**Assessment of your knowledge**

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

theories learned in this chapter:

1. What events lead to cell-material adhesion formation?

2. What structures do cells use to probe their external environment?

3. Describe and provide an example of mechanotransduction.

4. Which major chemical properties of a substrate determine cell attachment and behavior?

5. Which platforms exist to change cell shape?

6. What consequences can changing cell shape have on cell behavior?

7. How can hydrophobic and hydrophilic properties of a material be harnessed to control cell attachment?

8. Why is the chemistry of a biomaterial important for clinical applications?

9. What is the difference between static and dynamic chemistries on a substrate?

10. How does material stiffness affect cell adhesion?

11. What are the benefits of using synthetic polymer systems compared to naturally derived materials?

12. How can the molecular clutch be used to explain cell response to material stiffness?

13. Describe cell contact guidance.

14. How does material stiffness effect MSC differentiation?

15. How have materials with controlled ligand spacing provided important insight into adhesion formation?

16. Provide an example of integrin inside-out signaling.

17. Provide an example of integrin outside-in signaling.

18. Describe the molecular components of FAs.

19. Explain how materials with low stiffnesses can lead to adipogenic differentiation of MSCs?

20. Medical devices or implants can often fail due to the foreign body response, provide examples

of how tissue engineering can be used to improve device/implant success.

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. How can tissue engineering strategies be used to control cell-material interactions?

2. How do integrins provide mechanical linkages from materials to the nucleus, and what effects can this have on gene expression?

3. How do we determine which chemical and/or topological cues are most important for controlling cell behavior?

4. What would be the ideal properties of a biomaterial for wound healing?

5. Would we be able to apply dynamic chemistry to create topological cues?

6. What are the important parameters to consider when using topography for clinical applications?

7. What tissue engineering strategies could assist you in developing successful implantable medical devices?

8. What would be the ideal properties of a biomaterial for bone tissue engineering?

9. Give an example of how we can use biomaterial systems as tools to investigate cellular processes or mechanisms.

10. How could tissue engineered systems be used to control maintenance of stem cell pluripotency?