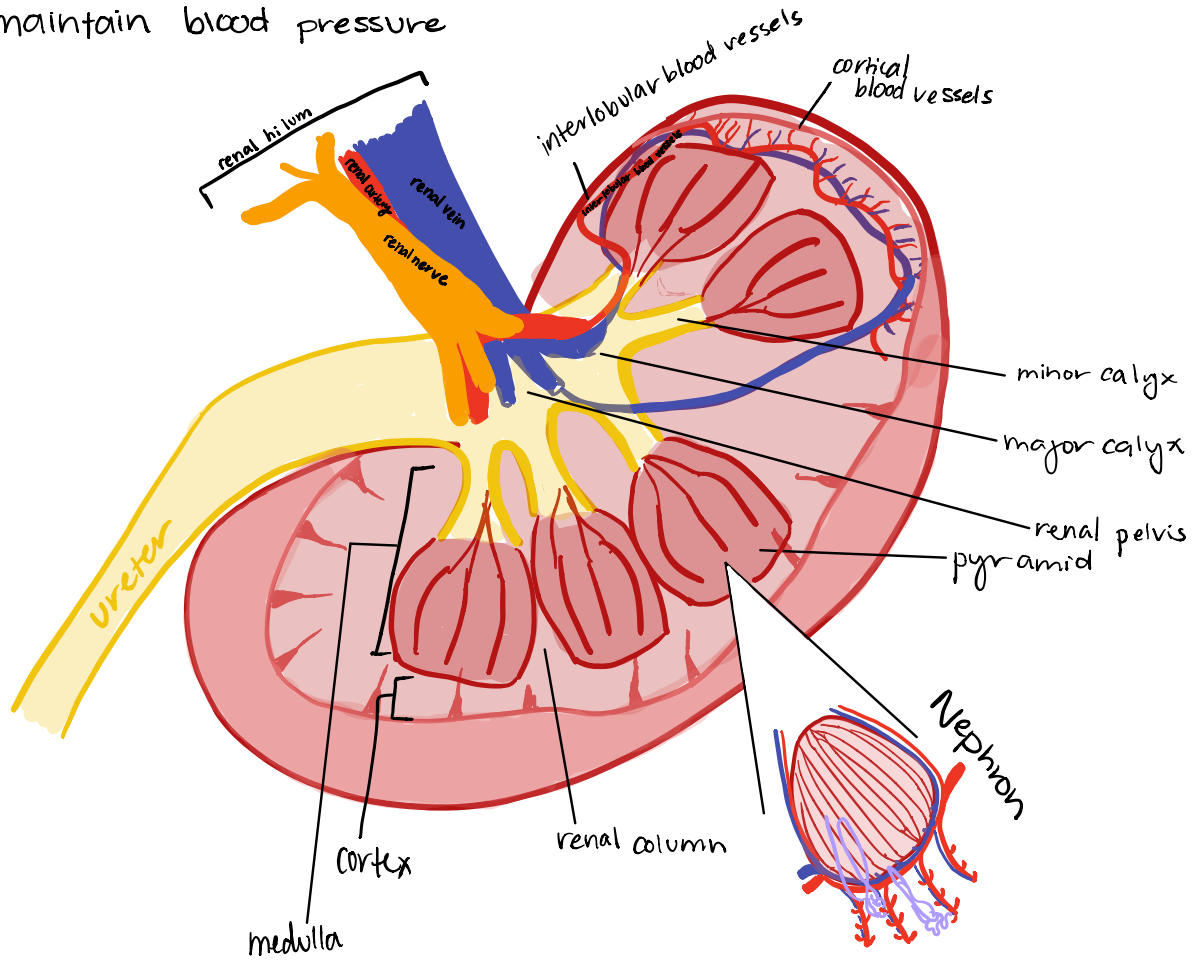
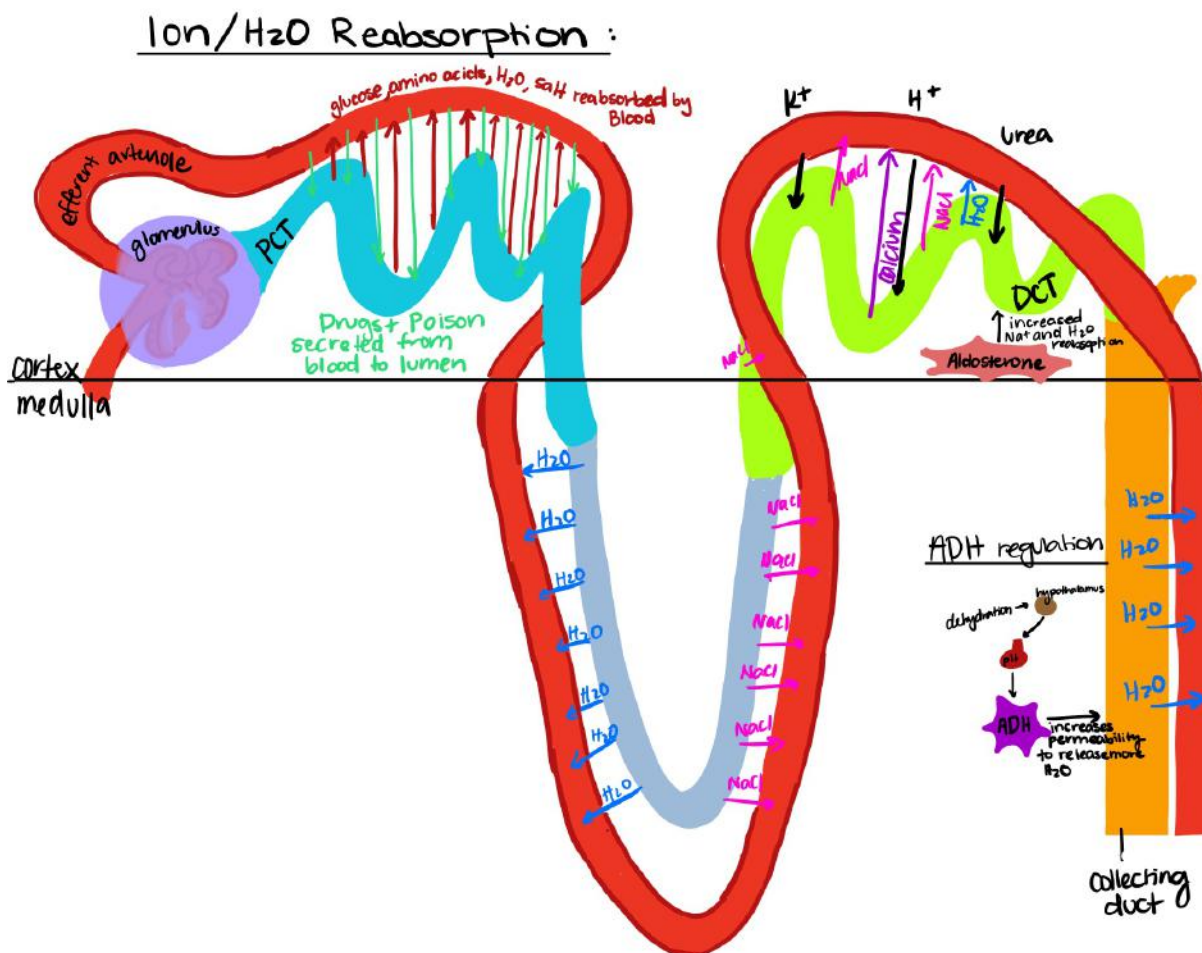
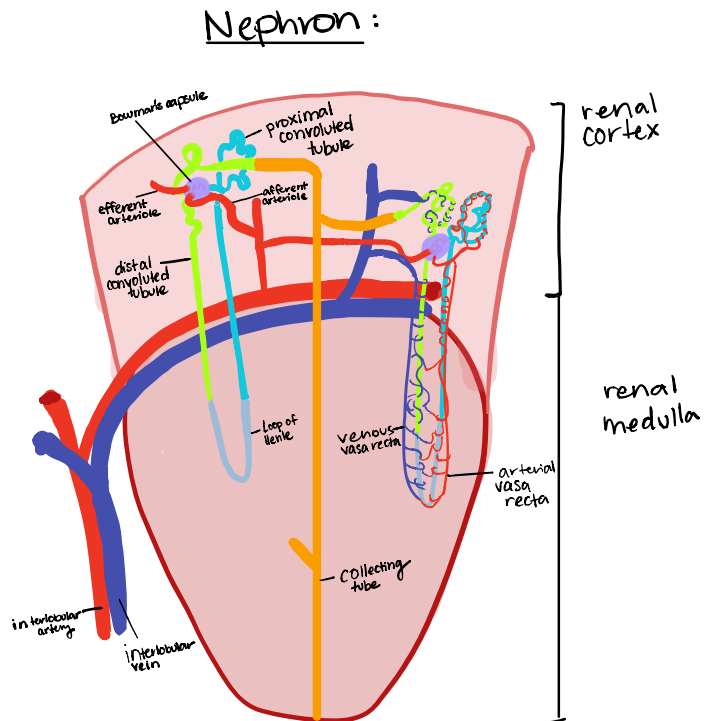
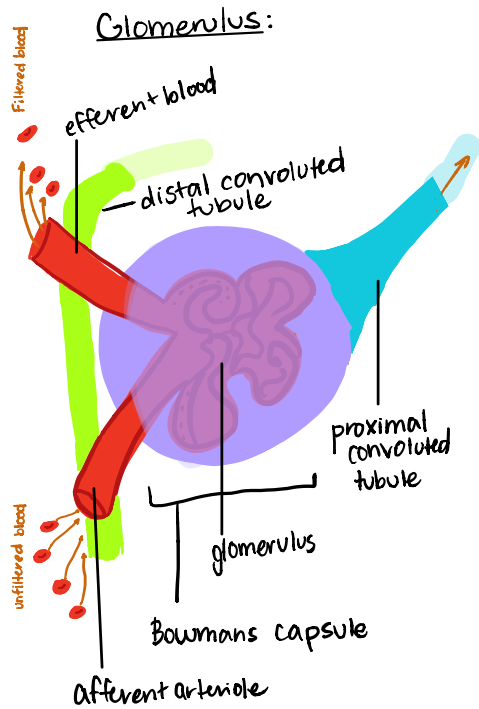


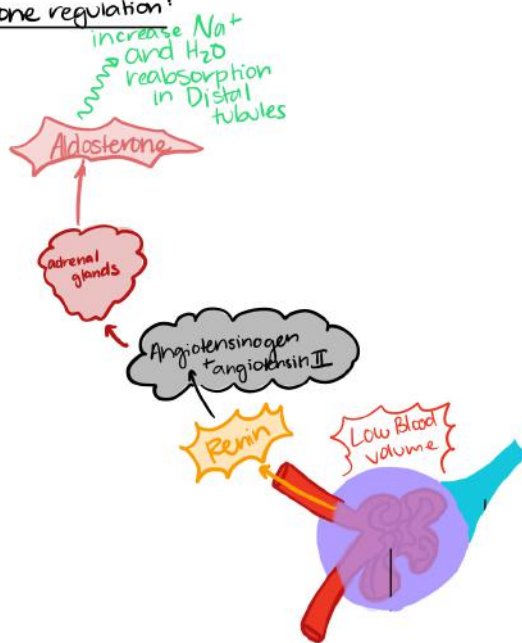
The Excretory System [Kidneys]

- Excrete liquid and solid waste (H₂O, salt, nitrogenous waste)
- maintain pH
- maintain osmolality
- maintain blood pressure

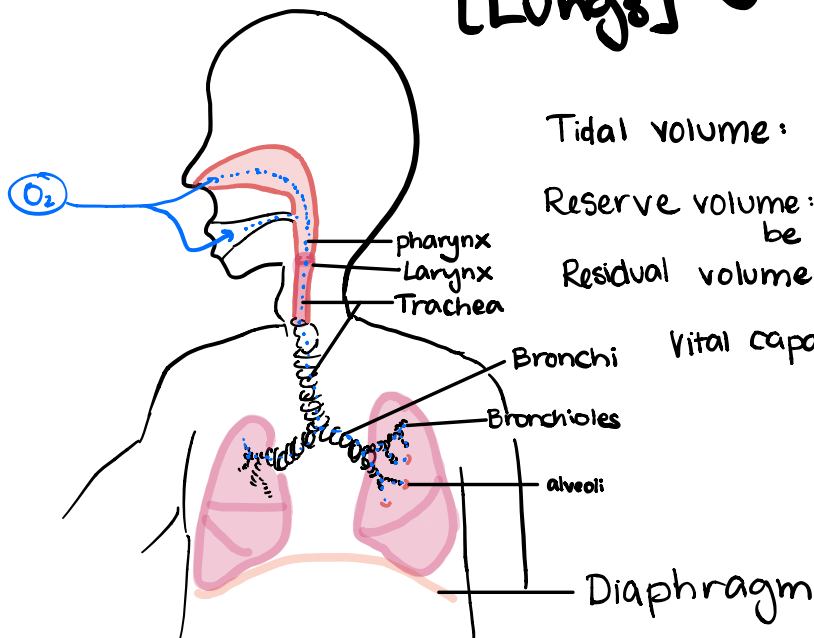




Aldosterone regulation:



The Respiratory System [Lungs]

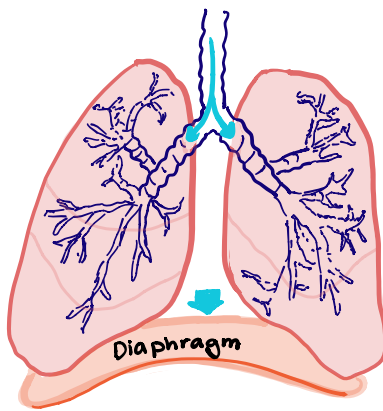


Tidal volume: average breath capacity

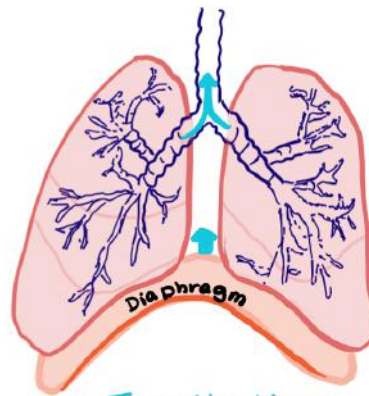
Reserve volume: Additional air that can be breathed in/out after tidal

Residual volume: air left in lungs after total forced exhalation

Vital capacity: How much air lungs can hold



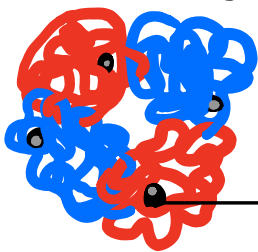
Inhalation
(diaphragm flexed)



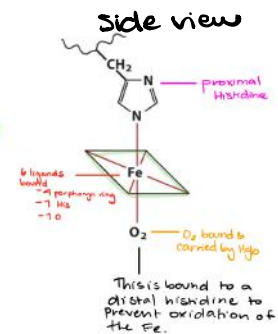
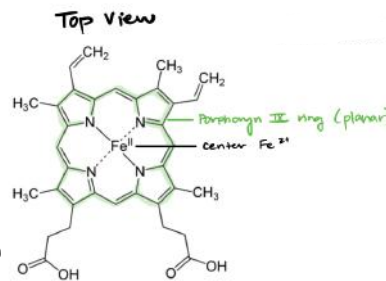
Exhalation
(diaphragm relaxed)

*Think of this as the diaphragm pulling and flexing to open up the lungs and relaxing to allow them to exhale.

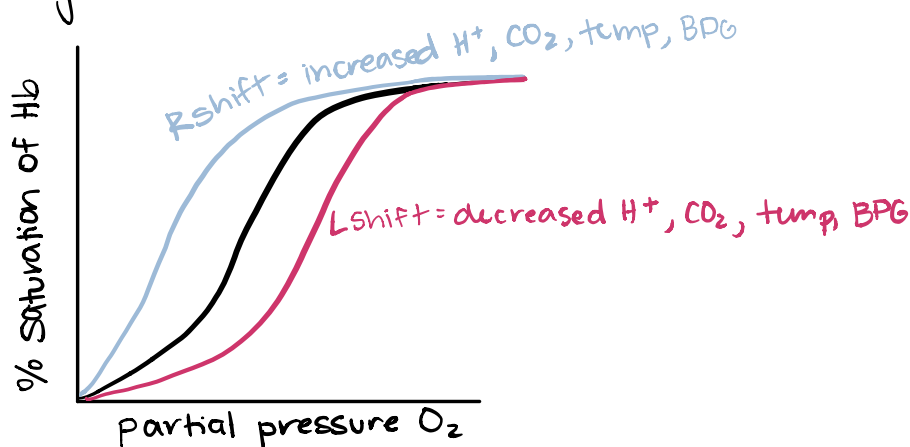
Hemoglobin



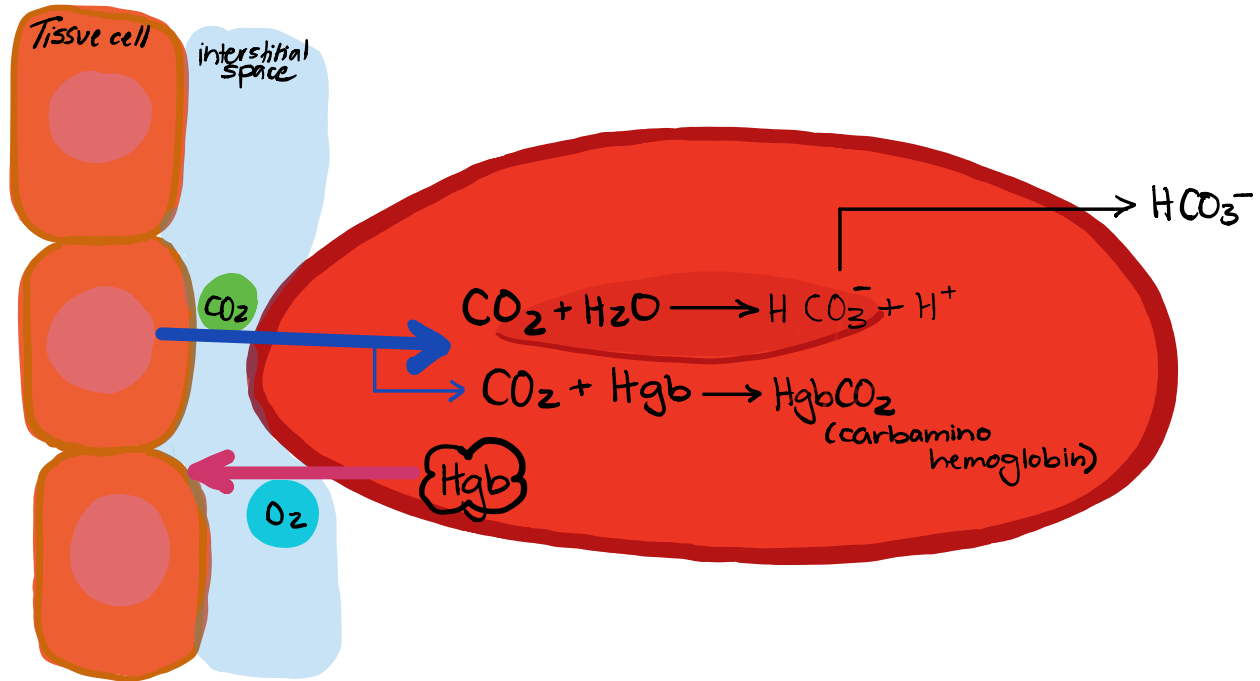
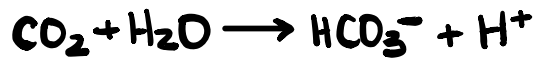
Fe (carries 1 O₂)



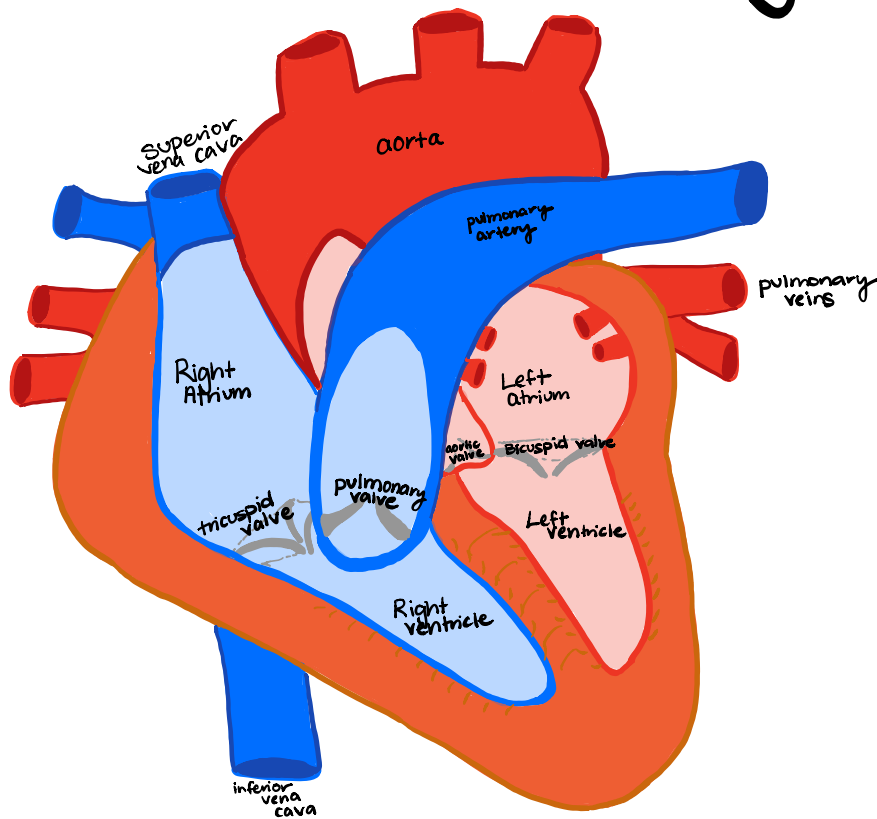
Hgb carries 4 O₂ molecules at full saturation. (or 8 O's)



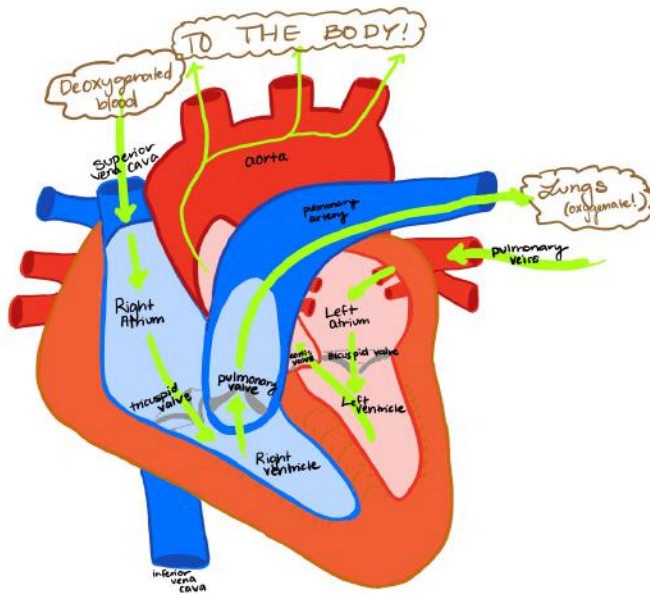
Hyperventilation = increased O₂, decreased CO₂ → increased pH
respiratory alkalosis



The Cardiovascular System



flow of blood:



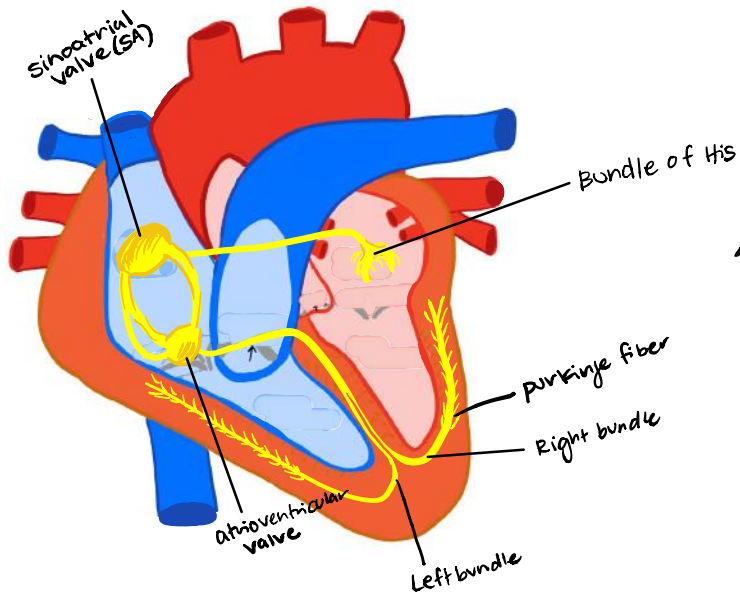
pulmonary artery:
deoxygenated blood

pulmonary vein:
oxygenated blood

carotid artery:
oxygenated blood

cuboidal vein:
deoxygenated blood

Electrical System



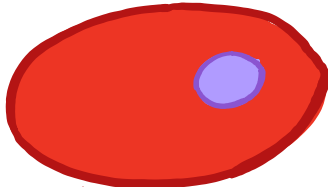
↑ Sympathetic activity
means increased
heart rate + blood
pressure

↑ Parasympathetic
activity = decreased
BP.

Blood:

Erythrocytes

immature RBC



- Hgb sacks
- nucleus
- organelles

mature RBC



- no organelles
- no mitosis
- live ~120 days
- Hgb

Leukocytes

Granulocytes

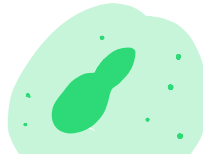
Life span = hours - days



NEUTROPHIL
* "first responders"



EOSINOPHIL



BASOPHIL

Agranulocytes

Life span = months to years

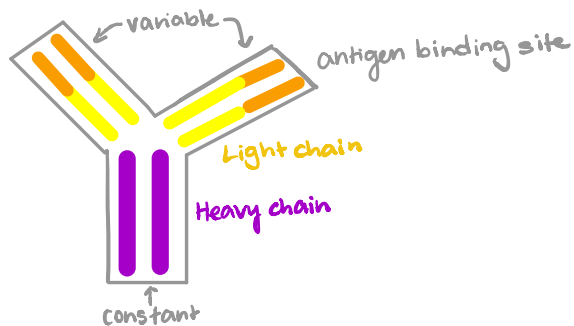


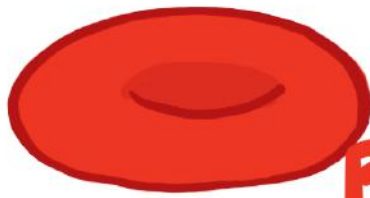
MONOCYTE
* Become macrophages



LYMPHOCYTE

Antibodies





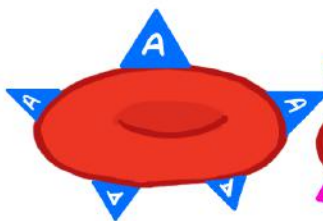
Blood typing

Rh(-)

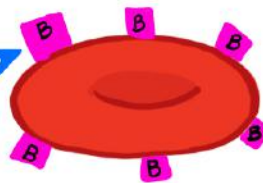
O-



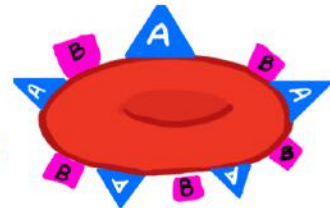
A-



B-

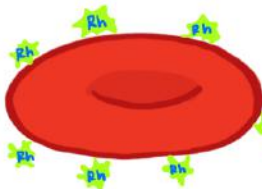


AB-

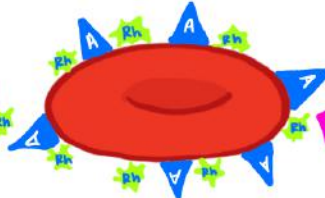


Rh(+)

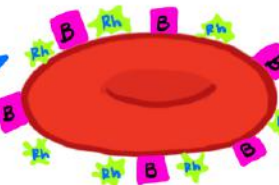
O+



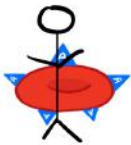
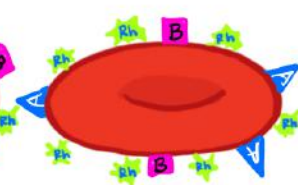
A+



B+



AB+



can donate to: A-, A+, AB+, AB-

can accept from: O-, A-



can donate to: B+, AB+

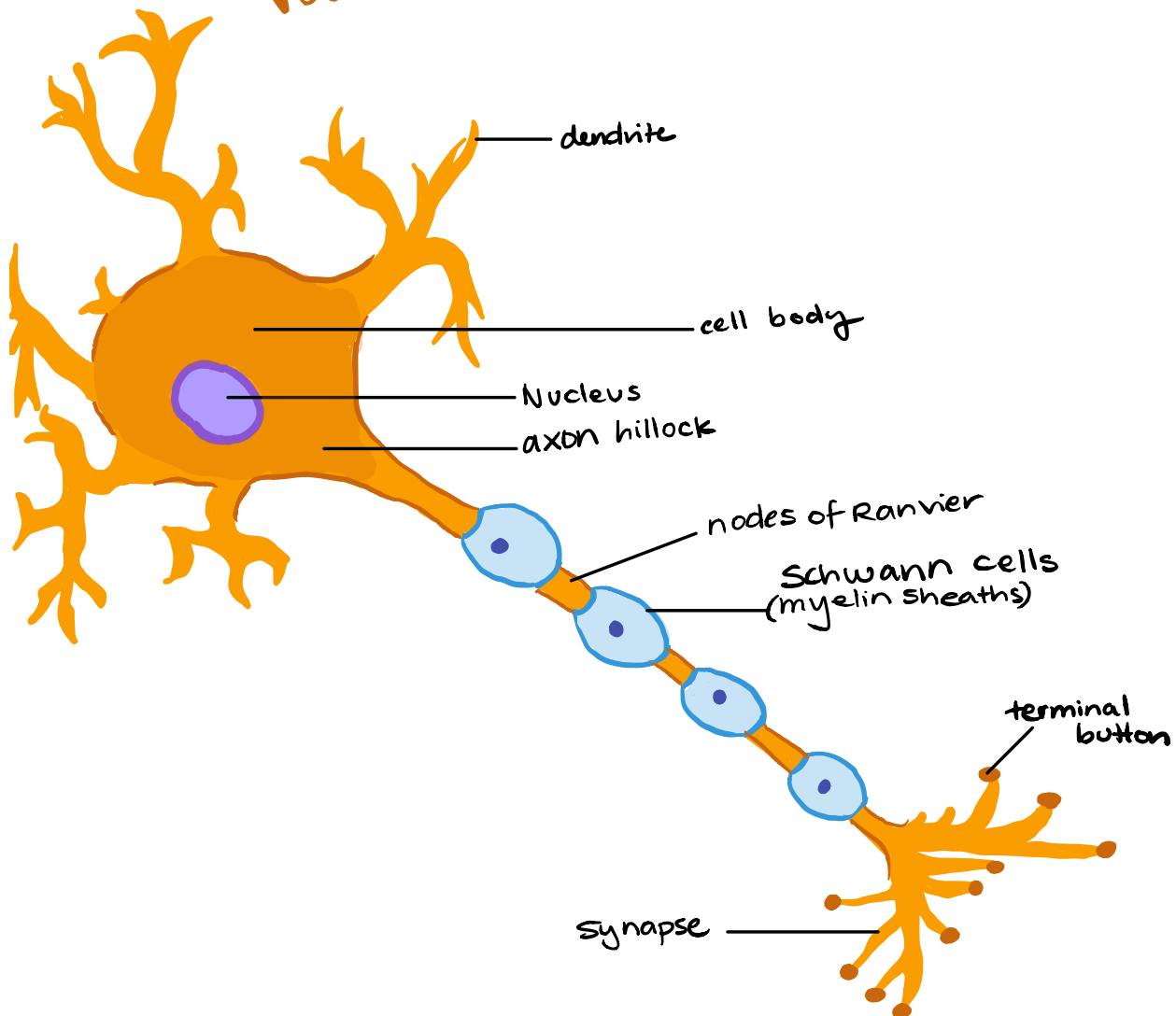
can accept from: B+, O+, B-, O-



can donate to: O+, A+, B+, AB+

can accept from: O-, O+

Neurons



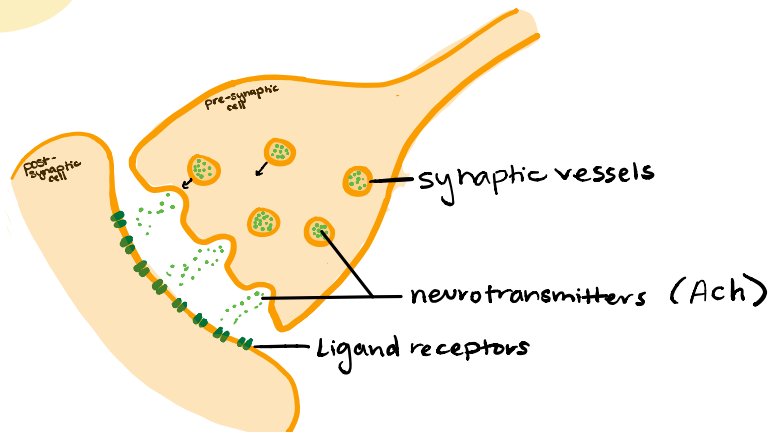
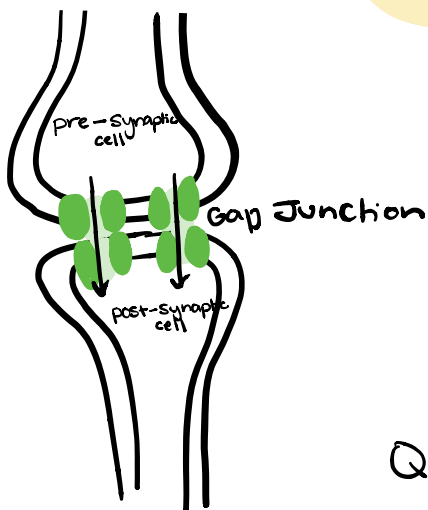
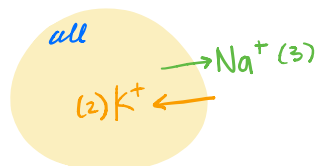
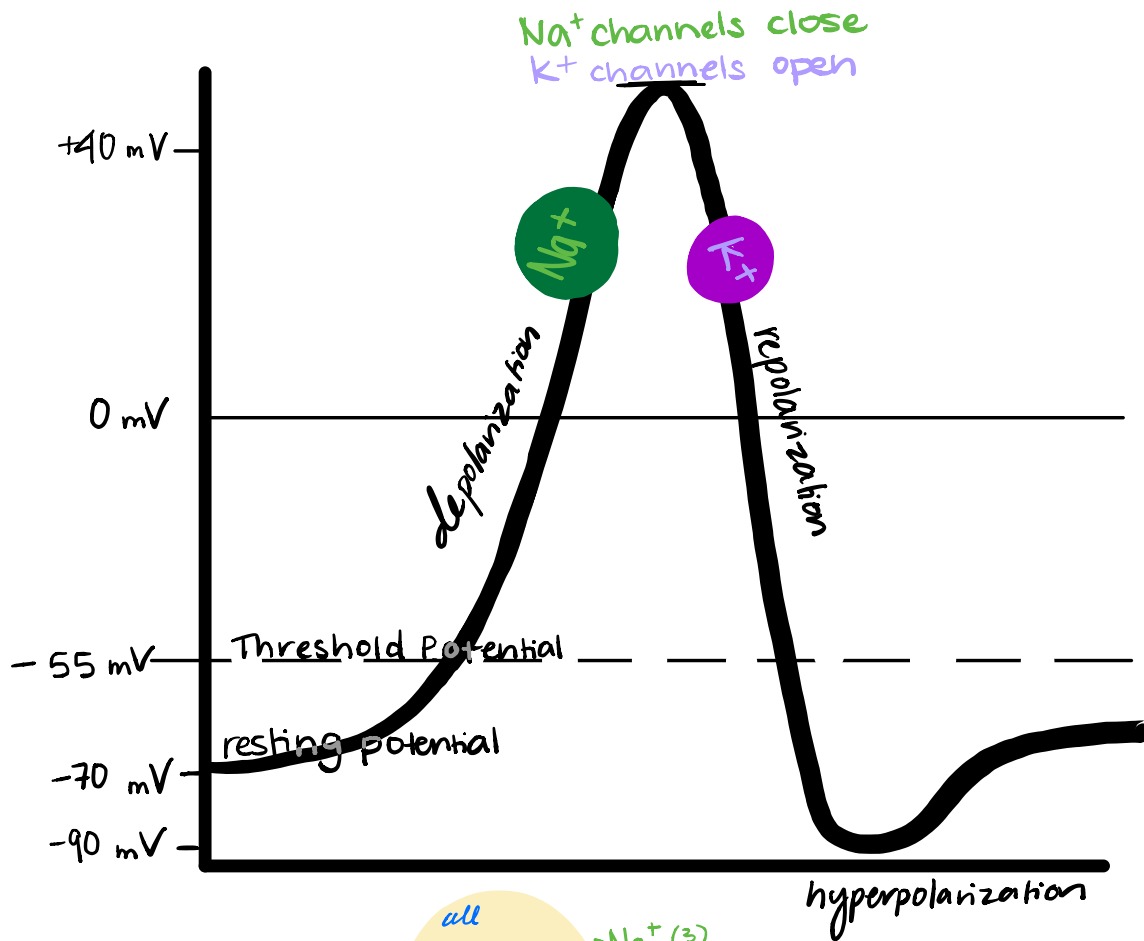
purpose of dendrites: receives signal from upstream neuron

axon hillock: axon joins cell body here. High concentration of voltage gated sodium channels

Schwann cells: high fat concentration forming myelin sheaths

Nodes of Ranvier: move a signal quicker down an axon by pumping node to node

Action Potential



Q: what ion initiates this cascade?

(calcium)

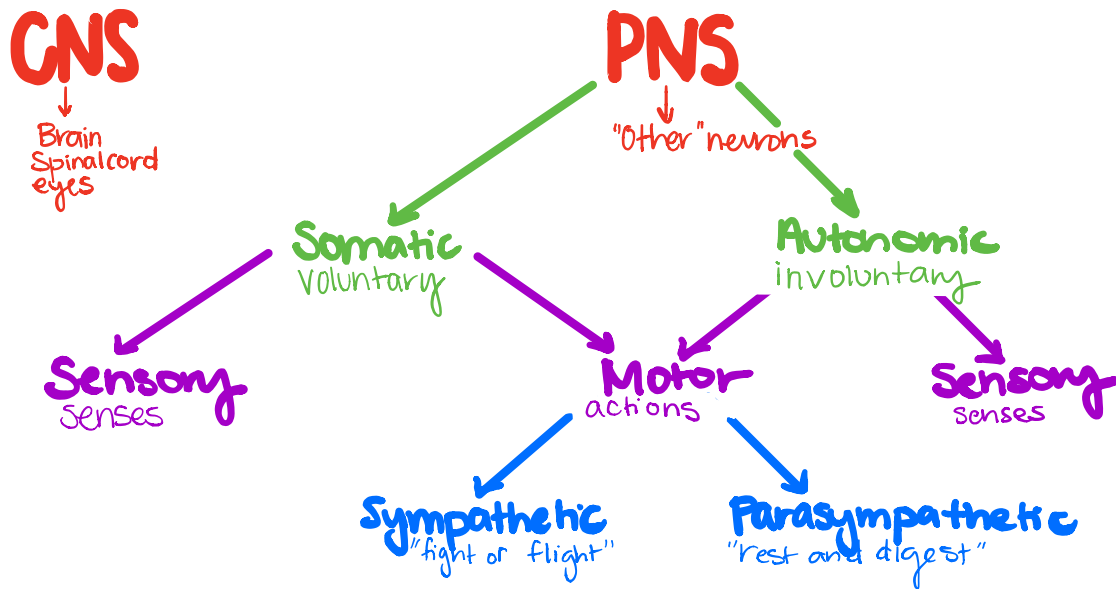
Synapses

- * Electrical
 - fast electrical signaling
 - found in:
 - retina
 - smooth/cardiac muscle
 - CNS

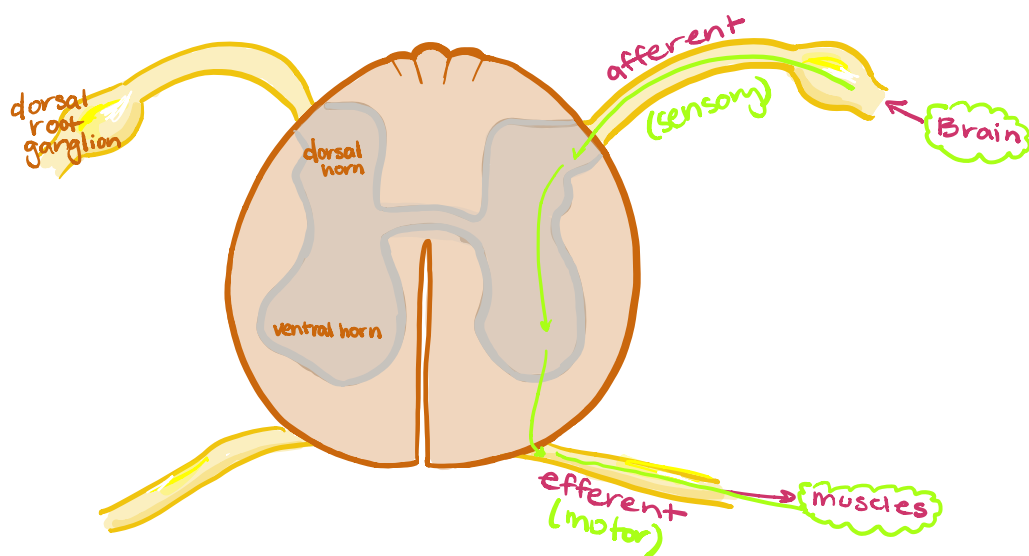
- * Chemical

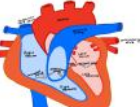
- small gap between terminal button and effector

The Nervous System



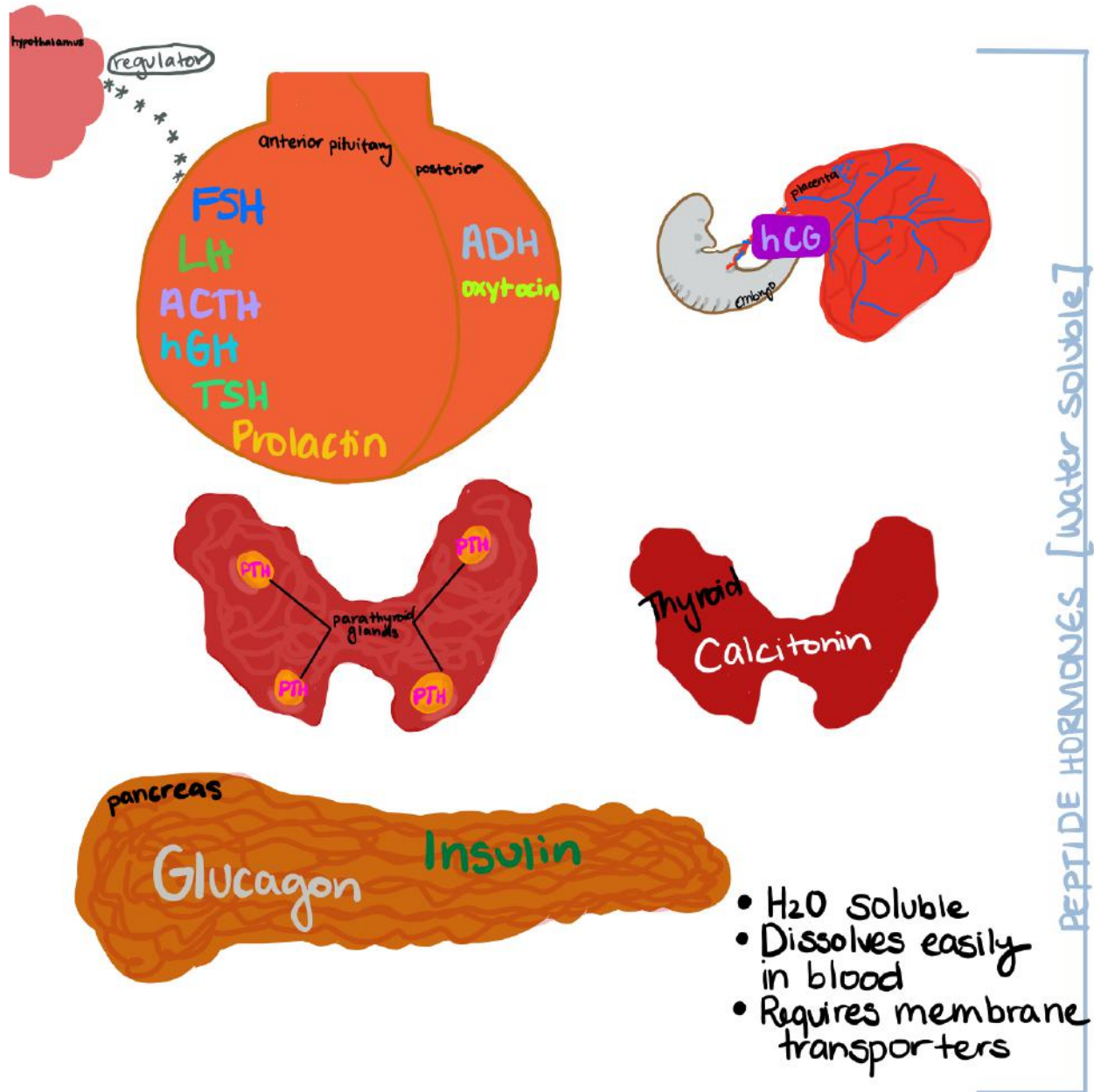
<u>CNS</u> <u>neural cells</u>	<u>PNS</u> <u>neural cells</u>
Astrocytes : Form blood-brain barrier and regulate brain function	Schwann cells : wrap neuron and provide insulation (myelinate)
Microglia : act as macrophages to engulf debris + pathogens	Satellite cells : surround neuron cell bodies
Ependymal : Line ventricles	
Oligodendrocytes : lipid cells which form the myelin sheath around neurons	

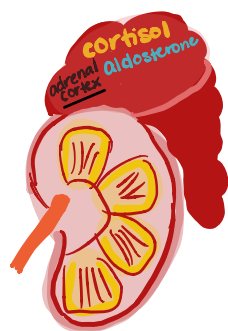
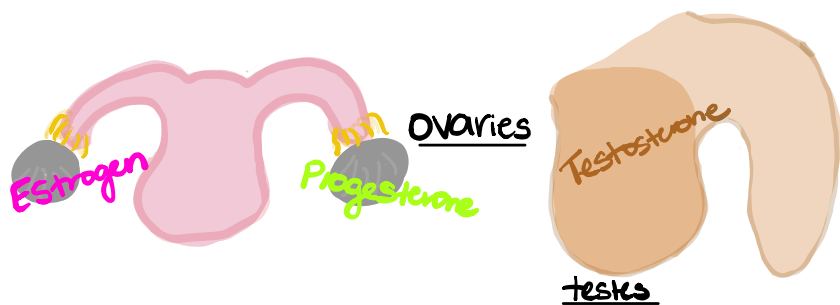


Parasympathetic	Sympathetic
Pupil constriction 	
	↑ Heart Rate 
	↑ Blood Pressure 
	Blood Flow to skeletal muscle
Blood Flow to digestive organs	
	Blood flow to Brain
Blood Flow to the skin	

The Endocrine System

These are very important and WILL come up on your MCAT. Know them.

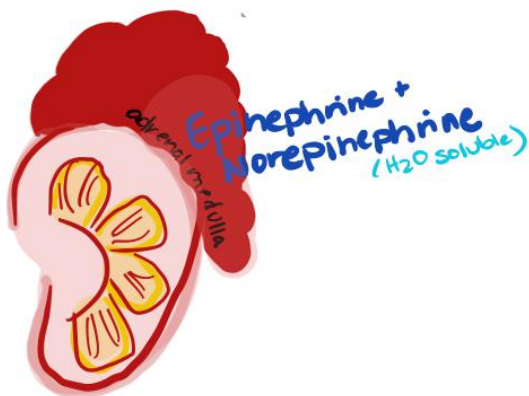




*notice this is the CORTEx

- Requires protein carrier in blood.
- Diffuse through lipid membranes

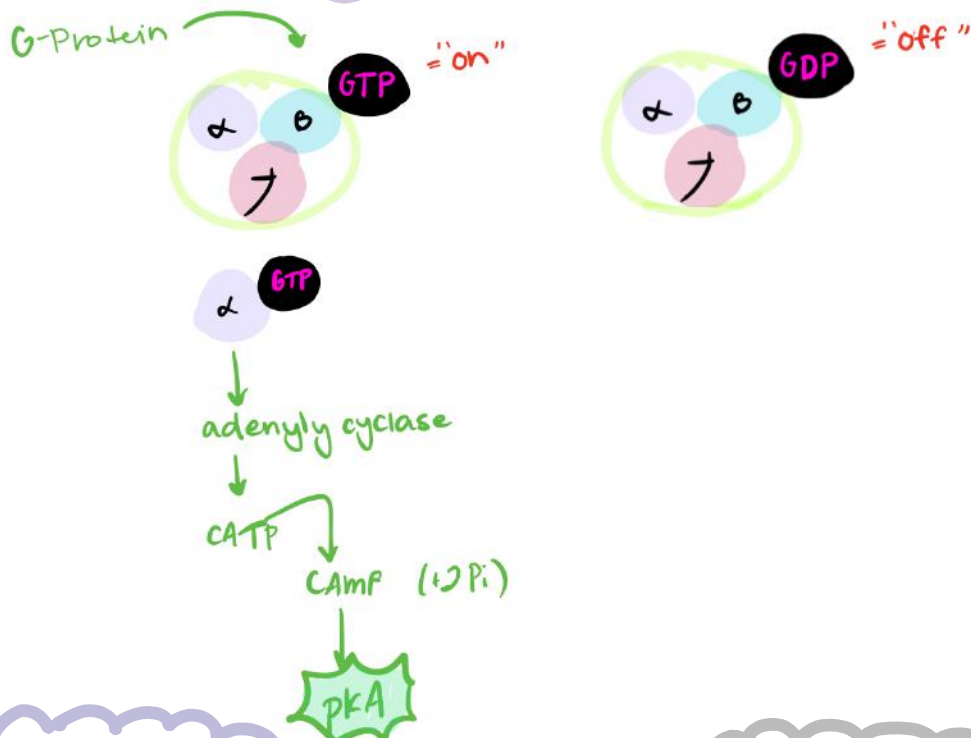
Steroid hormones (lipid soluble)



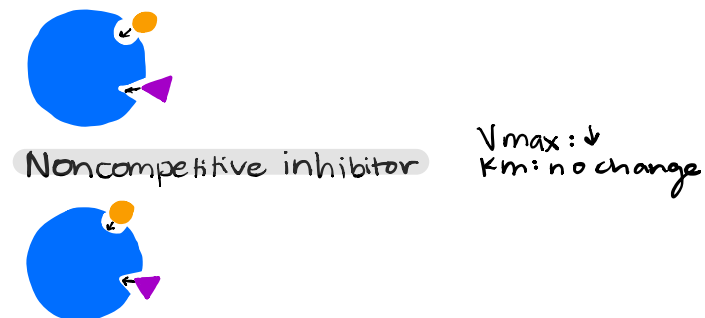
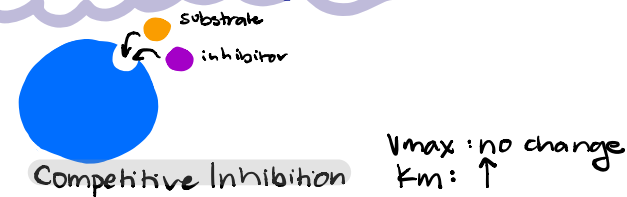
*notice this is the MEDULLA

Tyrosine Derivative Hormones

2° messenger systems (cascade)

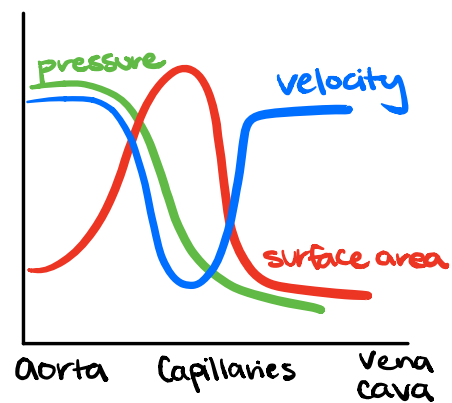


Enzyme Types



Flow Rate

$$Q = AV$$



Mcat Hormones

Peptide water soluble hormones:

- Follicle Stimulating Hormone**: promotes formation of the ova or sperm.
- Luteinizing Hormone**: Triggers ovulation and development of the corpus luteum.
- Adrenocorticotropic Hormone**: Acts on adrenal cortex to reduce
- Thyroid Stimulating Hormone**: Acts on thyroid to release T_3 and T_4 hormones.
- Prolactin**: stimulates mammary glands to produce milk.
- Growth Hormone**: promotes bone + skeletal muscle growth.
- Oxytocin**: stimulates uterine contractions. Also known as the "cuddle hormone."
- Antidiuretic Hormone**: Acts on the collecting duct to balance water in the blood.
- Parathyroid hormone**: Increases blood calcium by stimulating bone Ca^{2+} release.
- Calcitonin**: inhibits osteoclasts and decreases blood Ca^{2+} .
- Human Chorionic Gonadotropin**: Produced by placenta after implantation.
- Glucagon**: increases blood glucose by breaking down glycogen.
- Insulin**: decreases blood glucose by promoting glucose reuptake into tissues.

Steroid lipid soluble hormones

- Estrogen**: Develop female reproductive system + maintain menstruation
- Progesterone**: Develop female reproductive system
- Testosterone**: Develop male reproductive system
- Cortisol**: "Stress hormone" released in response to stress and low blood glucose.
- Aldosterone**: Acts on kidney distal tubule to maintain blood pressure.

Tyrosine Derivatives

 norepinephrine : Fight or flight
H₂O soluble

 epinephrine : "Fight or flight"
H₂O soluble

 triiodothyronine : maintain homeostasis: growth, metabolism, etc.
lipid soluble

 thyroxine : maintain growth, metabolism, etc.
lipid soluble
