

homeostasis-

Physical factors

- temperature
- osmotic blood pressure
- blood pressure

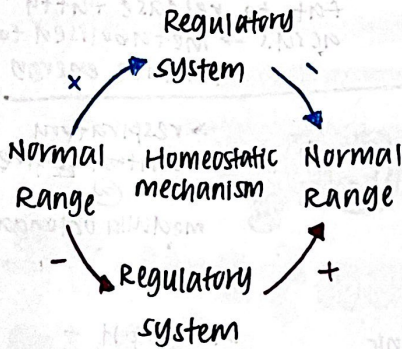
Chemical factors

- pH value
- concentration of minerals
- blood sugar level

- regulation of physical + chemical factors of the internal environment within normal ranges for the cell to function in optimum conditions
- any deviation triggers homeostatic mechanism that involves -ve feedback
- internal envi. in constant state altho external env. changes a LOT
- cell activities = optimum level

Organ systems involved in homeostasis

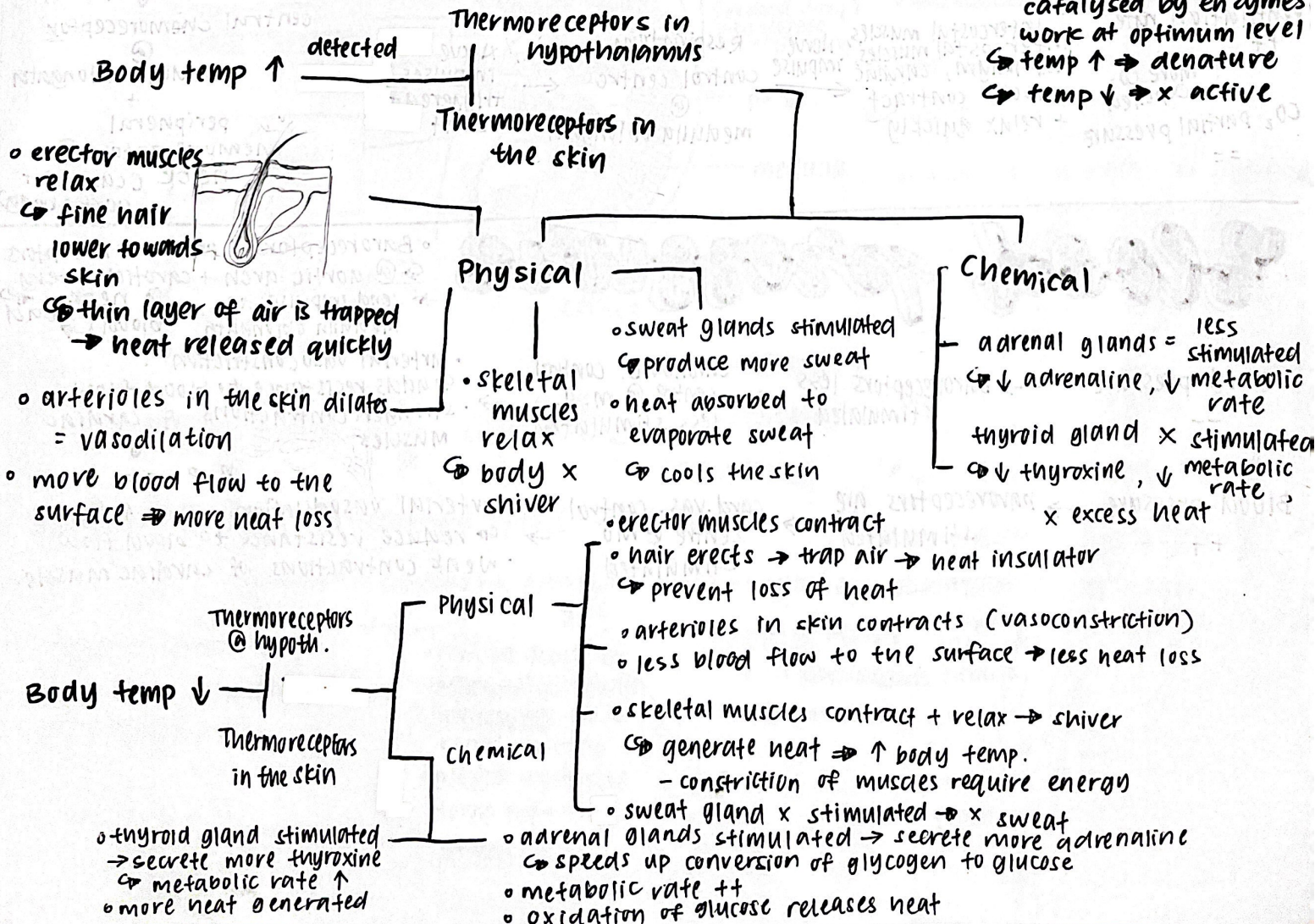
- Body temp. → too ↑, cell denature; too ↓, metabolic act. slow
 - integumentary syst.
 - muscular syst.
 - nervous syst.
 - endocrine syst.
 - circulatory syst. (75-110 mg/100 ml)
- Blood sugar levels
 - endocrine system
 - circulatory system
 - digestive system
- Partial pressure of CO₂ in blood
 - respiratory syst.
 - circulatory syst.
 - nervous syst.
- Blood pressure
 - circulatory system
 - nervous system



body temperature

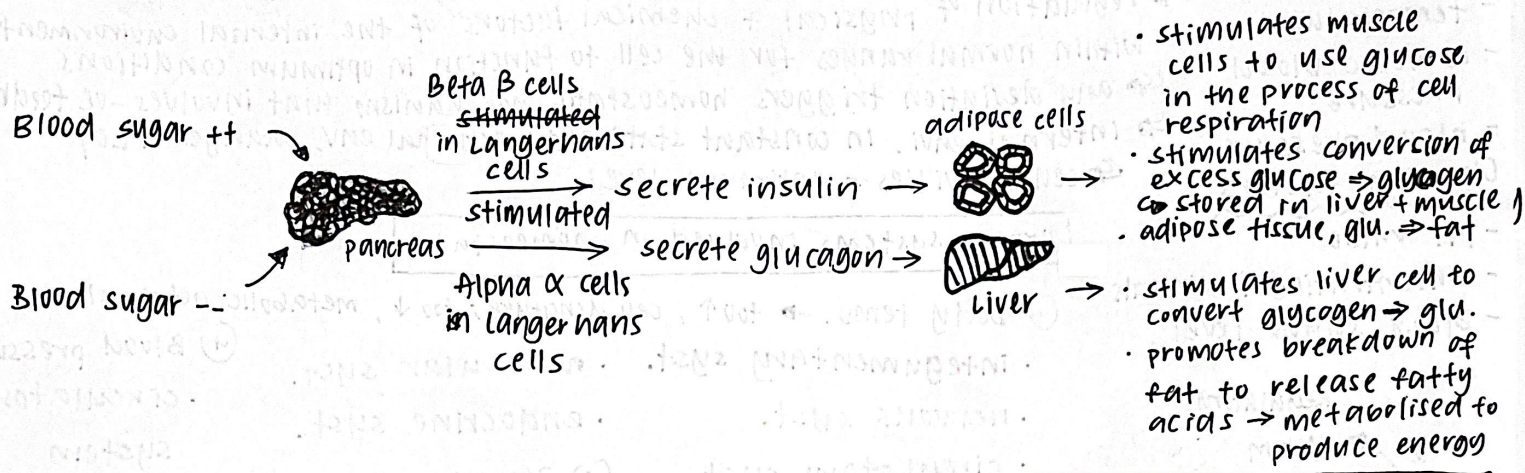
Importance:

- cell metabolism reactions that are catalysed by enzymes work at optimum level
- temp ↑ ⇒ denature
- temp ↓ ⇒ x active



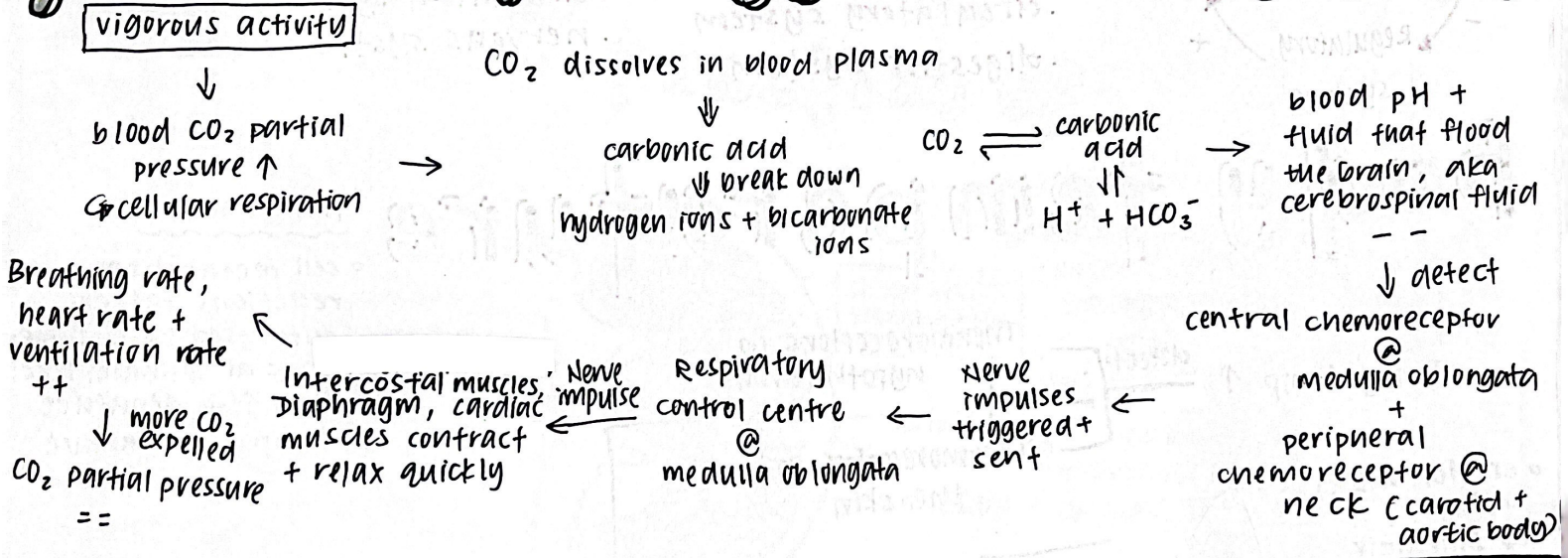
blood sugar level = glucose

organ that's responsible = pancreas normal range = 75-110 mg / 100ml



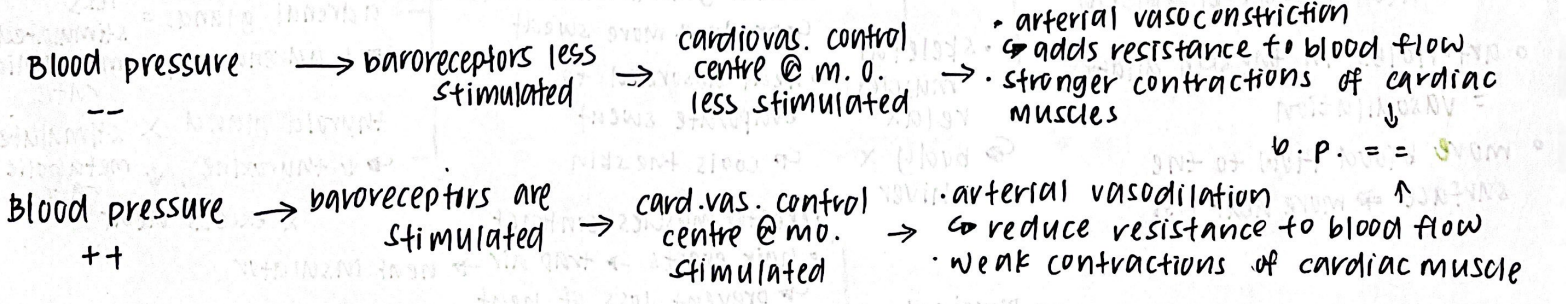
partial pressure of CO_2

respiratory control centre @ medulla oblongata



blood pressure

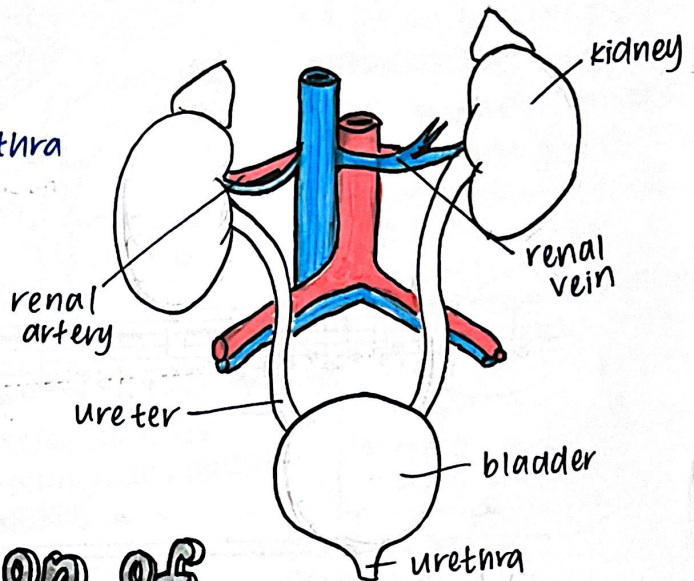
Baroreceptors / pressure receptors @ aortic arch + carotid artery @ neck send impulse to medulla oblongata



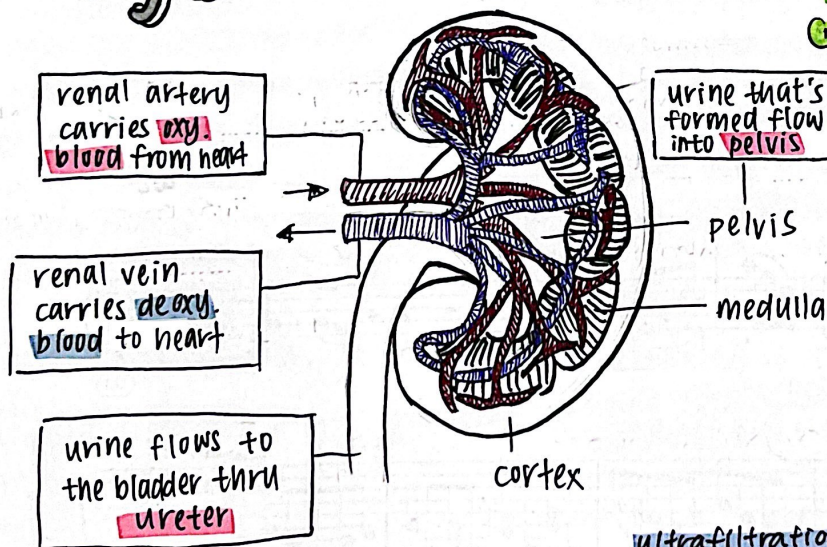
urinary system

introduction

- consists of : kidneys, **ureters**, bladder, urethra
- function ::
 - excrete** nitrogenous compound wastes such as **urea**
 - regulate** → **body fluids' volume** → **blood**
 - **blood osmotic pressure** → **pH**
 - **ion concentration** in body fluids
 - **electrolyte content**



Structure + function of kidneys



2 main functions

1 excretion

- excrete **toxic wastes** (nitrogenous compounds)
 - urea
 - ammonia
 - uric acid
 - creatinine

2 osmoregulation

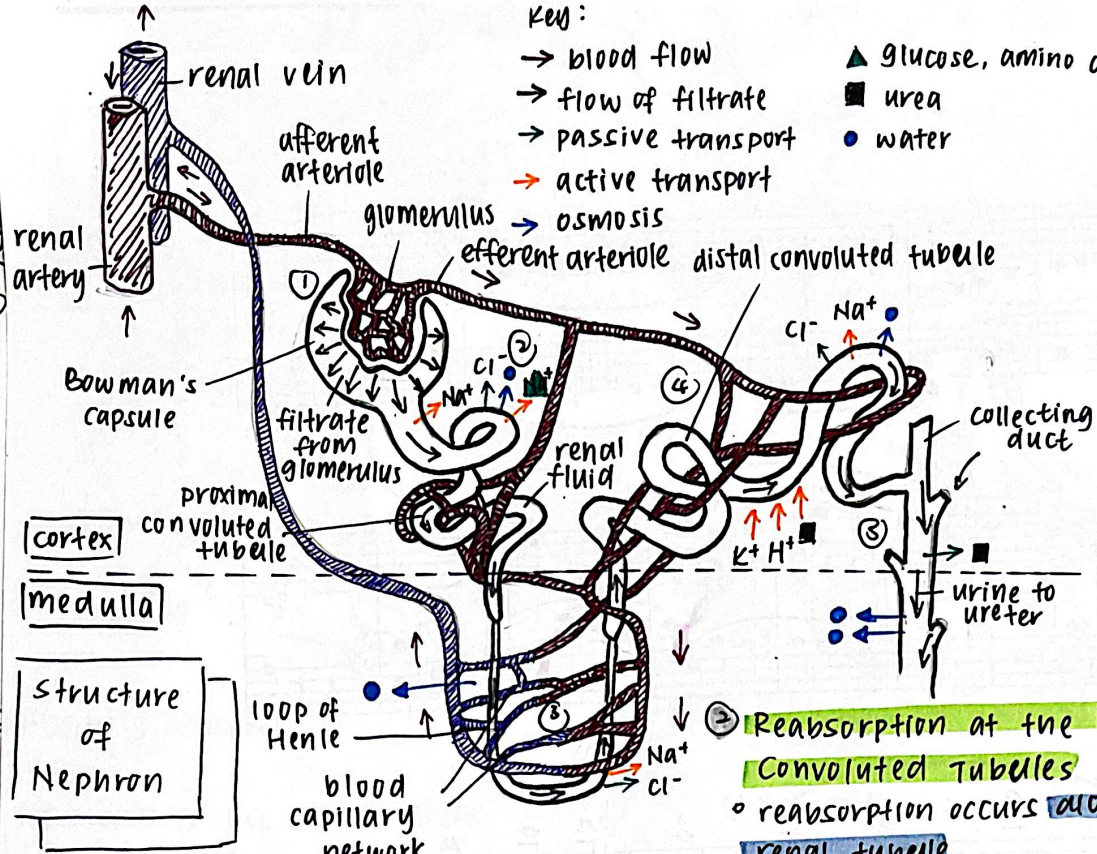
- kidney controls :
 - total vol of water in body fluid
 - concentration of ions in body fluids
 - blood osmotic pressure
 - concentration of dissolved materials + vol. of blood + body fluids
 - electrolyte content of blood + body fluids
 - pH of blood + body fluids

formation of urine

nephron

→ functional units in kidneys

- made up of :
 - Bowman's capsule
 - glomerulus**
 - Renal tubule
 - proximal convoluted tubules**
 - distal convoluted tubules**
 - loop of Henle** (several nephrons joined together in collecting duct)
 - long U-shaped tubule** that extends to the renal medulla
- cup-shaped
- contains a cluster of blood capillaries
- formed from the afferent arteriole branching from renal artery
- merge again to form efferent arteriole
- ultrafiltration
- reabsorption
- secretion
- produced urine flow from c.d. to ureter



- Key:
- blood flow
 - flow of filtrate
 - passive transport
 - active transport
 - osmosis
 - ▲ glucose, amino acids
 - urea
 - water

- ① **Ultrafiltration in Bowman's capsule**
- blood enters glomerulus w/ ↑ hydrostatic pressure
 - diameter of af. arteriole > ef. arteriole
 - ↑ pressure, causes **ultrafiltration** to occur
 - fluid seeps thru the walls of glomerulus capillaries in2 the cavity of B's cap
 - glomerular filtrate**
 - has the same composition as blood plasma, but x red blood cell, platelets, plasma proteins
 - remain in the blood bc. size too large

- ② **Reabsorption at the loop of Henle + distal convoluted tubules**
- LoH**, water reabsorbed thru **osmosis**, Na^+ reabsorbed thru **act. trans.**
 - DCT**, water, Na^+ , Cl^- more reabsorbed
 - amount: depends on H_2O + NaCl content in the blood

- ③ **Reabsorption at the Proximal Convoluted Tubules**
- reabsorption occurs **along renal tubule**
 - dissolved substances permeate across the renal tubular wall in2 blood capillary network.
 - in PCT, sodium ions (Na^+) **actively pumped** in2 blood capillaries, Cl^- **passively absorbed**
 - 100% glucose + amino acids = **active transport**
 - reduces the concentration of dissolved substances in glomerular filtrate, increases in blood capillary network
 - water → blood capillaries thru **osmosis**

- ④ **Secretion** → process of **secreting waste materials from the blood** that were not filtered earlier in2 the renal tubules
- occur **along renal tubules**, most active at **DCT**
 - thru simple diffusion, active transport
 - sub: H^+ , K^+ , NH_4^+ , urea, **creatinine**, toxic sub., drugs
 - get rid of **toxic waste**
 - help **regulate the level of ions** in the body

- ⑤ **Urine Formation**
- renal fluid reaches **collecting duct**
 - small amount of **salts**
 - water has been **reabsorbed** back in2 the bloodstream
 - remaining is called **urine**
 - urine **flows down CD**, small amount of **urea** **diffuses out** in2 surrounding fluid + blood capillaries → **small size**
 - after **CD** → **ureter** → **bladder** → **urethra** → **excreted**

Osmoregulation → process of regulating H_2O + NaCl in the body so that blood osmotic pressure can be maintained at a **norm. rang**

achieved by **regulating the vol. of urine** produced by kidneys

