**Assessment of your knowledge**

(a) Answer the following questions to assess your command on terminology, facts, concepts, and

theories learned in this chapter:

1. Which cell type is responsible for the heart-pumping action?

2. What are the major ECM components in the myocardium?

3. Define “infract expansion” in one or two sentences.

4. Distinguish the five phases in the progression from healthy to the infarcted myocardium.

5. List five major potential therapeutic targets and strategies to induce myocardial regeneration.

6. What is the difference between cardiac and skeletal muscle?

7. Name 4 cell sources for cardiovascular tissue engineering and regeneration.

8. What benefits does the combination of bioactive molecules with biomaterials provide?

9. Name three main strategies for in vitro cardiac patch construction.

10. Describe shortly the cell sheet-based approach for in vitro cardiac patch construction.

11. Which advantages do the preformed implantable scaffolds offer over the cell entrapment strategy?

12. Give an example for a strategy used to achieve an appropriate material surface for cell interactions.

13. What cell type is positive for troponin-T, sarcomeric α-actinin, Cx-43, and N-cadherin staining?

14. Define the term “Mechanotransduction.”

15. What is the advantage of a perfusion bioreactor as a mechanostimulator?

16. What kinds of stimulation can promote cell organization and cardiac graft maturation?

17. Name two approaches to overcome diffusion limitations in engineered cardiac tissues.

18. When alginate solution is dispensed through an outer tube of a coaxial nozzle and a calcium chloride solution is dispensed through the inner tube of the coaxial nozzle, how can the formed hollow channel size be controlled?

19. What are the two important characteristics that 3D sacrificial materials for channel bioprinting should possess?

20. What are the main limitations for the 3D bioprinting of myocardial tissue?

(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. Why would you consider is the reason behind using acellular grafts for cardiac TE?

2. Which cell sources would you use for cardiovascular tissue engineering? Explain why.

3. Describe the requirements of a cardiac tissue graft for the replacement of large scar tissue after MI.

4. What would be your proposed strategy to induce cardiac patch vascularization?

5. Suggest two reasons for the cultivation of cardiac patches within a perfusion bioreactor.

6. Which experiments would you perform to evaluate the functionality of a cardiac graft?

7. How would you achieve an in vivo prevascularized cardiac patch?

8. What would be your proposed strategy for bioprinting small-diameter vessel grafts?

9. Suggest an approach for engineering complex anatomical structures.

10. What are the new possibilities for cardiac TE that the 3D bioprinting strategy facilitates?