BME449 Tissue Engineering

Lecture #2
Tissue Engineering: ECM

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Scaffolds should be:

biocompatible

biodegradable

Proper surface chemistry

Adequate mechanical strength

porous

easily sterilized

Interconnected pores

Easy fabrication

3D structure

EXTRACELLULAR MATRIX (ECM)

ECM MOLECULES

- Glycosaminoglycans
- Proteoglycans
- Proteins

Structural proteins

- Collagen
- Elastin

Adhesion proteins

- Fibronectin
- Laminin

EXTRACELLULAR MATRIX (ECM)

Collagen

- Stiff
- Long
- Triplehelix
- With prolin and glycin
- 27 types the famous
- Type 1 in CT.

EXTRACELLULAR MATRIX (ECM)

Elastin

- Elastic fibers, found in connective tissues, are particularly abundant in organs that regularly stretch and then return to their original shape.
- Elastin is cross-linked into a network by covalent bonds formed between the side chains of lysine residues and the protein that elastic fibers are principally composed of.

EXTRACELLULAR MATRIX (ECM)

Fibronectin

- Large glycoprotein
- Dimer of tow lager subunits linked by disulfide bond.
- The principal function of the extracellular matrix protein fibronectin is to connect cells to matrices that contain fibrillar collagen.
- Some cells express integrin receptors that bind to the **Arg-Gly-Asp (RGD)** sequence of fibronectin

EXTRACELLULAR MATRIX (ECM)

Laminin

The principal functions of laminins are:

- to provide an adhesive substrate for cells
- to resist tensile forces in tissues

EXTRACELLULAR MATRIX (ECM)

Integrins

- Focal adhesions are a type of cell-matrix junction that attach a variety of cells, including fibroblasts, to the extracellular matrix.

- The ability of integrins to reversibly bind matrix components is dependent on their ability to change conformation between active and inactive states.