John N Daigle, J Biosens Bioelectron 2015, 6:3
http://dx.doi.org/10.4172/2155-6210.C1.023

OMICS International
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4th International Conference and Exhibition on
Biosensors & Bioelectronics
September 28-30, 2015 Atlanta, USA

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A biosensing approach for detecting and managing head injuries in American football

We describe a system for detecting and managing head injuries sustained during American football games. Our work is motivated by the fact that while young athletes make nearly one-quarter million visits per year to emergency rooms as the result of brain injuries from sports and recreations, the overwhelming majority of mild traumatic brain injuries (MTBI) in youth go undetected and unmanaged because of lack of detection tools. An MTBI may have a variety of consequences including headache, attention deficit and reduction in problem solving skills even in the face of normal MRI and CAT scans. The results on the classroom performance of a student athlete are obvious, but worse, sustaining a second concussion before an existing concussion properly heals may result in second-impact syndrome in which the brain swells rapidly and catastrophically. The University of Mississippi electrical engineering and athletics departments recently conducted a pilot study to measure impacts on some football players using X2 Biosystemsx PATCH devices. The devices provide extensive linear and rotational acceleration measurements to generate a hit profile for a player. Football coaches analyzed the profiles to devise tactics that reduce total head impact. This continuous monitoring and improvement in tactics of one player resulted in a 43% reduction in impact even with an 8% increase in collisions. In this presentation, we will discuss the status and details of our data collection and analysis system and as well as some preliminary results.

Biography

John N Daigle is Professor of Electrical Engineering at the University of Mississippi, Oxford. He has published widely in journals and conferences and is the author of two text books. He is a Life Fellow of the IEEE and served as Editor-in-Chief of two IEEE periodicals. He was a visiting researcher at IBM Zurich Research Laboratory (1999-2001) and at the University of Perugia (2002). He was an Erskine Fellow at the University of Canterbury (2009) and spent a sabbatical year in Biomedical Engineering at Louisiana Tech (2012). He holds a Doctorate from Columbia University in operations research (1977).

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