

## TRANSPORT IN ANIMALS

1. Carboxyhaemoglobin
2. Blood group **A** has antigens **A** on red blood cells and antibodies **b** in plasma. Recipient's blood group **B** has **B** antigens and **a** antibodies. When blood group **A** from donor is transferred antigen **A** will react with antibody **a** in the recipient's blood. Clumping or agglutination of the red blood cells will take place: the clumped red blood cells block capillaries and this hinders the flow of blood and may result in death.
3. In a closed circulatory system, blood flow is confined to enclosed vessels while in open circulation blood is not confined to vessels but flows in cavities (sinuses) and is in direct contact with tissues.
4.
  - a)
    - i) Arthropoda
    - ii) Chordata
  - b) When blood is confined within vessels, it generates high pressure. This results in a faster rate of circulation, over long distances, ensuring efficient transportation of material e.g nutrient to all parts of the body, which renders the animals more active than those with open circulatory system.
5.
  - i) They contain haemoglobin, a molecule that readily combine with oxygen.
  - ii) They are biconcave discs without a nucleus, allowing more haemoglobin to be packed in cells so that each cell can carry more oxygen.
6.
  - a)
    - i) - Capillaries
    - ii) - They are thin-walled (one cell thick), thus allowing diffusion of materials.

- b) - Have a small diameter to increase pressure thus allow materials to diffuse out.
  - They are intimately associated with tissues in order to allow exchange of materials
  - They are numerous- to provide a large surface area for exchange of materials.
  - c) i) Pulmonary arterioles contain more carbon dioxide than pulmonary venules.
  - ii) Pulmonary arterioles contain less oxygen than pulmonary venules.
7. It does not dissociate easily hence leads to suffocation
8. i) They contain haemoglobin, a molecule that readily combine with oxygen.
- ii) They are biconcave discs without a nucleus, allowing more haemoglobin to be packed in cells so that each cell can carry more oxygen.
9. i) Platelets (Thrombocytes)
- ii) Calcium,  $\text{Ca}^{2+}$
- iii) Fibrin.
10. a) Anemia/low blood volume/low haemoglobin leading to low oxygen, loss of nutrients and dehydration.
- b) Blood clotting
- c) Transfusion, taking fluids/eating iron in foodstuff/taking iron tablets.
11. a) - Thrombosis
- Arteriosclerosis

- Varicose veins
- b) - Regulate body temperature
- Regulate pH of fluids
- Regulate osmotic pressure
- 12. a) Presence of valves
- b) - Have biconcave shape to increase surface area for absorption of gases.
- Absence of nucleus and other organelles
- To increase packaging of haemoglobin.
- Presence of red pigment haemoglobin that has high affinity for oxygen.
- 13. - During birth
- Breast feeding
- 14. - Red blood cells have a biconcave shape, which increases the surface area for gaseous exchange. They have a thin plasma membrane, which allows rapid diffusion of gases. They contain haemoglobin, which readily combines with oxygen in areas of high oxygen tension (lungs) and releases it readily in areas of low oxygen tension (other body tissues). They have no organelles with whole internal space being filled with haemoglobin. They contain the enzyme carbonic anhydrase which help in the transport of carbon dioxide.
- Some white blood cells are phagocytic which enables them to engulf and destroy invading micro-organisms. They are also capable of amoeboid motion, which enables them to squeeze between cells of the capillary wall and into infected tissues where they proceed to engulf invading micro-organisms other

white blood cells called lymphocytes are able to recognize antigens of invading micro-organism and to form antibodies against them.

- Platelets are able to aggregate at the site of a damaged blood vessel forming a temporary platelet plug which stops blood loss. They also produce the substance called thromboplastin which initiates the blood clotting mechanism.
- Plasma is composed mainly of water which is a solvent for a large variety of substance. This enables it to act as a medium for transport of a large number of water soluble substances. It has a high heat capacity that enables it to transport heat from highly active tissues to the rest of the body.

15. Blood: Tissues which consist of a liquid part called plasma in which several types of cells are suspended.

Plasma: Liquid part of the blood

Serum: Plasma from which the blood clotting protein called fibrinogen has been removed. It does not clot.

Tissue fluid: Liquid part of blood without plasma proteins. It is derived from the blood by the process of ultra filtration.

Lymph: is a tissue fluid, which drains into lymphatic vessels instead of going back into the blood vessels.

16. a) The patient's red blood cells have antigen A on their membrane and his plasma has anti-b antibodies .

The donor's red blood cells have antigen B on their membrane and his plasma has anti-a antibodies. After transfusion, the anti-b antibodies in the patient's plasma reacted with B antigens on the donor's red blood cell membrane. This led to clumping together of the donor red blood cells a process called haemagglutination. This may have caused blockage of capillaries in a vital organ like the heart or brain leading to death.

- b) i) A,B,AB,O
- ii) He is universal recipient. His plasma' lacks antibodies.

17. Active immunity-that is produced when an animal's body reacts to an antigen by producing antibodies.

Passive immunity- Immunity that is produced when antibodies are transferred from one individual to another.

18. Antibodies formed against common cold viruses remain in the body and provide immunity for only a few days. Therefore, once a person has recovered from cold, he/she is only protected for a few days. Those antibodies formed against measles virus remain in the body and provide immunity throughout the person's life. Therefore, once a person has recovered from measles, he or she is protected for life.

19. PH of blood plasma is not altered homeostasis is maintained. Within the red blood cells, there is an enzyme (carbonic anhydrase) which help in fast loading/combination and offloading/dissociation of carbon dioxide.

20. Through tissues fluid, Oxygen and other food substance pass from the blood to the cells.

Carbon dioxide waste substance passes from the cells to the blood through it.

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