

New portable device checks for concussions on the sidelines

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A player just took a hard knock to the head and is lying on the field. A coach rushes to his side, but the player sits up and seems fine. He knows who the president is and how many fingers the coach is holding up. But is he ready to get back in the game?

Image: Biomedical Engineering Assistant Professor Michelle LaPlaca demonstrates Concussion DETECT with the help of Bryan Williams. The device helps quickly detect mild concussions in virtually any setting.

More than 750,000 mild traumatic brain injuries (mTBI) occur in the United States each year. When a player or soldier with even a mild concussion is sent back to the field, another blow to the head can lead to additional life long problems or even second impact syndrome, which

has a mortality rate of up to 50 percent. But the injury is difficult to diagnose, even with a quiet room and a several-hour-long test.

Michelle LaPlaca, an assistant professor in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University, and David Wright, assistant director of Emory University's Emergency Medicine Research Center, have developed a new device to detect brain injuries right on the sidelines of a football game, on a battlefield or in the emergency room.

Called DETECT (Display Enhanced Testing for Concussions and mTBI system), the device is a fast, easy to administer and sensitive system for assessing problems associated with concussions. The DETECT device is an integrated system that includes software applications, a portable computer and an LCD display in the headgear.

While a typical mTBI test requires a quiet room and 1-2 hours of testing, DETECT performs neuropsychological tests in an immersive environment in about 7 minutes, regardless of surrounding noise and movement. So, a football player or soldier who just took a hard hit to the head can take the test and either be safely cleared to get back on the field or sent to receive medical attention.

The device blocks external stimuli that could interfere with testing, such as light and sound. This allows the test to be given in virtually any setting, even a bright football field with a roaring crowd.

When suffering from mTBI, a person will have difficulty with certain types of thinking controlled by a different areas of the brain, such as working memory, complex reaction and multi-tasking. DETECT runs the wearer through three types of neuropsychological tests that measure the function of several parts of the brain as it attempts to perform the tests.

For example, the first shows the wearer a series of shapes with different colors and textures and gives voice instructions. The wearer uses a simple controller similar to a video game controller to respond to the commands. The device then measures the wearer's response times and answer selections. If the response time is too slow or the incorrect answers were provided, it indicates impairment.

The DETECT system includes a laptop to run the software, a head-mounted display, earmuffs that also act as headphones and an input device (controller). The display projects the visual aspect of the test, the headphones provide the verbal instructions and the controller records the wearer's response.

In addition to the advantages of its speed and portability, DETECT can also be administered by a non-medical personnel such as a coach or parent rather than a trained neurophysiologist.

While the device has already been tested in the lab and in a hospital emergency room, the Georgia Tech football program recognizes the need for improved concussion assessment and plans to test this new technology.

DETECT may have other potential cognitive testing applications, such as helping assess cognitive impairment related to Alzheimer's disease or drug use. The test would be brief and could be performed in a general physician's office.

DETECT is expected to be commercially available in the next three to five years.

Source: Georgia Institute of Technology

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