

# Difference Between Epithelial and Mesenchymal Cells

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## Key Difference - Epithelial vs Mesenchymal Cells

Epithelial and mesenchymal cells represent two of the main differentiated cell types in [vertebrates](#). Epithelial cells are uniform cells attached tightly to form epithelium of the body. Epithelium is a tissue that separates the underlying tissue of the body from the outside environment. Epithelial cells cover all body surfaces. They transform into mesenchymal cells by gaining migratory ability and losing their polarity and cell to cell adhesion. Mesenchymal cells are multipotent cells derived mostly from the [mesoderm](#), which forms a wide variety of mature cell types in the body. The key difference between epithelial and mesenchymal cells is **that epithelial cells are differentiated to cover body surfaces, line body cavities, and hollow organs** while **mesenchymal cells are differentiated into a variety of mature cell types such as [connective tissue](#), [cartilage](#), [adipose tissue](#), lymphatic tissue, bone tissues, etc.**

## What are Epithelial Cells?

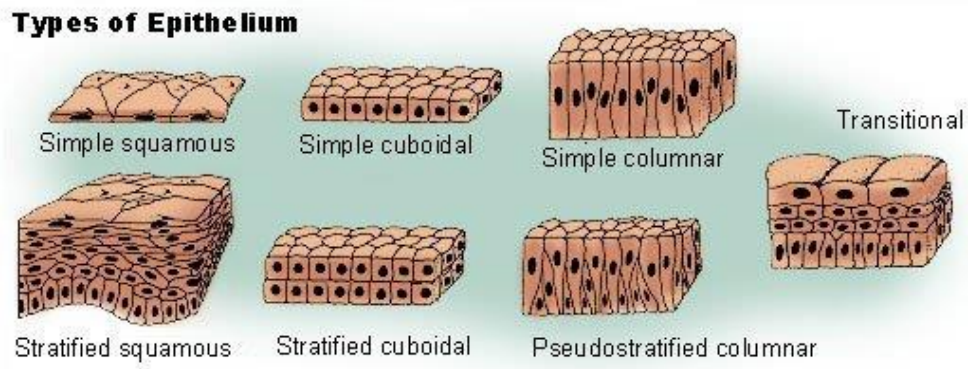
Epithelial cells are the uniform cells, which make the [epithelium](#) of organisms. These cells are stationary, tightly packed and anchored to a basement membrane. Epithelial tissues cover body surfaces (outside surface of the body), line hollow organs such as digestive, respiratory and urogenital system. This tissue also lines body cavities and forms [glands](#). Epithelial cells are avascular. They do not possess blood vessels. They are able to regenerate by [cell division](#) to replace dead cells.

Epithelium can be classified according to the number of layers or shape of the cell. Based on the number of layers, there are three types of epitheliums named, simple, stratified and pseudostratified. Epithelial cells extend from the basement membrane and arrange in one layer in the **simple epithelium**. If more than one layer of epithelial cells is arranged in the epithelium, then it is known as **stratified epithelium**. **Pseudostratified epithelium** appears as several cell layers. However, all cells in the pseudostratified epithelium are connected to the basement membrane.

There are different shapes of epithelial cells named squamous, cuboidal and columnar. Squamous epithelial cells are flat while cuboidal cells are equal in width and height. Columnar cells are taller.

Epithelial cells fulfill several functions in the body. They provide protection for underlying cells, act as a barrier to pathogenic microorganisms and other harmful effects, secrete and absorb substances and permit passage of substances.

Epithelial cells become mesenchymal cells during the tissue generation in the embryo through the process called epithelial-mesenchymal transition. The opposite transition occurs when the secondary epithelial cells are synthesized.

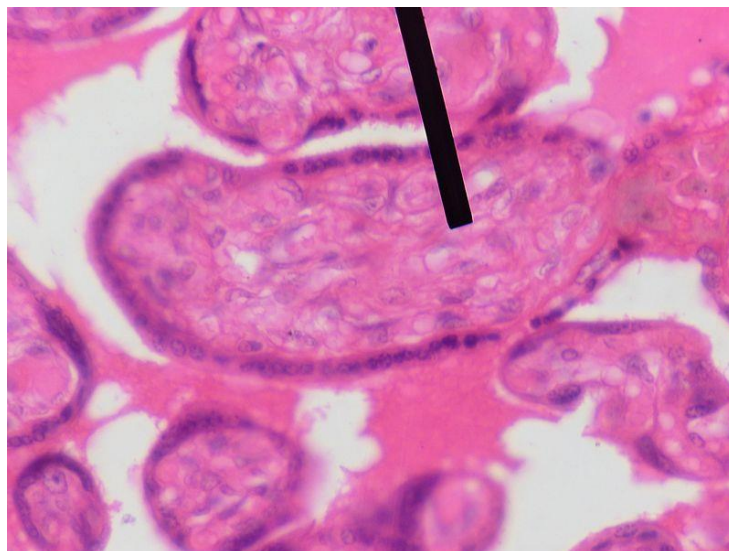


**Figure 01: Epithelial tissue**

## What are Mesenchymal Cells?

Mesenchymal cells are a group of cells with similar morphology and function. These cells make the mesenchymal tissue. It is the connective tissue from all three germ layers in the [gastrula](#). Mesenchymal stem cells can differentiate into several mature cell types. Hence, those cells are considered as multipotent stem cells. These cells convert into cells, which are needed to make connective tissues, cartilage, adipose tissue, lymphatic tissue and bone tissues in an adult. Mesenchymal stem cells are fusiform or stellate cells and are located between [ectoderm and endoderm](#) of the young [embryo](#) in the area of mesoderm. Most mesenchymal cells originate from the mesoderm.

Mesenchyme first emerges during the gastrulation due to a transition process called epithelial – mesenchymal transition. It is one of the basic processes that take place during tissue regeneration from the embryo. Embryonic epithelial cells become mesenchymal cells. Mesenchymal cells can also become epithelial cells. This transition process is reversible. The conversion of epithelial cells into mesenchymal cells initiates through the loss of epithelial cadherin, tight junctions, and adherens junctions on the cell membranes of epithelial cells. The surface molecules of the epithelial cells undergo [endocytosis](#), and the shape of the [microtubule](#) cytoskeleton is loosened, enabling mesenchymal cells to migrate along the extracellular matrix. When secondary epithelial tissue generation is required, mesenchymal cells convert into epithelial cells, showing reverse transition process.



**Figure 02: Mesenchyme**

## What is the difference between Epithelial and Mesenchymal Cells?

Epithelial vs Mesenchymal Cells	
Epithelial cells are uniform cells, which make epithelium of the body tissues.	Mesenchymal cells are multipotent cells derived from mesoderm.
Differentiation	
They are differentiated to cover body surfaces, line hollow organs and body cavities.	Mesenchymal cells are able to differentiate into cells, which make connective tissue, cartilage, adipose tissue, lymphatic tissue, and bone tissues.
Transition	
Epithelial cells are able to become mesenchymal cells.	Mesenchymal cells are able to become epithelial cells.

### Summary - Epithelial vs Mesenchymal Cells

Epithelial cells and mesenchymal cells are two types of differentiated cells found in vertebrates. Epithelial cells tightly adhere with each other and form a tissue called epithelium. It is the protective layer, which covers all body surfaces and body cavities. Mesenchymal cells are multipotent cells derived mainly from the mesoderm. Mesenchymal stem cells have the ability to differentiate into many types of cells. Hence, they convert into cells, which are needed to make connective tissues, cartilage, adipose tissue, lymphatic tissue and bone tissues in the adult. This is the difference between epithelial and mesenchymal cells.

#### References:

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