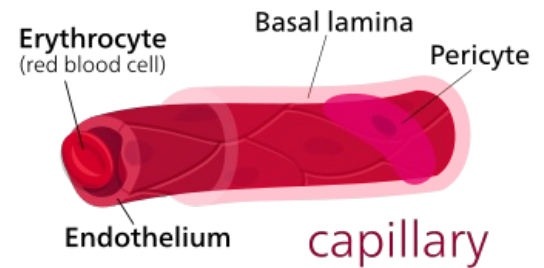


# Capillary

A capillary is a blood vessel with a very thin wall that forms a compartment of the microcirculation of the bloodstream. The microcirculation is a very important compartment in terms of the exchange of important substances between the blood and the cells of the tissues, forming the transition between the arterial and venous parts of the bloodstream. The **translucency** of the capillary is 7-9  $\mu\text{m}$  and the capillary **length** ranges from 0.25-1 mm. The total length of capillaries in the human body is estimated at 96 000 km. **The capillary wall consists** of a layer of endothelial cells, basal lamina and pericytes. The capillaries and postcapillary venules are surrounded by a layer of collagen and elastic fibers that replaces the adventitia.



## Endothelial cell layer

Endothelial cells are usually cells of polygonal shape and mesenchymal origin. They are elongated in the direction of blood flow. The endothelium is usually only 0.2  $\mu\text{m}$  thick and its cells are connected by zonulae adhaerentes, tight junctions ((water and small hydrophilic molecules) and gap junctions.

 For more information see *Cellular connections*.

## Types of endothelium

There are three basic types:

### ■ Contiguous endothelium

It is the most common type of endothelial arrangement **that does not contain fenestrations**. It is found in muscles, connective tissue, exocrine glands, nervous tissue. Endothelial cells are characterized by caveolae, cytoplasmic vesicles that facilitate the transcellular transport of macromolecular substances. Brain capillaries are a **typical example** of a continuous endothelium. Paracellular spaces are enclosed by densely packed **tight junctions**. Transcytosis is rare, it is limited to only a few selected substances. This endothelium is part of the blood-brain barrier.

### ■ Fenestrated endothelium

It is found in the endocrine glands, intestinal mucosa, peritubular plexus of the kidneys, circumventricular organs. The endothelium contains **small fenestrations** of 70 nm diameter, which are **covered by the diaphragm**. The fenestrations carry a negative charge (probably due to the glycocalyx). Water and small hydrophilic molecules penetrate the fenestrations, but plasma proteins do not. The basal lamina is well developed. **Fenestrated capillaries are in places with rapid exchange of substances between blood and tissues**, e.g. in the kidneys, in the intestines.

### ■ Discontinuous endothelium

It occurs in the **hepatic sinusoids**. They have no basal lamina and contain **fenestrations without diaphragm**. The endothelium is permeable to almost all substances in the plasma..

## Basal lamina

 For more information see *Basal lamina*.

## Pericytes

Cells that externally surround the capillary. They are capable of contracting and thus constricting the vessel. They replace the tunica media in the capillaries. They are of mesenchymal origin.

## Functions of capillaries

### ■ Permeability

Capillaries are permeable to respiratory gases, substrates and metabolites that pass either from the blood into the cell or vice versa. The permeability of the capillary wall depends on the size of the permeating molecules and the formation of the capillary wall.

### ■ Metabolic functions

The endothelium is capable of metabolizing e.g. conversion of angiotensin I to angiotensin II; conversion of bradykinin, serotonin, prostaglandins, norepinephrine, thrombin to inactive substances; degradation of lipoproteins and acquisition of triacylglycerols and cholesterol.

- **Anti-precipitation function**

Intact endothelium prevents platelet contact with subendothelial connective tissue.

## Links

### Related articles

- Blood vessels

### Sources

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