



Learn the key concepts of Science topic - Blood

Today we will be studying about Blood and its Classification, Blood Groups, Cardiovascular system, Types of BP. Blood is essential to life, so let's learn about it deeply.

Blood is a special connective tissue consisting of a dense fluid matrix, plasma, and formed elements. It is Alkaline in nature. It transports oxygen and nutrients to the lungs and tissue. Blood carries cells and antibodies that fight infection. It brings waste products to the kidneys and liver, which filter and clean the blood. It regulates body temperature. The major two elements of the blood is • Plasma • Blood corpuscles/ formed elements.

Classification of blood

1. Plasma (55%)
2. Blood corpuscles (45%)

Elements of plasma: 1. Water (92%) 2. Solid substance (8%) 3. Gaseous substance CO_2 , O_2

Elements of solid substances: 1. Organic Substance 2. Inorganic Substances (Na^+ , K^+ , Ca^+ , Mg^+ , Fe^+ , HCO_3^- , Cl^- , SO_4^{2-})

Elements of organic substance:

- Carbohydrates: (i) Glucose
- Protein: (i) albumin, (ii) globulin, (iii) fibrinogen, (iv) prothrombin
- Fat: (i) phospholipid, (ii) cholesterol, (iii) creatine
- NPN (non protein nitrogen) (i) urea, (ii) uric acid, (iii) creatine, (iv) creatinine

Plasma: It is a watery part of blood, yellow fluid, contains 90-92% water, protein, and other substances.

Blood corpuscles or Formed elements: The blood corpuscles are 40% - 50% part of the total blood and this part is called Haematocrit. Three types of blood corpuscles is: • Red blood corpuscles • White blood corpuscles • Platelets

Red blood corpuscles (RBC): It is also known as Erythrocytes. It does not have any nucleus in its cell whose shapes are spherical and bi-concave. RBC is produced in the spleen and liver, foetus and in bone marrow after birth. The radius of RBC is 7.2 micrometres and the circumference is 2.2 micrometres. RBC count in a male body is 14-15 gm/ 100 cc and in a female body is 12-14 gm/ 100 cc. The life of RBC is 120 days after which they are broken down in the spleen or liver. Polycythaemia refers to an increase in the number of Red Blood Cells. The deficiency of RBC is called Anaemia. The pigmented component of the haemoglobin takes part in the metabolic activities and forms a yellow coloured pigment called bilirubin.

Haemoglobin: Haemoglobin is iron-containing pigment. It is red-pigmented blood, consisting of a protein component and the iron complex of a porphyrin derivative. It transfers oxygen in blood from the lungs to tissues.

Learn the key concepts of Science topic - Blood

White blood corpuscles (WBC): WBC is also known as leukocytes. Nucleus is present in its cells that is why it is colourless. Per cubic millimetres, there are 5,000 – 9,000 WBC present in the human blood. The ratio of WBC to RBC is 1 : 700. It can survive only for 3-4 days. WBC mainly protects the body's immune systems.

Platelets: It is also called Thrombocytes, which are formed in the bone marrow. These are only found in the blood of Human beings and mammals in which the nucleus is absent. Blood normally contains 1,50,000 to 3,50,000 mm⁻³ platelets in human beings. It helps in blood clotting.

Blood groups of Human beings

Researcher Karl Landsteiner and his colleagues detected and observed that the blood in all human beings are not the same but are different.

Blood Group	Antigen (in RBC)	Antibody (in plasma)
A	Only A	Only B
B	Only B	Only A
AB	Both A and B	Absent
O	Absent	Both a and B

RH factor: You must have seen at times that blood groups are often followed with a + or - sign. This indicates the presence or absence of Rh factor. In 1940 Landsteiner and Wiener discovered another type of antigen present in human blood. This antigen was extracted from a monkey namely Rhesus is called Rh-factor. Blood possessing the Rh factor is called Rh positive and lack of Rh factor is called Rh negative. Possible blood groups of offspring from parents of various blood groups:

Learn the key concepts of Science topic - Blood

Blood Groups of parents	Possible	Impossible
O × O	O	A, B, AB
O × A	O, A	B, AB
O × B	O, B	A, AB
O × AB	A, B	O, AB
A × A	A, O	B, AB
A × B	A, B, O, AB	-
A × AB	A, B, AB	O
B × B	B, O	A, AB
B × AB	A, B, AB	O
AB × AB	A, B, AB	O

Lymph:

- It is worked as a middle man between blood and tissue
- Lymph = plasma + WBC
- Spleen produces Lymph at the same time it acts as the graveyard of lymph.
- It is a modified fluid, containing cells like lymphocytes and monocytes, salts, and small amounts of protein.
- It also helps in the renewal of ECF or ExtraCellular Fluid.

13 factors are responsible for blood coagulation: Fibrinogen, factor I; Prothrombin, factor II; Thromboplastin, factor III; Calcium Ion, factor IV; Labile factor, factor V; Acceleration, factor VI; Stable factor, factor VII; Antihemophilic factor, factor VIII; Christmas factor, factor IX; Stuart factor, factor X; Plasma Thromboplastin antecedent, factor XI; Hageman factor, factor XII; Fibrin stabilizing factor, factor XIII

Blood clotting system

Learn the key concepts of Science topic - Blood

- Sodium citrate is the anticoagulant used during blood collection and blood bank.
- In the 'O' blood group there are no agglutinogens on the surface of the red blood cells but alpha and beta agglutinin are found in plasma.
- ABO Blood group is rare and it is known as Bombay Blood Group.

Cardiovascular system

The cardiovascular system is the system responsible for delivering blood to different parts of the body. It consists of the following organs and tissues: Heart, Artery, Vein, Capillaries

Two type of circulation system are:

- Systemic circulatory system- where blood circulates into cells, organ and tissue.
- Pulmonary circulatory system- where blood circulates between the heart and lungs.

Heart is mesodermal derived organs, is situated in the thoracic cavity, in between the two lungs, slightly tilted to the left. It is protected by a double wall membrane called pericardium. Our heart has four chambers. Two upper small chambers are called atria and two lower larger chambers are called ventricles. Interatrial septum separates left and right atria from each other and interventricular septum separates left and right ventricular. The SA (sinoatrial) node generates an electrical signal that causes the upper heart chambers (atria) to contract. The signal then passes through the AV (atrioventricular) node to the lower heart chambers (ventricles), causing them to contract, or pump. The SA node is considered the pacemaker of the heart. Our heart normally beats 70 – 75 times in a minute. (At an average of 72 times per minute).

Artery: Arteries are blood vessels that carry blood away from the heart to the rest of the body. The main artery of the systemic circulation is the aorta. It is attached to the left ventricle of the heart and carries oxygenated blood. The pulmonary artery differs from the others in that it is attached to the heart's right ventricle and carries blood that is poor in oxygen to the lungs.

Vein: Veins carry deoxygenated blood from the body to the heart, where it can be sent to the lungs. The exception is the network of pulmonary veins, which take oxygenated blood from the lungs to the heart.

Capillaries: These tiny blood vessels have thin walls. Oxygen and nutrients from the blood can move through the walls and get into organs and tissues. The capillaries also take waste products away from your tissues. Capillaries are where oxygen and nutrients are exchanged for carbon dioxide and waste.

Cardiac Cycle: The cardiac cycle is defined as a sequence of alternating contraction and relaxation of the atria and ventricles in order to pump blood throughout the body. The cardiac cycle is essentially split into two phases, systole (the contraction phase) and diastole (the relaxation phase). They occur as the heart beats, pumping blood through a system of blood vessels that carry blood to every part of the body. Systole occurs when the heart contracts to pump blood out, and diastole occurs when the heart relaxes after contraction. Each of these is then further divided into an atrial and ventricular component. The cardiac cycle therefore proceeds in four stages:

Learn the key concepts of Science topic - Blood

- Atrial systole: It lasts about 0.1 seconds – both atria contract and force the blood from the atria into the ventricles.
- Ventricular systole: It lasts about 0.3 seconds – both ventricles contract, blood is forced to the lungs via the pulmonary trunk, and the rest of the body via the aorta.
- Atrial diastole: Lasting about 0.7 seconds – relaxation of the atria, during which the atria fill with blood from the large veins.
- Ventricular diastole: It lasts about 0.5 seconds – begins before atrial systole, allowing the ventricles to fill passively with blood from the atria.

The cardiac cycle comprises a complete relaxation and contraction of both the atria and ventricles, and lasts approximately 0.8 seconds. During a cardiac cycle, each ventricle pumps out approximately 70 ml of blood which is called **stroke volume**. The stroke volume multiplied by the heart rate gives the cardiac output. Cardiac output can be defined as the volume of the blood pumped out by each ventricle per minute and average 5000 ml or 5 litres. During each cardiac cycle Two prominent sounds are produced which can be easily heard through a stethoscope. The first sound of the heart lub is associated with closure of the tricuspid and bicuspid valves. The second sound dub is associated with the closure of the semilunar valves.

Different types of blood pressure

Systolic Blood Pressure:

During a heartbeat, the heart is pushing blood out into the arteries. This process is called “systole,” and that’s why it’s called the systolic blood pressure. It’s the pressure during a heartbeat and the highest pressure measured. When the reading is 120 mmHg or a little below while a person is sitting quietly at rest, the systolic blood pressure is considered normal High systolic blood pressure is usually caused by narrowing of the arteries, which makes the heart to work harder to push blood through.

Diastolic Blood Pressure:

Diastole occurs when the heart relaxes after contraction. Diastolic blood pressure is the measurement during this pause before the next heartbeat. A normal diastolic blood pressure during quiet rest is 80 mmHg or a little below, if you have high blood pressure, the diastolic number is often higher even during quiet rest.

Pulse Pressure: Pulse pressure is different between systolic and diastolic pressure. A normal pulse pressure range is between 40 and 60 mm Hg. Example: If blood pressure is 120/80 mmHg, pulse pressure would be $120 - 80 = 40$

Electrocardiogram (ECG): ECG is a graphical representation of the electrical activity of the heart during a cardiac cycle. Each peak in the ECG is identified with a letter from P to T that corresponds to a specific electrical activity of the heart. P wave represents the electrical depolarisation of the atria which leads to the contraction of both the atria. The QRS complex represents the depolarisation of the ventricles which initiates the ventricular contraction. The contraction starts shortly after Q and makes the beginning of the systole. The wave represents the return of the ventricles from excited to normal state (repolarisation). The end of the T wave makes the end of systole.



STUDY CONTENTS THAT GET YOU SELECTED

**FREE
PDF**



5 LAKH+ STUDENTS
Already enrolled with our
selection focused courses.



30+ EXPERT INSTRUCTORS
Our instructors are the best
In the industry



10000+ HOURS OF VIDEOS
All videos are well-explained for you
to get every bit out of the videos

Learn the key concepts of Science topic - Blood

Atherosclerosis: Plaque (fatty deposits) build up in your arteries is called atherosclerosis. Deposits are made up of cholesterol, fatty substances, cellular waste products, calcium and fibrin (a clotting material in the blood).

Blood is a vital fluid that circulates throughout the body. It is made up of plasma, red blood cells, white blood cells, and platelets. Blood transports oxygen and nutrients to cells and carries away waste products. It also helps to fight infection and to clot wounds. This was all about Blood. Hope you find this blog interesting. Stay with us for more such blogs.



Follow us on



Address : 1997, Mukherjee Nagar, 110009

Email : online@kdcampus.org

Call : +91 95551 08888

Download the App

