

BUILT FOR BATTLE, BRAIN INJURY TEST MAY BE HEALTH-CARE BOON

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[Contact Information](#)

GAINESVILLE, Fla. --- U.S. soldiers fighting in today's high-tech military force will be much more likely to survive traumatic brain injuries if University of Florida researchers succeed in developing a blood test to assess the severity of head wounds on the battlefield, U.S. Department of Defense officials say.

Such a test can't come soon enough for the department, which has allocated \$2.2 million to help scientists at UF's McKnight Brain Institute and the Walter Reed Army Institute of Research develop the first routine diagnostic tool to define the scope of such injuries. Penetrating brain injuries claim 25 percent of soldiers killed in battle, according to department officials, yet there is no effective way to diagnose traumatic brain injury short of a brain scan, which is not practical in combat settings.

The test could have many nonmilitary applications as well, from gauging brain damage incurred after a drug overdose to reassuring the soccer mom who worries when her child receives a blow to the head in the heat of a match. Traumatic brain injuries cost the country more than \$48 billion a year, according to the National Institute of Neurological Disorders and Stroke, and between 2.5 million and 6.5 million Americans alive today have had a traumatic brain injury.

"Traumatic brain injury is a scandalously ignored health problem," said Ronald L. Hayes, director of the Center for Traumatic Brain Injury Studies at the McKnight Brain Institute. "It's the biggest killer of kids. This research funding is where homeland defense provides a service for the soccer mom."

The test would pinpoint biochemical markers that cells release into the bloodstream after an injury. In combat, a medic could take a small amount of a soldier's blood, place it in a device about the size of a handheld computer and receive an analysis that would reveal the nature of the injury, said Hayes, a former fighter pilot in the Virginia Air National Guard.

"People who've watched 'Star Trek' know what a tricorder looks like - it would be much like that," said Kevin K.W. Wang, an associate professor of psychiatry and neuroscience at UF. "We are focusing on the analysis, and bioengineering experts will supply the technology that will make this possible. This is not just a fantasy."

Researchers say the test could be ready as soon as three years from now.

"The current engagement in Afghanistan is very real to us," said Dr. Col. Geoffrey Ling, an Army neurologist. "Right now, we have soldiers on the front lines getting injured. We needed this test yesterday. Our focus is on the young men and women we are sending into harm's way."

Ling said combat medics have to make life-and-death judgments with few resources to help them.

"Sometimes you have to determine who will live through the helicopter ride back (to safety)," Ling said. "At the front, we don't have a CT scanner, we don't have a neurosurgeon. But if we have a few drops of blood and can use that to determine whether someone is mildly, severely or moderately injured, that would be a huge contribution to decision-making."

Medics often must first eliminate an enemy threat before putting their medical skills to use.

“Combat medics are not trained to the extent of a physician’s assistant, for example. They are trained as soldiers and trained to save a fellow soldier at all costs,” said Frank C. Tortella, chief of neuropharmacology and molecular biology at the Walter Reed Army Institute of Research in Silver Spring, Md. “In the austere environment of combat, a biomarker diagnostic would give them an objective measure to make a decision on how to handle an injured soldier.”

The grant funds, which will be administered through the defense department’s Peer-Reviewed Medical Research Program, will support research in proteomics, a new field that goes beyond genes and explores the mechanisms of life - the proteins produced by genes to carry out all body functions. Researchers will begin by looking for signature proteins or fragments in the blood and cerebrospinal fluid of rats.

“When the brain is injured, cells are injured and die,” Hayes said. “When they disintegrate, ultimately the blood or cerebrospinal fluid will pick up pieces of proteins or proteins. These proteins can be specific markers - clues to the murder of the cell - telling us what caused it and where it happened.”

Hayes and Wang have formed Gainesville-based Daimonion Diagnostics to take the technology to the public market. Wang believes a biomarker test could cost about \$175 per application, compared to more than \$1,000 for one brain scan using magnetic resonance imaging or CT scanner. Because it is inexpensive, the test could be used easily, often and in all kinds of patient-care settings.

“We would be able to continually monitor how patients with severe injuries respond to treatment,” Wang said. “Patients seldom receive more than one or two brain scans because of the cost.”

Because of urgent need, Hayes said research is aimed at rapidly developing a means of diagnosis.

“The implications are great for applications to emergency medical care in the military, and to the many traumatic injuries that occur everyday in connection with things like automobile, motorcycle and boating accidents, contact sports and accidental falls,” Hayes said. “For parents who see their kids get a head injury, it’s a way to tell whether to put them back in the game next week or to wait.”

Practical uses for a blood test for brain injuries are broad, said Dr. Arthur L. Day, chief of cerebrovascular surgery at Brigham and Women’s Hospital, a teaching affiliate of Harvard Medical School.

“If we can find an indicator of impending nerve-cell death with a condition such as Alzheimer’s disease, then perhaps we would be able to predict Alzheimer’s disease,” said Day, a former associate chairman of neurological surgery at UF’s College of Medicine. “In that way, not only would the test be a method to determine the extent of a head injury or to measure the effectiveness of treatment, it could also be used as a prognostic tool.”

Despite its promise, developing the test will challenge researchers.

“My first response is I can’t see how a blood test is going to work,” said Ken Gilstein, a clinical psychologist and neuropsychologist practicing in Connecticut. “But a lot of new research has come out regarding the release of a cascade of chemicals into the brain during an injury. If there is a way to measure chemicals released in brain, it’s possible that there might be away to identify some type of marker.”

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