

P3b event-related potentials show changes in varsity football players due to accumulated sub-concussive head impacts

BACKGROUND: Concussion has been a focus in football at all levels of participation. However, there is a growing appreciation that repetitive sub-concussive impacts may have more significant effects on overall neurological health than the isolated diagnosed concussions that have been the focus of recent research. The purpose of this study was to evaluate the relationship between the number of head impacts that players experience throughout the season and their P300 evoked potential.

METHODS: Canadian university football players (n=45) were separated into three groups based on player mass and position/skill (small-skilled, big-skilled and big-unskilled). Groups were separated into low and high levels of impact exposure based on the total number of head impacts experienced in-season. Players completed baseline, midseason, postseason, and follow-up neurophysiological tests to measure P300 evoked potentials. Statistically significant differences between high versus low impact subgroups for each player group were assessed using independent-samples t-tests.

RESULTS: Small-skilled and big-skilled players showed statistically significant decreases in P300 amplitude at midseason and postseason for high impact players compared to low impact players. Follow-up measures revealed that all groups were not significantly different compared to baseline measures.

DISCUSSION & CONCLUSION: Players that experience a large number of head impacts in varsity football demonstrate significant decreases in specific EEG measures of cognitive function and information processing.

INTERDISCIPLINARY REFLECTION: The combination of biomechanical head impact exposure with neurophysiological outcomes yields insight into the processes behind head impacts and their effects on the human brain.