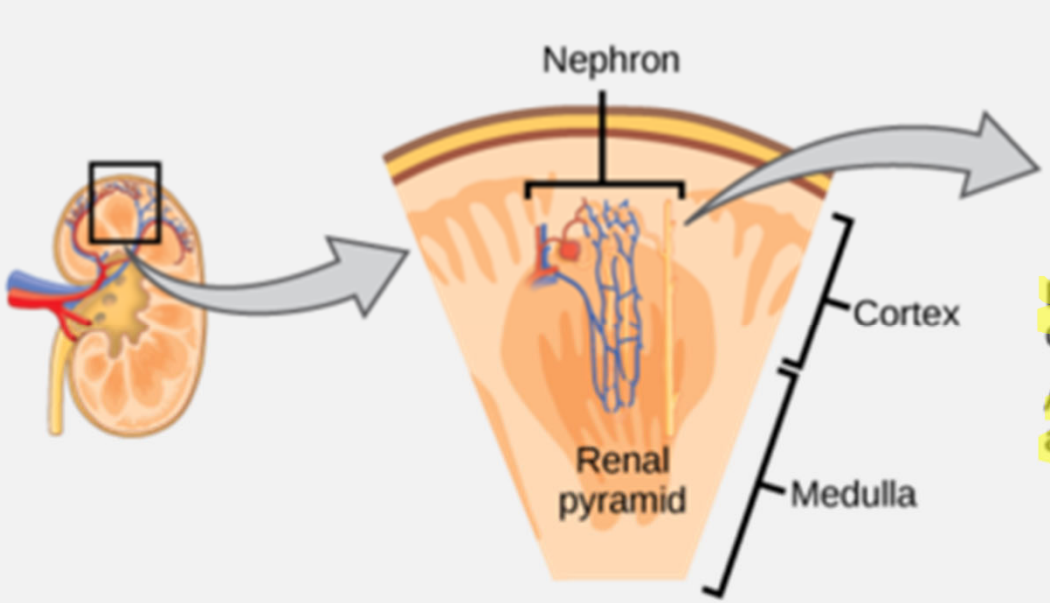
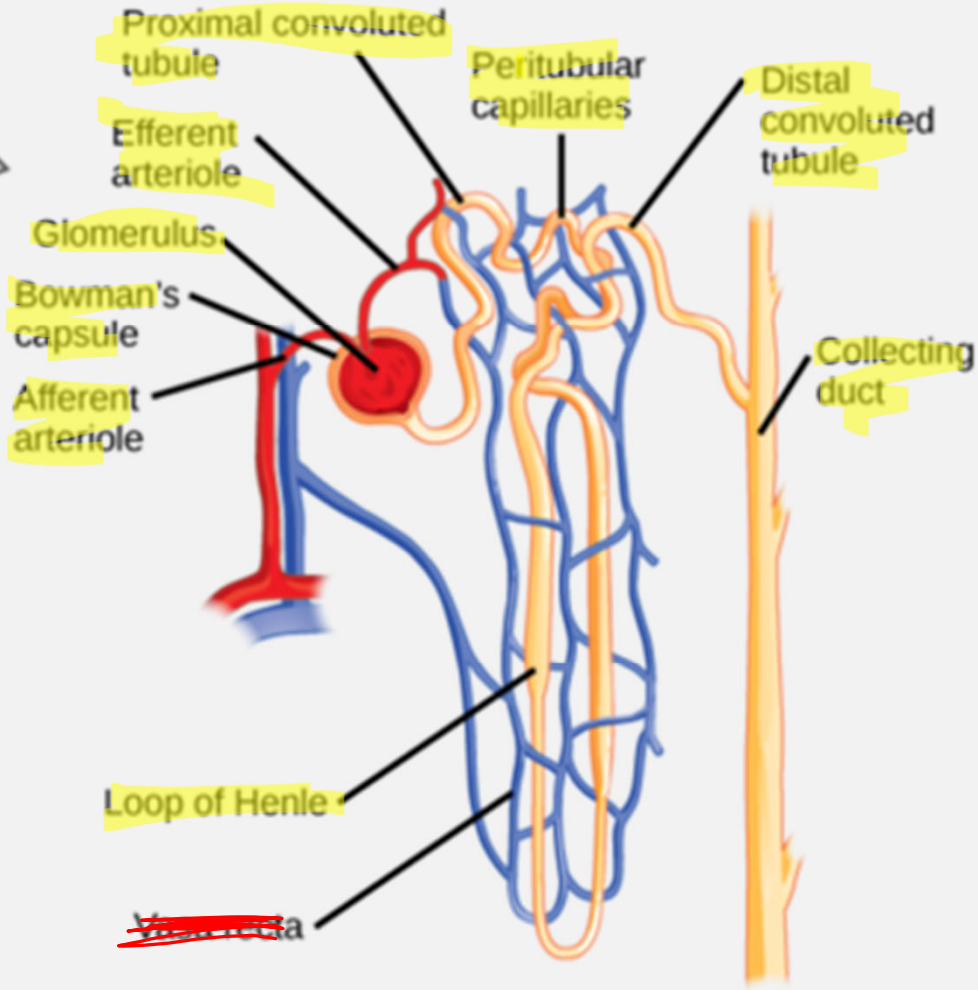
THE NEPHRON


Nephron
Cortex
Renal pyramid
Medulla


Proximal convoluted tubule
Peritubular capillaries
Distal convoluted tubule
Efferent arteriole
Glomerulus
Bowman's capsule
Afferent arteriole
Collecting duct
Loop of Henle

THE NEPHRON

- **Afferent Arterioles: A small branch of the renal artery that delivers blood to the glomerulus of a nephron.**
- **Glomerulus: Tightly coiled capillaries in the cortex region of kidney; inside the Bowman's Capsule.**
- **Bowman's Capsule: Closed end at the beginning of the nephron; in the cortex region of kidney.**
- **Efferent Arteriole: Carries blood away from the glomerulus through a network of capillaries. Its small diameter creates a high pressure in the glomerulus.**
- **Proximal Convoluted Tubule: First twisted region after Bowman's Capsule; in cortex.**

THE NEPHRON

- **Loop of Henle:** Long tube that extends from proximal convoluted tubule to distal convoluted tubule
- **Distal Convoluted Tubule:** Second twisted tube after Loop of Henle
- **Collecting Duct:** Long tube that drains the distal convoluted tubule and empties urine into the renal pelvis
- **Peritubular Capillaries:** Located between the loop of Henle and distal convoluted tubule

PROCESSES OF THE NEPHRON

1. Filtration

- The transfer of soluble components from the blood into the glomerulus
    - This "filters" or separates the liquid part of your blood (plasma) from the blood cells.
- Blood pressure increases
- 20% of blood plasma enters Bowman's capsule

PROCESSES OF THE NEPHRON

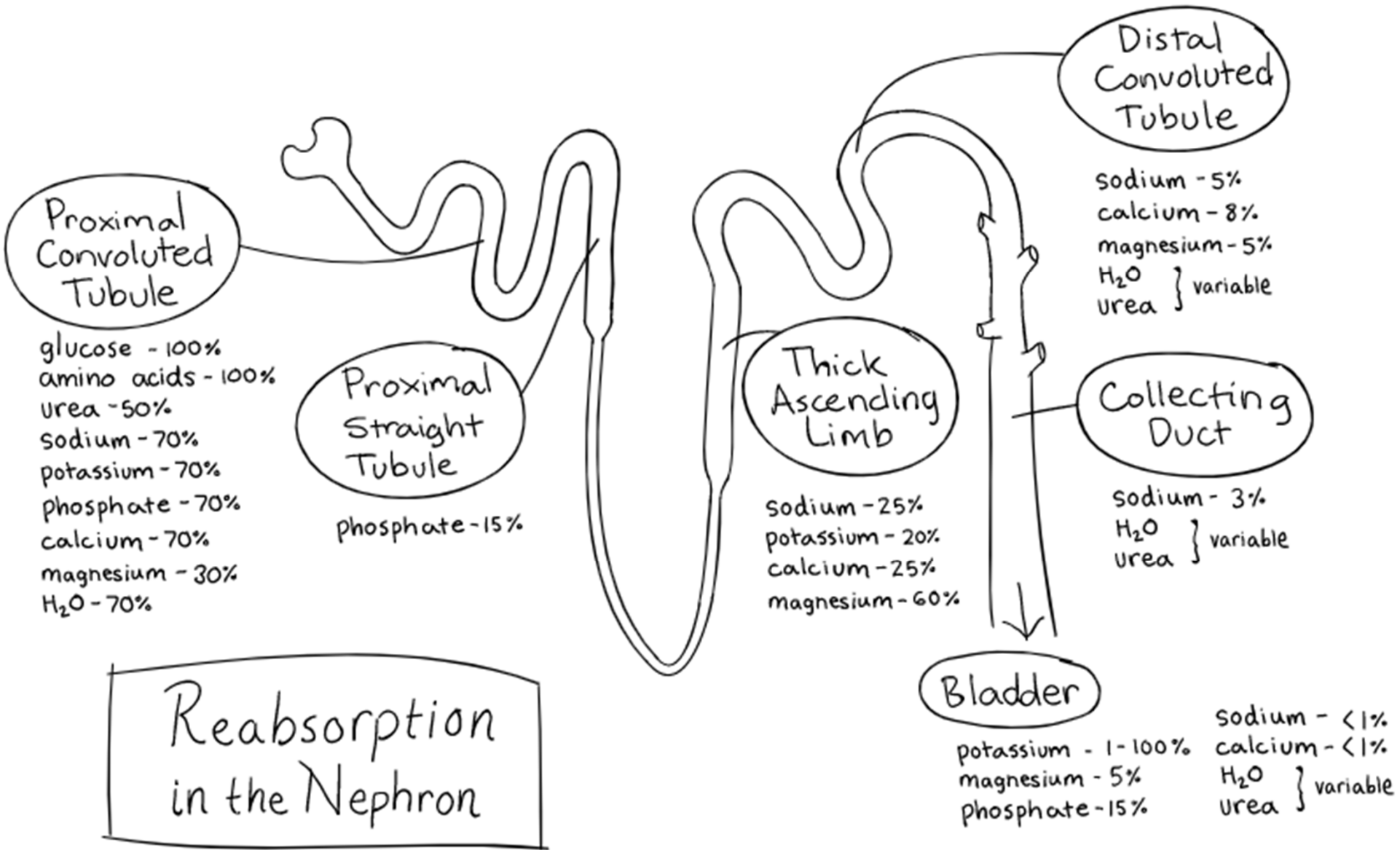
2. Reabsorption (Also called "*tubular reabsorption*")

- When solutes and water are reabsorbed back into the bloodstream, instead of being excreted

with gradient against gradient

STEP 1: Passive or active transport of water and dissolved substances from the fluid inside tubule through the tubule wall into space outside.

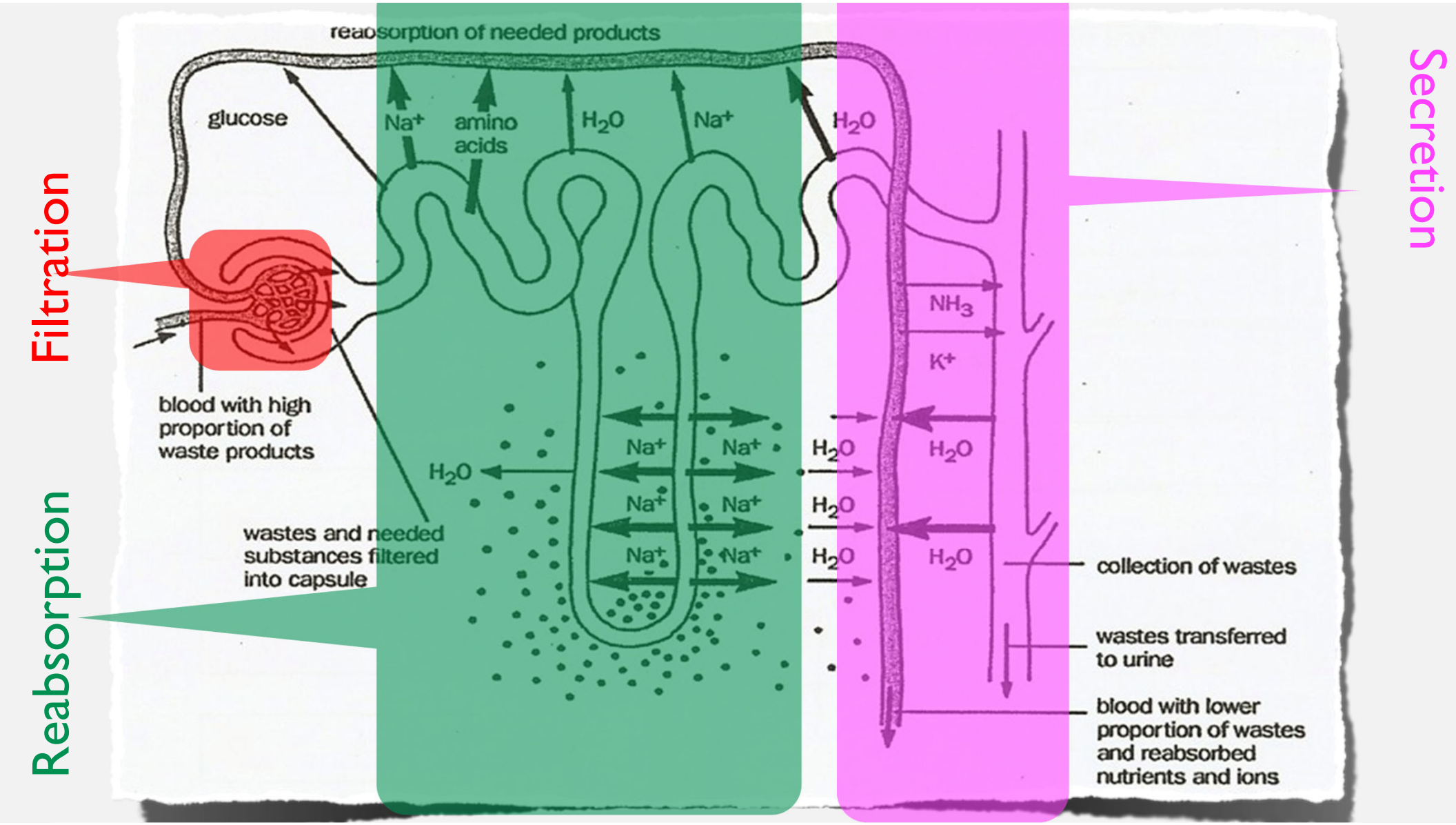
STEP 2: passive or active transport of water and substances from the space into the capillary walls (back into bloodstream)


Proximal Convoluted Tubule
glucose - 100%
amino acids - 100%
urea - 50%
sodium - 70%
potassium - 70%
phosphate - 70%
calcium - 70%
magnesium - 30%
H2O - 70%
Proximal Straight Tubule
phosphate - 15%
Thick Ascending Limb
sodium - 25%
potassium - 20%
calcium - 25%
magnesium - 60%
Distal Convoluted Tubule
sodium - 5%
calcium - 8%
magnesium - 5%
H2O
urea
variable
Collecting Duct
sodium - 3%
H2O
urea
variable
Bladder
potassium - 1 - 100%
magnesium - 5%
phosphate - 15%
sodium - <1%
calcium - <1%
H2O
urea
variable
Reabsorption in the Nephron

PROCESSES OF THE NEPHRON

3. Secretion

- Transportation of certain molecules out of blood and into the urine
    - Nitrogen-based wastes (urea, ammonia) removed
    - H/K ions and drugs removed
- Occurs in the proximal tubule
- Urine as final product


Filtration
Reabsorption
Secretion
reabsorption of needed products
glucose
Na+
amino acids
H2O
Na+
H2O
NH3
K+
blood with high proportion of waste products
H2O
Na+
Na+
Na+
Na+
Na+
Na+
H2O
H2O
H2O
H2O
H2O
wastes and needed substances filtered into capsule
collection of wastes
wastes transferred to urine
blood with lower proportion of wastes and reabsorbed nutrients and ions