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Question: 1

A deficiency of which of the following causes decreased prothrombin levels and abnormal bleeding time?

- A. Vitamin C
- B. Riboflavin
- C. Choline
- D. Vitamin K

Answer: D

Explanation:

Vitamin K deficiency causes decreases in prothrombin as well as other clotting factors. This can cause defective clotting and prolonged bleeding. Vitamin C and riboflavin (vitamin B₂) deficiencies do not affect coagulation factors. Choline is an essential nutrient, but it does not affect coagulation factors.

Question: 2

The removal of aging erythrocytes from circulation by macrophages releases iron. What then recycles the iron and transports it back to the bone marrow?

- A. Transferrin
- B. Hepcidin
- C. Haptoglobin
- D. Ferritin

Answer: A

Explanation:

Transferrin is a protein that transports iron. In the normal process of erythrocyte degradation, iron is recycled and transported back to the bone marrow by transferrin. Hepcidin is a hormone that regulates the GI tract's absorption of iron as well as the release of iron from the spleen. Haptoglobin is a protein that removes extracellular hemoglobin from circulation. Ferritin is a protein that stores iron.

Question: 3

Which hormone is produced by the kidneys in response to hypoxemia?

- A. ADH
- B. Aldosterone
- C. IGF-I
- D. EPO

Answer: D

Explanation:

EPO (erythropoietin) is produced by the kidneys in response to hypoxemia, stimulating the bone marrow's production of erythrocytes. ADH (Antidiuretic hormone) is a hormone produced by the hypothalamus that regulates water retention and excretion through the kidneys. Aldosterone is a hormone produced by the adrenal glands located on top of the kidneys. It plays a role in both blood pressure and electrolyte regulation. IGF-I (insulin-like growth factor) is a hormone produced by the liver that stimulates growth.

Question: 4

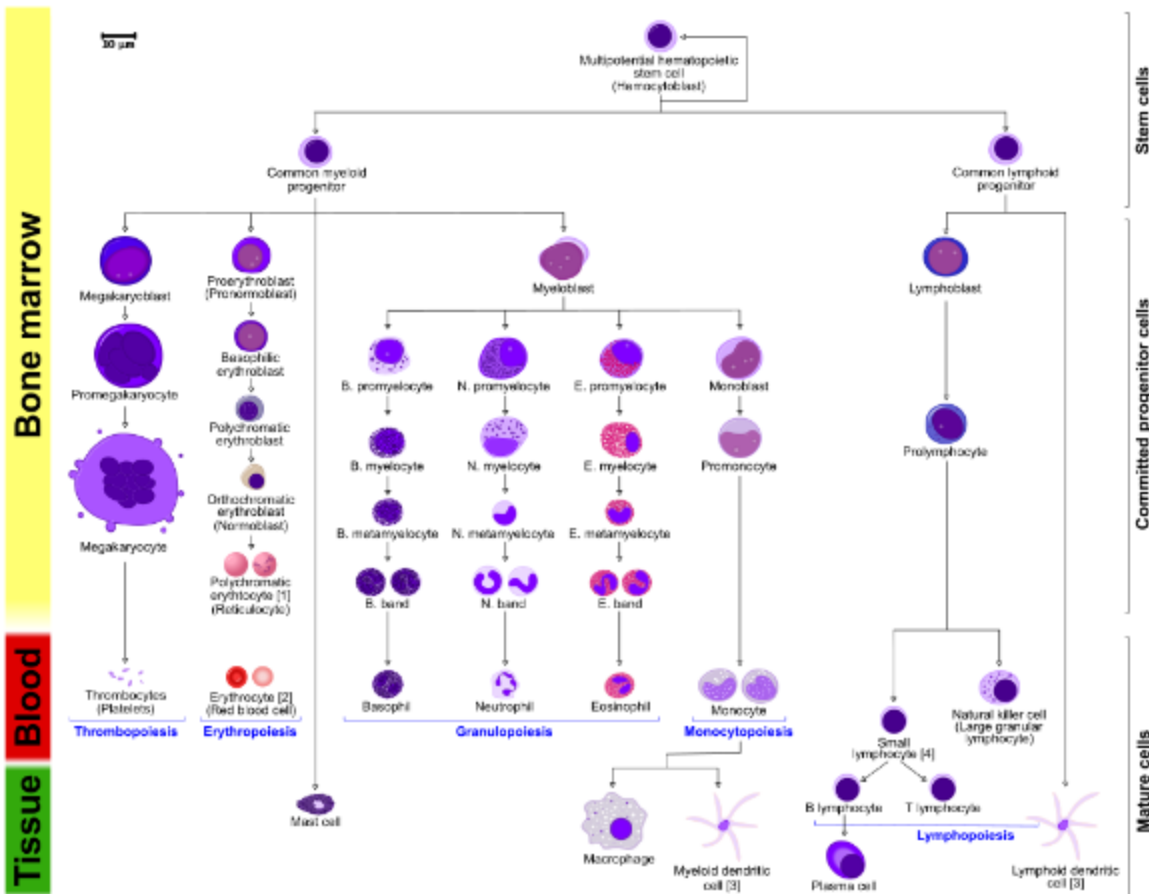
Common myeloid progenitor cells in the bone marrow give rise to many different cells. Which of the following cells is NOT a product of the differentiation of the common myeloid progenitor cell?

- A. Megakaryocyte
- B. NK cell
- C. Erythrocyte
- D. Promonocyte

Answer: B

Explanation:

The NK (natural killer) cell is a product of the differentiation of the common lymphoid progenitor cell. Megakaryocytes, erythrocytes, and promonocytes are all products of the differentiation of common myeloid progenitor cells.



Question: 5

Therapeutic phlebotomy treatment of polycythemia vera can cause what type of anemia?

- A. Sideroblastic anemia
- B. Iron deficiency anemia
- C. Megaloblastic anemia
- D. Pernicious anemia

Answer: B

Explanation:

Polycythemia vera is a type of myeloproliferative neoplasm in which there is an overproduction of erythrocytes, thrombocytes, and leukocytes, or sometimes just erythrocytes. Therapeutic phlebotomy treatment to remove excess erythrocytes puts the patient at increased risk of developing iron deficiency anemia due to the increased loss of iron through phlebotomy. Sideroblastic anemia affects the body's ability to utilize iron to produce hemoglobin, resulting in iron deposits. Megaloblastic anemia is caused by impaired DNA synthesis, which can develop due to deficiencies in vitamin B12 or folate. Pernicious anemia is caused by a lack of vitamin B12 that leads to a decrease in the production of erythrocytes.

Question: 6

Schistocytes are a key morphological finding associated with what condition?

- A. Thrombotic thrombocytopenic purpura
- B. Sickle cell anemia
- C. G6PD deficiency
- D. Hereditary spherocytosis

Answer: A

Explanation:

Thrombotic thrombocytopenic purpura (TTP) causes mechanical damage to erythrocytes due to the aggregation of platelets and resulting microvascular thrombi. This makes the presence of schistocytes a key finding on the peripheral slide for the diagnosis of TTP. Small numbers of schistocytes can also be present in normal samples, as well as in patients with diseases such as chronic renal failure and diabetic microangiopathy. They are also commonly found in patients with prosthetic heart valves. Sickle cell anemia's key morphological finding is, as the name suggests, sickle-shaped erythrocytes. G6PD deficiency is an RBC enzymopathy that results in a normocytic, normochromic anemia with no specific morphological findings. Hereditary spherocytosis is associated with morphological findings of spherocytes, acanthocytes, and polychromatophilic macrocytosis.

Question: 7

Which coagulation factors would be affected by anticoagulant therapy with warfarin?

- A. Factors I, III, and XII
- B. Factors II, V, and IX
- C. Factors VII, VIII, and vWF
- D. Factors I, V, and XI

Answer: B

Explanation:

Warfarin is an anticoagulant that inhibits the synthesis of vitamin K dependent clotting factors. Factors II, V, and IX are vitamin K dependent.

Vitamin K dependent	NOT Vitamin K dependent
Factor II (Prothrombin)	Factor I (Fibrinogen)
Factor V (Proaccelerin)	Factor III (Thromboplastin)
Factor VII (Proconvertin)	Factor IV (Ionized calcium)
Factor IX (Antihemophilic factor B)	Factor VIII (Antihemophilic factor A)
Factor X (Stuart-Prower factor)	Factor XI (Plasma thromboplastin antecedent)
Protein S	Factor XII (Hageman factor)
Protein C	Factor XIII (Fibrin stabilizing factor)
	vWF (von Willebrand factor)

Question: 8

Immunoglobulin M primarily exists in what structural formation?

- A. Dimeric
- B. Quaternary
- C. Pentamer
- D. Monomer

Answer: C

Explanation:

IgM primarily exists as a pentamer—a structure composed of five monomers. This large structural formation is what gives IgM its high molecular weight. IgM can exist as a monomer but is expressed on the cell membrane of B lymphocytes. The other immunoglobulins all exist as monomers, and IgA exists in both monomer forms and dimeric forms. There are chemical quaternary polymers, but no immunoglobulin polymers exist in quaternary structure.

Question: 9

Type I hypersensitivity anaphylaxis is mediated by which immunoglobulin?

- A. IgG
- B. IgE
- C. IgA
- D. IgD

Answer: B

Explanation:

Type I hypersensitivity anaphylaxis is mediated by IgE. Type II hypersensitivity is mediated by IgG or IgM, as seen in blood transfusion reactions or autoimmune hemolytic anemia. IgA and IgD are not involved in any hypersensitivity reactions.

Question: 10

What is the hepatitis B status of a patient with the following results?

HBsAg	+
HBsAb	=
HBc total Ab	+
HBc IgM Ab	+

- A. Inconclusive: repeat testing recommended
- B. Chronic HBV infection
- C. Immune status post vaccination
- D. Acute HBV infection

Answer: D

Explanation:

This pattern of test results indicates an acute hepatitis B virus (HBV) infection. The positive HBsAg result is a marker of a current contagious infection, and the positive HBC IgM Ab shows it is acute. Other results that can be positive during an acute HBV infection include HBcAb as well as HBV DNA and HBe Ag. Other patterns of HBV status:

	Chronic HBV	Immune; post-vaccination
HBsAg	+	=
HBsAb	=	+
HBc total Ab	+	=
HBc IgM Ab	=	=

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