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 PAPER PHYSIOLOGY

 DEPARTMENT BS RADIOLOGY 2nd semester sec(B)

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ANS1. FUNCTION AND COMPOSITION OF BLOOD.

Blood and its function.

Blood is a specialized body fluid, it has four main components, plasma, red bold cells, white blood cells, and platelets.

Function OF BLOOD.

(1) blood transports oxygen and nutrients to the lungs and tissues.

(2) forming blood clots to prevent excess blood loss.

(3) blood carry cells and antibodies that fight infection.

(4) blood bring waste products to the kidney and liver, which filter and clean the blood.

(5) blood carry nutrients from the digestive tract and storage sites to the rest of the body.

(6) hormones from the glands in which they are produced to their target cells.

(7) heat to skin so as to help regulate body temperature.

(8) blood has a ph. of 7.35-7.45, making its slightly basic (less than 7 in considered acidic).

Composition of blood.

Blood is composed of plasma, red blood cells, white blood cells and platelets.

1. plasma.

Plasma is the liquid component of blood, a mixture of water, sugar, fat, protein, And salts. the main job of plasma is to transport blood cells throughout your body along with nutrients, waste products, antibodies, clotting protein, chemical messengers such as hormones and protein that help maintain the body fluid balance.

(2) red blood cells.

 Known for their bright red color, red cells are the most abundant cell in the blood. Accounting for about 40 to 45 percent of its volume. The shape of a red blood cell is a biconcave disk with a flattened center. Production of red blood cell is controlled by erythropoietin; a hormone produces primarily by the kidneys. Red blood cells start as immature cells in the bone marrow and after approximately seven days of maturation are released into the blood stream. Red blood cells have no nucleus and can easily change shape, helping them fit through the various blood vessels in the body. Lack of a nucleus make red blood cell more flexible. The red blood cell survives on average only 120 days. Red blood cell carries a special protein called hemoglobin which helps carry oxygen from the lungs to the rest of the body and then return carbon dioxide from the body to the lungs so it can be exhaled.

 (3) white blood cells.

 White blood cell protects the body from infection. The y ae much fewer in number than red blood cells, accounting for about 1 percent of your blood. The most common type of white blood cell is the neutrophil, which is the immediate response cell and account for 55to 70 percent of the total white blood cell count. Each neutrophil lives less than a day, so your bone marrow must constantly make new neutrophil to maintain protection against infection. Transfusion of neutrophil is generally not effective since they do not remain in the body for very long. The major type of white blood cell is a lymphocyte. There are two main population of this cells. T lymphocytes help regulate the function of other immune cell and directly attack various infected cells and tumors.

 (4) platelets.

Platelets are not actually cells but rather small fragment of cells. Platelets helps the blood clotting process by gathering at the side of an injury, sticking to the lining of the injured blood vessels, and forming a platform on which blood coagulation can occur.

Ans2.erythrocyte, erythropoiesis, erythrocytosis, and erythropenia.

ERYTHROCYTE.

A cell that contains hemoglobin and carry oxygen to the body. Also called a red blood cell (RBC). the reddish color is due to the hemoglobin. erythrocytes are biconcave in shape, which increases the cell surface area and facilitates the diffusion of oxygen and carbon dioxide. this shape is maintained by a cytoskeleton composed of several proteins. Erythrocytes are very flexible and change shape when flowing through capillaries, immature erythrocytes called reticulocytes, normally account for 1-2 percent of red cells in the blood.

ERYTHROPOIESIS.

Is the process which produces red blood cells, which is the development from erythropoietic stem cell to mature red blood cell. It is stimulated by decreased o2 in circulation which is detected by kidneys, which then secrete the hormone erythropoietin. This hormone stimulates proliferation and differentiation of red cell precursors, which activates increased erythropoiesis in the hemopoietic tissues, ultimately producing red blood cells. in early fetus erythropoiesis takes place in the mesodermal cells of the yolk sac. By the third or fourth month, erythropoiesis moves to the liver after seven-month, erythropoiesis occurs in bone marrow. Increased level of physical activity can cause an increase in erythropoiesis.

The age of 20 years RBCS are produced from red bone marrow of all the bones. after the age of 20 years RBCS are produced from membranous bones such as, vertebra, the sternum, ribs, scapula’s and the iliac bones.

ERYTHROCYTOSIS.

Is the increased production of red blood cells. Erythrocytosis may be primary, and secondary.

Primary erythrocytosis.

It occurs as a result of polycythemia, a myeloproliferative neoplasm in which abnormal cells in the bone marrow produces too many red blood cells along with the excessive numbers of white blood cells and platelets., occasionally. only red blood cell production is increased.

Secondary erythrocytosis.

It develops as a result of a disorder that increases erythropoietin secretion. Erythropoietin is hormone made in the kidneys that stimulates the bone marrow to produce red blood cells. Secondary erythrocytosis is not considered a myeloproliferative neoplasm. However, it is important for doctors to look for it because both primary and secondary erythrocytosis result in too many red blood cells.

Secondary erythrocytosis has many causes. It includes.

 . smoking

 . severe lung disease.

 . birth defects of hearth

 . carbon mono oxide poisoning.

ERYHTROCYTOPENIA.

Literally means low count of RBCS. Anemia may mean low hemoglobin and or low rbc count. the thing that is most cases low hemoglobin is associated with low rbc count. However, there may be cases when the extent of decrease of rbc count and hemoglobin is not proportional. The term erythrocytopenia has this flavor of why there are less erythrocytes than normal. Decreased of rbc count may causes by secret mechanism. Low production, blood loss, or fast destruction. erythropenia is more likely to mean the situation with low production of erythrocytes. Thus, detailing the mechanism this can often be the result of some toxicity that inhibits bone marrow function or lack of erythropoietin’s (special substances that stimulates production of red blood cells in bone marrow). Particularly those that are produced in the kidneys.

Ans3. Platelets and clotting mechanism and it’s all steps.

Platelets.

Platelets are also called thrombocytes, are a component of blood whose function is to react to bleeding from blood vessel injury by clumping, thereby initiating a blood clot.

Structure.

Platelets have no nucleus, they are fragments of cytoplasm that are derived from the magakaryote of the bone marrow, which then enter the circulation.

Activated platelets have cell membrane projections covering their surface. Platelets are found only in mammals. Life span of platelets are 10 days.

Function.

. platelets help in to stop bleeding.

. platelets maintain homeostasis.

. platelets help in clotting mechanism.

Clotting mechanism and its steps.

It is the process by which blood changes from liquid toa gel, forming a blood clot.it potentially results in homeostasis, the cessation of blood loss from a damaged vessel, followed by repair. The mechanism of coagulation involves activation, adhesion, and aggregation of platelets, as well as deposition and maturation of fibrin. Coagulation begins almost instantly after an injury to the blood vessel has damaged the endothelium lining the blood vessel.

Steps of mechanism.

ADHESION.

When the injury to the blood vessel. the endothelium lining of the vessel damaged. then blood comes into the space under the endothelium underlying collagen exposed to circulating platelets.

Platelets binds with the surface receptors of collagen and adhere tightly. this is known as adhesion.

ACTIVATION.

In the activation step the platelets changes shape. It turns on receptors and secrete chemical messengers to activate and invite additional platelets. And after that activated platelets adhere tightly at the injury site.

AGGREGATION.

In aggregation platelets connect to each other through receptor bridges. Platelet plug formed and injury sites unless the interruption is physically too large.

Formation of platelet plug will ensure primary hemostasis. fibrin deposition starts and thus started secondary hemostasis. Thus, fibrin clot formed now clot retraction and platelet inhibition.

 Diagram of step of clotting mechanism

 

Ans4 note on ABO system.

 ABO blood group system.

Abo blood group system is used to denote the presence of one both, or neither, of A and B antigens on erythrocytes. In the human blood transfusion, it is the most important of the 36 different blood type. Classification system currently recognized. A mismatch in this way, any other serotype, can cause a potentially fatal adverse reaction after a transfusion, or a un wanted immune response to an organ transplant. The associated anti-A and anti-B antibodies are usually igm antibodies, produced in the first year of life by sensitization to environmental substances such as food, bacteria, and viruses.

ABO blood type was discovered by KARL LANDSTEINER in 1901, he received the noble prize in physiology or medicine in1930for the discovery.

The two most important ones are ABO and RH antigen system. they determine someone’s blood type (A, B. AB, and O) with null denoting RHD status.

RHUS factor is an inherited protein found on the surface of red blood cells. If your blood has the protein, you r RH positive. if your blood lakes the protein you r RH negative.

ABO SYSTEM

O 47 %

A 41%

B 9%

AB 3%

AGGLUTINOGENS AND AGGLUTININS

. agglutinogen on surface of RBC

. Agglutinins in blood plasma

. can cause blood transfusion reaction.

ROLE of blood group in blood transfusion

. if matched then hemolysis

. blood typing is mandatory.

 Diagram of ABO blood group system.



Ans5 Ans(A) if a person fell down from a tree and become unconscious, with bleeding, from head then if there is a serious head injury, I will call the ambulance. Till the ambulance come I encourage the injured person to minimize any movement of their head, or neck.

Scalp injuries can leed profusely, so I control any significance blood loss from the head wounds with direct pressure and dressing. I examine the wound, avoid disturbing blood cloths forming in the hair. I can Reassure the person and try to keep them calm. I can not move the person unless he is in immediate danger. Any unnecessary movement may cause grater complication to the head injury itself.

My role is to protect the injured person from any potential danger at the scene. I should also monitor his airway and breathing until the arrival of ambulance.

If the person breathing become impaired due to problem with the airway, I may need to very careful till his head back until normal breathing returns.

If the person stops breathing or has no pulse, then I give the person cardiopulmonary resuscitation (CPR) till the ambulance comes.

Ans(B). if I meet my friend and I came to know that he is covid positive. Then I first of all I will faraway from my friend up to 6 feet. It would not be considered at high risk unless my friend coughs, or sneezes directly on me. Corona virus spreads from person to person through when an infected person talks, coughs or sneeze. And after that I should self quarantine myself for 14 days, it involves me staying home and limiting my interaction with others. We understand that people can have the virus and pass it on to others even if they are nt showing any symptoms. So, in that situation self quarantine is critical to helping prevent the spread.

After that if I develop symptoms, such as, cough, fever, or shortness of breath, I can contact my healthcare provider for guidance on what to do.