Al-Mustaqbal University
College of Science
Forensic Evidence Department

جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قسم الادلة الجنائية

Lecture (4)

عنوان المحاضرة

Tissue: Structure, Properties and Classification (Part 1)

المادة : بايلوجي

المرحلة : الاولى

اسم الاستاذ: م.م هويدا نزال حسين

Tissue: Structure, Properties and Classification (Part 1)

Introduction

The human body is made up of a very large number of cells. These cells do not work alone. Instead, similar cells come together to form tissues. Each tissue has a specific structure and performs a specific function that helps the body survive and function normally.

Histology is the science that studies tissues under the microscope. It helps us understand how tissues are organized, how they work, and how changes in tissues can lead to disease. Studying tissues is very important for medical and biological sciences because it connects cell structure with body function.

Definition of Tissue

A tissue is a group of similar cells that have the same origin, structure, and function. These cells work together, along with the substances between them, to perform a specific job in the body.

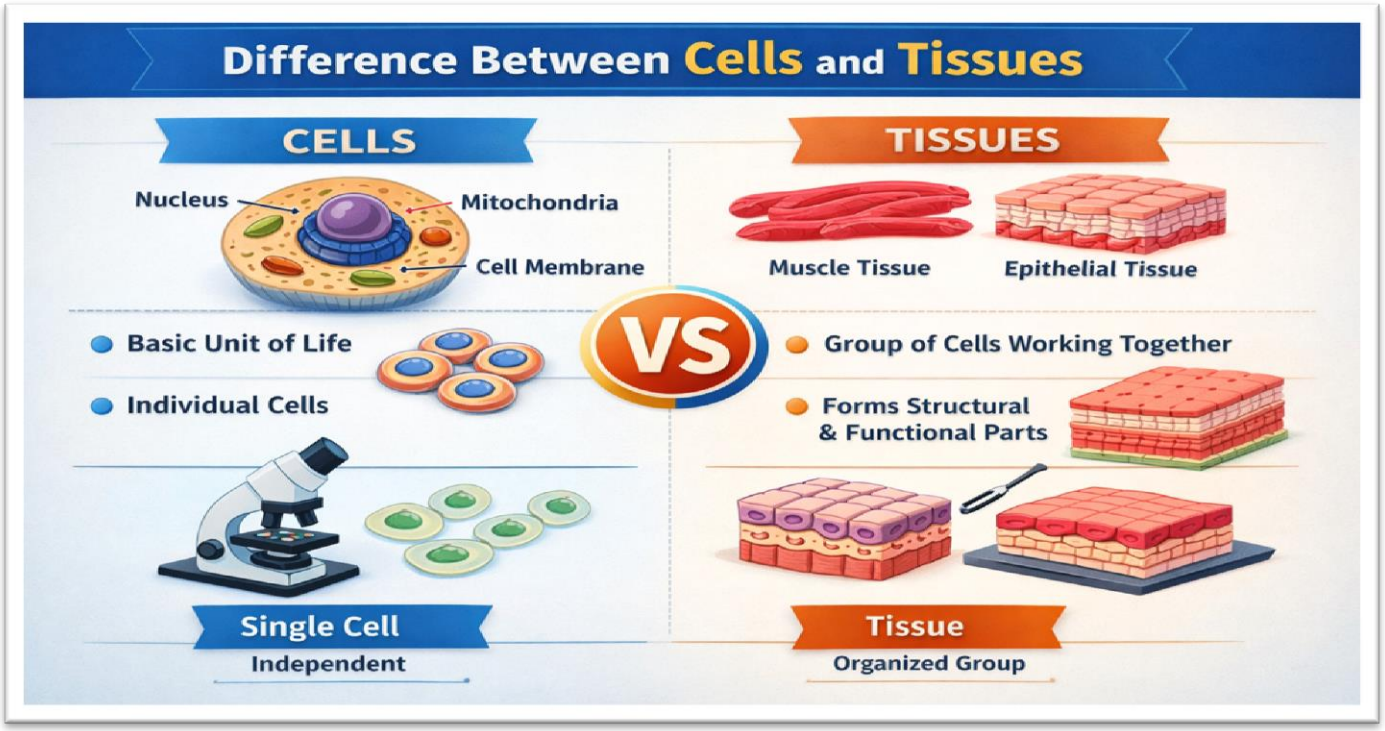
In simple words, tissue means:

- Many similar cells
- Working together
- Doing the same function

Difference Between Cells and Tissues

A cell is the smallest living unit in the body. It can perform basic life activities.
A tissue is made of many cells that work together to perform a bigger and more organized function.

Cells build tissues, and tissues build organs.

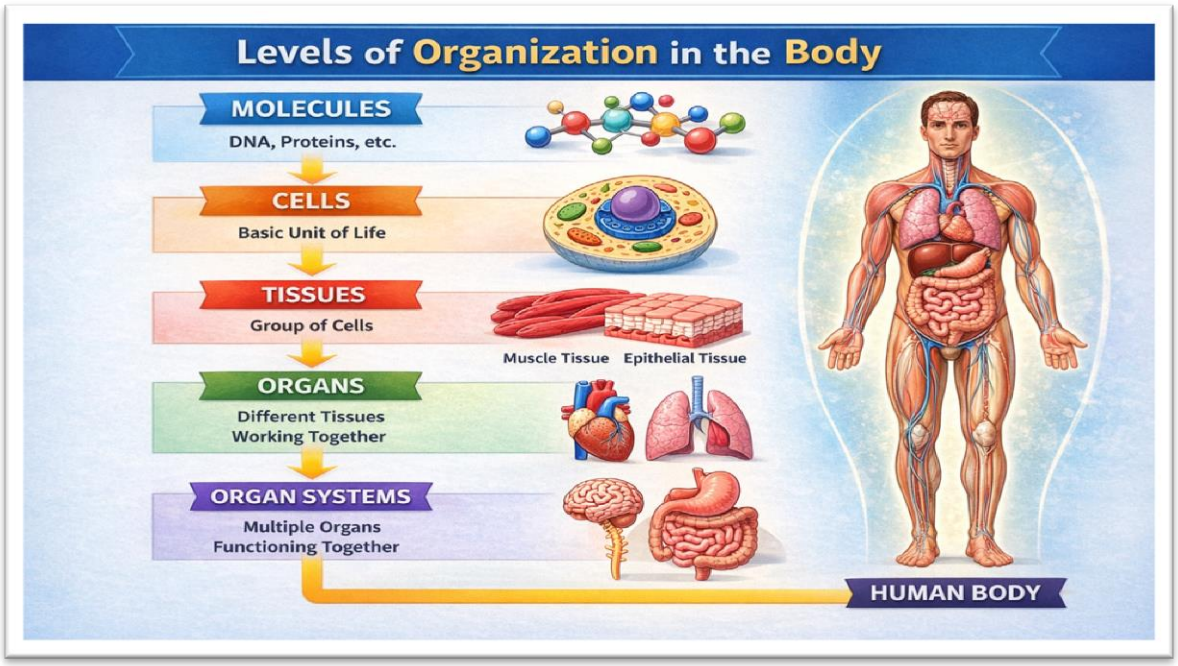


Levels of Organization in the Body

The human body is organized in levels:

1. **Cell**
   The basic unit of life.
2. **Tissue**
   A group of similar cells.
3. **Organ**
   Made of two or more types of tissues.
4. **System**
   A group of organs working together.
5. **Organism**
   The complete human body.

Each level is more complex than the one before it.



Importance of Studying Tissues

Studying tissues is important because:

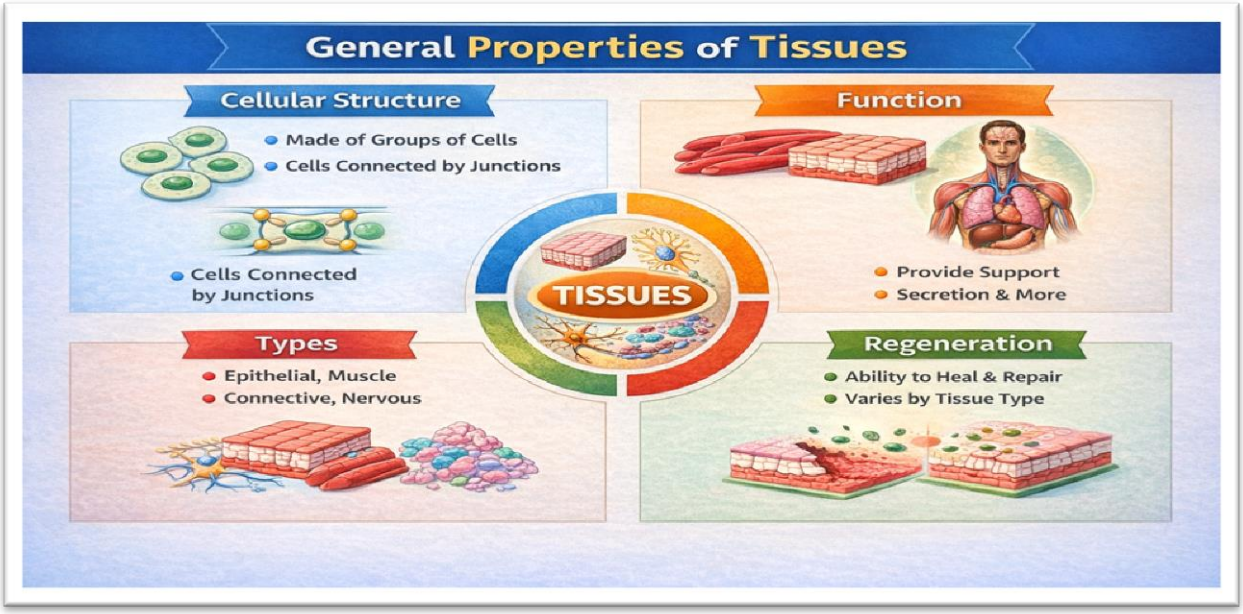
- It helps us understand how organs work
- It explains how diseases start
- It helps doctors diagnose diseases
- It is the base of pathology
- It connects structure with function

General Properties of Tissues

Although tissues are different from each other, they share some common properties.

Cellularity

All tissues are made of cells. The number, shape, and arrangement of cells differ from one tissue to another.



Intercellular Material

Some tissues have a lot of material between cells, while others have very little.
For example:

- Epithelial tissue has very little intercellular material
- Connective tissue has a lot of intercellular material

Specialization

Each tissue is specialized to do a specific function such as:

- Protection
- Support
- Movement
- Transport
- Communication

Regeneration

Some tissues can regenerate quickly after damage, such as epithelial tissue.
Other tissues regenerate slowly or do not regenerate at all, such as nervous tissue.

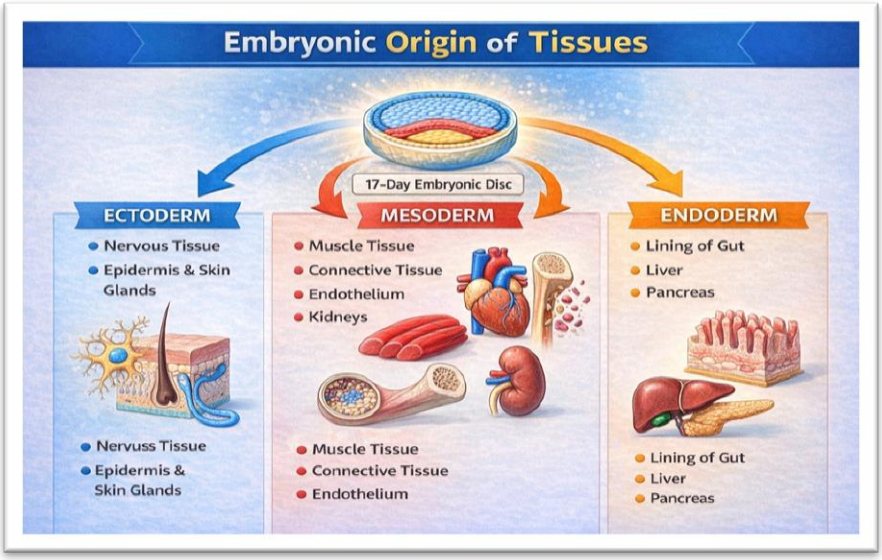
Embryonic Origin of Tissues

All tissues develop from three embryonic layers during early development.

Ectoderm

This layer forms:

- The epidermis of the skin
- The nervous system
- Sensory organs



Mesoderm

This layer forms:

- Muscles
- Bones
- Blood
- Connective tissues

Endoderm

This layer forms:

- Lining of the digestive system
- Lining of the respiratory system
- Some glands

Classification of Tissues

The tissues of the human body are classified into four main types:

1. **Epithelial tissue**
2. **Connective tissue**
3. **Muscle tissue**
4. **Nervous tissue**

Each type has a different structure and function.

Epithelial Tissue

Definition

Epithelial tissue is made of closely packed cells. It covers the outer surface of the body and lines the internal organs and cavities. It also forms glands.

Functions of Epithelial Tissue

Epithelial tissue has many important functions:

- **Protection**
  It protects the body from injury, bacteria, and dehydration.
- **Absorption**
  It absorbs nutrients, for example in the intestine.
- **Secretion**
  It produces and releases substances such as enzymes and hormones.
- **Filtration**
  It helps filter substances, as in the kidneys.
- **Sensation**
  It helps in sensing taste, smell, and touch.

Characteristics of Epithelial Tissue

Epithelial tissue has special features that make it different from other tissues.

Closely Packed Cells

Cells are very close to each other with almost no space between them.

Polarity

Each epithelial cell has:

- An apical surface (top)
- A basal surface (bottom)

Basement Membrane

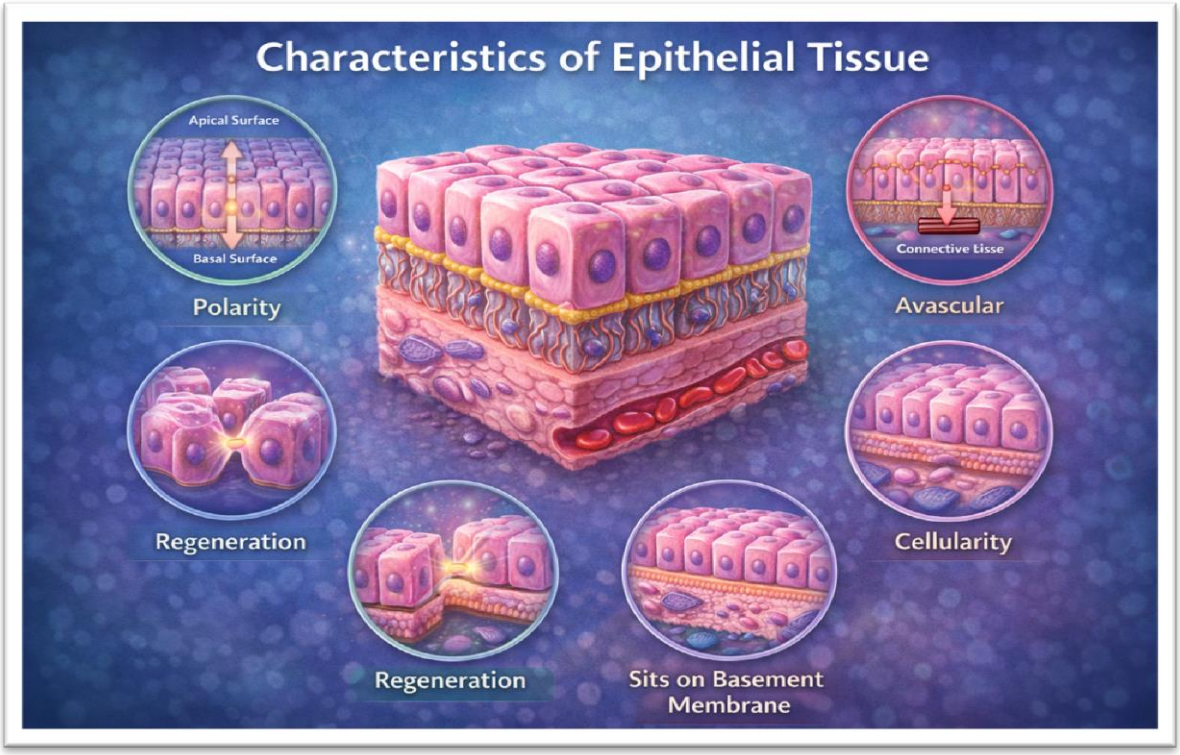
The epithelial tissue rests on a basement membrane that connects it to connective tissue.

No Blood Vessels

Epithelial tissue does not contain blood vessels, but it gets nutrients by diffusion.

Rapid Regeneration

Epithelial cells divide quickly to replace damaged or dead cells.



Types of Epithelial Tissue (General Idea)

Epithelial tissue is classified based on:

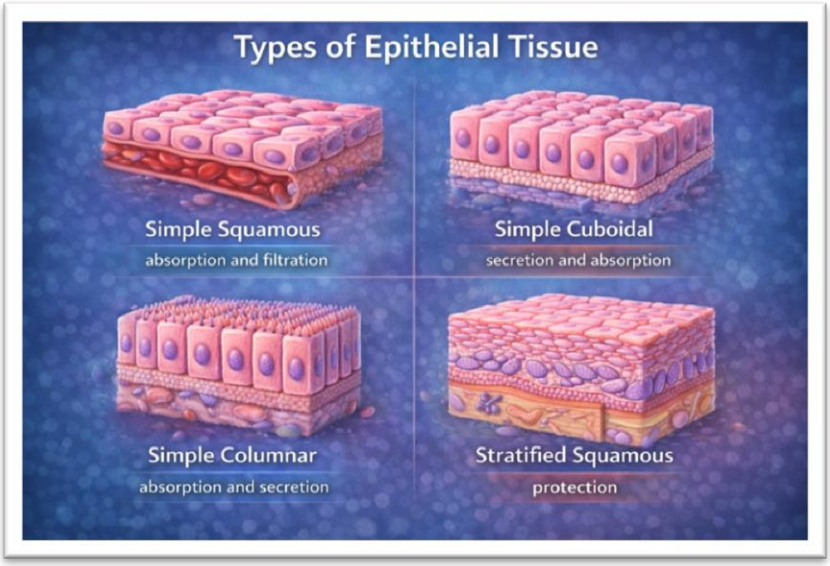
- Number of layers
- Shape of cells

Based on Layers

- Simple epithelium (one layer)
- Stratified epithelium (many layers)

Based on Shape

- Squamous (flat)
- Cuboidal (cube-shaped)
- Columnar (tall)



Relationship Between Structure and Function

The structure of epithelial cells helps them perform their function:

- Flat cells allow diffusion
- Tall cells help in absorption
- Cuboidal cells help in secretion

Conclusion

Tissues are an essential part of the human body. They are made of similar cells that work together to perform specific functions. Understanding tissue structure helps us understand how the body works and how diseases develop. Epithelial tissue is one of the most important tissue types because it protects, absorbs, secretes, and senses.