

General Pathology

Cell Types and Cell Constituents

Lec 7

Dr.Zainab Ali hussein



Introduction

Pathology

study of disease causes, mechanisms and effects.

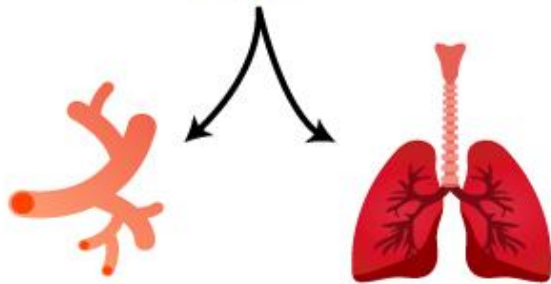
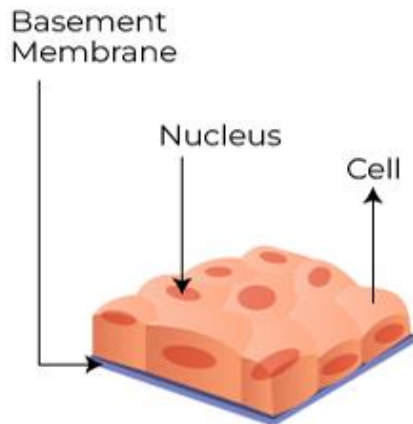
Understanding cell structure and function is essential to interpret cellular injury and disease.

Cell Types

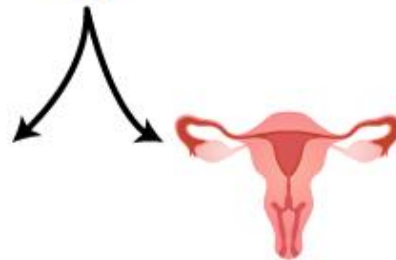
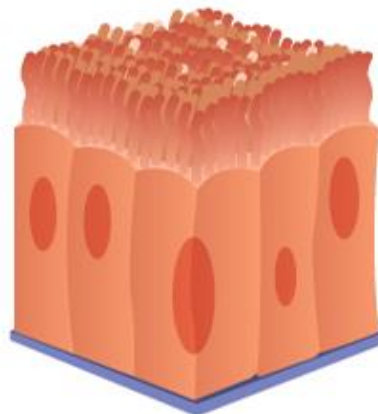
- Epithelial cells – protection, absorption, secretion.
- Connective tissue cells – fibroblasts, adipocytes, chondrocytes, osteocytes.
- Muscle cells – skeletal, cardiac, smooth.
- Nervous tissue – neurons and glial cells.
- Hematopoietic cells – RBCs, platelets, WBCs (neutrophils, lymphocytes, monocytes, eosinophils, macrophages, basophils).

Epithelial Cell

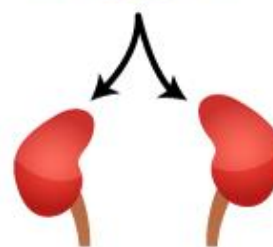
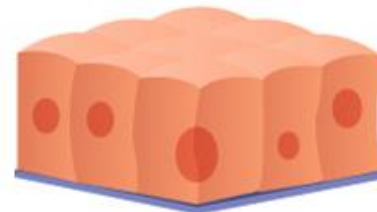
Single Squamous Epithelium



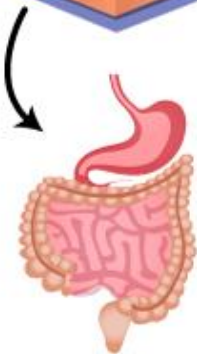
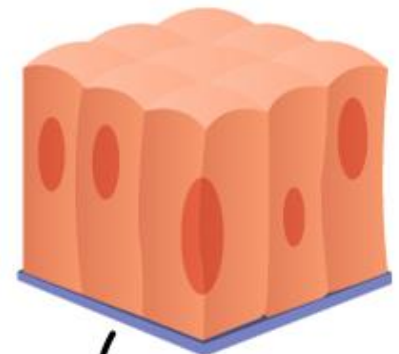
Ciliated Columnar Epithelium



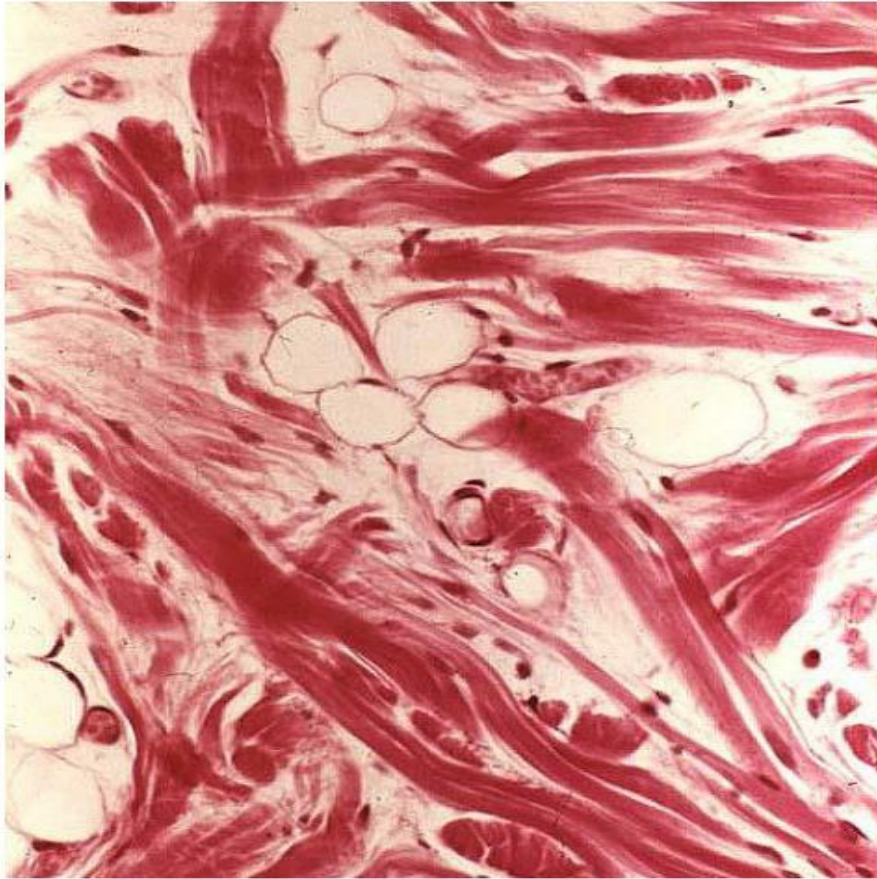
Simple Cuboidal Epithelium



Simple (smooth) Columnar Epithelium

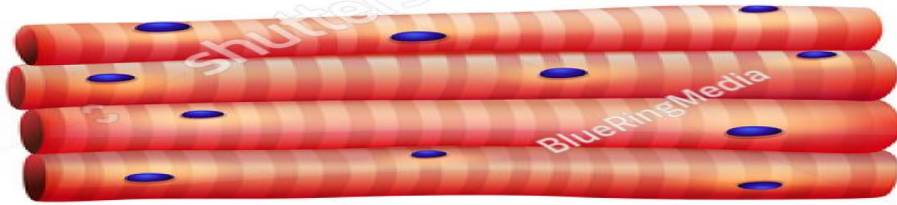


Connective Tissue

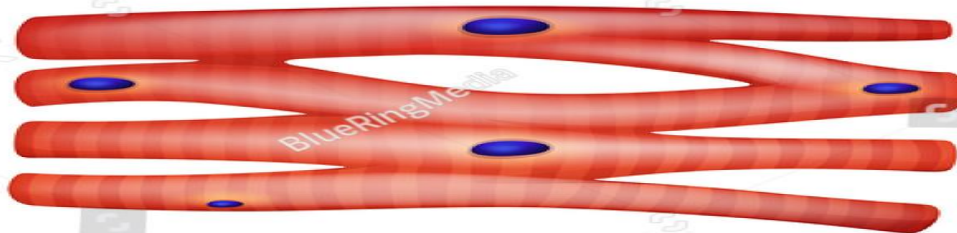
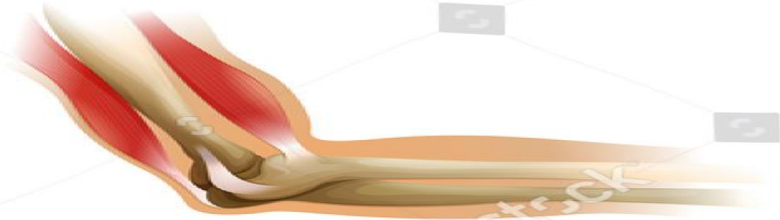


- **Extracellular Matrix**
 - Fibers** – collagen & elastic
 - “Ground substance”**
- **Cells**
 - Fixed:
 - Fibroblasts**
 - Adipocytes**
 - “Tissue macrophages”**
 - Free:
 - Immune cells**
(lymphocytes)
 - Inflammatory cells**
(neutrophils & activated macrophages)

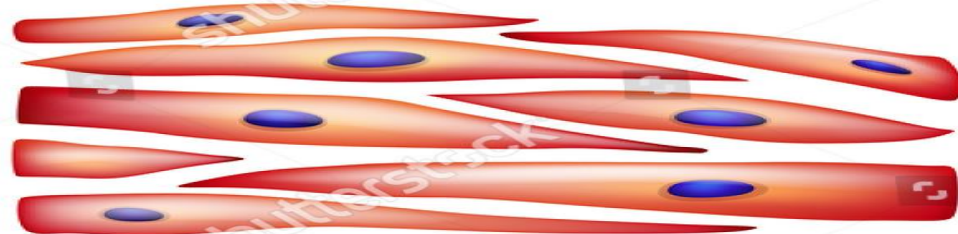
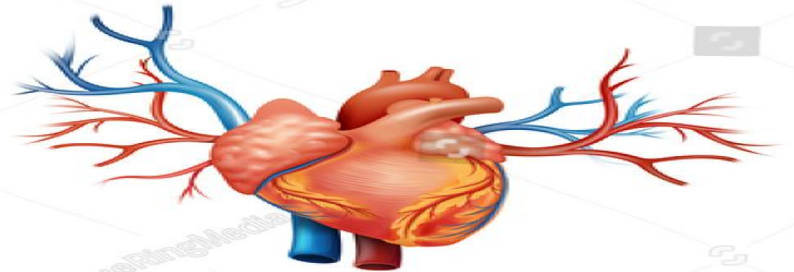
Types of Muscle Cells



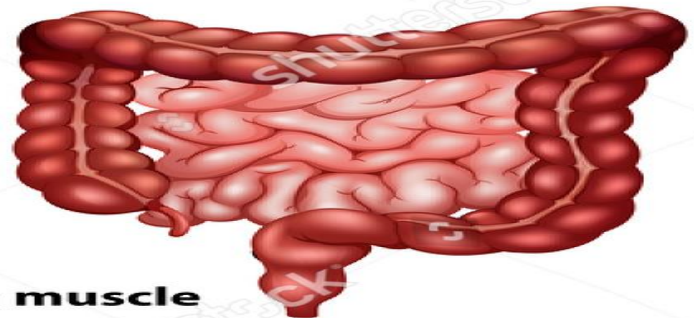
skeletal muscle



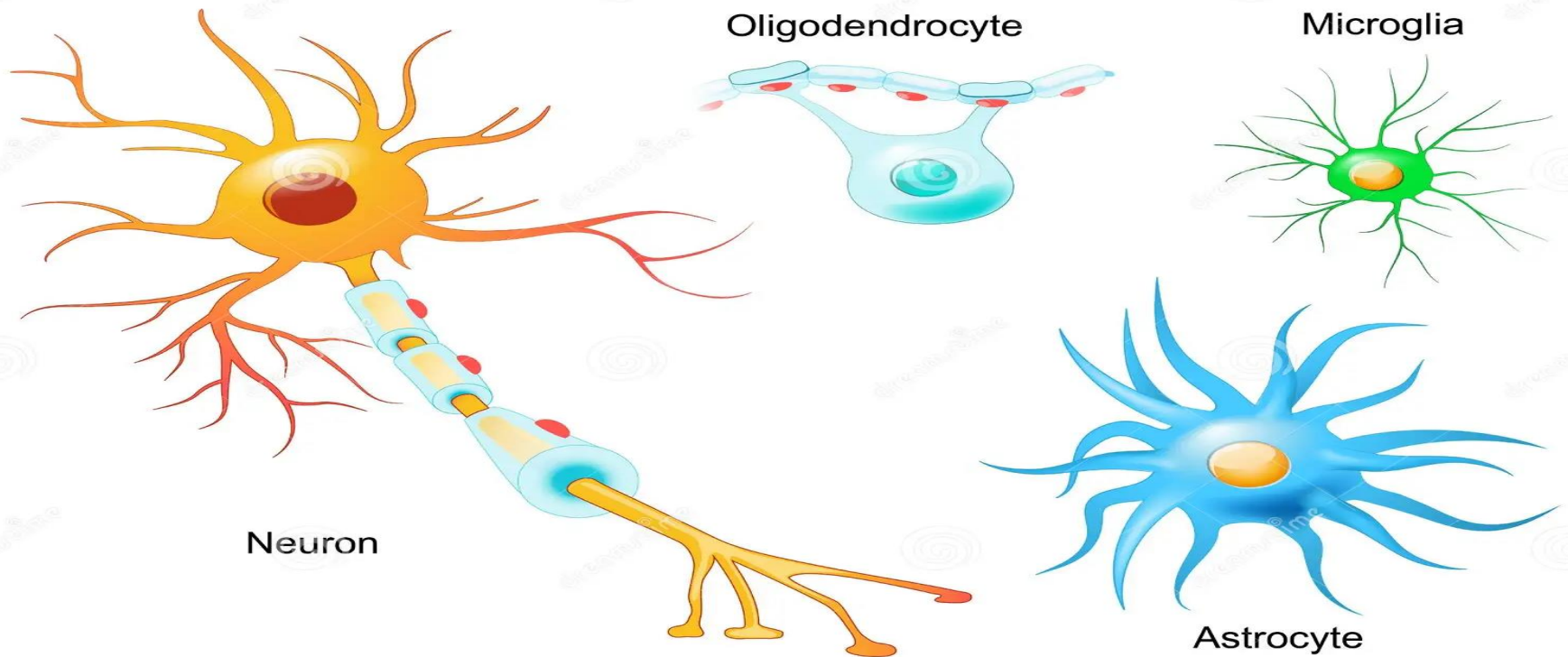
cardiac muscle



smooth muscle



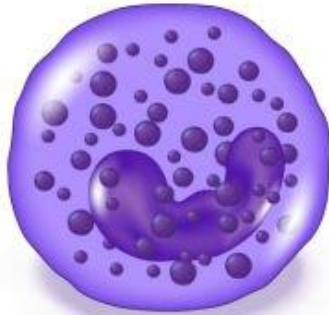
NEURON and GLIAL CELLS



BLOOD CELLS



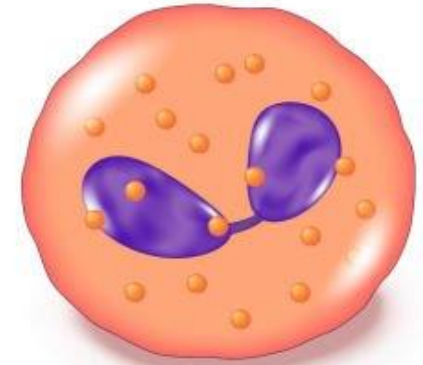
Red blood cell



Basophil



Neutrophil



Eosinophil



Platelets



Macrophage



Monocyte



Lymphocyte

iStock

Credit: Rujirat Boonyong

Cell structure

1. Cell Membrane

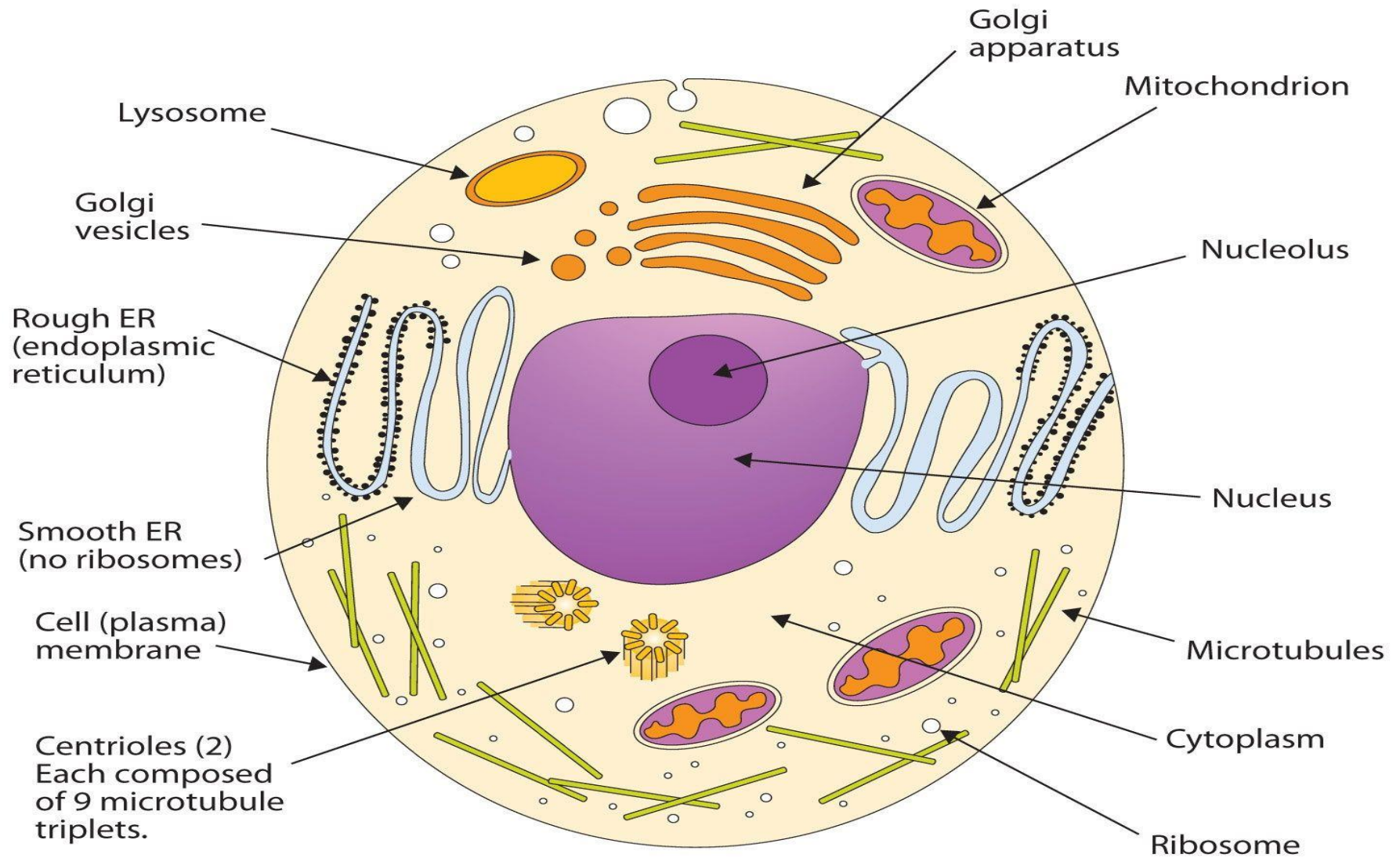
- Phospholipid bilayer.
- Contains receptors, channels and transport proteins.
- Regulates entry/exit of substances.
- Primary site affected in many injuries.

2.Cytoplasmic Organelles

- Mitochondria – ATP production, apoptosis.
- Rough ER – protein synthesis.
- Smooth ER – lipid synthesis, detoxification.
- Golgi apparatus – protein modification and packaging.
- Lysosomes – digestion, autophagy.
- Peroxisomes – fatty acid oxidation.
- Cytoskeleton – structural support and cell movement.

3.Nucleus

- Nuclear membrane, chromatin, nucleolus.
- Controls genetic expression.
- Nuclear changes are key indicators of injury.



Acute Inflammation

- Rapid, early response to injury.
- Key features: redness, heat, swelling, pain, loss of function.
- Dominant cells: neutrophils.
- Outcomes: resolution, abscess, or progression to chronic inflammation.

Chronic Inflammation

- Prolonged inflammation lasting weeks to years.
- Dominant cells: lymphocytes, macrophages, plasma cells.
- Causes: persistent infections, autoimmune diseases, prolonged exposure to toxins.
- Leads to tissue destruction and fibrosis.

Examples of Acute Inflammation

- Acute appendicitis
- Acute pneumonia
- Cellulitis
- Acute bacterial meningitis
- Abscess formation
- Acute cholecystitis

Examples of Chronic Inflammation

- Rheumatoid arthritis
- Chronic gastritis (*H. pylori*)
- Tuberculosis (granulomatous)
- Crohn's disease
- Atherosclerosis
- Chronic osteomyelitis