

“Assessing Balance and Quantifying Traumatic Brain Injury (TBI)”

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Introduction: Traumatic Brain Injury (TBI) is an extended disruption of the normal function of the brain caused by physical trauma to the head. Presently, there is no efficient means for detecting and quantifying TBI in combat wounded. In a recent pilot study, balance as an overall indicator of central nervous system health was investigated using linear techniques and found to differentiate between those with and without TBI. We hypothesize that balance can be quantified with a pressure plate using non-linear methods developed in our laboratory.

Methods: Exploratory *post-hoc* analysis of two subjects from a prospective observational study was done which included center of pressure (COP) data recorded using a force plate under one-legged stance/eyes-closed conditions. Balance complexity was analyzed by generating 3-dimensional phase space diagrams which were enclosed by 95% confidence ellipsoids and by performing sample entropy measurements (*see below*).

Results: Data shows that the individual with TBI yielded COP movements that are more constrained in phase space than the subject without TBI (*Figure 1 versus Figure 2, respectively*).

Conclusion: Quantification of balance complexity is achievable. Furthermore, these findings suggest that non-linear metrics may be of use in diagnosing TBI in combat casualties.

Figure 1

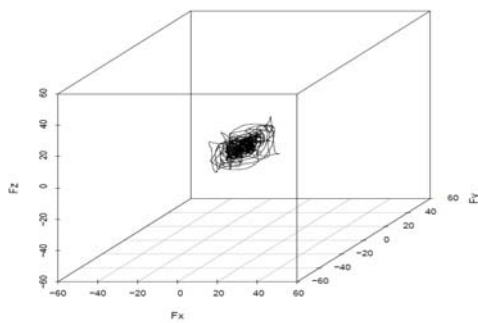


Figure 2

