



Practical Biology Lecture - 5

Kidney Dialysis Techniques Department

Prof . Dr. Younis A. Alkhafaj

Tissue Classification, Types, and Functions



Learning Objectives

- 1- Define biological tissue
- 2- Classify the four primary tissue types
- 3- Describe basic characteristics and functions of each type
- 4- Relate tissue functions to dialysis procedures

What is Tissue?

***A group of similar cells working together to perform specific functions.**

****Cells organize into tissues to form body organs.**

*****Each organ contains multiple tissue types.**

There are four types of Tissues: Epithelial, Connective, Muscle and Nervous Tissue.

Epithelial Tissue

Characteristics:

- ▶ Covers body surfaces and lines body cavities**
- ▶ Closely packed cells**
- ▶ Basal (attached to connective tissue) and polar**

Functions:

- Protection (skin)**
- Absorption (intestines)**
- Secretion (glands)**
- Sensation (sensory receptors)**

♣ Types of Epithelial Tissue

- ▶ Squamous epithelium (lines blood vessels)
- ▶ Columnar epithelium (lines intestines)
- ▶ Cuboidal epithelium (in kidney tubules)
- ▶ Transitional epithelium (in bladder)

Connective Tissue

Characteristics:

- ▶ Cells spaced apart in extracellular matrix
- ▶ Matrix contains fibers (collagen, elastin)

Functions:

- ▶ Support and connection between tissues
- ▶ Protection (bones)
- ▶ Storage (fat)
- ▶ Transport (blood)

♠ **Types of Connective Tissue**

- ♠ **Loose connective tissue (supports organs)**
- ♠ **Fibrous connective tissue (tendons, ligaments)**
- ♠ **Cartilage (flexible, supports joints)**
- ♠ **Bone (hard, supports and protects)**
- ♠ **Blood (fluid, transports substances)**

Muscle Tissue

Characteristics:

- 🌀 **Specialized cells for contraction**
- 🌀 **Contain actin and myosin proteins**

Functions:

- ▣ **Movement (skeletal muscles)**
- ▣ **Moving substances within body (smooth muscles)**
- ▣ **Pumping blood (cardiac muscle)**

Types of Muscle Tissue

- ♥ **Skeletal muscle: voluntary, striated**
- ♥ **Smooth muscle: involuntary, non-striated (in digestive tract, blood vessels)**
- ♥ **Cardiac muscle: involuntary, striated**

Nervous Tissue

Characteristics:

- ▣ **Consists of neurons and glial cells**
- ▣ **Neurons have extensions (axons and dendrites)**

Functions:

- ▶ **Receiving sensory stimuli**
- ▶ **Processing information**
- ▶ **Sending signals to muscles and glands**

Dialysis Applications

How Tissues Relate to Dialysis:

- ▶ **Epithelial tissue:** lines blood vessels used for vascular access
- ▶ **Connective tissue:** forms membranes in artificial kidney filters
- ▶ **Muscle tissue:** in walls of blood vessels used for access
- ▶ **Nervous tissue:** transmits pain or discomfort signals during treatment

Interactive Activity

***Case Study:

Patient undergoing hemodialysis via arteriovenous (AV) fistula

1- Identify tissue types involved

2- Describe each tissue's role in dialysis process

References

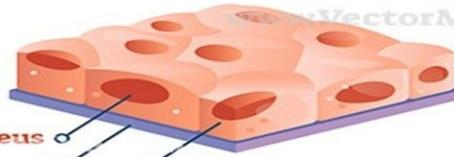
1- Human Histology

2- textbook

3- Dialysis Technology manual

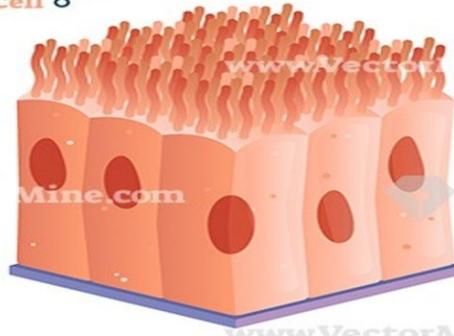
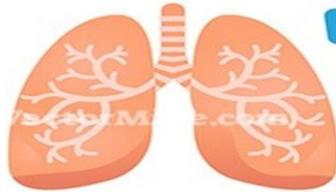
4- Electronic tissue atlas

EPITHELIAL CELL



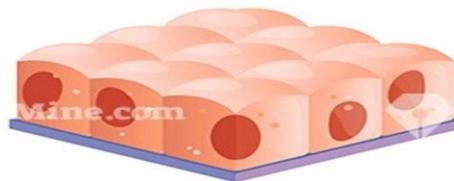
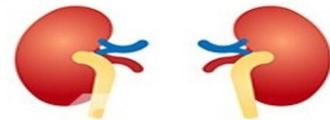
Simple Squamous Epithelium

- ▣ Lines Blood Vessels and Sacs of Lungs
- ▣ Permits Exchange of Nutrients, Waste and Gases



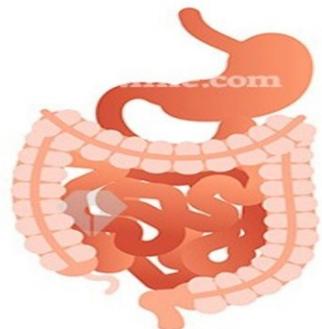
Ciliated Columnar Epithelium

- ▣ Sensitive Areas - Trachea, Bronchi and Uterus
- ▣ Absorption and Secretion



Simple Cuboidal Epithelium

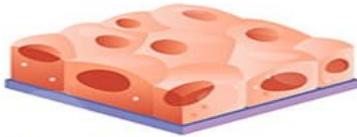
- ▣ Lines Kidney Tubules and Glands
- ▣ Secretes and Reabsorbs Water and Small Molecules



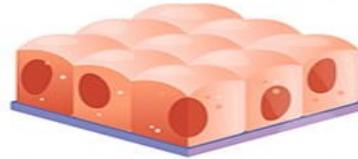
Simple (Smooth) Columnar Epithelium

- ▣ Lines most Digestive Organs
- ▣ Absorbs Nutrients and Produces Mucus

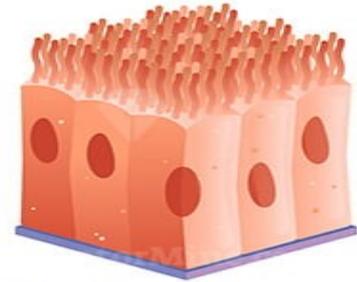
EPITHELIAL TISSUE



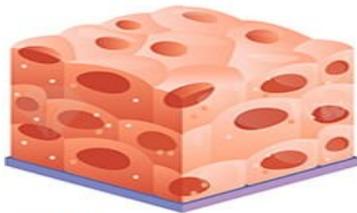
Simple squamous



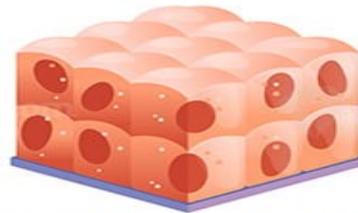
Simple cuboidal



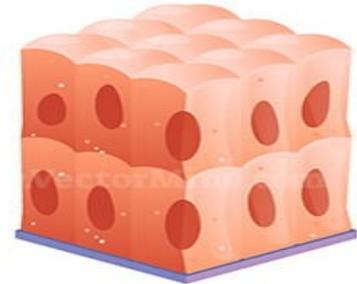
Simple columnar



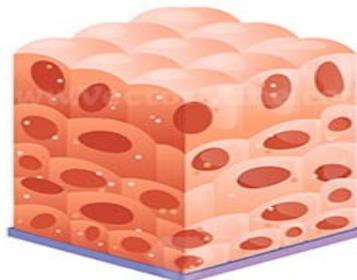
Stratified squamous



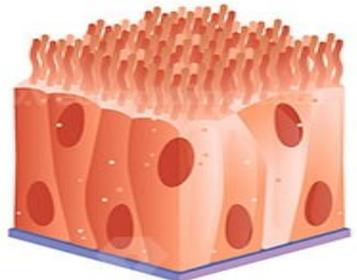
Stratified cuboidal



Stratified columnar



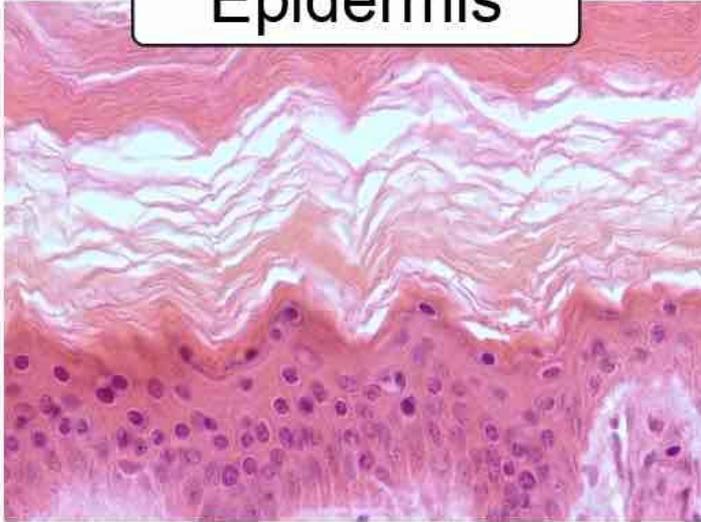
Transitional



Pseudostratified columnar

Four Examples of Epithelial Tissues

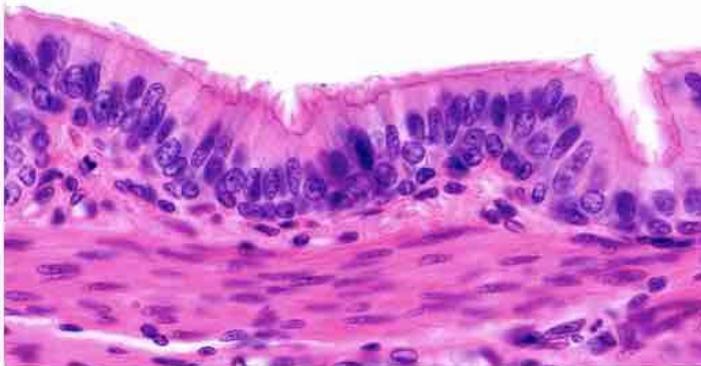
Epidermis



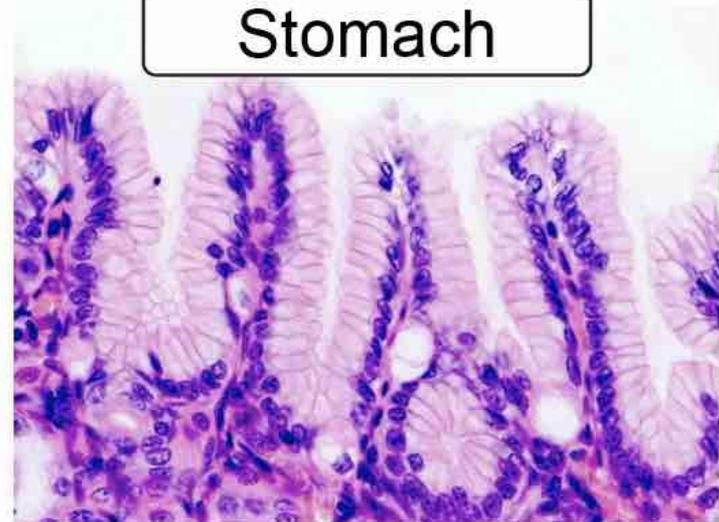
Sweat gland



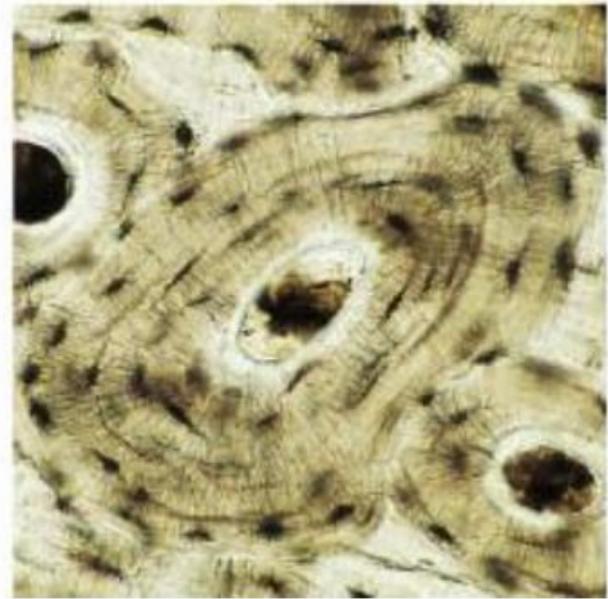
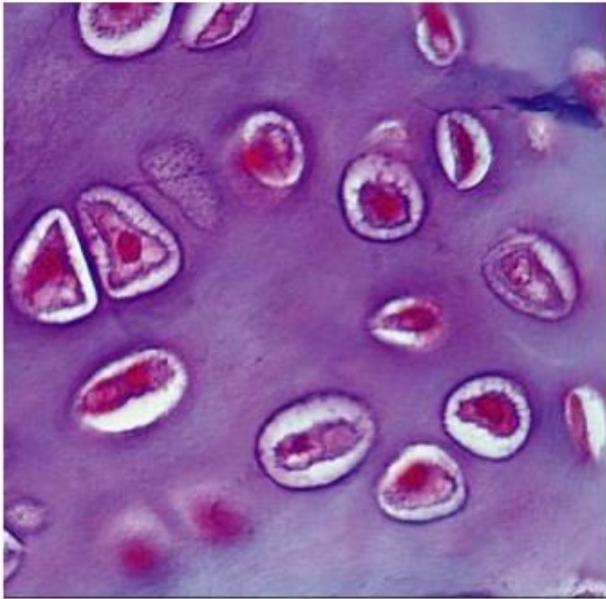
Trachea

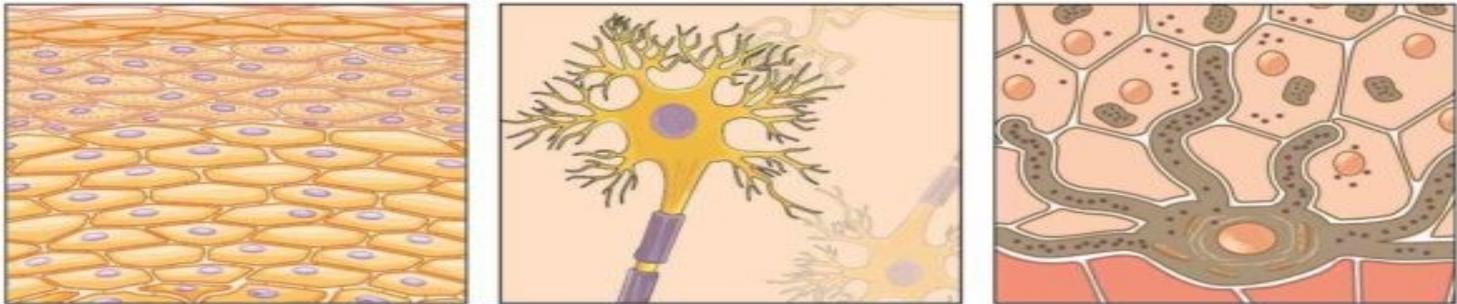


Stomach



“Cartilage and Bone”



Germ Layer	Gives rise to:
Ectoderm	<p data-bbox="401 97 1858 154">Epidermis, glands on skin, some cranial bones, pituitary and adrenal medulla, the nervous system, the mouth between cheek and gums, the anus</p> <div data-bbox="401 188 1858 492">  </div> <div data-bbox="556 506 1729 535"> <p data-bbox="556 506 714 535">Skin cells</p> <p data-bbox="1058 506 1197 535">Neurons</p> <p data-bbox="1522 506 1729 535">Pigment cell</p> </div>
Mesoderm	<p data-bbox="401 582 1825 639">Connective tissues proper, bone, cartilage, blood, endothelium of blood vessels, muscle, synovial membranes, serous membranes lining body cavities, kidneys, lining of gonads</p> <div data-bbox="401 668 1858 849">  </div> <div data-bbox="479 863 1787 921"> <p data-bbox="479 863 608 921">Cardiac muscle</p> <p data-bbox="768 863 898 921">Skeletal muscle</p> <p data-bbox="1039 863 1217 921">Tubule cell of kidney</p> <p data-bbox="1342 863 1516 921">Red blood cells</p> <p data-bbox="1657 863 1787 921">Smooth muscle</p> </div>
Endoderm	<p data-bbox="401 968 1874 1025">Lining of airways and digestive system except the mouth and distal part of digestive system (rectum and anal canal); glands (digestive glands, endocrine glands, adrenal cortex)</p> <div data-bbox="401 1049 1858 1349">  </div> <div data-bbox="556 1363 1748 1392"> <p data-bbox="556 1363 705 1392">Lung cell</p> <p data-bbox="1033 1363 1226 1392">Thyroid cell</p> <p data-bbox="1503 1363 1748 1392">Pancreatic cell</p> </div>