



# TRAUMATIC BRAIN INJURY

*VA researchers are conducting cutting-edge research aimed at improving care for Veterans with traumatic brain injury (TBI). VA research in this area focuses on gaining a better understanding of the brain changes that occur in TBI, refining screening and diagnostic tools, developing and evaluating treatments, and identifying coping strategies for Veterans and their families.*

## EXAMPLES OF VA RESEARCH ADVANCES

**ENVIRONMENT COULD HELP TO HEAL THE BRAIN**—A rodent study suggests that recovering from TBI in an “enriched” environment may enhance brain function. The enriched environment included more visual stimulation, toys, and chances for interaction, compared with the normal environment. Animals in the enriched environment had improvements in spatial memory after TBI, while those housed in normal environments had no memory improvements. The animals in the enriched environment also had cellular and molecular changes in parts of their brains that indicate healing.

**DEPRESSED BRAINS WITH TBI RESPOND DIFFERENTLY**—Depression after TBI is common. A San Diego VA research team used functional MRI and another type of imaging to chart the brain’s ability to recognize and match facial expressions depicting happiness, anger, and fear. All of the Veterans in the study had mild TBI, and some also had depression. During the matching exercise, those with depression had more brain activity in the amygdala and other emotion-processing structures of the brain and less activity in areas of emotional control, such as the superior longitudinal fasciculus (SLF). Those with the most severe symptoms of depression had the least activity in the SLF. This was the first research to show differences in brain response in depressed Veterans with mild TBI.

**UNDETECTED EYE INJURIES**—Veterans with TBI may have eye injuries that go undetected in standard eye exams. A Palo Alto VA research team, collaborating with researchers at the University of Muenster, Germany, found diverse types of eye injuries in 46 combat Veterans. All had blast-related TBI. They had various kinds of damage to the iris, optic nerve, lens, retina and other parts of the eye. Yet vision was 20/20 or better in most of the injured eyes. The authors recommend comprehensive eye exams by an ophthalmologist for any Veteran with a diagnosis of blast-related TBI. VA has already instituted this practice at its rehabilitation centers.

★ **FACTS ABOUT TRAUMATIC BRAIN INJURY**—*Traumatic brain injury (TBI) is estimated to affect as many as 22 percent of U.S. troops injured in Afghanistan or Iraq. The cause is usually an explosive. Most of the injuries are considered mild, but even these cases can involve serious long-term effects on areas such as thinking ability, memory, mood, and focus. Symptoms may also include headaches and vision problems. Treatment typically includes a mix of cognitive, physical, speech, and occupational therapy, along with medication to control specific symptoms, such as headaches or anxiety. According to the Defense and Veterans Brain Injury Center, nearly 196,000 troops suffered a traumatic brain injury between 2000 and June 2010.*