



What is a Traumatic Brain Injury?

A Traumatic Brain Injury (TBI) is a complex and convoluted process that leads to the disruption of brain function. A TBI is usually separated into two phases; **Phase I**, the actual insult or injury followed by **Phase II**, which consists of the release of inflammatory chemistry by microglia which are part of the brain's unique immune system. Phase I, the initial injury, can be represented by traumatic or non-traumatic injuries.^①

In traumatic injuries there is a transfer of physical energy from outside the individual to the inside which might be represented by blunt head trauma as in an assault, blast wave trauma from an IED, acceleration-deacceleration injury as in a motor vehicle accident or a fall, and repetitive impact injury as in boxing, gunfire, football, and even skiing. Non-traumatic injuries can be precipitated by chronic stress, certain medications, x-rays, surgical procedures, viral and bacterial infections, auto-immune illnesses, and inflammatory bowel diseases to name a few.^②

Regardless of the causation, the effect is the turning on of cells in the brain called Microglia. These are the main immune cells in the brain that protect us from infections and help to keep our brain clear from the accumulation of by-products of cellular metabolism, death, and bad chemistry.^③

Normally when the microglia are turned on, they do their jobs and then shut off. This usually consists of releasing inflammatory chemicals called Cytokines (also chemokines and leukotrienes) which help to kill any actual or perceived invading organisms. In an acute process, these inflammatory cytokines (IL-1, IL-1b, IL-6, and TNF-alpha) do their job and then stop being made being replaced by anti-inflammatory cytokines (IL-4, IL-10, IL-11, and IL-13). Once inflammation is neutralized, both inflammatory and anti-inflammatory cytokines fade into the background and the microglia return to a resting state during which they maintain surveillance for another attack. A good example of the effect of this process on your mental health is how you feel with a common cold: fatigue, irritable, and a "foggy" brain. When the cold subsides, these symptoms improve and go away. These are the effect of cytokines.^④

In situations where there is repetitive trauma or stress, this can lead into a chronic condition where the microglia turn on and continuously produce inflammatory cytokines. Over time, the inflammation generated can affect your cognitive and emotional health which is associated with poor short and long-term memory, emotional lability and one or more mood disorders such as depression, anxiety, and bi-polar disorder. Recent scientific literature is making the association of these inflammatory cytokines with all forms of neurodegenerative illnesses such as Alzheimer's disease, Parkinson's disease, Multiple Sclerosis, and Amyotrophic lateral sclerosis (ALS).^⑤

The Millennium Health Centers, Inc. has approached the chronic state of neuroinflammation, associated with intellectual and psychological symptoms, with a group of anti-inflammatory nutraceuticals along with the correction of any underlying hormonal deficiencies.^⑥

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