

IMPACT APPLICATIONS, INC.

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# EXECUTIVE SUMMARY

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## EXECUTIVE SUMMARY

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### OVERVIEW

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ImPACT Applications, Inc. is a premier provider of computerized neurocognitive assessment tools and services used by medical professionals to assist them in determining an athlete's fitness to return to play after suffering a concussion. **The ImPACT test provides an objective measurement of memory, reaction time, attention span, and other factors to help a clinician diagnose a concussion and decide when the patient has recovered.**

#### *What is a Concussion?*

**A concussion is a brain injury caused by a bump, blow, or jolt to the head.** Ranging from mild to severe, a concussion can disrupt the way the brain normally works. Someone affected by a concussion may exhibit headaches, nausea, dizziness, or double vision, and may seem confused, slow to react, or forgetful. Symptoms may be noticeable right away, or may show up days or weeks after the injury.

There are an estimated 1.6 million sports-related concussions each year, and consequences can be severe, especially if the individual doesn't fully recover from the concussion before returning to at-risk activities. Athletes who are not fully recovered from an initial concussion are significantly vulnerable for recurrent, cumulative, and even catastrophic consequences of a second concussive injury. Such difficulties are prevented if the athlete is allowed time to recover from concussion and return to play decisions are carefully made. No athlete should return to sport or other at-risk activities when symptoms of concussion are present and recovery is ongoing. **The best way to prevent difficulties with concussion is proper management of the injury using the ImPACT concussion management program.**

Estimates regarding the likelihood of an athlete in a contact sport experiencing a concussion may be as high as 19% per season. Although the majority of athletes who experience a concussion are likely to recover, it is unknown how many of these individuals may experience chronic cognitive and neurobehavioral difficulties related to recurrent injury. Someone who has suffered a concussion may exhibit headaches, nausea, dizziness, or double



vision, and may seem confused, slow to react, or forgetful. Symptoms may be noticeable right away, or may show up days or weeks after the injury.

ImPACT's clinically proven technology assesses eight key neurocognitive domains known for discriminatory ability in diffuse manifestations of brain pathology. These domains include; Impulse Control; Sustained Attention; Visuomotor Processing Speed; Visual and Verbal Memory (immediate/delayed); Working Memory; Selective Attention; Reaction Time; and Response Variability. This functionality provides ImPACT with the ability to design products and protocols targeting a wide range of disorders associated with subtle non-specific neurocognitive dysfunction, including:

- HIV/AIDS
- Dementia
- Medication
- Metabolic or Endocrinal Disorder
- Neurological Disorder (e.g., Tumor, Stroke)
- Traumatic Brain Injury or cumulative Mild Traumatic Brain Injury
- Premature Aging (early onset Alzheimer's/Parkinson's)
- Psychiatric Disorder (Depression)
- Learning Disability

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#### WHAT IS IMPACT?

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ImPACT is a sophisticated, research-based computer test developed to help clinicians evaluate recovery following concussion. **ImPACT is a 20-minute test battery that can be administered in the pre-season for a baseline and post-injury to track a concussion.** ImPACT promotes an athlete's full recovery from injury and assists clinicians in making a safe return-to-play decision and reducing the chance of follow-up concussions.

The ImPACT baseline test is ideally administered under the supervision of a clinician, athletic trainer, coach, or even a parent. The test involves tasks that measure a variety of factors. An initial test or "baseline test" is taken before a concussion occurs and establishes baseline results. When a concussion is suspected, a follow-up or "post-injury" test is administered to see if the results have changed from the baseline to help diagnose and manage the concussion. Additional follow-up tests may be administered over several days or weeks to assist the clinician with the return to play decision.

ImPACT provides comprehensive in-person or online training in the interpretation of test results, advice and consultation in the doctors' community, and many other resources to help clinicians make the best use of test results.

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#### WHY IMPACT?

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Traditional neurological and radiologic procedures, such as CT, MRI, and EEG, although helpful in identifying more serious concerns (e.g. skull fracture, hematoma, contusion), are not useful in identifying the effects of concussion. Such tests are typically unremarkable or normal, even in athletes sustaining a severe concussion. The reason for this is that concussion is a metabolic rather than structural injury.



**As few as 10% of concussions may result in loss of consciousness.**

Thus, structural neuroimaging techniques are insensitive to the effects of concussion. As a result, doctors often have to rely on subjective observations of a patient's self-reporting of symptoms to diagnose a concussion and decide when it's safe for the patient to return to playing sports and other activities.

Athletes are often reluctant to admit their symptoms, because they're afraid they won't be able to play, and observations of their signs and symptoms are subjective. At the forefront of proper concussion management is the implementation of baseline and/or post-injury neurocognitive testing. Such evaluation can help to objectively evaluate the concussed athlete's post-injury condition and track recovery for safe return to play, thus preventing the cumulative effects of concussion.

**Neurocognitive testing has recently been called the "cornerstone" of proper concussion management by an international panel of sports medicine experts.**

**ImPACT is designed to provide sensitive information in the form of cognitive data and symptom reporting in athletes suspected of sustaining a concussion. This information can be used to help determine recovery from injury and safe return to participation and overall clinical management issues.**

One of the key factors in determining an athlete's recovery curve is to compare an athlete's post-concussive performance and symptoms to their baseline (pre-concussion) levels, rather than using group normative data. This is the best method of controlling for inter-individual differences. In order to do this, the athlete must have taken ImPACT prior to sustaining a concussion. However, in the event that baseline testing is not possible, ImPACT has a normative database of thousands of non-injured athletes, and such data can be used effectively for adequate comparison and safe decisions for return to play.

**ImPACT's approach to managing concussion has been found to be reliable, valid and extremely sensitive in determining when an athlete has recovered sufficiently from a concussion.**



**Who is ImPACT?**

Headquartered in Pittsburgh, PA, ImPACT is a leader in computerized neurocognitive assessment tools and services. ImPACT has created an international network of clients who utilize the company's proprietary concussion management program. ImPACT's commercial success to date is directly attributable to our research-based approach to product development which has been in effect for the past twelve years. The scientific and clinical validity of ImPACT's technology is well established within the medical community resulting in adoption of the program by a diverse pediatrics, family care, sports medicine, neurology, neuropsychology, psychiatry, and geriatrics clinical community.

ImPACT was founded in May 2002 by Mark Lovell, Ph.D, ABPN, Joseph Maroon, M.D., and Michael Collins, Ph.D. ImPACT team members have dedicated the past 15 years to the scientific study of sports-related concussion and the clinical application of this knowledge throughout professional and amateur sports. The founders are widely acknowledged as world leaders in the field of concussion management and are committed to ongoing development of increasingly advanced concussion management tools. Together they provide concussion management services to some of the leading sports organizations in the world, including:

At the current time, ImPACT is being used for concussion management services by the following organizations...

*Sample of Current Users*

<b>31 NFL Teams</b>	<b>Ontario/Western Hockey Leagues</b>
<b>All MLB Team</b>	<b>Irish Rugby</b>
<b>Major League Soccer</b>	<b>New Zealand Rugby</b>
<b>National Hockey League</b>	<b>South African Rugby</b>
<b>Major/Minor League Baseball Umpires</b>	<b>US Lacrosse</b>
<b>USA Olympic Hockey</b>	<b>USA Rugby</b>
<b>USA Hockey</b>	<b>US Army</b>
<b>USA Ski Team</b>	<b>US Navy</b>
<b>US Soccer Federation</b>	<b>US Air Force Academy</b>
<b>Swedish Soccer</b>	<b>500+ Clinical Centers</b>
<b>1800+ High Schools</b>	<b>700+ Colleges and Universities</b>

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