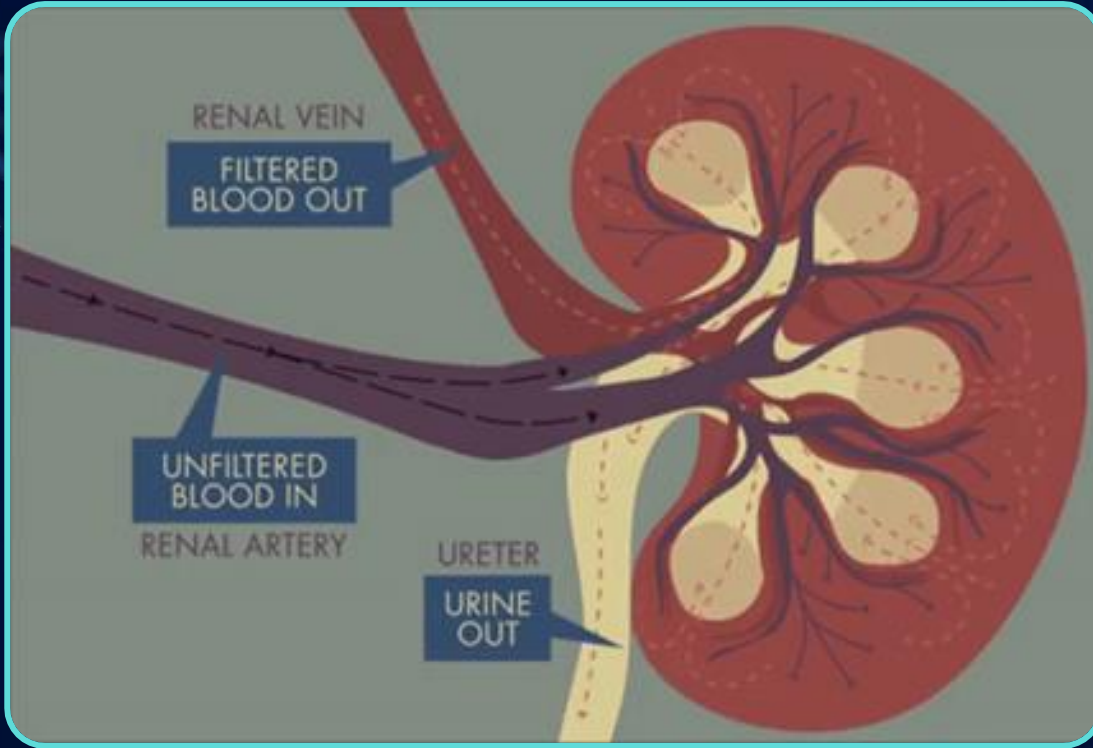


Nephrons



Did You Know?

Did You Know?



Urine Formation



Urine Formation



Urine formation

①

Ultrafiltration

≠

②

Reabsorption

③

Secretion

Urine Formation



Urine formation

Ultrafiltration

Reabsorption

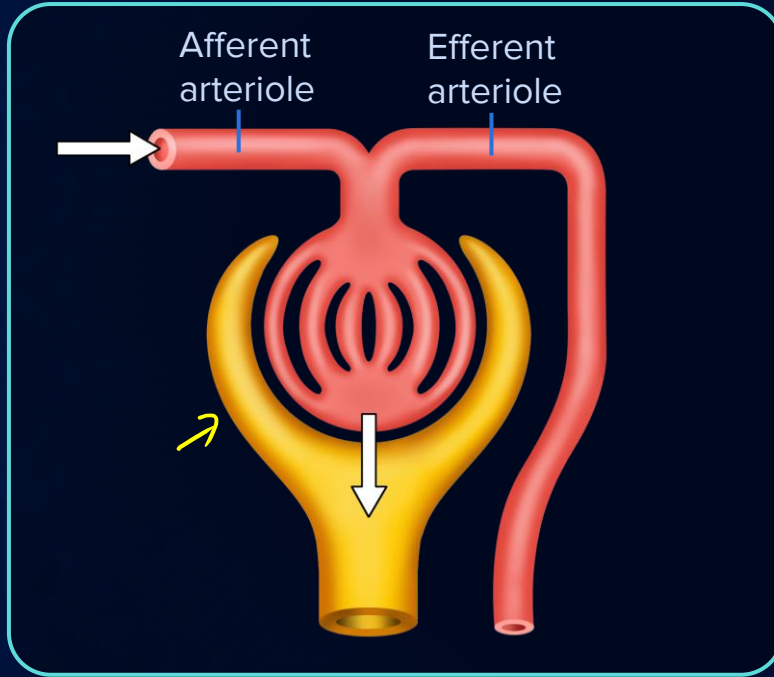
Secretion



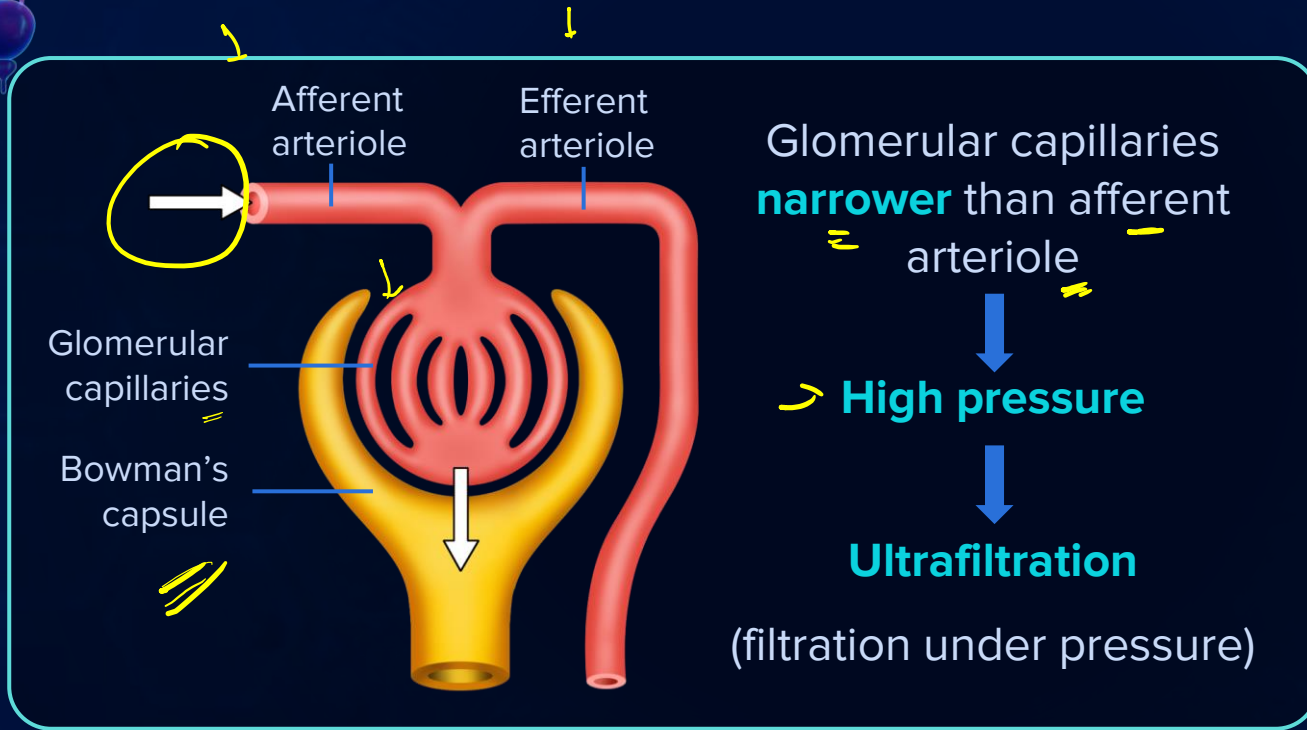
Ultrafiltration (Glomerular Filtration)



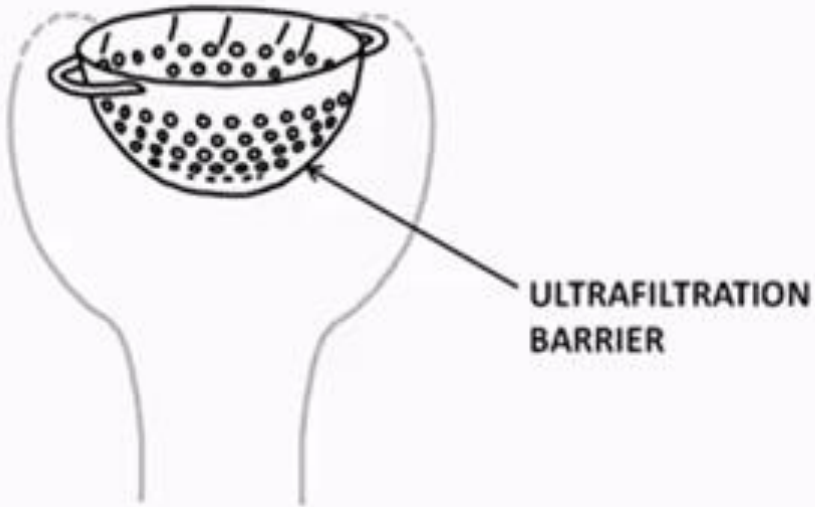
Recall: The Glomerulus



Urine Formation: Ultrafiltration



Urine Formation: Ultrafiltration





Ultrafiltration

3 layers

Glomerular capillaries

=

A

Capillary epithelium

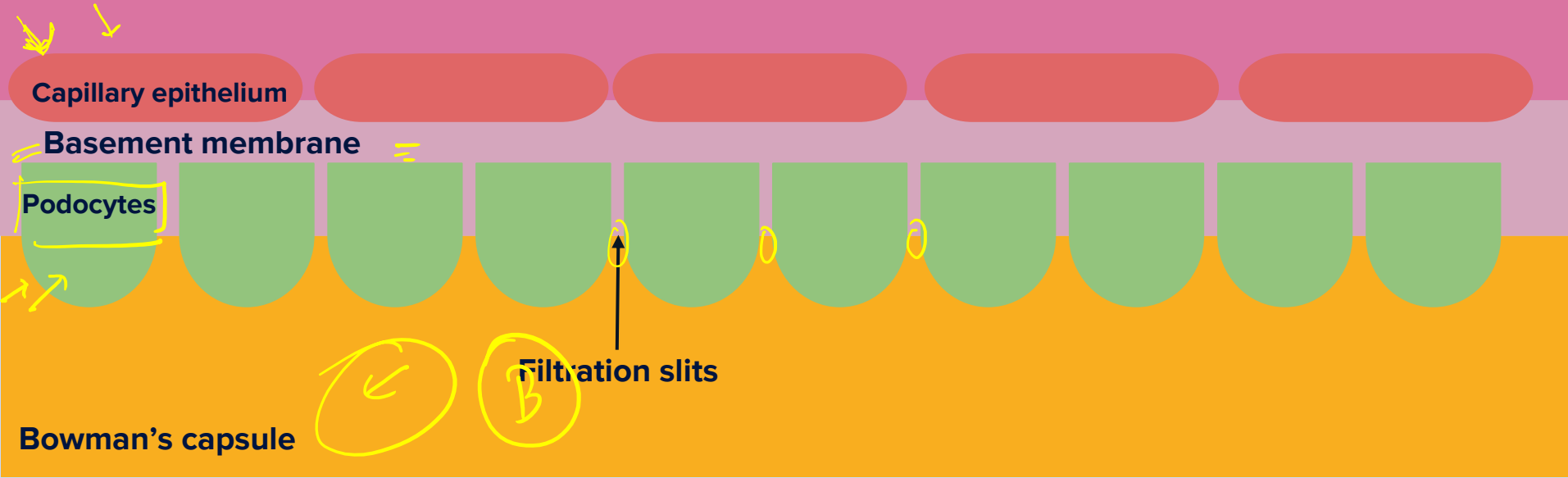
Basement membrane

=

Podocytes

Filtration slits

Bowman's capsule





Ultrafiltration

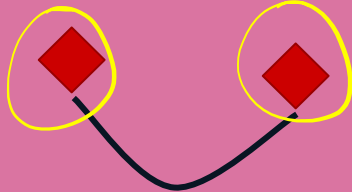
Glomerular capillaries



Urea, uric acid,
creatinine, amino acids



Protein



K^+

H_2O

Na^+



Capillary epithelium

Basement membrane

Podocytes

K^+

H_2O

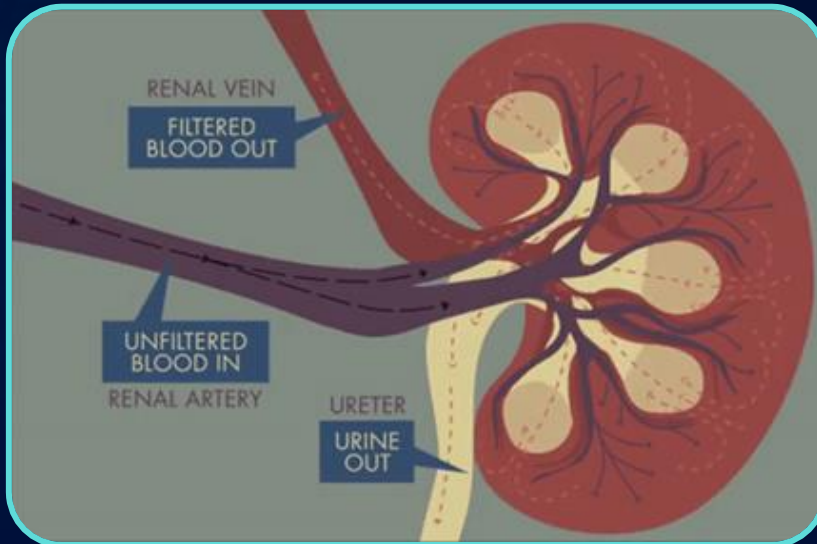
Na^+



Bowman's capsule

Urine Formation: Glomerular Filtration Rate

- Filtrate formed by the kidneys per minute: **Glomerular filtration rate**
- GFR: 125 ml/min (approximately), i.e., **180 litres per day!**





Do we release 180 litres of urine everyday?

No!

1.5 litres per day!

11

Urine Formation



```
graph TD; A[Urine formation] --> B[Ultrafiltration]; B --> C[Reabsorption]; C --> D[Secretion];
```

Urine formation

Ultrafiltration

Reabsorption

Secretion

Urine Formation



Urine formation

Ultrafiltration

Reabsorption

Secretion

Reabsorption and Secretion





Urine Formation: Reabsorption and Secretion

Reabsorption from the filtrate:

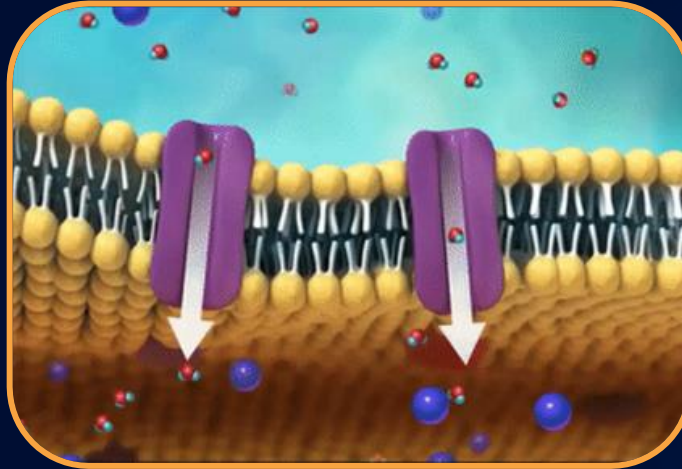
- Performed either by active or passive transport

Recall: Active and Passive Transport



Active transport

ATP =



Passive transport

No ATP =



Urine Formation: Reabsorption and Secretion

Reabsorption from the filtrate:

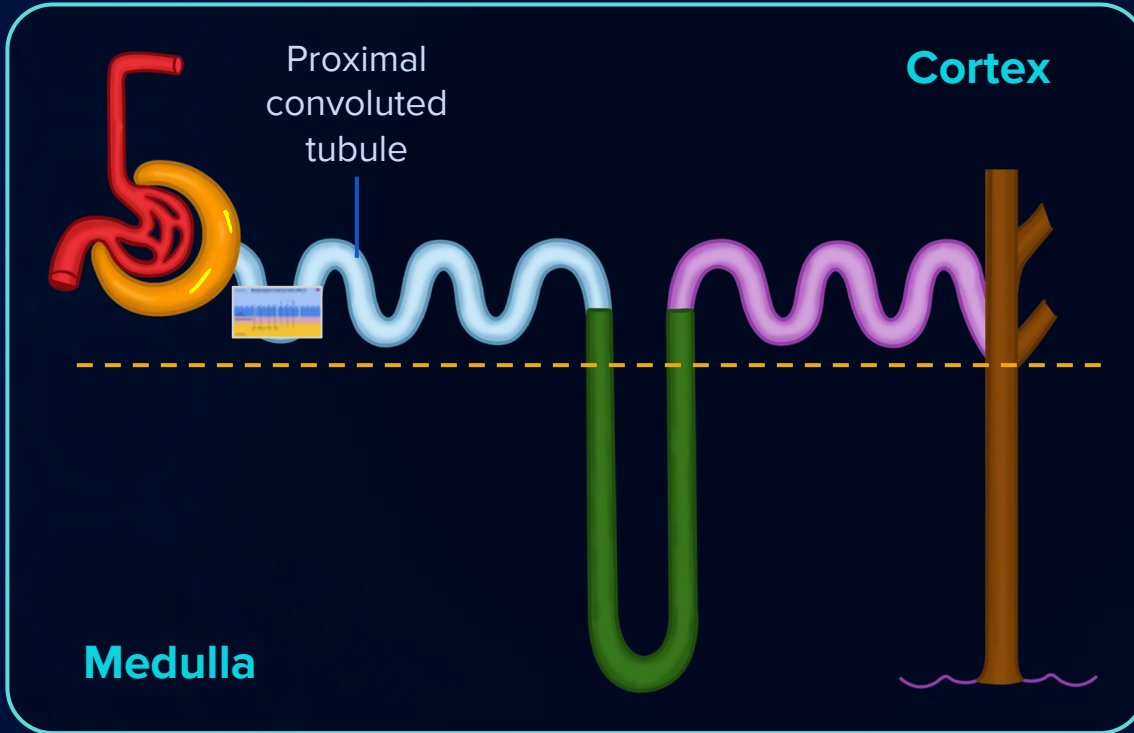
- Performed either by active or passive transport
- Examples:
 - **Active:** Glucose, amino acids, Na^+ , etc
 - **Passive:** Nitrogenous wastes, water (initial segments)

Secretion into the filtrate:

- Tubular cells secrete substances
- Examples: H^+ , K^+ , ammonia

= [why?] →

Reabsorption and Secretion (PCT)





Tubular fluid



H^+

K^+

NH_3



Tubular
epithelial cell

Basement membrane



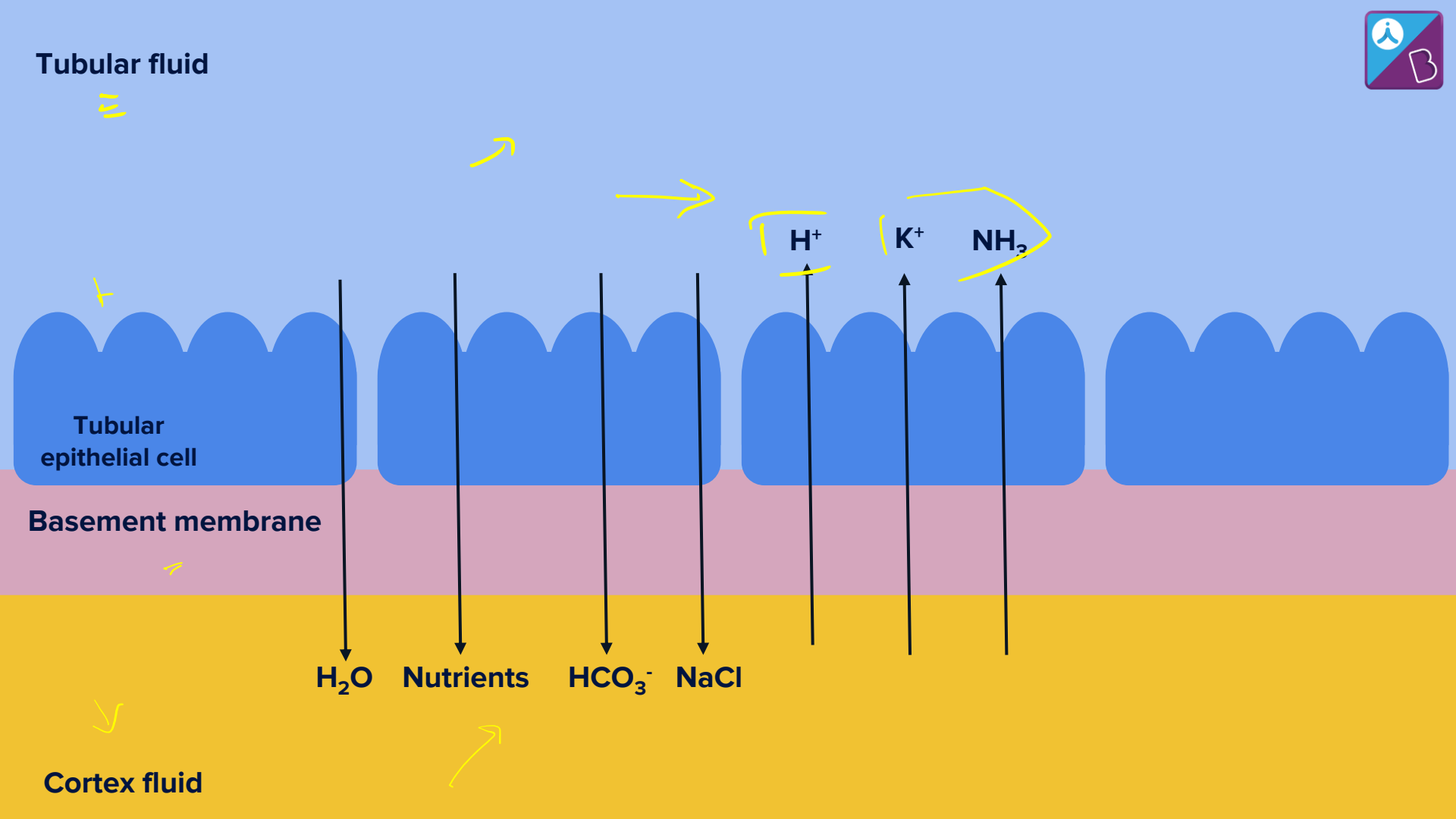
H_2O

Nutrients

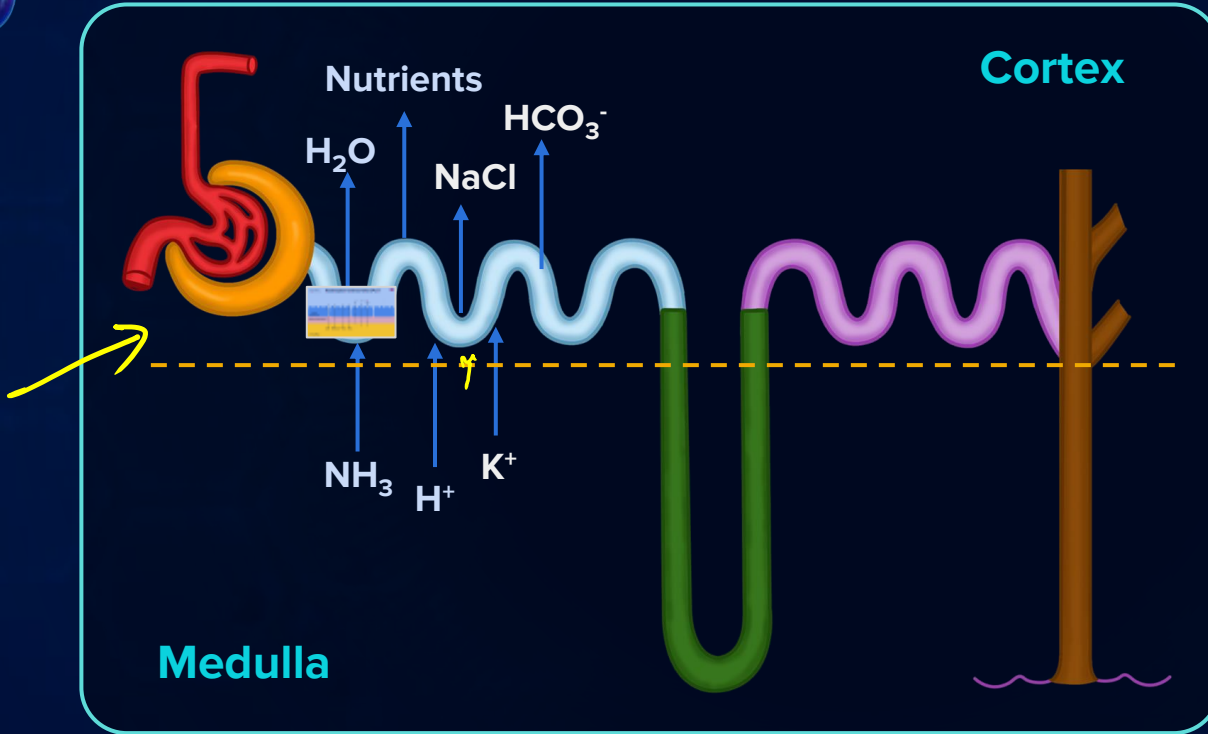
HCO_3^-

$NaCl$

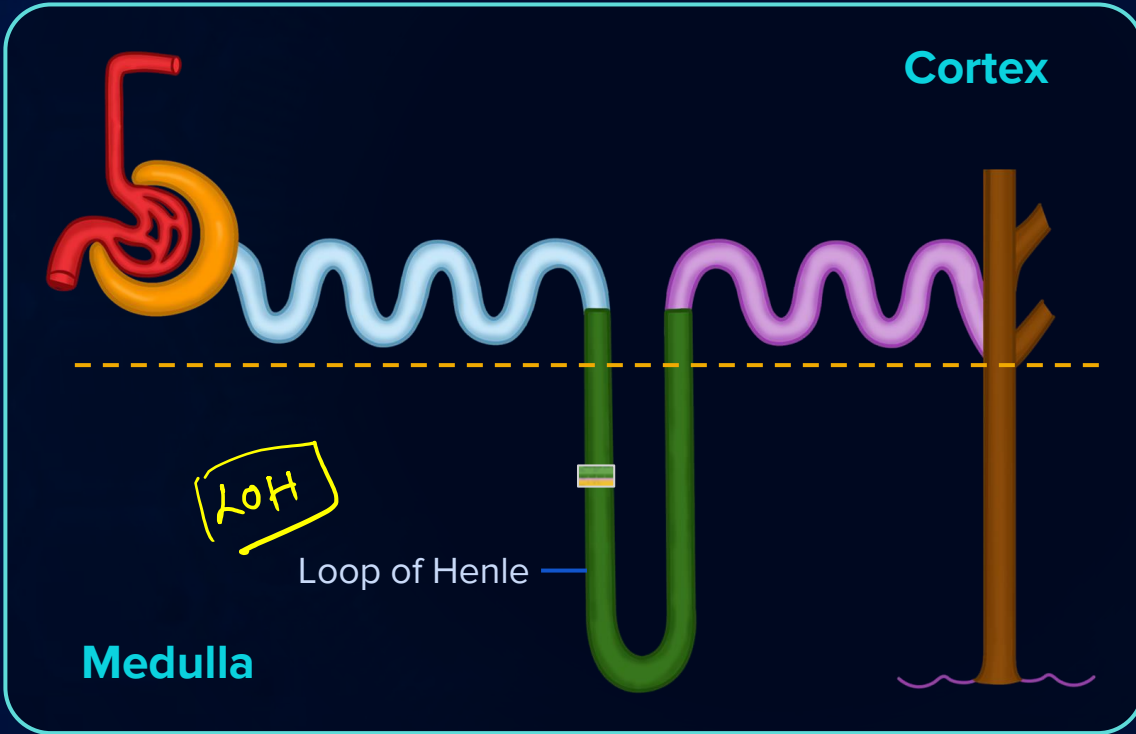
Cortex fluid



Reabsorption and Secretion (Loop of Henle)



Reabsorption and Secretion (Loop of Henle)



Reabsorption and Secretion (Loop of Henle)



Descending
tubular fluid

Ascending
tubular fluid

Tubular
epithelial cell

Basement membrane

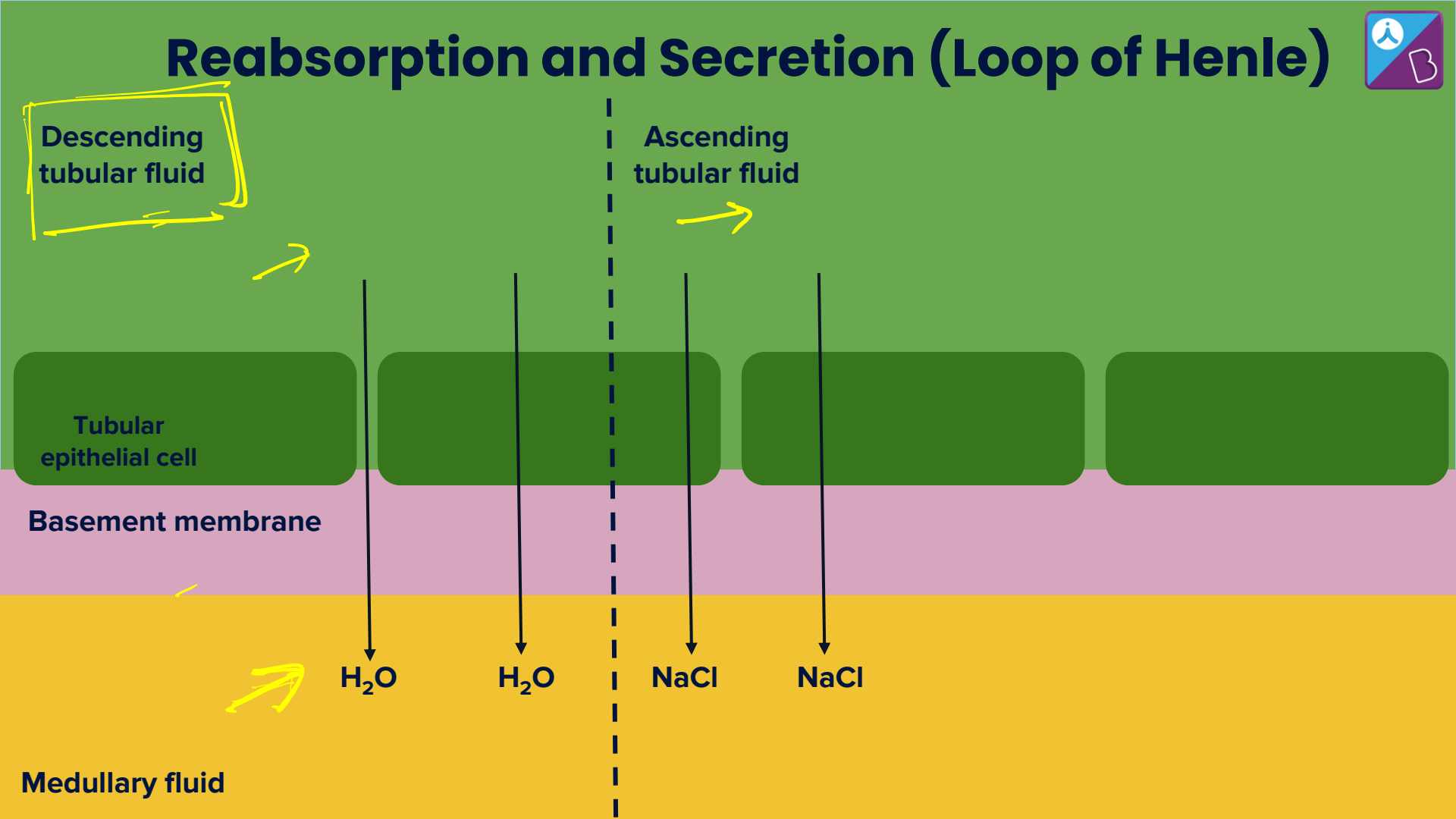
H_2O

H_2O

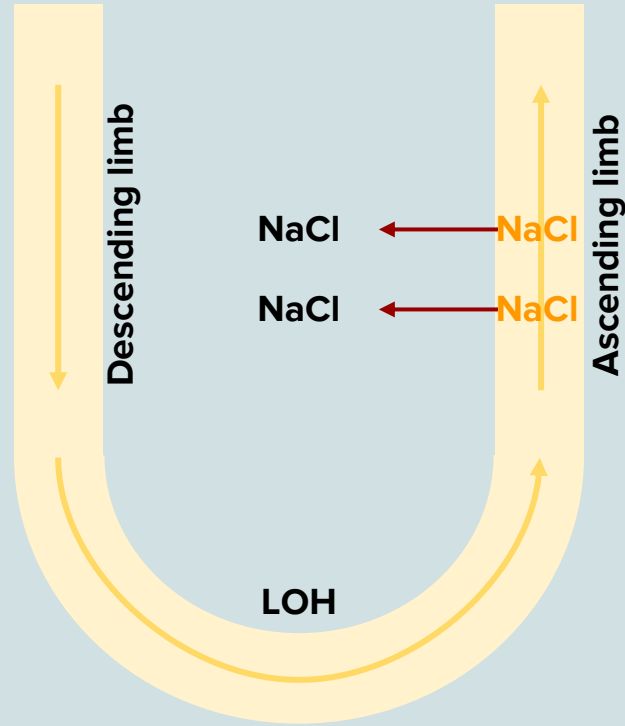
NaCl

NaCl

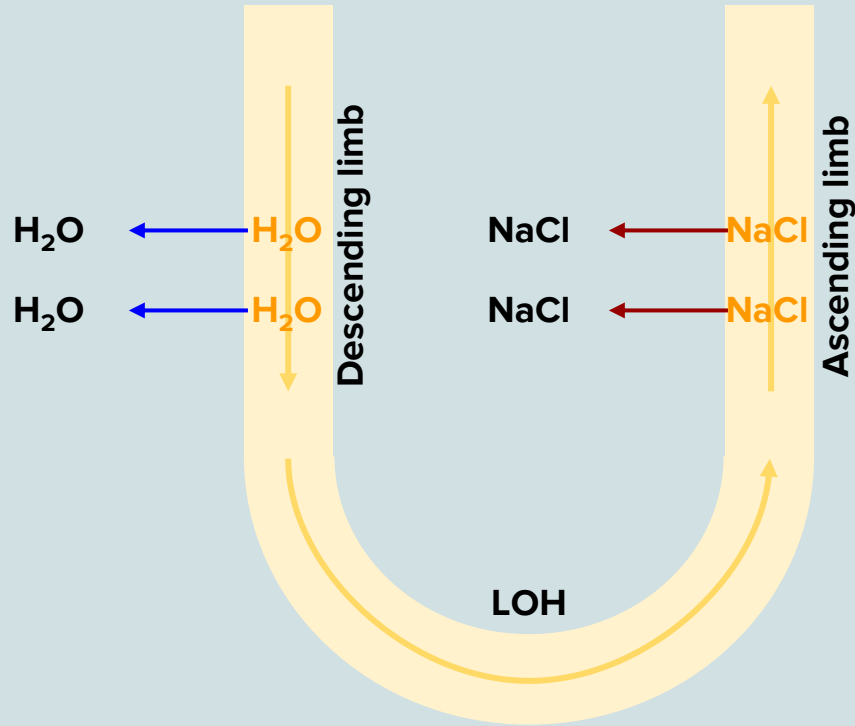
Medullary fluid



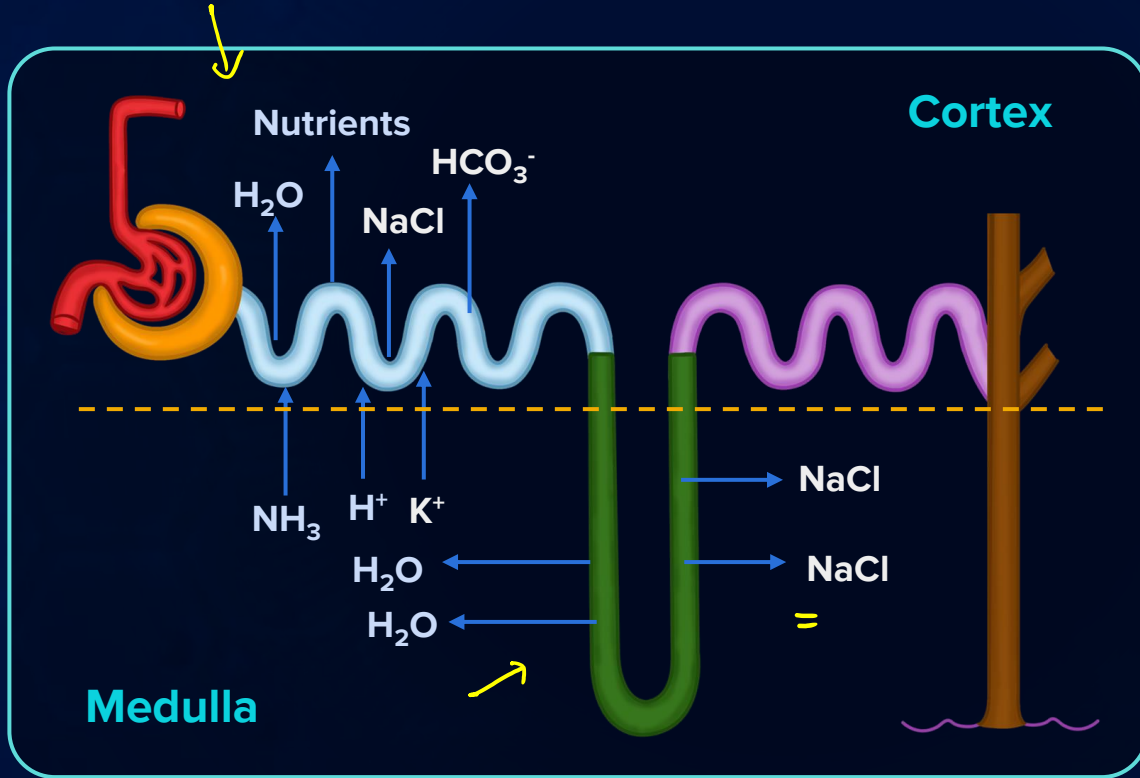
Reabsorption (Loop of Henle)



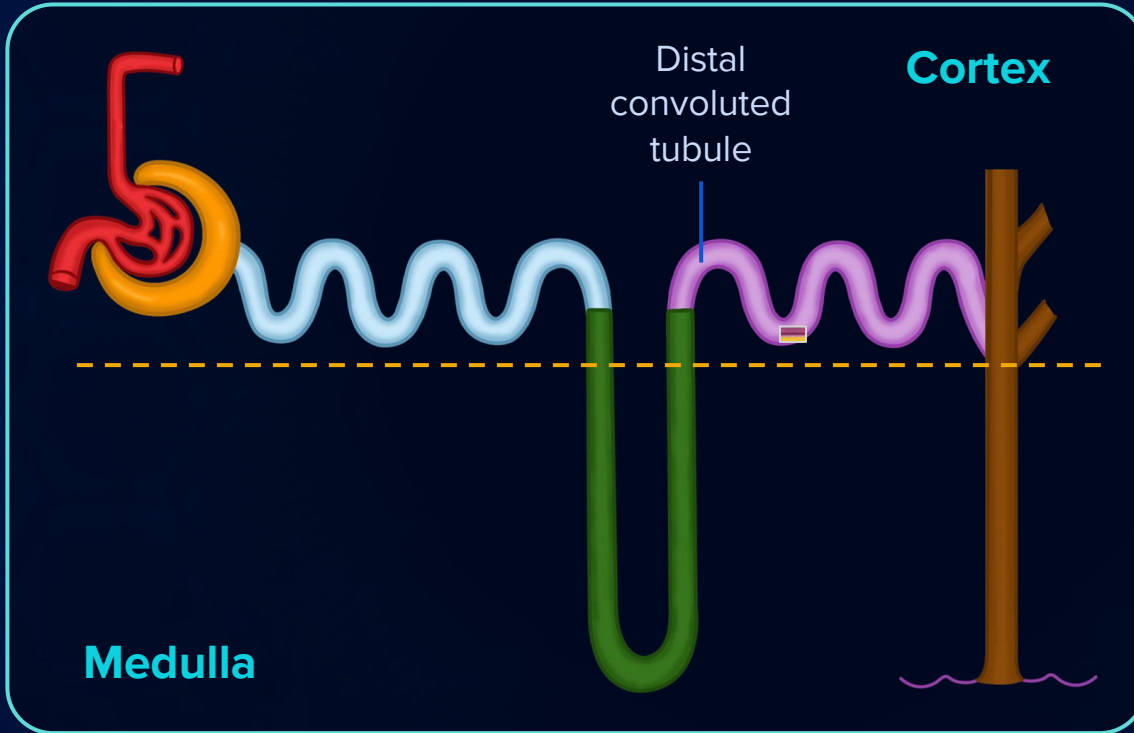
Reabsorption (Loop of Henle)



Reabsorption (Loop of Henle)



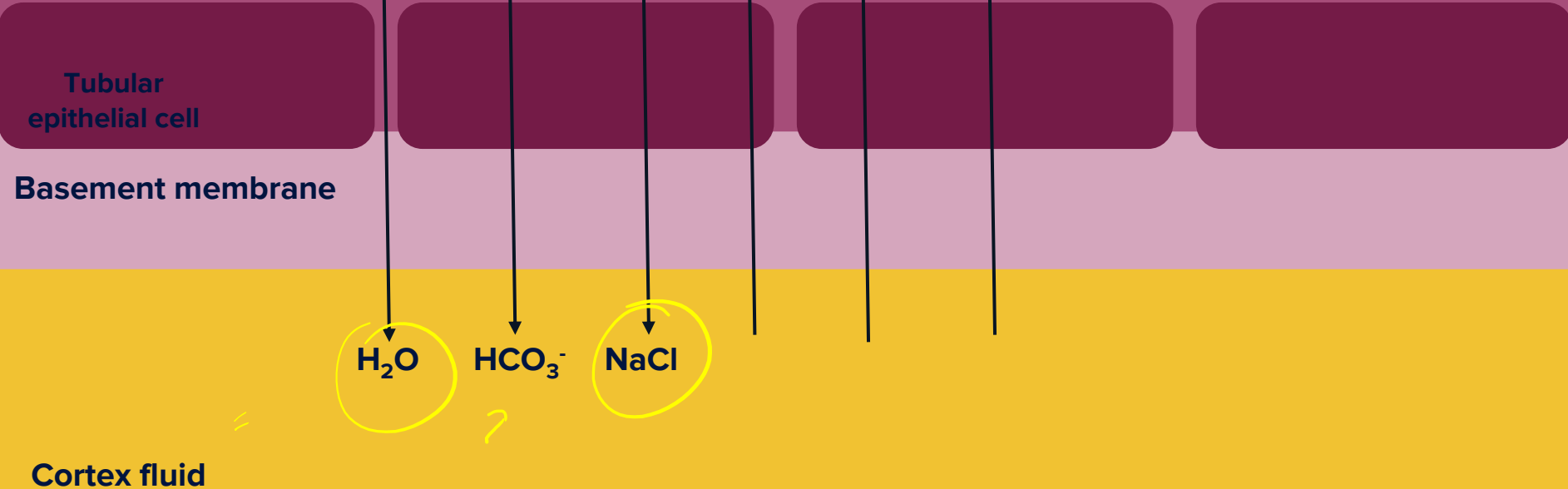
Reabsorption and Secretion (DCT)





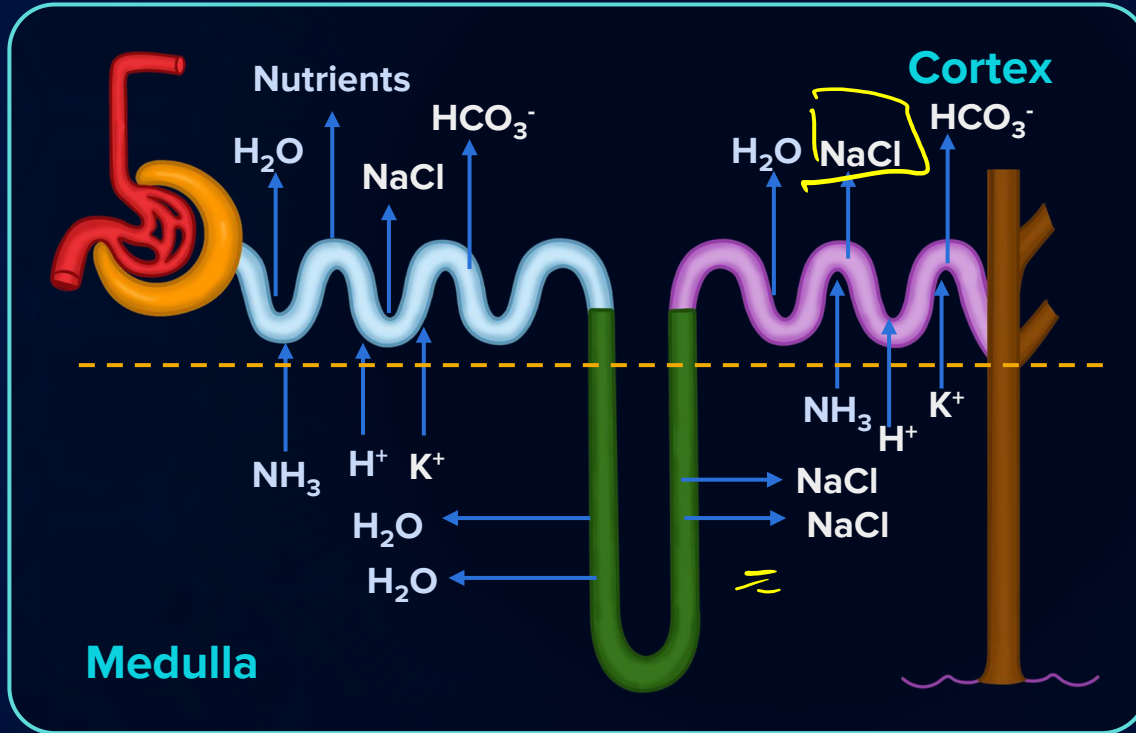
Reabsorption and Secretion (DCT)

Tubular fluid

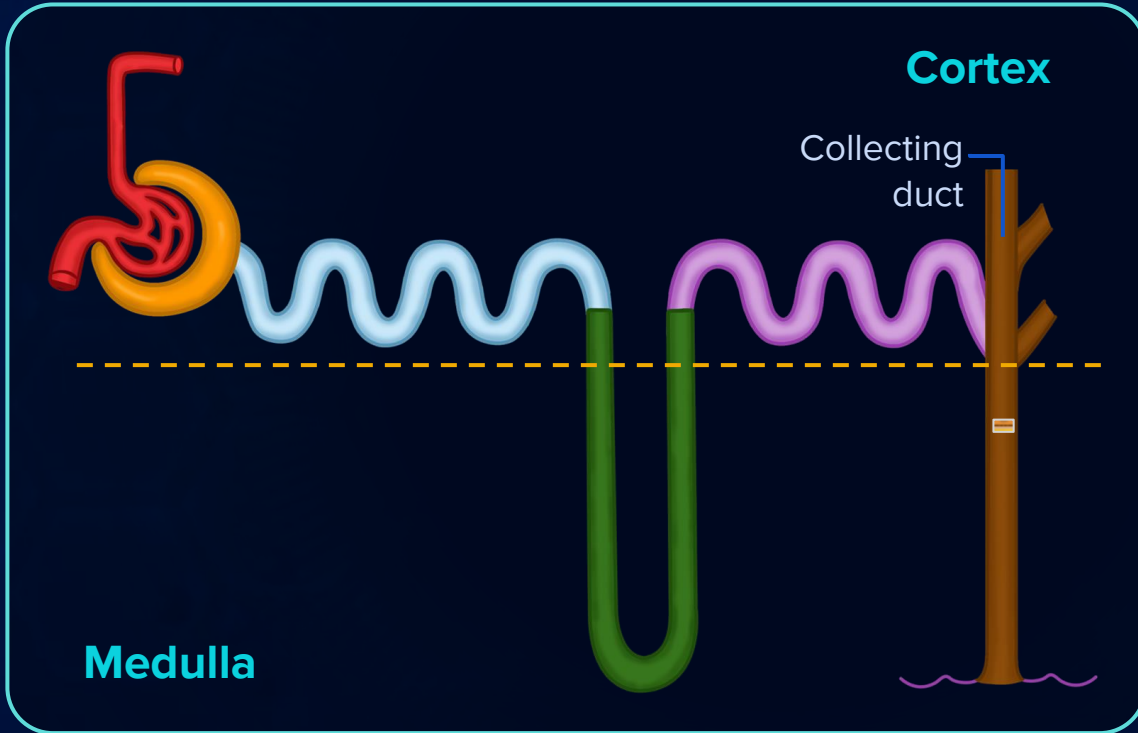


Cortex fluid

Reabsorption and Secretion (DCT)

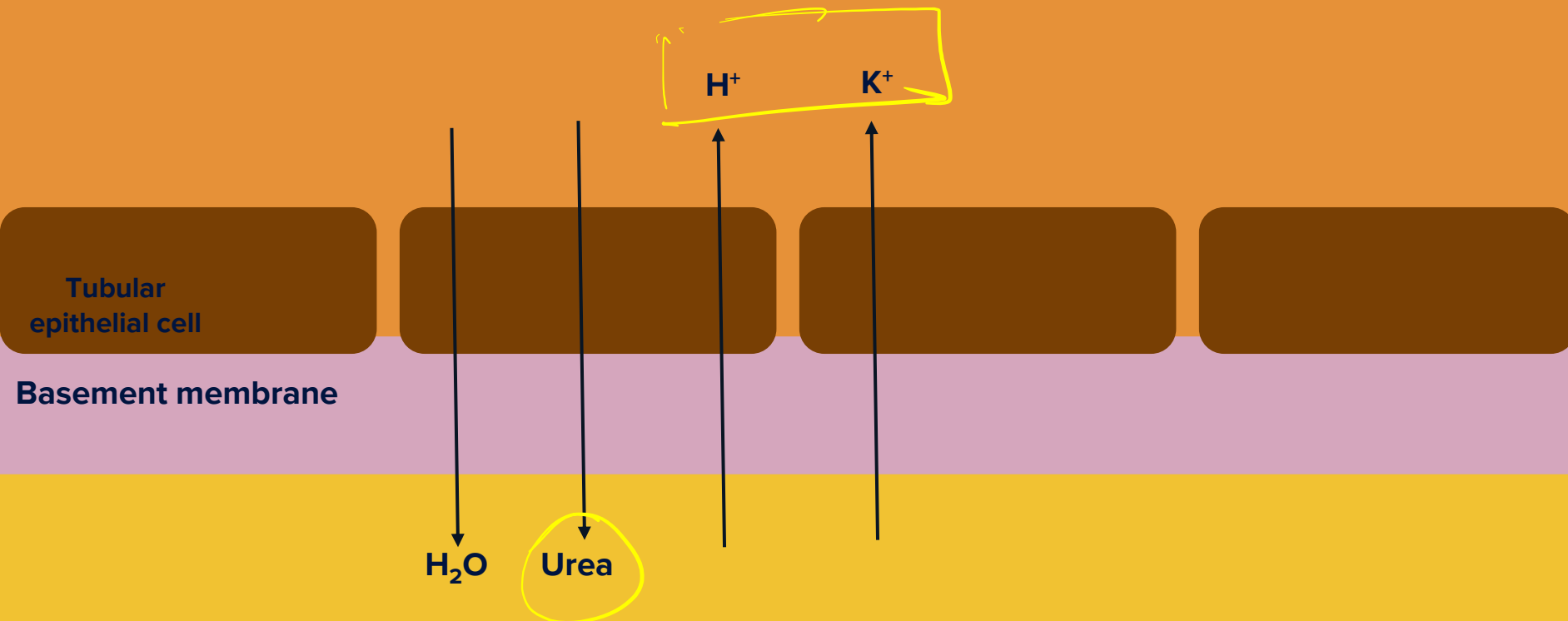


Reabsorption and Secretion (Collecting Duct)



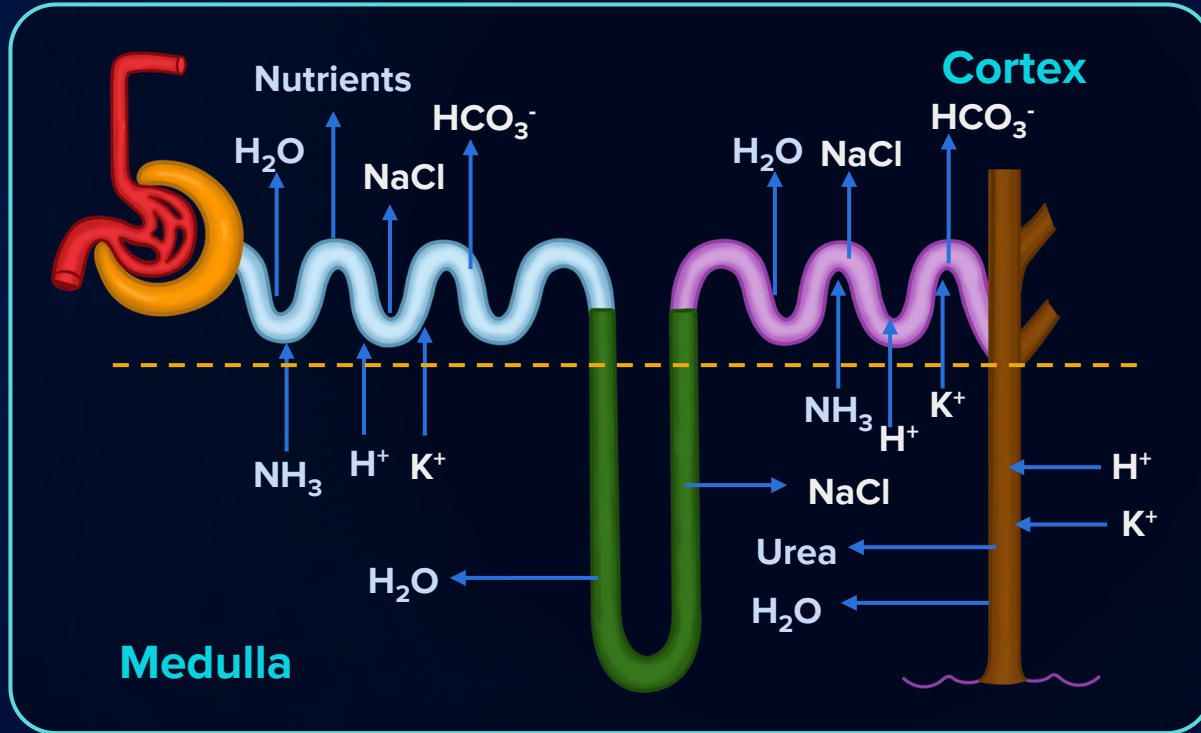


Tubular fluid

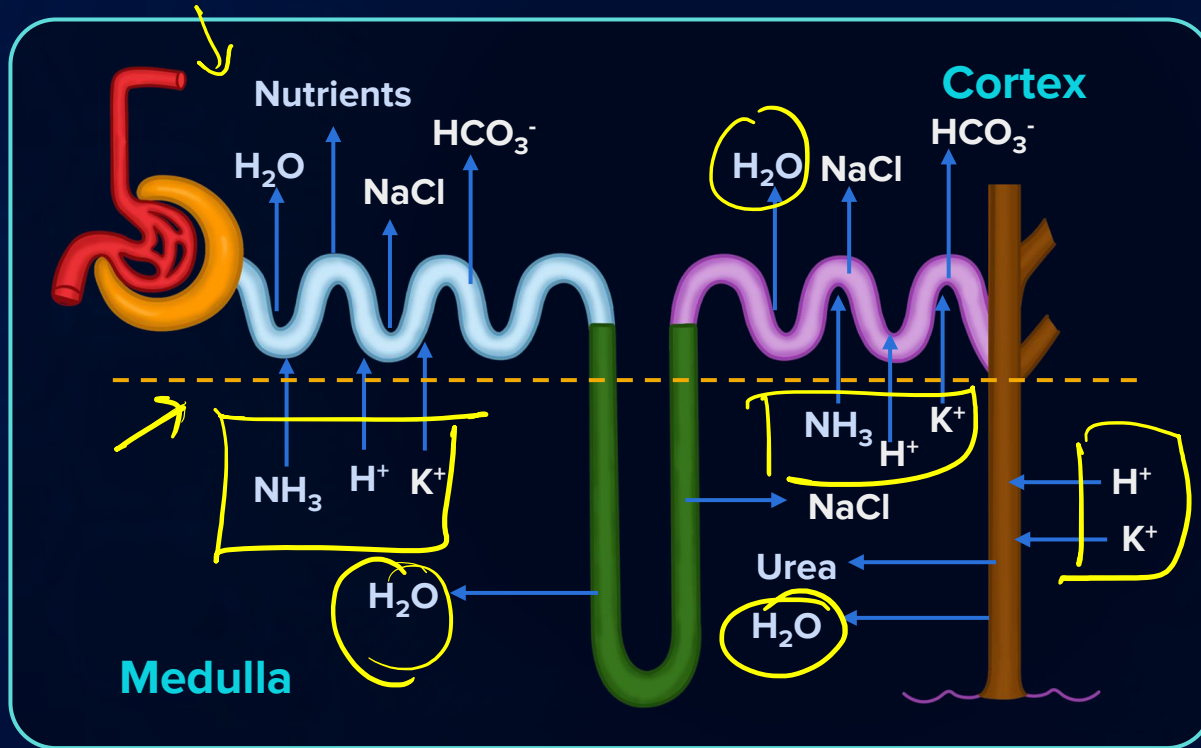


Medullary fluid

Reabsorption and Secretion (Collecting Duct)



Urine Formation: Reabsorption and Secretion





Question Time !





The removal of proximal convoluted tubule will result into:

A) More concentrated urine

B) No change

C) No urine formation

D) More dilute urine



The removal of proximal convoluted tubule will result into:

A) More concentrated urine

B) No change

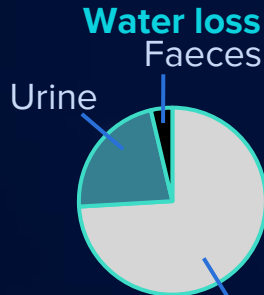
C) No urine formation

✓ D) More dilute urine

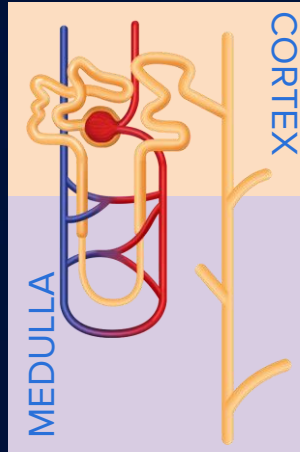
Did You Know?

NORMAL (MESIC) CONDITIONS

Cow



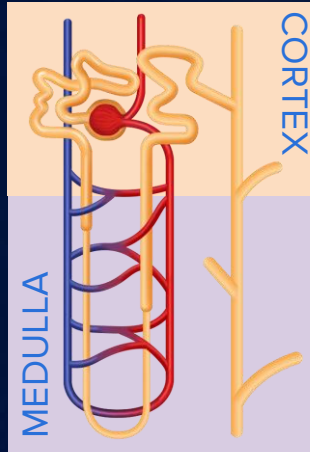
Cortical
nephron



Less water
retention

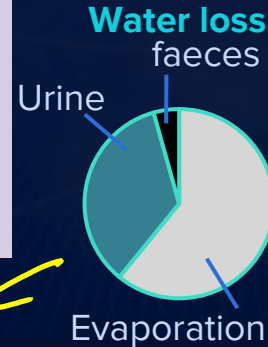
ARID (DESERT) CONDITIONS

Juxtamedullary
nephron



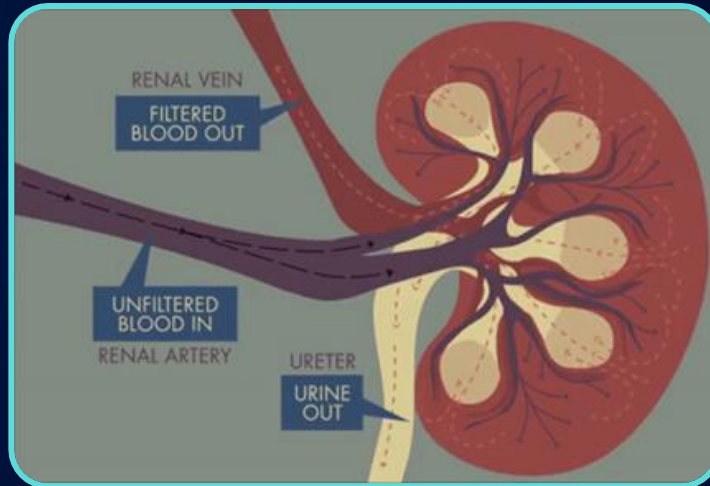
More water
retention

Desert rat



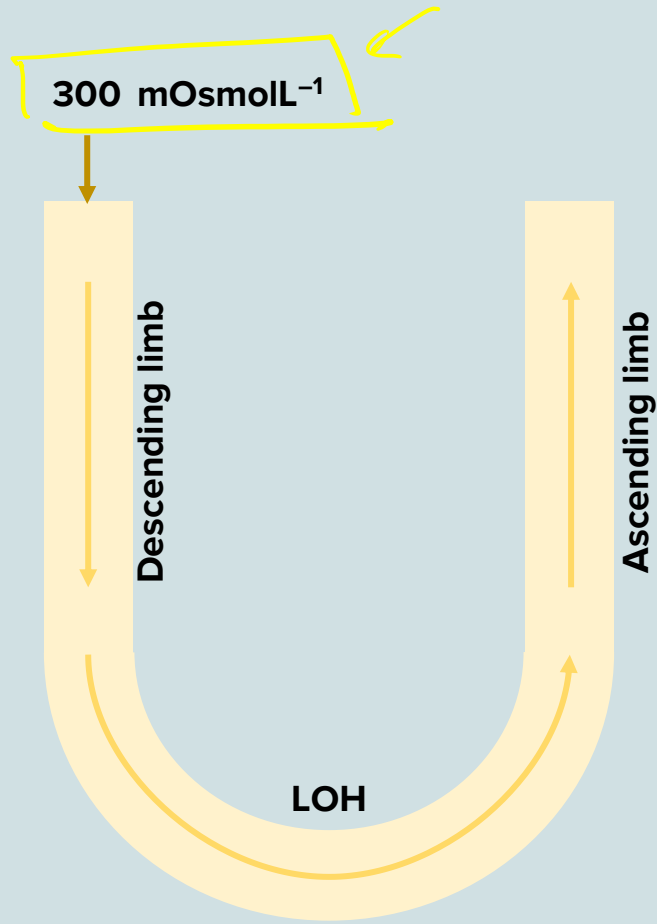
Urine Formation: Glomerular Filtration Rate

- Filtrate formed by the kidneys per minute: **Glomerular filtration rate**
- GFR: 125 ml/min (approximately), i.e., **180 litres per day**
- Urine released: **1.5 litres per day**



Concentration of Filtrate





300 mOsmolL⁻¹

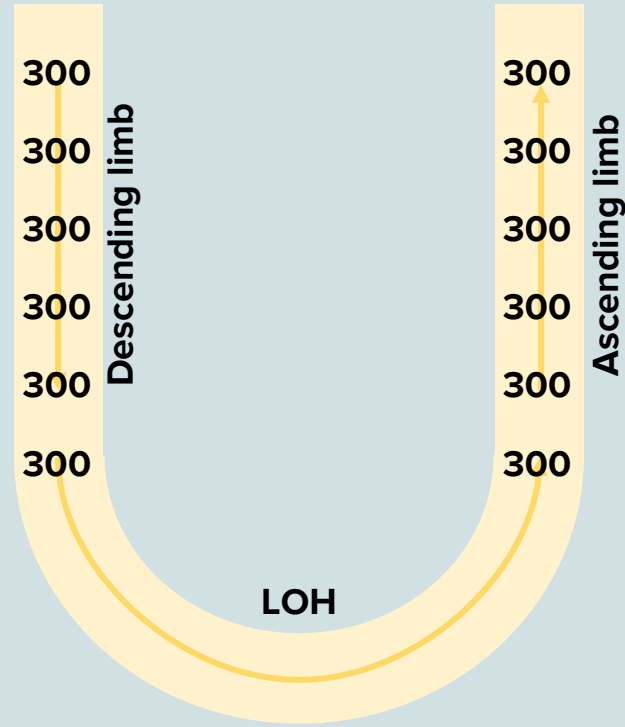


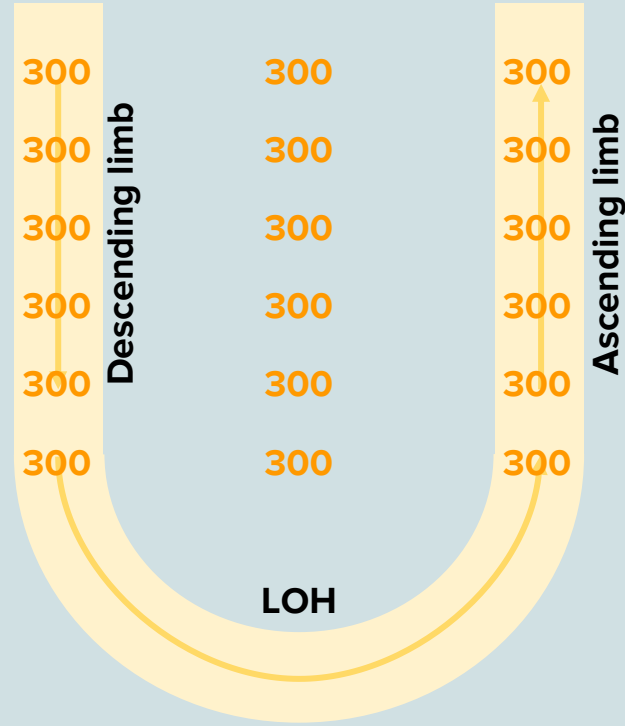
Osmolarity

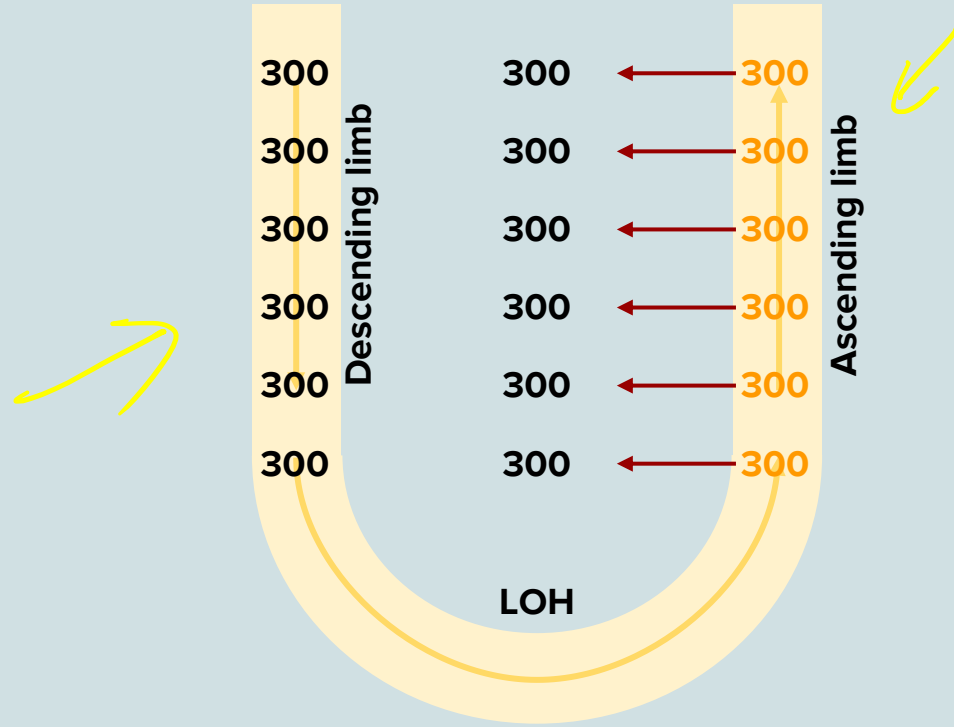
Osmolarity is a measure of solute concentration.

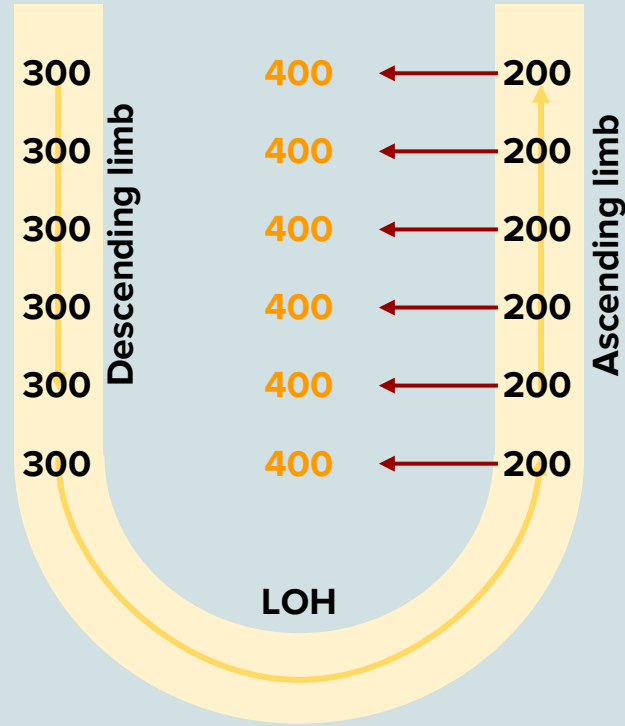
LOH

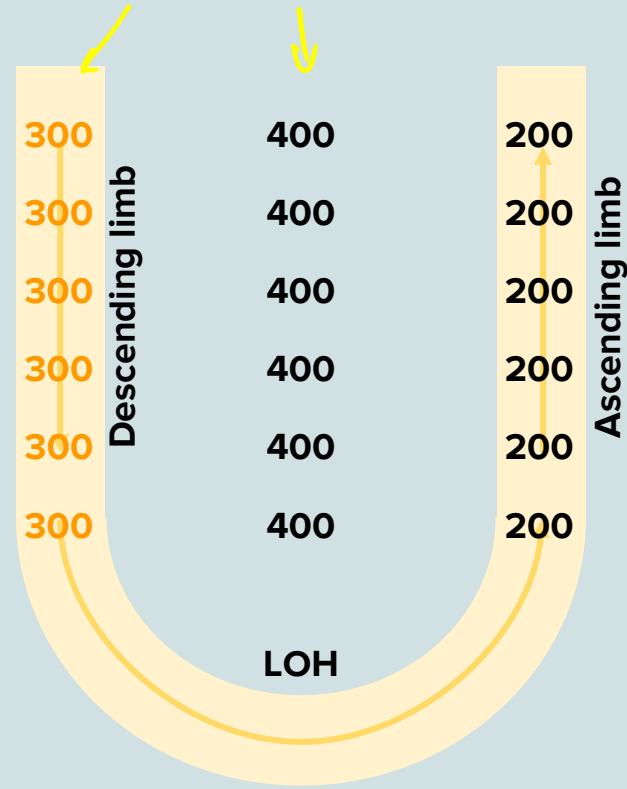












300 mOsmolL⁻¹

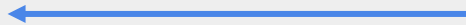


Osmolarity

Osmolarity is a measure of solute concentration.

**Higher
solute conc.**

Water



**Lower
solute conc.**

300 mOsmolL⁻¹



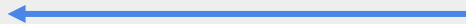
Osmolarity

Osmolarity is a measure of solute concentration.

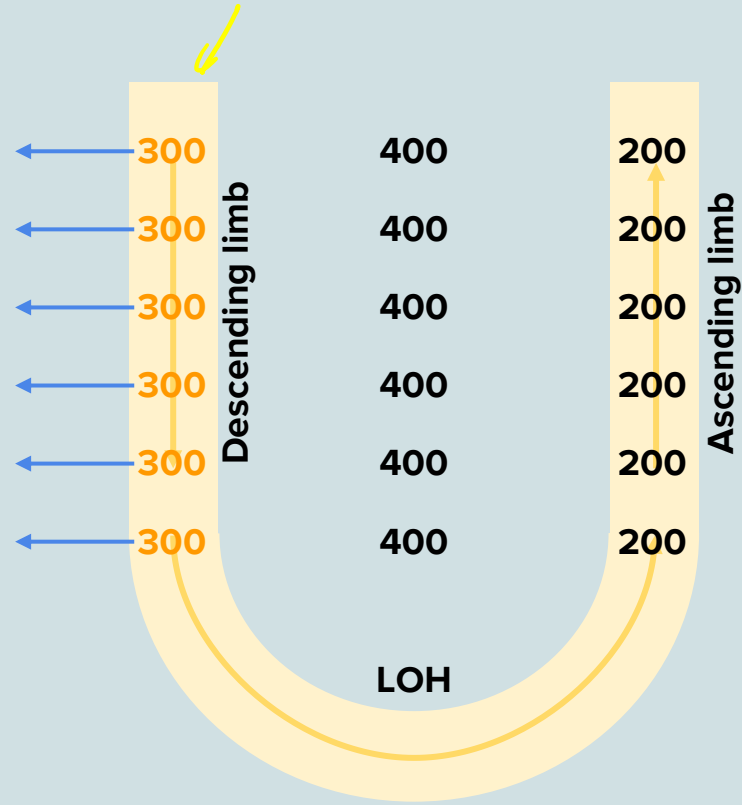


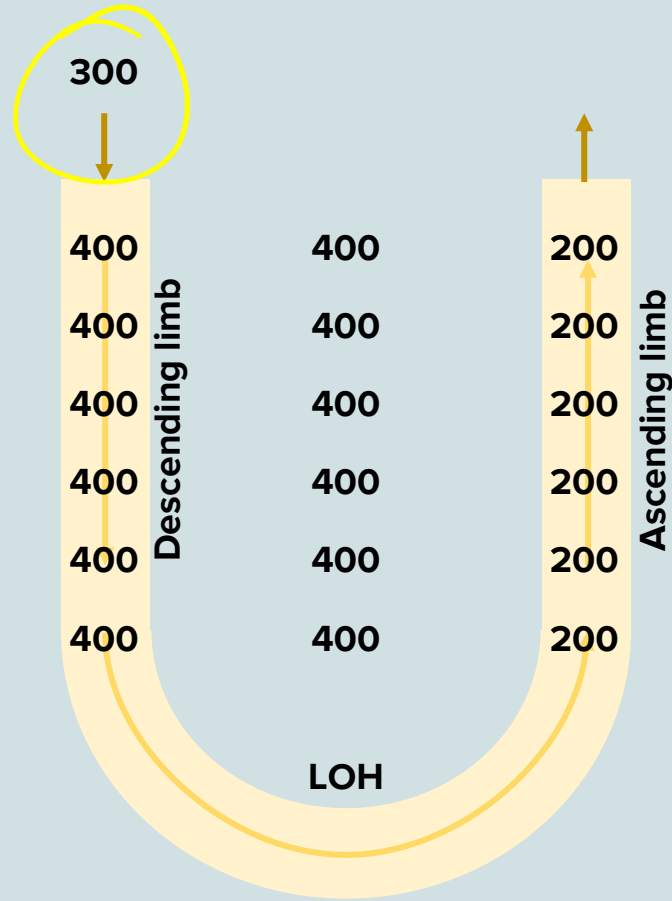
**Higher
osmolarity**

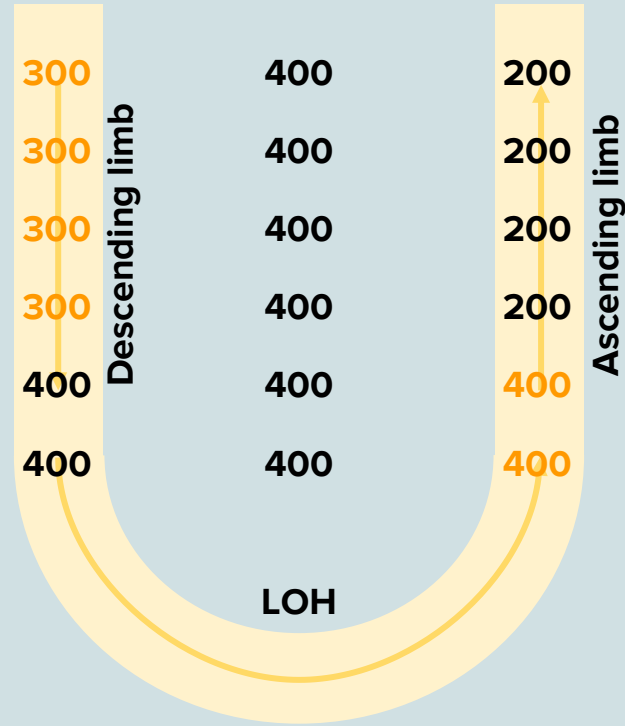
Water

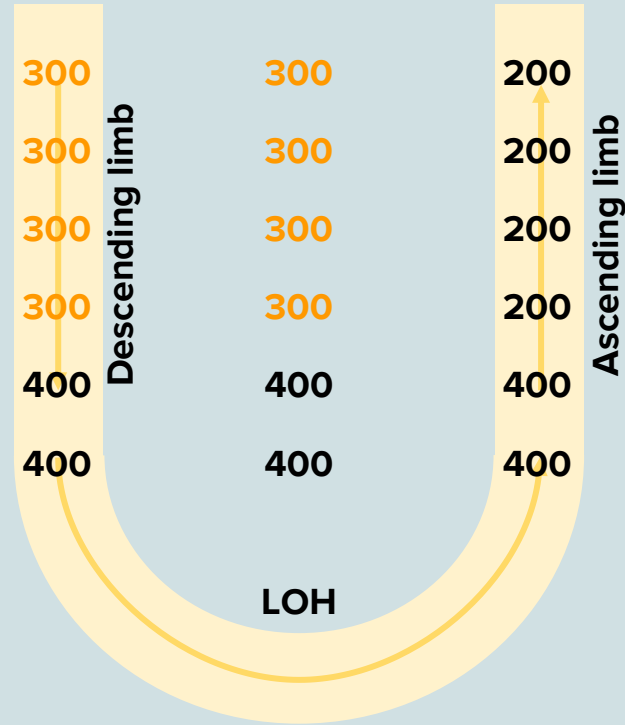


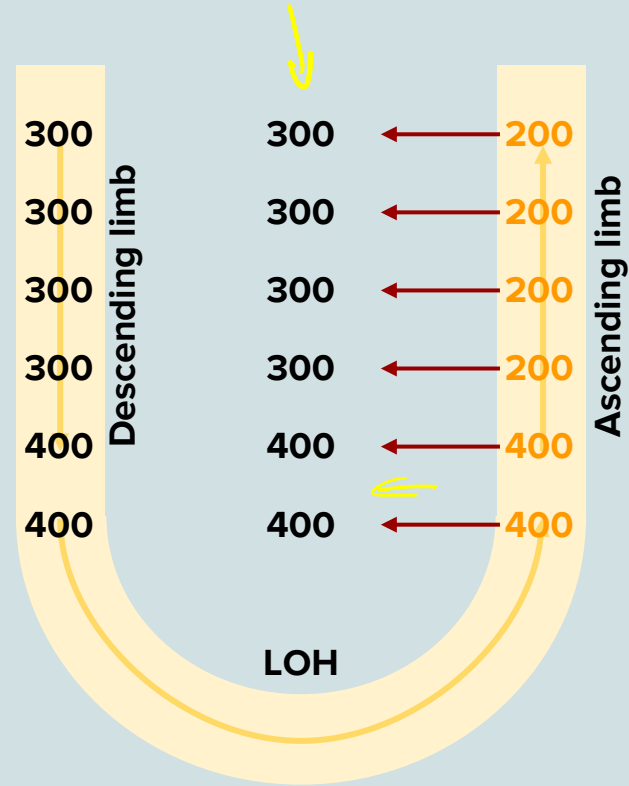
**Lower
osmolarity**

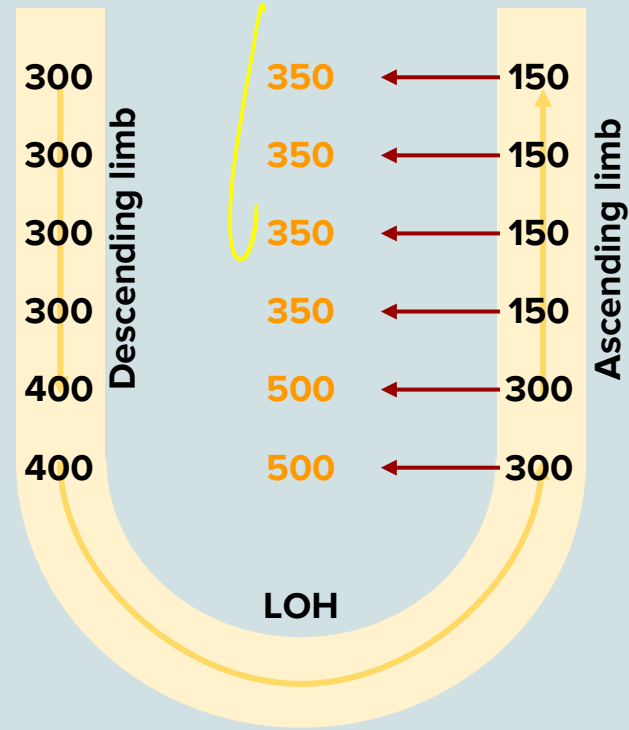


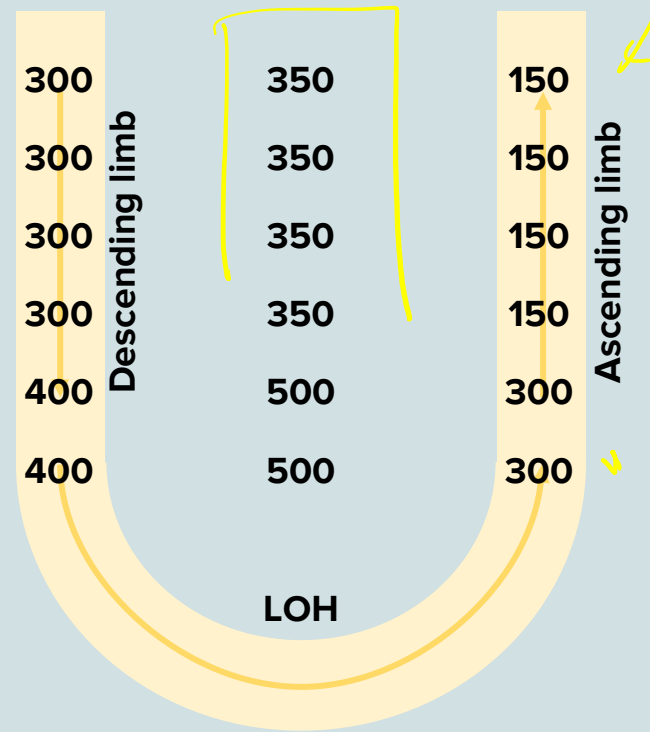


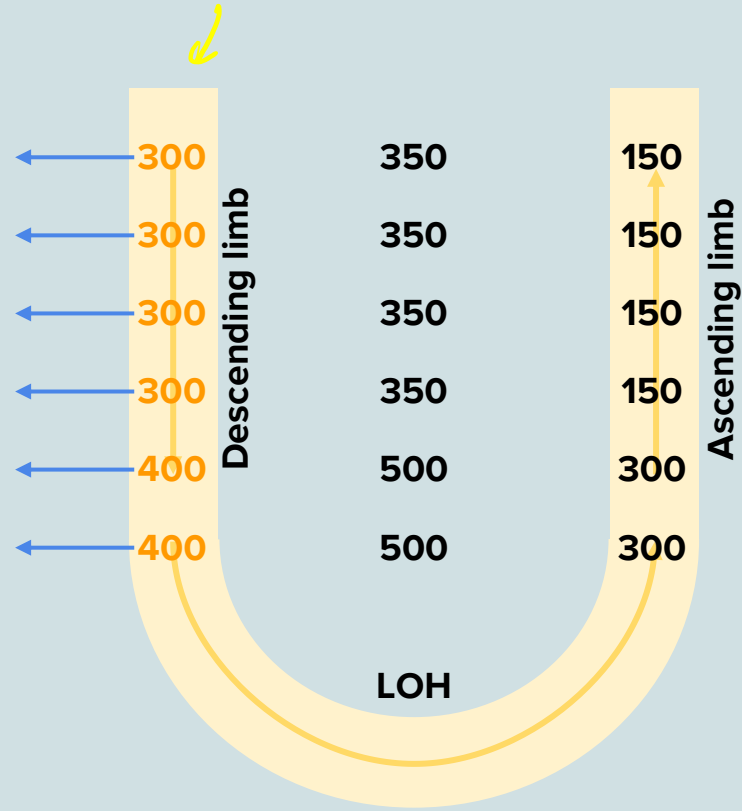


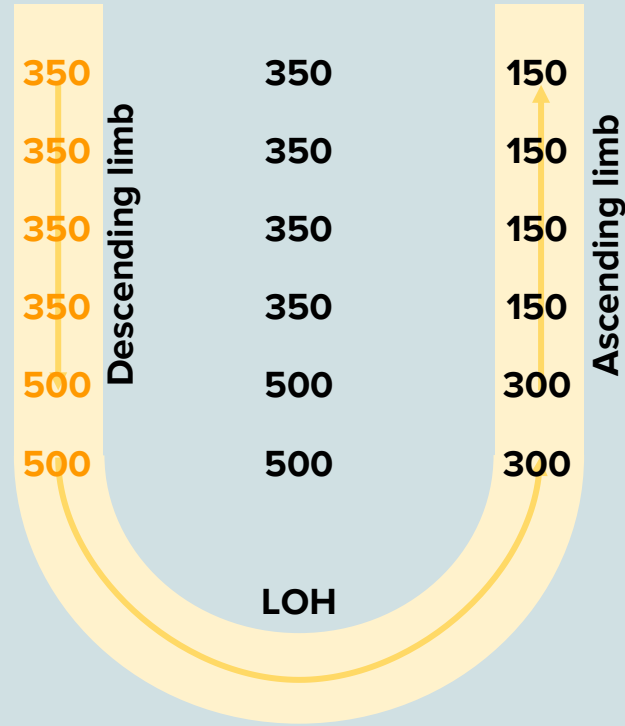


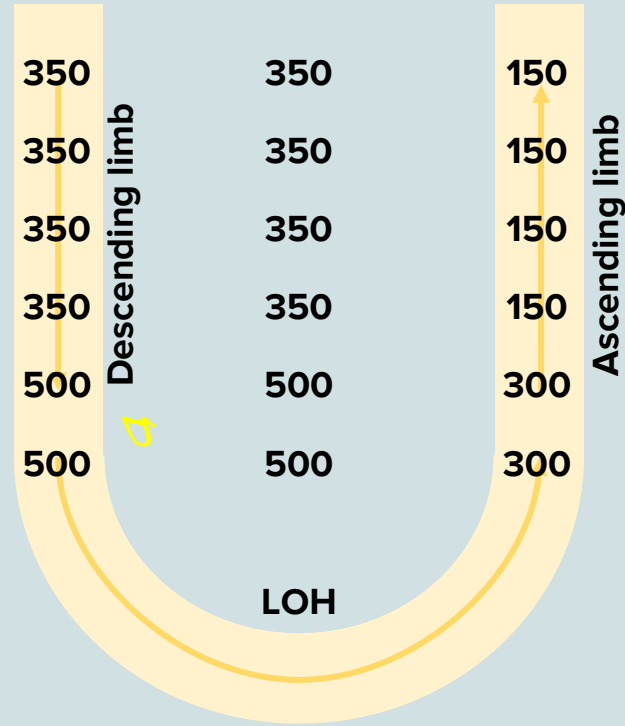


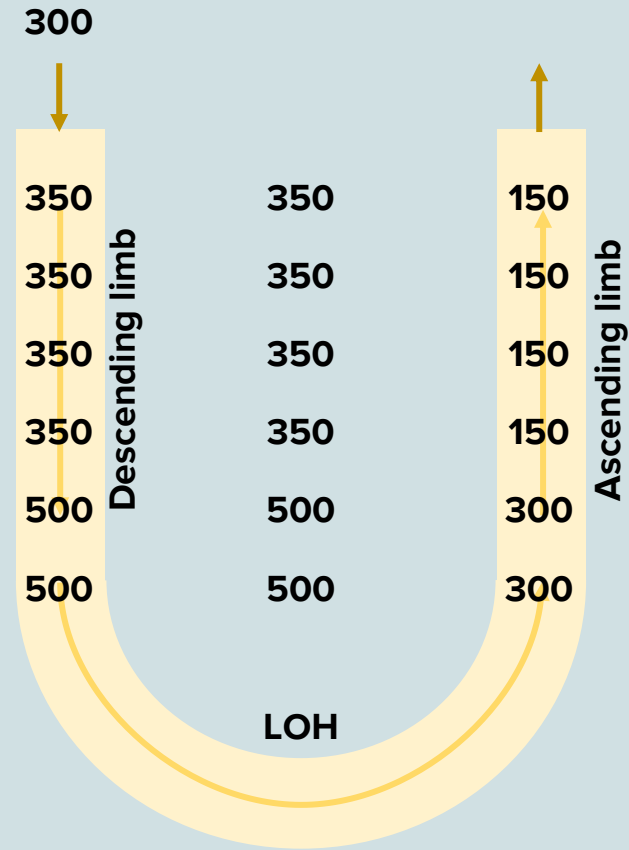


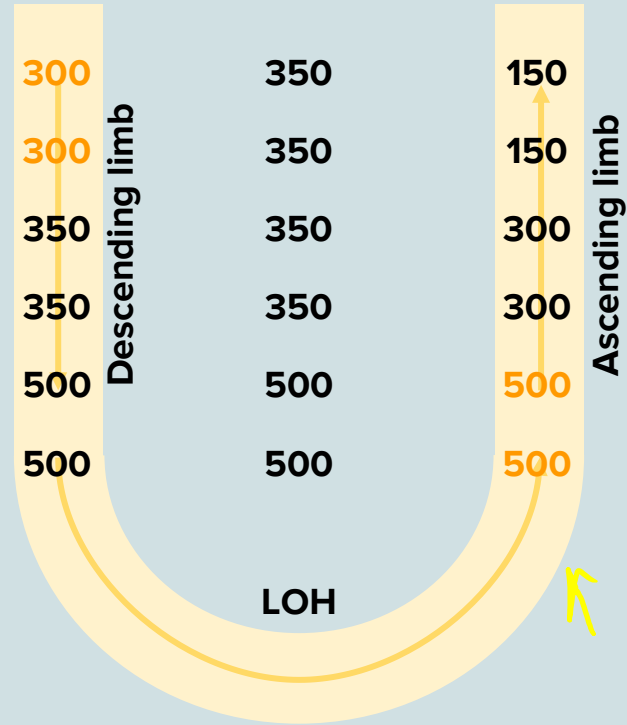


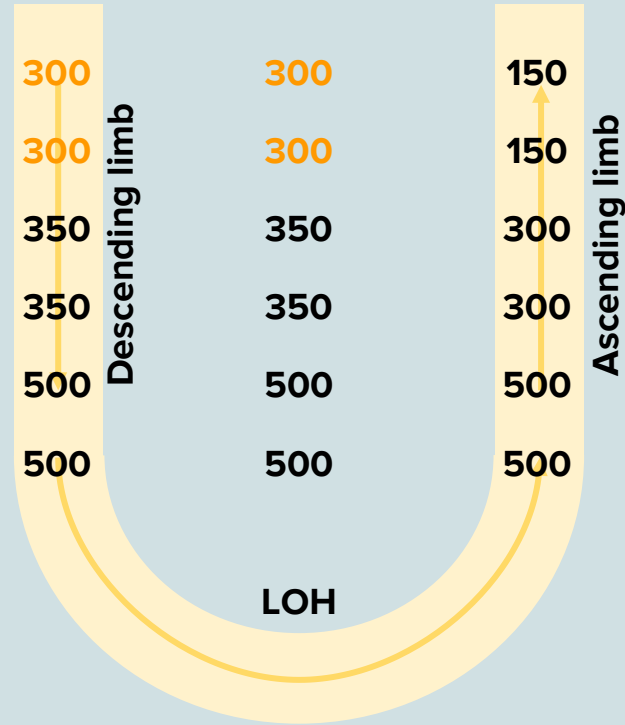


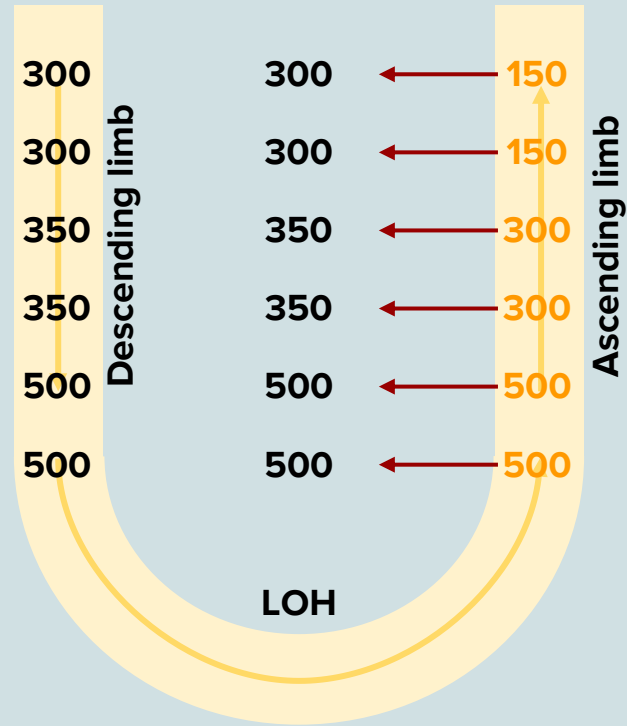


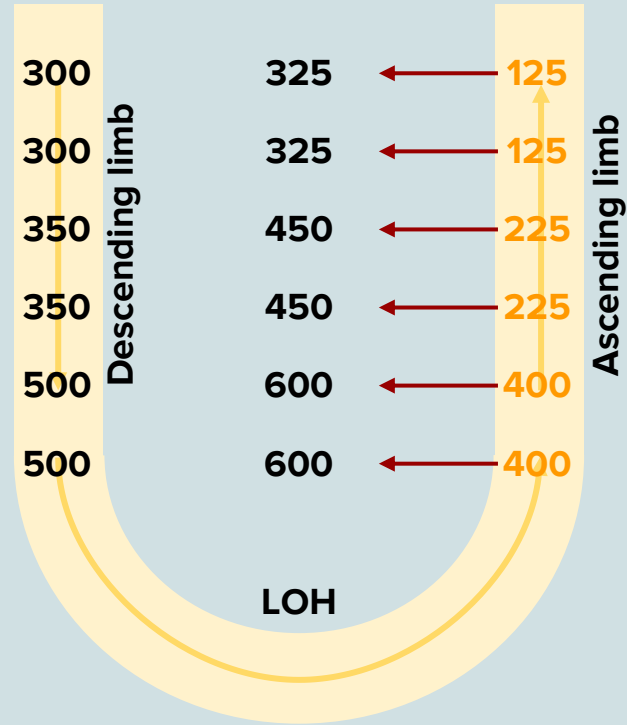


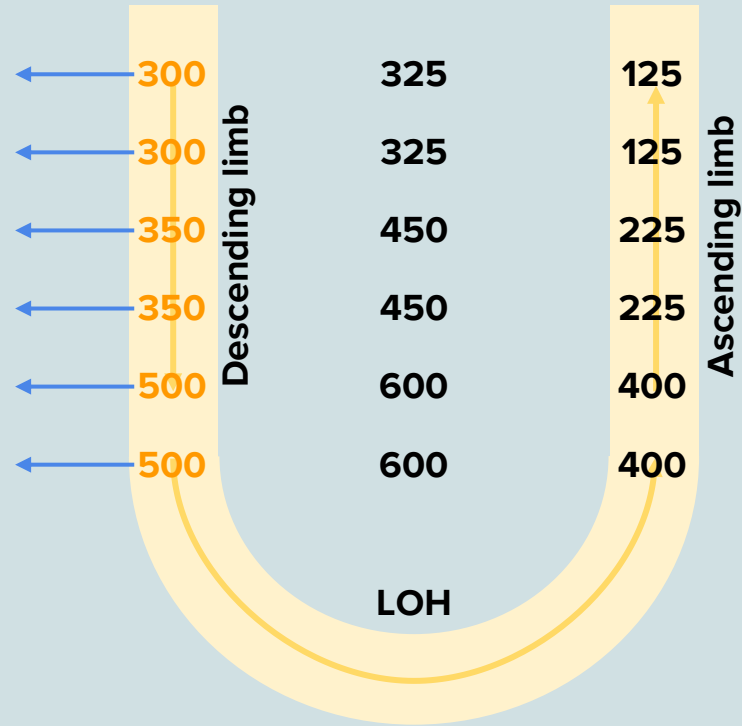


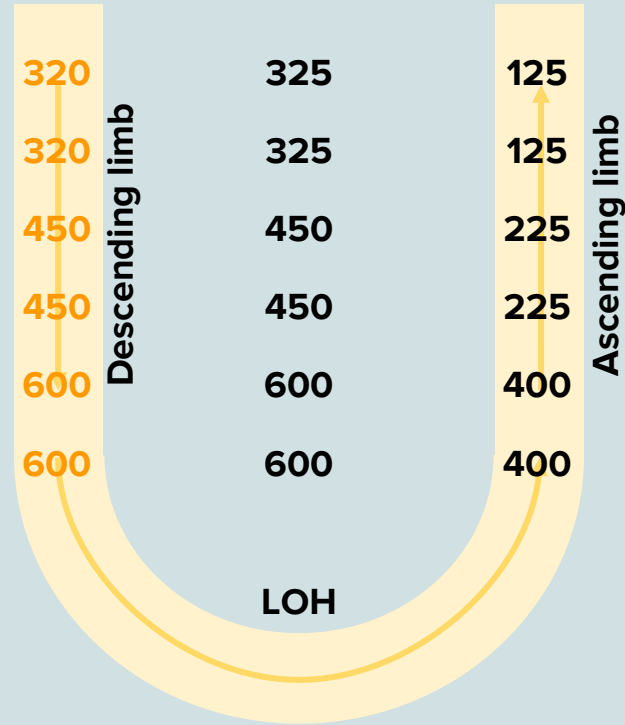


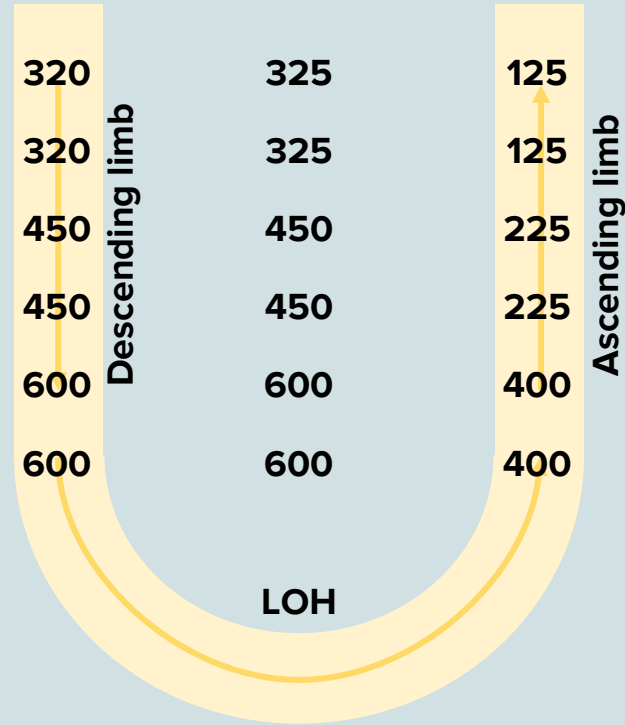


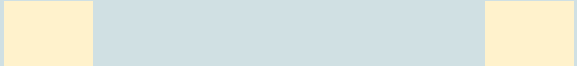








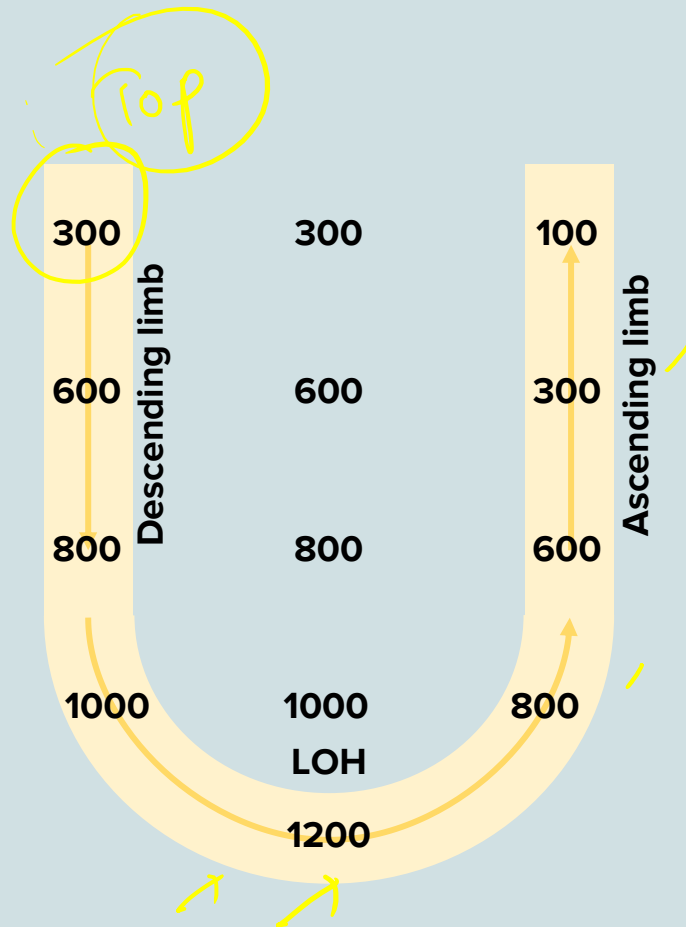




This goes on ...



LOH





300

600

800

1000

1200

300

600

800

1000

Descending arm

300

600

800

1000

LOH

1200

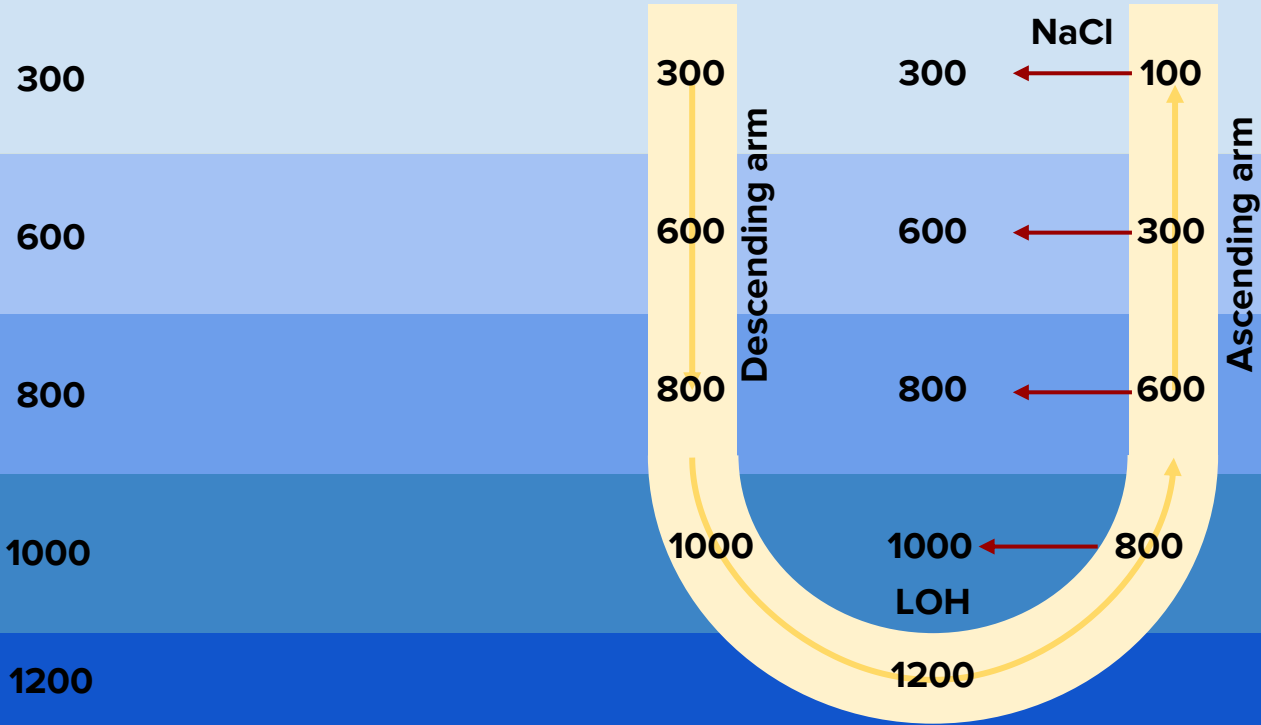
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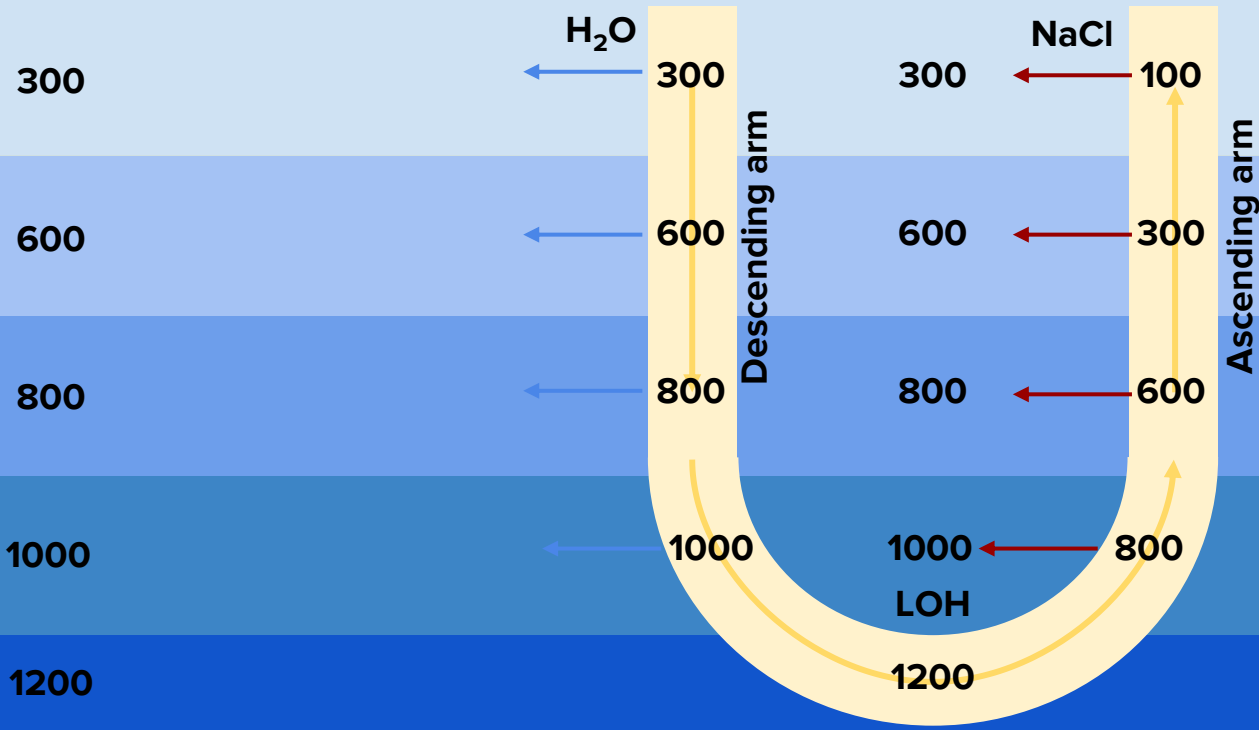
300

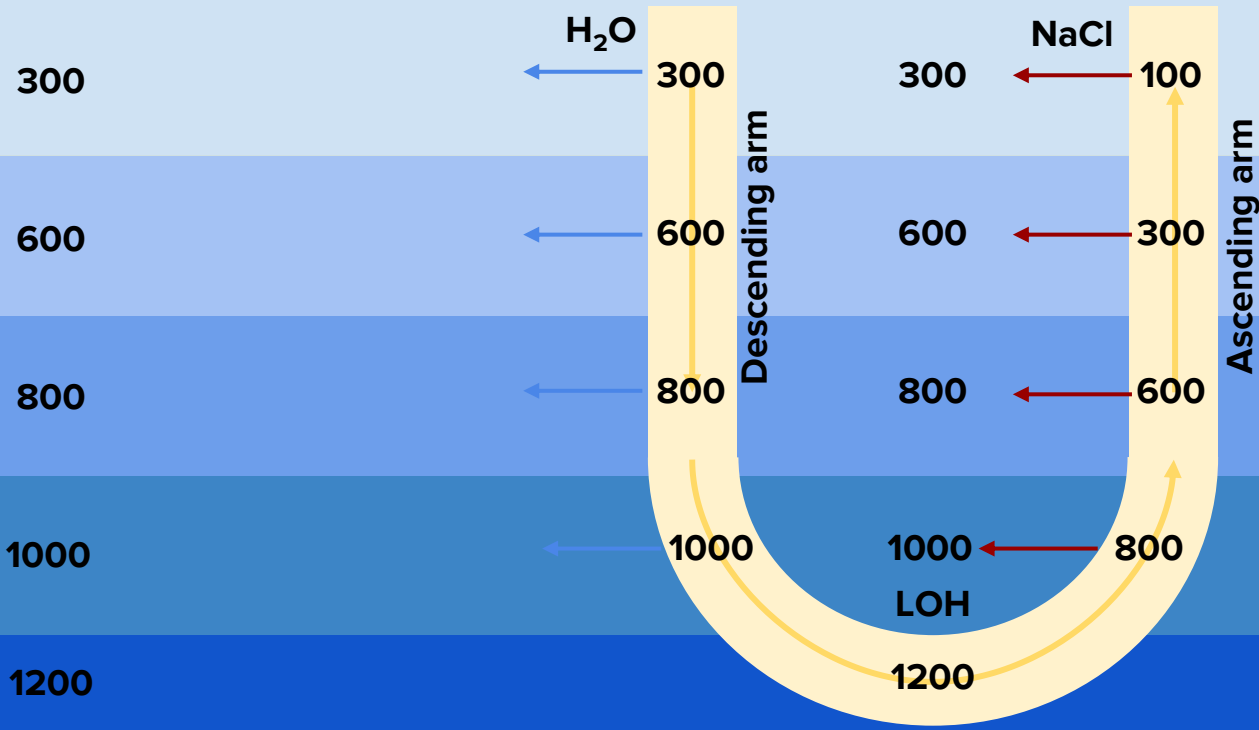
600

800

Ascending arm

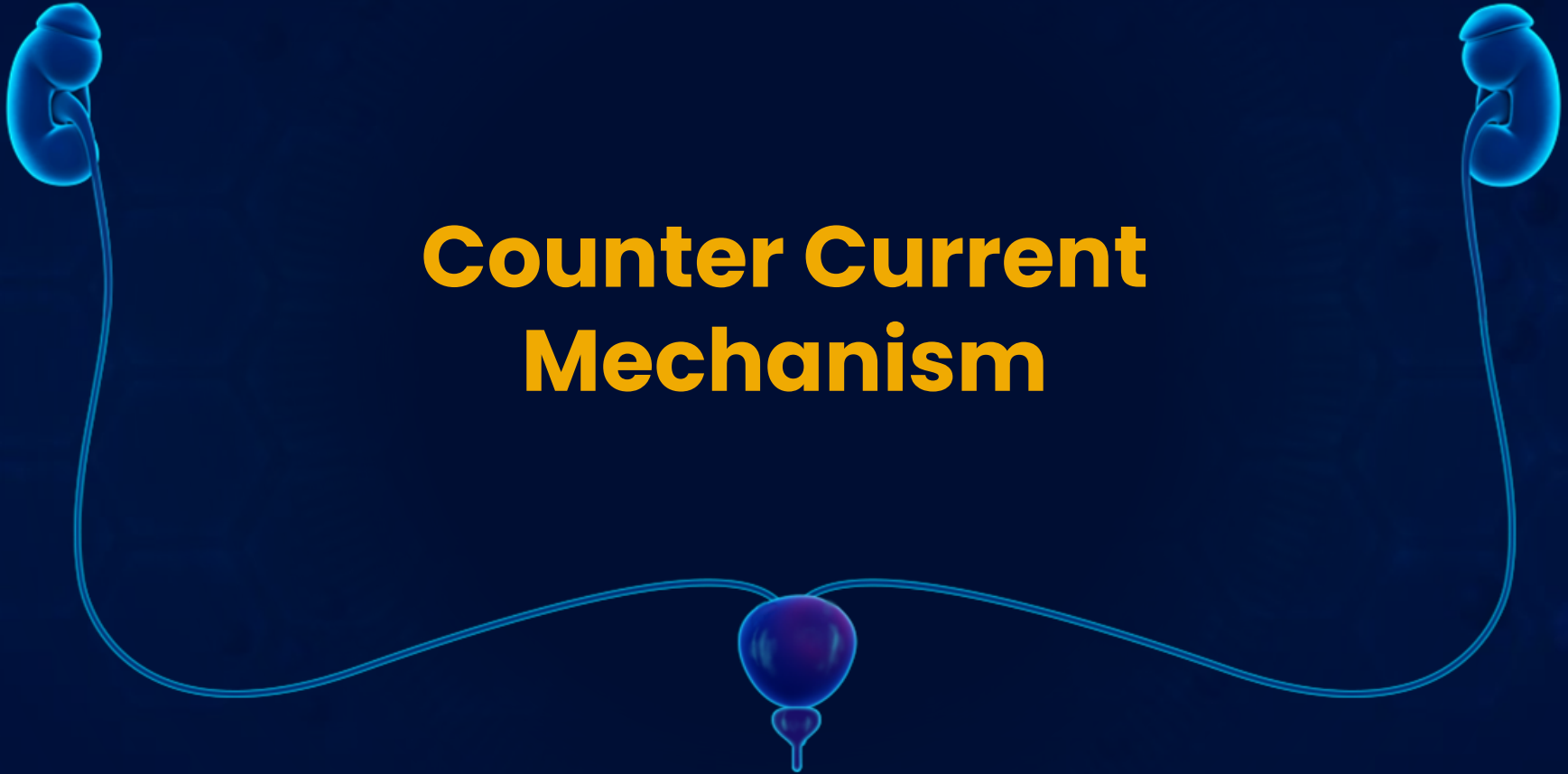




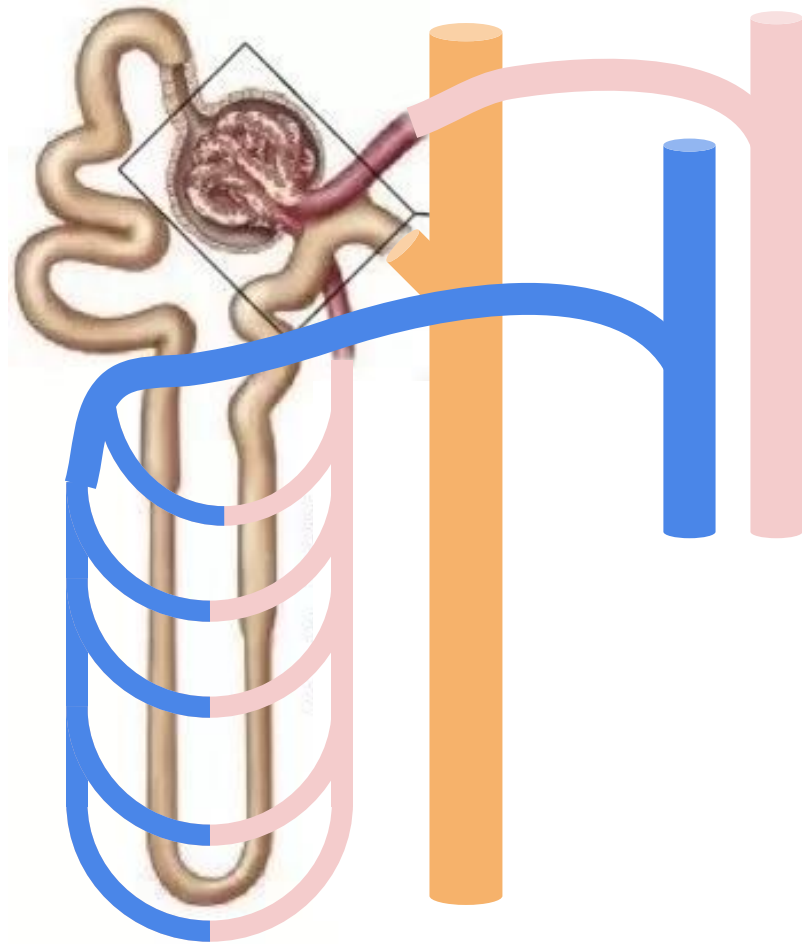




Counter Current Mechanism









300



300

600

800

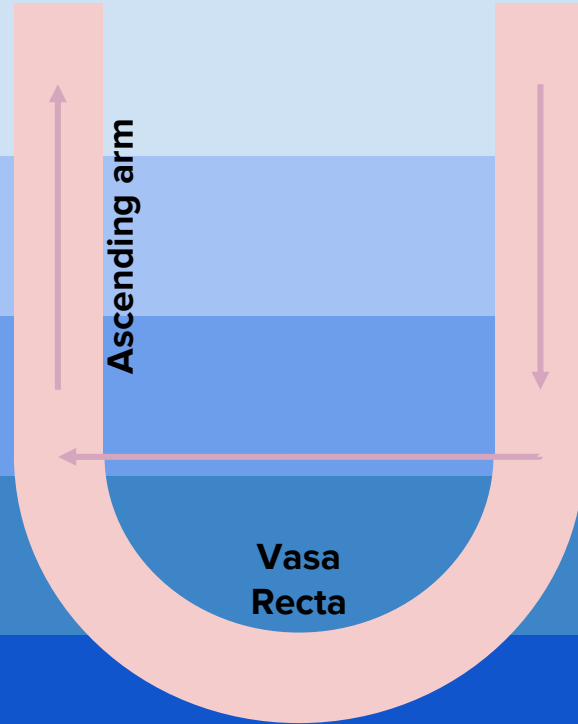
1000

1200

Ascending arm

Descending arm

Vasa Recta





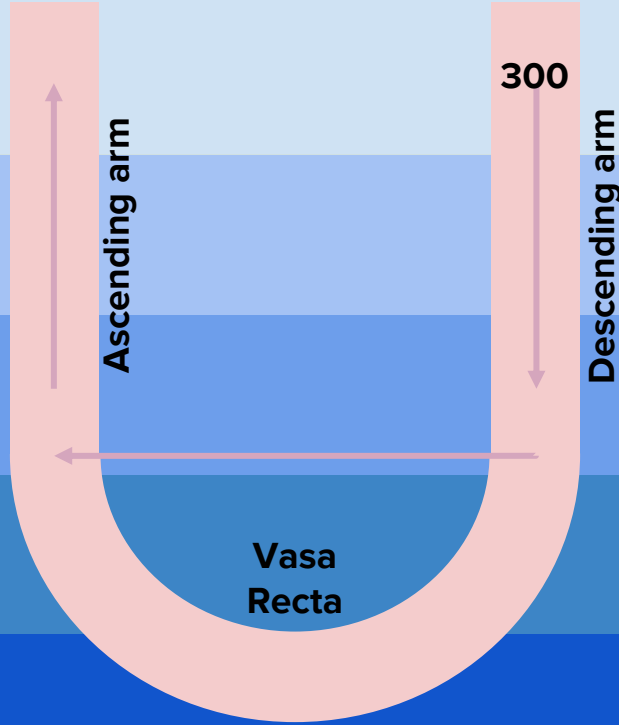
300

600

800

1000

1200





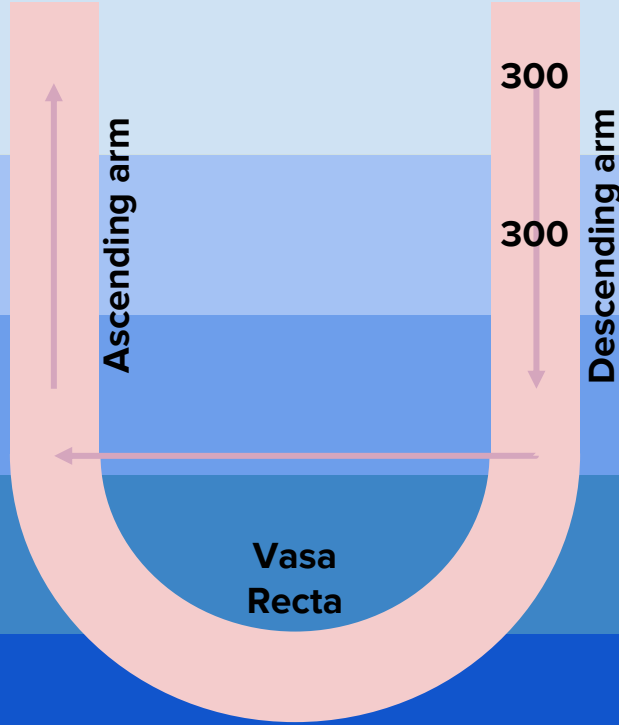
300

600

800

1000

1200





300

600

800

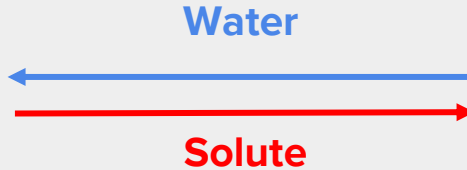
1000

1200

Osmolarity

Osmolarity is a measure of solute concentration.

**Higher
osmolarity**



**Lower
osmolarity**



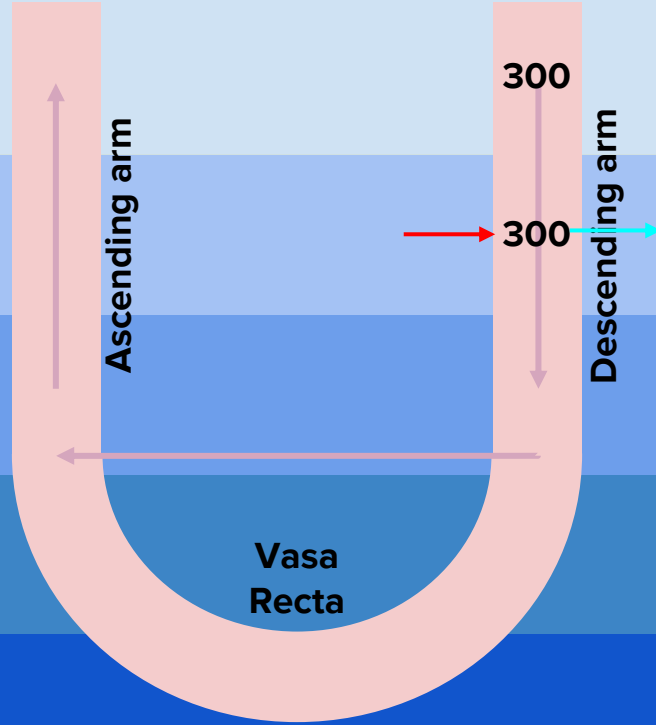
300

600

800

1000

1200





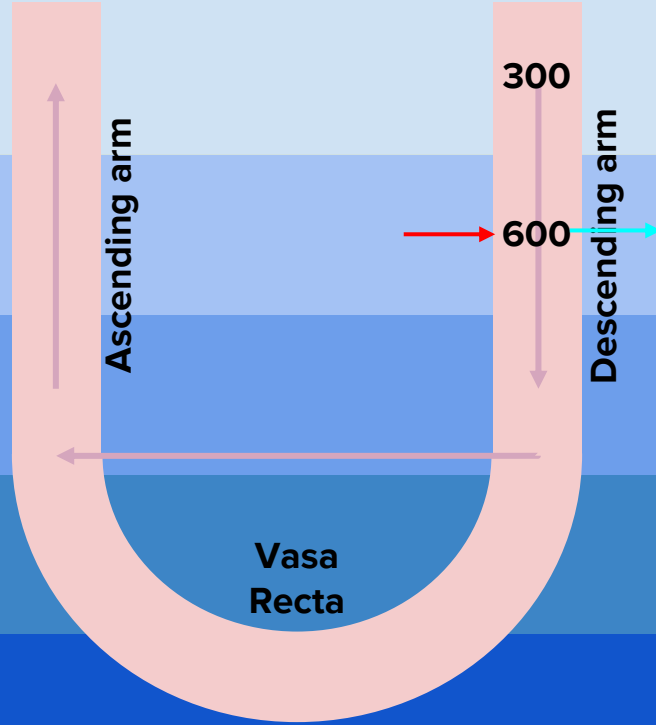
300

600

800

1000

1200





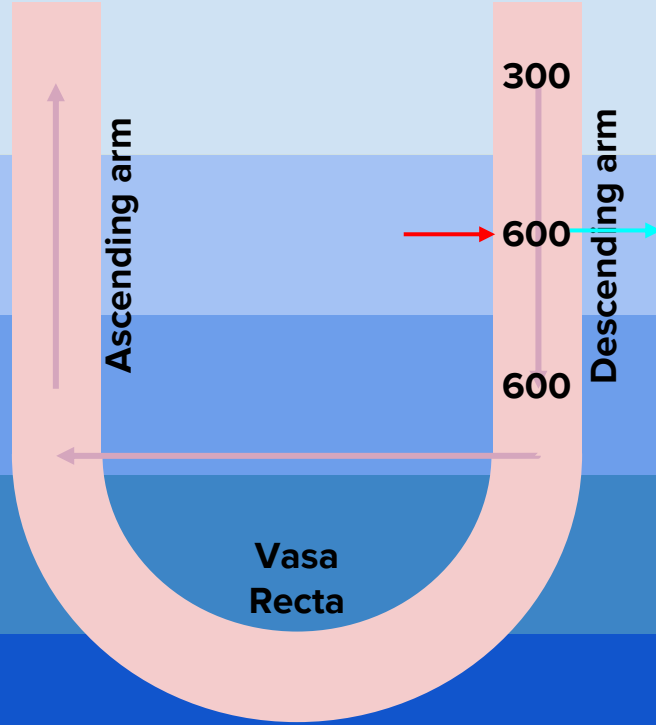
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800

1000

1200





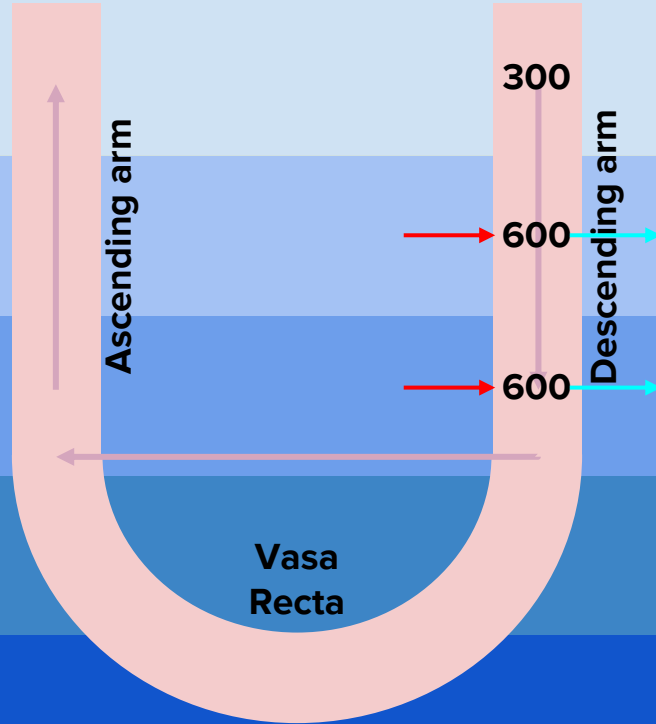
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600

800

1000

1200





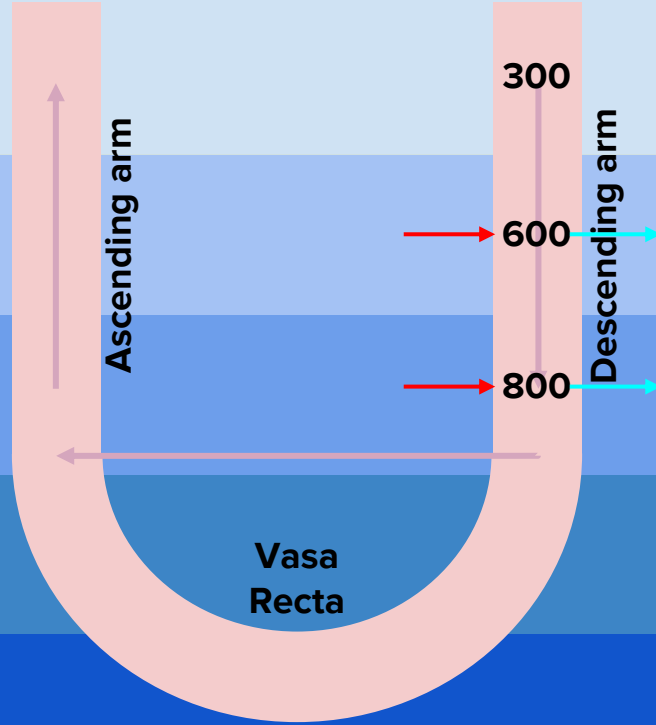
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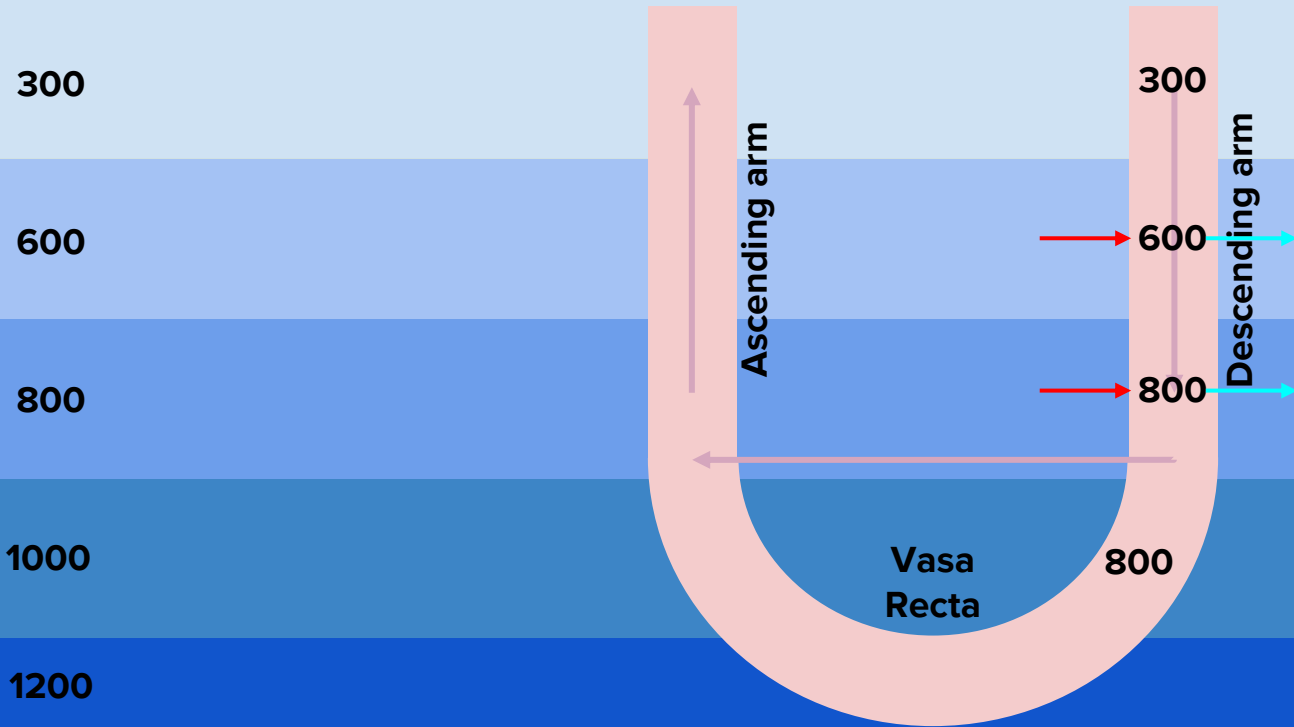
600

800

1000

1200







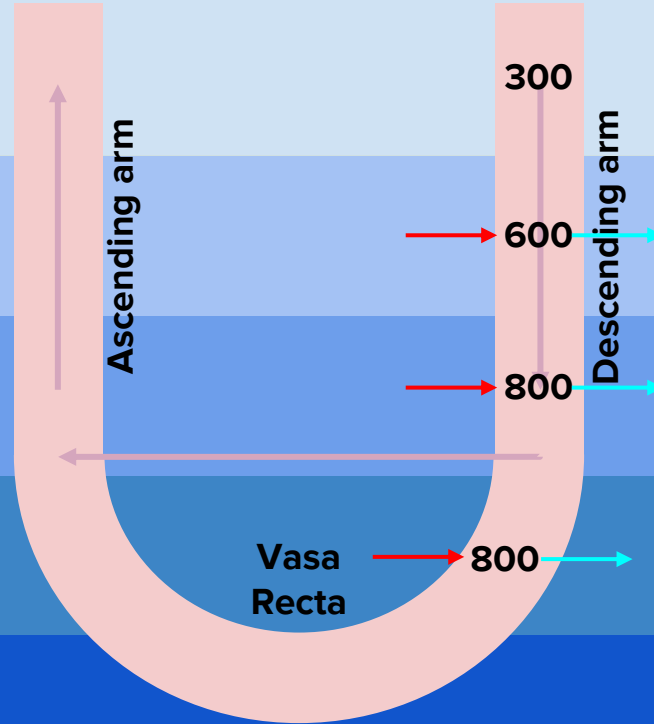
300

600

800

1000

1200



Ascending arm

Descending arm

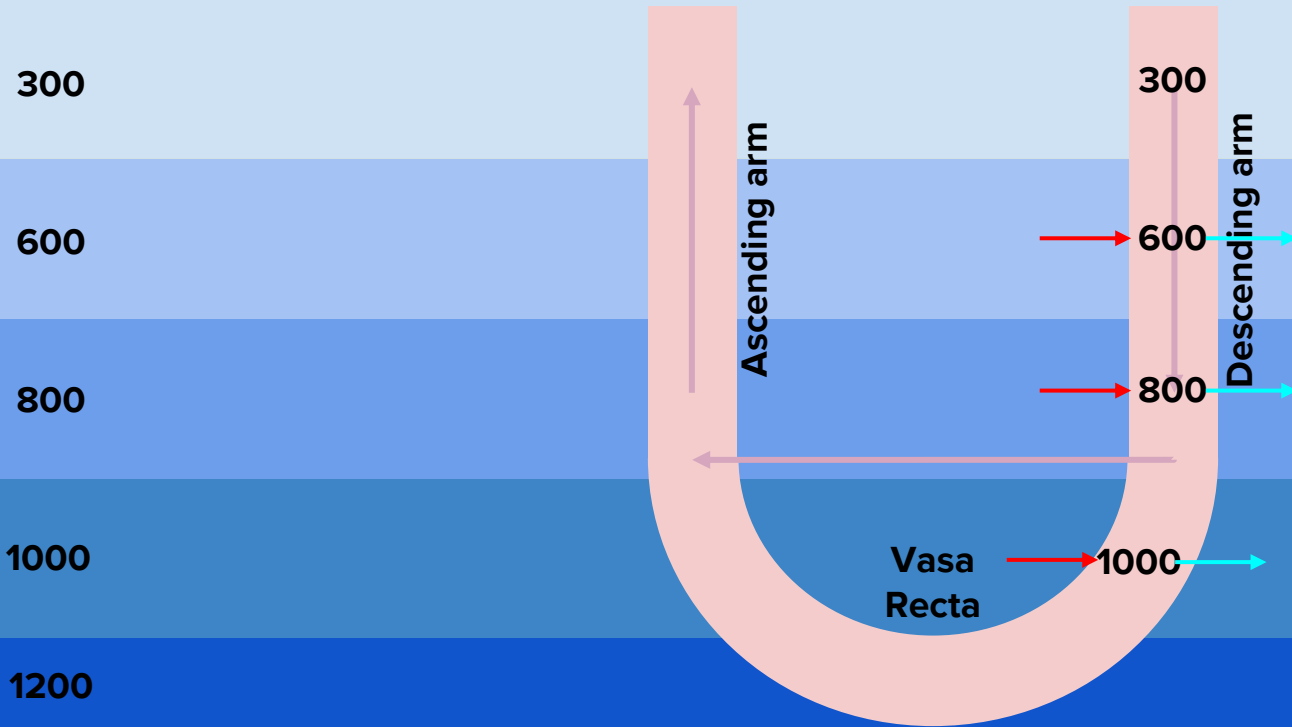
Vasa Recta

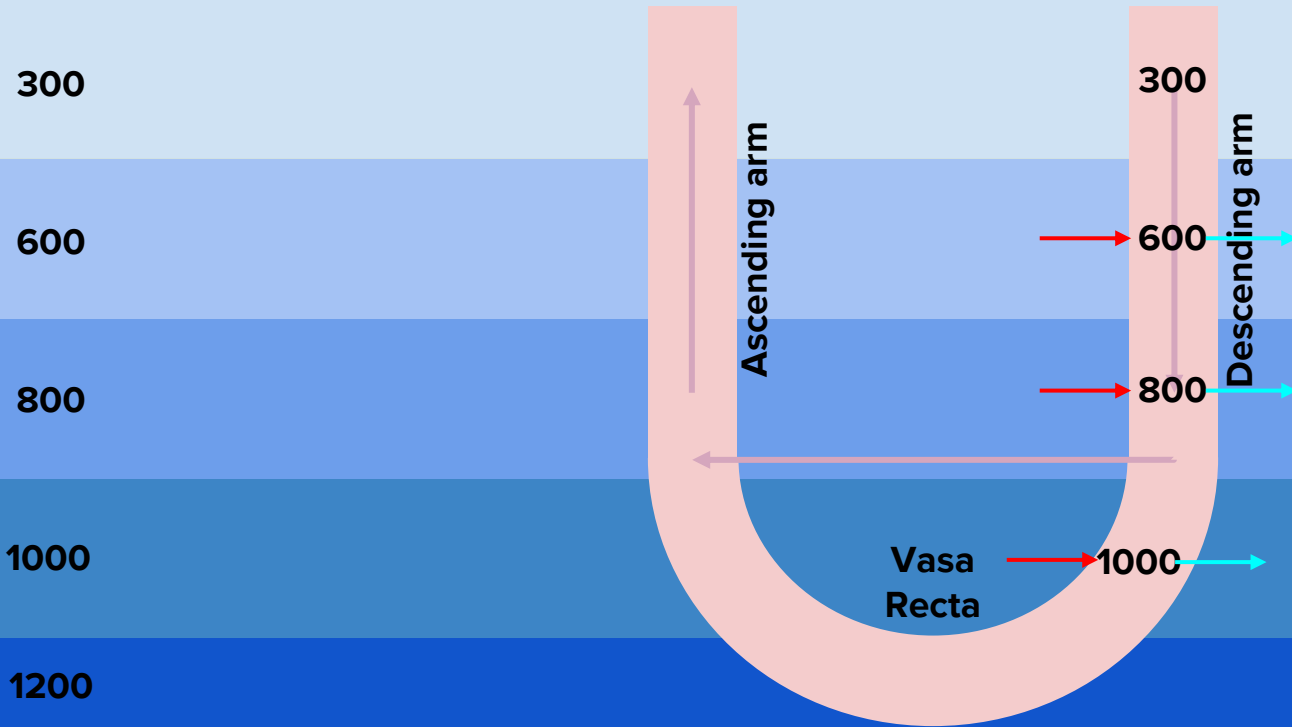
300

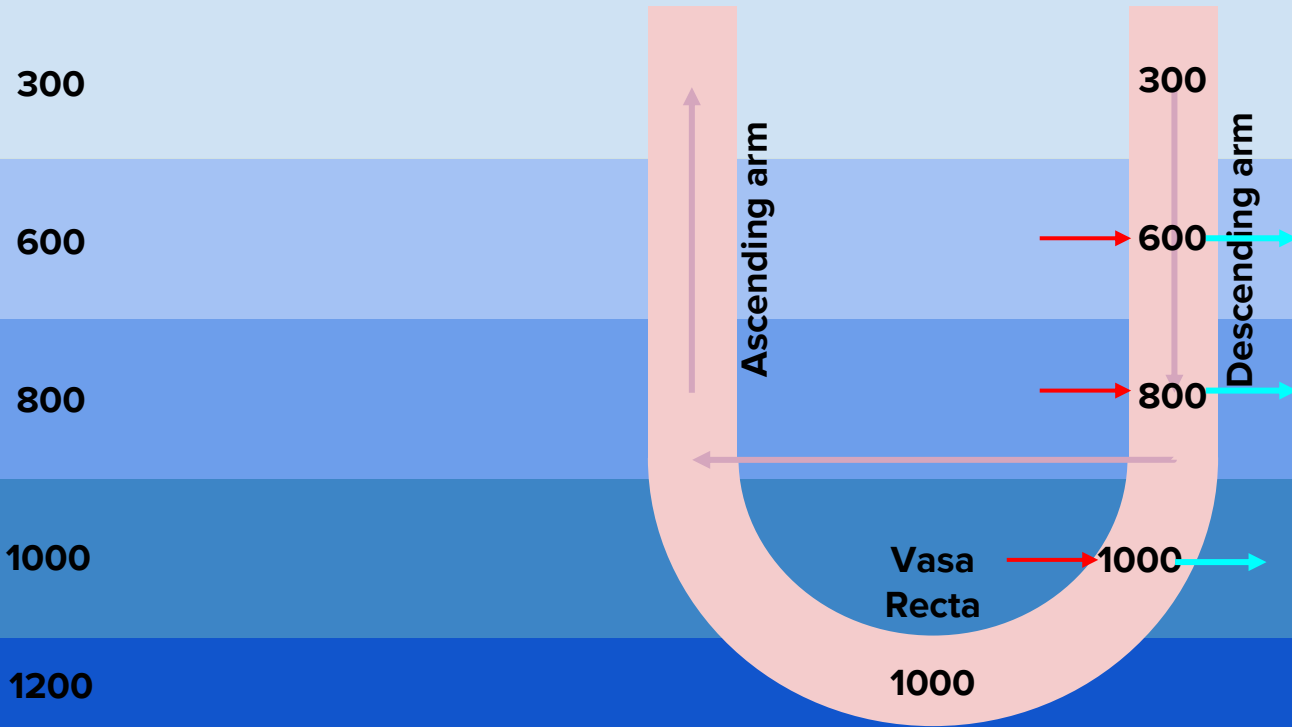
600

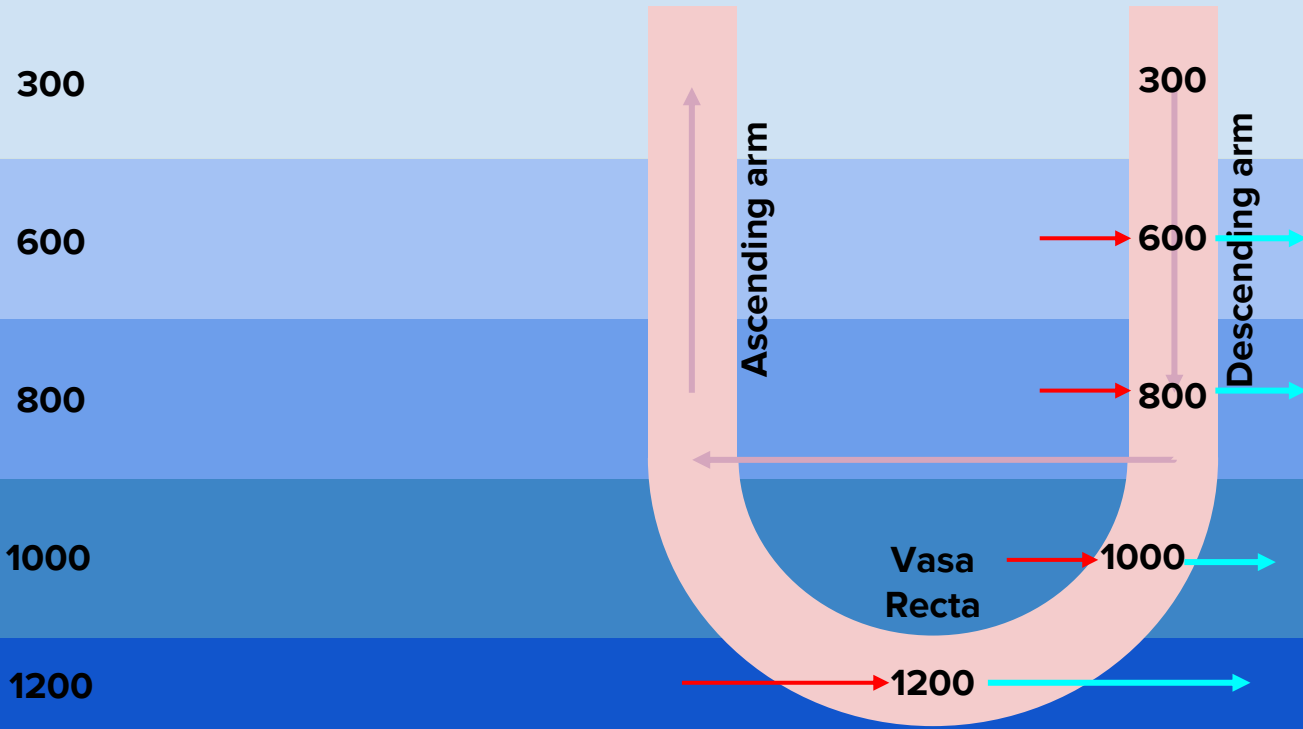
800

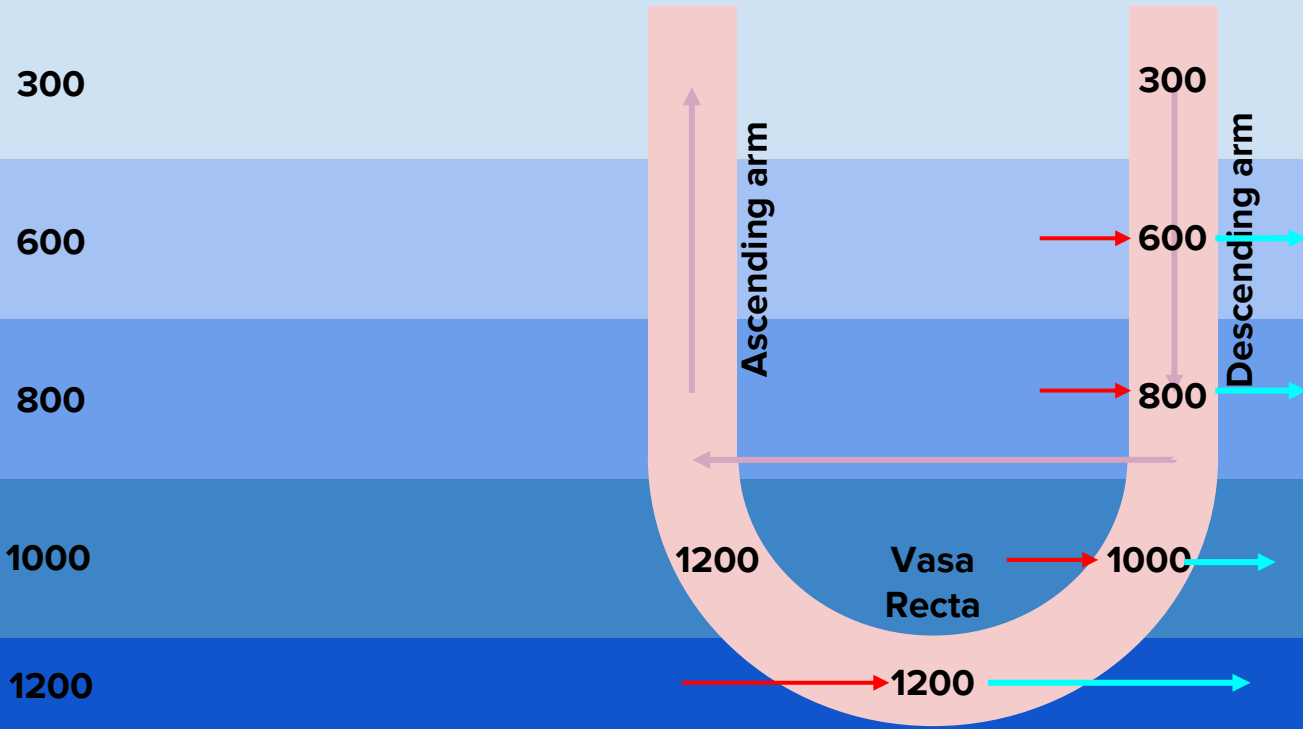
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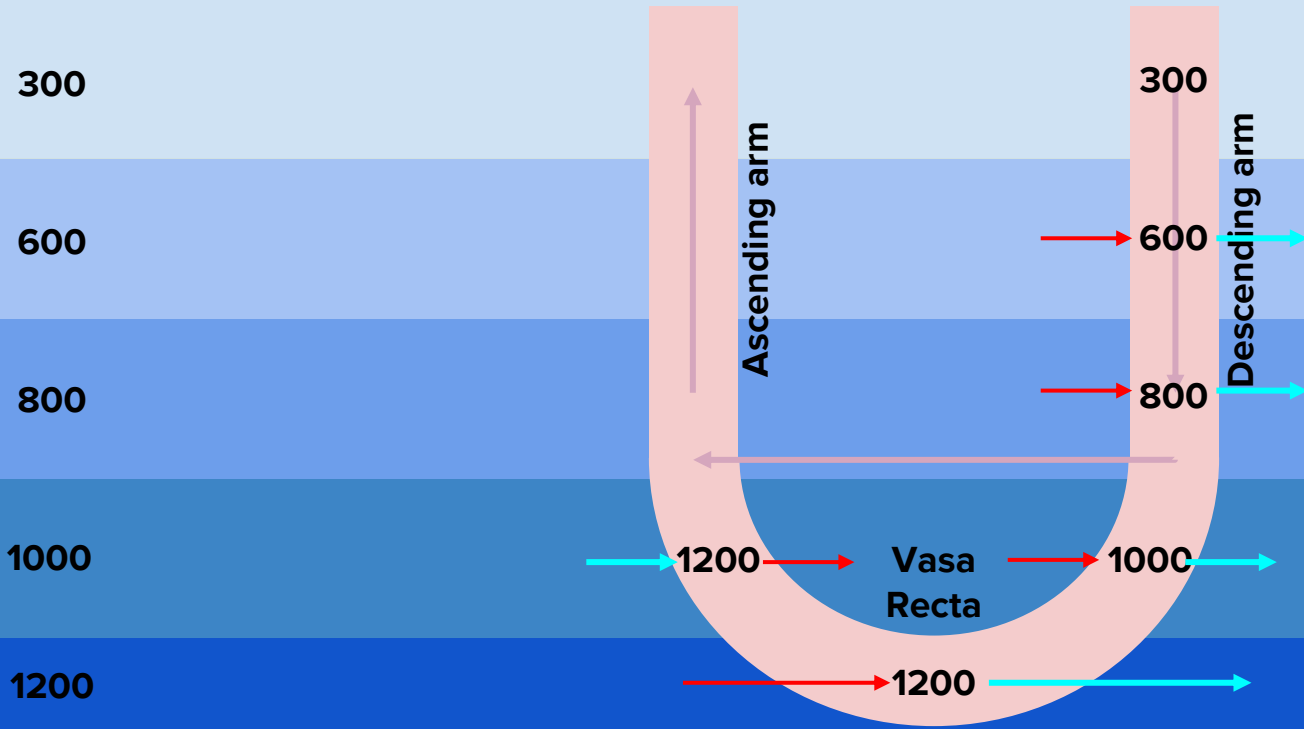


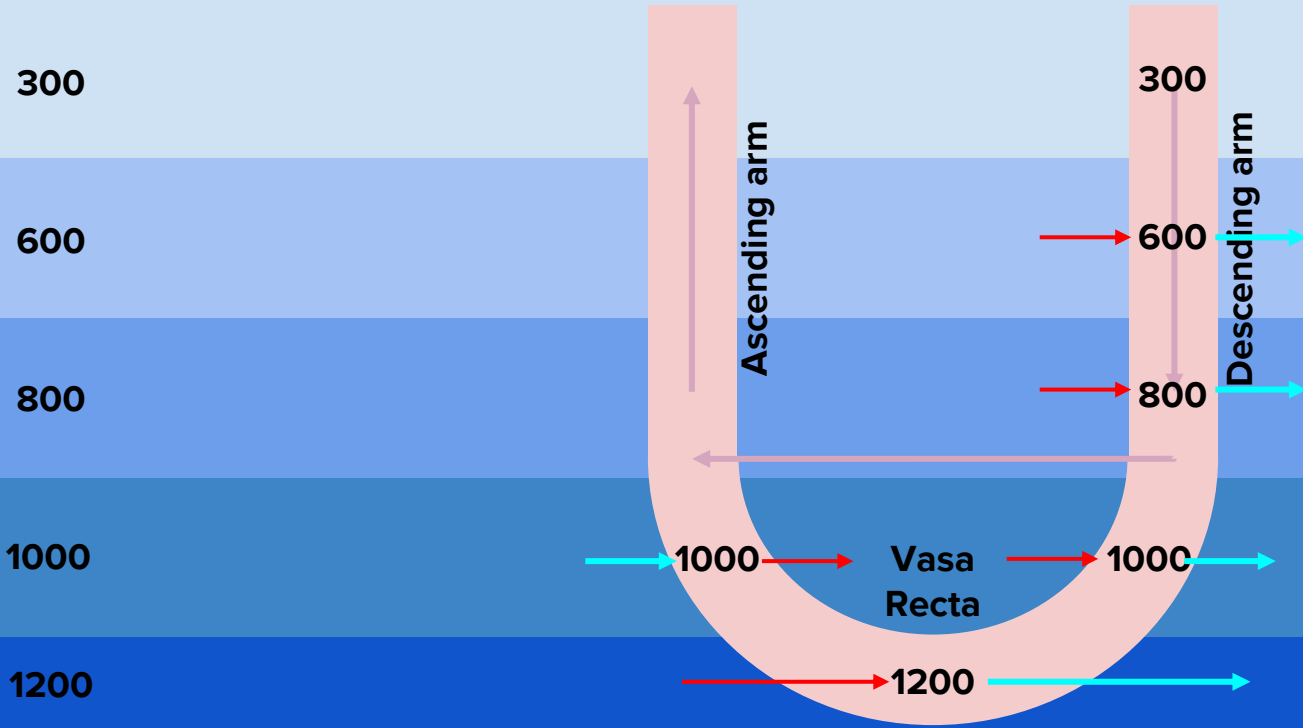


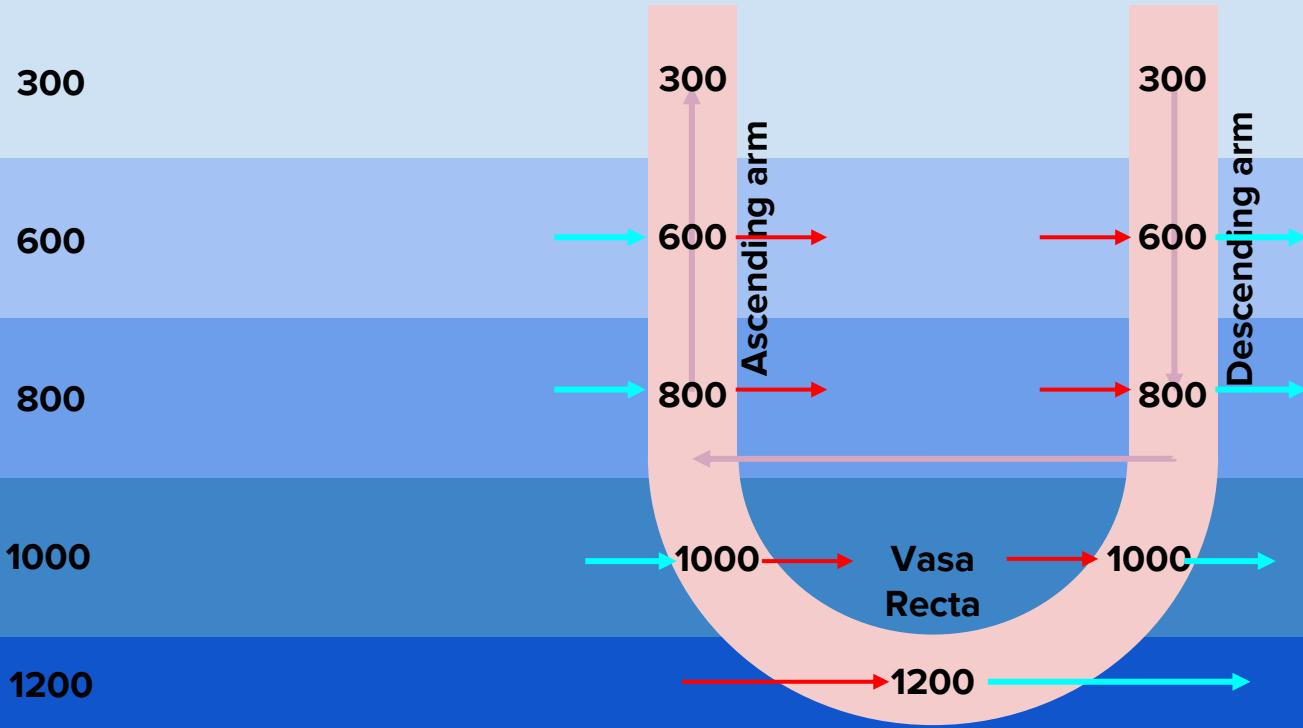












**It comes together at
last!**



300

600

800

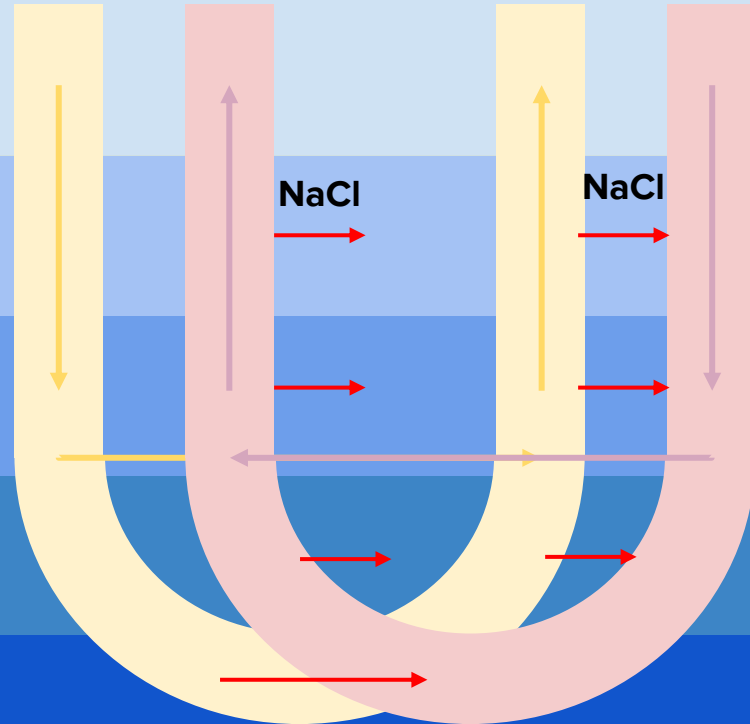
1000

1200

NaCl

NaCl

LOH Vasa Recta





300

600

800

1000

1200

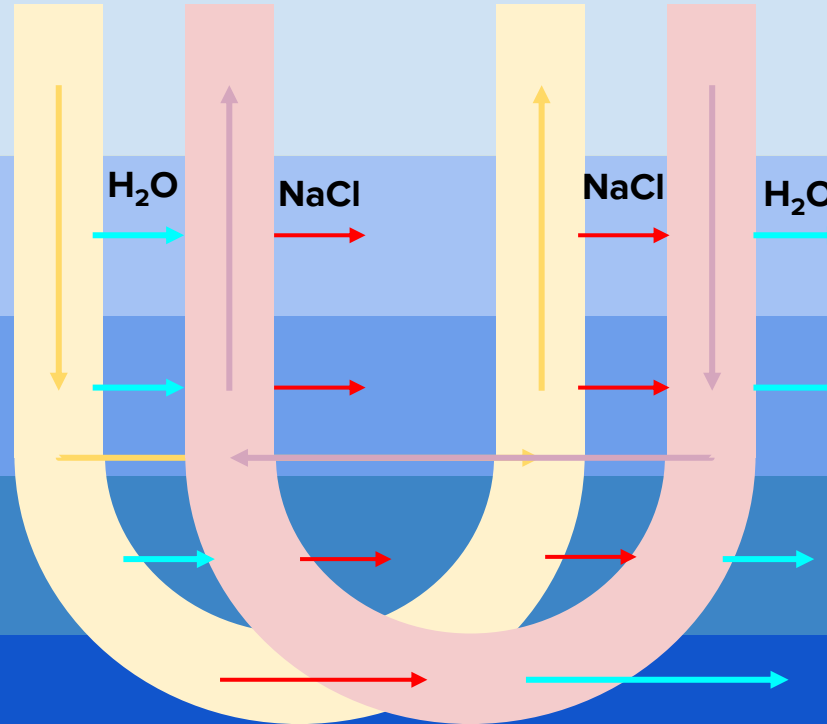
H₂O

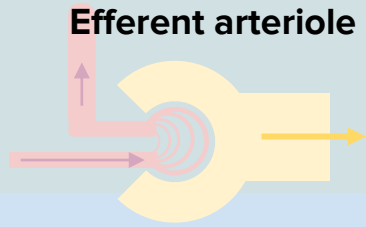
NaCl

NaCl

H₂O

LOH Vasa Recta





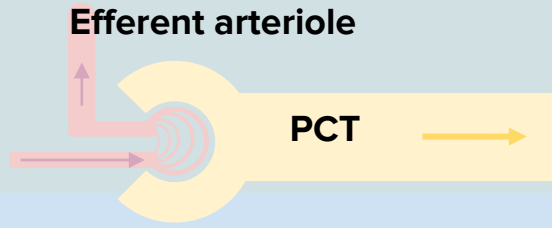
300 Bowman's capsule

600

800

1000

1200



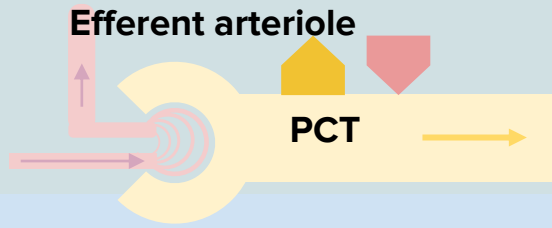
300 Bowman's capsule

600

800

1000

1200



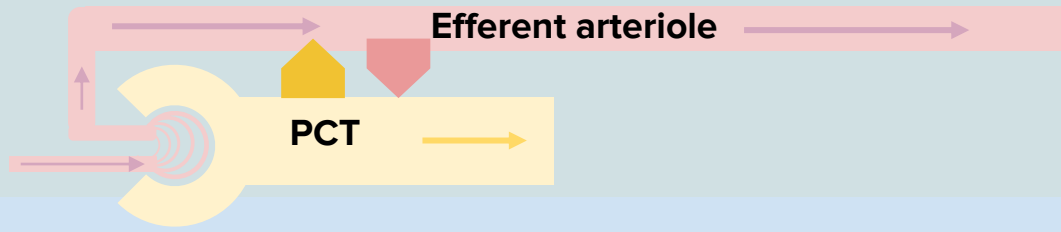
300
Bowman's
capsule

600

800

1000

1200



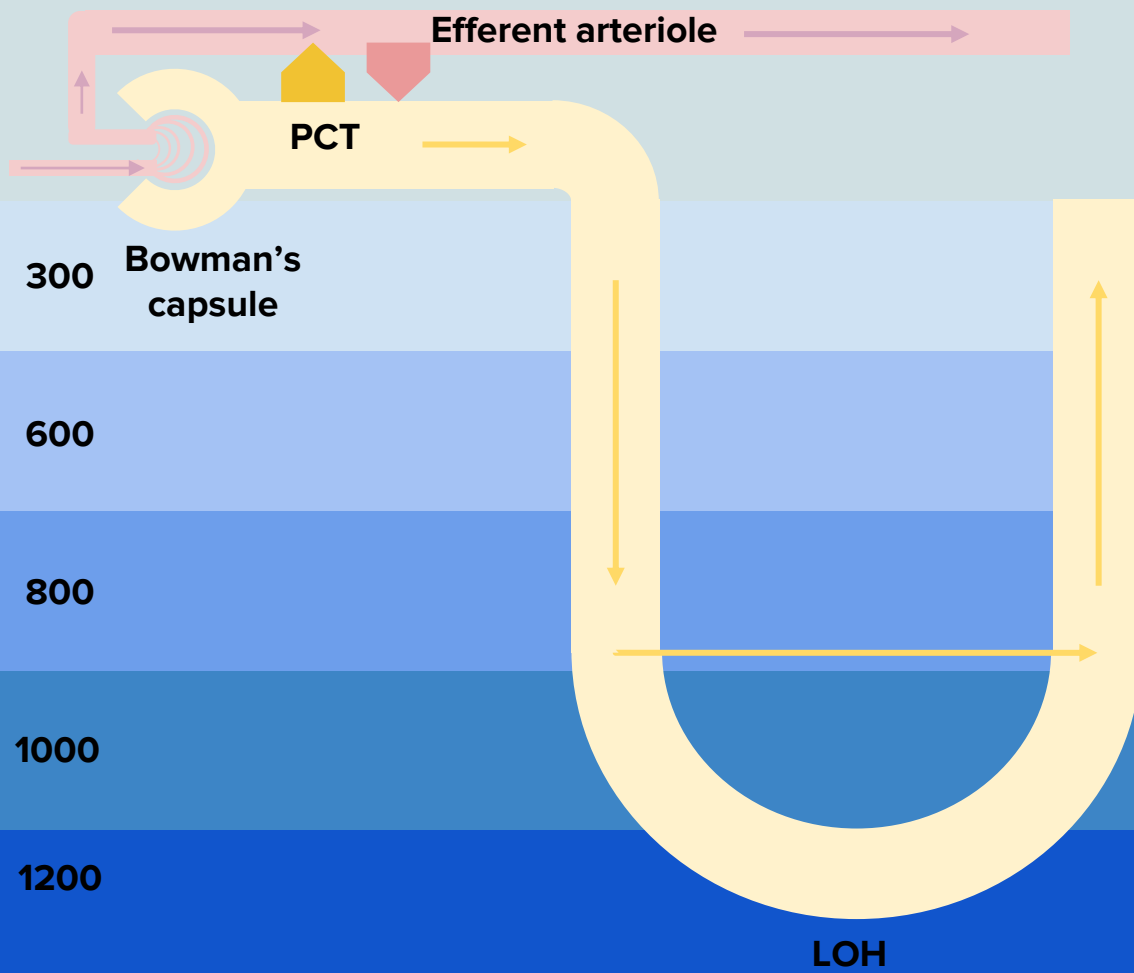
300
Bowman's
capsule

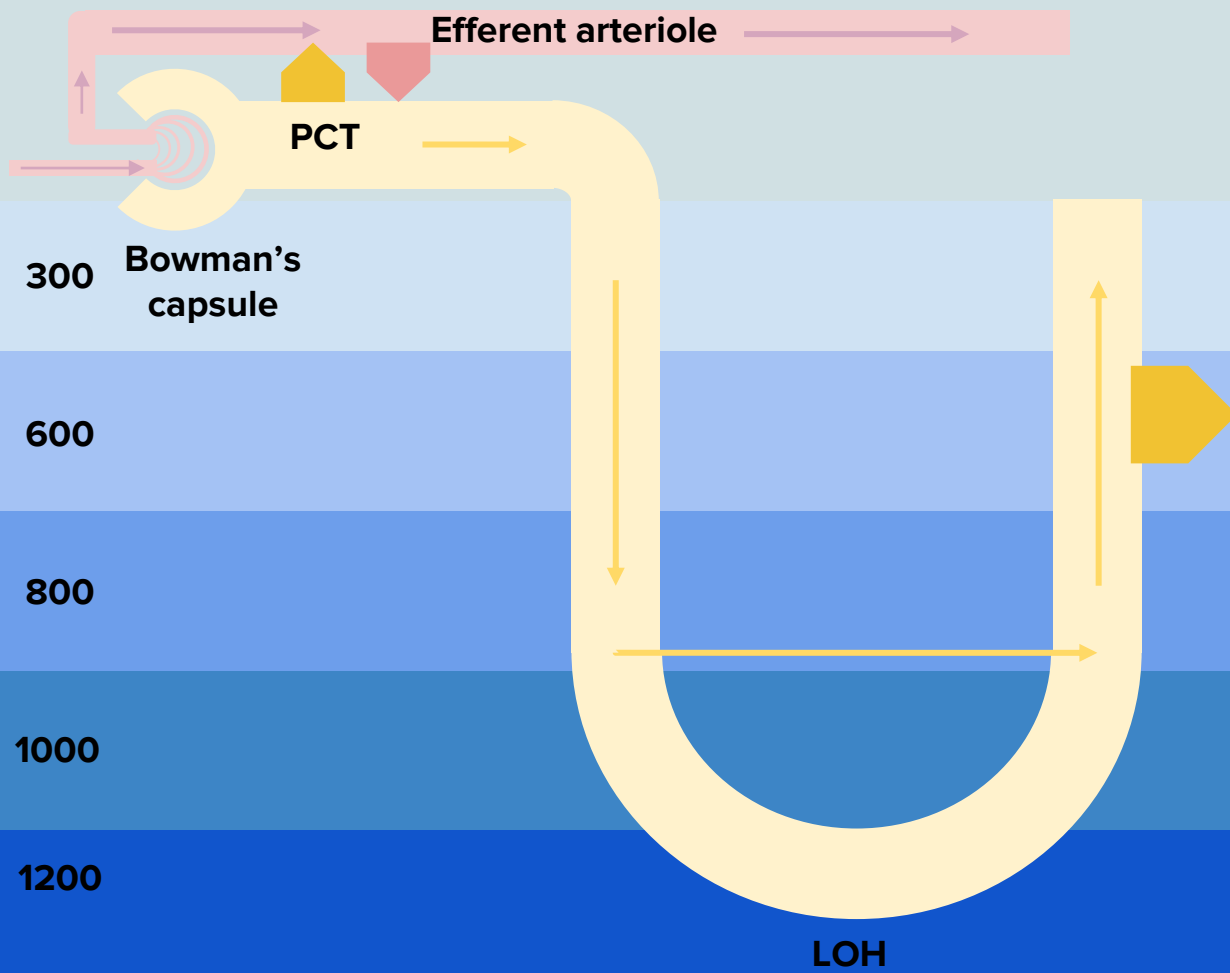
600

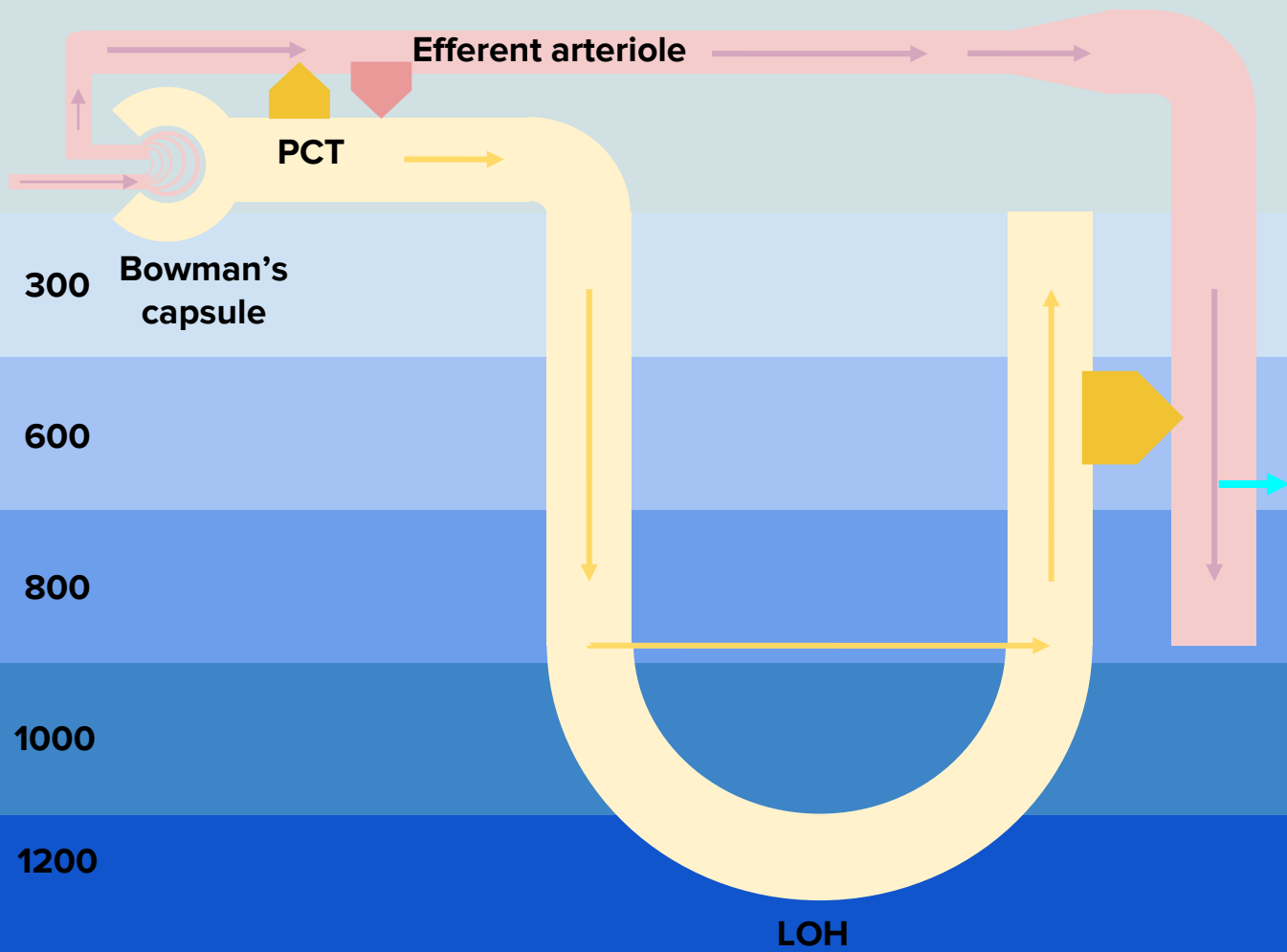
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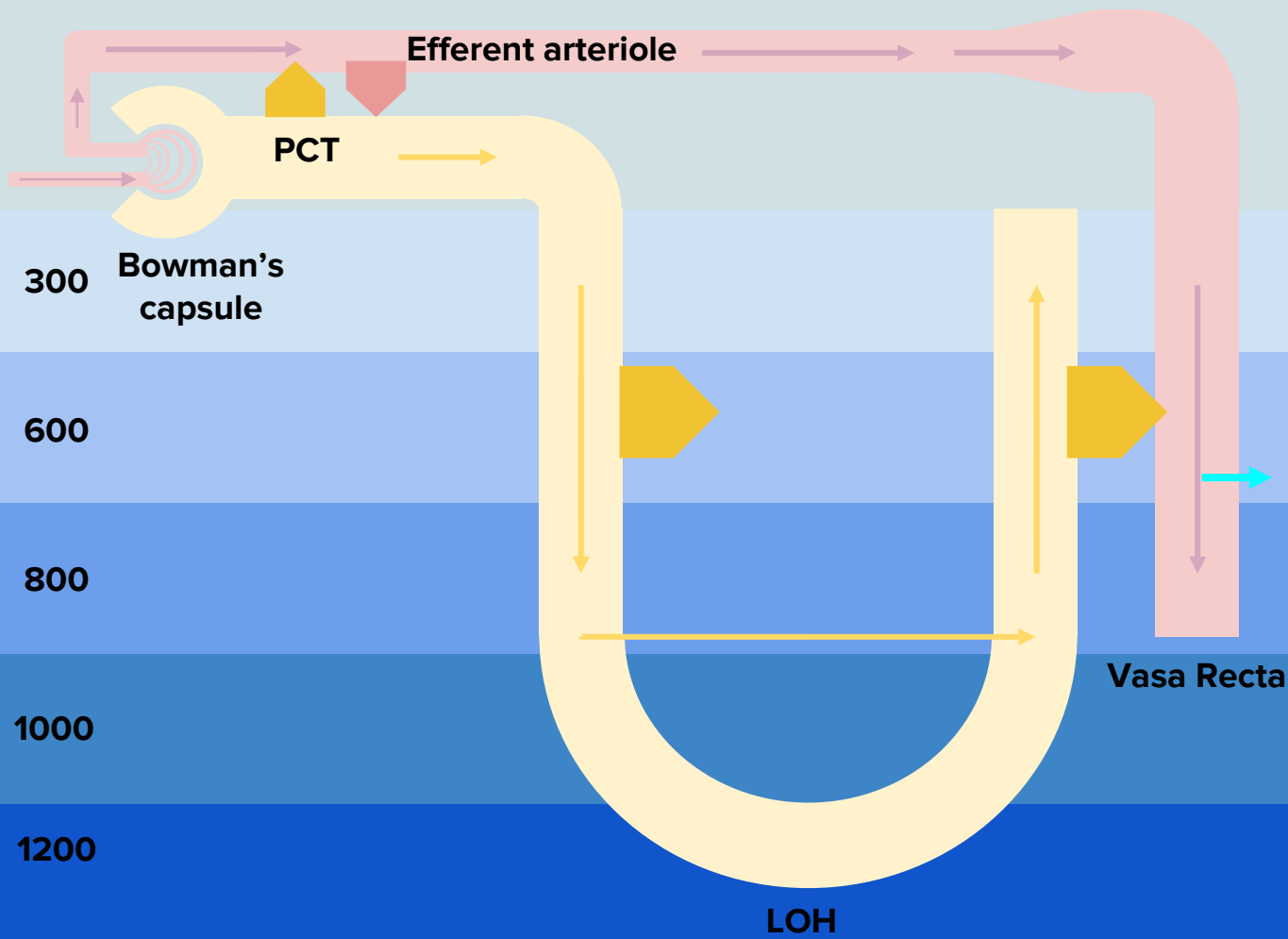
1000

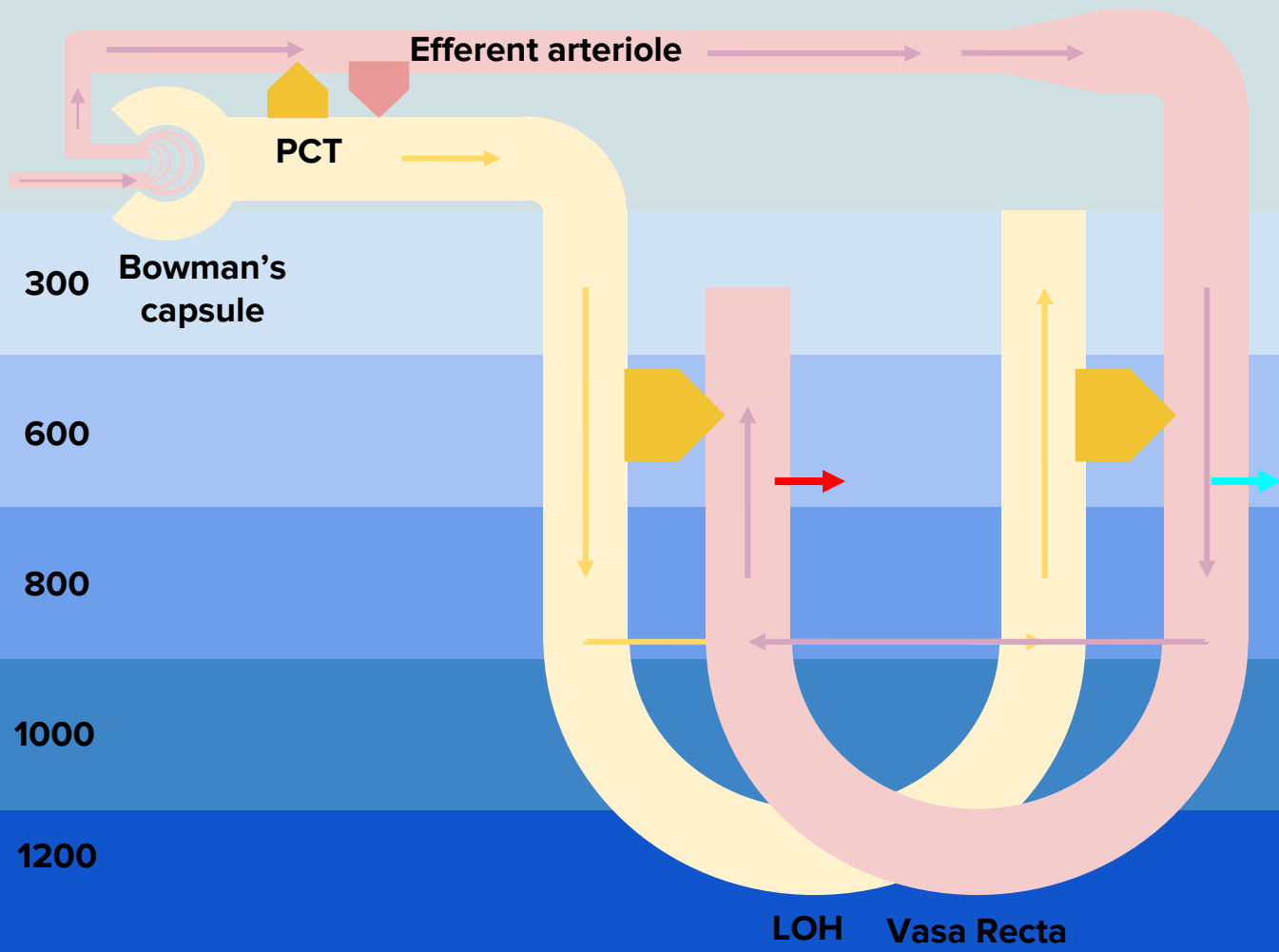
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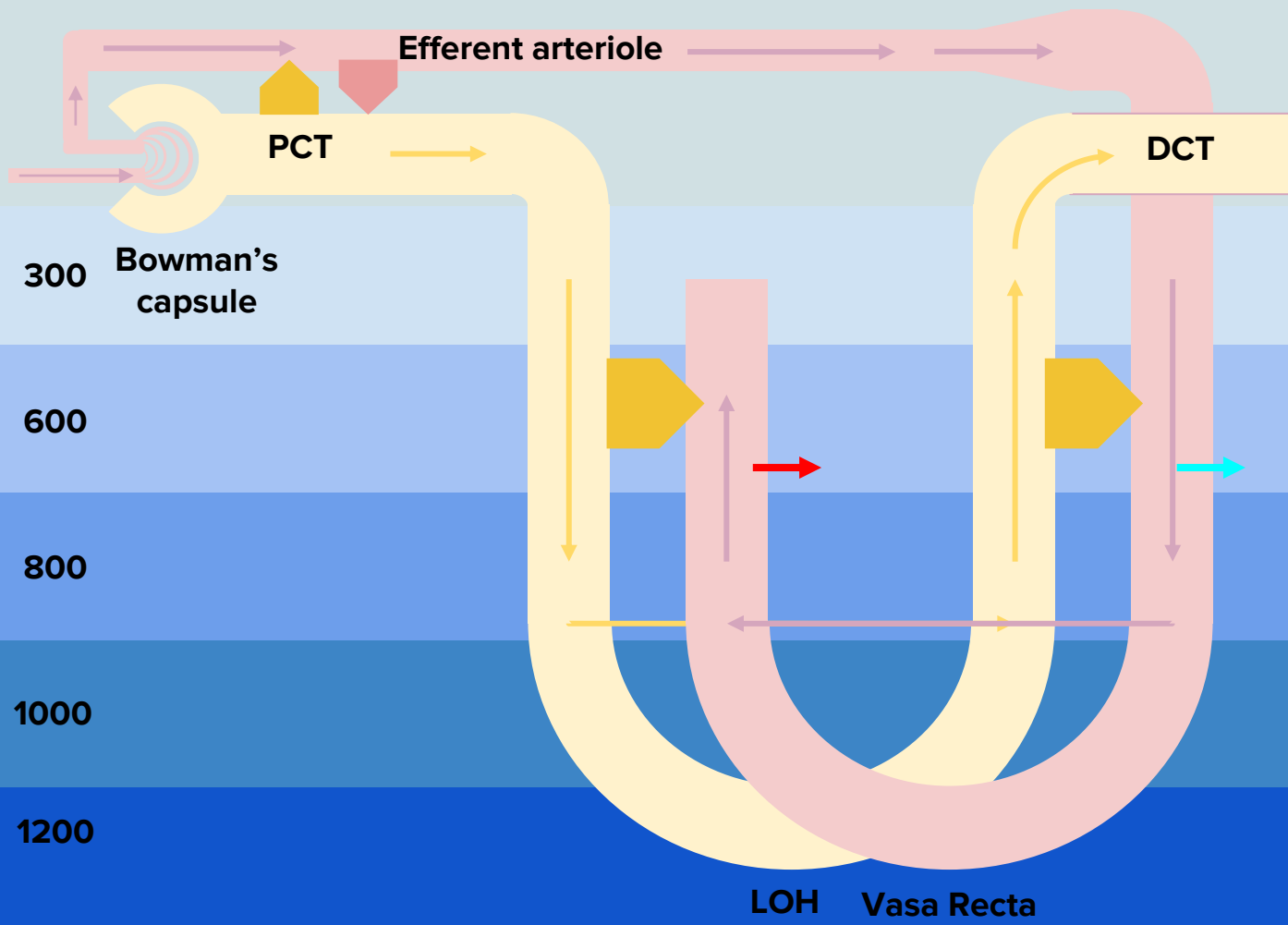


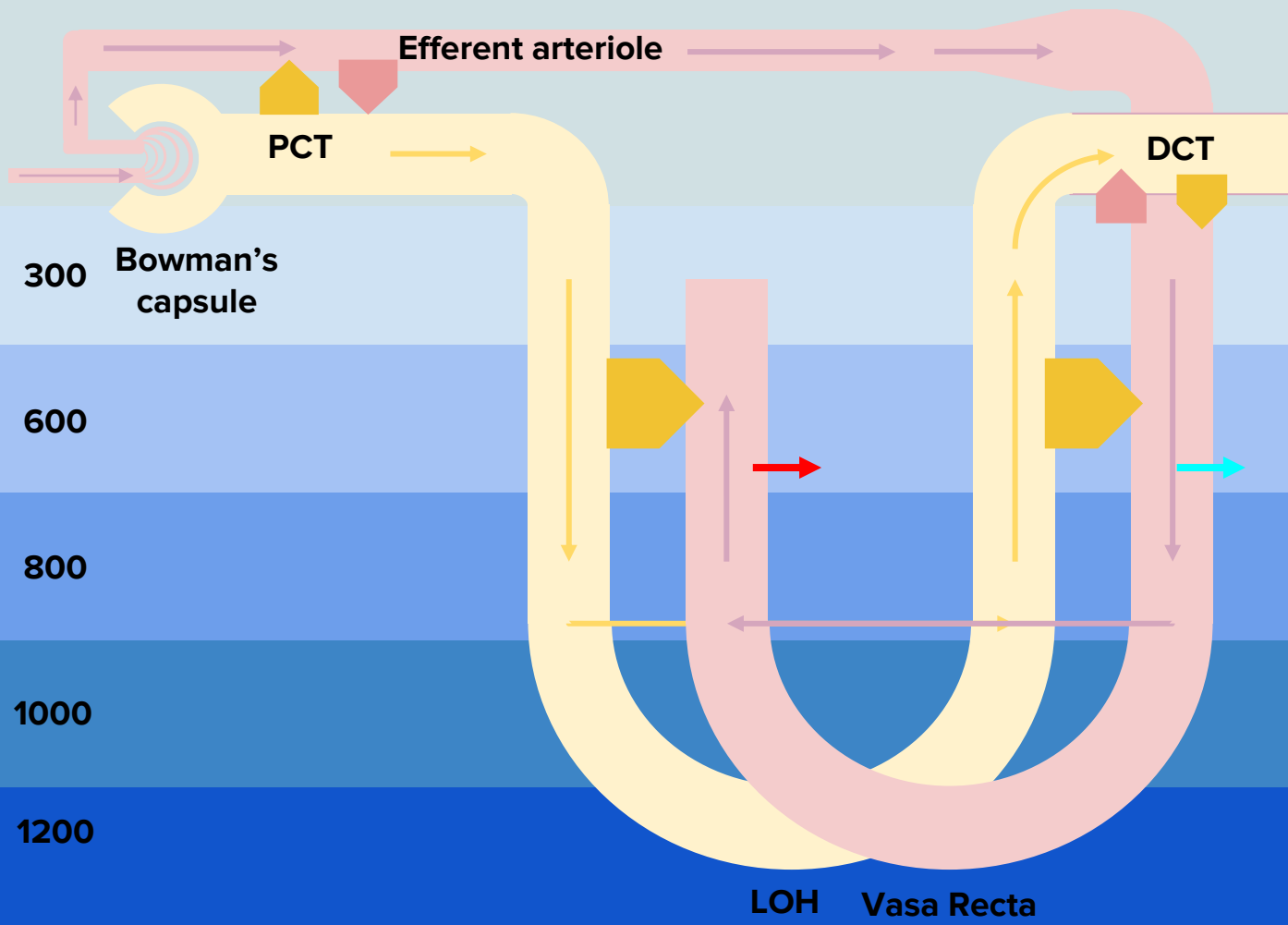


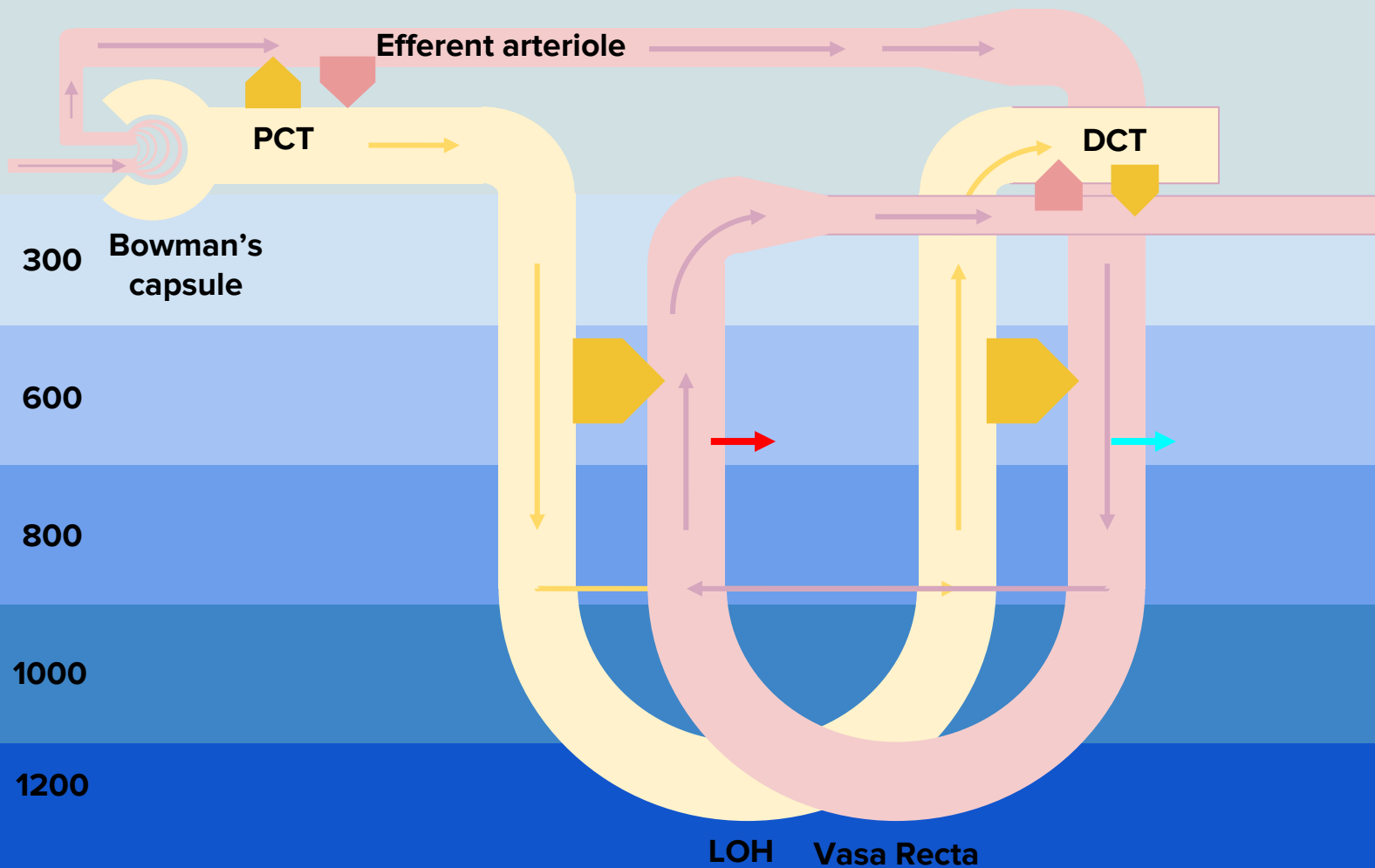


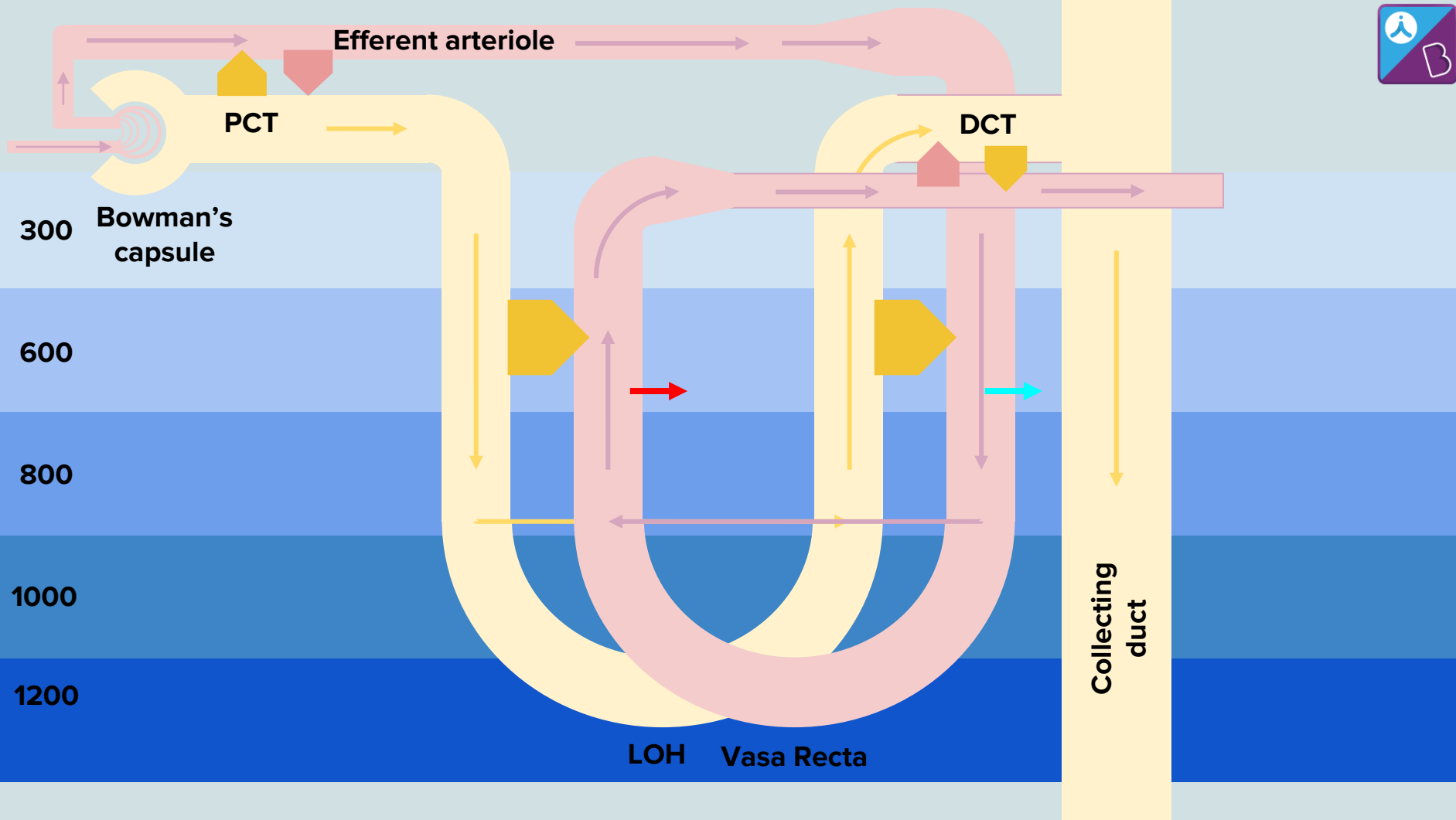


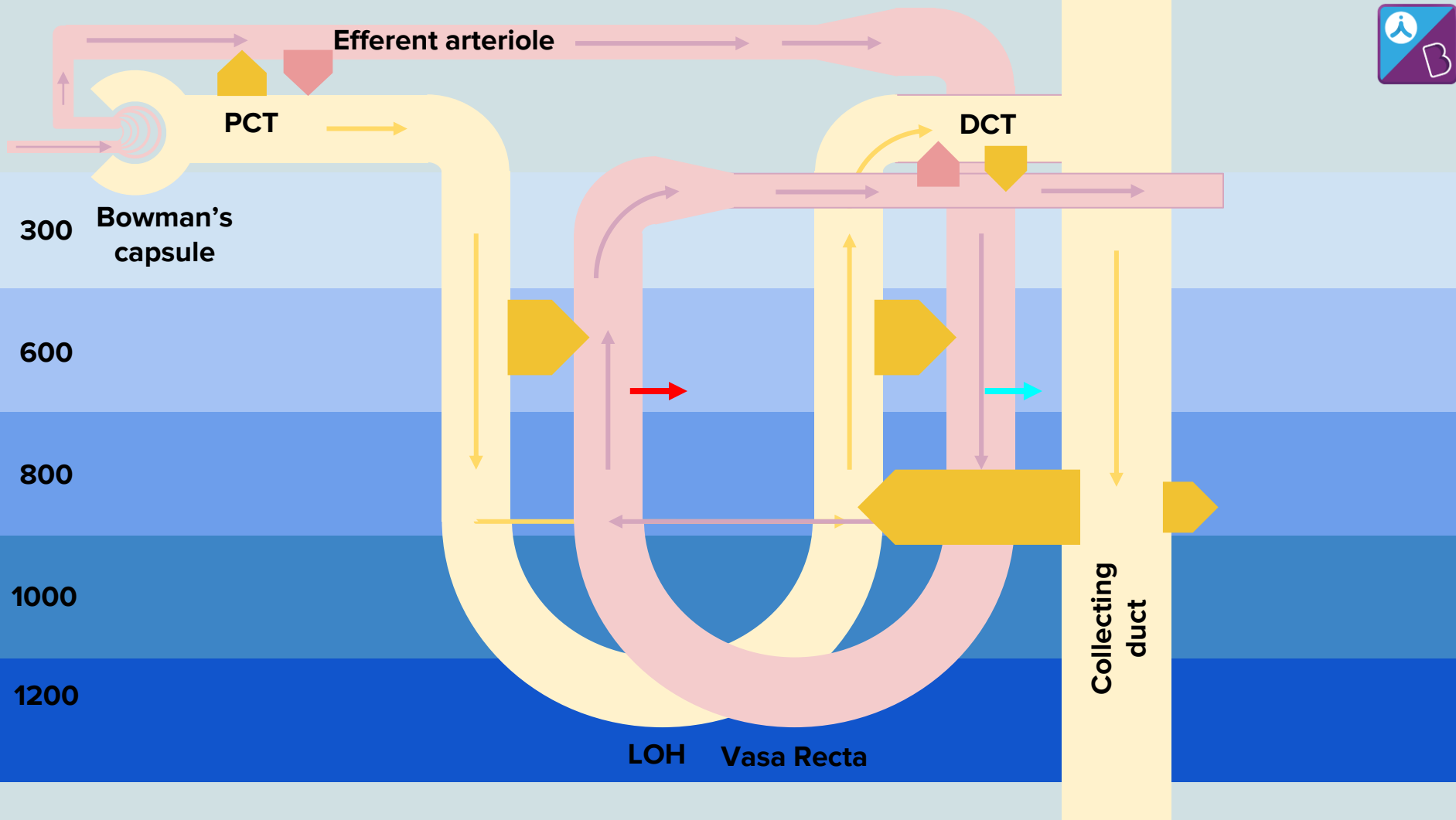


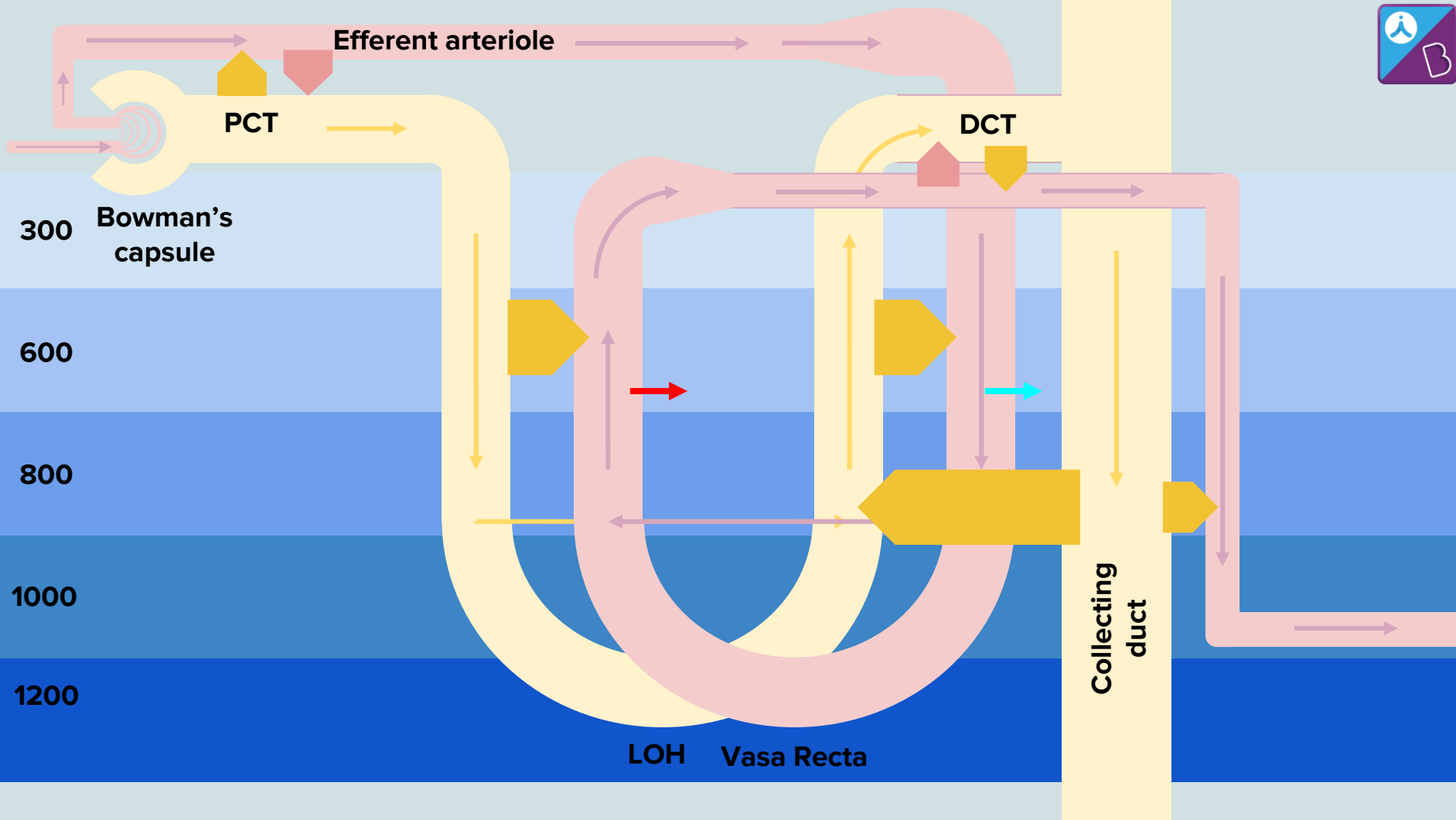


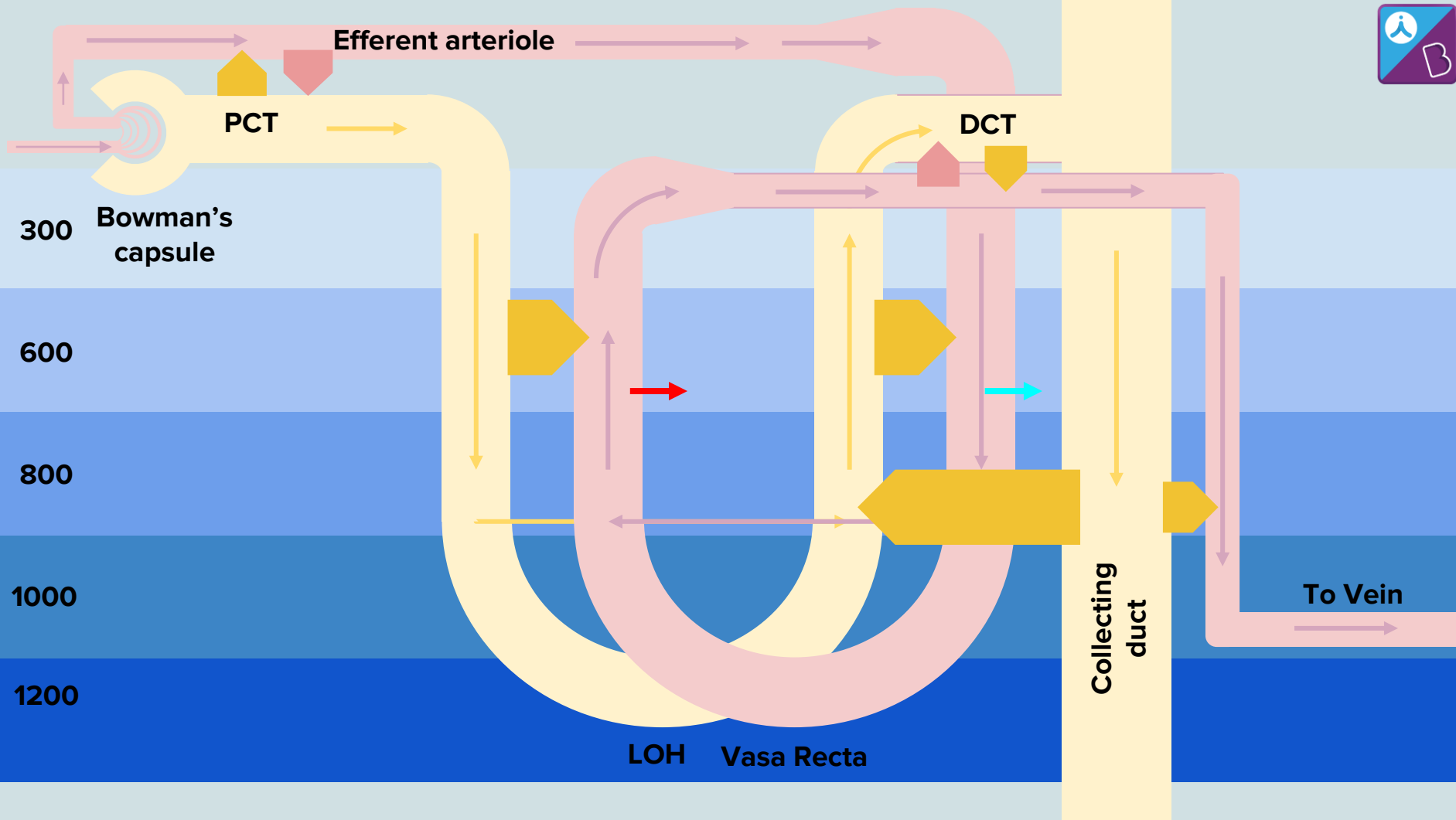














Question Time !





The ability of a vertebrate to concentrate urine depends on:

- a) Capillary network in Bowman's capsule
- b) Length of proximal convoluted tubule
- c) Length of Henle's loop
- d) Area of Bowman's capsule



The ability of a vertebrate to concentrate urine depends on:

a) Capillary network in Bowman's capsule

b) Length of proximal convoluted tubule

c) Length of Henle's loop

d) Area of Bowman's capsule

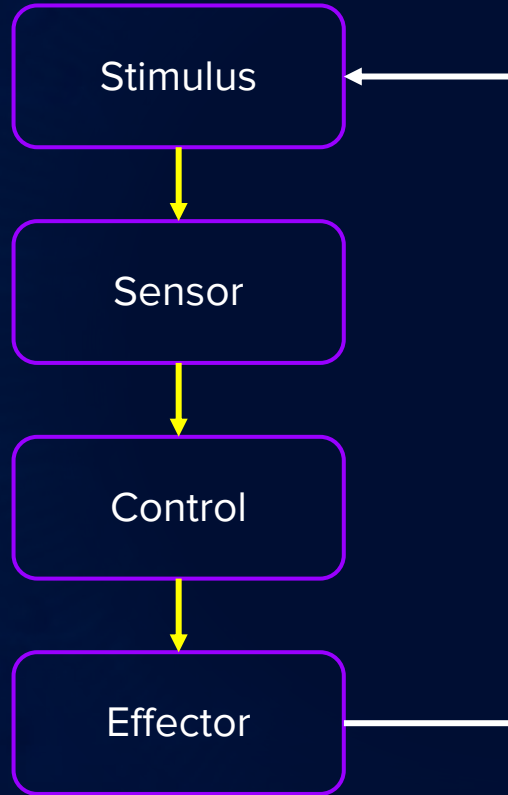


Back to Homeostasis



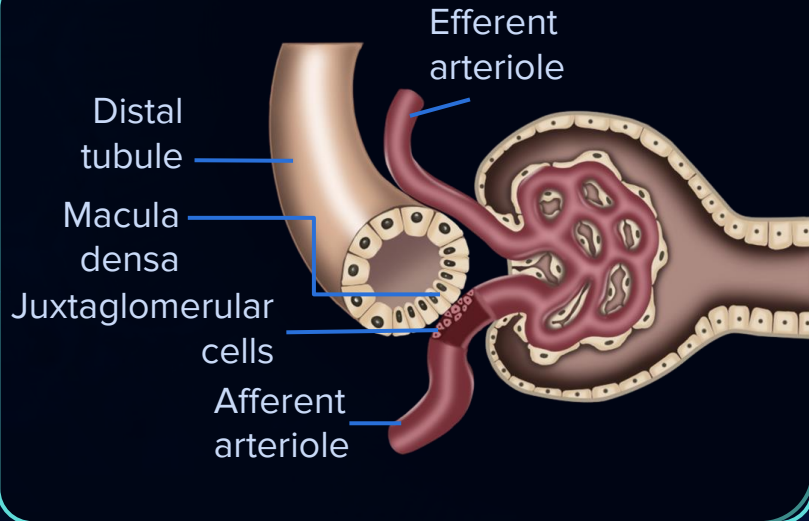


Recall: Negative Feedback or Homeostasis

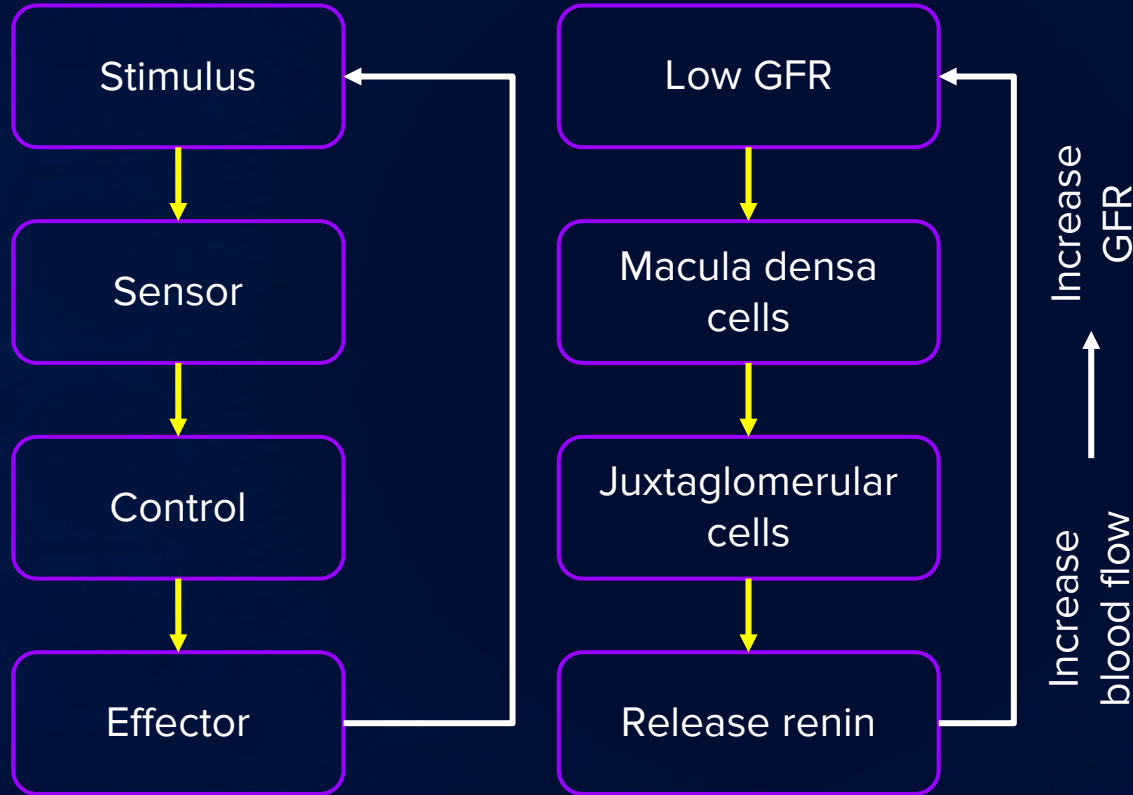


Juxta Glomerular Apparatus

Juxta Glomerular Apparatus:
Sensitive region formed by cellular modifications in the **DCT** (Macula densa cells) and **Afferent arteriole** (Juxta glomerular cells).



Juxta Glomerular Apparatus





More Homeostasis

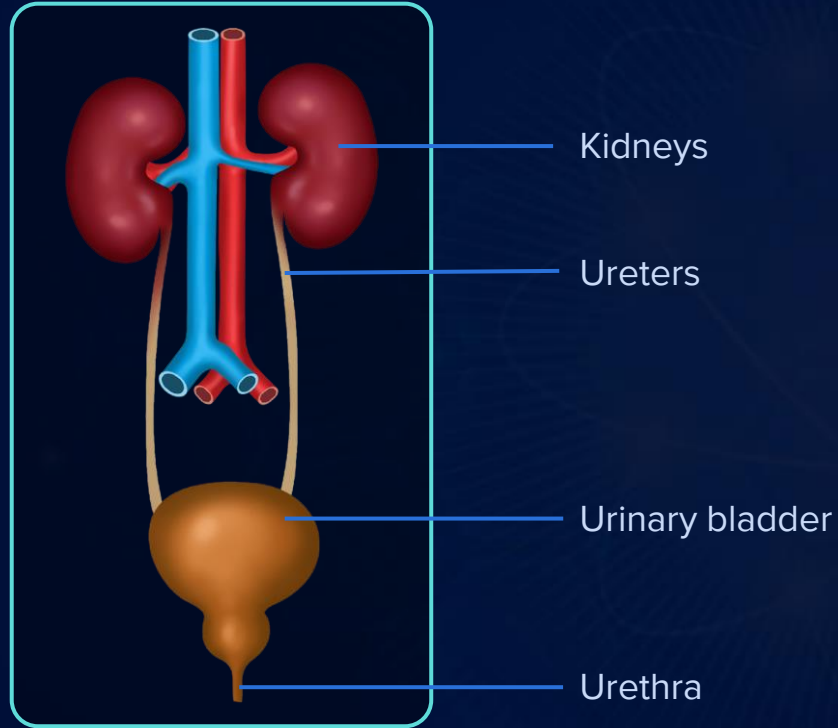




Did You Know?

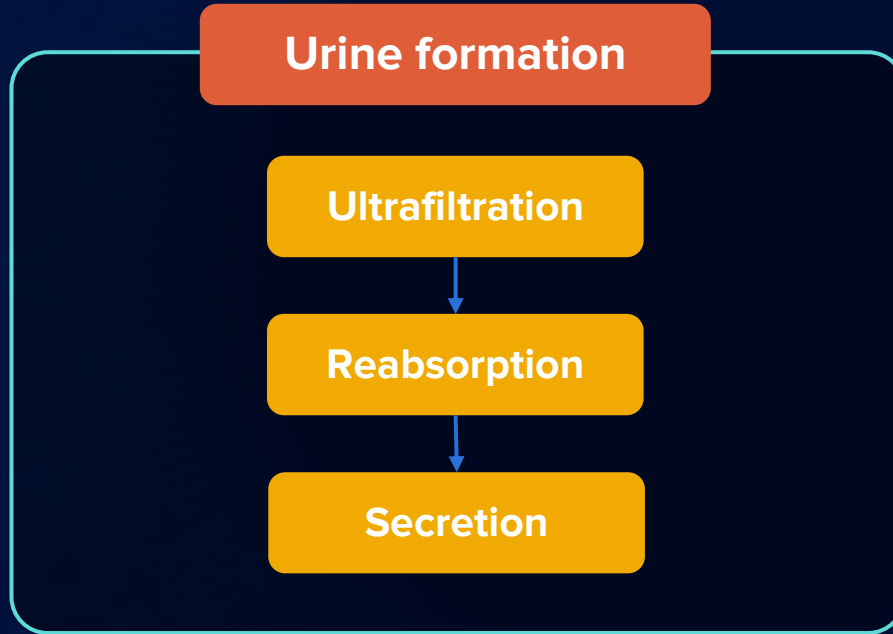


Did You Know?

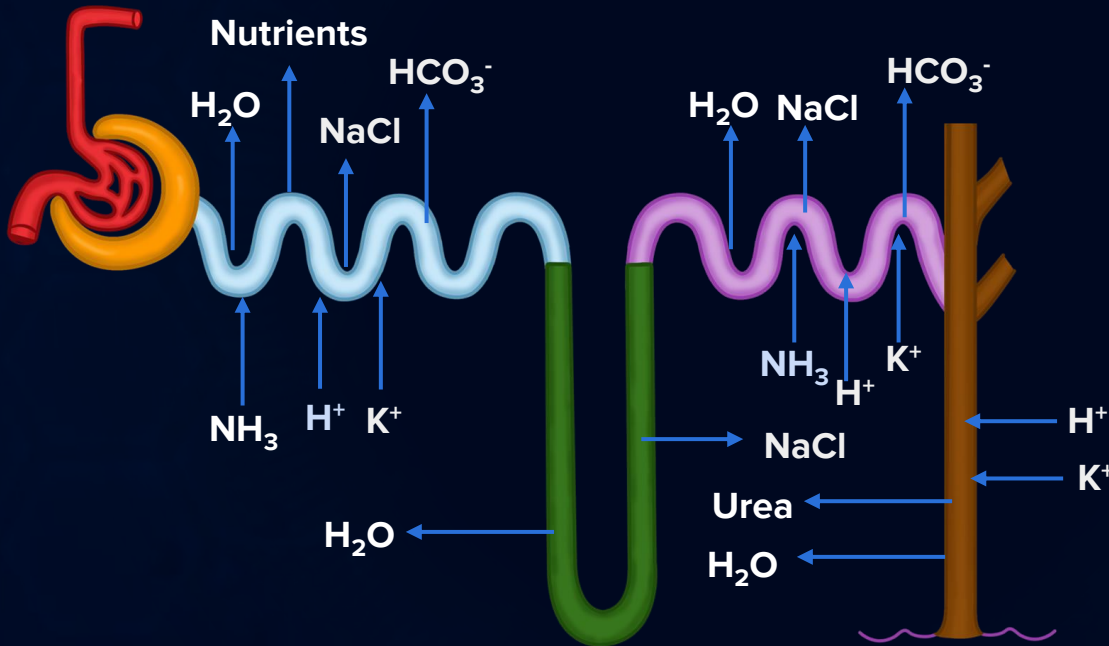




Revise: Urine Formation



Revise: Urine Formation



**Keep
Learning!**

