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Q:- 1 :-

Ans:- ① ABO Blood Group Systems -

It is used to denote the presence of one, both, or neither of A & B antigen on erythrocyte. There are almost 36 different blood type "or group"

② Background history:-

ABO blood types were discovered by 'Karl Landsteiner' in '1901' for the first time, for which he was awarded with noble prize in physiology in 1930.

He discovered three groups

① Group "A" which agglutinates with Group B

② Group "B" which agglutinates with Group A

③ Group "C" which agglutinates with both "A & B"

on 1910 1910

Ludwik Hirsfeld & Emil Freiherr von Denger for the group

"C" introduced the term "null".

AB type (group) was discovered by Sturli &

Von Decastello

③ Genetics :-

Blood group are inherited from both parents. The ABO blood type is controlled by single gene. The ABO gene with three types of Alleles.

The four possibilities represents obtained when one

is taken from each parent each has a 25% chance but some occur more than once.

④ Clinical Relevance:

The carbohydrates molecules on the surface of red blood cells have role in cell membrane integrity, cell adhesion, membrane transportation of molecules & acting as receptors for extracellular ligand

⑤ Bleeding & Thrombosis:

The ABO Antigen is also expressed on the von Willebrand Factor (vWF) glycoprotein which participates in "hemostasis" control of bleeding.

on fact having type "O" blood group predispose to bleeding.

an individual with group O blood normally have significantly lower plasma level of "vWF" & "Factor VIII" than do non-O individual.

⑥ Disease Risk:

Compared to "O" group individual non-O group ("A, B, AB") individual have 14% reduced risk of "Squamous Cell carcinoma" & 41% reduced risk of carcinoma, conversely type "O" blood is associated with reduced risk of pancreatic cancer.

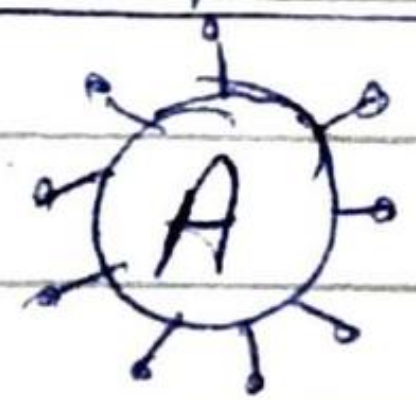
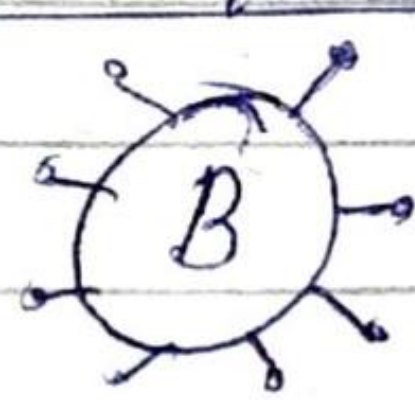
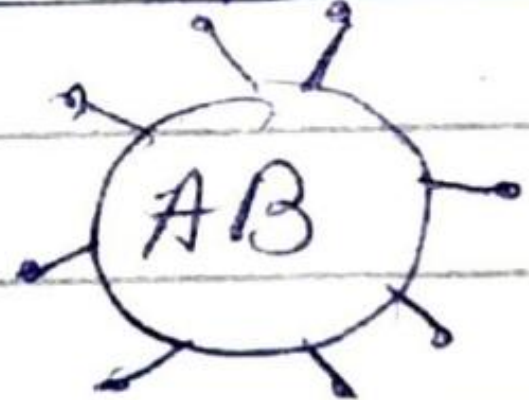
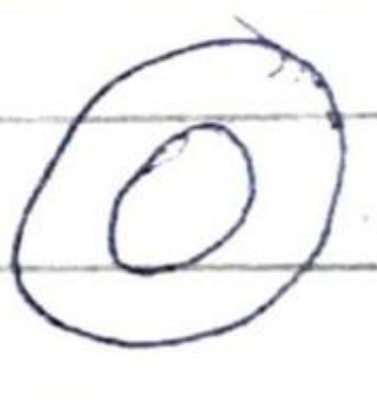
The "B antigen" links with reduced risk of "ovarian cancer".

Donor & Recipient

As we know that "O" blood group having no antigen therefore there will be no antibodies form against antigen so we can say "O" blood group is "Universal donor".

And we know that "AB" blood having both antigen A & B so AB is universal recipient.

ABO System: Diagram

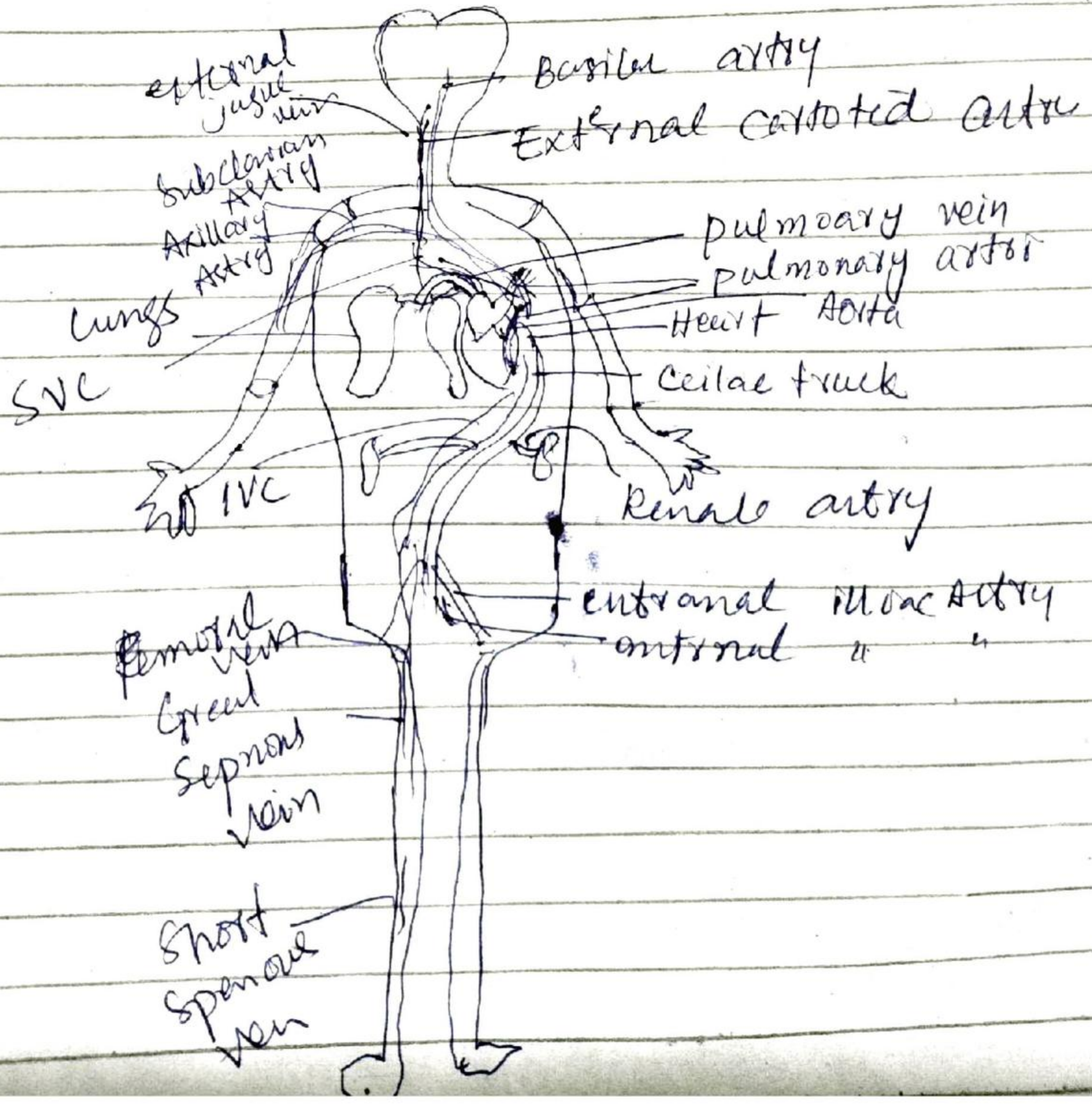
	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in plasma	Anti-B antibodies	Anti-A antibodies	None	Anti-A & Anti-B
Antigen in RBC	A - Antigen	B Antigen	A & B antigens	None

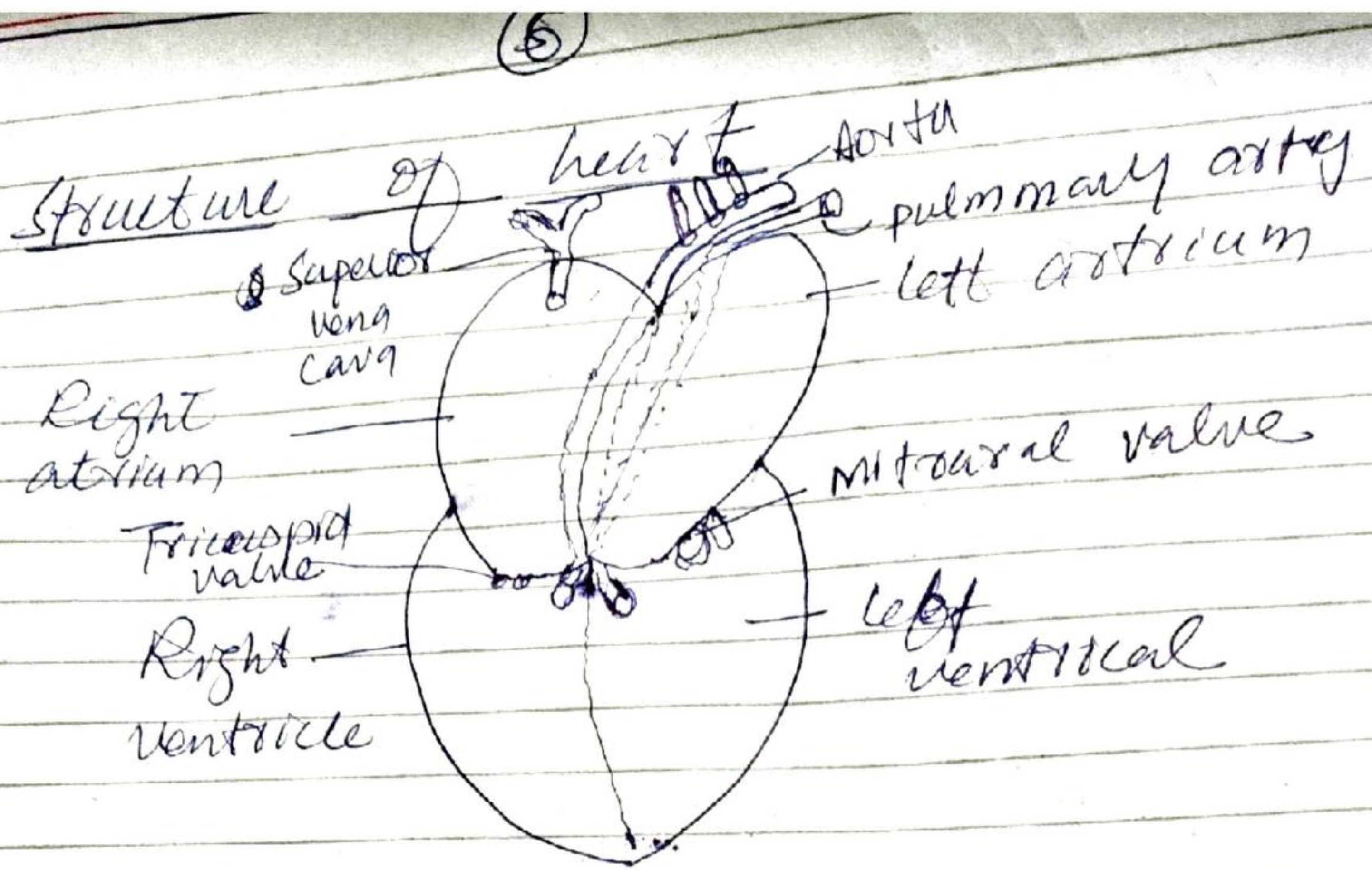
Qo-2

Ans A patient having blood group AB, As we know that it having Both Antigen A & B on surface of RBC & having no antibodies present in serum so there fore we can say it is Universal recipient & we can give blood of group A, B, AB & O; so All type of blood group are recipient for this patient.

Q: 3 Cardiovascular System:-

It is a vascular system that permits blood to circulate & transport nutrients such as amino acids, electrolytes, O<sub>2</sub>, CO<sub>2</sub>, hormones, & blood cells to & from the cells in the body to provide nourishment & help in fighting disease. It stabilizes temperature, pH & maintains homeostasis.





### Components :-

It having two components.

- ① systemic circulation
- ② pulmonary circulation

The essential components of the human cardiovascular system are heart, blood & blood vessels while blood consist of plasma, red blood cells, white blood cells & platelets.

### Systemic Circulation :-

Arteries carry <sup>oxygenated</sup> blood from heart to all system of the body except pulmonary artery which carry deoxygenated blood from heart to lungs. And vein carries blood deoxygenated blood from bodies to

to heart except pulmonary vein  
which carries oxygenated blood from  
lungs to heart.

## Pulmonary Circulation

This is the network  
b/w lungs & heart.  
Blood purify in lungs & given  
O<sub>2</sub> to pulmonary vein which carry  
them in heart & from  
heart, right ventricle pumps  
push out deoxygenated blood  
into pulmonary artery which  
carry them into lungs where  
CO<sub>2</sub> comes out via exhalation  
& O<sub>2</sub> join blood in  
pulmonary vein.

## Lymphatic System

It is also the  
part of circulatory system.  
It is the network of lymph  
system vessels, lymph capillaries,  
lymph nodes & organs of lymphatic  
tissue & circulating lymph.

## Function

Major function is to carry the  
lymph, draining & returning interstitial  
fluid back toward the heart  
for return to the cardiovascular  
system by emptying of lymph  
ducts. It help in "adaptive immune  
system".



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## Network of vessels:-

Aorta divided into Ascending Aorta & descending Aorta where further divided & redivided into Arterioles, Arterioles join Capillaries — Capillaries rejoin into Venules, → join into vein — vein is Superior vena cava & inferior vena cava

## Coronary vessels:-

There are two coronary arteries

- ① Right coronary
- ② left coronary

Q:- 4:- immunity difference

Ans:-

Active

- ① It is also known as "Adaptive" or "acquired" immune system.
- ② Acquired immune system creates immunological memory after an initial response to a specific pathogen & leads to enhanced response to subsequent encounter of that pathogen.
- ③ This process may be acquired i.e. vaccination.
- ④ The acquired system include both humoral immunity & cell mediated immunity.
- ⑤ It is very specific to pathogen.
- ⑥ It provide long lasting protection i.e. "measles". Some one recovered from measles is now protected from measles for their life time.
- It also called "adaptive" b/c it prepare body immune system for future challenges.

Passive

- ① It is transfer of active humoral immunity of "ready made antibodies".
  - ② It can occur naturally when maternal antibodies are transferred to fetus through placenta.
  - ③ It can also be induced artificially, when high level of antibodies specific to a pathogen or "toxin" obtained from human, horses & other animals are transferred to non immune person through blood contents that contain antibodies.
- ie
- Immune globulin therapy
  - Antiserum therapy
- ④ It is used when high risk of infection or insufficient time for the body to develop their own antibodies.
  - ⑤ Naturally
  - ① From mother to fetus through placenta

Active	Passive
<p><u>Function</u> :-</p> <p>The major function of acquired immune system</p> <p>(i) Recognition of specific 'non self' antigens in the presence of 'self' during the process 'antipresentation'</p> <p>(ii) Development of immunological memory in which pathogen are remembered through 'memory B cell' &amp; 'memory T-cell'</p>	<p>(i) From breast feeding</p> <p><u>Artificially</u></p> <p>It is acquired passive immunity is a short term immunization achieved by transfer of antibodies which can be administered in several forms. :-</p> <p>human or animal's blood plasma or serum.</p> <p>(iv) IVIG</p> <p>(v) IG</p> <p>(vi) monoclonal antibodies</p>

Qo-5

Ans

### Lymphatic System :-

The lymphatic system or lymphoid tissue is a part of circulatory system & of the immune system. It is made up of large network of lymphatic vessels & lymphoid organs & lymphoid tissue.

Vessels - Lymphoid vessel carry clear color fluid called lymph toward the heart.

one of the main functions of lymph system is to provide an accessory return route to the blood for the surplus three liter

### Lymphoid organs:-

- It include
- ① lymph nodes
  - ② spleen
  - ③ thymus
  - ④ Tonsils.

It is also associated with mucosa such as mucosa associated lymph tissue.

### Collection of fluids:-

Fluid from circulating blood leaks into the tissue of the body by capillary action to carry nutrient into cells.

The fluid bath the tissue as interstitial fluid which collects waste products, bacteria & damaged cells,

lymph into much larger vessels known as lymph ducts. The right lymphatic duct drain into right side of the body & left lymphatic duct known as "thoracic duct" drain left side of body.

### Function:-

① It is responsible for the

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Removal of interstitial fluid from tissue

- (2) It absorb and transport fatty acid & fat & chyle from digestive system
- (3) It transport WBC to & from the lymph nodes.
- (4) It transport antigen presenting cells. such as dendritic cells.

The Lymphatic System, or lymphoid system, is an organ system in vertebrates that is part of the circulatory system and the immune system. It is made up of a large network of lymphatic vessels, lymphatic or lymphoid organs, and lymphoid tissues.

The vessels carry a clear fluid called lymph (the Latin word *lymph* refers to the deity of fresh water, "Lympha"), towards the heart.

Unlike the cardiovascular system, the lymphatic system is not a closed system. The human circulatory system processes an average of 20 liters of blood per day through capillary filtration, which removes plasma from the blood. Roughly 17 liters of the filtered plasma is reabsorbed directly into the blood vessels, while

The remaining three litres remain in the interstitial fluid. one of the main functions of the lymphatic system is to provide an accessory return route to the blood for the surplus three litres.

### **STRUCTURE** :-

The lymphatic system consists of a conducting network of lymphatic vessels, lymphoid organs, lymphoid tissue, and the circulating lymph.

### **PRIMARY LYMPHOID ORGANS** :-

The primary (or central) lymphoid organs generate lymphocytes from immature progenitor cells. The thymus and the bone marrow constitute the primary lymphoid organs involved in the production and early clonal selection of lymphocyte tissues.

## SECONDARY LYMPHOID ORGANS:

The Secondary (or peripheral) lymphoid organs (SLO), which include lymph nodes and the spleen, maintain mature naive lymphocytes and initiate and adaptive immune responses. The peripheral lymphoid organs are the sites of lymphocyte activation by antigens. Activation leads to clonal expansion and affinity maturation. Mature lymphocytes recirculate between the blood and the peripheral lymphoid organs until they encounter their specific antigen.

## TERTIARY LYMPHOID ORGANS:

Tertiary lymphoid organs (TLOs) are abnormal lymph node-like structures that form in peripheral tissues at site of chronic inflammation, such as chronic infection, transplanted organs undergoing graft rejection, some cancers and autoimmune and



autoimmune-related diseases.

TLOs are regulated differently from the normal process whereby lymphoid tissues are formed during ontogeny, being dependent cytokines and hematopoietic cells, but still drain interstitial fluid and transport lymphocytes in response to the same chemical messengers and gradients.

TLOs typically contain far fewer lymphocytes and assume an immune role only when challenged with antigens that result in inflammation. They achieve this by importing the lymphocytes from blood and lymph.

LOs often have an active germinal center.

## OTHER LYMPHOID TISSUE :-

Lymphoid tissue associated with the lymphatic system is concerned with immune function in defending the body against infections and the spread of tumours. It consists of connective tissue formed of reticular fibers with various types of reticular fibers with various type of leukocytes (white blood cells) mostly lymphocytes enmeshed in it, through which the lymph passess.

Regions of the lymphoid tissue that are densely packed with are known as lymphoid follicles. Lymph nodes or may consist of loosely organized lymphoid follicles known as the mucosa-associated lymphoid tissue : (MALT).