CYREX® Laboratories

CLINICAL SPECIFICATIONS

BLOOD-BRAIN BARRIER

Function:

The blood brain barrier (BBB) is a physical barrier formed by the arrangement of endothelial cells and tight junctions that line the capillaries which supply blood to the brain. It is a highly selective barrier that restricts the movement of molecules from the blood across to the brain. The BBB naturally permits the passage of essential metabolites, small hydrophobic (lipid soluble) molecules like oxygen, carbon dioxide, hormones, etc. Acting like a filter, the BBB prevents the entry of infectious agents, toxins and other environmental triggers into the nervous system.

Antibodies Appear:

Traumatic brain injury[9]
CNS involvement in lupus[4]
Sarcoidosis[8]
Neurosarcoidosis[8]
Lost tolerance to environmental triggers[2, 5, 7, 10]

Known Cross-Reactions: *Campylobacter jejuni* CDT[12]

Clinical Significance:

When the BBB is inflamed, the tight junctions open and produce a condition called increased BBB permeability or increasingly referred to as "leaky brain" (not the same as leaky brain syndrome). Xenobiotics, viruses, bacterial toxins and other molecules greater than 400 Daltons in size, which are normally excluded, can penetrate the BBB.[5, 7, 10] Penetration of the BBB by very large molecules such as LPS or even intact viruses may first cause neuroinflammation, followed by neuroautoimmunity with peripheral or central nervous system (CNS) symptoms.[1, 2] Disruption of brain barrier results first in the release of BBB proteins and then in the formation of IgG, IgM or IgA antibodies against tight junctions and BBB proteins.[3] Production of these antibodies against the BBB and other neural cell antigens from a cell-mediated and humoral immune response may indicate a pathological alteration of the protective brain barrier.[4, 5, 6] Continued opening of the BBB and the persistent release of autoantigens for an extended period in adulthood may cause neuronal cell death and an early cognitive decline. Repeated head trauma and traumatic brain injury (TBI) associated with accidents and some sports, such as football or hockey, have also been shown to damage the BBB and the astrocytes.[3] Traumatic brain injury is a multifaceted pathology involving excitotoxicity, free radical formation, brain swelling, and the entry of locally produced molecules such as cytokines, chemokines, and other molecules.[9] For an excellent review on the role of the BBB in health and neurodegenerative disorders including AIDS dementia, Alzheimer's, Amyotrophic Lateral Sclerosis, Multiple Sclerosis and Parkinson's, please see Zlokovic.[11]

References:

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10. Zheng, et al. Brain barrier systems: a new frontier in metal neurotoxicological research. Toxicol Appl Pharmacol, 2003; 192:1-11.
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