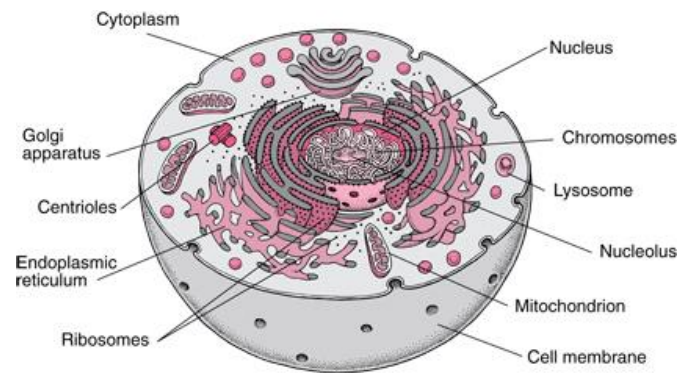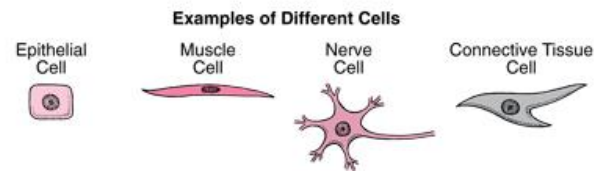Session 2, Lecture 1, Tissue background
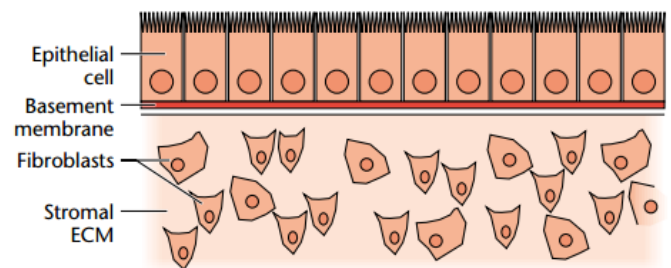
Tissue

:

- **Two main components**

1. Cells

2. Extracellular Matrix

- **ECM Functions**

Previously known as an inert ground substance

- **Two main forms**

Basement membrane:

Stromal matrix:

- **Molecular composition**

ECM is composed mainly of glycoproteins and proteoglycans, many of which are able to bind to specific sites on other ECM glycoproteins so that the matrix becomes a highly crosslinked gel
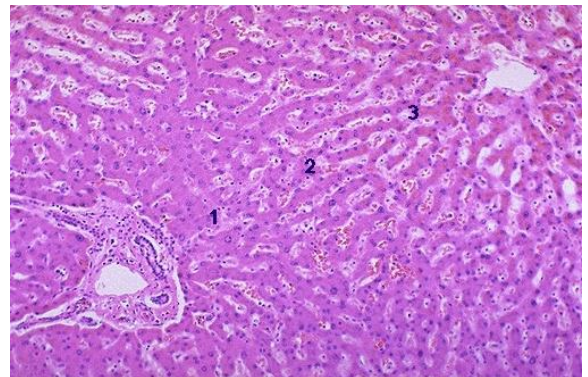

Histology

: The study of tissue, especially their structure and arrangement

Pathology

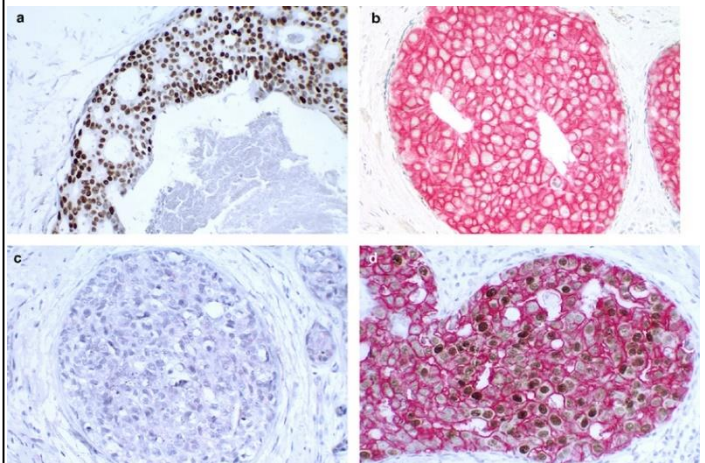: The study of the causes and effects of diseases, diagnostic or forensic purposes
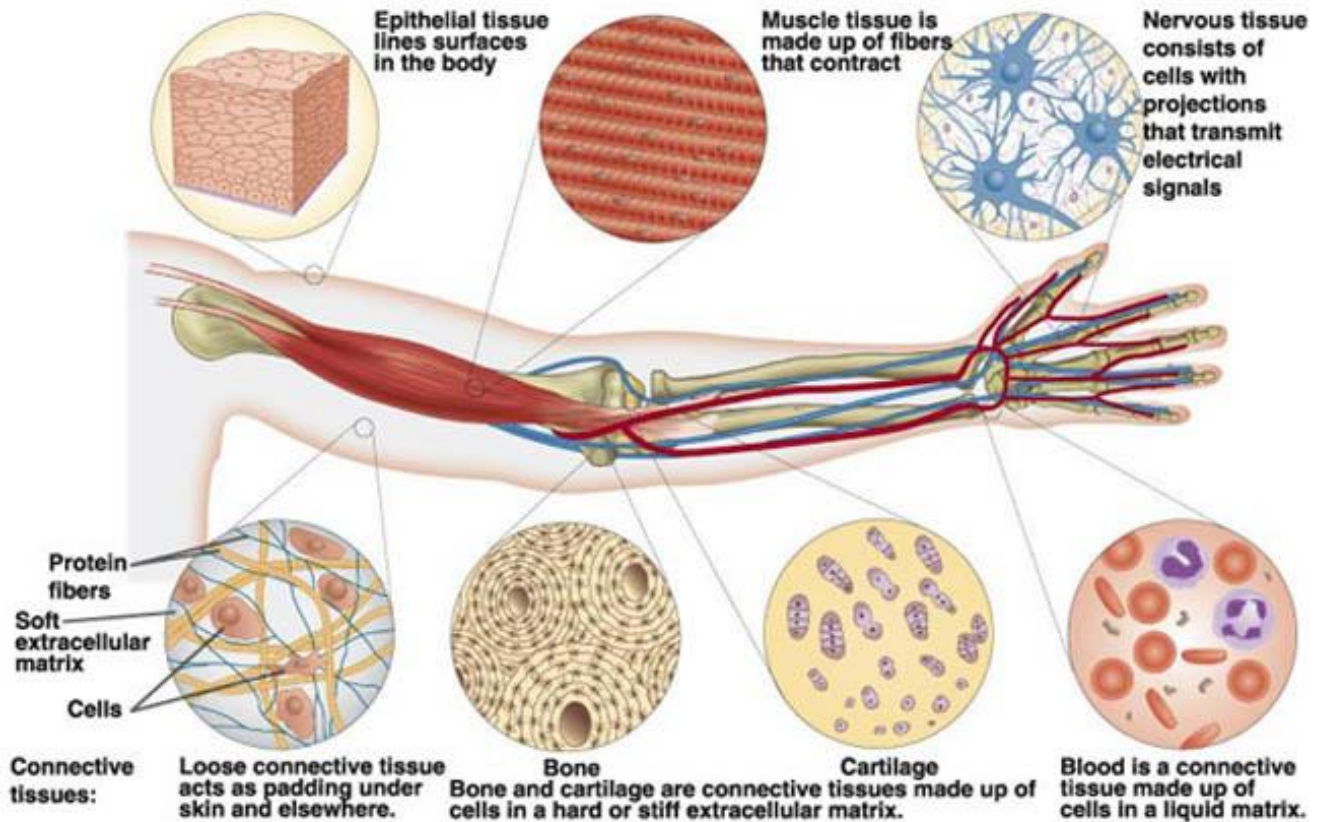

Hisopathology

:

Examples of DCIS double immunostained for ER and HER2 protein. ER expression is denoted by brown nuclear staining and HER2 overexpression is represented by red staining of the cell membrane.

(a) ER-positive/HER2-negative

(b) ER-negative/HER2-positive

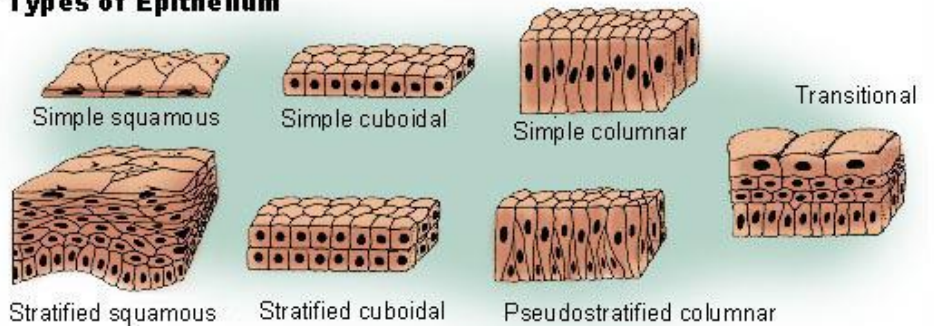(c) ER-negative/HER2-negative

(d) ER-positive/HER2-positive.

Four types of Tissue

Epithelial tissue lines surfaces in the body

Muscle tissue is made up of fibers that contract

Nervous tissue consists of cells with projections that transmit electrical signals

Protein fibers
Soft extracellular matrix
Cells

Connective tissues:

Loose connective tissue acts as padding under skin and elsewhere.

Bone
Bone and cartilage are connective tissues made up of cells in a hard or stiff extracellular matrix.

Cartilage

Blood is a connective tissue made up of cells in a liquid matrix.

- Epithelium

A sheet-like layer of cells

Types of Epithelium

Simple squamous   Simple cuboidal   Simple columnar   Transitional

Stratified squamous   Stratified cuboidal   Pseudostratified columnar

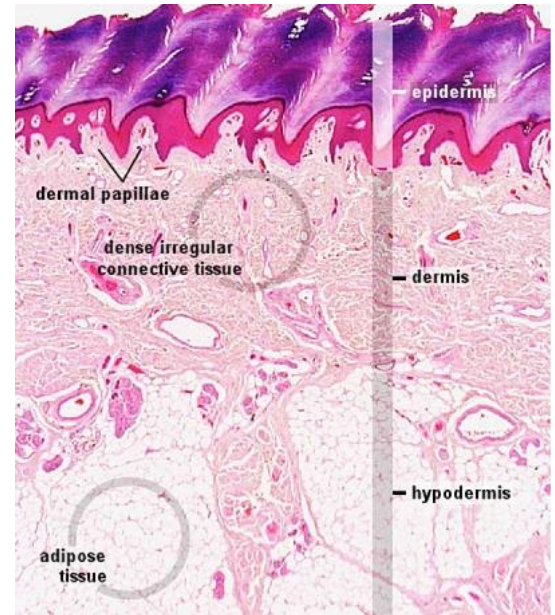Function:

1.

2.

3.

4.

- Connective tissue

Most abundant tissue type in the body

Possessing a great blood (not tendons, ligaments, and cartilages)
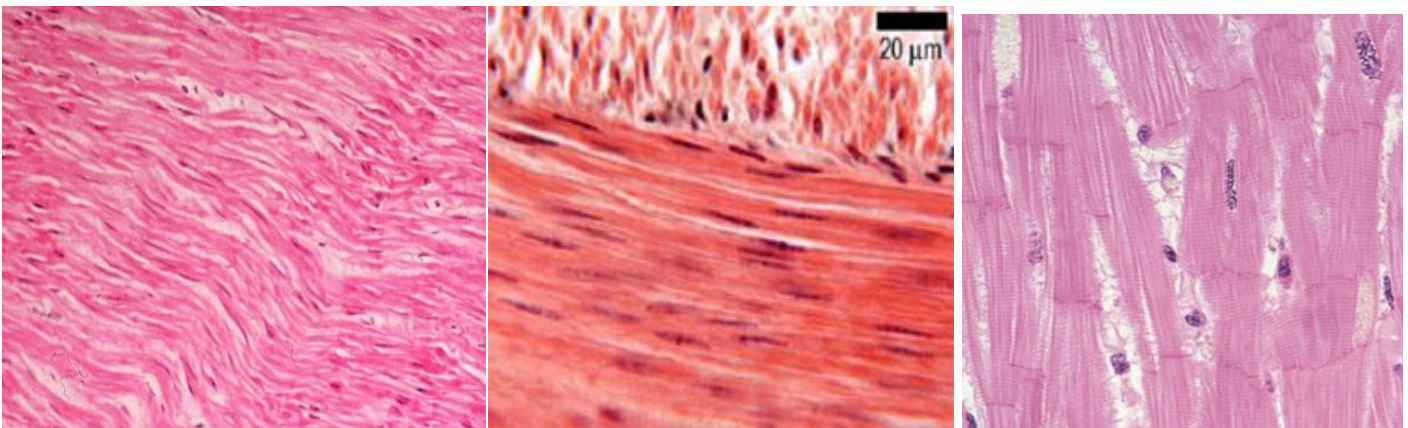
Various properties based on the amount, type, and arrangement of ECM (fiber, proteoglycans, glycoproteins)
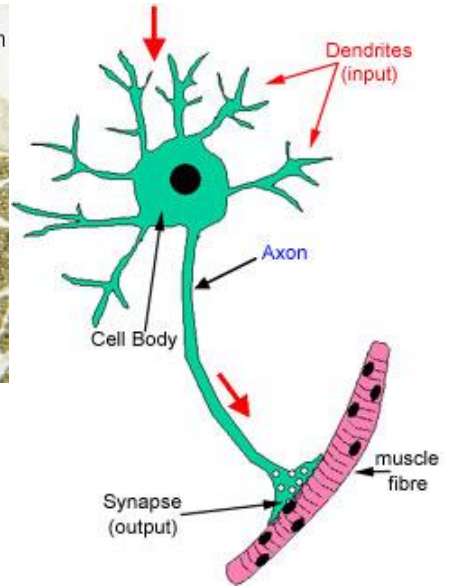
Function:

Many specialized types
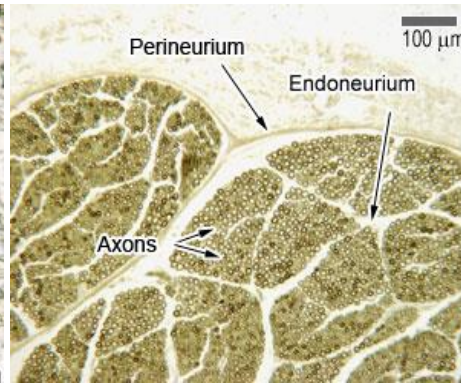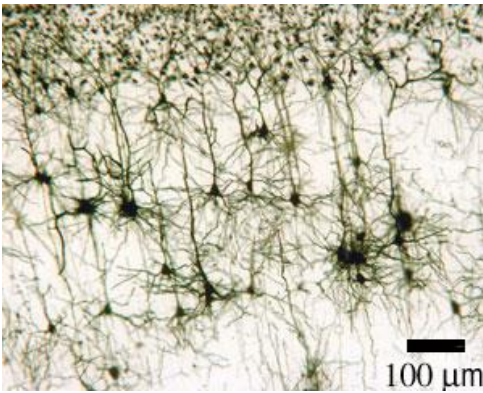

- Muscular tissue

Function:

Type:

1. Smooth muscle
2. Skeletal muscle
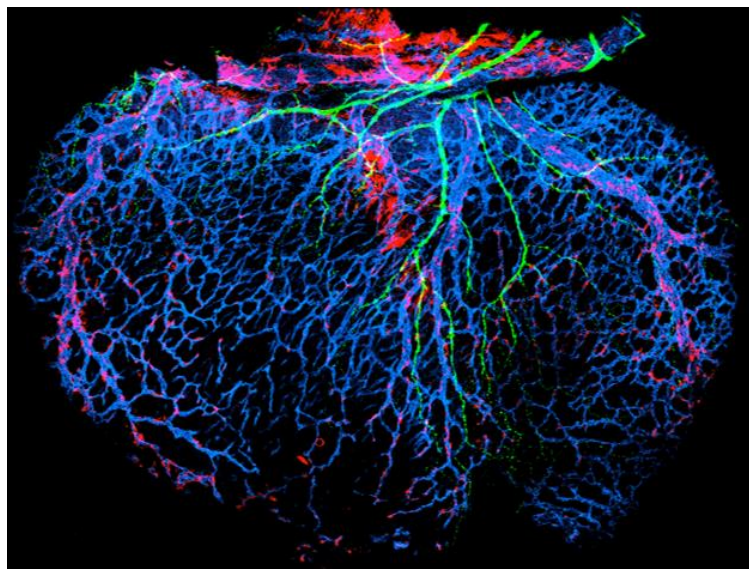3. Cardiac muscle

- Nervous tissue

Brain, spinal cords, nerves

:

Cardiac sympathetic axons subepicardium of the ventricular wall of the developing mouse heart

Next week

We will look at the soft tissue from an engineering point of view

Soft tissue

:

Structural Properties

1.
2.
3.