

Concussion Diagnosis

The Centers for Disease Control and Prevention (CDC) report that an estimated 3.8 million concussions associated with sports and recreational activities occur each year in the United States.¹ Many people fail to realize the consequences that can accompany a concussion if it is not properly diagnosed and treated. The results can be devastating, leading to cognitive deficits and neurological diseases.

In an effort to detect a concussion in an athlete immediately after it occurs, many athletic trainers are turning to cognitive software packages to establish a baseline score for each player prior to the start of the season. If an athlete sustains a head injury during practice or during a game, he or she can be tested a second time and the post-injury score compared to the baseline test.

Many companies specialize in cognitive software packages to monitor athletes. The following are just a few examples of available technology and what is on the horizon as devices become more sophisticated.

CSMi Medical Solutions

CSMi Medical Solutions offers a product line known as SportsWare, designed to help athletic trainers monitor athletes' injuries. The product uses the Standardized Assessment of Concussion (SAC), a test used to determine the severity of a concussion. CSMi's SAC Trac Plus provides a convenient way for athletic trainers to administer the SAC exam and compare baseline tests to post-injury measurements. The package also includes the Standard Symptom Checklist for concussions and the Balance Error Scoring System (BESS), used to evaluate an athlete's balance following a blow to the head.³ The product runs on Windows-based desktops and PDAs and costs approximately \$500.³

ImpACT

ImpACT is designed for use by coaches, athletic trainers and physicians. An athlete's reaction time can be captured to the nearest one hundredth of a second on each of the ten test modules. The 20-minute test randomly generates different forms to prevent athletes from beating the test. The program measures multiple aspects of cognitive functioning in athletes including: Attention span, working memory, sustained and selective attention time, response variability, non-verbal problem solving and



reaction time.⁴

ImpACT is a Windows-based computer program. Pricing varies depending on the type of organization. Educational institutions can expect to spend anywhere from \$500–\$1,000. Each package comes with the opportunity to purchase additional baseline and post-injury tests after the first year. Other packages are also available for athletic clubs and physicians.⁴

HeadMinder

HeadMinder also offers a software package similar to ImpACT's with a 25-minute baseline neurocognitive test the athlete completes in the pre-season. The test uses the Concussion Resolution Index (CRI) designed to assess cognitive functions including reaction time and decision-making speed after a concussion. The product generates reports that compare post-injury tests to the athlete's baseline.

This particular product is Web-based, allowing testing from any PC connected to the Internet. In turn, registered professionals monitoring the athlete's progress can log in and securely access the information. Like ImpACT, test forms are altered to avoid the "practice effect." The reports generated include medical history, physiological symptoms and concussion characteristics.⁵

Pricing is about \$600 a year for high schools and \$1,000 for universities. Packages are also available for professional teams, hospitals and clinics. ⁵

BrainScope Company Inc.

The BrainScope NT-1000 is one of the newest technologies on the horizon. Although not currently available for purchase, the company expects to receive FDA approval this summer. This

Concussion Diagnosis *continued*

technology uses a small handheld, mobile device that analyzes electrical activity in the brain through sensors attached to a disposable headset. Coaches can use this device to assess an injury onsite immediately after it occurs.

The device uses patented algorithms based on over 15,000 abnormal brain scans to identify brain dysfunctions. The device is being tested by three university hospitals, New York University, Case-Western Reserve in Cleveland, and Washington University in St. Louis, for the possibility of emergency room use, and the company is also in discussions with the U.S. Army about potential applications.

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