

Histology

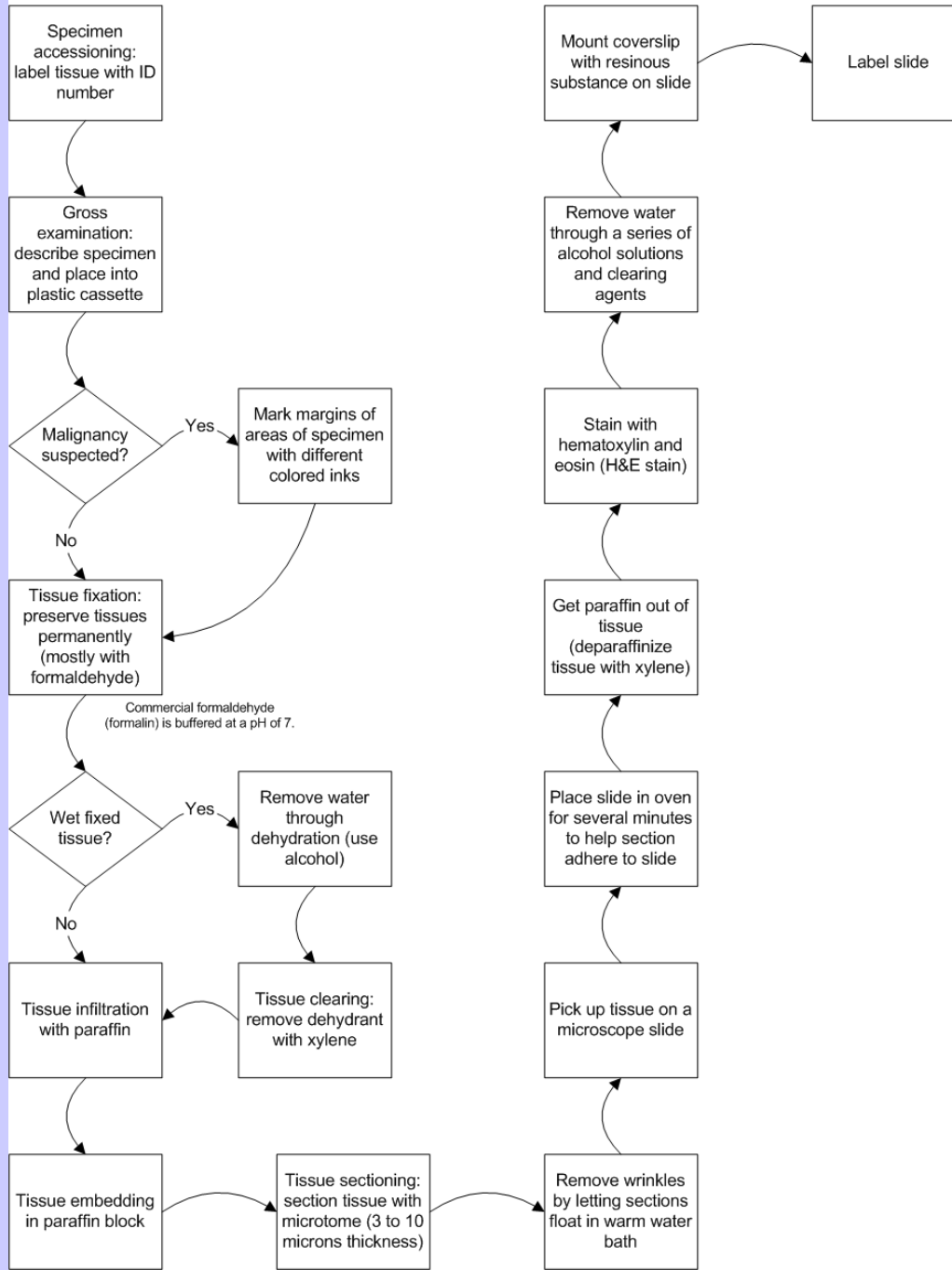
Presented by

Dr. Loay H. Ali

Introduction to Histology

- How Histology Slides are Made
- Four basic tissue types:
 - Epithelial, connective, muscle, nervous
- All animals are composed of **ONLY** these four tissue types
- Tissue types are organized to form organs, which form the functional systems of the body

Making Histology Slides with H&E Stain

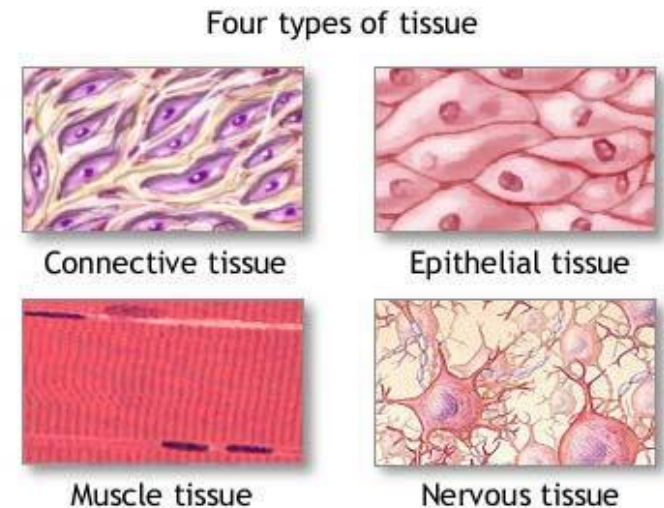


Introduction

- Histology
- There are (4) types of tissue:
 - 1. Epithelial
 - 2. Connective
 - 3. Muscle
 - 4. Nervous

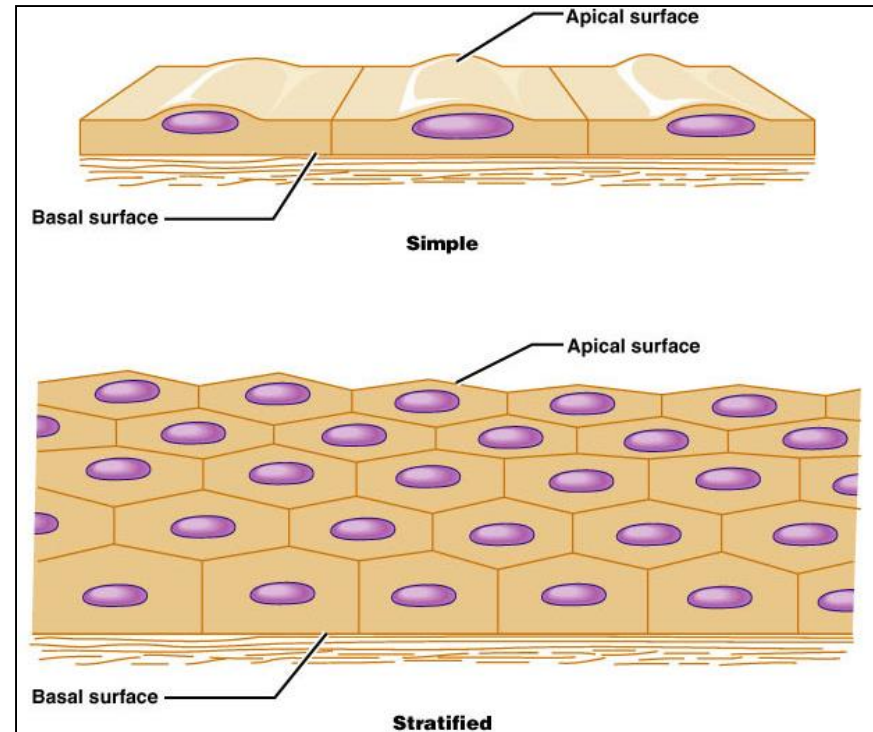
- Similarities between tissue types:

- 1. All contain cells
- 2. Cells that make up tissues have similar functions



Basement Membrane

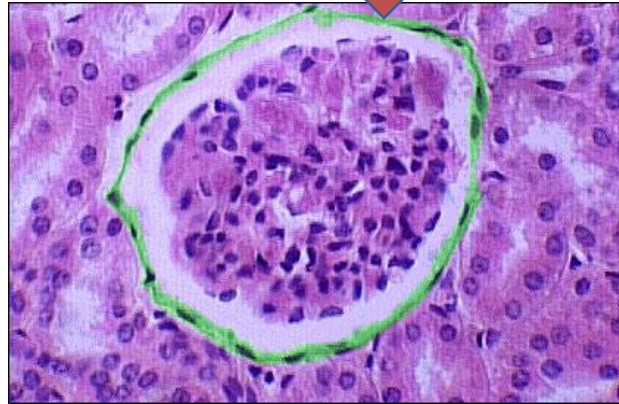
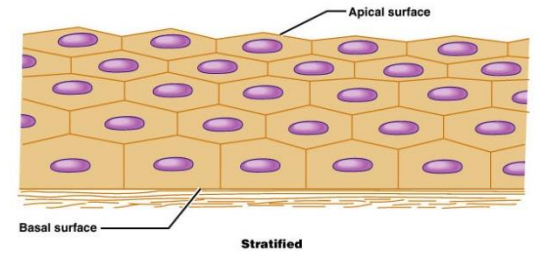
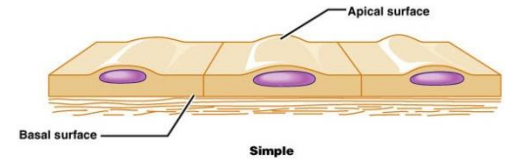
- The epithelial cells lie on the reticular lamina (collagen – CT)
- Reticular lamina is bound to another CT called areolar CT.
- Together this structure is called the "basement membrane"



Classification and Examples

1. Simple Epithelium

- Single layer
- All cells anchored to basement membrane

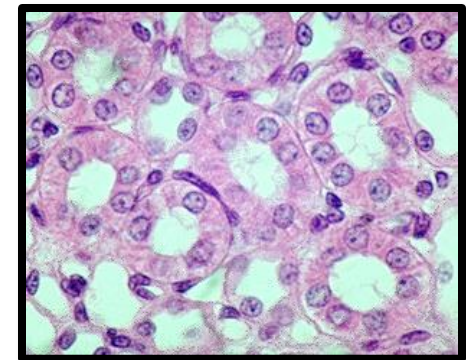


2. Simple Squamous

- Kidney – filtration

3. Simple Cuboidal

- Kidney tubules
- Filtration; secretion, absorption



Epithelial tissue

- Function: covers the internal and external surfaces of the body
- Four types: Squamous, cuboidal, columnar, and transitional
- Organized in layers: simple or stratified

Characteristics of Epithelial Tissue

- **General Characteristics**

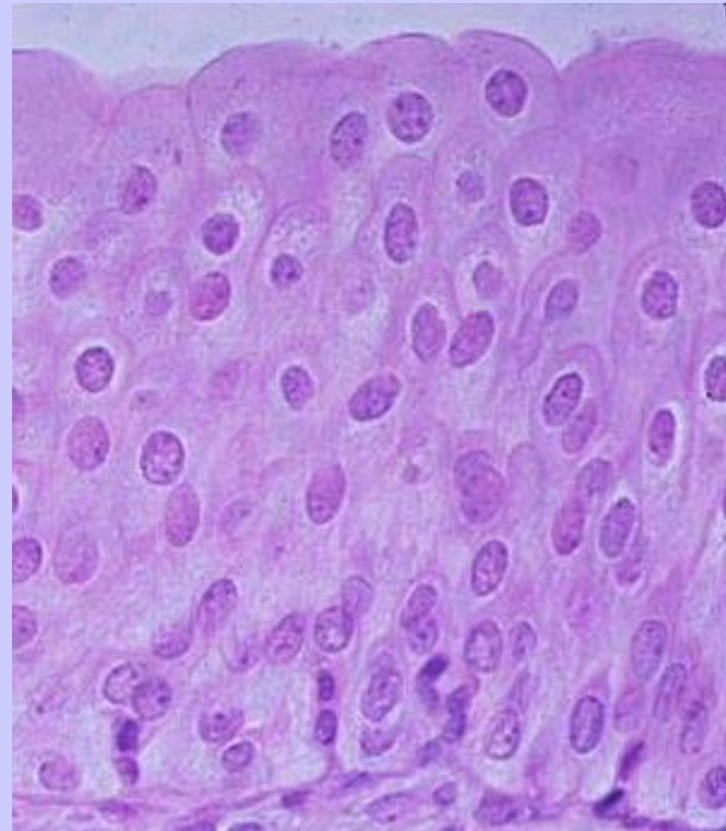
- 1. Covers and lines organs/cavity walls
- 2. Forms boundaries

- **Special Characteristics**

- 1. **As an interface tissue**
 - Protection, absorption, filtration, secretion and excretion
- 2. **Exhibits polarity**
 - Apical (superior) and basal (inferior) surfaces
- 3. **Avascular, but innervated**
- 4. **Supported by connective tissue**
 - Cells are attached to a ‘basement’ membrane
- 5. **Ability to regenerate**
- 6. **“Cellular”**

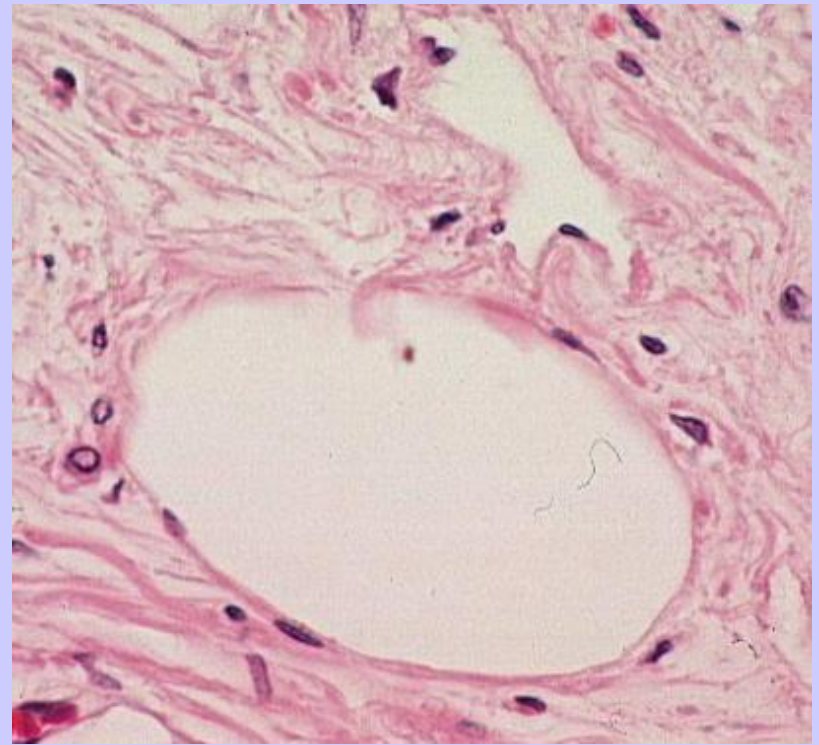
Examples: Epithelial

- Transitional epithelial: found in the bladder
- Stretches as the bladder becomes full



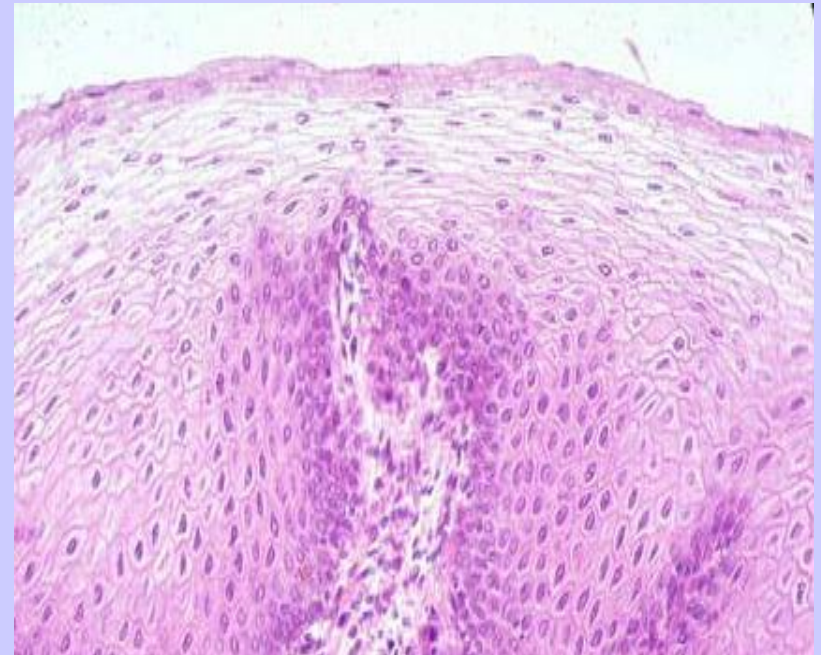
Examples: Epithelial

- Simple squamous: lines blood vessels and lungs
- Allows for increased blood flow and increased oxygen diffusion



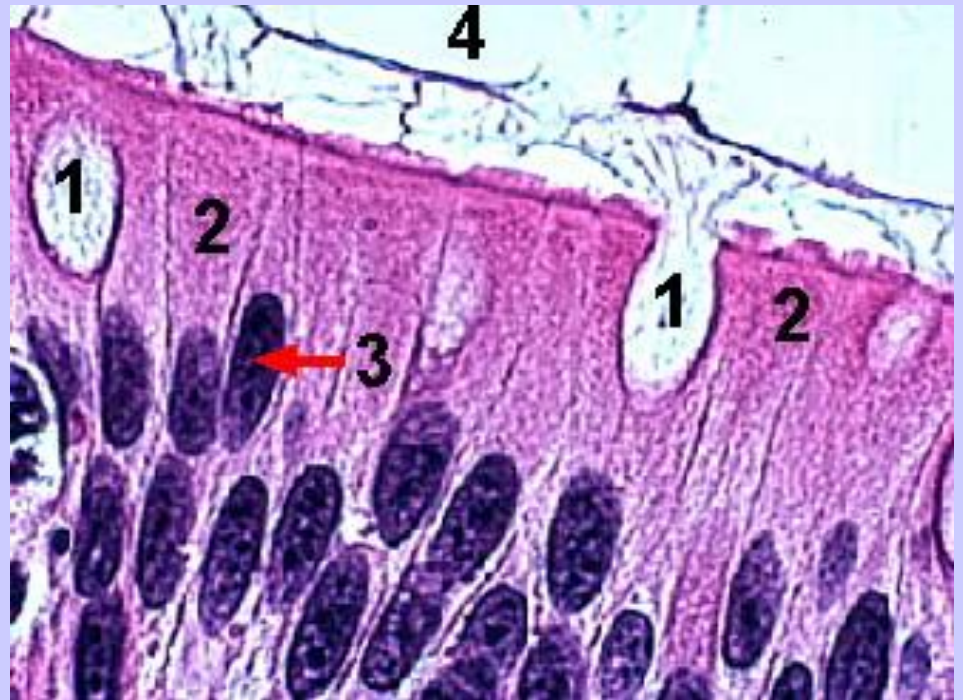
Examples: Epithelial

- Stratified squamous: lines the mouth, esophagus, cervix and skin
- Several layers offers protection to outer layers and membranes of body.



Examples: Epithelial

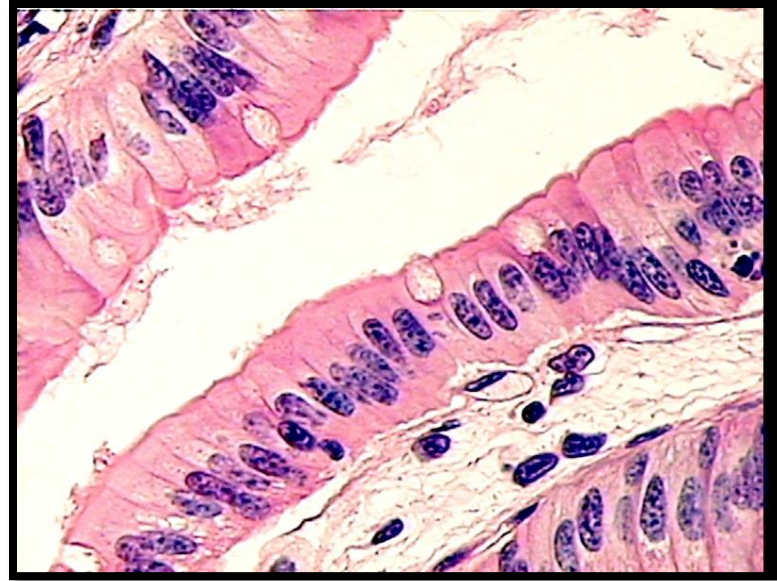
- Simple columnar: digestive tracts
- Cells mixed with goblet cells that secrete mucous to aid in digestion



Simple Epithelia

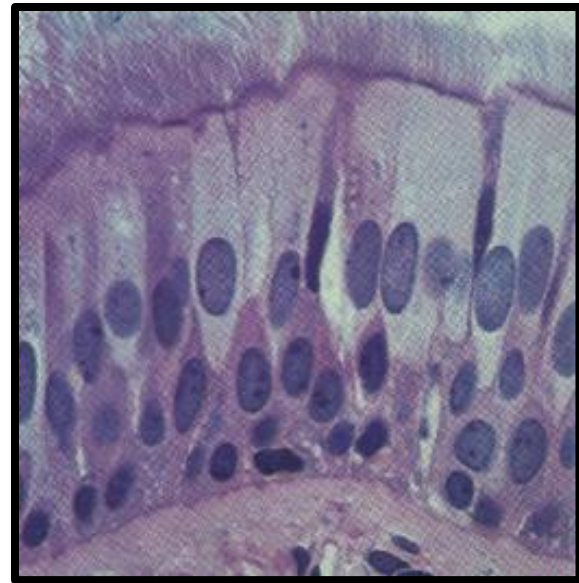
4. Simple Columnar

- Tall, thin cells
- Absorptive cells (small intestine)
- Goblet Cells



5. Pseudostratified 'Ciliated' Columnar Epithelium

- “Pseudostratified” ?
- Trachea
- Goblet Cells and Mucus



Stratified Epithelium

1. Characteristics

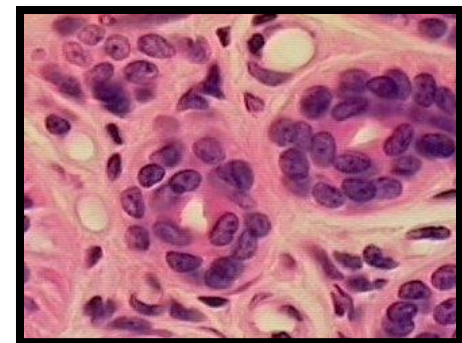
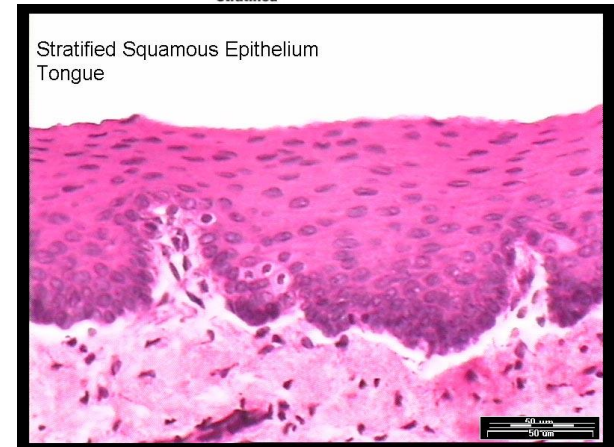
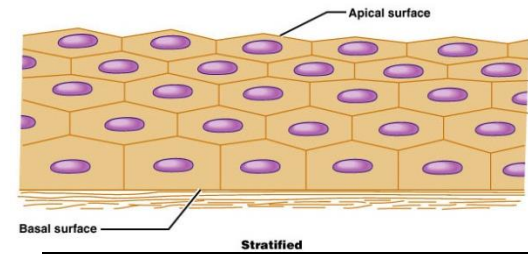
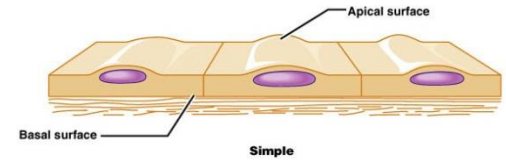
- 2+ layers

2. Stratified Squamous

- Skin – outer layer hardened by ‘keratin’
- 4 to 5 layers thick

3. Stratified Cuboidal

- Ducts of sweat glands
- This type + stratified columnar are rare!



Example	Location	Shape (form)	Function
Transitional epithelium	Bladder	Layer with no specific shape, Cells can stretch	Allow bladder to stretch as it fills
Simple squamous	Lungs, blood vessels	Flat and thin layer	Increase flow and absorption rate through tubes
Stratified squamous	Skin, esophagus, mouth cervix	Several layers of thin flat cells	Provide protection from abrasions
Simple columnar	Digestive tract	One cell layer of rectangular cells mixed with goblet (mucous – producing) cells	Aid in digestion with mucous production

Glandular Epithelium

- **Characteristics**

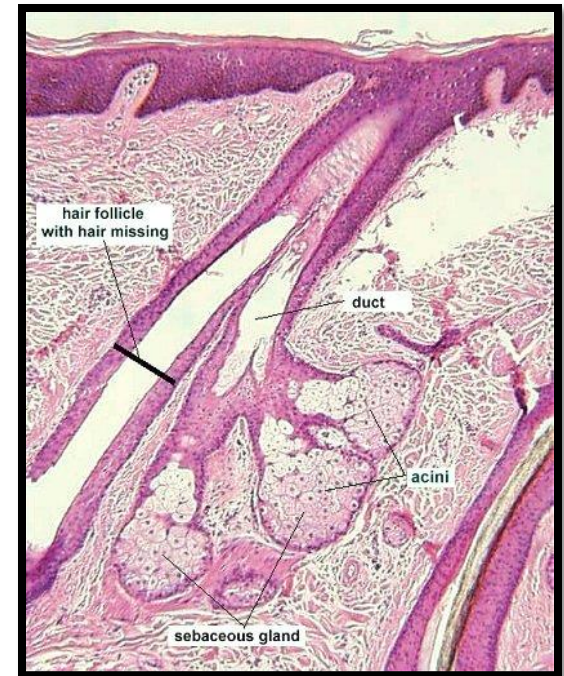
- Situated in sweat (sudoriferous) and oil (Sebaceous) glands
- “Secretes” a product

1. **Endocrine Glands**

- Internal secretion – hormones
- “Ductless”
- Pituitary, Thyroid, Testes, Ovaries

2. **Exocrine Glands**

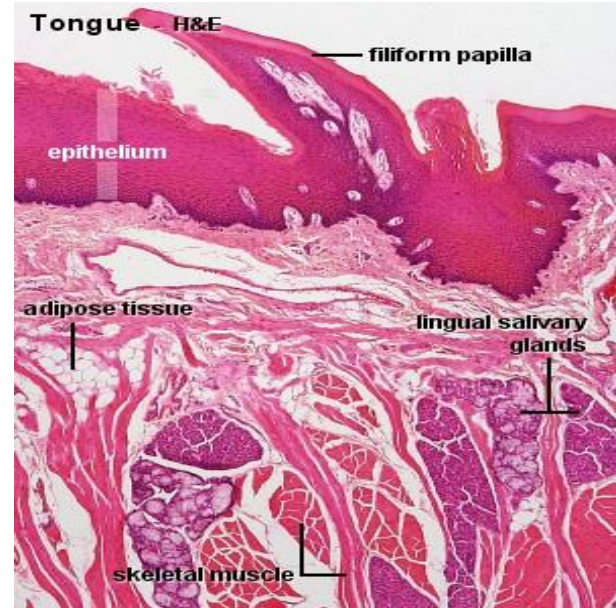
- Secretes product ‘outside’ or onto a surface
- True ‘ducts’
- Extracellular and unicellular



Exocrine Epithelial Glands

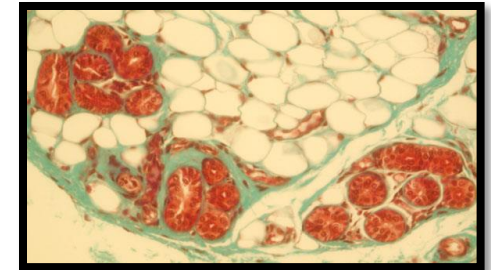
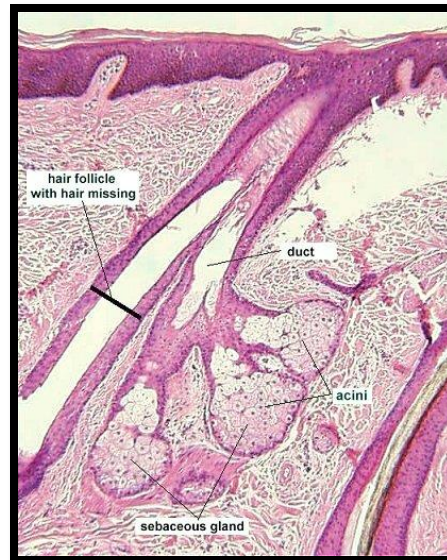
1. Unicellular

- Goblet cells (Trachea epithelium; absorptive cells)
- Mucin and Mucus



2. Multicellular

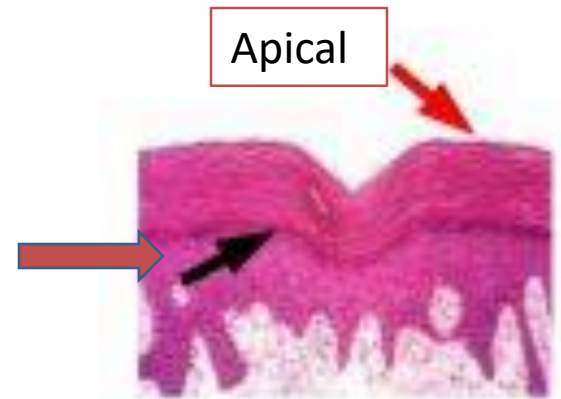
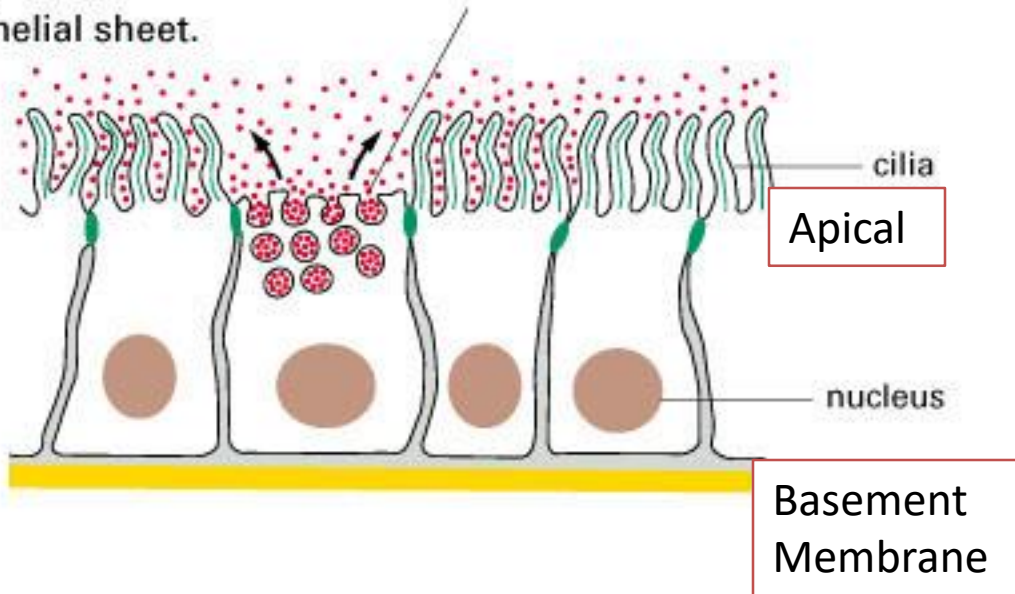
- Salivary Glands
 - Merocrine gland
- Sebaceous glands
 - Halocrine gland



Epithelial Structure

Ciliated cells have cilia on their free surface that beat in synchrony to move substances (such as mucus) over the epithelial sheet.

Secretory cells are found in most epithelial layers. These specialized cells secrete substances onto the surface of the cell sheet.

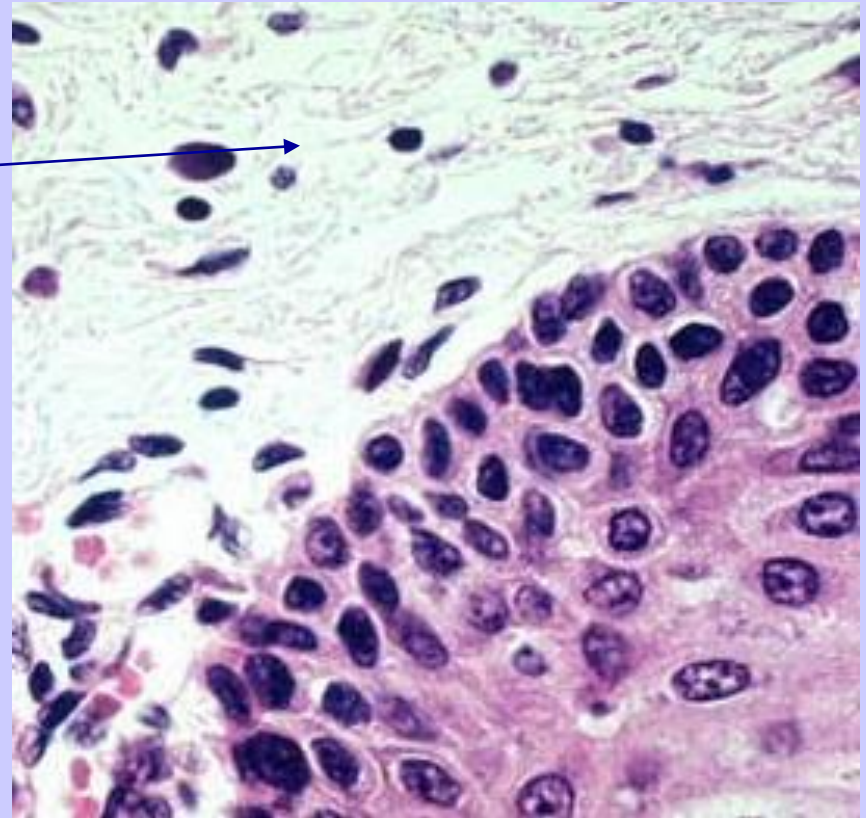


Connective

- Function: Bind and support other tissues
- Several types:
 - Bone
 - Blood
 - CT proper: dense and loose
 - Adipose
 - Cartilage

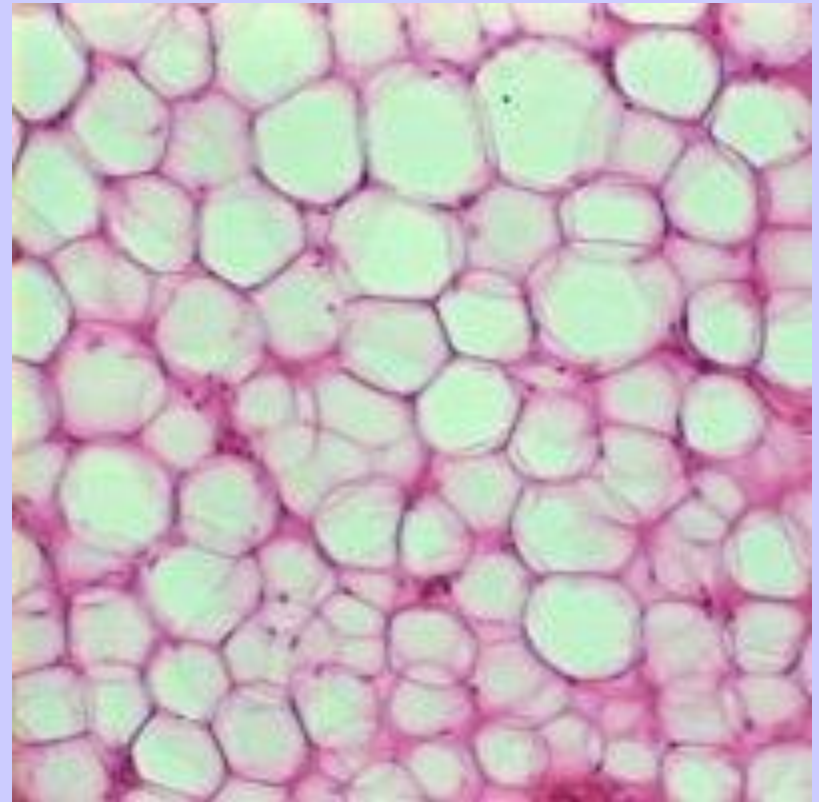
Examples: Connective

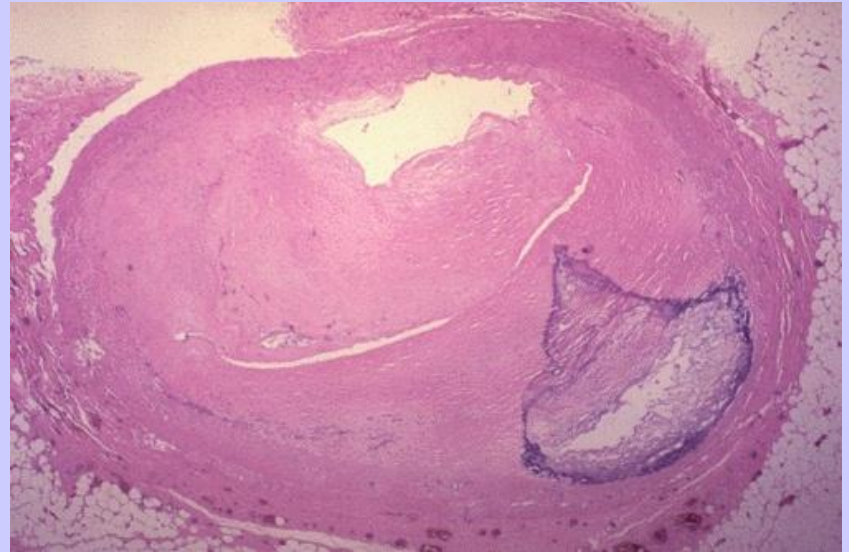
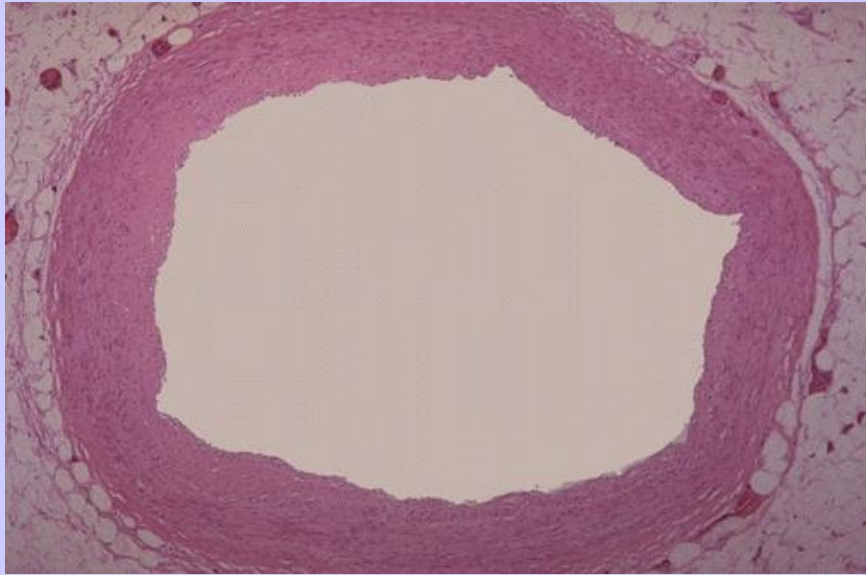
- CT proper:
 - Loose: ECM
 - Dense: tendons and ligaments



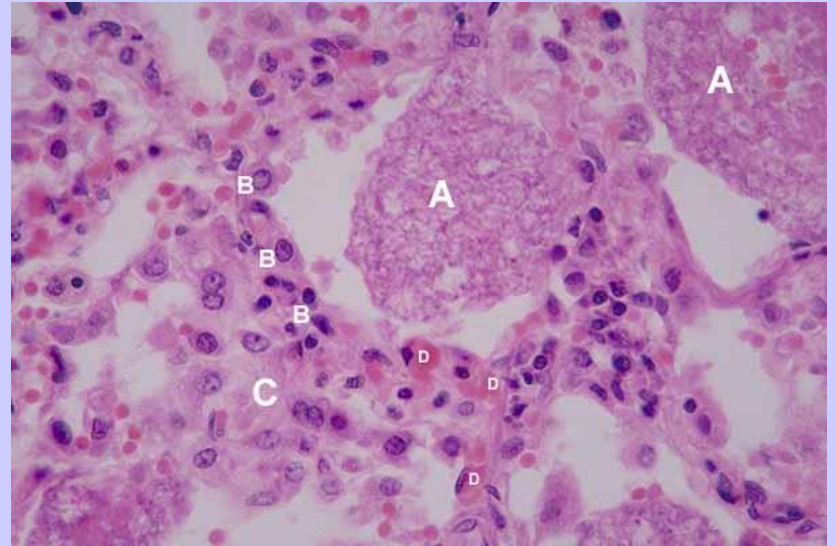
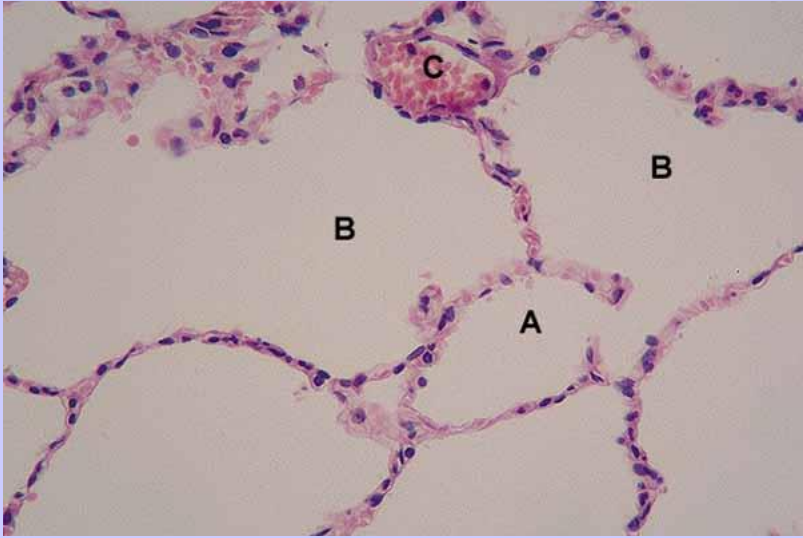
Examples: Connective

- Adipose tissue:
 - Insulation
 - Storage

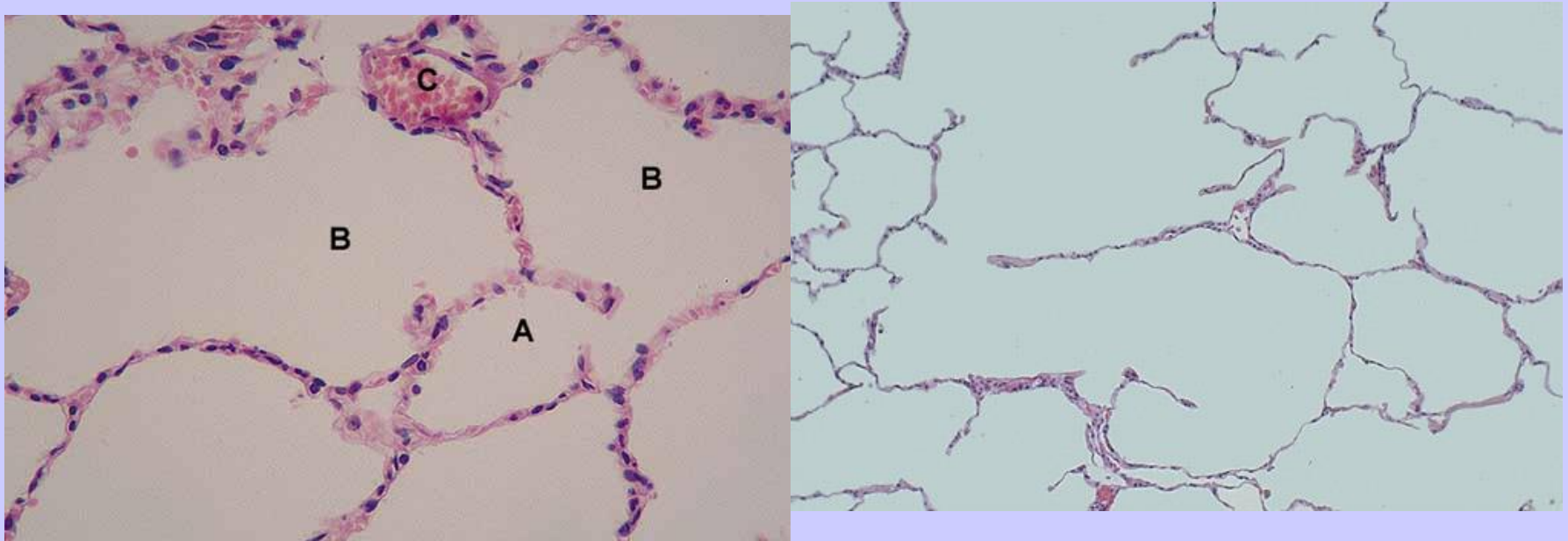




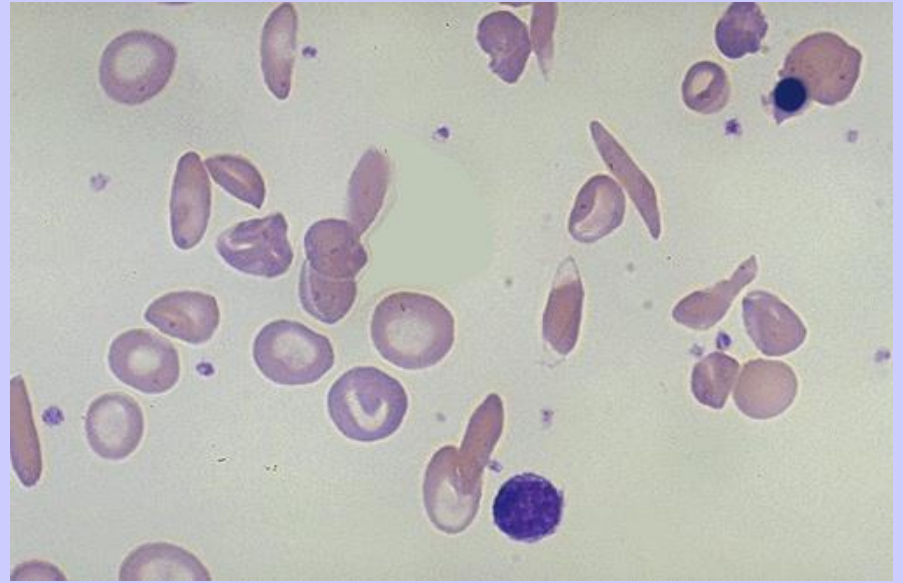
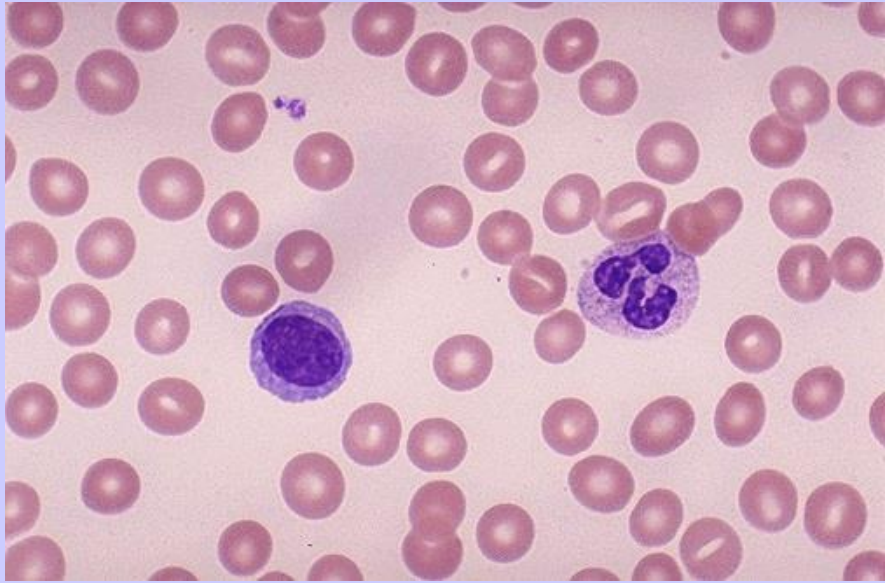
- Blocked coronary artery



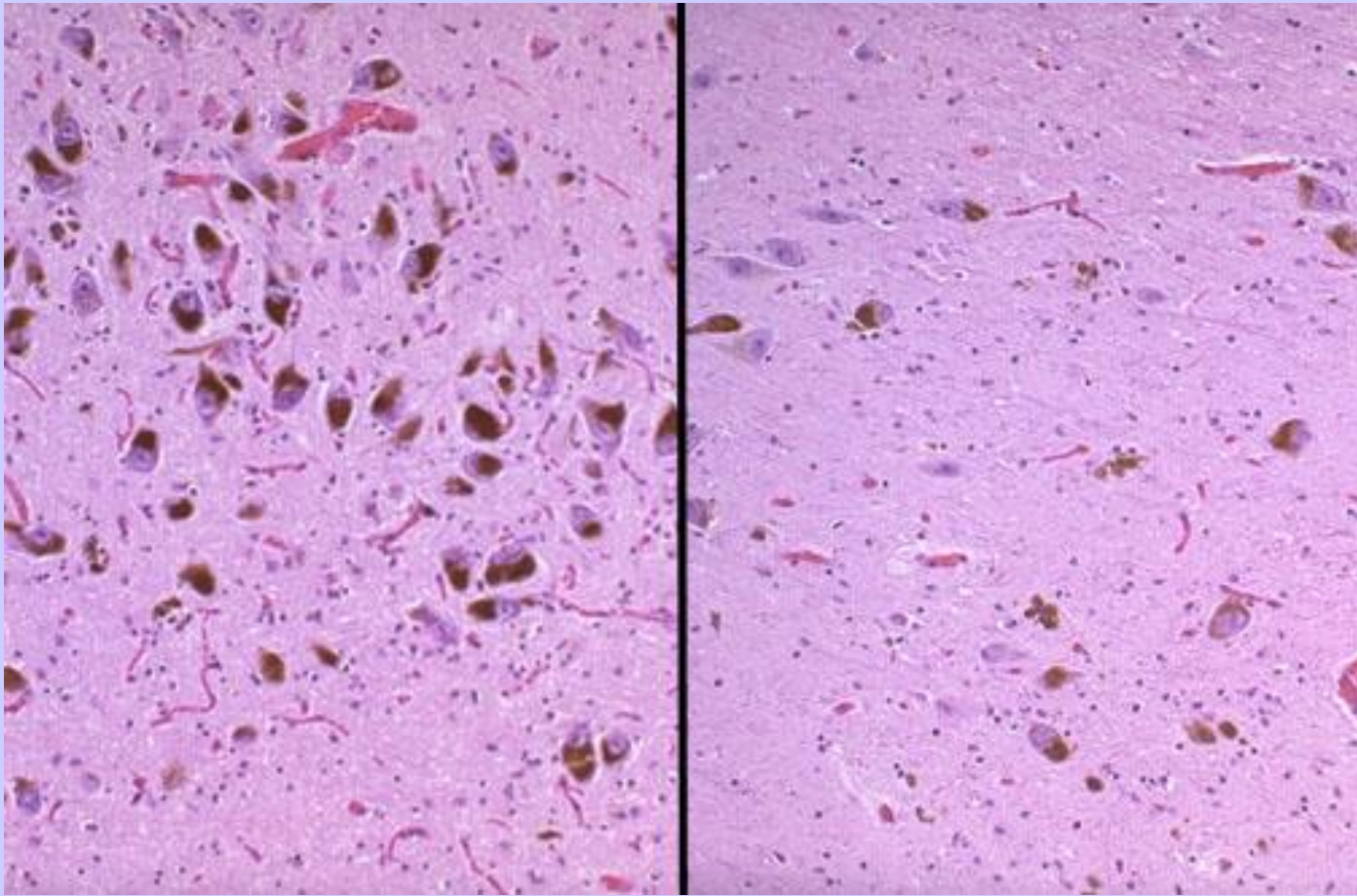
- Alveoli of lungs with pneumonia



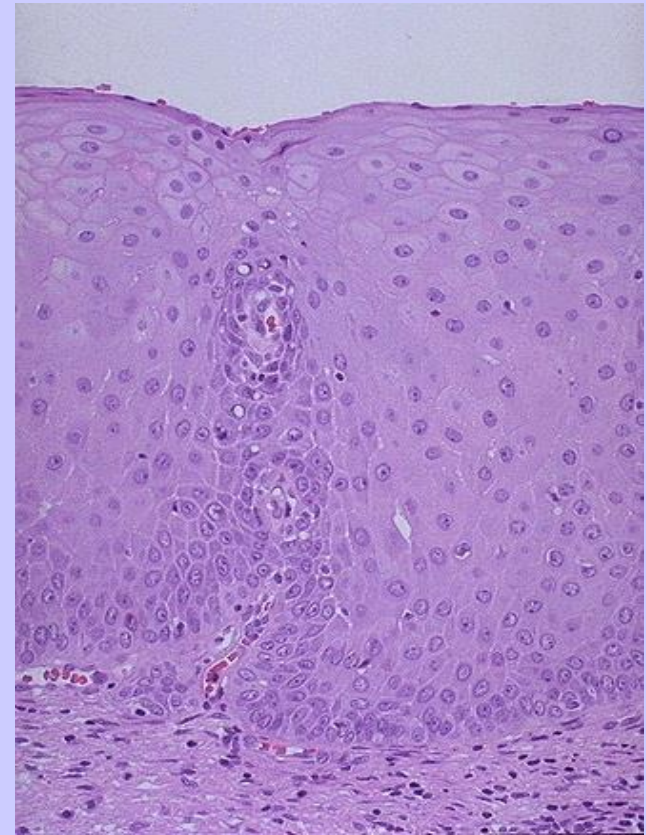
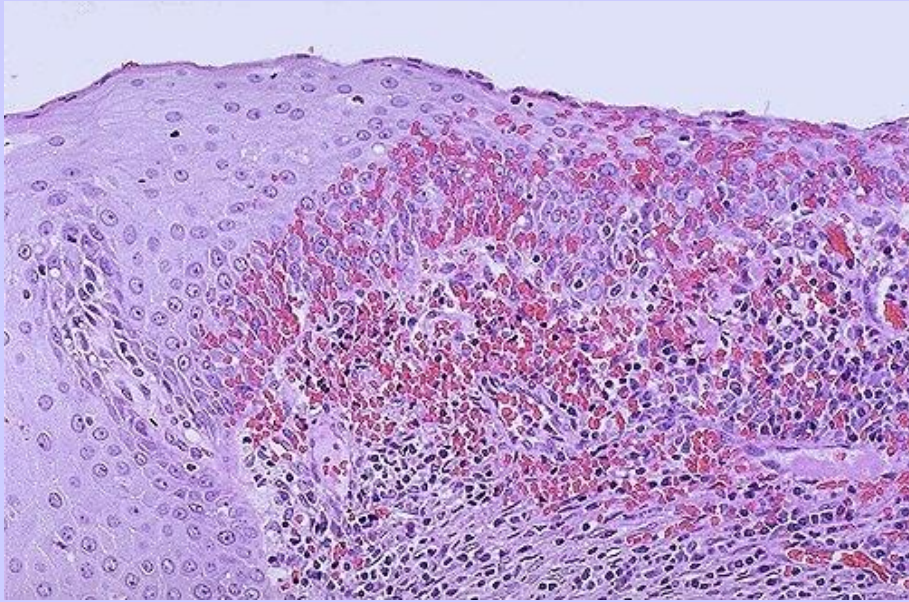
- Emphysema in alveoli of lungs



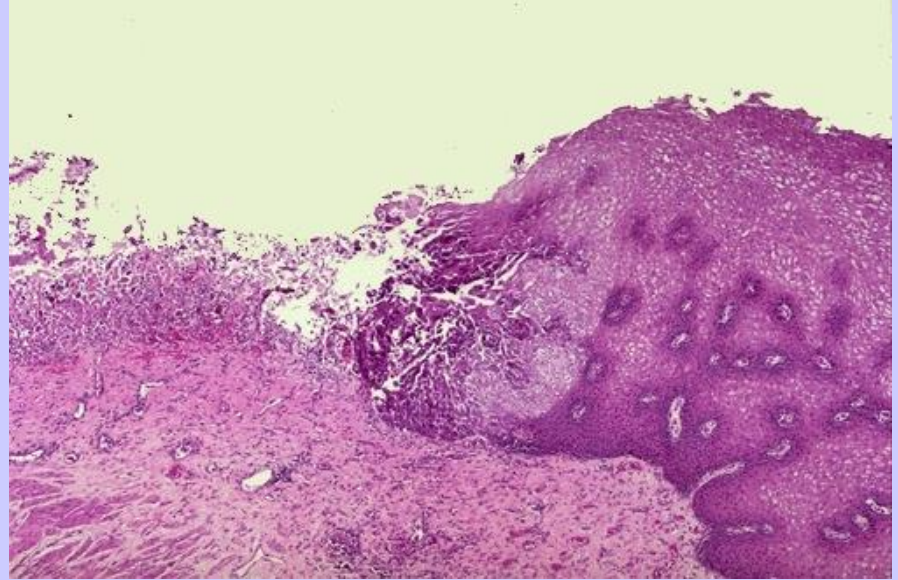
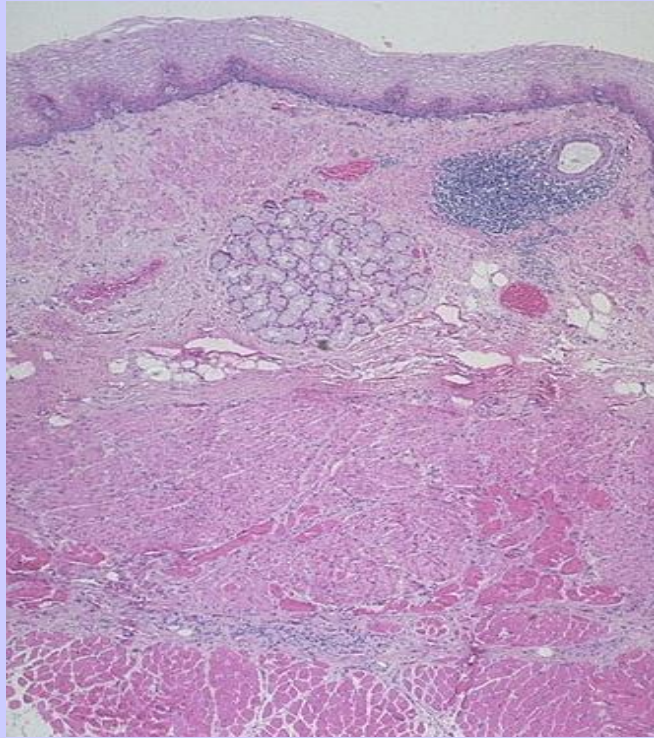
- Sickle cell anemia



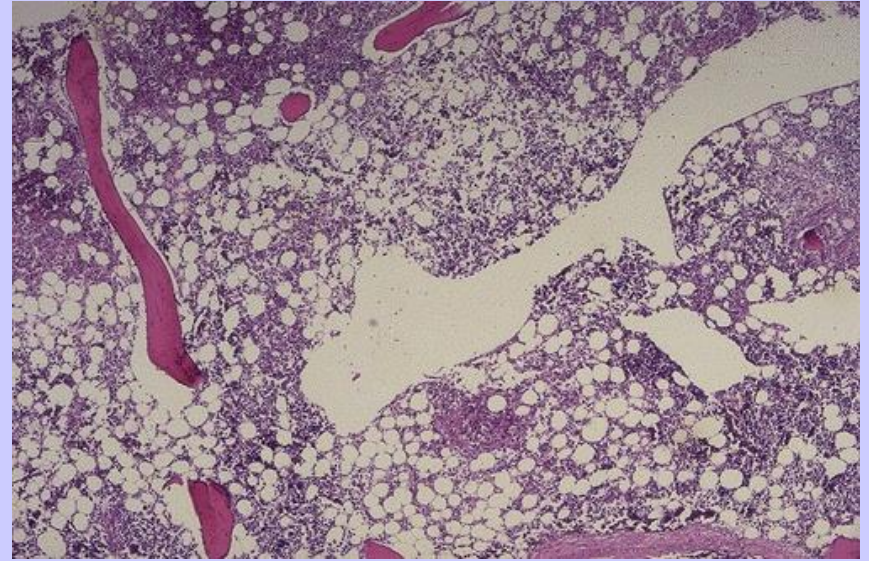
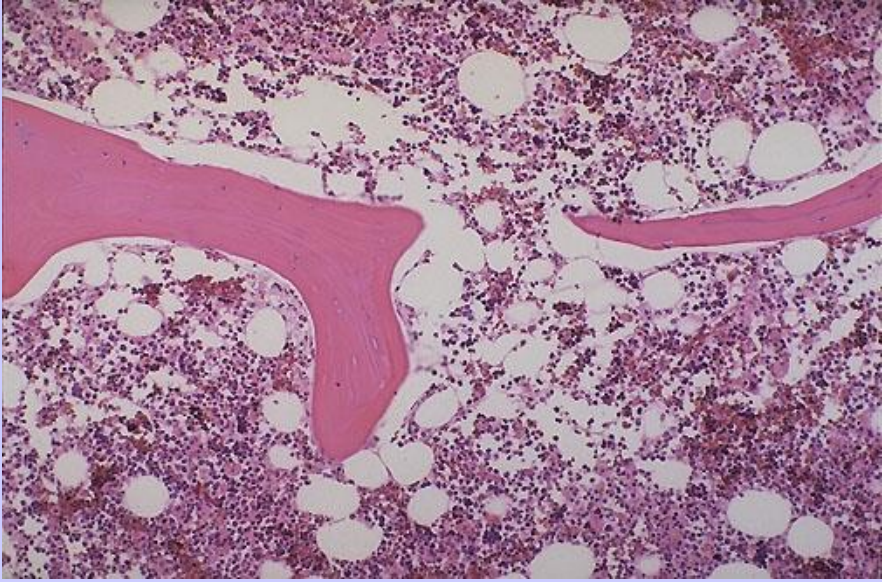
- Parkinson's disease



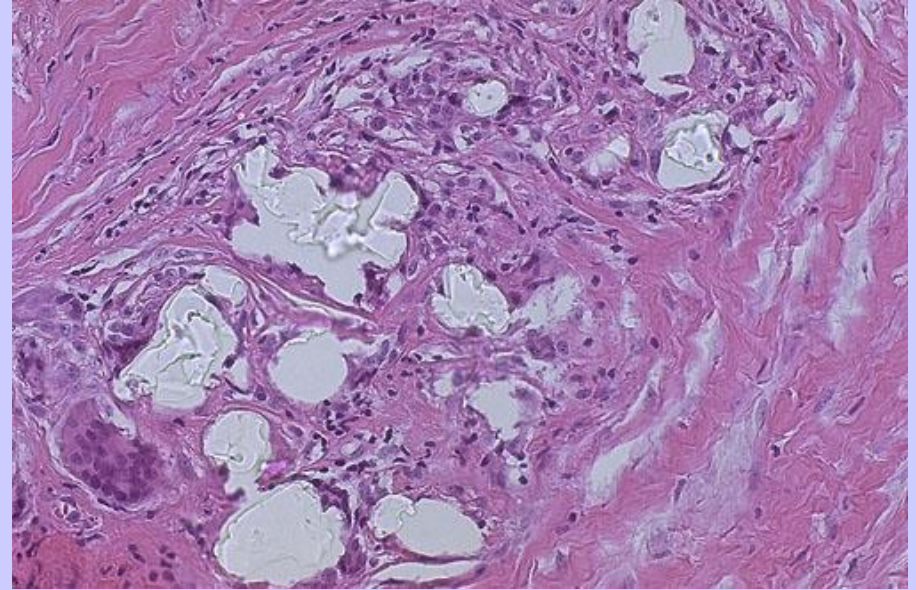
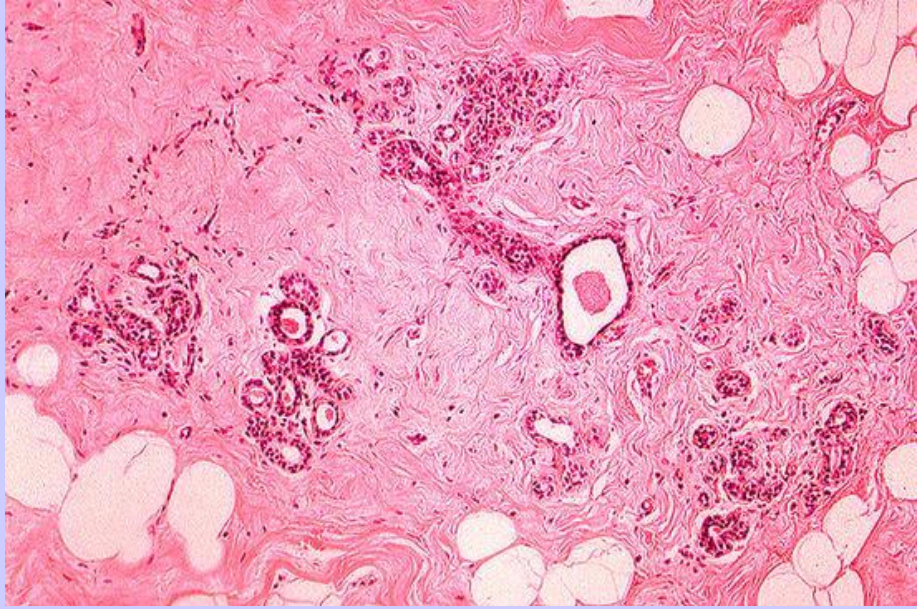
- Cervical Human papillomavirus



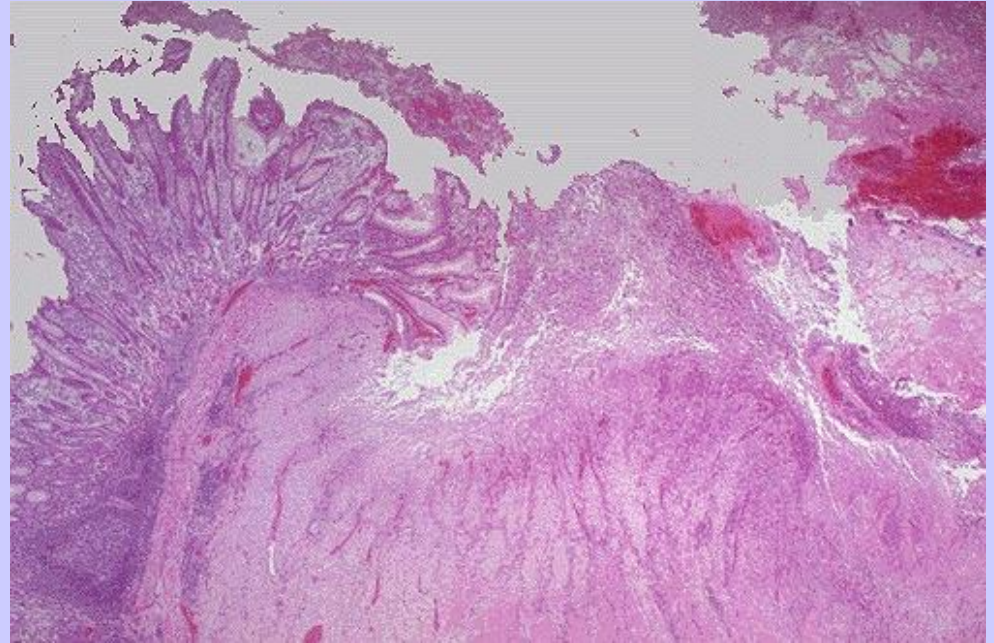
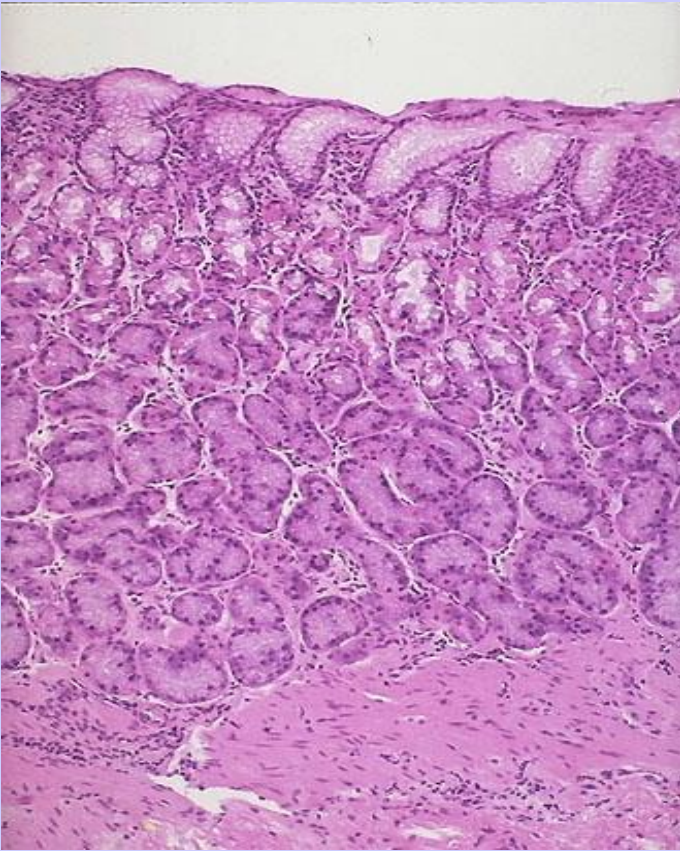
- Herpes on esophagus



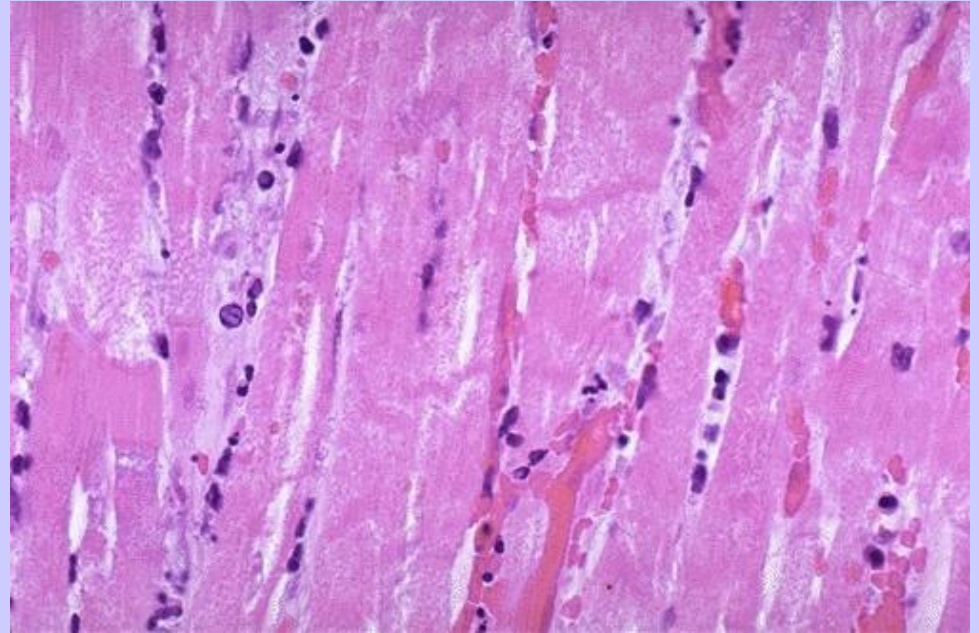
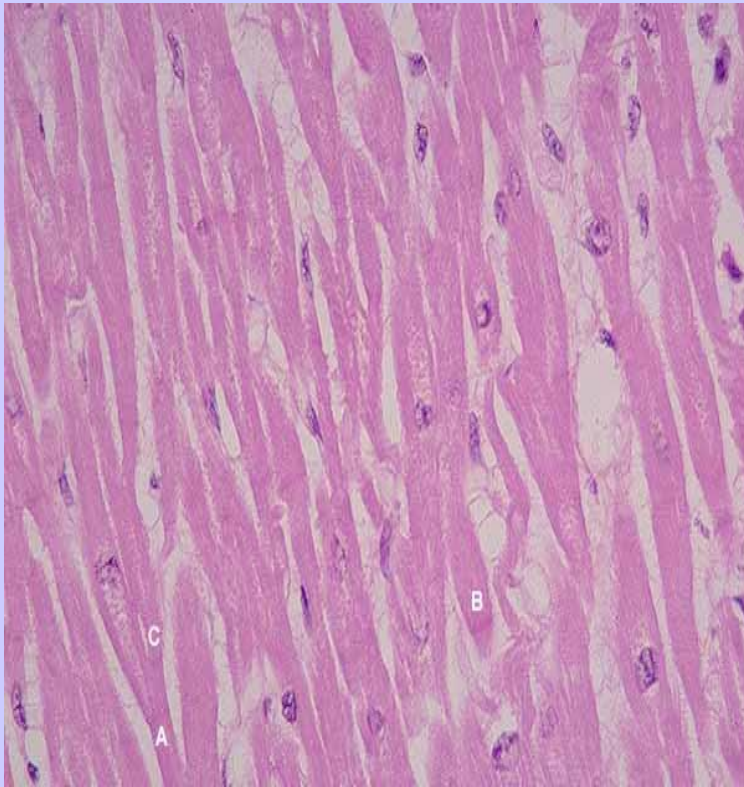
- Osteoporosis



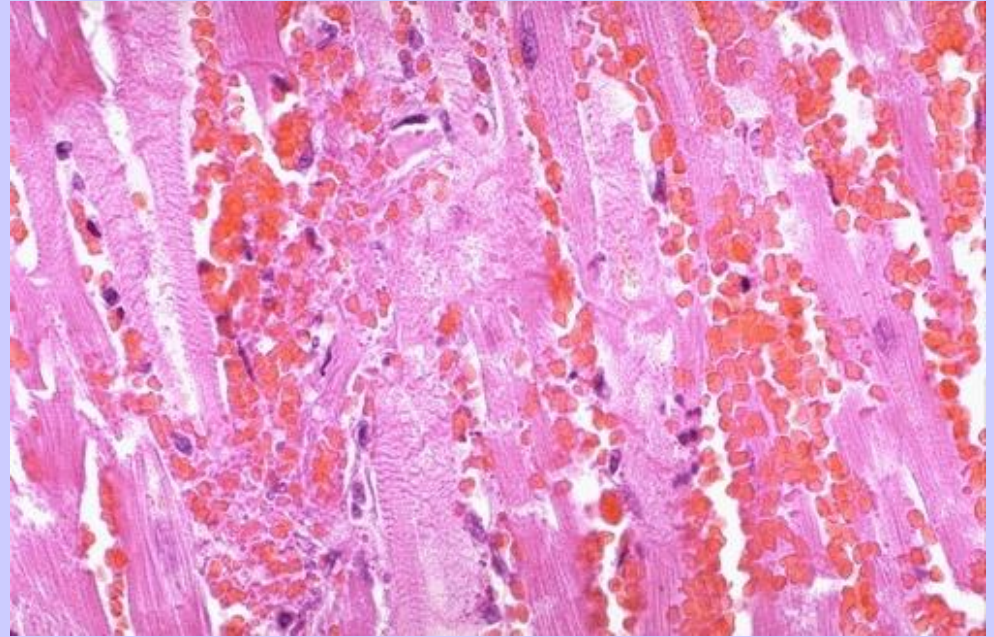
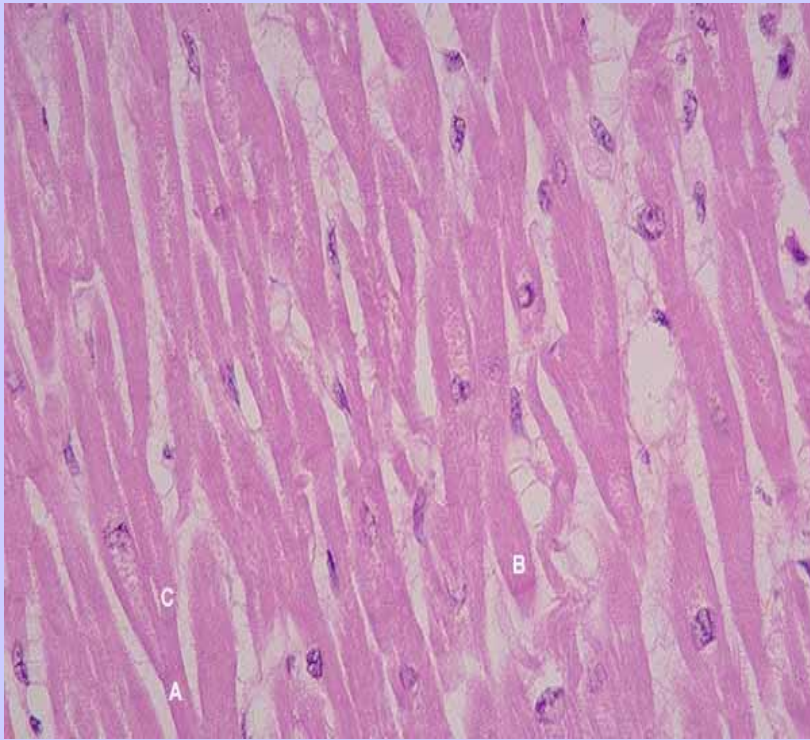
- Infected mammary gland from silicone leak



- Stomach ulcer



- Cardiac tissue after cocaine use



- Cardiac tissue following myocardial infarction