

# Assignment 12: Tissue Engineered Products

## Cell and Tissue Engineering

### Problems

1. Please answer the case study questions (a), (b) and (c) on page 436-437 in your textbook, Tissue Engineering by Saltzman.
  - a. Describe the differences between hyaline cartilage and fibrocartilage. Histologically, what do these two types of tissue look like (that is, describe the cellular and extracellular features of each)?

#### Differences between hyaline cartilage and fibrocartilage

	Hyaline cartilage	Fibrocartilage
<b>Color</b>	White	Glass-like, translucent, bluish-white color
<b>Location</b>	Present at the connection between the ribs and the sternum, in the trachea and on the articulating surfaces of the synovial joints (such as elbow and knee)	Occurs between vertebral bodies, in the pubic symphysis, menisci, the annulus fibrosis of the intervertebral discs, and at the tendon-bone interface.
<b>Function</b>	Provides smoothness and lubrication of the bones at the joints.	Attaches bones to other bones and provides restricted mobility to the joints.
<b>Extracellular Features</b>	Matrix rich in ground substance: glycosaminoglycans (CAGs) and collagen fibers (collagen II) in a fewer number compared to fibrocartilage, making it weaker. Contains large chondrocytes in lacunae.	Matrix rich in densely braided collagen fibers (collagen I and II) making the tissue highly resistant to compression. Contains fibroblasts, fibrocytes, chondroblasts and a few chondrocytes in lacunae. The ground substance contains equal amounts of dermatan and chondroitin sulfate.s
<b>Perichondrium</b>	Contains (except the hyaline cartilage at the end of the growing bones).	Lacks

Hyaline cartilage is very uniform in appearance. It is surrounded by the perichondrium. It is mainly made of chondrocytes with one or two nuclei and clear protoplasm. Chondrocytes are found in the lacunae.

Fibrocartilage is densely arranged, whitish, fibrous tissue with a mixture of both chondrocytes and fibroblasts. It contains large bundles of collagen fibers. Running linearly through the tissue.

- b. What features of the local site of repair would you expect to influence the outcome towards either of these endpoints?
  - c. Are there any elements that you could add to the cell suspension that is injected into the defect site, or to the surgical procedure used to deploy the cells, to increase the probability of the most desirable outcome?
- 2. The review article in your assigned reading this week was co-authored by our guest lecturer Dr. Yusuf Khan. It discusses the state-of-the-art in bone tissue engineering solutions as well as the future directions for this field. After watching lecture 2 and reading this article please provide a summary of bone tissue engineering approaches, tools, limitations and prospects. (350 words or less)

AT THE END OF THE SUMMARY provide a paragraph comparing and contrasting approaches in bone tissue engineering to approaches in engineered skin grafts (300 words or less).

**Rubric**

Question	Component	Total Point Value
1	A	5
	B	5
	C	5
2	Summary	7
3	Comparison	8
<b>Total</b>		<b>30</b>