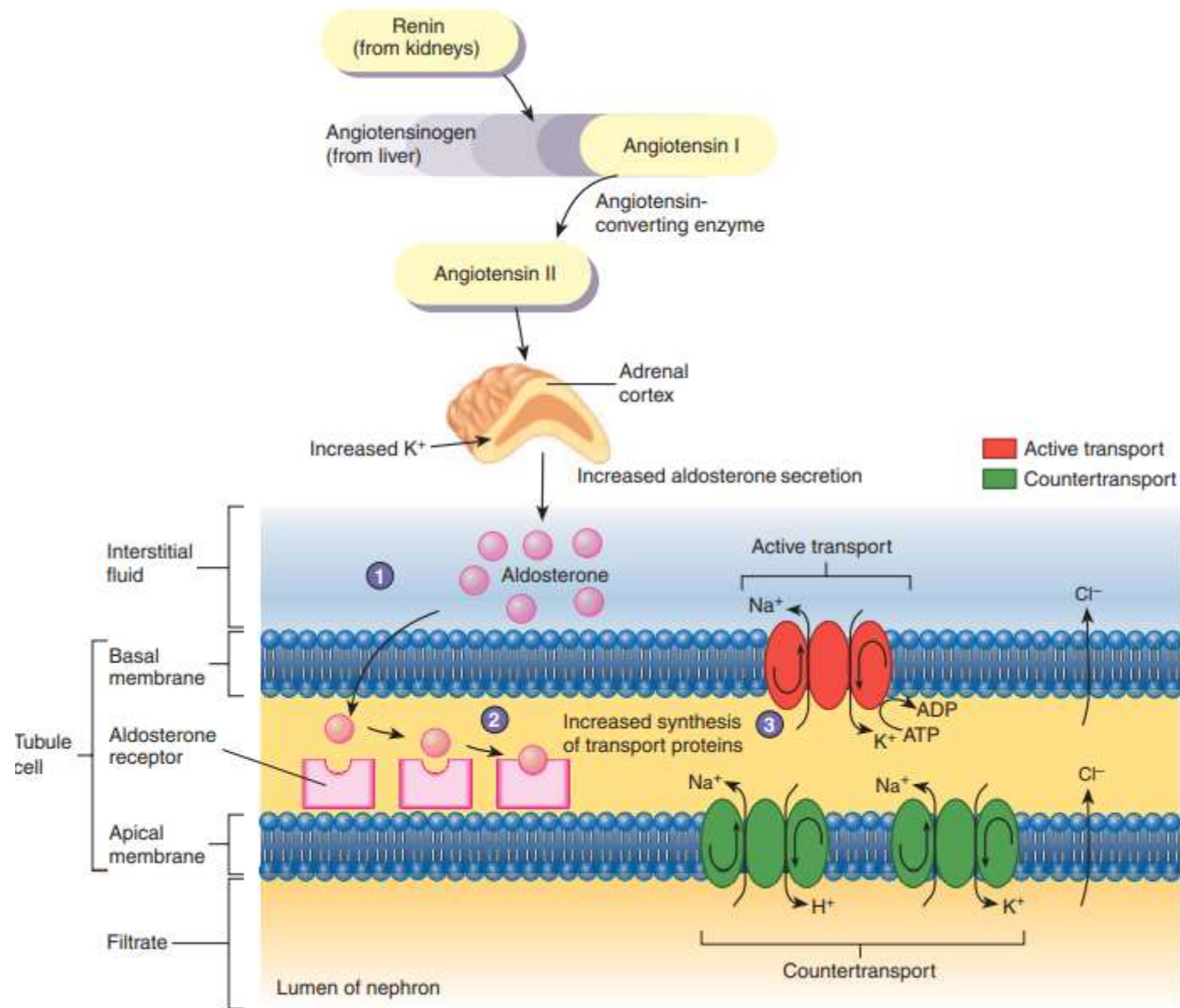


Lecture 32. The role of the kidneys in maintaining homeostasis

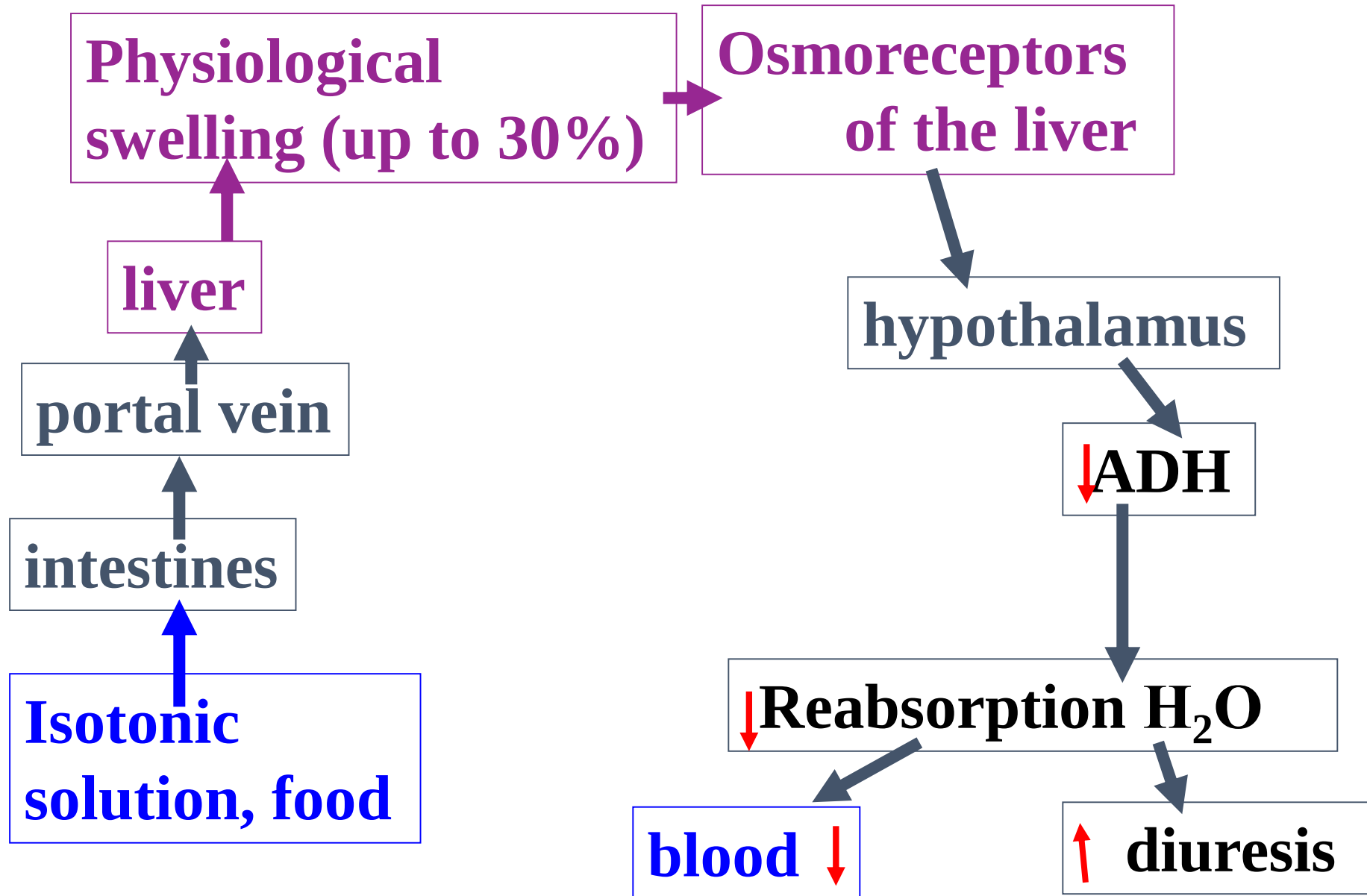
HOMEOSTATIC FUNCTIONS OF THE KIDNEYS

are to maintain:

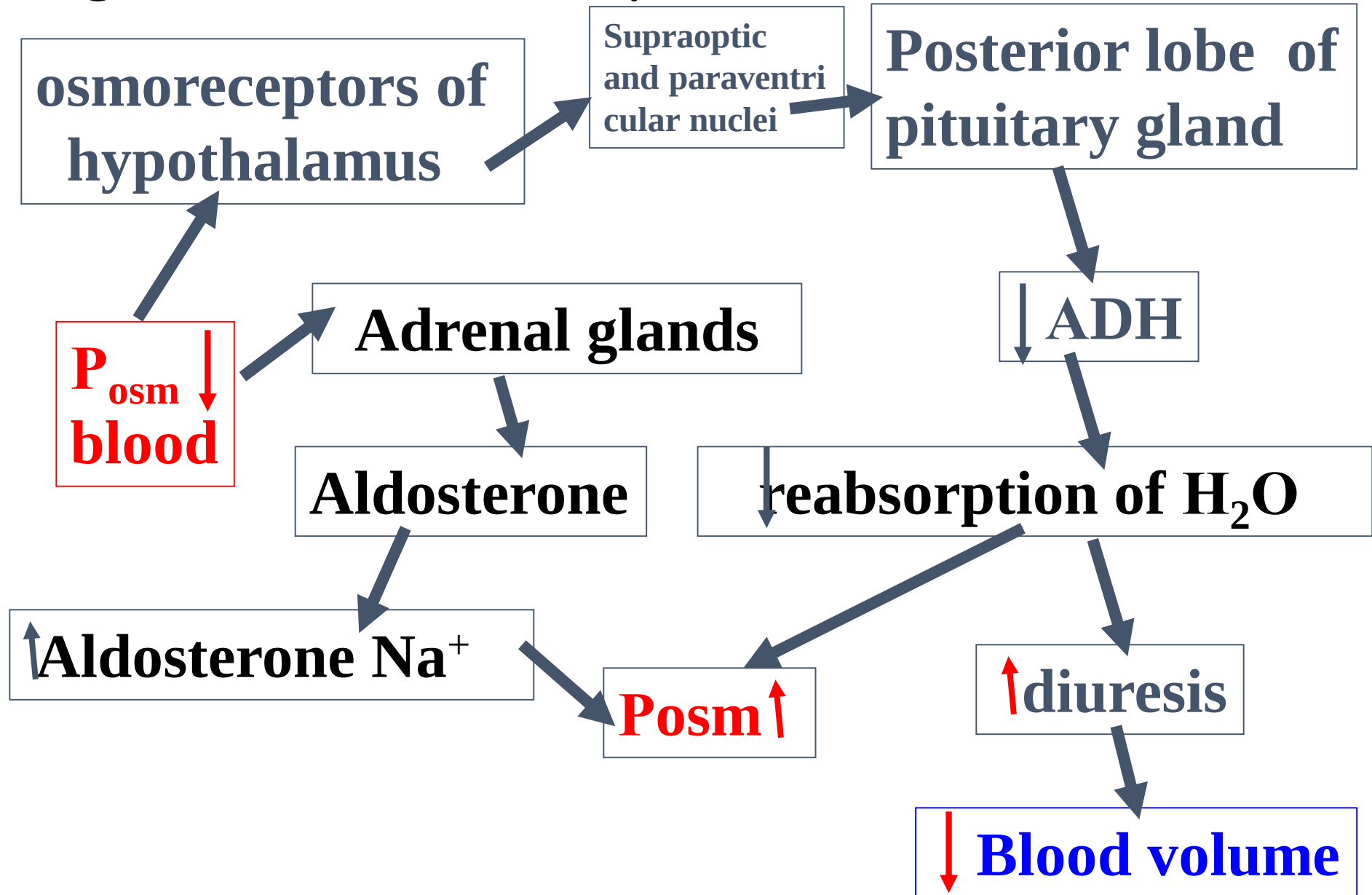
- Oxygen capacity of blood, Isovolumia (a constant volume of circulating blood, which depends on the total water content in the body and averages 7% of body weight),
- Isoosmia (constant osmotic pressure, which averages 7.6 atm),
- Isoions (constant concentration of ions, especially sodium and potassium ions),
- Isohydria (constant concentration of H^+),
- Blood pressure,
- Blood coagulation.



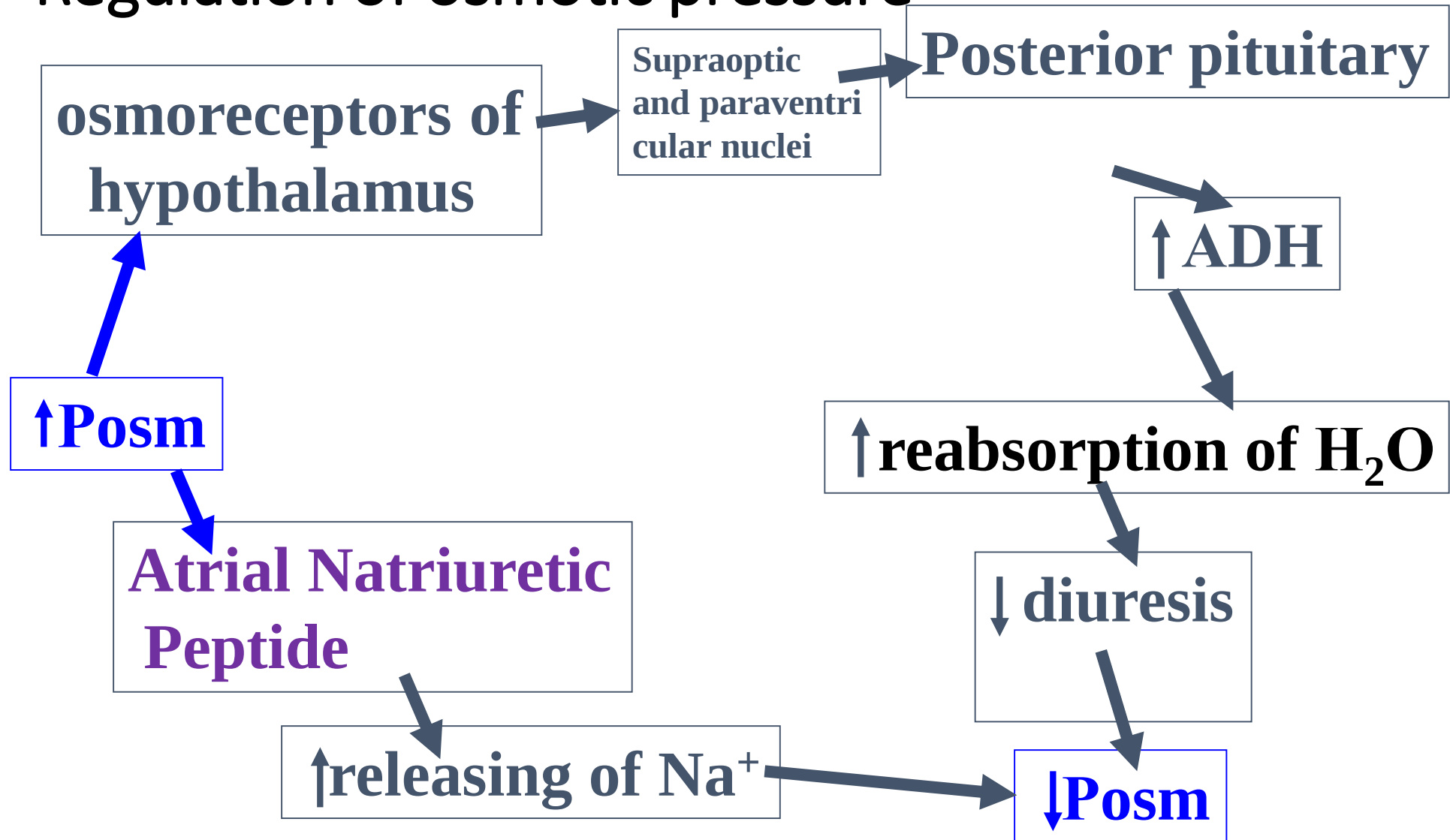
Regulation of water balance



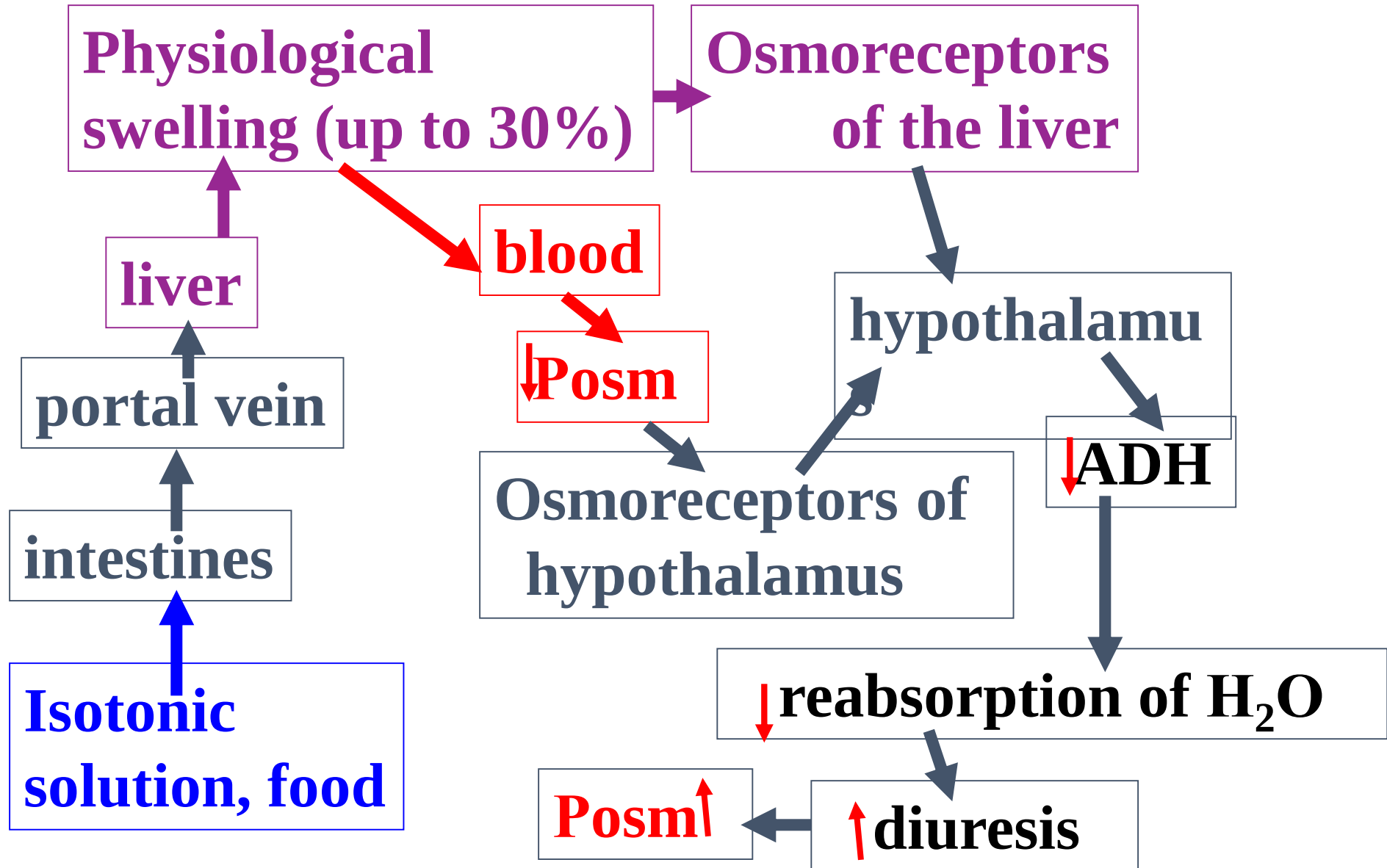
Regulation of osmotic pressure



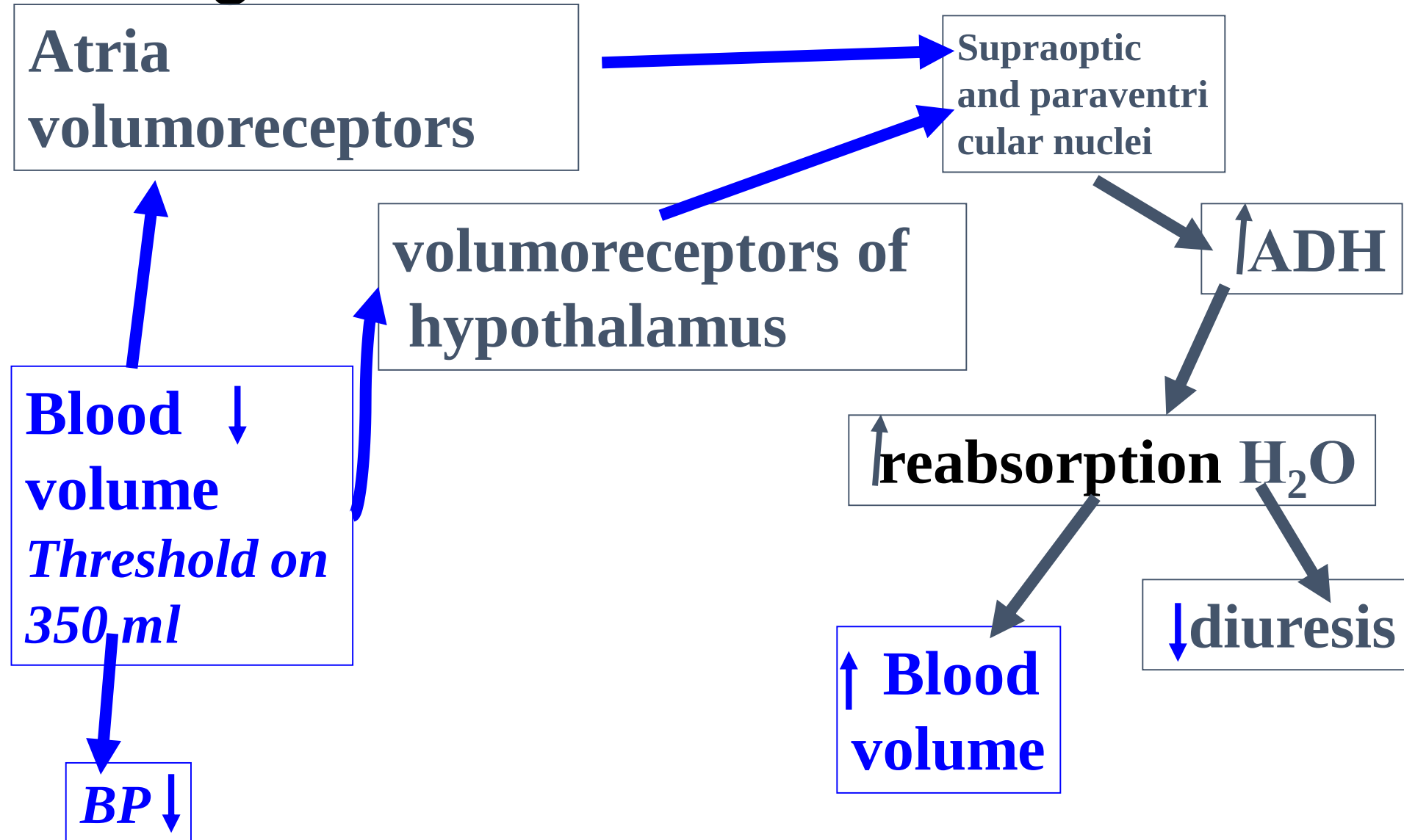
Regulation of osmotic pressure



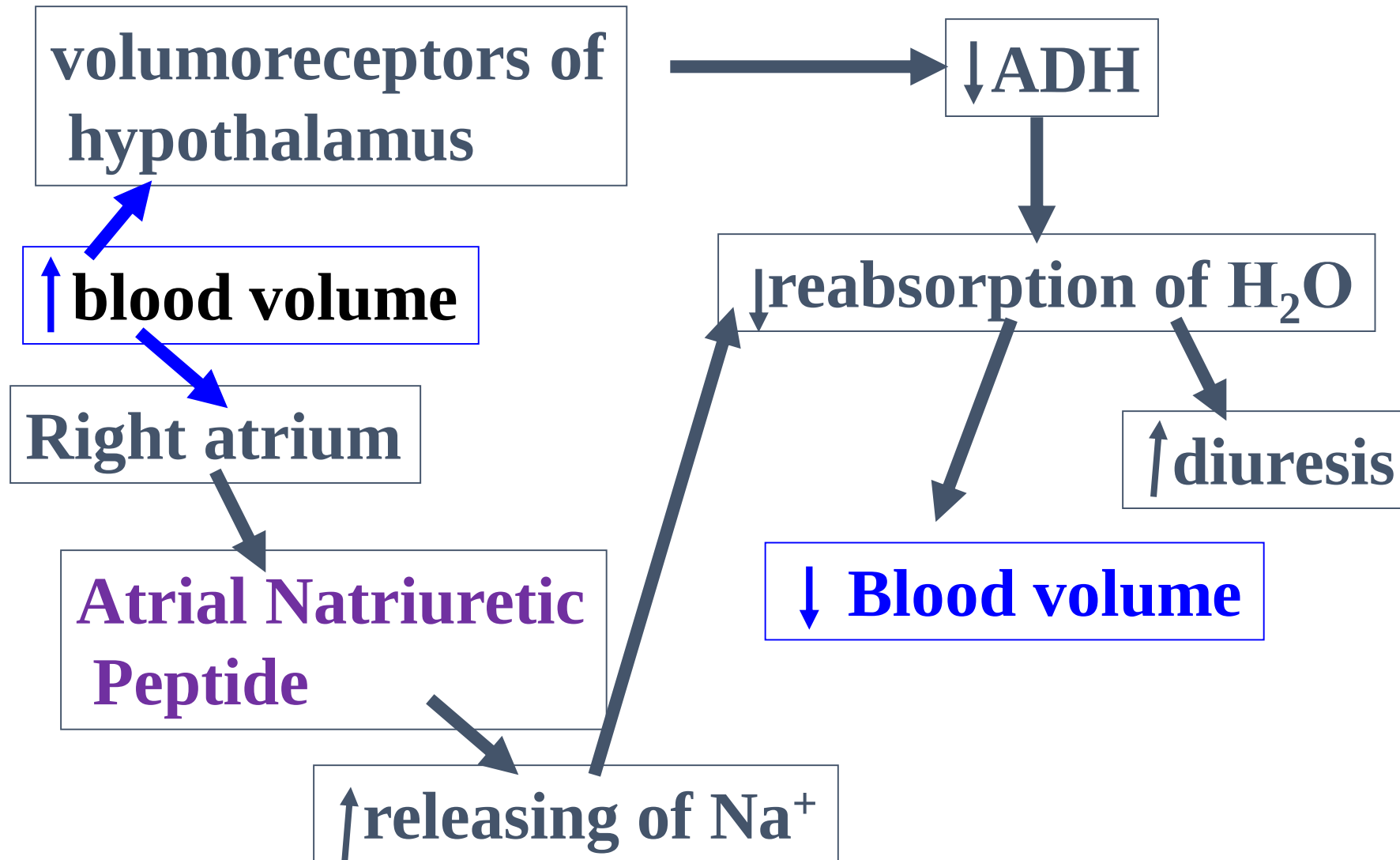
Regulation of osmotic pressure

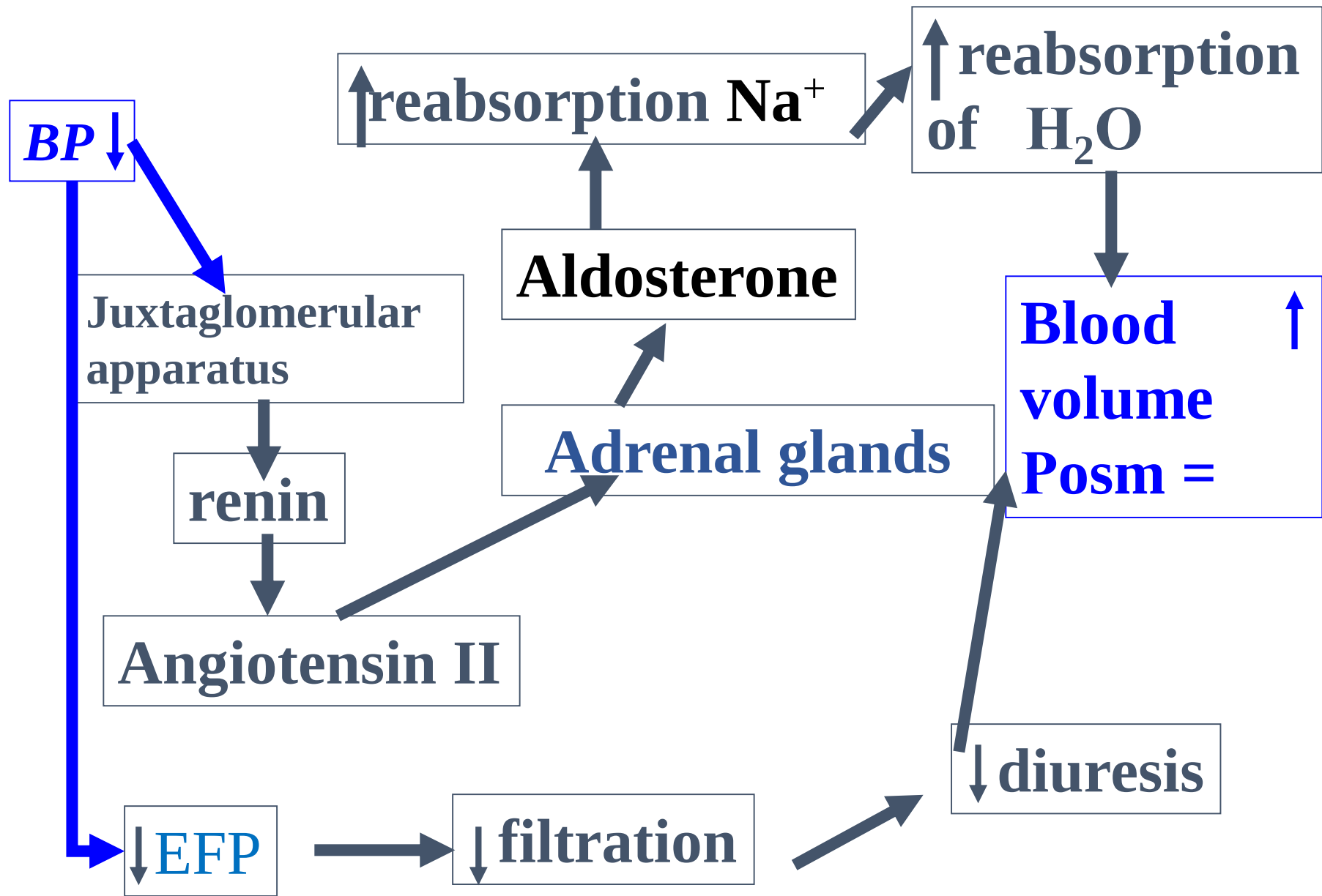


Regulation of blood volume

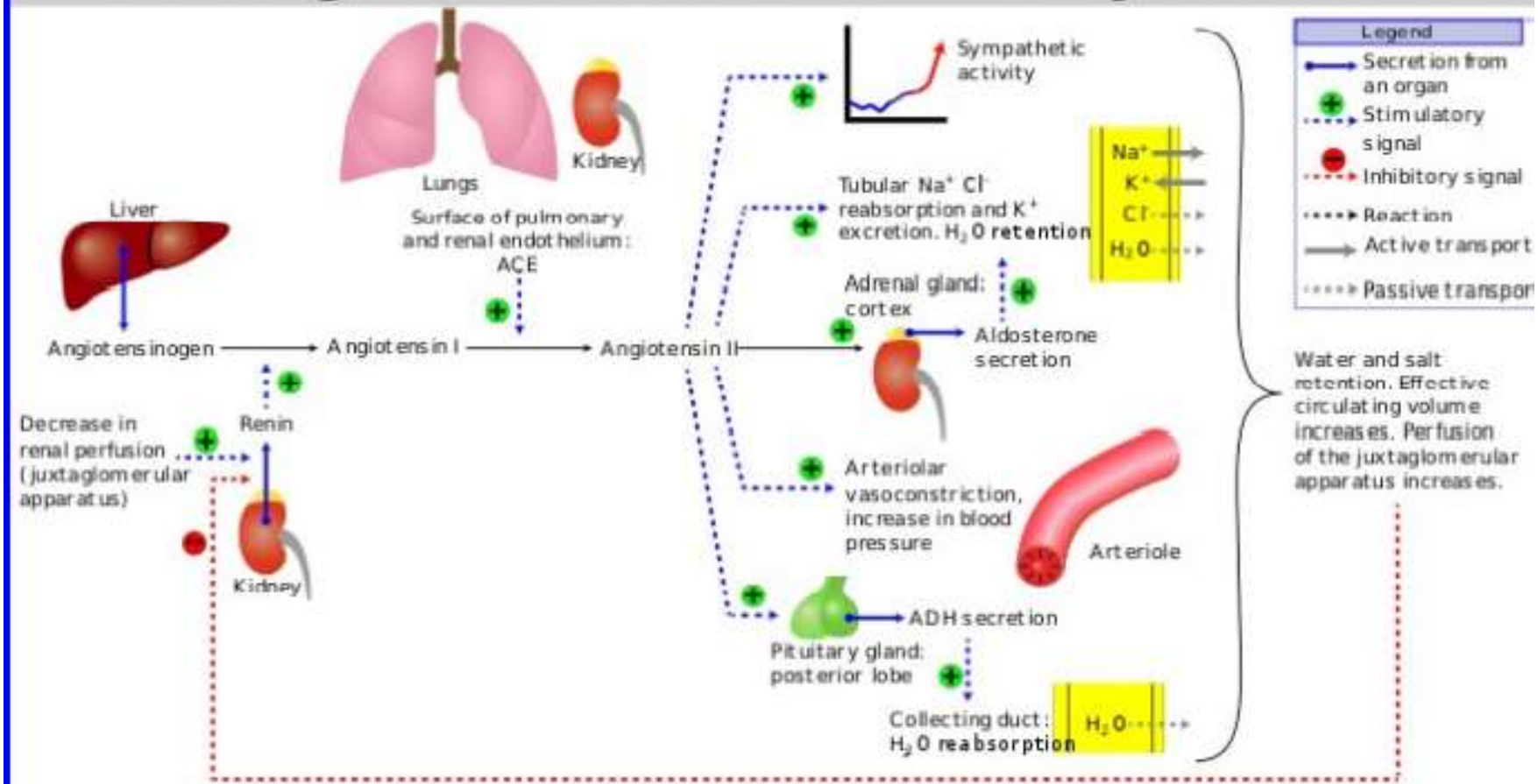


Regulation of blood volume





Renin-angiotensin-aldosterone system

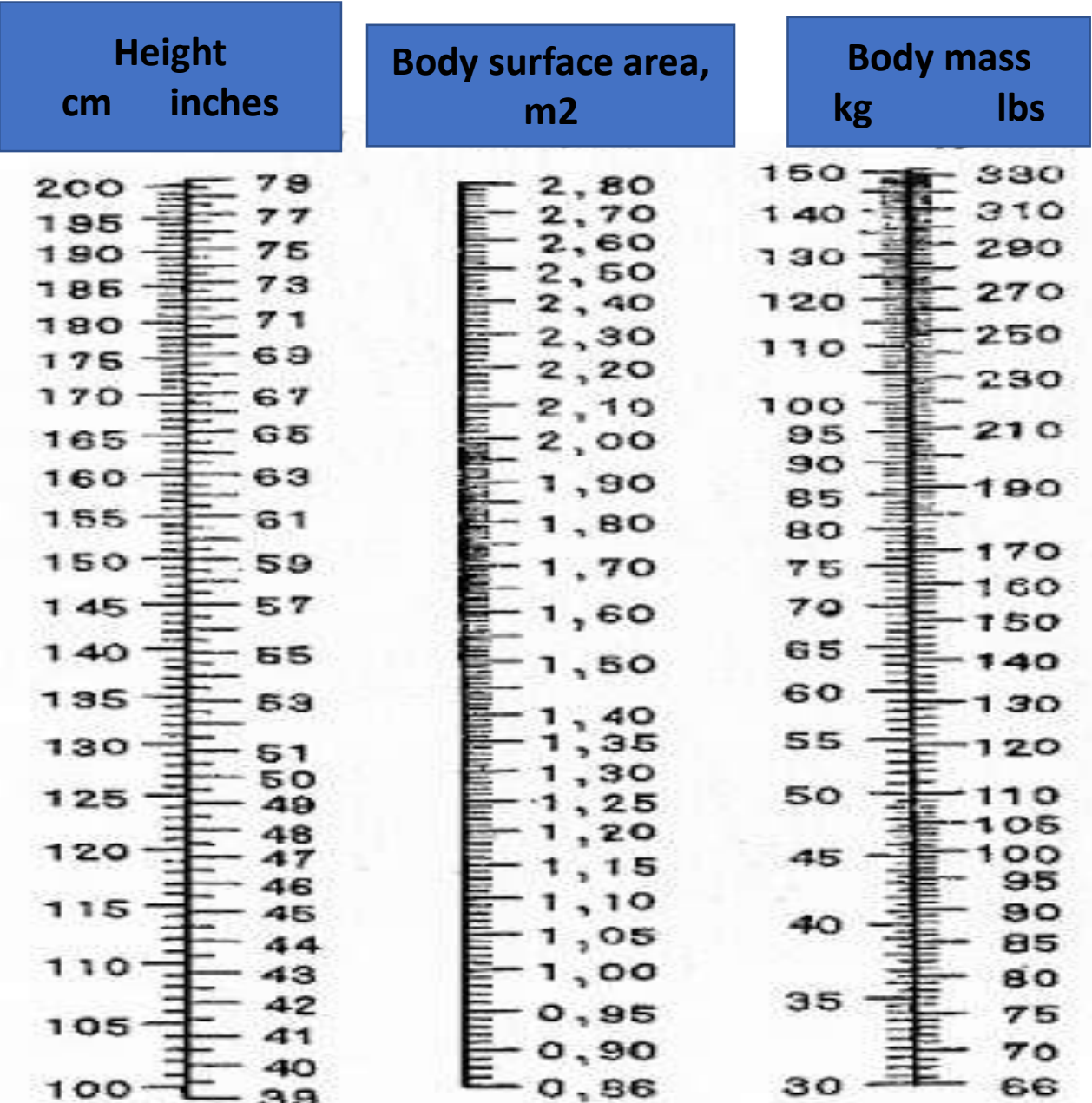


REGULATION OF pH

- Occurs due to an intracellular enzyme - carbonic anhydrase (CA). CO_2 from blood plasma enters the epithelial cells;
- The spacecraft binds CO_2 to water and forms H_2CO_3 ;
- Carbonic acid dissociates organically into H^+ and HCO_3^- ;
- Hydrogen ions are actively excreted in the urine;
- HCO_3^- ions enter the blood by an electrochemical gradient and replenish the alkaline blood reserve; The amino acid glutamine is broken down by epithelial cell enzymes;
- An ammonia molecule NH_3 is formed;
- Ammonia is actively excreted in the urine;
- In the tubules of the kidney, ammonia attaches a hydrogen atom - NH_4^+ - ammonium ion is formed;
- The ammonium ion takes on the Cl^- atom and becomes NH_4Cl ammonium chloride.
- Thus, hydrogen ions are retained in the urine and do not return to the blood.

THIRST

- Loss of water - 0.5% of body weight - stimulation of the production of ADH.
- Loss of blood - stimulation of the renin-angiotensin-aldosterone system - angiotensin II causes thirst



Nomogram for determining body surface area in an adult

The end

