

# Visual test effective in diagnosing concussions in collegiate athletes

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A sideline visual test effectively detected concussions in collegiate athletes, according to a team of researchers from the Perelman School of Medicine at the University of Pennsylvania. Concussed athletes scored an average of 5.9 seconds slower (worse) than the best baseline scores in healthy controls on the timed test, in which athletes read a series of numbers on cards and are scored on time and accuracy. This quick visual test, easily administered on the playing field, holds promise as a complement to other diagnostic tools for sports-related concussion.

Up to 3.8 million Americans sustain sports-related concussions each year, yet current methods fall short from objectively and quickly measuring the presence and severity of a concussion. Evidence-based protocols are needed, both on sidelines to prevent injured players from returning to play too soon, and off the field, for physicians to more accurately and effectively diagnose, treat and rehabilitate patients suffering from concussions.

"This test has demonstrated its ability to provide objective evidence to aid medical professionals and trainers in determining which athletes need to come out of games after a blow to the head," said Laura Balcer, MD, MSCE, professor of Neurology and senior author on the paper.

"We'll continue to measure the test's effectiveness in different groups - players who play the same position who have and have not suffered concussions, for instance. It is our hope that the new test, once validated, can be folded into the current sideline battery of tests for concussion, as no single test at this time can be used to diagnose or manage

concussion."

The King-Devick test, originally used as a dyslexia test, detects impaired eye movements and rapid eye movements called saccades, indicating diminished [brain function](#). A previous study, published in *Neurology*, of this visual screening test for concussion found that boxers and mixed martial arts (MMA) fighters who had [head trauma](#) during their matches had significantly higher (worse) post-fight time test scores. Fighters who lost consciousness were on average 18 seconds slower on the test after their bouts.

In this follow-up study, published online in the *Journal of the Neurological Sciences*, 219 collegiate athletes were given the 2 minute test as a baseline at the start of the sports season. Athletes who sustained concussions - an impulse blow to the head or body that results in transient neurologic signs or symptoms - in games or practices during the season were given the test immediately on the sidelines.

Athletes who suffered concussions had significantly higher (worse) time scores compared to baselines. In the injured group, there were occasional accuracy errors while reading the cards, with one athlete making four errors and two others making one mistake each following a blow to the head. Two of these three did not have significantly slower test-taking times, suggesting that there may be a tradeoff of accuracy for increased time to complete the test in some concussed athletes. Researchers proposed adding a defined amount of time to the cumulative score for every error on the test, to account for the tradeoff of accuracy for time.

Researchers also looked at test improvement over time and post-game fatigue. A group tested following an intense scrimmage showed no signs of fatigue and actually improved their test scores compared to baseline. Another group tested before and after the season showed modest

improvements, likely a result of learning effects common in many performance measures.

This rapid sideline visual screening tool can complement other diagnostic assessments for sports-related [concussion](#).

Provided by University of Pennsylvania School of Medicine

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