

1. Child death may occur in the marriage of

- (a) Rh⁺ ve man and Rh⁺ ve man (b) Rh⁺ ve man and Rh⁻ ve woman
(c) Rh⁻ ve man and Rh⁻ ve woman (d) Rh⁻ ve man and Rh⁺ ve woman.

Answer and Explanation:

1. (b): Rh factor plays a crucial role in child's birth born out of a marriage between Rh woman and a Rh- man. In such a case, the mother becomes sensitive while carrying a first Rh⁺ child within her womb. The reason for such sensitivity is that some of the RBCs from the developing embryo get into the blood stream of the mother during development, causing her to produce anti-Rh antibodies. In fact, the first child of such parents is nearly normal and is delivered safely. However, if such a mother gets pregnant again, the subsequent Rh⁺ foetuses will be exposed to the anti-Rh antibodies produced by the mother. As a result serious damage to the red blood cells of the developing embryo will occur causing haemolytic disease of the newborn (HDN) or erythroblastosis foetalis. This disease leads to the death of the developing embryo before birth or after parturition.

2. Presence of RBC in urine is

- (a) alkaptonuria (b) urothiasis
(c) hematuria (d) Proteinuria.

Answer and Explanation:

(c): Presence of RBCs in the blood is known as hematuria. Alkaptonuria is the excretion of large amount of alkapton in urine which when comes in contact with light turns black. Proteinuria is the presence of proteins in the blood.

3. Sickle cell disease is characterised by

- (a) leukaemia (b) polycythemia
(c) Mental retardation (d) Haemolytic anaemia.

Answer and Explanation:

(d): Sickle cell disease is a generic term for a group of genetic disorders characterized by the predominance of haemoglobin S (Hb S). These disorders include sickle cell anemia, the sickle beta thalassemia syndromes, and hemoglobinopathies in which Hb S is in association with another abnormal haemoglobin that not only can participate in the formation of haemoglobin polymers but also is present in sufficient concentration to enable the red cells to sickle.

There are two cardinal pathophysiologic features of sickle cell disorders: chronic hemolyticanaemia and vasoocclusion (which results in ischemic tissue injury). Hemolyticanaemia may be related to repeated cycles of sickling and unsickling, which interact to produce irreversible red cell membrane changes, red cell dehydration, and erythrocyte destruction. Tissue injury is usually produced by hypoxia secondary to the obstruction of blood vessels by an accumulation of sickled erythrocytes.

4. Haemophilia is

- (a) Royal disease (b) Faulty blood clotting
(c) Both a and b (d) Mosquito having haemocoel.

Answer and Explanation:

(a): Haemophilia disease (Royal Disease) has been | quite common in the royal families of Europe. The disease spread to them through the children of Queen Victoria. The ancestors of the queen did not possess the disease, j It appears that the gene for haemophilia developed either in the germ cells of her father or herself through mutation. : Haemophilia is sex-linked disease which is also known as bleeder's disease as the patient continues to bleed even from a minor cut since he or she does not possess the natural phenomenon of blood clotting due to absence of anti haemophilic globulin or factor VIII (haemophilia- A) and plasma thromboplastin factor IX (haemophilia-B. Christmas disease) essential for it. As a result of continuous bleeding, the patient may die of blood loss.

There is no permanent cure of the disease. Haemophilia (= hemophilia) is genetically due to the presence of a recessive sex linked gene h, carried by X- chromosome.

5. Which one engulfs pathogens rapidly?

- (a) acidophils (b) monocytes
(c) basophils (d) neutrophils.

Answer and Explanation:

(d): Neutrophils, are the most abundant type of white blood cells and form an integral part of the immune system. These phagocytes are normally found in the blood stream. However, during the acute phase of inflammation, particularly as a result of bacterial infection, neutrophils leave the vasculature and migrate toward the site of inflammation in a process called chemotaxis. They are the predominant cells in pus, accounting for its whitish/ yellowish appearance. Neutrophils react within an hour of tissue injury and are the hallmark of acute inflammation. Monocytes are also phagocytes but take 7-8 hours to reach at the site of injury. Acidophils and basophils are not phagocytic in nature.

6. Tricuspid valve is found in between

- (a) sinus venosus and right auricle (b) right auricle and right ventricle
(c) left ventricle and left auricle (d) ventricle and aorta.

Answer and Explanation:

(b): The right auricle opens into the right ventricle through a wide passage, the right auriculoventricular or A-V aperture. This aperture is guarded by a one-way valve called the tricuspid valve. The valve consists of three membranous flaps which are attached to the margin of the right auriculoventricular aperture above but project freely into the ventricle below. Their free lower edges are fixed to the papillary muscles of the right ventricle by a number of tough, white cords, the chordae tendineae.

7. A person with blood group A requires blood. The blood group which can be given is

- (a) A and B (b) A and AB
(c) A and O (d) A, B, AB and O.

Answer and Explanation:

(c): Karl Landsteiner recognized four types of blood groups in human beings. The ABO blood groups are determined by the gene I having three alleles (1^A , 1^B and 1^O) In human beings, there are present two antigens A and B produced by 1^A and 1^B alleles respectively. These antigens are always present on the surface of red blood cells.

Also are present two antibodies in the plasma anti A and anti B Blood group A has antigen A and antibody B so a person having this blood group can receive blood from the person having the same blood group. Persons with blood group O have no antigens on the surface of RBCs but have both the antibodies in the plasma. Hence, these can donate blood to anyone (universal donors). However, such persons can receive blood only from those persons who have blood group O.

8. Removal of calcium from freshly collected blood would

- (a) cause delayed clotting (b) prevent clotting
(c) cause immediate clotting (d) prevent destruction of haemoglobin.

Answer and Explanation:

(b): Thromboplastin, a lipoprotein, helps in clot formation. Thromboplastin helps in the formation of an enzyme prothrombinase. This enzyme inactivates heparin and it also converts the inactive plasma protein prothrombin into its active form, thrombin. Both the changes require calcium ions. Thrombin converts fibrinogen molecule to insoluble fibrin.

The fibrin monomers polymerize to form long, sticky fibres. The fibrin threads form a fine network over the wound and trap blood corpuscles (RBCs, WBCs, platelets) to form a crust, the clot. Thus, if calcium is removed from the blood, clotting process will not occur.

9. Arteries carry oxygenated blood except

- (a) pulmonary (b) cardiac
(c) hepatic (d) systemic.

Answer and Explanation:

(a): Pulmonary artery carries the blood from the right ventricle of the heart to the lungs for oxygenation so it carries deoxygenated blood.

10. A vein possesses a large lumen because

- (a) tunica media and tunica externa form a single coat
(b) tunica interna and tunica media form a single coat
(c) tunica interna, tunica nicuiu and tunica externa are thin
(d) tunica media is a thin coat.

Answer and Explanation:

(d): Wall of a vein consists of tunic externa, tunic media and tunica interna. All these layers are also present in the wall of artery. However, in the wall of a vein, the elastic membrane of tunica interna is relatively thin, and muscle fibres and elastic fibres in tunica media are fewer. Therefore, a vein has a thinner and less elastic wall but a wider cavity than an artery of the same diameter.

11. Splenic artery arises from

- (a) anterior mesenteric artery (b) coeliac artery
(c) posterior mesenteric artery (d) intestinal artery.

Answer and Explanation:

(b): The splenic artery is the blood vessel that supplies oxygenated blood to the spleen. It branches from the coeliac artery, and follows a course superior to the pancreas. The coeliac artery is the first major branch of the abdominal aorta and branches from the aorta around the level of the T12 vertebra in humans. It is one of three anterior/ midline branches of the abdominal aorta.

12. Wall of blood capillary is formed of

- (a) haemocytes (b) parietal cells
(c) endothelial cells (d) oxyntic cells.

Answer and Explanation:

(c): The wall of capillaries is very thin (usually less than one micron) and have numerous minute pores and made up of only endothelium. Exchange-of material takes place between blood and tissue fluid across the endothelial membrane of capillaries through active diffusion.

The wall of blood vessels (arteries and veins) is made up of mainly 3 layers – the outer external has connective tissue, collagen fibres, lymph vessels and the middle tunica media has circular smooth muscle fibres some elastic fibres and the inner most tunica interna in a single layered endothelium of polyhedral squamous cells. If the arteries reach organs they form arterioles which are thinner and mainly consist smooth muscles and when they subdivide in the tissues they make capillaries.

13. Carbonic anhydrase occurs in

- (a) lymphocytes (b) blood plasma
(c) RBC (d) leucocytes.

Answer and Explanation:

(c): During transport of CO₂ in the blood, about 70% of CO₂, released by respiring tissue cells is transported as bicarbonate ions. It diffuses into the plasma and then into the RBCs. Here, CO₂ combines with water to form carbonic acid. This reaction is catalyzed by a zinc containing enzyme carbonic anhydrase. Carbonic- acid dissociates into bicarbonate and hydrogen ions. A small amount of bicarbonate ions is transported in the RBCs, whereas most of them diffuse into the plasma to be carried by it.

14. Blood group AB has

- (a) no antigen (b) no antibody
(c) neither antigen nor antibody (d) both antigen and antibody.

Answer and Explanation:

(b): ABO blood groups are determined by the gene I (isoagglutinin). There are three alleles, I^A , I^B and I^O of this gene. Proteins produced by the I^A and I^B alleles are called A antigen and B antigen. People with blood group A have the A antigen on the surface of their RBCs, and antibodies to antigen B in their plasma.

Persons with blood group B have B antigen on their RBCs, and antibodies against A antigen in their plasma, individuals with AB blood group have both antigen A and antigen B on their RBCs, and no antibodies for either of the antigens in their plasma. Type O individuals are without A and B antigens on their RBCs, but have antibodies for both these antigens in their plasma.

15. Cells formed in bone marrow include

- (a) RBC (b) RBC and leucocytes
(c) leucocytes (d) lymphocytes.

Answer and Explanation:

(b): In the embryo and foetal stage of vertebrates, RBCs and leucocytes are formed in the bone marrow, lymph nodes, yolk sac, liver, spleen and thymus but after birth they are formed in red bone marrow only.

16. Blood capillaries are made of

- (a) endothelium, connective tissue and muscle fibres
(b) endothelium and muscle fibres
(c) endothelium and connective tissue
(d) endothelium only.

17. Cells involved in immune mechanism are

- (a) erythrocytes (b) lymphocytes
(c) eosinophils (d) thrombocytes.

Answer and Explanation:

(b): The resistance that an individual acquires during life, is called acquired immunity. Two major groups of cells are involved in acquired immunity: lymphocytes and antigen presenting cells. A healthy person has about a trillion lymphocytes. Lymphocytes are of two types: T lymphocytes or T cells and B lymphocytes or B cells. Both types of lymphocytes and other cells of the immune system are produced in the bone marrow.

18. The pace setter in the heart is called

- (a) sino-atrial node (SAN)
- (b) atrio-ventricular node (AVN)
- (c) Purkinje fibres
- (d) papillary muscle.

Answer and Explanation:

(b): AV (atrioventricular) node is a mass of modified heart muscle situated in the lower middle part of the right atrium. It receives the impulse to contract from the SA node via the atria and transmits it through the atrioventricular bundles to the ventricles. AV node is called the pace setter. Here, the impulses are delayed for 0.1 second to ensure that the auricles will contract first and empty fully before the ventricles contract.

19. The heart sound dup is produced when

- (a) mitral valve is closed
- (b) semi-lunar valves at the base of aorta get closed
- (c) tricuspid valve is opened
- (d) mitral valve is opened.

Answer and Explanation:

(b): The “dup” sound is produced by the closure of the semilunar valves at the start of ventricular relaxation. It lasts for 0.1 seconds and its principle frequency is 50 cycles/sec. It is higher pitched, louder, sharper and of short duration as compared to ‘lub’. The semilunar valves close to prevent any backflow of blood from aorta to the ventricles.

20. The main reason why antibodies could not solve all the problems of bacteria mediated disease is

- (a) decreased efficiency of the immune system
- (b) insensitivity of the individual following prolonged exposure to antibiotics
- (c) development of mutant strains resistant to antibodies
- (d) inactivation of antibiotics by bacterial enzymes.

Answer and Explanation:

(c): Bacteria develop mutant strains that become resistant to antibodies, so these antibodies become incapable of removing bacteria mediated diseases.

21. Antigens are present

- (a) inside the cytoplasm
- (b) on nuclear membrane
- (c) inside the nucleus
- (d) on cell surface.

22. In veins, valves are present to check backward flow of blood flowing at

- (a) atmospheric pressure
- (b) high pressure
- (c) low pressure
- (d) all of these.

Answer and Explanation:

(c): Veins carry blood at low pressure as compared to blood carried by arteries. Arteries carry blood from the heart whose function is to pump blood at high pressure so that blood can reach each and every part of the body. Veins carry blood from tissues to the heart, so they carry blood at low pressure. Valves are present in the veins to prevent backflow of blood due to force of gravity.

23. The lymph serves to

- (a) return the interstitial fluid to the blood
- (b) return the WBCs and RBCs to the lymph nodes
- (c) transport CO₂ to the lungs
- (d) transport O₂ to the brain.

Answer and Explanation:

(a): Lymph (also called tissue fluid in the intercellular spaces) is the colourless liquid found within the lymphatic system. An important function of lymph is to return interstitial fluid back to the blood. The interstitial fluid is the filtered form of the blood without the cellular components and plasma proteins. It consists of water containing dissolved materials. It receives CO₂, nitrogenous waste products, hormones and other synthetic substances from the tissue cells and enters the lymph capillaries to discharge them into blood.

24. The correct route through which pulse-making impulse travels in the heart is

- (a) SA node → Purkinje fibres → bundle of His → AV node → heart muscles
- (b) SA node → AV node → bundle of His → Purkinje fibres → heart muscles
- (c) AV node → bundle of His → SA node → Purkinje fibres → heart muscles
- (d) AV node → SA node → Purkinje fibres → bundle of His → heart muscles.

Answer and Explanation:

(b): The heart beat results from an action potential generated at SA node which is located in the wall of the right auricle. The wave of depolarization is then passed to AV node, located in the wall between the right auricle and right ventricle.

The bundle of His originates from AV node and passes downward, dividing into the right and left bundle branches, one going into the wall of each ventricle. In the walls, the two branches break up into a large number of Purkinje fibres that are distributed to the entire musculature of the ventricles. This shows that the pulse making impulse travels in the heart in the following order.

25. Antibodies are produced by

- (a) leucocytes (b) monocytes
(c) lymphocytes (d) spleen.

Answer and Explanation:

(c): Lymphocytes [type of leucocytes (WBCs)] secrete antibodies to destroy microbes and their toxins, reject grafts and kill tumor cells. Antibodies are protein in nature. Monocytes (type of WBC) is phagocytic in nature and engulf bacteria and cellular debris. Spleen is an organ that produces lymphocytes.

26. The interferons are

- (a) antigen proteins (b) antiviral proteins
(c) antibiotic proteins (d) all of these.

Answer and Explanation:

(b): Interferons are antiviral proteins that increase the resistance of a cell to attack by viruses. In humans, three groups of interferons have been discovered: α -interferons from WBCs, β -interferons from connective tissue fibroblasts and γ -interferons from lymphocytes.