

MCM Practice Questions Answer Key: Lecture Day 1

karan gidwani

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Lecture 2: Cell Membranes Answer Key

Question 1: B

The correct answer is the Lecithin : sphingomyelin ratio (B). This is because the most important component of pulmonary surfactant, the substance that maintains the shape of the lungs, is lecithin. When evaluating a preterm birth, increased lecithin relative to sphingomyelin indicates more surfactant production which increases viability of the fetus. Phosphatidylethanolamine (A) is a substance found in the inner leaflet of membrane and acts as a polar head. Phosphatidylglycerol (C), while an important component of pulmonary surfactant, is incorrect as its levels are used to mark the development of fetal lungs throughout a pregnancy. It is not used to assess preterm births. Phosphatidylserine (D) is also a substance found in the leaflet of inner membranes. Important in apoptosis signaling.

Question 2: A

Albumin is the major blood protein responsible for transporting Fatty Acids (A). Via the interactions between nonpolar FA hydrocarbon chain and uncharged amino acid sidechains present on albumin. Proteins (B) are not transported in the bloodstream. While there are blood proteins like albumin, globulins, and fibrinogens, they all have specific roles and protein transport is not one of them. Polysaccharides (C) are typically not transported in the bloodstream. They must be broken down into their constituent monosaccharides before they can be transported in the blood. Nucleic acids (D) are also typically not transported in the bloodstream.

Think About it: what AA's on albumin would participate in binding to Fatty Acids?

Question 3: D

Ceramide conjugates with phosphatidylcholine (D) to make sphingomyelin. Sphingosine (A) is a precursor to ceramide, conjugating with a Fatty Acid to make ceramide. Inositol (B) and Glycerol (C) do not take part in any reactions concerning sphingomyelin production.

Question 4: B

The correct answer is Peripheral proteins (B) as spherocytosis is caused by a defect in the proteins of erythrocytes that structural proteins bind to, specifically spectrin, ankyrin, and/or Band 3. There are no major lipid anchored proteins (A) present on the surface of erythrocytes. Heat Shock Proteins (C) are found in nucleated cells to aid in protein folding. As erythrocytes lack nuclei, these proteins will not be found on or in erythrocytes. Integral proteins (D) is not the best answer as the main cause of spherocytosis is a defect in peripheral proteins that attach to integral proteins.

*edited: Previous version incorrectly states D as the correct answer choice. This has been rectified.

Question 5: C

(A) is incorrect as it is *Unsaturated* phospholipids that make up greater than 50% of the membrane bilayer. (B) is incorrect as unsaturated phospholipids have the "kink" in the hydrocarbon structure which reduces their ability to be packed closely together. Saturated phospholipids would lead to a more rigid membrane structure. Phospholipids are amphipathic, meaning they contain both hydrophilic and hydrophobic sections, so (D) is incorrect. (C) is the only correct answer choice pertaining to phospholipids.