



# Traumatic Head Injuries: The Need for Baseline Concussion Testing

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# TRAUMATIC BRAIN INJURIES



## PROBLEM STATEMENT & RESEARCH QUESTIONS

- Policies and rules have been written to guide when an athlete can return to play after a traumatic brain injury, but how do we know their “normal” brain function?
- Concussion baseline testing for all high school athletes in contact sports could better diagnose TBI. Institute of Medicine, 2014
- *In 9<sup>th</sup> grade football athletes, what is the change in baseline ImPACT score to the end of the season ImPACT score?*
- *In 9<sup>th</sup> grade football athletes that experience a potential concussion, what is the change from the baseline ImPACT score as measured 48 hours post injury, days 3, 7 & 15 post injury?*

# METHODOLOGY OF THE STUDY

- Research Design
  - Expedited IRB Obtained
  - This was a quantitative quasi-experimental pre and post test design with a prospective cohort.
  - The dependent variable was the repeated results from testing using a computerized neurocognitive software





## METHODOLOGY OF THE STUDY- DATA COLLECTION

- Immediate Post Concussion Assessment and Cognitive Test (ImPACT)
- Developed at the University of Pittsburgh Medical Center
- Research based software tool utilized to evaluate recovery after a concussion 25 minutes to complete
- Each athlete enters their own demographic information
- Measures six variables: word discrimination, design memory, X's & O's, symbol matching, color matching and three letter memory
- Valid and reliable instrument
- A total composite score is given and compared to national norms

# RESULTS

- A paired sample t test was performed on the Cognitive Efficiency Index (CEI) scores before and after the season among 21 athletes that completed the full sequence of ImPACT analysis pre- and post-season.
  - Post season CEI scores did **not** reveal a player who sustained an undiagnosed TBI
  - For injured players the post injury CEI mean score was initially decreased compared to pre-season scores.
  - Subsequent CEI mean scores on days 3, 7, 15 and post-season scores trended upwards from the pre-season baseline mean score for the 3 TBI subjects.
- No significant variance between pre- and post-season ImPACT scores for the non-injured athletes.
- Post-season testing revealed no undiagnosed TBI's were missed.
- 3 athletes sustained a TBI during practice or a game.
  - 2 athletes had abnormal variances from baseline ImPACT score at Day 1 and Day 7
  - All 3 injured athletes had normalized ImPACT scores at 15 days post injury.
  - None of these players were returned to play until ImPACT scores met or exceeded baseline scores.

# IMPLICATIONS

- **Research:** Findings warrant continued baseline concussion testing and historical profiling on these 9<sup>th</sup> grade athletes throughout their high school careers.
- **Practice:** Baseline concussion testing using standardized instruments provides objective measures that are valuable for use by clinicians to determine readiness for return to play.
- **Policy:** Baseline concussion testing should be implemented in all high schools for contact sports to gather long term data on cumulative TBI effects
- **Education:** Dissemination of the results to the school board, athletic department, parents and players will provide further education on the effects of concussions.

# IF IN DOUBT...SIT THEM OUT



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## REFERENCES

- Broglio, S. P. (2014). National Athletic Trainers' Association Position Statement: Management of Sport Concussion. *Journal of Athletic Training*, 245-265.
- Control, Centers for Disease. (2011). *Nonfatal Traumatic Brain Injuries Related to Sports and Recreation Activities Among Persons Aged <19 Years--United States, 2001-2009*. Washington, DC: Morbidity and Mortality Weekly Report.
- Dziemianowicz, M. K. (2012). Sports-Related Concussion Testing. *Current Neurology & Neuroscience Reports*, 547-559.
- Grubenhoff, J. K. (2010). Evaluation of the Standardized Assessment of Concussion in a Pediatric Emergency Department. *American Academy of Pediatrics*, 688-695. Retrieved from pediatric publications.
- Guskiewicz, K. R. (2001). Postural Stability and Neuropsychological Deficits after Concussion in Collegiate Athletes. *Journal of Athletic Training*, 263-273.
- Kontos, A. E. (2013). Posttraumatic Migraine as a Predictor of Recovery and Cognitive Impairment After Sport-Related Concussion. *American Journal of Sports Medicine*, 1497-1504.
- Marchie A, Cusimano MD. Bodychecking and concussions in ice hockey: should our youth pay the price? *CMAJ*. 2003;169(2):124-128.
- McCrea, M. I. (2013). Day of injury assessment of sports related concussion. *British Journal of Sports Medicine*, 272-284.

# REFERENCES

- McCrea, M. K. (1998). Standardized Assessment of Concussion (SAC): On-site Mental Status Evaluation of the Athlete. *Journal Head Trauma Rehabilitation*, 27-35.
- McCrory, P. M. (2014, December 30). *British Journal of Sports Medicine*. Retrieved from [bjsm.bmj.com](http://bjsm.bmj.com/): <http://bjsm.bmj.com/>
- Medicine, Institute of. (2014). *Sports-Related Concussions in Youth Improving the Science, Changing the Culture*. Washington, DC: National Academies Press.
- Meehan WP III, Bachur RG. Sport-related concussion. *Pediatrics*. 2009;123(1): 114-123.
- Robbins, C. D. (2014). Self-reported concussion history: impact of providing a definition of concussion. *Journal of Sports Medicine*, 99-103.
- Sports Concussion Institute. (2014). *Concussion resources for teachers & educators*. Retrieved from <http://www.concussiontreatment.com/forteachers.html#stfaq3>
- Stroke, N. I. (2013, December 16). *NIH and NFL tackle concussion research*. Retrieved from National Institute of Neurological Disorders and Stroke: <http://www.ninds.nih.gov>
- Swaine R, Tremblay C, Plat, W, et al. Previous head injury is a risk factor for subsequent head injury in children: a longitudinal cohort study. *Pediatrics*. 2007;119(4):749-758.
- Talavage, T. N. (2014). Functionally-Detected Cognitive Impairment in High School Football Players without Clinically-Diagnosed Concussion. *Journal of Neurotrauma*, 327-338.
- Zemek, R., Duval, S., Dematteo, C. (2014). Guidelines for Diagnosing and Managing Pediatric Concussion. Retrieved from Ontario Neurotrauma Foundation: <http://onf.org>