TENDER HEART HIGH SCHOOL, SEC-33B, CHD

CLASS-9 Date - 02.12.2024

Subject - Biology Teacher - Nidhi Rana

Chapter 8 Circulatory system

Good morning Students

This lesson is of class 9 for the subject of Biology Topic Heart which is covered in ch-8 titled Circulatory system starting on Page No 90 of your text book titled Concise Biology - Selina Publications and is being submitted to you on 02.12.2024 This voice is of Nidhi Rana.

Children Kindly open Page No 100 of your textbook and carefully see Fig 8.7 and 8.8 of Heart as we are going to discuss the 'valves' present in the heart that regulate the flow of blood in single direction in the heart.

There are 4 valves in the heart as follows -

i Right atrio-ventricular valve or Tricuspid valve guards the opening between right auricle and right ventricle It has 3 thin triangular leaf like flaps (cusps) and is therefore called Tricuspid valve The apices of these flaps are held in position by Chordae Tendinae [i.e. thread like fibrous tissues that attach the tricuspid and bicuspid valves of the heart to the papillary muscles of the heart] Thus Chordae Tendinae anchor the valves.

CLASS - 9 BIOLOGY

CHAPTER - 8

TEACHER - Nidhi Rang

Left atrio ventricular or Bicuspid valves guard the opening between left auricle and left ventricle. Bicuspid valve has two cusps and is therefore called Bicuspid valve. Bicuspid valve is also called mitral valve. Children may carefully see the positioning of Tricuspid valve and Bicuspid valve in the Fig 8.7 and 8.8 given in the text book.

Pulmonary semilunar valves are located at the opening of the right ventricle into the pulmonary artery. These are pocket shaped and three in number.

Aortic semilunar valves: are located at the point of origin of aorta from the left ventricle. These are also pocket shaped and three in number.

Circulation of Blood in the heart

To begin with, blood from the pulmonary vein and vena cava flows into the left and the right auricles respectively. As the Tricuspid and bicuspid valves are open, the blood passes into ventricles easily. Both the auricles undergo a simultaneous contraction. Contraction phase is called Systole. Thus the auricular systole increase the flow of blood into the ventricles, which at this time are relaxing.

Next, the ventricles contract and auricles relax.

CLASS-9 [BIOLOGY]
CHAPTER - 8
TEACHER - Nidhi Rana

This phase is called the ventricular systole
Ventricular systole increases the ventricular pressure
The blood from ventricles under pressure tends to return to auricles, but the flaps of the bicuspid and tricuspid valves get tightend and puffed up, thus closing the passage and prevent the backflow of blood into the auricles
Chordae Tendinae hold the bicuspid tricuspid valves in position and prevent their overturning into the auricles when the blood flows under high pressure during ventricular systole
Children please see Fig 8.8 Bon Page No 101 to see the position of chordae tendinae whose working can be compared to the cords of a parachute. As the cords of parachute prevent its upturning similarly chordae tendinae prevent the overturning of bicuspid and tricuspid valves into the auricles.
The only course left for the ventricular blood is to enter the pulmonary artery from right ventricle and the aorta from left ventricle. The mouths of the pocket like valves at the bases of these two blood vessels face away from the ventricles. Therefore the blood leaving the ventricles presses the valves flat and gets a clear passage in between
When the ventricles dilate, the blood from the pulmonary artery and the aorta tends to return, the blood fills the pockets of the valves and closes the passage of semilunar valves which

CLASS- 9 [BIOLOGY]
CHAPTER - 8
TEACHER - Nidhi Rana

prevents back flow of blood into the ventricles
The relaxation phase of ventricles is called ventricular diastole. Due to decline in ventricular pressure, tricuspid and bicuspid valves are pushed open by the pressure in auricles The blood now once again moves freely to the ventricles This sequential event in the heart which is cyclically repeated is called Cardiac cycle
At the end of ventricular systole, the ventricles start relaxing called ventricular diastole
Meanwhile the auricles have also been relaxing ie. auricular diastole and thus for a short period both auricle and ventricles are in a relaxed state known as joint diastole
Thus the caridiac cycle consists of -
Auricular systole → Ventricular systole → Joint diastole
Now before going further, it is the break time I will ask you some short questions which you may please answer in your notebooks during this break time. Questions are as follows-

Q1. Name the valve of the heart present between right auricle and right ventricle
Q2 State the location of Mitral valve
Q3 Name the relaxation phase of ventricles.

You may pause the audio for 3 mins now Break is over children.

CLASS- 9 [BIOLOGY]
CHAPTER- 8
TEACHER - Nidhi Rang

Children first listen to correct answers

A1 Tricuspid valve is present between right auricle and right ventricle

A2 Mitral valve is present between left auricle and left ventricle

A3 Ventricular diastole is called the relaxation phase of the heart's ventricles

Now let us resume the topic with the

Heart sounds - LUBB and DUP

During each cardiac cycle two prominent sounds are produced which can be easily heard through a stethoscope.

LUBB The first sound LUBB is produced when atrio ventricular valves i.e. valves present between the auricles and ventricles (i.e Bicuspid and Tricuspid valves) get closed sharply at the start of ventricular systole

DUP The 2nd sound DUP is produced when at the beginning of ventricular diastole, the semilunar valves at the roots of aorta and pulmonary artery get closed.

Rate of heart beat varies among different species and even in individuals of same species Smaller the size of the organism, faster is the heart rate This is because of the following two reasons -

(1) Smaller the size of the animal, higher will be

CLASS-9 [BIOLOGY]
CHAPTER- 8
TEACHER- Nidhi Rana

the surface area to volume ratio, hence smaller organism will lose more of its body heat, therefore the increased heart rate helps to distribute the body heat faster.

ii) At the young stage of growth, such as human baby, the metabolism is higher enabling the fast and rapid growth in babies. Therefore faster heart beat keeps the "supply" and "take off" of the metabolic substances rapidly and in right quantities.

Pacemaker

The impulse or command which starts the heart beat arises in Pacemaker or the Sino-atrial node or SAN. Location - SAN is located in the walls of right auricle near the opening of the superior vena cava.

Children please see Fig 8.9 of textbook showing the position of SAN. and also AVN

AVN - Atrio Ventricular node is found near the interauricular (i.e. between two auricle) septum near the tricuspid valve.

The impulse from SAN is passed to AVN and then to Bundle of HIS

Bundle of HIS are bundle of fibres that begin from AVN and extend to interventricular septum. [i.e. division between two ventricles]

Purkinje fibres - Bundle of HIS consists of

CLASS-9 [BIOLOGY]
CHAPTER-8
TEACHER- Nidhi Rana

branches of fibres running along the wall of the ventricles, called Purkinje fibres. Thus the impulse generated in SAN is passed to AVN and then through bundle of HIS and Purkinje fibres it is conducted to every part of the heart. Sometimes the pacemaker becomes faulty causing heart Trouble An artificial pacemaker may be fixed in the heart of such a person.

Now let us conclude our discussion here. All of you please carefully see Fig 8.9. showing the positioning of SAN, AVN, Bundle of HIS and Purkinje fibres. I am ending the topic here Now I will give you some home assignment questions which you all have to do in your notebooks -

Home assignment questions are as follows -

Q1. Do the following Progress check questions given on Page 103 of your text book
Q No 1 and 2

Q2 Do the following Review questions given on Page 110 - 112 of your text book
C Short Answer type
Q No 4
E structured Type
Q No 4.

Q3 Draw a well labelled diagram of Human heart Fig 8.7.