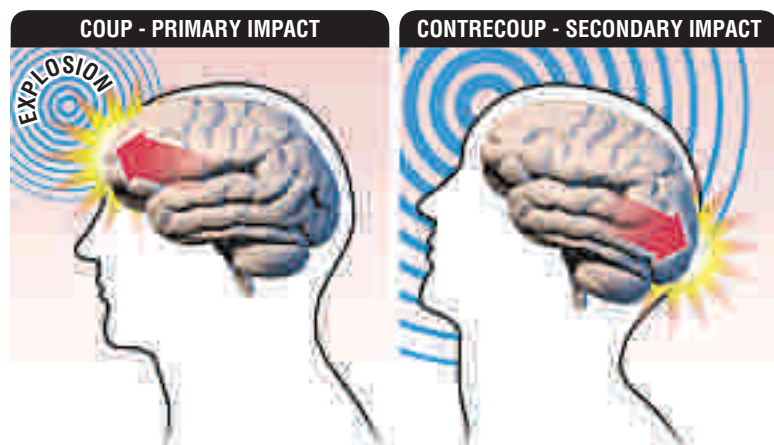


WHAT HAPPENS, AND WHAT TO CHECK FOR

A blast can be severe enough to cause a contusion at the site of impact, but also can knock the brain into the opposite side of the skull, which causes the additional contusion.



CONCUSSION GRADES

GRADE ONE

No loss of consciousness and symptoms resolve after 15 minutes

GRADE TWO

No loss of consciousness and symptoms last longer than 15 minutes; requires physician's evaluation

GRADE THREE

Loss of consciousness or prolonged signs/symptoms; requires immediate referral for medical care

Source: BrainInjury.com

EVALUATION

- Is he alert and conversant?
- Does he know the date, place and what happened?
- Can he name the months in reverse or any four random numbers in reverse?
- Ask him to recall three words and three objects immediately after the event, and again after five minutes
- Ask him to recall recent newsworthy events

CHRIS BROZ/STAFF

Bomb blasts, falls have same effect on brain

Experts studying traumatic brain injuries have come to a surprising conclusion about head injuries from bomb blasts and from car accidents or falls: They're basically the same.

"The brain just knows it's bleeding," said David Cifu, who oversees the traumatic brain injury program at the Department of Veterans Affairs Medical Center in Richmond, Va.

Because explosives are the weapon of choice for insurgents in Iraq, and because their force tosses bodies about like dolls, the services are seeing many more head injuries than in past wars.

Theories about about blast-pressure waves causing tiny bubbles to form after passing through a brain, or compression of air in the lungs causing an injury in the brain. Some have even suggested mild traumatic brain injuries from blasts are somehow less harmful than those caused by a bump on the head.

But Cifu said current research shows that blast waves cause

the same symptoms, heal over the same amount of time and should be treated the same way as any head injury.

"They look the same" as head injuries from sports or car accidents, he said. "We're comparing apples to apples."

If pressure waves were really passing through the skull, "you'd see lost eardrums and blown-out eyeballs," Cifu said.

But that doesn't mean the blasts are not causing injuries.

Ronald Glasser, who was an Army doctor in Vietnam and is author of "Wounded: Vietnam-Iraq," said the blast from an improvised explosive device moves at 13,000 mph, gets as hot as 7,000 degrees and creates 400 tons of pressure per square inch.

"No one survives that," Glasser said. "We're trying to save the kids at 25 meters and beyond."

Beyond that range, Glasser and Cifu said, injury results from the power of the blast hitting the skull like spray from a fire hose.

"The pressure is throwing

their head back really fast," Cifu said. "That rapid acceleration and deceleration appears to be causing the injury."

The wave creates a two-strike blow: If it hits the back of the head, the brain slams the front of the skull, which then snaps back, causing the back of the brain to hit the rear of the skull.

Add to that the possibility of an overturned vehicle, flying debris and the general chaos of a roadside bomb attack, and it's hard to tell what caused the injury, said Col. Jonathan Jaffin, head of the Army Medical Research and Materiel Command.

"In most such cases, all these things happen at once, so it's hard to tell what the mechanism was," he said. "But there's no evidence that overpressure causes a brain injury."

In April, the military rolled out a standardized treatment plan for the top 22 symptoms of traumatic brain injuries, based on years of research of civilian head injuries, Cifu said.

"The symptoms are the same," said Barbara Sigford, director of the VA's Physical Medicine and Rehabilitation Service. "And there's no reason to believe [the standard treatment] is not just as effective." □

Santiago's "mild" TBI killed his Army career, drove his wife to the edge of divorce and forces him to rely on special assistance to get through each day.

"I'll never be the same," he said.

And because he had a closed-head injury and seems normal enough to people who didn't know him before, he said military doctors accused him of faking his symptoms to try to bilk the Army for tax-free, combat-related disability pay.

His family got no counseling, he said, and the medical evaluation board to determine his disability retirement pay began this spring — four years after his injury.

As with many other military medical issues emerging in recent years, no one planned for so many TBIs. Six years after the war in Afghanistan began, the military has just established standardized treatment for TBI symptoms; begun to reorganize the Defense and Veterans Brain Injury Center's administrative, research and budget functions; and launched front line education programs.

"We're actually pretty good at treating moderate to severe head injuries and have improved since the war began," said Col. Jonathan Jaffin, commander of Army Medical Research and Materiel Command.

But because mild head injuries are not obvious, they haven't inspired a lot of money for research.

However, the wars are changing the priority level of TBIs.

"We're getting money ... visibility ... answers to questions that have troubled us — and patients — for years," Jaffin said.

Difficult to diagnose

A head injury is any change in consciousness. Black out for even a few seconds, it's a head injury. Conk your head on a beam and get dizzy, it's a head injury. Get whiplashed by an explosion, it's a head injury.

When the injuries are moderate to severe, they're fairly easy to diagnose. They may come with a cracked skull, and bleeding of the brain will show up on an MRI or CT scan. Moderate to severe head injuries knock people out longer and may cause amnesia.

Mild brain injuries are "more subtle," Jaffin said.

Even the term "mild" is confusing. Most people with mild brain injuries — 70 percent, according to Jaffin — have no symptoms by the time they're screened by a doctor who knows what to look for. Because their injuries don't show on electronic scans, they have to be diagnosed based on a medical exam, he said.

And that's tricky, too, because

several symptoms are similar to those of post-traumatic stress disorder: depression, anger, sleep problems, a sensitivity to noise.

So doctors must pay attention to the timing of the symptoms and the experiences of the service member — did the angry outbursts begin after his Humvee was hit by a roadside bomb?

Some symptoms do point to mild TBI: stuttering, seizures, headaches, obsessive-compulsive disorder, tunnel vision and numbness in some areas of the body. There are also cognitive disabilities: problems with math, short-term memory loss, slowed reactions and other problems.

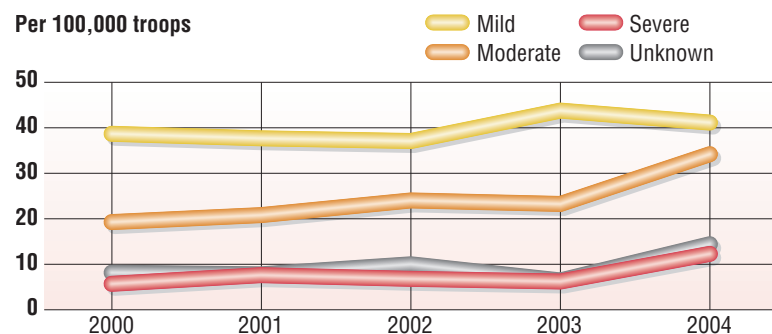
On July 18 at Camp Pendleton, Calif., Marine Cpl. Trent Thomas was convicted of conspiracy to commit murder and kidnapping in the death of an Iraqi civilian and now faces a life sentence.

His attorneys tried to show that exposure to multiple explosive blasts caused traumatic brain injury that may have impaired Thomas' judgment. The Marine was on his third combat tour in Iraq and had been exposed to more than 25 bomb blasts, said Maria Mouritidis, head of the traumatic stress and brain injury program at the National Naval Medical Center in Bethesda, Md.

Thomas "would have difficulty with decision-making, problem-

MORE SEVERE CASES

The number of troops hospitalized with severe traumatic brain injury rose sharply from 2002 to 2004:



Source: Defense and Veterans Brain Injury Center

CHRIS BROZ/STAFF

solving and especially coming up with different solutions in a high-pressure atmosphere," she said. "The evidence suggests that he would be very susceptible to influence and have difficulty seeing other options."

Often, the initial evaluation of a traumatic brain injury is done by a service member's primary-care physician. "That's going to miss people," Jaffin said. "We have to educate providers."

In Santiago's case, a 2003 X-ray showed a Chiari malformation — the base of the rear of the skull was smaller than normal. That can push the cerebellum and brainstem toward the spine, blocking the fluid that surrounds

and protects the brain from flowing through the spine.

But doctors in his initial medical exams "didn't even look at the right rear orbital lobe," he said.

The damage there wasn't found until late 2006, when he was diagnosed with TBI because he'd been having vision problems.

Santiago had no symptoms before he fell in 2003. But Col. Joel Fishbain, acting deputy commander for clinical services at Walter Reed Army Medical Center in Washington, responded to a congressional inquiry with a letter dated May 7, 2007, that said Santiago's problems were due to a

See TBI next page