

BIOLOGICAL FRAMEWORKS FOR ENGINEERS

Session #16 [Integrating Cells into Tissues]

General Objectives:

- ✓ Describe the features of tissues - structural organization, cell localization, extracellular matrix, and protein synthesis.

Central Framework:

- ✓ Cells join together physically, electrically, and chemically to work together in a common specialized function as a tissue.

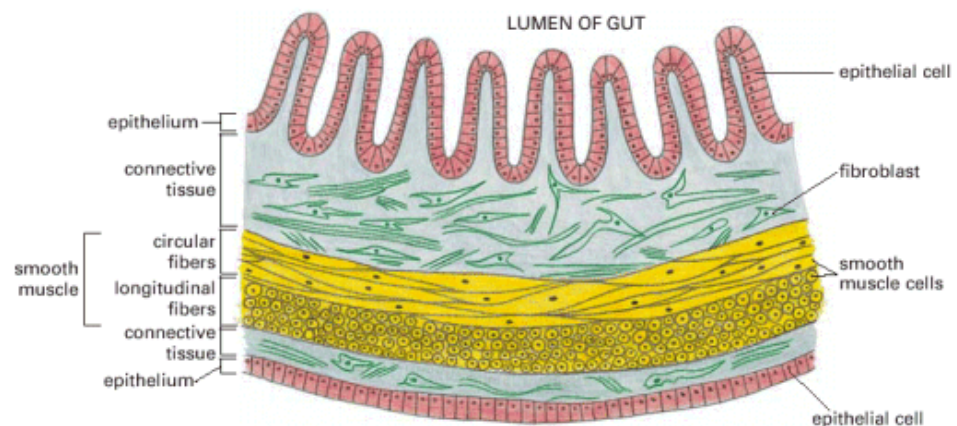
Interactive Activity:

- ✓ Worksheet in class on protein synthesis.

Session Outline:

A. Tissues Defined

B. Examples of tissues & their jobs.

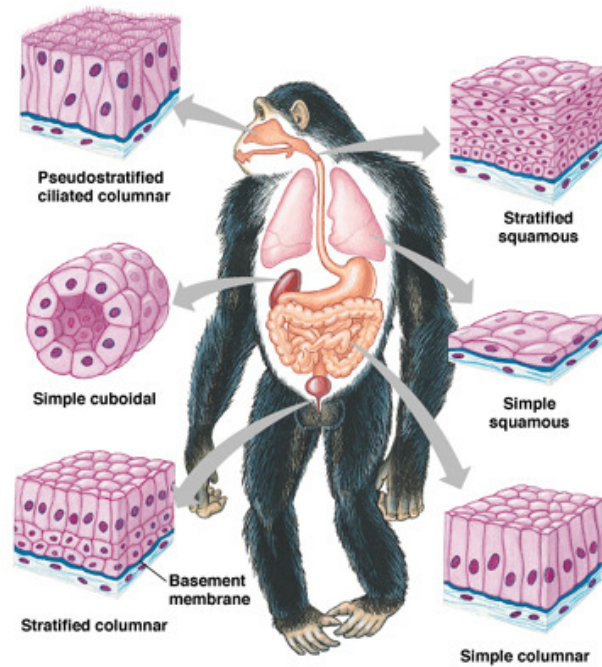


C. Our bodies have many different tissues that perform different tasks.

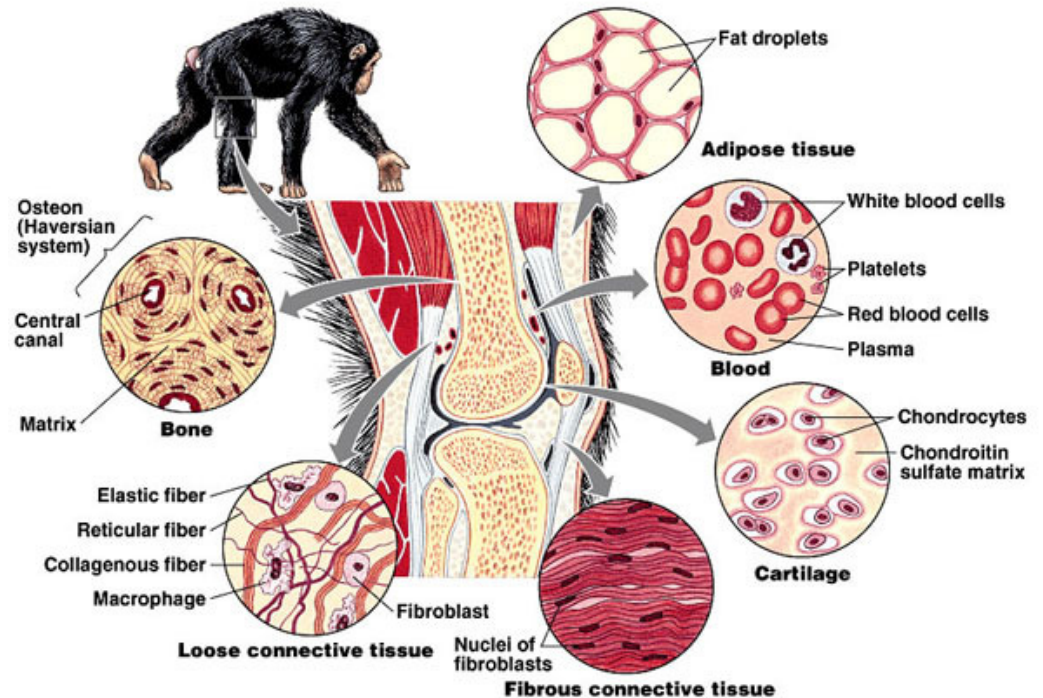
D. Every cell in your body starts with the same DNA, but some cells obviously have specialized functions.

E. All cells contain the ability to make all proteins, but they divide up the tasks and each cell only expresses specific proteins necessary for its specific functions.

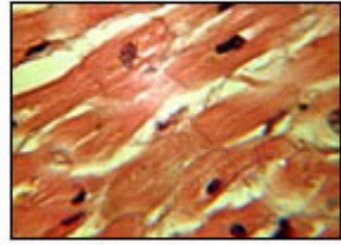
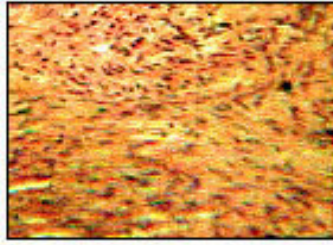
A. Epithelial Tissue



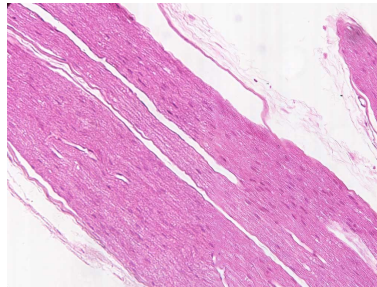
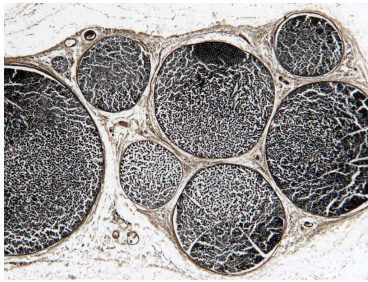
B. Connective Tissue



C. Muscle Tissue



D. Nerve Tissue



In Class Worksheet

Over time, it is generally necessary for cells to alter the levels of the proteins they contain. This is especially true in the case of tissue development where cells need to *specialize* in order to have different characteristics at different positions and to *interact* with neighbor cells to coordinate their behavior. Which of the following are reasonable mechanisms by which a eukaryotic cell could change its concentration of a particular protein (protein P) without affecting the concentrations of other proteins in that cell?

Could the cell . . .

alter the sequence of the gene coding for protein P?

alter the concentration of RNA polymerase in the cell?

alter RNA polymerase's access to the promoter of the gene coding for protein P?

alter RNA polymerase's ability to move forward along the gene coding for protein P?

alter the rate at which the mRNA coding for protein P exits the nucleus and enters the cytoplasm?

alter the rate at which the mRNA coding for protein P is degraded?

alter the concentration of ribosomes in the cell?

alter the ribosomes' access to the ribosome binding site of the mRNA coding for protein P?

alter the concentration of tRNA in the cell?

alter the rate at which protein P is degraded by proteasomes?