

Using branched chain amino acids as a novel therapeutic for brain injury

Jeffrey T Cole

Uniformed Services University of the Health Sciences, USA

Traumatic brain injury (TBI) is a leading cause of death and disability in the United States, with an annual average of over 50,000 fatalities each year. Mortality rates appear to be declining, although this is more likely attributable to improved safety measures and increasingly rapid responses rather than the development of effective therapies. Branched chain amino acids (BCAAs) may prove to be a key component of any treatment that is clinically effective. Following a TBI, BCAAs appear to be the only amino acids whose concentration in the injured brain regions is significantly altered following the injury. In vitro application of BCAAs to hippocampal slices restored electrophysiological parameters to normal, while providing these same amino acids via the drinking water restored cognitive performance 7 days after the injury. However, the mechanisms of these effects have not been determined. Recently, this laboratory has determined a likely mechanism for this improvement by investigating the effects of BCAA treatment on calcium homeostasis after brain injury. BCAAs appear to ameliorate calcium dystasis after an injury. Regulation of calcium will allow the BCAAs to have exquisite control over neurotransmitter trafficking and synaptic release, which in turn regulates electrophysiological function and thus cognitive abilities. Further, BCAAs will ameliorate impaired bioenergetic function in both mitochondria and cytosol by altering the activity of both calcium-dependent and -independent enzyme activity. Results thus far suggest tremendous promise for the use of BCAAs as a therapy for traumatic brain injury.

Biography

Dr. Jeffrey Cole completed his Ph.D from North Carolina State University before completing postdoctoral studies at Wake Forest University School of Medicine and the Children's Hospital of Philadelphia. He is currently an assistant professor in the Neurology Department at Uniformed Services University, where he leads a team investigating treatments for Traumatic Brain Injury.

Jeffrey.Cole@usuhs.mil