Research & Reviews: Neuroscience

Characteristics and Functions of Blood Brain Barrier

Weis George*

Department of Neurology, University of Umea, Umea, Sweden

Commentary

Received: 29-May-2023, Manuscript No.neuroscience-23-99587;
Editor assigned: 31-May-2023, Pre QC No. neuroscience-23-99587 (PQ);
Reviewed: 14-Jun-2023, QC No. neuroscience-23-99587;
Revised: 21-Jun-2023, Manuscript No.neuroscience-23-99587 (R);
Published: 30-Jun-2023, DOI:10.4172/neuroscience.7.2.003
***For Correspondence:** Weis George, Department of Neurology, University of Umea, Umea, Sweden
E-mail: gweiss@jhmi.jp
Citation: George W.Characteristics and Functions of Blood Brain Barrier .RRJneuroscience.2023;7:003.

DESCRIPTION

The Blood-Brain Barrier (BBB), which is made up of endothelial cells, is a highly selective semipermeable barrier that keeps blood-borne solutes from non-selectively entering the extracellular fluid of the central nervous system, where neurons are found. The capillary endothelial cells, astrocyte end-feet, and pericytes implanted in the capillary basement membrane combine to form the blood-brain barrier. This system permits the selective and active transport of different nutrients, ions, organic anions, and macromolecules like glucose and amino acids that are essential for brain function in addition to the passive diffusion of some tiny molecules.

Pathogens, blood-borne solutes, and big or hydrophilic molecules cannot cross the blood-brain barrier into the cerebrospinal fluid, whereas hydrophobic molecules (such as oxygen, carbon dioxide, and hormones) and small, non-polar molecules can. Using certain transport proteins, barrier cell membrane cells actively move metabolic products like glucose over the barrier. Additionally, the barrier prevents peripheral immune components including antibodies, immune cells, and signaling molecules from entering the CNS, protecting the brain from harm brought on by peripheral immunological events. Contrarily, the choroid plexus and circumventricular organs, which are specialized brain structures involved in sensory and secretory integration within brain neuronal circuits, have extremely permeable capillaries.

The selective tight connections between the endothelial cells of the brain capillaries, which limit solute movement, are the cause of the BBB. These tight junctions, which are made up of smaller subunits of transmembrane proteins like occludin, claudins (such as Claudin-5), and junctional adhesion molecules (such as JAM-A), continually attach endothelial cells at the blood-brain barrier. A different protein complex, which consists of 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 make up the BBB, which restricts the passage of chemicals from the blood more selectively than other capillaries' endothelial cells do. The BBB's endothelial cells are surrounded by astrocytic cell protrusions known as astrocytic feet (sometimes called "glia limitans"), which give those cells biochemical support. The Blood-Brain Barrier (BBB) is distinct from the Blood-Cerebrospinal Fluid Barrier (BCSFB), which is a function of the choroidal cells of the choroid plexus, and from the Blood-Retinal Barrier (BRB), which can be seen as a subset of the entire category of such barriers.

Not every vessel in the human brain possesses BBB characteristics. The pineal gland, capillaries in the pineal gland on the roof of the diencephalon, the third and fourth ventricles, and the circumventricular organs are a few examples of this. The hormone melatonin is secreted "directly into the systemic circulation" by the pineal gland, bypassing the blood-brain barrier. Effective defence against circulating viruses and other potentially hazardous chemicals is provided by the blood-brain barrier. Blood-borne infections of the brain are therefore uncommon. When they do happen, brain infections are frequently difficult to cure. Only few antibiotics can pass through the blood-brain barrier because antibodies are too big. In some circumstances, a medicine must be delivered directly into the cerebrospinal fluid so that it can pass the blood-cerebrospinal fluid barrier and enter the brain. There have been numerous attempts to link physicochemical parameters with the experimental blood brain barrier permeability. *In vivo* results for a large range of H2 receptor histamine agonists were published in rats for the first QSAR research of brain-blood distribution in 1988. Three characteristics, namely molecule volume, lipophilicity, and hydrogen bonding potential, were found to be significantly influencing the transport through the blood brain barrier.