2nd sem

Excreatory System

Paper - C4T

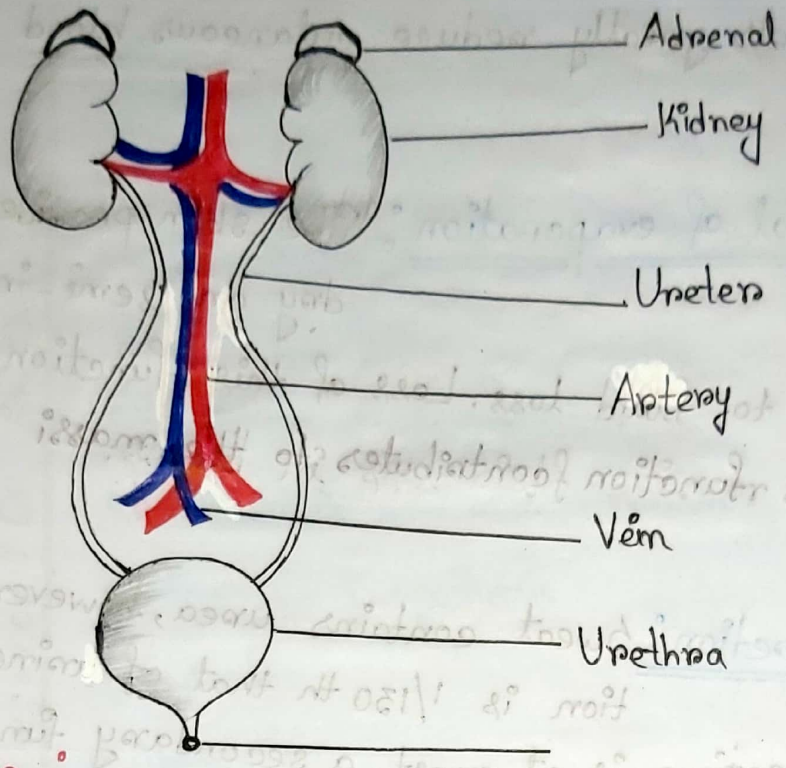

Fig : Human Excreatory Structure / Anatomy Structure of Kidney

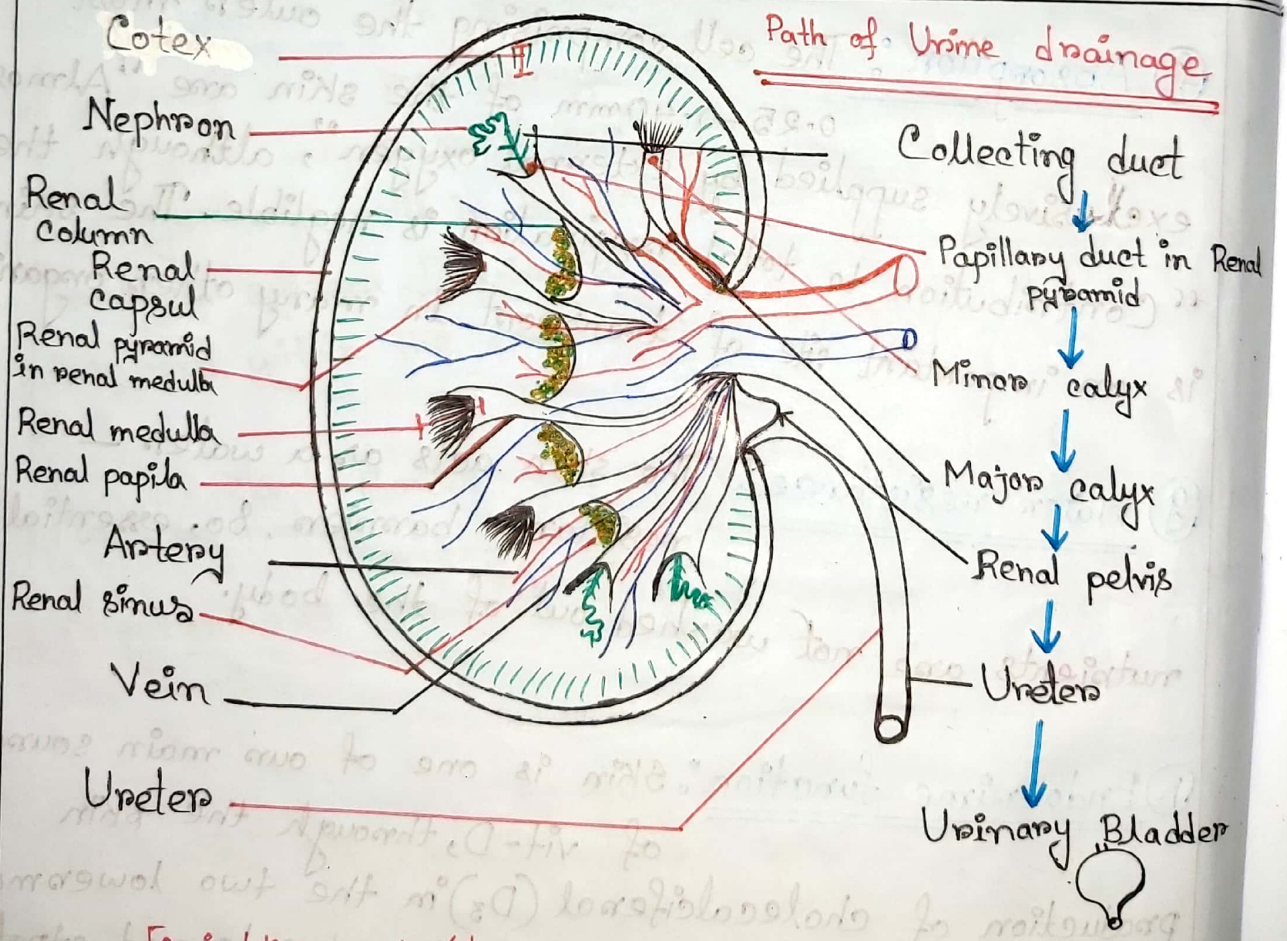

Fig : Histological Structure of Kidney

Q. **Structure of Kidney :** The Kidney are two bean-shaped organ found in vertebrates (মেরুদণ্ডী). They are located on the left and right in the retroperitoneal space, and in adult humans are about 11 cm (4.3 inch) in length. They recieve blood from the paired renal arteries; blood exists into the paired renal veins. Each kidney is attached to a ureter, a tube that carries excreted urine to the bladder.

A. External Structure : Kidney has 3 coverings:

1. Renal fascia: Renal fascia that covers both kidneys like a huge tent like structure, seperates the retroperitoneal cavity into 3 compartment.

This renal fascia also divides the fat that surrounds the kidney into two layers ——

- Inside the renal fascia, is perirneal fat, between the capsule of the kidney fascia.
- Outside the renal fascia is the paraenal fat (Peri means around it, like perimeter and Para means next to, or almost in but not quite, like paranormal, or paraplegic). Each kidney then as a seperate adipose layer, within the fascia is perirenal fat.

Lastly, each kidney has a fibrous capsule, called renal capsule. This capsule, unlike in other organs, doesn't send CT septa into the kidney and is therefore removable easily.

2. Renal sinus : Renal sinus is the inner cavity of the kidney (not part of parenchyme, the tissue stuff, just an empty space), which leads the hilum of the kidney.

3. Renal hilum: Renal hilum entrance into the renal sinus.

B. Internal Structure: Within each kidney, there is an outer cortex, and inner medulla. Structures within the cortex and medulla will be discussed in further detail in the histology section.

1. Cortex: The cortex is the outer part of the kidney and projects into the inner medulla region, between the renal pyramids as renal columns.

2. Medulla: The medulla is arranged into triangle shaped renal pyramids, that end in a renal papilla, which then lead into the minor calyx (each minor calyx drains one lobe of the kidney) 3-4 minor calices join to form the major calices.

- The major calices all join to form the renal pelvis —> that becomes the ureter.
- The function unit of the kidney is called the nephron. It is made up of a renal corpuscle (muscle up of capillaries surrounded by the Bowman's capsule, which has visceral and parietal layers. The renal corpuscle leads into a series of tubules surrounded by a arterial network, that aids in filtering urine.

Q. Write the function of kidney?/Not excreatory function

=> The kidney perform the following functions:

- Regulation of arterial blood pressure
- Regulation of water and eletrolyte balance
- Excreation of metabolic waste products and foreign chemicals
- Regulation of red blood cell production
- Regulation of Vitamin-D production
- Gluconeogenesis

Regulation of arterial blood pressure: The kidney excreate a great amount of sodium and water. They secrete an enzyme called renin that activates the renin-angiotensin system that control blood pressure and sodium concentration.

Regulation of water and electrolyte balance: In Order for our bodies to maintain a balance, the amount of water and electrolyte we take in must be the same amount we excrete. If we take in more than we excrete the kidneys will work to regulate the excess and bring the body to a balance.

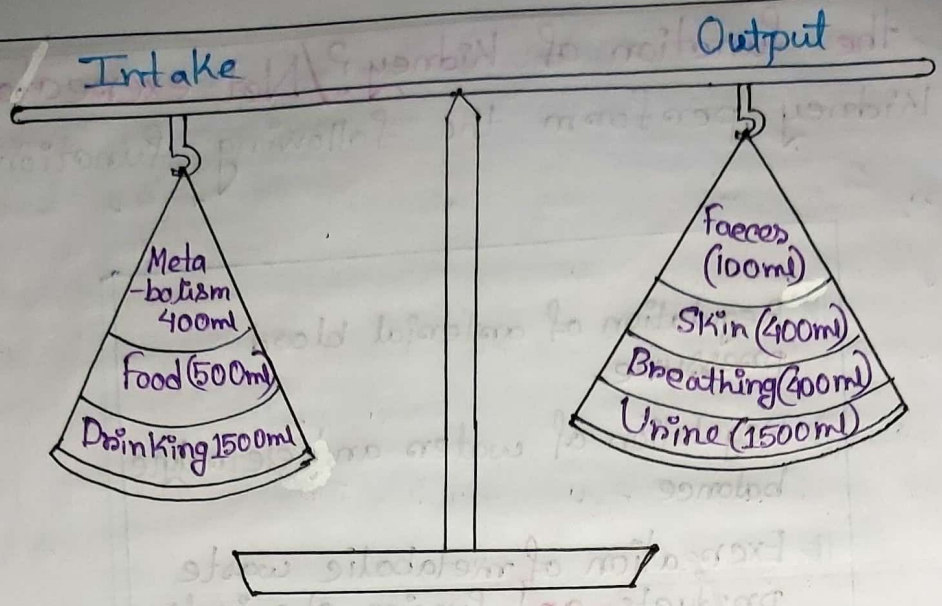

Fig: Water balance maintanence

1. Excreation of metabolic waste products and foreign chemicals: Bodies, each day, from waste products that it does not need. These products include urea, creatinine, uric acid and waste products from the breakdown of hemoglobin that give the urine the colour it has. The kidney remove these waste products so, our body can function normally.

1. Regulation of red blood cell production: Kidneys secrete erythropoietin, a hormone which stimulate the production of RBCs in the body. If the kidney is removed or severely damaged, then we may not be able to produce RBC and severe anemia will develop as a result of the decrease in the production of erythropoietin.

1▶ Regulation of Vitamin-D production: Kidneys produce the active from of vitamin D, calcitriol. We get vitamin D from sunlight or form ingested vitamin. These types of Vit-D are in their inactive form. The Kidneys are needed to convert them into their active forms.

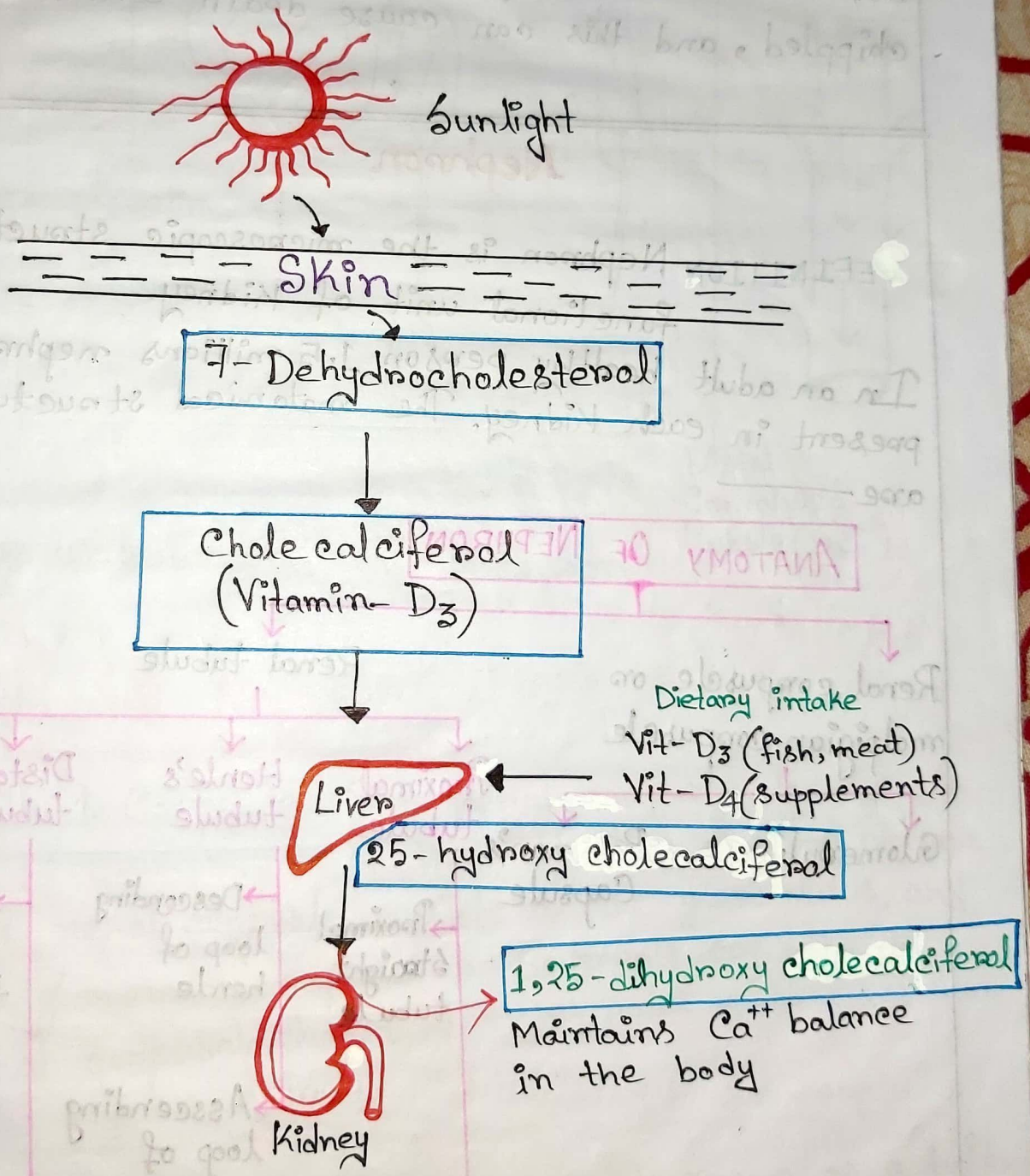

Fig: Regulation of Vitamin-D

1▶ **Gluconeogenesis:** If we should stop eating carbohydrates (our main source of glucose) for a day, our bodies would begin to form new glucose from the amino acid in the protein we intake. This process is known as gluconeogenesis.

So, when the kidneys are damaged, this function is crippled, and this can cause death within a few days.