

**Date:**

Uses of energy:

- drive the chemical rxns needed to keep the organism alive <sup>o.g</sup>/digestion
- movement — make muscles contract
- cell division
- to maintain constant conditions — homeostasis
- active transport
- transmission of nerve impulses
- protein synthesis

Date:

## EXCRETION:

- presence is poisonous
- removal of metabolic waste from body of living organism.

e.g:

- CO<sub>2</sub> in exhalation
- sweat from a body (contains urea + salts + water) (min. amount is removed)
- nitrogenous waste material (urea + uric acid + creatinine)  
↑ toxic ↓ toxic

\* Aorta that receives blood has high concentration of Urea

Urea : produced by deamination of amino acids in liver  
(NH<sub>2</sub> + C) requires water for excretion

NC(=O)N } Urea

Blood → (kidneys) Excretory Organ  
↓  
Urine (dilute form of waste material) } Urea + H<sub>2</sub>O + toxins + creatinine

Creatinine : produced by degradation of muscle proteins

## EXCRETORY SYSTEM

- Excretory Organ : Kidneys (pair) present in abdominal region (back) towards dorsal side along our vertebral column (with backbone)

- bean shaped
- Urination is a process of the removal of urine out from urethra.
- voluntary with age, involuntary in infants
- act as a site for cleaning of blood / formation of urine
- reabsorption at level of R.V for max. H<sub>2</sub>O

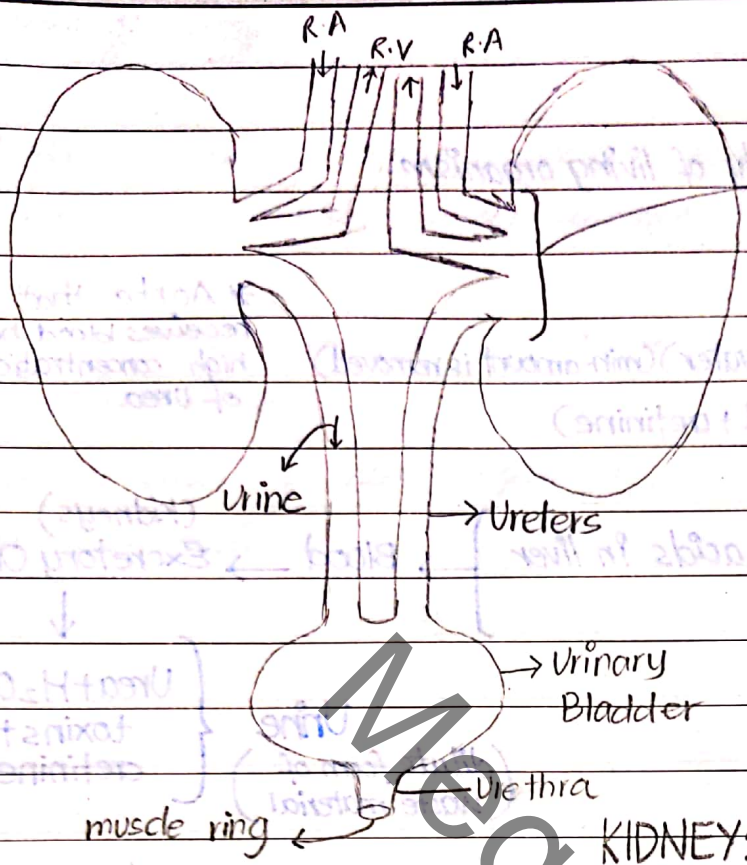
to move to RV

- Kidneys filter blood from wastes

DALMATIAN

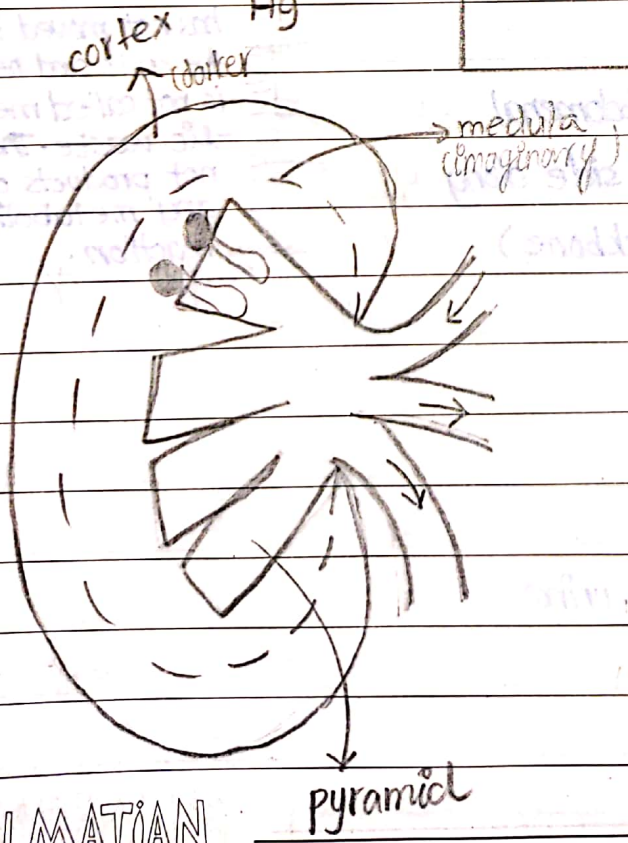
EGESTION:  
because the wm has not moved into the cells and hence is not called metabolic waste. They are not products of any metabolic reaction.

Date: \_\_\_\_\_



**KIDNEYS Filter**

<ul style="list-style-type: none"> <li>- Urea</li> <li>- H<sub>2</sub>O</li> <li>- Salts</li> <li>- Oxygen</li> <li>- glucose</li> <li>- Amino Acids</li> <li>- toxins</li> </ul>	<ul style="list-style-type: none"> <li>- H<sub>2</sub>O (osmosis)</li> <li>- Urea</li> <li>- Salts</li> <li>- toxins</li> <li>- glucose</li> <li>- Amino Acids</li> <li>- ...</li> </ul>	<ul style="list-style-type: none"> <li>- H<sub>2</sub>O</li> <li>- Urea</li> <li>- toxins</li> <li>- Salts</li> </ul> <p>Urine</p>
<p>R.A →</p> <p>60 mm of Hg</p>	<p>Ureter</p>	



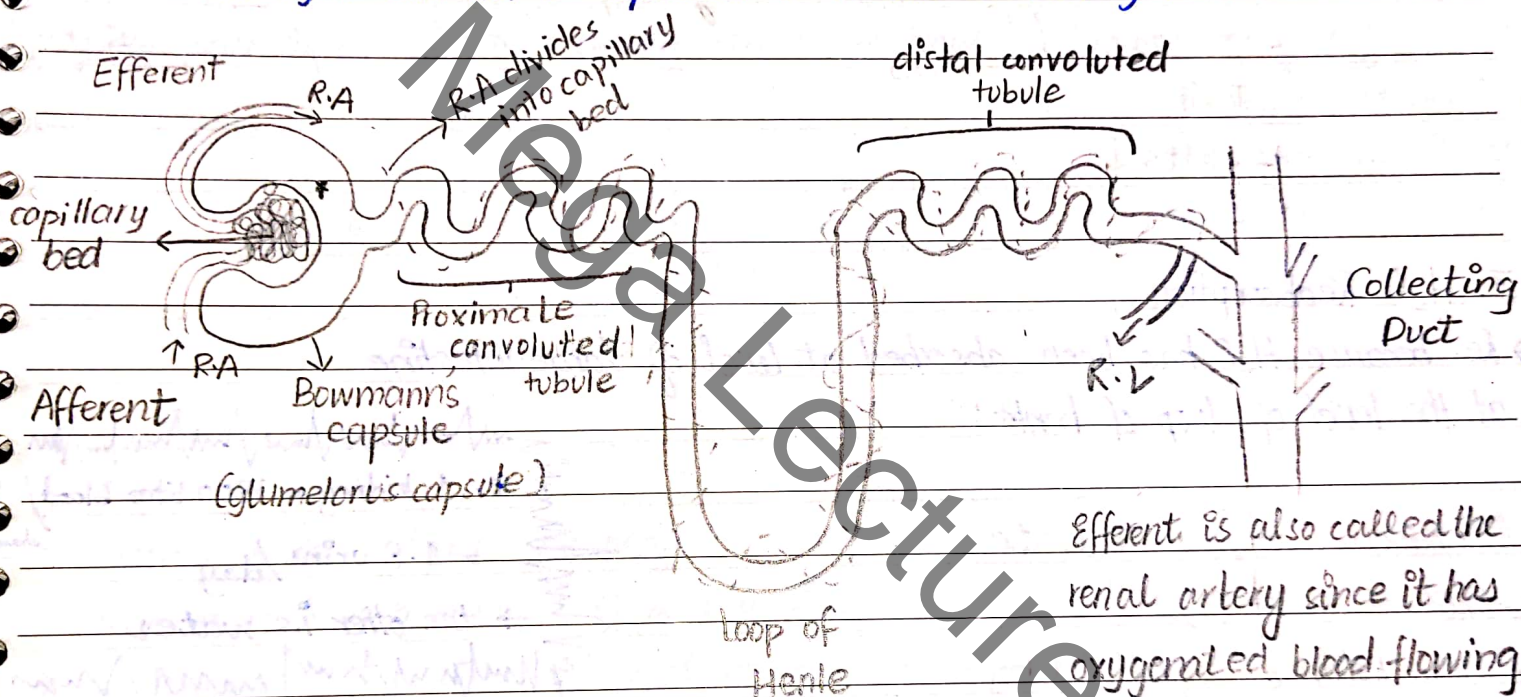
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\* a person can survive one kidney but with less efficiency

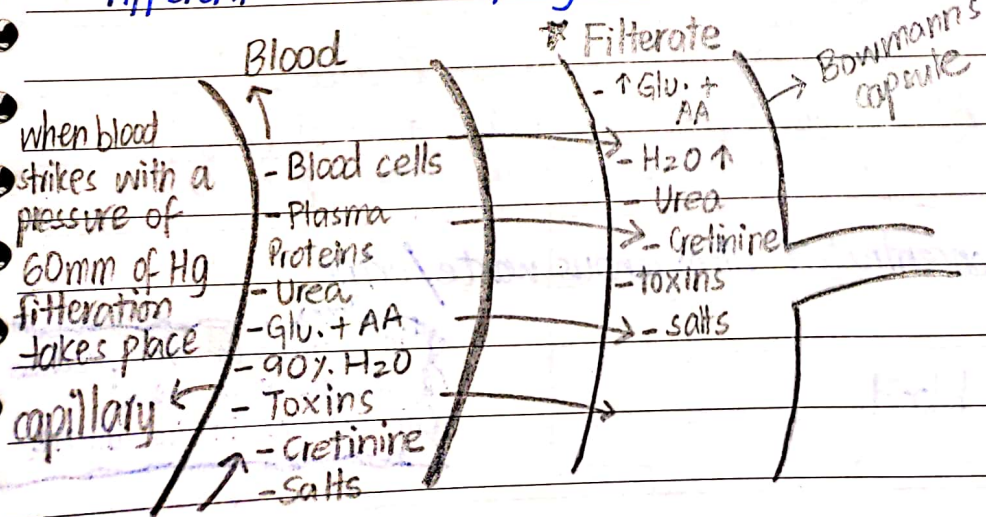
## NEPHRON

- functional and structural unit of kidney
- millions in numbers
- filtration takes place at the level of nephrons
- they make the cortex darker
- the loops - medulla
- once damaged can not be repaired & result in Kidney Failure.



### 1. Pressure Filtration

Afferent = 60 mm of Hg



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## 2. Reabsorption

→ selective reabsorption

→ in proximal convoluted tubule

→ glucose and amino acids into blood through active transport (against conc. differe)

→ salts, specifically  $\text{Na}^+$  and  $\text{K}^+$  ions by active transport are also absorbed

Filterate:

-  $\text{H}_2\text{O}$

- Urea

- Creatinine

- Toxins

- Salts ↓

↑ when entering loop of henle

## 3. $\text{H}_2\text{O}$ Reabsorption

→ Re. because  $\text{H}_2\text{O}$  has been absorbed at level of large intestine

→ at the level of loop of henle

• Blood

• Filterate

- Blood cells

- Plasma Proteins

- Nutrients

- Salts

-  $\text{H}_2\text{O}$  ↓

-  $\text{H}_2\text{O}$  ↑

- Urea

- Creatinine

- Toxins

- some salts

→ osmosis - ①

ADH (Anti Diuretic Hormone) - ②

from pituitary gland in Brain

↑ ADH in blood — More reabsorption of  $\text{H}_2\text{O}$

↓ ADH in blood — Less reabsorption of  $\text{H}_2\text{O}$   
 (also dilute urine)

\* 1 kidney = 1800 litre blood/day

= 1.8 urine/day

→ the other is water

→ it results in formation of concentrated nitrogenous waste/urine

ADH: way of regulating water in blood.

in summers we produce concentrated urine  
 in winters it is dilute

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#### 4. Tubular Secretion

→ Blood at this step pours any toxins that were left, into our filtrate to finally clean the blood

#### 5. Collecting Duct

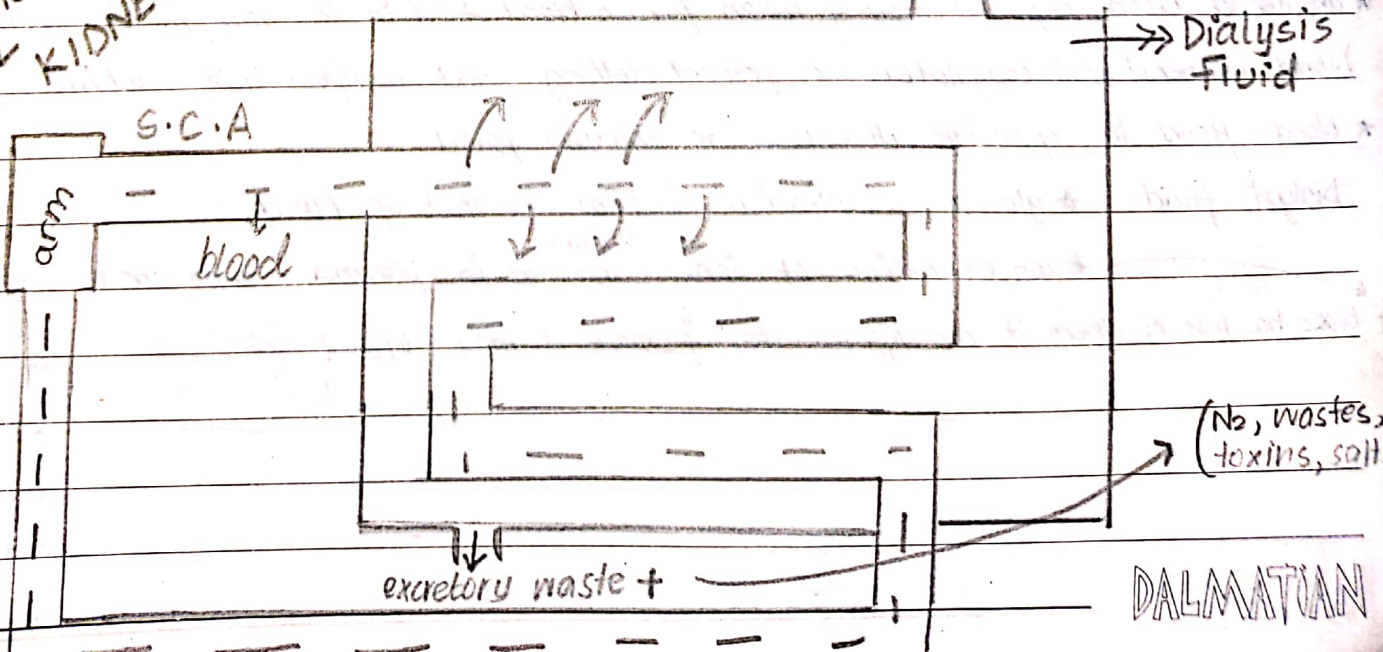
→ final form of our excretory waste which can now be termed as Urine.

- max. concentration of urine, toxins, creatinine
- min. concentration of  $H_2O$  + salts

### DIALYSIS :

- filtering blood outside the body
- hence, there is requirement of a machine
- the machine contains a system of tubules

ARTIFICIAL KIDNEY



**Date:**

### CONDITIONS:

1. The dialysis fluid must contain equal concentration of  $H_2O$  as the blood. (to avoid diffusion)   
 nutrients salts
2. Continuous supply of dialysis fluid to maintain concentration difference throughout the process. Active diffusion.   
 (nitrogenous wastes)
3. The tubes should be folded to increase the surface area for diffusion
4. Should be small volume of blood moving out for a very short space.

- \* Process should be repeated twice a week for the sake of survival.
- \* Not a solution to the problem. No long-term therapy
- \* The only solution is kidney transplant.

→ Kidneys regulate water concentration through the influence of ADH. } OSMOREGULATION

### SIDE EFFECTS:

- painful 2-3 days
- in muscles because of less salts
- \* unfiltered blood, high in urea is taken from a blood vessel in the arm, mixed with blood thinners/anti-coagulaters to prevent clotting and pumped into machine
- \* blood flows in opposite direction to dialysis fluid
- Dialysis fluid: \* glucose concentration similar to that of blood
- \* concentration of ions <sup>optimum</sup> same as in plasma \* no urea
- if blood has less of them it can diffuse into ↓ if more it may diffuse out

Date:

MCQ.

Extra info:

- \* glycogen  $\Rightarrow$  stored form of glucose in the liver
  - \* glucagon  $\Rightarrow$  hormone produced by pancreas
  - \* glucose  $\Rightarrow$  sugar circulating in the body  $C_6H_{12}O_6$
- conversion is called glycogenesis
- \* amino acids can be converted into glucose in the liver
  - \* alimentary canal  $\Rightarrow$  includes the entire digestive system

\* cancers can't be controlled by antibiotics

\* once the hormones have performed their functions, they are either destroyed by the liver or actual tissues of target organ  
 $\hookrightarrow$  removed by kidneys

\* alleles are also known as alternative forms of a gene

\* active transport & osmosis can occur only through a membrane, diffusion however does not need one

\* antibiotics are produced by bacteria for protection against other bacteria  
e.g. produced by fungus that kills bacteria  
demical

$\Rightarrow$  virus do not have a cellular structure

$\Rightarrow$  in a muscle, glucose and oxygen show net movement from plasma into the tissue fluid

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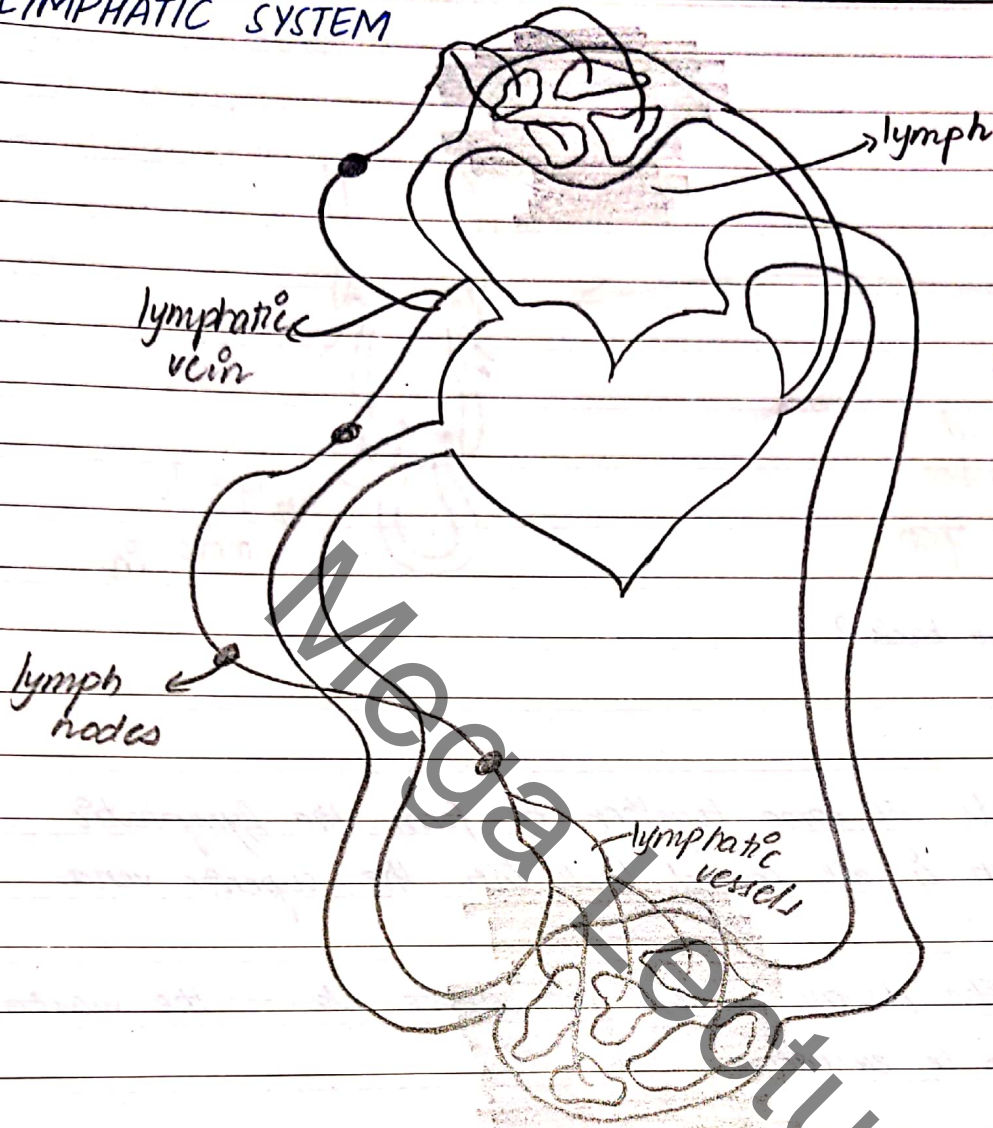
⇒ condoms give some sort of protection against HIV or syphilis

⇒ internal intercostal muscles relax to allow sneezing with full force

MegaLecture

Date:

## LYMPHATIC SYSTEM



if lacteals are damaged, we have swelling % lymph begins to push on the cells

or when a lot of bacteria is present to a lot of WBCs gather causing the node to swell

↓  
early indication of an infection

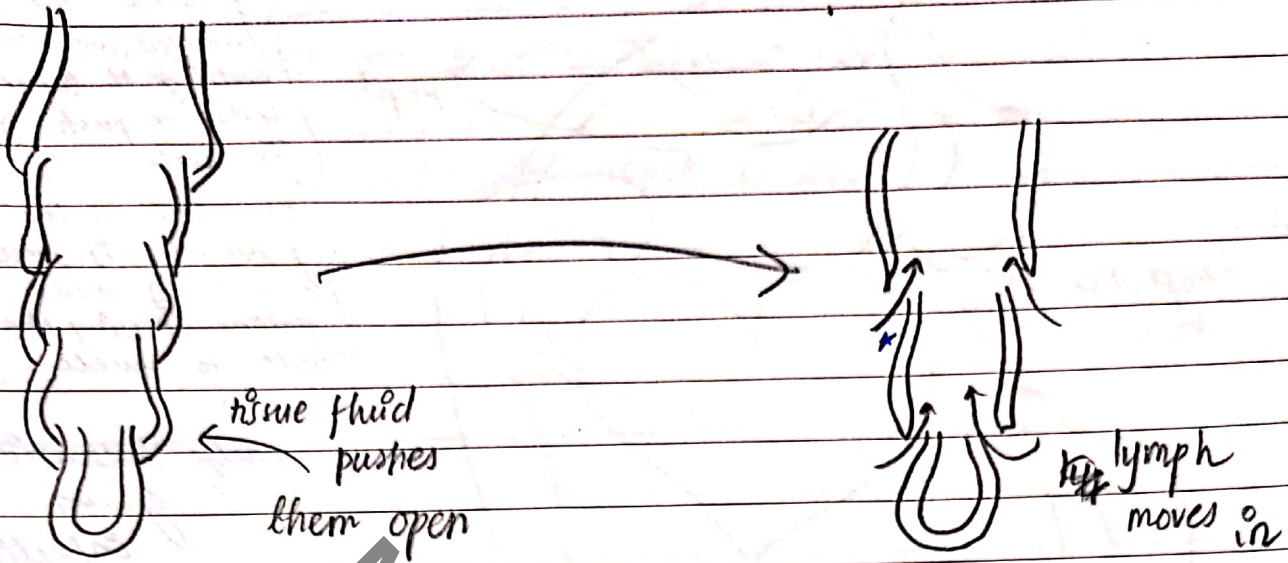
→ the walls of the capillaries have holes in them and blood begins to ooze out  
↳ we do not call it blood but plasma tissue fluid % the plasma proteins and the blood cells are still inside the capillaries → lymph  
↳ no RBCs which is why it's colorless ↳ only plasma

→ we have a separate set of vessels to manage lymph

→ lymph capillaries are closed at one end unlike normal capillaries that are open ended

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why does it not flow back?

→ valves avoid that

→ the lymphatic vessels all come together to form the lymphatic vein and the lymph is all poured back into the superior vena cava

→ the blood regains the plasma & all the waste, etc. — the waste moves to kidneys to be excreted

→ the lymph nodes have presence of WBCs — ~~to~~ kill bacteria ~~that~~  
o present in bacteria

\* amino acids & glucose enter through those holes in the capillaries — into the blood

\* the fat globules move into the lymph vessels and move into the blood stream. (that absorb fat globules lymphatic vessels are called lacteal)