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Brain Injuries Are Seen in New Scans of Veterans

By DENISE GRADY

A new study may help explain why some military personnel exposed to blasts have symptoms of brain injury even though their CT and M.R.I. scans look normal.

Using a highly sensitive type of magnetic resonance imaging, researchers studied 63 servicemen wounded by explosions in Iraq or Afghanistan and found evidence of brain injuries in some that were too subtle to be detected by standard scans. All the men already had a diagnosis of mild traumatic brain injury (synonymous with concussion), based on symptoms like having lost consciousness in the blast, having no memory of it or feeling dazed immediately afterward.

About 320,000 American troops have sustained traumatic brain injuries in Iraq and Afghanistan, most of them mild, according to a 2008 report by the RAND Corporation. The injuries are poorly understood, and sometimes produce lasting mental, physical and emotional problems.

“This sort of mild traumatic brain injury has been quite controversial,” said Dr. David L. Brody, an author of the new study and an assistant professor of neurology at Washington University in St. Louis. “Is it due to structural abnormalities in the brain, chemical dysregulation, psychological factors or all three? We show that at least in some there are structural abnormalities.”

The pattern of the damage differed from that found in head injuries not caused by blasts, and matched computer simulations predicting how explosions would affect the brain, Dr. Brody said. If the new findings hold up, he added, they may eventually influence the design of helmets to provide more protection against blasts.

But Dr. Brody and other researchers cautioned that the study was only “a small first step.” The study and an accompanying editorial were published online on Wednesday by The New

England Journal of Medicine.

The special M.R.I. technique, known as diffusion tensor imaging, is also being studied to help improve the diagnosis of concussions. It can be performed by most M.R.I. machines and does not take longer or cost more than a standard M.R.I. The test measures the movement of water in nerve fibers in the brain; abnormal flow may indicate injury. Changes can be detected in bundles of thousands of axons, the fibers that carry signals.

Dr. Brody and others from Washington University collaborated with military researchers at the Landstuhl Regional Medical Center in Germany, to which troops injured in Iraq and Afghanistan are evacuated for treatment.

In 2008 and 2009, the researchers performed diffusion tensor imaging on 63 men who had recently sustained mild traumatic brain injuries from blasts; all but one had normal results on a standard M.R.I. For comparison, 21 control subjects were also scanned — men exposed to blasts recently but with no symptoms of concussion.

Eighteen of the 63 men with traumatic brain injury had abnormalities consistent with nerve injury in two or more brain regions, areas not usually damaged by other types of mild head injury. The researchers said that only 2 of 63 healthy subjects would be expected to have such abnormalities. Twenty other men with traumatic brain injury had abnormalities in one area, and 25 had none.

“A negative scan, even with these advanced methods, does not rule out traumatic brain injury,” Dr. Brody said.

Although the findings suggested that blasts may cause a specific pattern of brain injury, the researchers could not be sure, because their study subjects had experienced blows to the head in addition to blast exposure.

Dr. Allan H. Ropper, the executive vice chairman of neurology at Brigham and Women’s Hospital in Boston, who wrote the editorial, said in an interview, “It’s never been clear that a blast alone could cause brain damage without some kind of impact on the head, so it’s a very important finding that there may be a structural brain representation of a blast injury.”

Katherine Helmick, deputy director for traumatic brain injury at the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury, said the Defense Department was eager for information that would “help us understand what blast is doing to the brain, and help us get what we really want in diagnosing traumatic brain injury, which

is objective markers."

The new study helps, but is by no means definitive, she said.

The researchers did not tell the study participants the results of their tests. "We were specifically directed by the Department of Defense not to do so," Dr. Brody said. "Many of them were hoping we could give results to their care providers to document or validate their concerns. It was anguishing for us, because as a doctor I would like to be able to help them in any way I can. But it was not the protocol we agreed to."

Nick Colgin, 26, an Army veteran with a brain injury from the war in Afghanistan, who was not involved in the study, said he would like very much to have one of the sensitive M.R.I. scans, to better understand his injury. After a blast in 2007, he developed problems with speech, balance, thinking and focusing his eyes. For a while, he could not write his own name. But nothing showed up on his M.R.I. He has improved gradually and is now attending the University of Wisconsin at Stevens Point, but he still has severe headaches.

Christine L. MacDonald, a research instructor in neurology at Washington University and another author of the study, said the scans were still a research tool and not ready for widespread use. Researchers are trying to perfect the technique as quickly as possible for use in the care of wounded service members, she said in an e-mail, adding, "I wish we could help them now, but we aren't there yet."