

## A Brief Note on Blood Brain Barrier

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### DESCRIPTION

The Blood Brain Barrier (BBB) is a highly selective semipermeable border of endothelial cells that inhibits non-selective passage of solutes in the circulating blood into the extracellular fluid of the central nervous system, where neurons dwell. Endothelial cells of the capillary wall, astrocyte end-feet ensheathing the capillary, and pericytes imbedded in the capillary basement membrane create the blood brain barrier. This system provides for passive diffusion of certain small molecules as well as selective and active transport of nutrients, ions, organic anions, and macromolecules like glucose and amino acids that are essential for brain function.

The blood-brain barrier prevents infections, solutes in the blood, and big or hydrophilic molecules from entering the cerebrospinal fluid, while enabling hydrophobic molecules and tiny non-polar molecules to pass through.

Barrier cells mainly use particular transport proteins to actively transfer metabolic products such as glucose through the barrier. The barrier also prevents peripheral immunological components such as signalling molecules, antibodies, and immune cells from entering the CNS, protecting the brain from harm caused by immune events. The circumventricular organs and choroid plexus, which play a role in sensory and secretory integration within brain neuronal circuits, have extremely permeable capillaries in contrast.

The BBB is formed by the selection of tight junctions between endothelial cells in brain capillaries, which prevents solutes from passing through. At the blood-brain barrier, endothelial cells are continuously connected by tight junctions, which are made up of smaller transmembrane protein subunits such as occludin, claudins, and Junctional Adhesion Molecule (such as JAM-A). Another protein complex, which contains scaffolding proteins like tight junction protein 1 (ZO1) and related proteins,

stabilizes each of these tight junction proteins to the endothelial cell membrane.

Endothelial cells in the BBB block the flow of chemicals from the blood more selectively than endothelial cells in other capillaries in the body. Astrocytic feet (also known as "glia limitans") are astrocytic cell projections that surround the BBB's endothelial cells, giving biochemical support to those cells. The BBB is separate from the blood-cerebrospinal fluid barrier, which is a function of the choroid plexus's choroidal cells, and the blood-retinal barrier, which is a component of the entire world of such barriers.

BBB characteristics are not present in all vessels in the human brain. Circumventricular organs, the roofs of the third and fourth ventricles, capillaries in the pineal gland on the roof of the diencephalon, and the pineal gland are all instances of this. Melatonin is not impacted by the blood brain barrier since it is secreted "directly into the systemic circulation" by the pineal gland.

The blood brain barrier protects the brain from circulating viruses efficiently. As a result, brain infections caused by blood are uncommon. When brain infections do arise, they are typically difficult to cure. Antibodies are too big to pass through the blood brain barrier, and only a few antibiotics do. In some situations, a medicine must be injected directly into the cerebrospinal fluid, where it can pass the blood-cerebrospinal fluid barrier and enter the brain.

Select neurological illnesses, such as amyotrophic lateral sclerosis, epilepsy, brain trauma, and edoema, as well as systemic conditions, such as liver failure, can cause the blood brain barrier to leak. During inflammation, the Blood Brain Barrier (BBB) becomes more porous, allowing antibiotics and phagocytes to pass through.

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