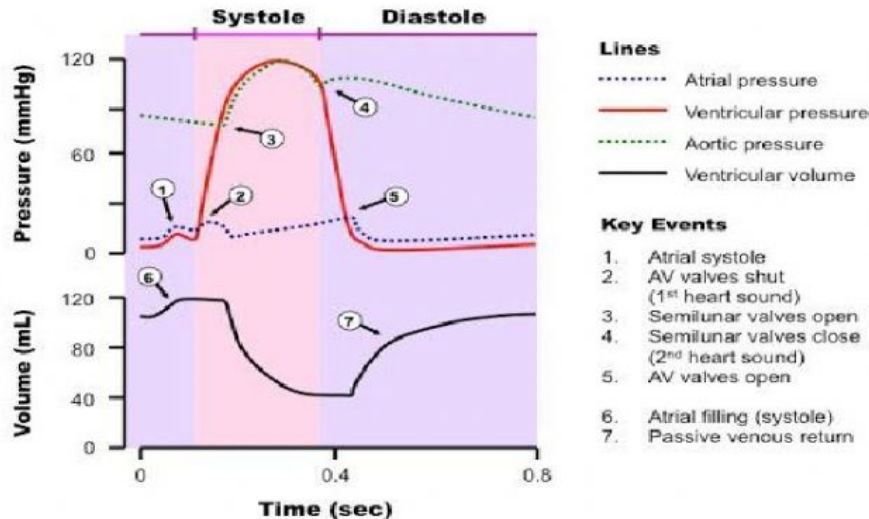


TOPIC 8 : TRANSPORT SYSTEM



1. Explain the pressure & volume changes of heart chambers (10m).

Comprises of 3 phases :

Atrial systole, ventricular diastole (___ s)

Atrial diastole, ventricular systole (___ s)

Atrial & ventricular diastole (___ s)

A) Atrial systole, ventricular diastole

- Atrium _____.
- Blood from _____ is pumped into ventricle.
- Causes pressure of ventricle to _____.

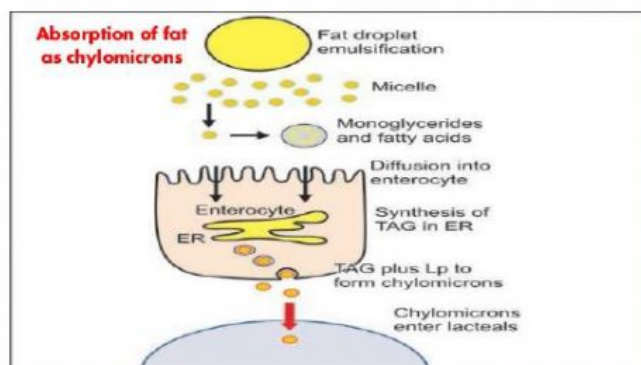
B) Atrial diastole, ventricular systole

- _____ contracts, pressure of ventricle increase.
- When pressure of ventricle _____ than pressure of atrium, AV valve close.
- Ventricle continues to contract, blood remains within ventricle.
- When pressure of _____ more than pressure of _____, semilunar valve _____.
- Atrium starts to relax, pressure of atrium _____.
- Blood from the lungs flows to the _____ atrium.
- Blood filling causes pressure of _____ to increase.

C) Atrial & ventricular, diastole

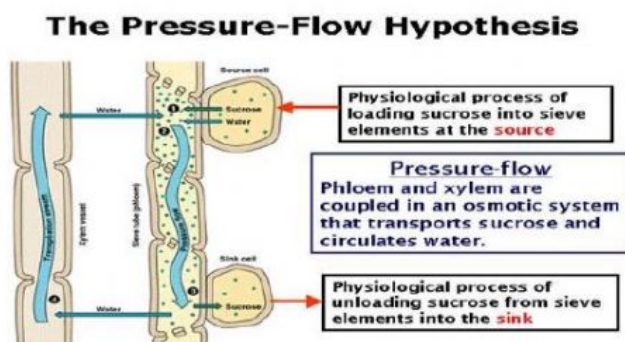
- _____ starts to relax.
- Pressure of ventricle decrease.
- When pressure of ventricle _____ than pressure of aorta, _____ valve close.
- Ventricle continues to relax.
- When pressure of _____ less than pressure of _____, AV valve opens.
- _____ flows from atrium to ventricle.

2. **Discuss the transport of lipids from small intestine into blood stream (10m).**



- In lumen of the small intestine, bile salts break up large fat globules into _____ increasing exposed surface of hydrolysis.
- _____ breaks the triglycerides to fatty acid and _____ during enzymatic hydrolysis.
- After _____ into epithelial cells, monoglycerides and fatty acids are re-formed into triglycerides.
- Some _____ and fatty acids pass directly into capillaries.
- The triglycerides are incorporated into particles called _____.
- _____ and protein on the surface make chylomicrons _____.
- Chylomicrons leave epithelial cell and enter _____, where they are carried away by the _____ and later pass into the large veins that lead directly to the heart.

3. **Explain the Pressure Flow Hypothesis in plants (8m).**



- Mesophyll cells in leaves synthesise _____ by photosynthesis.
- Sucrose is transported _____ from the source _____ into _____ then into sieve tubes in leaves.
- Companion cells supply _____.
- ψ within phloem is _____ than the ψ in xylem.

- Water from _____ diffuse into sieve tube by _____.
- The entrance of water creates a _____ hydrostatic pressure in the sieve tube
- Forcing the phloem sap to flow towards the _____.
- When sucrose reaches sink, sucrose is either consumed during growth or converted into _____ starch.
- Sugar concentration in sink is _____ than within phloem.
- Sucrose is passively & actively transported _____ from the sieve tube into the sink cell.
- Water diffuses from phloem to _____ by osmosis.
- Most of the water enters the xylem due to its _____ water potential.
- And _____ the hydrostatic pressure in phloem.
- When water enters xylem, _____ pulls water to leaves again.

TOPIC 9 : HOMEOSTASIS

1. Discuss the regulation of blood glucose level (15m)

- Blood glucose level is regulated by the _____ in pancreas.
- These cells act as receptor and control centre.
- Receptor : _____
- Control centre : _____
- Effector : _____

When blood glucose level is high (hyperglycaemia) :

- Changes _____ is detected by _____ in pancreas.
- It stimulates _____ of pancreas to secrete insulin.
- Insulin is carried in the _____.

Insulin:

- Increase the _____ of _____ cell membrane (e.g., liver) towards glucose.
- Stimulates _____ of glucose to CO₂ & H₂O.
- Increase the _____ of glucose to glycogen (_____) & stored in liver & muscle cells.
- _____ of lipids / protein from glucose.
- _____ liver cells from releasing glucose.
- **Result:** Blood glucose level _____ to the normal level.

When blood glucose level is low (hypoglycaemia) :

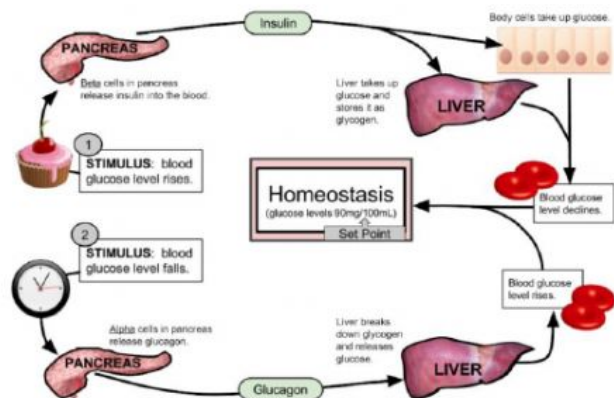
- It stimulates _____ in pancreas to secrete _____.

Glucagon stimulates:

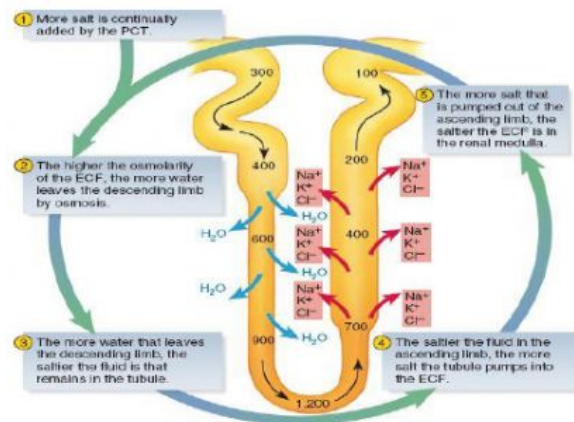
- Breakdown of glycogen to glucose (_____).
- _____ of glucose from non-carbohydrate molecules eg: fats & proteins (gluconeogenesis).
- **Result:** Blood glucose level _____ to the normal level.

What happen if the regulation of blood glucose failed?

- β -cells _____ to secrete _____ amount of insulin (none).
- Blood glucose level remains _____ (hyperglycaemia).
- Large amount of glucose is excreted in _____ (glycosuria) ~ _____.
- Volume of urine _____.
- Even if [glucose] increase, it _____ be used as energy source
- _____ are used.
- Loss of _____ for diabetic patient..
- Type I : due to _____ (juvenile diabetes).
- _____ : usually due to lifestyle & genetic factor.



2. Counter current Multiplier Mechanism is the process of using energy to generate an osmotic gradient that enables you to reabsorb water from the tubular fluid and produce concentrated urine. (12m)



Counter current :

Fluids flows in _____ direction in loop of Henle.

Descending limb ~ fluids _____.

Ascending limb ~ fluid _____.

Multiplier Mechanism :

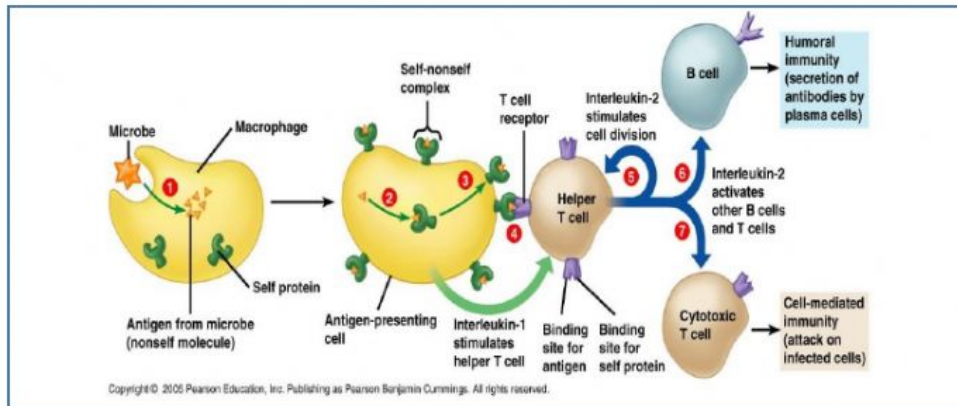
Fluid flows down the _____ limb, increasing the concentration of NaCl; _____.

Fluid flows up the _____ limb, decreasing the concentration of NaCl; _____.

- In medulla, concentration of NaCl is _____ (hypertonic).
- As filtrate flows down the _____ limb, it is surrounded by _____ concentration of NaCl in medulla. Descending limb is permeable to water.
- Water diffuse out by osmosis into _____ / interstitial fluid.
- More water diffuses _____ as the filtrate flows down.
- Filtrate becomes more _____.
- [NaCl] reaches maximum at the hairpin loop of Henle (1200 mosm).
- Thin ascending limb is permeable to _____, impermeable to water.
- [NaCl] in the tubule is _____ than the interstitial fluid.
- As the fluid flows up the ascending limb, Na⁺ diffuse into the medulla _____.
- Filtrate becomes diluted and _____ to the medulla.
- At the thick segment of ascending limb, Na⁺ is actively pumped into the _____.
- Create a _____ concentration of NaCl in medulla to maintain the hypertonic condition of interstitial fluid in medulla.
- More water diffuse out from descending limb but water remains in the _____ limb (impermeable to water).
- As filtrate flows upward, it becomes _____.
- Filtrate moves along _____ and _____.
- Water diffuse out by osmosis _____ vasa recta.
- The effect : _____ urine.

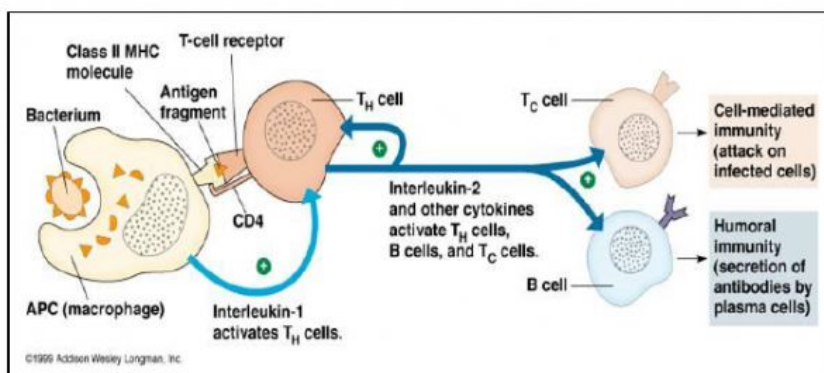
TOPIC 11 : IMMUNITY

1. Explain the Humoral Immune Response (10m).



- Macrophage engulf antigen by _____.
- Fragments of antigen is displayed on the cell surface together with a _____.
- To form a _____.
- These cells are called _____.
- T_H cell (with complementary T cell receptor) _____ to the class II MHC-antigen complex.
- APC secrete _____.
- Which activates T_H cell to secrete _____.
- IL-2 stimulate the activated T_H cell to _____ & _____.
- Proliferate : _____ rapidly to form many T_H cells which has _____ T cell receptor (clonal selection)
- Differentiate : Form different types of T_H cells, _____ & _____.
- When B lymphocyte binds to a specific antigen, it becomes _____.
- IL-2 secreted by T_H cell stimulates _____ to proliferate & differentiate to form: _____ & _____.
- Plasma cells secrete the same _____ that can bind to the invading antigen to form _____.
- Antibody-antigen complex does not destroy the antigen but only prepare them for _____ process.
- Humoral immune response is effective to protect against free _____ found outside the host cells.
- Antigen receptor on B cell can only bind _____ to antigen.

2. Explain the Cell Mediated Immune Response (9m).



- Involve the formation of _____ complex by APC (partly same as humoral immune response).
- APC secrete _____.
- Which activates _____ to secrete _____.
- When antigens infect body cells, fragment of antigen is _____ on the cell surface of body cell together with class I MHC molecule.
- Forming a _____ complex.
- T_c cell with a complementary T cell _____ binds to class I MHC-antigen complex on infected cell.
- IL-2 secreted by activated T_H cell stimulates activated _____ to proliferate & differentiate to :
_____ clone & _____ clone.
- IL-2 also stimulates activated T_c cell to release _____ & _____.
- Which form _____ in the infected cell's membrane causes it to _____.
- Activated T_c cell clone circulate & _____ other infected cells.
- This immune response involved mainly T cell.
- Effective against _____ found _____ the host cells, _____ cell & transplant.

3. Comparison between Primary & Secondary Immune Response (6m)

Primary Immune Response	Secondary Immune Response
<ul style="list-style-type: none"> Has a _____ lag period (where no antibody is produced). Due to the time needed for the specific B cell to: _____ _____ _____ Plasma cell secrete antibody, mainly _____. Amount of antibody is relatively _____. After a short time, amount of antibody _____. 	<ul style="list-style-type: none"> Has a very _____ lag period (due to the presence of memory B cells ~ immunological memory). Production of antibody is: _____ _____ _____ Antibody level tends to remain _____ for longer period. Plasma cell secrete antibody, mainly _____.