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***UC Department of Neurosurgery receives \$1.7 million
To study molecular treatment of brain injury***

CINCINNATI—The National Institutes of Health has awarded \$1.7 million to a University of Cincinnati (UC) scientist to do molecular research that could lead to better treatments for brain injury patients.

Kenneth Strauss, PhD, will study two types of molecules known as eicosanoids (eye-KO-sa-noids), which are created by injured brain cells, to confirm that they can actually protect healthy brain cells from further damage.

If successful, Strauss's research could lead to a new class of drugs designed to enhance the levels of these helpful molecules, and thereby improve outcomes in patients who have suffered traumatic brain injury, the leading cause of death and disability among people aged 16 to 45.

"One of my goals," says Strauss, a research associate professor of neurosurgery at UC and director of the Mayfield Neurotrauma Research Lab, "is to develop therapies for traumatic brain injury, a condition for which there is no effective medical treatment."

When the brain suffers traumatic injury, Strauss explains, it automatically takes self-protective action. The brain cells release arachidonic acid, which triggers a series of events that draw additional cells to the injured site.

While some of the compounds resulting from the initial trauma appear to be protective and to inhibit harmful inflammation, Strauss says, others are harmful if they remain for too long. Their fight to save the injured brain can spill over into nearby areas, damaging neighboring structures.

"Brain cells and immune system cells in the blood stream alter their function and essentially gather at the damage site," Strauss says. "They can proliferate and release chemicals that cause the region to swell up. In their effort to either cordon off or repair the damage, they can also constrict blood vessels or attract even more cells into that area."

Thus far doctors have been unable to prevent or manipulate these progressive changes that follow traumatic brain injury.

Strauss and other researchers previously found that the enzyme COX-2 is one of the contributors to harmful inflammation. COX-2 increases following injury and, to the brain's detriment, remains elevated for many days.

Strauss had originally been studying the potential of the arthritis drug Vioxx, a COX-2 inhibitor, for reducing inflammation in the injured brain. But his plan was shelved when Merck withdrew Vioxx in 2004 after clinical trials showed that long-term use increased the risk of heart attack and stroke.

Strauss then shifted his focus from suppression of the harmful COX-2 enzyme to the potential for elevating two theoretically helpful eicosanoids, known as “HETEs” and “EETs.”

“We believe eicosanoids reduce the number of inflammatory cells that fester around the injury site and cause chronic tissue degeneration,” Strauss says. “We think this plays a role in impairment not only after trauma, but also after other brain injuries, including strokes, seizures and the chronic neurodegenerative conditions like Alzheimer’s disease.”

Strauss hypothesizes that manipulating the chemistry of the injured brain cells to favor the creation of the beneficial eicosanoids will aid recovery from traumatic brain injury.

He will first study the phenomenon in rodents that have been genetically manipulated so that they produce either an abundance or an insufficient amount of the molecules.

He will also study unique compounds, provided by colleagues at the University of Texas Southwestern Medical Center and the University of California, Davis, that boost beneficial eicosanoids that occur naturally in the brain. These compounds could set the stage for the development of drugs that would benefit traumatic brain injury patients.

UC’s department of neurosurgery and the affiliated Mayfield Clinic are recognized nationally for clinical care, education, and research of the spine and brain. The Mayfield Clinic has 22 neurosurgeons and each year treats 20,000 patients from around the world. Mayfield’s neurosurgeons participate in important clinical trials and have pioneered surgical procedures and instrumentation that have revolutionized neurosurgery for brain tumors and neurovascular diseases and disorders.

Both the UC neurosurgery department and Mayfield are part of the Neuroscience Institute, an international center of excellence at the UC College of Medicine and University Hospital.

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