

## **Review questions for Blood lecture**

### **Multiple choice review questions:**

- 1) Which one(s) of the following are dissolved in the plasma?(More than one possible answer).
  - A) glucose
  - B) Na<sup>+</sup>
  - C) K<sup>+</sup>
  - D) albumin
  
- 2) Platelets
  - A) help fight bacteria and viruses
  - B) are the largest of the formed elements and are also called megocytes.
  - C) help stop blood loss when we are cut.
  - D) are the basis classifying people into the eight major blood groups.
  
- 3) Which of the following cells is present in the blood in greatest numbers?
  - A) erythrocytes
  - B) platelets
  - C) white blood cells
  - D) plasma
  
- 4) Erythrocytes
  - A) lack a nucleus
  - B) are the blood cell that is responsible for fighting bacteria.
  - C) are produced in the heart and muscles.
  - D) carry glucose in the blood
  
- 5) Blood clotting would not occur if the plasma was deficient in
  - A) antibodies
  - B) hormones
  - C) albumin.
  - D) fibrinogen.

6) Which of the following events is the first to occur during the process of hemostasis after a blood vessel becomes injured?

- A) The vessel wall is damaged, exposing collagen proteins to the blood.
- B) The injured blood vessel is dilated by newly released chemicals to let in defense cells.
- C) Platelets become "sticky" and a platelet plug is formed near the injury site.
- D) A web of fibrin protein strands tightly interweave the platelet plug.

7) Which of the following is true?

- A) People of blood type A- have the B antigen only
- B) People of blood type B+ have the B antigen only
- C) People of blood type O- have the O antigen
- D) People of blood type O- have no antigens

8) A person whose blood type is A+ has red blood cells with \_\_\_\_\_ antigen(s), and the antigen(s) \_\_\_\_\_ is/are foreign antigens to their immune system.

- A) B and Rh                      A
- B) A and Rh                      B
- C) A only                         B and Rh
- D) B only                         A and Rh
- E) Rh only                        A and B

**Answers to multiple choice questions:**

- 1 = A, B, C, D
- 2 = C
- 3 = A
- 4 = A
- 5 = D
- 6 = A
- 7 = D
- 8 = B

**Fill-in-the-blank review questions:**

- 1) Of the four major tissue types of the body, blood is classified as a type of \_\_\_\_\_ tissue.
- 2) Although it varies with body weight, normal blood volume is approximately \_\_\_\_\_ liters.
- 3) Blood consists of two major parts: Living cells, called the \_\_\_\_\_, and a straw-colored fluid matrix (consisting of water with many dissolved solutes) called \_\_\_\_\_.

- 4) Blood that has been centrifuged separates into two major layers: \_\_\_\_\_ on top and \_\_\_\_\_ on the bottom.
- 5) A major function of blood is the delivery of \_\_\_\_\_ and \_\_\_\_\_ to cells, which are needed for cellular aerobic respiration.
- 6) A major function of blood is the removal of \_\_\_\_\_, a waste gas produced by cellular aerobic respiration.
- 7) The plasma is about \_\_\_\_\_ % of the blood's volume and the formed elements are about \_\_\_\_\_% of the blood's volume.
- 8) Blood plasma is 90% \_\_\_\_\_ (a molecule), but it also contains dissolved nutrients, gases, hormones, wastes, products of cell activity, ions, and proteins.
- 9) Name any two ions found in the plasma.
- 10) Name the major cellular energy-providing organic molecule found in the plasma: \_\_\_\_\_
- 11) Name the major gas that is transported in the plasma (not inside blood cells).
- 12) The most abundant protein found in blood plasma is: \_\_\_\_\_. It is for osmotic balance and pH buffering.
- 13) In addition to albumin protein, the blood contains large amounts of \_\_\_\_\_ which are proteins needed to protect the body from invaders, and \_\_\_\_\_ proteins which are needed for blood clotting.
- 14) Among the many solutes dissolved in the plasma are \_\_\_\_\_, which are signal molecules that travel in the blood.
- 15) What is the term for the cells of blood tissue? \_\_\_\_\_ (Two words)
- 16) The three formed elements of the blood are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- 17) \_\_\_\_\_ are blood cells that are biconcave in shape. They lack nuclei and most organelles. These cells are also called \_\_\_\_\_ cells. Their major function is to carry the \_\_\_\_\_ using a protein called \_\_\_\_\_.
- 20) The blood cells which are part of the immune system are the \_\_\_\_\_, also known as the \_\_\_\_\_.
- 21) There are \_\_\_\_\_ major types of white blood cells.
- 22) Platelets are the smallest of the formed elements and play a major role in the process of \_\_\_\_\_.
- 23) Each hemoglobin protein contains \_\_\_\_\_ to help the hemoglobin carry oxygen.

- 25) Which one(s) of the three formed elements is/are formed in the red marrow? \_\_\_\_\_
- 27) Blood cell formation occurs in the \_\_\_\_\_ (a tissue) of \_\_\_\_\_ (a type of organ).
- 28) Name the bones where most blood cells are produced in adults: \_\_\_\_\_
- 29) The formation of erythrocytes is controlled by the hormone \_\_\_\_\_, most of which is produced by the \_\_\_\_\_ (organs) in response to a low supply of oxygen.
- 30) If there are too few erythrocytes in one's blood, then the person will have a disorder known as \_\_\_\_\_.
- 31) Anemia may be due to an insufficient number of \_\_\_\_\_ (e.g., after a loss of blood), or an insufficient amount of \_\_\_\_\_ metal in the diet, or \_\_\_\_\_ (often as a treatment for cancer), or \_\_\_\_\_ diseases, such as sickle-cell anemia, that cause RBCs to burst.
- 34) The formation of white blood cells is primarily controlled by the hormones \_\_\_\_\_ and \_\_\_\_\_.
- 37) \_\_\_\_\_ is the term for all the events that slow down then stop blood loss after damage to a blood vessel.
- 38) \_\_\_\_\_ cells are critical for starting and carrying out the hemostasis process.
- 39) Platelets bind tightly to any \_\_\_\_\_ they happen to encounter. This protein is normally not accessible to platelets, since it is in the outer \_\_\_\_\_ (a tissue) layer of the blood vessel wall, but not in the inner \_\_\_\_\_ (a tissue) layer.
- 41) \_\_\_\_\_ is the body's first step in hemostasis. This slows blood flow through the broken vessel by making the vessel smaller.
- 43) The second step in hemostasis is forming a temporary seal where a blood vessel has broken, called the \_\_\_\_\_.
- 44) The final step in hemostasis is filling the vessel break with a solid clump of protein fibers and RBCs. The clump is called a \_\_\_\_\_ and its formation is called \_\_\_\_\_.
- 45) One of the last steps in blood clotting is conversion of prothrombin to the active enzyme \_\_\_\_\_, which then forms a mesh of \_\_\_\_\_ protein that traps RBCs. The protein that traps the RBCs is made from smaller blood proteins called \_\_\_\_\_.
- 46) \_\_\_\_\_ is the name for all the plasma proteins that are involved in the clotting process.

50) Place the events of hemostasis in their proper order by writing numbers in the blank space after each event. Write 1 for the first event, 2 for the second event, etc.

- \_\_\_\_\_ Prothrombin converted to thrombin
- \_\_\_\_\_ Passing RBCs are trapped
- \_\_\_\_\_ Platelets stick to each other
- \_\_\_\_\_ Fibrin produced from fibrinogen
- \_\_\_\_\_ Blood vessel constricts

51) Vitamin \_\_\_\_\_ is needed by the \_\_\_\_\_ (an organ) for the formation of many clotting factors.

52) The liquid left in a blood sample after a clot forms is called \_\_\_\_\_.

53) The term \_\_\_\_\_ means the disease caused by genetic lack of a clotting factor.

54) Common causes of bleeding disorders are deficiency in \_\_\_\_\_ (a formed element), failure of the liver to synthesize clotting factors because of lack of vitamin \_\_\_\_\_, or a genetic defect in one or more of the clotting factors (called “\_\_\_\_\_”).

55) A blood clot that develops in an unbroken blood vessel is called a(n) \_\_\_\_\_. It may or may not become large enough to block the vessel.

56) Anything that blocks a blood vessel (such as a thrombus that breaks free of its original site and travels through the bloodstream until it wedges itself into a vessel too small for it to traverse) is called a(n) \_\_\_\_\_.

57) An embolism (such as a dislodged thrombus) that is blocking a blood vessel will cause tissue hypoxia and possibly tissue death. If this happens in the heart it is called a \_\_\_\_\_. If it happens in the brain it is called a \_\_\_\_\_.

58) Blood thinners are substances that inhibit \_\_\_\_\_. They are often given to people at risk for a heart attack.

59) \_\_\_\_\_ is a common, over-the-counter drug which is a blood thinner. Two common prescription blood thinners are \_\_\_\_\_ and \_\_\_\_\_.

60) Any molecules on cells that the immune system interacts with are called \_\_\_\_\_. They are usually proteins, carbohydrates, or lipids on the surface of a cell.

61) Molecules on cells that the immune system interacts with but does not attack (because the molecules occur naturally as part of the organism) are called \_\_\_\_\_.

62) Molecules on cells that the immune system interacts with and attacks (because the molecules do not occur naturally as part of the organism) are called \_\_\_\_\_.

63) Humans have different \_\_\_\_\_ because of differing antigens on their erythrocytes. These antigens cause such severe immune reactions that a transfusion mismatch can be fatal.

- 64) The medicines that dissolve blood clots are called \_\_\_\_\_.
- 65) In addition to the A and B antigens, erythrocytes may also carry another antigen known as the \_\_\_\_\_ antigen.
- 66) A transfusion mismatch can be fatal because the erythrocytes with the foreign antigens \_\_\_\_\_.
- 67) Pete is blood type B-. Which blood types could he always receive safely? Each of your answers must be a complete blood type, such as B- for example.
- 69) Sean is blood type O+. What blood type(s) can he always safely receive as transfusions? Give full blood types as answers.
- 71) Blood type \_\_\_\_\_ is considered the "universal donor" (can be safely given to everyone) because it lacks any antigens. (Give the full blood type).
- 72) People of blood type \_\_\_\_\_ are considered the "universal acceptors" (They can be safely receive any blood type) because all antigens are self antigens to them. (Give the full blood type).
- 73) List the eight major blood groups. Give full blood types as answers.

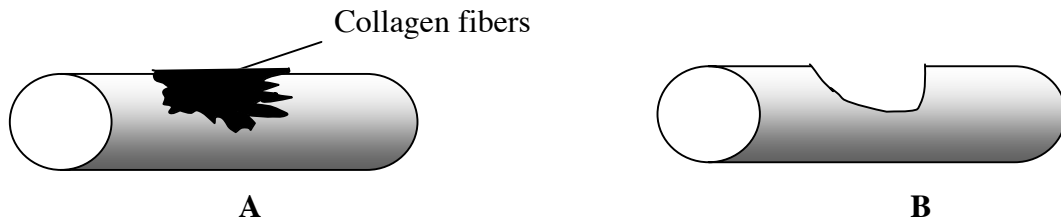
**Answers to fill-in-the-blank review questions:**

- |                               |                               |
|-------------------------------|-------------------------------|
| 1) Connective                 | 13) Antibodies                |
| 2) Five liters                | Clotting factors              |
| 3) Formed elements            | 14) Hormones                  |
| Plasma                        | 15) Formed elements           |
| 4) Plasma                     | 16) Red blood cells           |
| Formed elements               | White blood cells             |
| 5) Oxygen                     | Platelets                     |
| Glucose                       | 17) Red blood cells           |
| 6) Carbon dioxide             | Erythrocytes                  |
| 7) 55%                        | Oxygen                        |
| 45%                           | Hemoglobin                    |
| 8) Water                      | 20) White blood cells         |
| 9) Any two ions listed below: | Leukocytes                    |
| Na <sup>+</sup>               | 21) Five                      |
| K <sup>+</sup>                | 22) Hemostasis                |
| Ca <sup>+</sup>               | 23) Iron                      |
| Cl <sup>-</sup>               | 25) All three formed elements |
| H <sup>+</sup>                | 27) Red marrow                |
| HCO <sub>3</sub> <sup>+</sup> | Bones                         |
| 10) Glucose                   |                               |
| 11) Carbon dioxide            |                               |
| 12) Albumin                   | 28) Sternum                   |

- Ribs
- Skull
- Pelvis
- 29) Erythropoietin
  - Kidneys
- 30) Anemia
- 31) Red blood cells
  - Iron
  - Chemotherapy
  - Hemolytic
- 34) Interleukin
  - Cytokines
- 37) Hemostasis
- 38) Platelet
- 39) Collagen
  - Connective tissue
  - Epithelial
- 41) Vasoconstriction
- 43) Platelet plug
- 44) Blood clot
  - Coagulation
- 45) Thrombin
  - Fibrin
  - Fibrinogen
- 46) Clotting factors
- 50) 3
  - 5
  - 2
  - 4
  - 1
- 51) K
  - Liver
- 52) Serum
- 53) Hemophilia
- 54) Platelets
  - K
  - Hemophilia
- 55) Thrombus
- 56) Embolism
- 57) Heart attack or myocardial infarction
  - Stroke or cerebrovascular accident
- 58) Blood clotting
- 59) Aspirin
  - Coumadin
  - Warfarin
- 60) Antigens
- 61) Self antigens
- 62) Foreign antigens
- 63) Blood types
- 64) Thrombolytic medicines
- 65) Rh factor
- 66) Become lysed and their debris logs blood
  - vessels
- 67) B-
  - O-
- 69) O+
  - O-
- 71) O-
- 72) AB+
- 73) A+
  - A-
  - B+
  - B-
  - AB+
  - AB-
  - O+
  - O-

**Short answer review questions:**

- 1) Name three major plasma proteins and describe the function of each one.
- 2) Name the formed element that contains iron and explain why it needs iron.
- 3) Name two possible causes of anemia.
- 4) What is the difference between hemostasis and blood clotting?
- 6) One person is cut in a way that tears a jagged hole in the wall of a blood vessel (see picture A). Another person is cut in a way that makes a smooth clean hole in the wall of a blood vessel (see picture B). Assuming that the holes are the exact same size, which person's blood would clot first? Justify your answer using hemostasis concepts.



- 7) List the events in the body that lead to death when a patient receives a transfusion mismatch. Your list should include specific organs that are damaged.
- 8) What do the terms “positive” and “negative” refer to in blood types?

**Answers to short answer review questions:**

- 1) Albumin protein is the most abundant plasma protein. Its main functions are osmotic balance and buffering. Antibodies are another abundant plasma protein. They are part of the immune system and are therefore involved in defending the body from invasion. Clotting factors are another type of plasma protein. They are involved in coagulation of the blood when a blood vessel is damaged.
- 2) Red blood cells (erythrocytes) contain iron. The iron is used to carry oxygen since iron has a natural affinity for oxygen.
- 3) Anemia can be caused by low iron in the diet, loss of RBCs by bleeding or hemolysis, and chemotherapy drugs.



- 4) Blood clotting is just one part of hemostasis. Hemostasis also includes vasoconstriction and platelet plug formation.
- 6) Blood vessel A has more exposed collagen fibers. Since exposure to collagen fibers is what triggers the platelets to begin hemostasis, blood vessel A would clot first.
- 7) A transfusion mismatch is when a patient receives blood containing a foreign antigen to that patient. The patient's immune system attacks and breaks apart the transfused RBCs that have the foreign antigen. The debris from the RBCs clogs many of the patient's blood vessels, causing embolisms throughout the body.
- 8) Positive means that the Rh antigen is present on the person's RBCs. Negative means that the Rh antigen is not present.