Groundbreaking research looks at how blasts injure brain

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Stars and Stripes
Published: November 25, 2011

LANDSTUHL, Germany — During a firefight in Afghanistan's Kandahar province in 2002, U.S. Army Maj. Kevin Kit Parke hill awaiting a Medevac flight for an injured soldier when a bomb exploded several miles away.

He saw the bomb's intense light first, then felt its shock waves ripple through his body.

"It felt like it was lifting my bowels, and I was quite far away," Parker said.

Several years later, when he was working in bioengineering research at Harvard University, a friend of Parker's suffered a brain injury, and Parker was reminded of his Kandahar experience. Parker chose to shift his focus from cardiac tissue to br after receiving encouragement from Col. Geoffrey Ling, a neurologist and program manager at the Defense Advanced Rese Agency, or DARPA.

Now a professor at Harvard, Parker has published groundbreaking research describing how blasts injure the brain. Gather on the battlefield from servicemembers who've been in close proximity to blasts, he said, will be key to understanding the c subtle damage caused.

The military currently is fielding several new technologies in Afghanistan to do exactly that. Now:

● Soldiers are being outfitted with high-tech gauges that can detect a blast's severity and alert medics on site that a soldier exposed to shock waves.

● Armored vehicles are equipped with sensors that connect to each vehicle's "black box," which measures and stores inforı

● Two advanced magnetic resonance imaging units have been sent to Afghanistan, marking the first time such sophisticate machines have been used in a war zone. Until now, troops couldn't get MRI scans of their brains before arriving at Landstu Medical Center in Germany, the main hub for servicemembers injured downrange.

Military doctors and researchers hope data collected using the technologies will lead to more precise diagnosis of mild trau injuries. The findings could also influence the design of helmets and body armor to protect against blast waves.

And they could help answer a long-standing question about these injuries: Can servicemembers who are near explosions, b a blow to the head, still suffer brain damage?

If so, the findings could explain why so many troops — more than 200,000, according to the latest figures from the Defens are returning from the Iraq and Afghanistan wars with brain injuries.

"We have to do this science, and the soldiers have to be involved," Parker said.

Gauging blasts

But new research is adding credence to the theory that a blast's shock waves can cause a brain injury. Traveling at more tha per hour after an explosion, these violent waves of air, called overpressures, penetrate the skull and reach the brain, resear

Overpressures have long been known to cause other types of internal injuries, including collapsed lungs. New research sug blast's shock waves can stretch brain cells, causing them to tear, or force the long nerves between brain cells to expand and damaging them, or stretch the blood vessel walls beyond their limit, causing an injury called vasospasms.

To measure the force of blast waves on troops near explosions, DARPA developed a blast gauge. About the size of a watch f weighing an ounce, the portable blast gauge can be attached to helmets and body armor. Inside it are a microprocessor and detect the blast's force and measure its overpressures, storing the data until it can be downloaded.

In addition to measuring the bomb's force, the device is designed to give medics attending blast victims an instant read of t blast waves. The medic inserts a stylus or pen tip into the device, causing a light to flash green, yellow or red. The color ind the blast was strong enough to require the soldier receive further medical attention and rest.

"Thank God this is coming out now," Parker said. "We can't get this in the field fast enough."