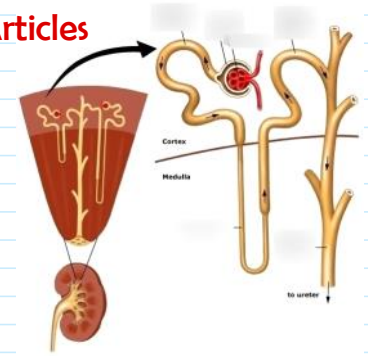
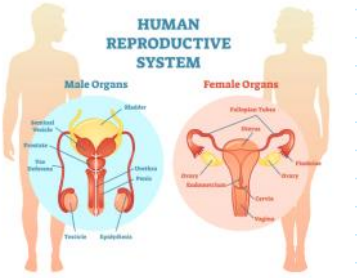
Wednesday, Apr. 10th

Plan For Today:

1. Any questions from last class?
   - ❖ **Share** and Hand-in Kidney Disease Articles
2. Finish Chapter 13 Excretion
   - ✷ Urinary System
   - ✷ The Nephron
   - ✷ Urine Production
   - ✷ **Hormones**
   - ✷ **Kidney Dissection**



4. DO KIDNEY DISSECTION
5. Do practice worksheets
6. Start Ch14: Reproductive System
   - o **Male & Female Structures**
   - ❖ Male Hormones
   - ❖ Female Hormones
   - ❖ Pregnancy & Birthing
7. Do practice worksheets



Plan Going Forward:

1. Complete any worksheets and finish MC Review for Ch13.

   - ❖ KIDNEY DISSECTION LAB DUE MONDAY, APR. 15TH
   - ❖ CHAPTER 13 MC REVIEW ASSIGNMENT DUE MONDAY, APR. 15TH
     - PART 1 ON NEW SCANTRON
   - ❖ CHAPTER 13 QUIZ ON MONDAY, APR. 15TH

2. Start working through Ch14 Reproduction to prepare for next class after the test. We will finish most of Ch14 on Monday after the Ch13 quiz.

   - ❖ CHAPTER 14 DISEASE ARTICLE SUMMARY DUE MONDAY, APR. 15TH
   - ❖ CHAPTER 14 MC REVIEW ASSIGNMENT DUE WEDNESDAY, APR. 17TH?
     - PART 2 ON CH13 SCANTRON
   - ❖ CHAPTER 14 TAKE-HOME QUIZ DUE MONDAY, APR. 22ND

3. HAND-IN YOUR CH13 PROJECT ASAP (by Wednesday) Ch13 will be due next Wednesday and Ch14 will be due the following Wednesday but the absolute cut-off for any project is the last day of the course (no time for corrections if handed in on last day).

   - ❖ TERM 3 EXAM ON MONDAY, APR. 22ND
     - THIS EXAM COVERS MATERIAL IN CHAPTER 12-14
     - THERE WILL BE 36 MC & 20 MARKS FROM THE WRITTEN SECTION

- **REWRITE IS WEDNESDAY, APR. 24TH (LAST CLASS)**

Please let me know if you have any questions or concerns about your progress in this course.
The notes from today will be posted at anurita.weebly.com after class.
Anurita Dhiman = adhiman@sd35.bc.ca

Urine Production

- Blood high in wastes enters the kidney via the renal arteries.
- As blood vessel branch, the blood enters the

1. Afferent Arteriole = blood high in wastes is delivered to the glomerulus with high BP

2. Glomerulus = the BP in the glomerulus forces filtration of blood where only small molecules are filtered ∴ large molecules (formed elements - RBCs, WBCs, platelets & proteins) are not filtered. } = Pressure Filtration

   p. 418

   * note: podocytes cells on glomerular blood vessels create pores which allow filtration of small molecules only.

3. Efferent Arteriole = any unfiltered components in blood leave glomerulus via the efferent arteriole & enter the capillaries.

4. Peritubular Capillary Network = the capillaries surround the nephrons ∴ exchange nutrients, wastes, drugs, O_2, CO_2, H_2O & salts with the nephron.

5. Renal Venules to Renal Veins = blood leaving the capillaries is free (low in) wastes & pH is balanced & water-salt is balanced.

balanced + water-salt is balanced.
= the blood the kidney via venules to the renal vein.

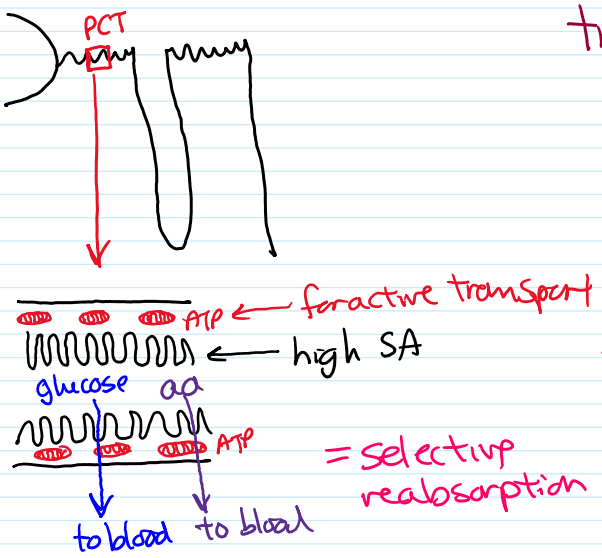
(A) Glomerular Capsule (aka: Bowman's Capsule) = this capsule surrounds the glomerulus ∴ collects all molecules filtered during pressure filtration at glomerulus.

(B) Proximal Convoluted Tubule (PCT) = fluid (filtrate) from glomerular capsule enters PCT for 100% nutrient reabsorption.

= Selective Reabsorption

= the structure of PCT + most of the nephrone consists of many mitochandria for ATP for active transport.

↳ the inside of tubule has many microvilli to increase surface area for reabsorption



= selective reabsorption

= in addition to 100% reabsorption of glucose + aa's, there is also reabsorption of Na^+ (salt/NaCl) + H_2O.

(C) Descending Limb of Loop of Nephron (Loop of Henle) = filtrate (without nutrients) leaves PCT + travels down the loop into the renal medulla.

= here H_2O reabsorption occurs but

= here H_2O reabsorption occurs but no other molecules can be transported (only permeable to water)

(D) Ascending Limp of loop = Na^+ (salt / NaCl) reabsorption occurs along the ascending limb.

= as Na^+ is reabsorbed, this medulla region becomes hypertonic compared to the renal cortex.

= due to the hypertonic medulla, any parts of nephron which pass through medulla region, will do H_2O reabsorption.

= descending limb & collecting duct.

Salt / water balance regulated →

(E) Distal Convoluted Tubule (DCT) = filtrate from ascending limb enters DCT which is back in renal cortex.

= DCT does excretion of H^+ + reabsorption of HCO_3^- to regulate blood pH (N pH = 7.4)

Tubular Excretion

ex: acidic blood is pH < 7.4

= more H^+ excretion + more HCO_3^- reabsorption to get rid of excess acid.

ex: basic blood is pH > 7.4

= less H^+ excretion + less HCO_3^- reabsorption to keep acid

= DCT also does excretion of additional wastes (ex: creatinine) + any drugs are also

= DCT also does excretion of additional wastes (ex: creatinine) + any drugs are also also excreted here.

(F) Collecting Duct (CD) = urine is collected from DCT + neighbouring nephrons + carried in funnels to the renal pelvis where urine is collected

= since the CD passes through the renal medulla which is hypertonic, H_2O reabsorption occurs ∴ urine becomes concentrated.

= depending on hydration, the amount of H_2O reabsorbed determines how concentrated urine is.

* H^+ is acidic ∴ when it enters nephron, a lot of it is buffered + forms ammonia (NH_4^+) p.421 (this helps to prevent an overly acidic urine)

* ADH → acts on CD to increase H_2O reabsorption

* Aldosterone → acts on the ascending limb + PCT to increase Na^+ reabsorption which is followed by H_2O reabsorption

ADH = Anti-Diuretic Hormone
(Anti-Pee Hormone)

-FB Cycle = for maintaining homeostasis

(1) When you are dehydrated, there is a low osmoregularity = ↓ H_2O + ↑ Na^+ (salt)

(1) When you are dehydrated / low osmoregularity = ↓ H_2O + ↑ Na^+ (salt)
↳ this is detected by hypothalamus

(2) ADH is produced by hypothalamus + secreted by the posterior pituitary gland in to the blood.

(3) ADH travels in the blood to kidneys + causes increase permeability to H_2O at the collecting ducts
↳ more protein channels are added to CD wall ∴ ↑ possibility of H_2O transport.

p.420

(4) ↑ H_2O reabsorption at CDs causes more water in the blood which increases osmoregularity ∴ -FB shuts down the cycle + ADH production + secretion will decrease.

Aldosterone.
p.419

(1) When you have lower than normal BP (N $\frac{120}{80}$ mmHg) + low Na^+ in the blood, this detected by the juxtaglomerular ← p.418 apparatus which is b/w the afferent arteriole + DCT
(JGA = detects BP in aff. arteriole to maintain pressure filtration)

(2) Renin is an enzyme secreted by the JGA + when it enters blood it causes a plasma protein produced by Liver called angiotensinogen to be converted to

a [illegible] angiotensinogen to be converted to angiotensin I.

angiotensinogen —renin→ angiotensin I

③ Angiotensin I —ACE (in pulmonary capillaries.)→ angiotensin II

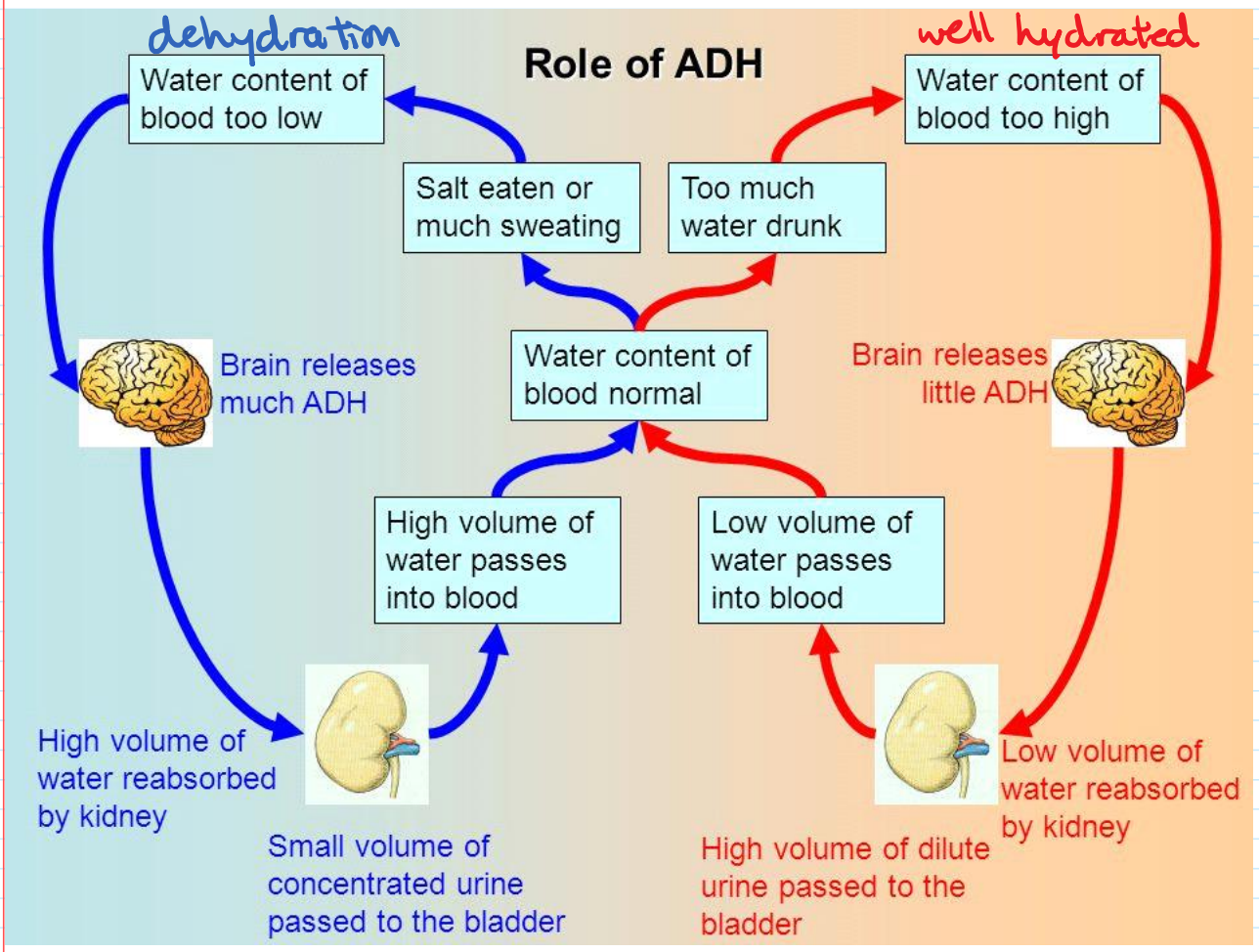
④ angiotensin II causes vasoconstriction to help ↑ BP + causes the adrenal cortex to produce + secrete aldosterone into the blood.

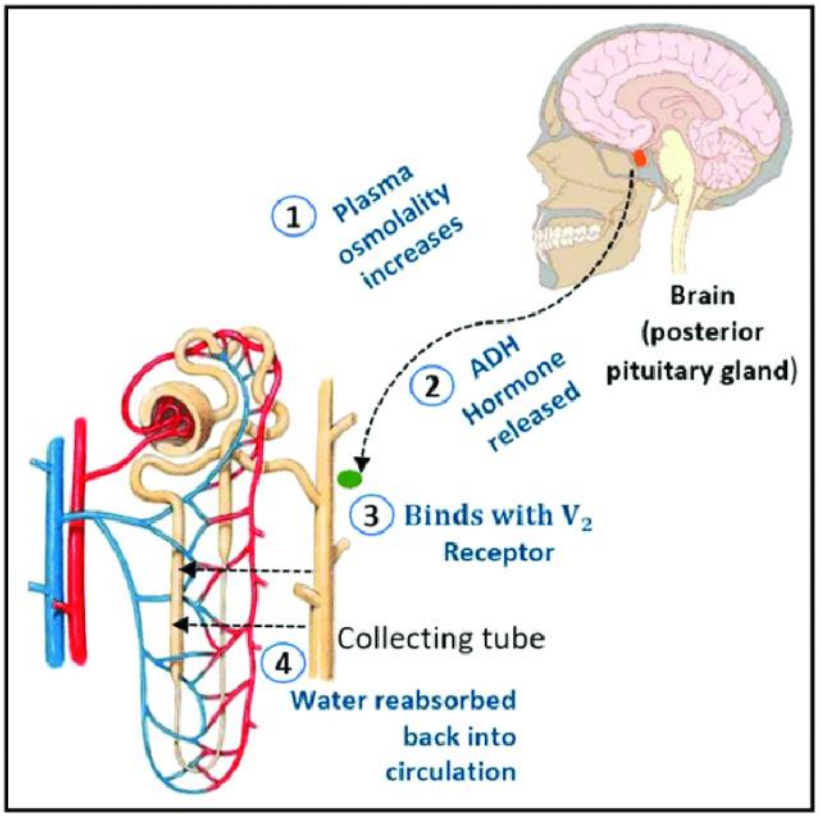
⑤ Aldosterone acts the nephrons to ↑ Na^+ reabsorption which results in an ↑ H_2O reabsorption.

⑥ ↑ H_2O = ↑ Blood Volume + ↑ BP.
↑ Na^+ = − FB

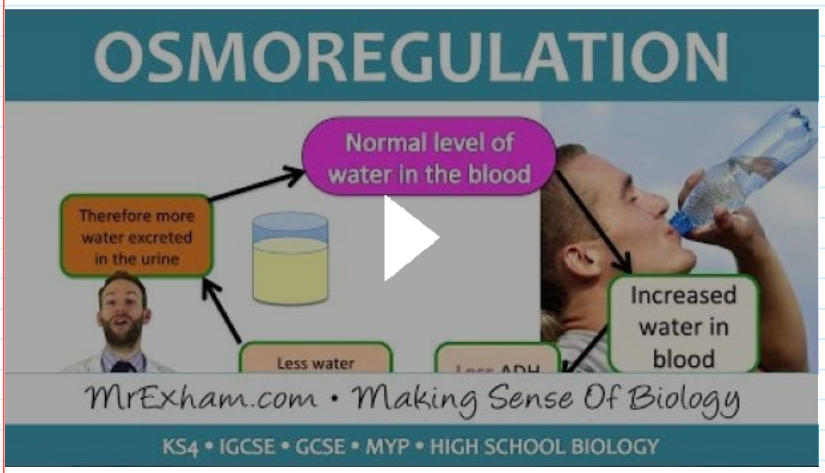
Renin → Angiotensin I → Angiotensin II → Aldosterone

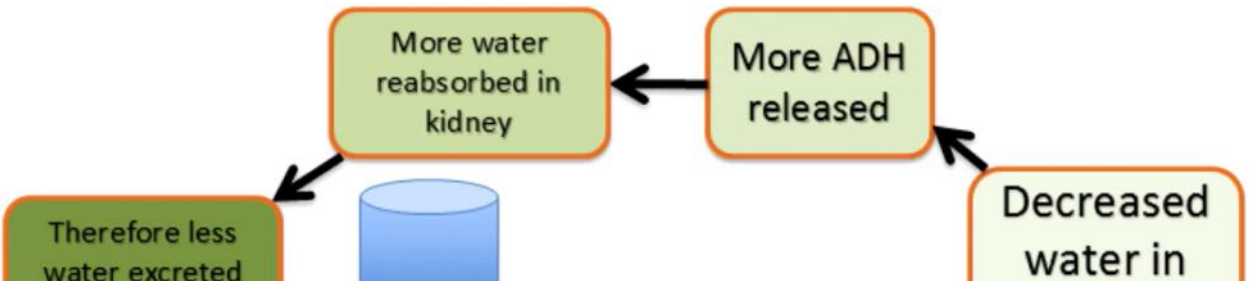
ADH

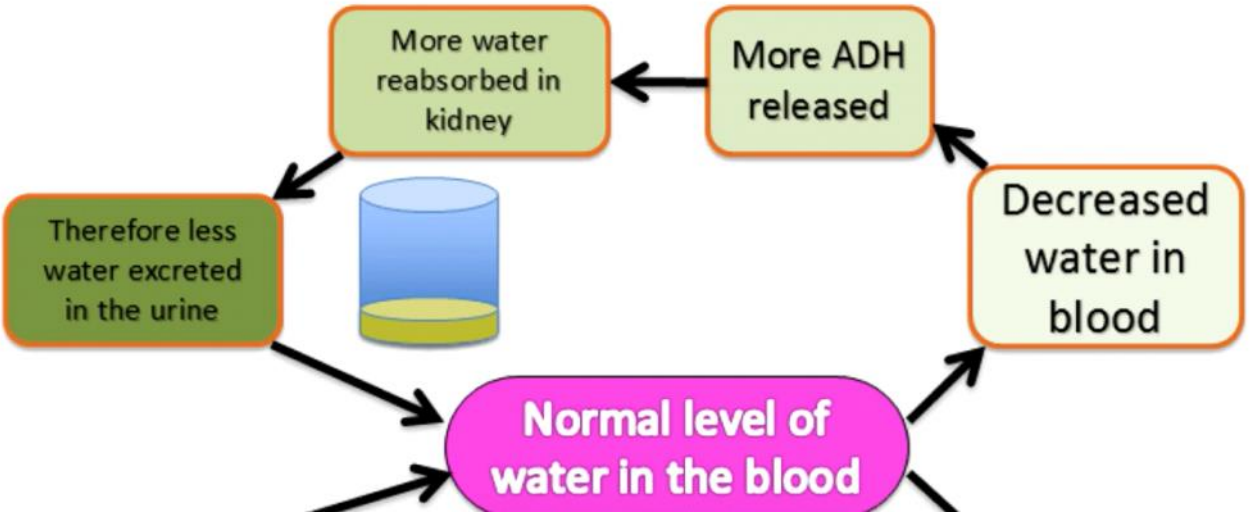

dehydration
Role of ADH
well hydrated
Water content of blood too low
Water content of blood too high
Salt eaten or much sweating
Too much water drunk
Brain releases much ADH
Water content of blood normal
Brain releases little ADH
High volume of water passes into blood
Low volume of water passes into blood
High volume of water reabsorbed by kidney
Low volume of water reabsorbed by kidney
Small volume of concentrated urine passed to the bladder
High volume of dilute urine passed to the bladder

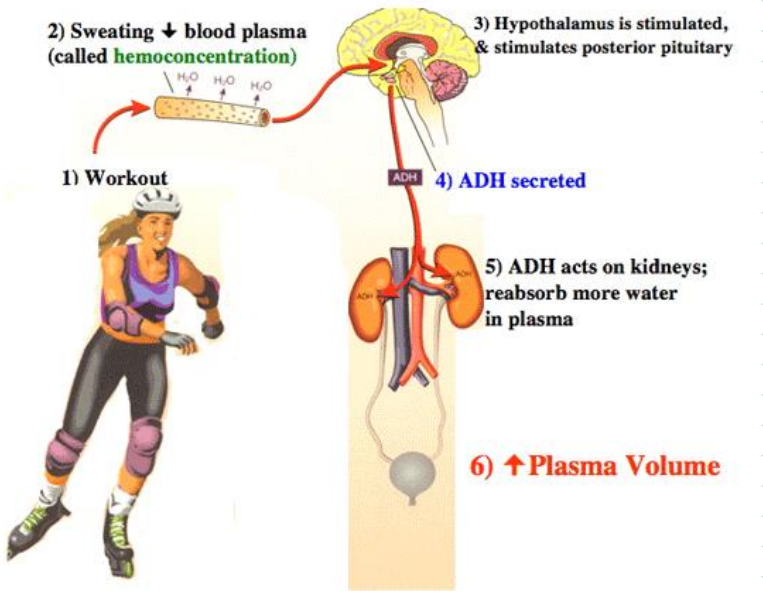


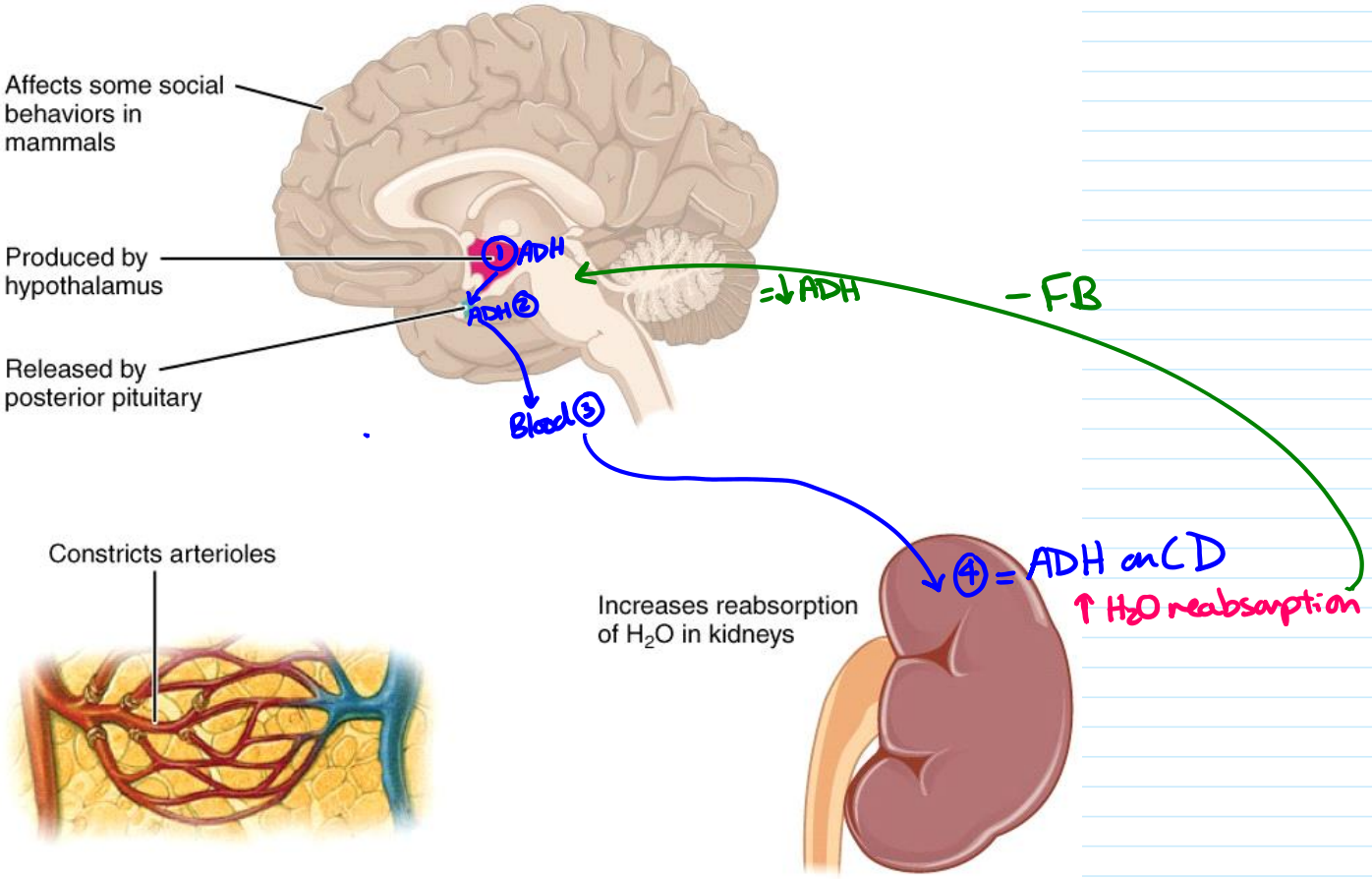
Excretion - ADH and Homeostasis - GCSE Biology (9-1)



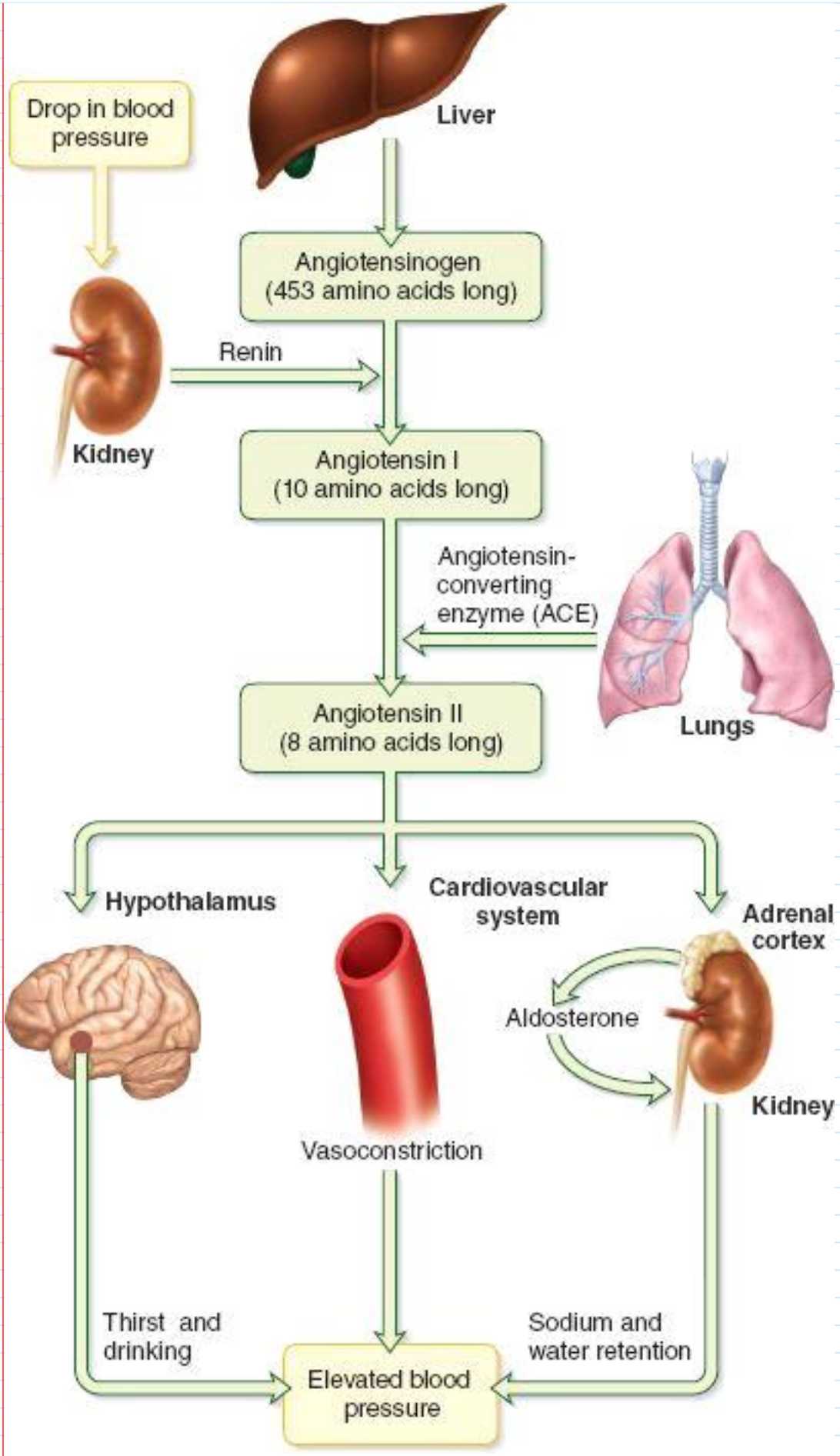



More water reabsorbed in kidney
More ADH released
Therefore less water excreted in the urine
Decreased water in blood
Normal level of water in the blood


2) Sweating ↓ blood plasma (called hemoconcentration)
3) Hypothalamus is stimulated, & stimulates posterior pituitary
1) Workout
ADH
4) ADH secreted
5) ADH acts on kidneys; reabsorb more water in plasma
6) ↑Plasma Volume


Affects some social behaviors in mammals
Produced by hypothalamus
Released by posterior pituitary
① ADH
② ADH
Blood ③
=↓ADH
- FB
④ = ADH on CD
↑ H2O reabsorption
Increases reabsorption of H2O in kidneys
Constricts arterioles

Aldosterone


Drop in blood pressure
Liver
Angiotensinogen (453 amino acids long)
Renin
Kidney
Angiotensin I (10 amino acids long)
Angiotensin-converting enzyme (ACE)
Lungs
Angiotensin II (8 amino acids long)
Hypothalamus
Cardiovascular system
Adrenal cortex
Aldosterone
Kidney
Vasoconstriction
Thirst and drinking
Sodium and water retention
Elevated blood pressure

Renin Angiotensin Aldosterone System