Smart body armor could gauge brain damage from explosions

Sensors could tell whether or not soliders are likely to face trauma.

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Explosions are insidious. Even if a blast doesn't deliver a conspicuous injury, it can inflict brain trauma that might not be evident until much later. The US Navy's Office of Naval Research doesn't want medics to wait, though. It's developing Blast Load Assessment Sense and Test (conveniently, BLAST), a sensor system that could determine whether or not an explosion's shockwave is likely to have injured your brain. Tiny sensors in your helmet and body armor would record the blast pressure and share it with a scanner. When combined with a palm-sized neurological assessment tool (which stimulates your fingers to gauge your responses), the data would let medical teams quickly decide whether or not you're able to fight.

That's particularly important given US military guidelines. Soldiers relatively close to an explosion (about 165 feet) are supposed to stand down for a full day and get a medical checkup. That's not enough time to properly assess brain trauma, and it's not very practical in a densely packed field base. Why take half of your troops out of the action if just a handful of them are at risk? BLAST could limit the stand-down order to soldiers that are actually affected, and spare those who were behind cover or otherwise untouched.

The system is still in the lab right now, but its first field tests should start within a year and a half. Ultimately, ONR would like to put this in the hands of acquisition teams within 3 to 5 years. The office is mainly focused on the Navy and Marine Corps, but this invention could easily be vital to just about any soldier in a combat zone -- it could make the difference between a trip to the field hospital and staying on the front line.

Via: MilitaryTimes

Source: Office of Naval Research

A real suicide bomb detector should arrive this year

After years of dodgy detectors, one company claims to have a real solution.

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Randy Montoya

Ever since terrorism became an all-too-real fact of life, people have dreamed of suicide bomb detectors that spot an explosive vest before its wearer has a chance to detonate. However, making a working example has proven elusive. Some companies threw their hands up in frustration after developing systems that just weren't accurate enough. Others, meanwhile, didn't even try that hard -- the UK went so far as to ban some detectors that proved utterly ineffective. At last, though, it looks like a genuinely functional suicide bomb detector is on the horizon.

R3 Technologies is nearly ready to sell the CBD-1000, a semi-portable continuous wave radar that's reportedly accurate enough to detect the materials you typically see in suicide vests, whether or not they're metallic. If a terrorist loads up on glass or rocks to maximize damage, they may well be caught. It currently works best at relatively short ranges and with mostly stationary targets (you need 1.3 seconds to complete a scan at 9 feet), but there are plans for instant scans as far away as 100 feet. If it reaches that goal, it could change the face of security -- officers could spot and shoot bombers well before they reach their targets.

If all goes well, the plan is to offer the CBD-1000 this year for $50,000. It's too soon to say whether or not this will work in the chaotic, unpredictable circumstances of real life. R3 has some hard science to

back up its claims, mind you. It partnered with Sandia National Laboratories scientists to refine the detector, so this is more than just a well-meaning idea.

BLAST: Greater Speed, Accuracy in Recognizing Brain Injury

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By Warren Duffie Jr., Office of Naval Research

ARLINGTON, Va.—Modern body armor better protects warfighters against shrapnel from explosive blasts. However, they still face a hidden threat—the resulting blast pressure and shock wave that could cause traumatic brain injury (TBI).

To fight this invisible, insidious adversary, the Office of Naval Research (ONR) is sponsoring the development of a portable, three-part system that can measure blast pressure, establish injury thresholds for the brain and analyze potential TBI symptoms. It's called Blast Load Assessment Sense and Test—BLAST, for short.

"A system like BLAST is vitally important because it can help recognize the signs of TBI early and tell warfighters they might need medical attention," said Dr. Timothy Bentley, a program manager overseeing the research for ONR's Warfighter Performance Department. "This reduces the likelihood of someone enduring multiple blasts and suffering more serious brain injury. BLAST also is unique for its unique suite of technology."

Department of Defense doctrine requires all those within 50 meters (approximately 165 feet) of an explosion to "stand down" for 24 hours and undergo a mandatory medical checkup. Bentley said this approach presents two major challenges—(1) some forward operating bases are only 100 meters (approximately 330 feet) across, so half of the personnel would need to stand down after an explosion, and (2) 24 hours isn't enough time for a regular medical exam to detect signs of even mild TBI.

BLAST uses coin-sized sensors that are tough enough to survive an explosion, can be worn on helmets and body armor and are able to record blast pressure. This pressure can be downloaded with a specialized scanner—design possibilities include a handheld barcode-style scanner or a stationary one modeled after airport metal detectors. By using a special algorithm to convert data into a "go or no-go" injury threshold, BLAST indicates if exposed warfighters can stay in the fight, or need a TBI-focused medical exam with the third component: a neurofunctional assessment tool.

This assessment tool is sized like a computer mouse, fits in the palm of the hand, and emits vibrations to stimulate fingertip sensations and assess brain health. By testing whether or not warfighters feel these vibrations, administered in a variety of patterns, a medic or corpsman can decide if someone exhibits TBI symptoms and needs to stand down.

"BLAST sensors can provide valuable blast pressure data that can be used to assess the possibility of TBI," said Dr. Amit Bagchi, a scientist at the Naval Research Laboratory, which is developing the physical sensors. "The more data we have, the better we can predict the presence of TBI."

"Together, the components of BLAST can enable us to designate a pressure threshold number for when someone is at risk for TBI and needs to stand down for more advanced testing or medical care," said Dr. Laila Zai, a scientist with ARA, a research and engineering company helping to develop BLAST's algorithm and neurofunctional assessment tool. "Think of a speedometer. Whether you're going too fast or slow depends on road conditions, and is indicated by the speed limit. BLAST determines a safe 'speed' for the brain."

BLAST sensors currently are being tested in laboratories using electrical shocks to simulate blasts of varying size and intensity. Within the next year and a half, Bentley said, the system should be tested on field mannequins and then by Marines completing breacher training—overcoming obstacles such as walls and doors using explosives.

BLAST is part of ONR's Future Naval Capability—a science and technology program aimed at developing and transitioning cutting-edge technology products to Navy and Marine Corps acquisition managers within a three- to five-year timeframe.

Warren Duffie Jr. is a contractor for ONR Corporate Strategic Communications.

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