New collaboration explores how the brain's "immune memory" may contribute to ALS

Researchers in the Quintana Lab at the Mass General Brigham Neuroscience Institute, Brigham and Women's Hospital campus, are teaming up with the Healey & AMG Center for ALS to investigate whether a process known as "inflammatory memory" in brain cells contributes to amyotrophic lateral sclerosis (ALS). Led by Francisco Quintana, PhD, this project builds on recent findings from his lab showing that certain brain cells called astrocytes can retain a memory of past inflammation or infection. This lingering memory may trigger exaggerated inflammatory responses later in life, potentially contributing to neurological diseases.

Francisco Quintana, PhD

Previously, long-term immunological memory was thought to be a trait only in specialized immune cells. Astrocytes were seen as structural support cells for neurons. Dr. Quintana's work flipped this model by demonstrating that non-immune brain cells can effectively "remember" past trauma and actively manage the central nervous system's immune responses.

"Why is that important?" asks Dr. Quintana, "Because then you can start to think that being exposed to an infection when you were a kid, or being exposed to some trauma - or having specific genes - can leave your brain predisposed to showing these exacerbated pro-inflammatory responses that then contribute to disease."

The project, funded by an anonymous donor to the Healey & AMG Center, will examine whether this mechanism is active in ALS and whether it plays a role in disease progression. Researchers will study patient samples and laboratory models to identify signs of this inflammatory process and better understand how it affects the brain.

The collaboration will also test a potential therapeutic approach. Quintana's team has identified a molecular target that may help regulate this harmful inflammatory response and has developed a pathway to interfere. The researchers hope this work will increase understanding of ALS and also uncover therapeutics to address multiple neurological diseases.

Dr. Quintana says, "I'm extremely thankful for this opportunity to contribute to Mass General Brigham's Neuroscience Institute efforts in the ALS space. At a time when traditional funding sources are so complicated, donor support for this research is especially important because it enables promising science to move forward."