

1. Which statement BEST captures the structural nature of glycosaminoglycans (GAGs) as described?
 - A. Highly branched neutral polysaccharides composed of identical monosaccharide units.
 - B. Linear, negatively charged heteropolysaccharides composed of repeating disaccharide units.
 - C. Short oligosaccharides attached non-covalently to proteins.
 - D. Positively charged polymers composed primarily of amino acids.

2. The negative charge of GAGs is MOST directly attributed to:
 - A. The presence of amino groups in their structure.
 - B. The acetylation of amino sugars increasing positive charge.
 - C. The presence of acidic sugars and sulfation patterns.
 - D. The absence of hydroxyl groups in their backbone.

3. Which statement BEST explains why acetylation of amino sugars is significant?
 - A. It enhances the positive charge of the molecule.
 - B. It eliminates the positive charge associated with the amino group.
 - C. It introduces branching into the GAG structure.
 - D. It converts the sugar into an acidic sugar.

4. Which of the following MOST accurately describes the repeating unit of GAGs?
 - A. Two identical monosaccharides forming a homopolysaccharide
 - B. A disaccharide composed of an acidic sugar and an amino sugar
 - C. A trisaccharide composed of glucose, fructose, and galactose
 - D. A monosaccharide attached to a peptide chain

5. Which of the following BEST reflects the functional consequence of GAGs binding large amounts of water?
 - A. Formation of rigid crystalline structures
 - B. Production of a gel-like extracellular matrix
 - C. Decrease in cellular adhesion
 - D. Inhibition of enzymatic activity

6. The original naming of GAGs as mucopolysaccharides is MOST closely related to:
 - A. Their role in DNA synthesis
 - B. Their viscous and lubricating properties in secretions

- C. Their ability to form glycoproteins
 - D. Their involvement in energy metabolism
7. Which of the following GAGs is NOT covalently attached to a protein?
- A. Heparin
 - B. Dermatan sulfate
 - C. Hyaluronic acid
 - D. Keratan sulfate
8. Proteoglycan monomers are BEST described as:
- A. Lipid-protein complexes with embedded carbohydrates
 - B. Core proteins with covalently attached GAG chains
 - C. Free GAG chains associated with DNA
 - D. Enzyme complexes degrading polysaccharides
9. Which statement BEST describes proteoglycan aggregates?
- A. Formed by covalent attachment of multiple proteins
 - B. Result from association of proteoglycan monomers with hyaluronic acid
 - C. Composed solely of glycoproteins
 - D. Formed in the lysosome during degradation
10. GAG synthesis involves elongation of chains by:
- A. Random addition of identical sugars
 - B. Sequential addition of alternating acidic and amino sugars
 - C. Direct polymerization of glucose units
 - D. Fragmentation and recombination of oligosaccharides
11. The immediate donors of sugars during GAG synthesis are:
- A. Free monosaccharides
 - B. ATP-bound sugars
 - C. UDP-sugar derivatives
 - D. Protein-bound sugars
12. The final modification step in GAG synthesis is:
- A. Acetylation

- B. Hydrolysis
- C. Sulfation
- D. Reduction

13. GAG degradation occurs primarily:

- A. In the cytosol by proteases
- B. In mitochondria by oxidases
- C. In lysosomes by hydrolases
- D. In the Golgi by transferases

14. A deficiency of lysosomal hydrolases leads to:

- A. Increased synthesis of GAGs
- B. Rapid degradation of polysaccharides
- C. Accumulation of GAGs in tissues
- D. Decreased extracellular matrix formation

15. Which of the following BEST characterizes mucopolysaccharidoses?

- A. Acquired metabolic disorders
- B. Hereditary disorders with accumulation of GAGs
- C. Infectious diseases affecting glycoproteins
- D. Nutritional deficiencies affecting carbohydrates

16. Which statement BEST distinguishes glycoproteins from proteoglycans?

- A. Glycoproteins have longer carbohydrate chains
- B. Glycoproteins lack covalent bonds with carbohydrates
- C. Glycoproteins have shorter, non-repeating carbohydrate chains
- D. Glycoproteins are composed entirely of sugars

17. Which function is MOST directly associated with membrane-bound glycoproteins?

- A. Energy storage
- B. Cell surface recognition
- C. DNA replication
- D. Lipid synthesis

18. O-linked glycoprotein synthesis is BEST described as:

- A. Transfer of pre-formed oligosaccharides from lipid carriers
- B. Sequential transfer of sugars from nucleotide carriers
- C. Random attachment of sugars in lysosomes
- D. Direct binding of glucose to proteins

19. N-linked glycoproteins differ from O-linked glycoproteins in that they:

- A. Do not require the Golgi apparatus
- B. Use dolichol as a lipid carrier for oligosaccharide transfer
- C. Are synthesized entirely in the cytosol
- D. Contain no mannose residues

20. A defect in phosphorylation of mannose residues in glycoproteins results in:

- A. Mucopolysaccharidosis
- B. I-cell disease
- C. Lactose intolerance
- D. Glycogen storage disease

Answer Key

- 1. B
- 2. C
- 3. B
- 4. B
- 5. B
- 6. B
- 7. C
- 8. B
- 9. B
- 10. B
- 11. C
- 12. C
- 13. C
- 14. C
- 15. B

16. C

17. B

18. B

19. B

20. B