



The Best Approach to Concussion

Call 877-646-7991 or visit: www.impacttest.com

WHAT IS A CONCUSSION?

- A disturbance in brain function that occurs following either a blow to the head or as a result of the violent shaking of the head.

CONCUSSION

- One of the most serious and prevalent medical problems at the high school level
- CT and MRI are not sensitive to the effects of concussion
- A difficult condition to diagnose and treat
- Relying solely on self-report of athlete leads to premature return-to-play & increased risk of serious injury
- **Proper management of concussion is the best form of prevention of serious injury.**
- More schools are being sued each year for concussion mismanagement.

ImPACT

- A "physical" of the brain
- Software program that provides information that can help to take the guesswork out of concussion management and return-to-play decisions.

ImPACT

- provides information regarding the severity of injury and a standard for evaluating recovery from injury
- Uses a battery of scientifically-validated computerized neurocognitive tests
- Consists of a Self-Report Symptom Questionnaire (21 symptoms commonly associated with concussion), a Concussion History Form, and 7 tests of neurocognitive functioning

Measures

- *Attention Span*
- *Working Memory*
- *Sustained Attention*
- *Reaction Time*
- *Response Variability*
- *Visual & Verbal Memory*
- *Selective Attention*
- *Non-verbal Problem Solving*

OUR APPROACH:

- **Is Reliable, valid, and extremely sensitive in determining whether an athlete has recovered sufficiently from a concussion in order to safely return to play.**

KEY FACTORS...

in determining an athlete's recovery is to compare post-concussive performance & symptoms to their "baseline" (pre-concussion) levels.

BASELINE ADMINISTRATION:

- The most effective utilization of ImPACT is to obtain a preseason baseline as part of their physical at the beginning of the season
- Baseline testing takes approximately 20 minutes.
- ImPACT may also be used without a baseline by comparing the athlete to normative values. Normative data accompanies the software.

POST-CONCUSSION TESTING:

ImPACT may be re-administered if an athlete is deemed to have sustained a concussion, even if it is considered mild without loss of consciousness.

ImPACT post-concussion follow-up evaluations can be conducted within 24-72 hours after injury (to help determine severity of injury) and subsequently as needed (e.g. days 5 and 10 post-injury).

How does ImPACT work?

All athletes are given a baseline test on the computer at the beginning of the season. If an athlete has a concussion, they retake the test. Then their post concussion test results are compared to their baseline test results to determine when they are ready to return to play. An athlete should be symptom free and ImPACT data should be back to baseline in order to safely allow return to competition.

Who is using ImPACT?

- ✓ 24 NFL Teams
- ✓ IRL, CHAMP Racing (formally CART), and Formula One
- ✓ New Zealand Rugby Football Union
- ✓ US Soccer
- ✓ Swedish World Cup Soccer
- ✓ 900+ High Schools
- ✓ 300+ Universities
- ✓ 250+ Sports Medicine & Neuropsychology Clinics



"ImPACT has proven to be an absolutely indispensable tool at our school. Time and time again athletes chomping at the bit to return will strongly deny having subjective symptoms and their gross neurological exam will be negative. When the objective and much more sensitive ImPACT results still show deficits though, the athletes often reconsider their symptoms and admit to not really feeling 100% yet. Knowing that the test results don't lie, the athletes become more honest with themselves and with the ATCs. The more complete information obtained through the use of ImPACT means I never have to second guess if I'm being either too aggressive or too conservative in returning athletes to play. Without question, the first purchase I'll make at any future jobs will be the ImPACT Testing Software."

CA, LATC, Sheffield, MA

New Research Findings Lead UPMC Sports Concussion Doctors to Caution High School Athletes on Premature

PITTSBURGH

One in 10 high school athletes involved in contact sports sustains a concussion each year. Sixty-three percent of the approximately 62,000 concussions expected to occur this year will be in football players.

This fall, doctors at the University of Pittsburgh Medical Center (UPMC) Sports Medicine Concussion Program are cautioning athletes, coaches, athletic trainers, team physicians and parents to be aware of new research data on concussion symptoms and effects, and the dangers of returning concussed athletes to the playing field too soon before the brain has had time to heal. The doctors' heed comes after they have published the results of six separate research studies in major medical journals since last fall's sports season.

"A lot has changed since last year. Our research findings have given us new objective information that impacts directly on how the severity of a concussion is measured and how it is determined when an injured athlete can safely return to play," said Mark Lovell, Ph.D., a neuropsychologist who is director of UPMC's sports concussion program.

The UPMC studies were the first ever published studies of the effects of concussion specifically in high school athletes – the population most at risk for

concussion – the doctors say. Following are summaries of the major findings in the studies:

- **Amnesia - not loss of consciousness - may be the main indicator of concussion severity and the best predictor of post-injury neurocognitive deficits.** (American Journal of Sports Medicine; Clinical Journal of Sport Medicine)

"It was long thought that loss of consciousness was the main marker for injury severity. But, we have proven that an athlete can have a severe concussion with significant effects without losing consciousness," said Dr. Lovell. "Amnesia and confusion on the field after injury may be as important, if not more important, in determining injury severity and making a return-to-play decision. Amnesia is any period of memory loss occurring either before or after the hit."

- **Even seemingly mild concussions can have significant effects.** (Journal of Neurosurgery)

"There is no such thing as 'just a bell ringer'," said Michael Collins, Ph.D., assistant director of the UPMC sports concussion program. "Our study showed that many athletes with mild concussions whose symptoms disappeared within 15 minutes still showed significant decline in memory processing and other symptoms within one week post-injury, which means they weren't healed. However, current guidelines sometimes allow athletes with "mild" concussion to return to

play even in that particular game, in some cases, if the symptoms disappeared within the 15-minute period."

- **Effects of multiple concussions can be cumulative.** (Neurosurgery)

"Our research has documented for the first time the common assumption that prior concussions may indeed lower the threshold for subsequent concussion injury and increase symptom severity in even seemingly mild subsequent concussion," said Joseph Maroon, M.D., a professor and vice chairman of neurological surgery at UPMC and team neurosurgeon for the Pittsburgh Steelers. In the study, high school athletes with a history of three or more concussions who sustained a new concussion were up to nine times more likely to experience common symptoms compared to athletes with no history of concussion.

- **Headache symptom likely indicates incomplete recovery.** (American Journal of Sports Medicine)

In another study, high school athletes with headache one week post-injury also had significantly more other symptoms and performed more poorly on neurocognitive tests measuring reaction time and memory than concussed athletes who reported no headache at one week post-injury.

ImPACT - The Best Approach to Concussion Management

"Headaches should be taken seriously because they also appear to be associated with a more severe concussion, lingering problems and incomplete brain recovery," said Dr. Collins.

- **High school athletes may take longer to recover from concussion than college athletes.**
(Journal of Pediatrics)

In the first study to examine age as a factor in concussion recovery, researchers found that high school athletes demonstrated prolonged memory dysfunction requiring longer recovery compared to college athletes. "Our study was the first to suggest that there may be differing vulnerabilities to concussion at different ages and current return-to-play guidelines may not be appropriate for all age groups," said Dr. Maroon. Current guidelines assume a standard use for all levels of play, from school age to professional.

Pittsburgh Steelers team orthopaedist and study co-author James Bradley, M.D., said, "This new research has changed the

way that I manage concussion in high school athletes. When I diagnose a concussion in a high school athlete from the sideline, I sit him out until they can be more fully evaluated."

A concussion is defined as any change in mental status that results when the brain is violently rocked back and forth inside of the skull due to a blow to the head, neck or upper body. Symptoms may include amnesia, confusion, disorientation, headache, nausea, uncoordinated hand-eye movements and, in some cases, loss of consciousness.

"Most athletes who sustain an initial concussion can recover completely as long as they do not sustain a second concussion before the brain has had time to heal from the first one," said Dr. Lovell. "Returning to play too soon puts the athlete at greater risk for sustaining a second concussion and more severe damage. No athlete with a concussion or suspected concussion should ever return to play before the brain has healed and all related symptoms have disappeared.

"Thus, it is important for everyone to be aware of the new research data regarding on-the-field markers of concussion severity in relation to post-injury symptoms and neurocognitive deficits," added Dr. Lovell. "Our studies also suggest that the currently used grading scales and return-to-play guidelines crucially need to be re-defined and further researched. Every athlete should be evaluated individually and not by following generalities of a grading scale."

In all of the research studies, the UPMC team used a computerized concussion evaluation tool, which they have developed, called ImPACT (Immediate Post-concussion Assessment and Cognitive Testing). ImPACT is the first system that can objectively evaluate the severity of injury and help determine when it is safe for an injured athlete to return to play by testing the athlete's neurocognitive functional state with tests of brain processing speed, memory and visual motor skills. ImPACT is currently used by more than 900 high schools nationwide.

...By the way I want to thank you & your staff for a truly GREAT product. I had 14 significant concussions last year & the year before we had 13, two of which were career ending. Using the Impact software last year made managing the injuries much better, for me and my athletes, than in my previous 29 years of Athletic Training. Thank you, all. [WH, MA, ATC/L Naperville, IL](#)

"I love it. It provides us objective data not just — "How are you?" I consider it a functional evaluation of the brain. By using the computer lab at the school I consult for, I am able to run 20 student athletes through at a time. I believe ImPACT will soon be the gold standard for return to play." [U V, ATC, HealthSouth, Portland, ME](#)

"This program has been a very valuable tool for me in dealing with concussions and educating my local family physicians. In the past my area docs have been allowing my athletes to return to play as soon as they "feel better." Since I have been sending a copy of the test with the athlete to the physician I have been getting better feedback and more appropriate post concussion care. Thank you for your help." [M.G., Certified Athletic Trainer, PA](#)

Nelson•Tyler•Langer, P.L.L.C.

Attorneys at Law

MICHAEL E. NELSON
FREDERICK P. LANGER, R.N.*
*LICENSED IN OREGON AND WASHINGTON

JEFFREY H. TYLER
OF COUNSEL

March 15, 2004

Michael Collins, Ph.D.
c/o ImPACT Applications
P.O. Box 23288
Hilton Head Island, SC 29925

Re: *ImPACT*

Dear Dr. Collins:

I believe that the ImPACT program is an effective method of preventing "Second Impact Syndrome", a rare but potentially fatal condition caused when an athlete's already injured brain is subjected to (even a relatively minor) second hit. In addition to preventing "Second Impact Syndrome", ImPACT is an effective tool in overall concussion management. Your new research confirms that multiple, successive, concussions represent a far more serious long-term problem for athletes than previously thought. Making certain that an injured athlete has recovered both physically and cognitively is vital.

Existing "return-to-play" guidelines based upon a sideline assessment of the severity of the initial concussion and the injured athlete's self-report of injury can only go so far. Post-injury neuropsychological assessment when compared to pre-injury baseline testing is the "gold standard". This has been available to professional and major college programs, but has not been affordable for high school programs and less well-funded athletic departments.

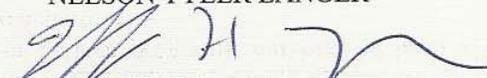
As a lawyer working in this area on behalf of injured persons, I know that "negligence" is usually defined as the "failure to exercise ordinary care." "Ordinary care" is usually defined as what a "reasonably careful ... (athletic trainer, athletic department, school district, etc...) would do under the same or similar circumstances." Standards of care can vary in different communities, but I believe that a program like ImPACT could one day represent the "standard of care" based upon its penetration into the marketplace. For instance, if every other school in the district used a program like ImPACT to determine safe "return-to-play" on an athlete by athlete basis, then baseline neuropsychological assessment could become the "standard of care" in that particular community.

I believe that use of the ImPACT program, in most instances, exceeds the required standard of care for athletic concussion management.

Most importantly, I am confident that use of the ImPACT program will save lives.

Sincerely,

NELSON TYLER LANGER



Jeffrey H. Tyler
Attorney

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