

Assessment of your knowledge

(a) Answer the following questions to assess your command on terminology, facts, concepts, and theories learned in this chapter:

1. Name the main structural components of the extracellular matrix and one function of each.
2. Define the phrase "constructive remodeling."
3. What is the term used to describe the removal of cellular components from the ECM to produce a biologic scaffold?
4. What are the important factors to consider in preparing an ECM-based scaffold?
5. What other forms of ECM-based biomaterials have been produced besides surgical meshes?
6. What host cell type has been implicated in predicting constructive remodeling upon ECM bioscaffold implantation?
7. List the main contributing mechanisms to the ECM-mediated constructive remodeling response in chronological order.
8. Mention the three criteria used to determine the adequate decellularization of an ECM mesh.
9. Give three examples of ECM biomaterials used in a clinically translated context.
10. What is a foreign body reaction?
11. What is the general structure of a collagen molecule?
12. Describe techniques used to chemically cross-link ECM bioscaffolds.
13. Xenogeneic ECM sources are often used in tissue engineering applications. What is one major concern associated with the use of xenogeneic materials?
14. Which structural ECM component is responsible for binding growth factors and contributing to water retention?
15. How many types of collagen have been identified?
16. Name two common glycosaminoglycans.
17. Describe the main structural components of integrins.
18. Name three important roles of the native extracellular matrix in physiology.
19. What is the difference between an M₁ versus an M₂ macrophage?
20. Explain why, technically speaking, the word "inert" biomaterial is misleading.

(b) Answer the following questions to assess your ability to apply the concepts and theories learned in this chapter in real life, clinical, and scientific situations:

1. Describe the overall manufacturing process of an ECM bioscaffold.
2. Describe the role in the host response to ECM bioscaffolds in perpetuating a constructive remodeling outcome.
3. Utilizing ECM bioscaffolds has been described as an acellular tissue engineering approach. How, without supplemented cells, can ECM function as a tissue engineering scaffold?
4. What is the general difference in host response and final outcome associated with synthetic, nonresorbable versus biologic resorbable scaffold materials?
5. Which processing factors have been found to contribute to negative outcomes associated with the use of ECM scaffolds?
6. Describe the Boyden Chamber assay. What is it used for? What are the primary parameters that are manipulated in the assay?
7. What is meant by the description of macrophages as a "plastic" cell type?
8. How does "constructive remodeling" differ from tissue regeneration?
9. What is the rationale for the use of ECM from xenogeneic sources to promote tissue repair?
10. What is meant by "dynamic reciprocity" and how is it relevant to the design and application of ECM as a biomaterial?