

Chapter 8 CIRCULATORY SYSTEM

Good morning students

This lesson is of Class 9 for the subject of Biology
Topic - Heart which is covered in Chapter 8
titled - Circulatory system starting on Page No 90
of your text book titled Concise Biology Selina
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This voice is of Nidhi Rana.

Dear children kindly open Page No 97 of your textbook
as we will now discuss the different Blood groups.

The concept of blood groups was discovered by Karl
Landsteiner. RBCs of humans have a specific
proteins on their surface, called as antigens

Thus human blood has 2 types of antigens -

(i) Antigen A and (ii) Antigen B

The plasma of the blood contains complementary
proteins, called the antibodies, with respect to
the antigen that is present on the surface of RBCs

To sum up we have -

Blood group A - with antigen A & antibody B

Blood group B - with antigen B & antibody A

Blood group AB - with antigen A & B & No antibody

Blood group O - with no antigen & Both antibody A
and antibody B

Sometimes it becomes necessary to inject blood
into a patient's body [Eg - during surgery or

into the body of a blood cancer patient.] Thus the blood is taken from a healthy person (donor) and is introduced into the body of the patient or the recipient. This is called blood transfusion. During blood transfusion the type of blood of the donor should match with the type of blood of the recipient. The antigens present on donor's blood group should match with the ^{antigens on} blood group of the recipient.

Table 8.2 Summary of ABO Blood Group matching (Compatibility)

Blood group of Donor	Blood group of Recipient			
	A	B	AB Universal recipient	O
A	✓	✗	✓	✗
B	✗	✓	✓	✗
AB	✗	✗	✓	✗
O Universal donor	✓	✓	✓	✓

Children you can see in the table 8.2 given on Pg 98 of your text book showing compatibility of blood groups. You can see that donor with blood group A, having antigen A, can donate blood to the recipient of Blood group A and blood group AB, where both blood group A & AB have the antigen A in them. thus making blood group A compatible with blood group A & AB. Similarly blood group A is not compatible with blood group B and O.

because blood group B and O of the recipient do not have antigen A, thus these blood groups B and O, will produce antibodies against antigen A of Blood group A.

Further O type blood can be given to persons of all types of blood i.e. O, A, B & AB because O blood group does not have any antigen, thus no antibody is produced against it. Thus O is called universal donor. Also person with AB type of blood can receive blood from all types i.e. from AB, A, B, & O. because AB blood group has both antigens A & B. Thus AB is called universal recipient.

RHESUS - Rh System Rh stands for Rhesus, a monkey in which this factor was first discovered.

Rh factor is present in the blood of most people. Again during blood transfusion Rh factor compatibility is to be taken care i.e. blood of donor and recipient should be compatible in terms of Rh factor.

Blood of Rh-positive (Rh+) people have D antigen and people with Rh(-) Rh negative blood group lack these antigen.

Thus person with Rh+ blood group can receive blood from both Rh+ and Rh- donor.

however person with Rh- blood group can receive blood only from Rh- blood donor.

This is because Rh- blood of recipient will develop antibodies against Rh+ (with D antigen) blood group.

Rh factor in pregnancy An Rh - woman may become sensitive and may develop antibodies, if she carries an Rh + child in her womb. In this case the 1st Rh + child will be normal, but if it sensitizes the mother, the second positive child if conceived soon, then the antibodies developed in mother's body may cause problem and sometimes leading to death of fetus and abortion of the Rh + child.

Now before going further it is the break time children. I will give you some short questions which you may please answer in your notebooks during this break time. Questions are as follows -

Q1 Name the 'universal donor' blood group.

Q2 Name the 'Universal recipient' blood group.

Q3 What does 'Rh' stand for in Rh factor?

You may pause the audio for 3 mins now.

Break is over children. First listen to the correct answers of the questions being asked to you.

A1 Blood group 'O' is Universal donor.

A2 Blood group 'AB' is Universal Recipient.

A3 Rh stands for 'R.hesus' in Rh factor.

Now children let us start with 'The heart'.

Location of Heart - Heart is located in the centre between the two lungs and above the diaphragm. We feel that the heart is on the left side because heart is roughly triangular shaped organ and the narrow end of this

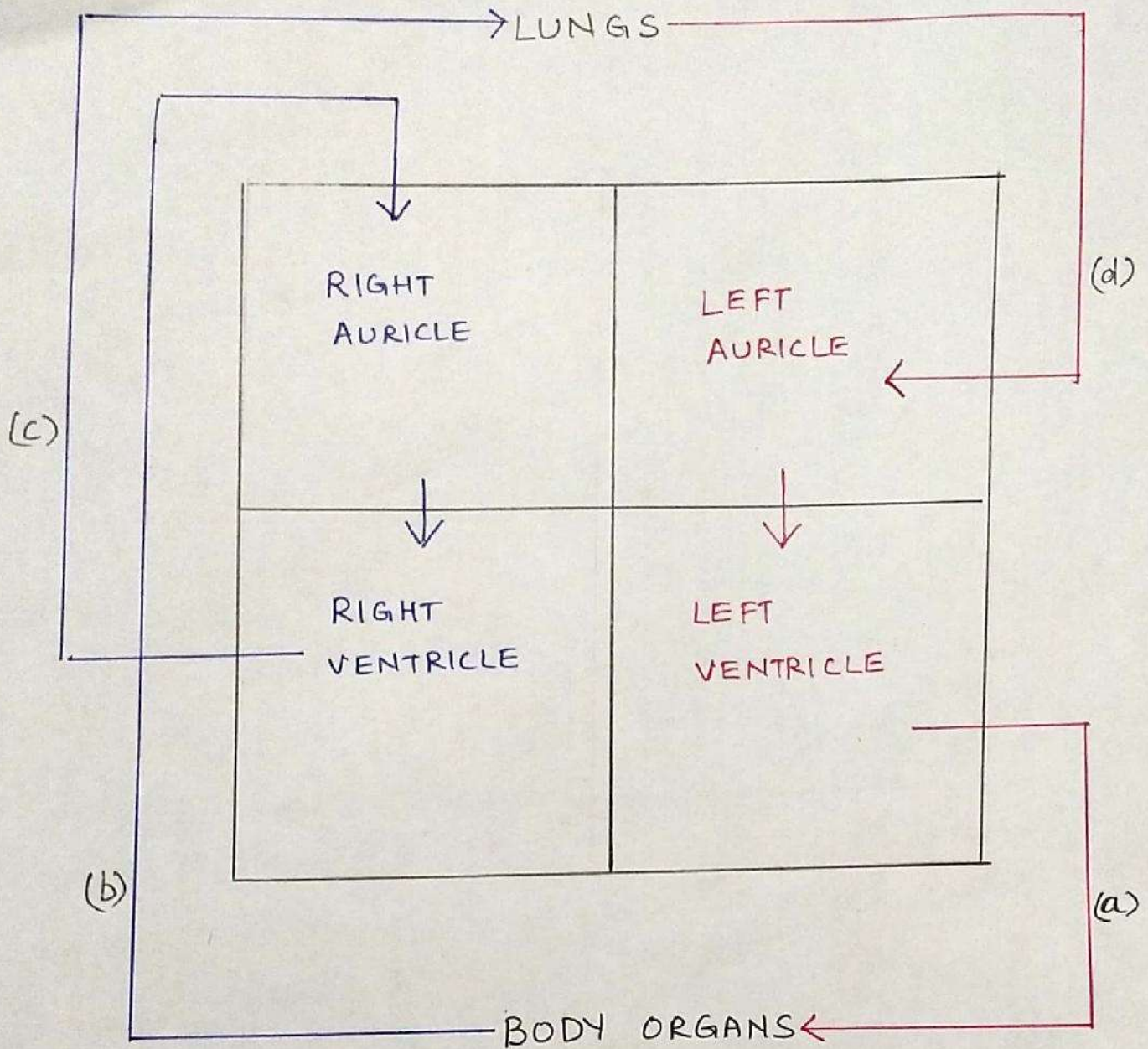
Triangular organ is pointed to the left side. When the heart pumps the blood, then the contraction of the heart is most powerful at this pointed end. giving us the feeling that heart is placed towards the left side.

Children, heart is a muscular pumping organ. about the size of a closed fist. Heart is protected by a double walled membranous covering called pericardium. A pericardial fluid is present between the heart wall and pericardium. which reduces friction during heart beat and protects it from mechanical injuries.

Now let us talk about the 4 chambers of the heart. Heart has 4 chambers - the upper two chambers constitute the right and left auricles and the lower two chambers form the right and the left ventricles. The right and the left side do not communicate and are separated.

Auricles of the heart have thinner walls than the ventricles because auricles receive blood from body and pump it into the very next ventricle. however ventricles have thick muscular walls because they have to pump the blood to long distances. Further walls of left ventricle are thicker than right ventricle. To understand this, children again look at the general plan of blood circulation in the body as shown in Fig 1.

Fig. 1



BLUE COLOUR - deoxygenated blood

RED COLOUR - oxygenated blood

- a) Aorta
- b) Vena cava
- c) Pulmonary artery
- d) Pulmonary vein.

You can see in the Fig 1 that the right ventricle pumps blood only upto the lungs for oxygenation. But the left ventricle pumps it up to the farthest points in the body such as upto the toes or upto the brain, so its walls are thicker.

Now let us discuss the blood vessel entering and leaving the heart.

Blood vessels entering the heart

Again look at Fig 1 children's blood vessels b and d are entering the heart. so let us discuss them one by one.

Right auricle receives the vena cava, thus two vena cava - Anterior and Posterior vena cava enters the right auricle.

i Anterior vena cava or superior vena cava carries deoxygenated blood from the upper half of the body including head, chest and arms to the right auricle.

ii Posterior or inferior vena cava carries deoxygenated blood from lower half of the body including legs and abdomen to the right auricle.

Left auricle receives 4 pulmonary veins

The blood after oxygenation from lungs is poured back into left auricle. Thus two pulmonary veins from each lung carries oxygenated blood to the heart's Left auricle.

Blood vessels leaving the heart

Again look at Fig 1 children blood vessels a and c are leaving the heart. So let us discuss them one by one.

- i Aorta arises from left ventricle and carries oxygenated blood to be distributed to all the body parts.
- ii Pulmonary artery - arises from right ventricle and carries deoxygenated blood to the lungs for oxygenation.

Besides these blood vessels there are two coronary arteries, right and left, arising from the base of the aorta, to supply the blood to heart muscles. If due to any reason there is blockage in coronary arteries or in any of their branches, 'deadening' of the corresponding area of the heart muscle occurs, causing myocardial infarction, commonly called heart attack. Infarction means death of an area of tissues due to interrupted blood supply. Angina pectoris is a type of chest pain which occurs due to insufficient supply of blood to the heart muscles.

Now let us conclude our discussion here children. All of you may please look at Fig 8.6 of your text book showing the front view of the human heart.

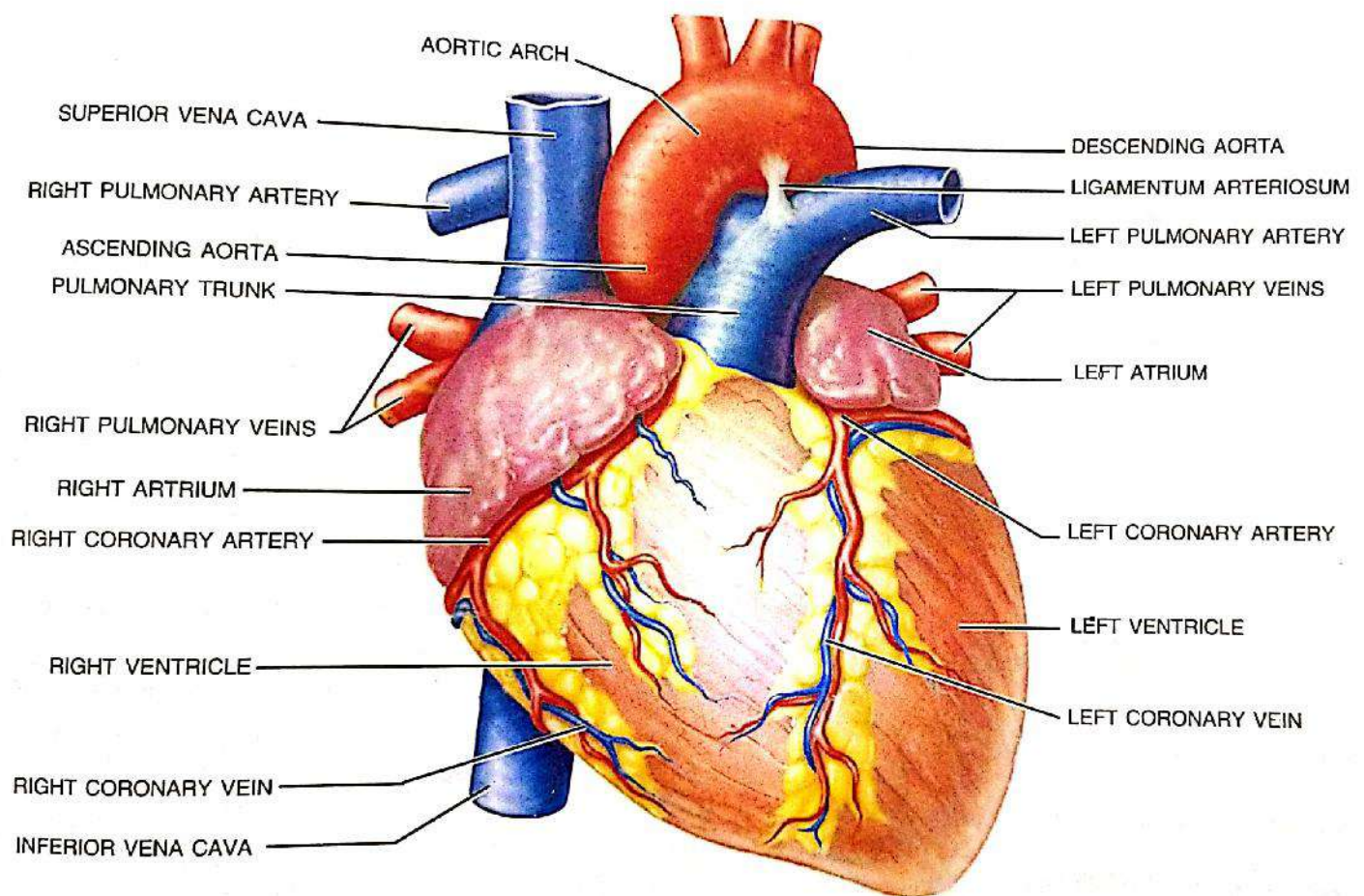


Fig. 8.6 Front view of the human heart

You may please carefully see all the labellings. You should be able to identify the - auricles, ventricles, pulmonary veins & arteries, aorta, vena cava, coronary arteries etc.

I am ending today's class now. Now let me give you some home assignment questions which you all have to do in your notebooks.

Home assignment questions are as follows-

Q1 Draw a well labelled diagram of 'Front view of the human heart' Fig 8.6 in your text book.

Q2 Find out the blood groups of all your family members. Tabulate the data. Also find out who can donate blood to whom in your family (among your family members).