

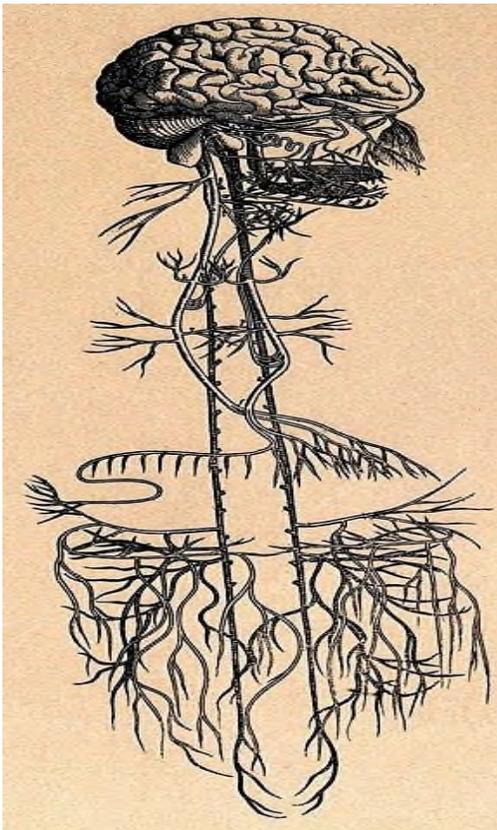


# CTE Hope

Research. Development. Support. Advocacy.

## THE BRAIN-GUT AXIS

Individuals who suffer from a TBI could potentially suffer from chronic digestive disorders. The brain is directly connected to the gut through the Vagus nerve and disruption in the brain significantly affects function in the digestive system. Once someone incurs a concussion, research shows that within two hours, the blood brain barrier has been damaged and multiple influxes of hormones, chemicals and substances rush to the brain from the gut for possible healing.



The gut microbiome is defined as the collective genomes of the microbes composed of bacteria, bacteriophage, fungi, protozoa and viruses that live inside and on the human body. We have about 10 times as many microbial cells as human cells. The microbiome works constantly to balance body and keep our immune system functioning properly. When the gut becomes toxic, instead of filling the brain with healing components, it encapsulates the brain with toxins increasing the inflammation and blood flow. In addition, communication occurs through messenger signals from the gut's microbiota, involving gut peptides, cytokines and lipopolysaccharides. Disruption of the brain-gut axis from a TBI can lead to vicious cycle of chronic inflammation in both the brain and the entire gastrointestinal system.

The gut microbiome can be easily compared as your internal garden. If you tend your garden, supply what it needs daily and give it the nutrients it needs, it will flourish and produce success. If your garden is shaded, has no water, weeds are everywhere, and a bug is eating your roots, you will have an unproductive unhealthy garden. The garden will not function properly and cannot help other areas grow strong. Decades ago, people had more functional and healthy digestive systems that would help aid in the healing of the blood brain barrier and the brain itself. The toxicity today in our food, water, antibiotics, air supply and hundreds of chemicals we use daily has created a toxic gut microbiome

The restoration of the gut microbiome in the healing of the brain is a conscious awareness of your body and its stresses. Processed food, refined sugars, sugar and flavored drinks, chemical sprays, personal care products, cleaning products, and toxic water all create an unfavorable environment for the gut. Our everyday habits of uncontrolled stress, lack of sleep, chronic dehydration and unleashed emotions all play a major role in the dysfunction of the brain gut axis.

This is a medical Disclaimer for CTE Hope. The information you will find on our media sources and in our presentation and literature are for educational purposes to help create a support system for people involved with TBIs and CTE. Any advice or suggestions found on our media sources, and in our presentations and literature are not intended to be medical diagnosis, create a treatment plan, or manage your specific complaints and/or signs and symptoms. If you would like to contact our Medical Research and Development Team, please send an email to: [info@cte-hope.org](mailto:info@cte-hope.org)

References and helpful articles:

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6. Rege, Sanil, *The Simplified Guide to the Gut-Brain Axis—How the Gut and The Brain Talk to Each Other*, 2017.
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8. Shreiner, Andrew, et al. *The gut microbiome in health and in disease*, 2015.
9. Stocchetti, Nino and Zainer, Elisa, *Chronic impact of traumatic brain injury on outcome and quality of life: a narrative review*, 2016.
10. Zhu, Caroline, et al. *A Review of Traumatic Brian Injury and the Gut Microbiome: Insights into Novel Mechanisms of Secondary Brain Injury and Promising Targets for Neuroprotection*, 2018.

For more information on steps to take to start healing your microbiome and your brain gut axis, please visit CTE Hope resource document library or contact a member of our team at [www.ctehope.org](http://www.ctehope.org).