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## **CHAPTER 7**

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# **Tissue Engineering**

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**7.1 Paradigms/Strategies**

**7.2 Cells**

**7.3 Matrices**

**7.4 Regulators**

## 7.1 ELEMENTS OF TISSUE ENGINEERING

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### **MATRICES** (porous structures)

Synthetic Polymers (absorbable)

Polyactic acid

Polyglycolic acid

Natural Polymers (absorbable)

Collagen (Types I, II, III, IV)

Collagen - GAG copolymer

Fibrin

Chitosan

Synthetic Polymer (nonresorbable)

PTFE

Synthetic Ceramics

Calcium Phosphate

Natural Mineral

Bone Mineral

### **CELLS**

Autologous

Allogenic

Marrow Stromal Stem Cell

Phenotypically Altered Cells

Genetically Altered Cells

### **SOLUBLE REGULATORS**

Growth Factors (polypeptide mitogens)

Differentiation Factors (*e.g.*, BMP)

## 7.1 STRATEGIES FOR TISSUE ENGINEERING

<b><u>TISSUE</u></b>	<b><u>MATRICES (Resorbable)</u></b>	<b><u>REGULATORS</u></b>	<b><u>EXOGENOUS CELLS</u></b>
<b>CONNECTIVE TISSUE</b> Dermis	Collagen-GAG (C-G) Polyactic Acid (PLA) Polyglycolic Acid (PGA)	PDGF FGF TGF- $\beta$	Fibroblasts
BONE	Synthetc Hydroxyapatite (HA) Tricalcium Phosphate Natural Bone Mineral (Anorganic Bovine Bone) PLA Collagen Collagen-HA/TCP	BMP	Marrow Stromal Stem Cells
Articular Cartilage	C-G Collagen PGA	BMP	Autologous Articular Chondrocytes Allogeneic Articular Chondrocytes
Ligament	Collagen Fibers PLA Fibers	FGF	Fibroblasts
Tendon	Collagen Fibers PLA Fibers C-G	----	----
Meniscus	C-G	----	----
<b>EPITHELIA</b> Epidermis	C-G PGA	EGF	Epidermal cells (Keratinocytes)
<b>NERVE</b> Peripheral	Sillicone Tube Collagen Tube C-G	----	----
Endothelial	PGA	----	Endothelial Cells

\* PDFG-platelet derived growth factor;  
 FGF-fibroblast growth factor;  
 TGF- $\beta$ -transforming growth factor;  
 EGF-epidermal growth factor;  
 BMP-bone morphogenetic protein