

# Scientists discover a direct route from the brain to the immune system

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It used to be dogma that the brain was shut away from the actions of the immune system, shielded from the outside forces of nature. But that's not how it is at all. In fact, thanks to the scientific detective work of Kevin Tracey, MD, it turns out that the brain talks directly to the immune system, sending commands that control the body's inflammatory response to infection and autoimmune diseases. Understanding the intimate relationship is leading to a novel way to treat diseases triggered by a dangerous inflammatory response.

Dr. Tracey, director and chief executive of The Feinstein Institute for Medical Research, will be giving the 2007 Stetten Lecture on Wednesday, Oct. 24, at the National Institutes of Health in Bethesda, MD. His talk – Physiology and Immunology of the Cholinergic Anti-inflammatory Pathway – will highlight the discoveries made in his laboratory and the clinical trials underway to test the theory that stimulation of the vagus nerve could block a rogue inflammatory response and treat a number of diseases, including life-threatening sepsis.

With this new understanding of the vagus nerve's role in regulating inflammation, scientists believe that they can tap into the body's natural healing defenses and calm the sepsis storm before it wipes out its victims. Each year, 750,000 people in the United States develop severe sepsis, and 215,000 will die no matter how hard doctors fight to save them. Sepsis is triggered by the body's own overpowering immune response to a systemic infection, and hospitals are the battlegrounds for

these potentially lethal conditions.

The vagus nerve is located in the brainstem and snakes down from the brain to the heart and on through to the abdomen. Dr. Tracey and others are now studying ways of altering the brain's response or targeting the immune system itself as a way to control diseases.

Dr. Tracey is a neurosurgeon who came into research through the back door of the operating room. More than two decades ago, he was treating a young girl whose body had been accidentally scorched by boiling water and she was fighting for her life to overcome sepsis. She didn't make it. Dr. Tracey headed into the laboratory to figure out why the body makes its own cells that can do fatal damage. Dr. Tracey discovered that the vagus nerve speaks directly to the immune system through a neurochemical called acetylcholine. And stimulating the vagus nerve sent commands to the immune system to stop pumping out toxic inflammatory markers. "This was so surprising to us," said Dr. Tracey, who immediately saw the potential to use vagus stimulation as a way to shut off abnormal immune system responses. He calls this network "the inflammatory reflex."

Research is now underway to see whether tweaking the brain's acetylcholine system could be a natural way to control the inflammatory response. Inflammation is key to many diseases - from autoimmune conditions like Crohn's disease and rheumatoid arthritis to Alzheimer's, where scientists have identified a strong inflammatory component.

Dr. Tracey has presented his work to the Dalai Lama, who has shown a great interest in the neurosciences and the mind-body connection. He has also written a book called "Fatal Sequence," about the double-edge sword of the immune system.

Source: North Shore-Long Island Jewish (LIJ) Health System

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