CONQUER CHIARI
From Knowledge, Strength. Through Research, Hope.

Scientists Identify How the Brain Controls the Inflammatory Response

Through a series of sophisticated experiments, scientists have shown that a specific region of the brainstem, known as the caudal nucleus of the solitary tract (cNST) is involved in regulating the body's inflammatory response. At this point, you may be asking yourself if you're reading a Chiari update. Yes you are, and we will discuss the connection between this work and Chiari after we review the study's findings, which were published in the prestigious journal, Nature.

The brain essentially monitors and regulates everything in the body to maintain a normal state of function. Therefore, it has been theorized that there is a brain-body connection to the immune system; however, the specifics of this potential connection have not been previously identified. To explore this, the scientists in this study first injected mice with either a known inflammatory inducing chemical, or saline. Next, they confirmed a difference in the immune responses of the two groups of mice by looking at the levels of inflammatory cytokines, which are small proteins the immune system uses to communicate. They then scanned the brains of the mice and found that the cNST of the inflammatory mice was much more active than the saline mice. The cNST is located at the end of the sensory nerves of the vagus nerve bundle (the vagus nerve bundle connects the brain to many parts of the body such as the heart, lungs, and digestive system). The cNST is thought to be a relay station of information collected from the body and passed to the brain.

In the next stage of the experiment, the scientists cut the nerves going into the cNST and found that this eliminated the cNST activation in response to the inflammatory injections. This suggested that the cNST was in fact responding to information about the injection from information carried on the vagus nerve. The group then genetically manipulated the neurons of the cNST to disable their function. When they did this, they found that the mice had a 'run away' inflammatory response to the injection. When the scientists genetically manipulated the cNST neurons to be overactive, they found the mice responded to the injections with a stronger anti-inflammatory response. Finally, the group showed that inflammatory cytokines induced a response in vagus sensory nerves.

Taken together, these experiments provide strong evidence that a specific region of the brainstem is involved in regulating the body's inflammatory response (at least in mice). So, what does this have to do with Chiari? Conquer Chiari researchers have previously shown that Chiari patients often suffer from chronic inflammation. In addition, Conquer Chiari researchers have shown that the brainstem of Chiari patients is under higher levels of strain, which aren't necessarily reduced after surgery.

From this, it seems reasonable to ask whether the chronic inflammation seen in Chiari patients is due to damage to the cNST region of the brainstem. But like so many aspects of Chiari, this question will require extensive research to fully answer.

Source: A body-brain circuit that regulates body inflammatory responses. Jin H, Li M, Jeong E, Castro-Martinez F, Zuker CS. Nature. 2024 Jun;630(8017):695-703. doi: 10.1038/s41586-024-07469-y. Epub 2024 May 1. PMID: 38692285

Please consider a $10 donation as Conquer Chiari's educational material is free to read, but not free to produce:

https://www.conquerchiari.org/donate

Conquer Chiari's research updates highlight and summarize interesting publications from the medical literature while providing background and context. The summaries do contain some medical terminology and assume a general

understanding of Chiari. Introductory information and many more research articles can be found in the Conquer Chiari Library.

Conquer Chiari is a 501(c)(3) public charity dedicated to improving the experiences and outcomes of Chiari patients through education, awareness and research.