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**Electrophysiological and SCAT 5 characteristics of contact vs  
non-contact sport athletes**

By

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## **Abstract**

*Introduction:* There are a number of studies and systematic reviews suggesting potential chronic neurodegenerative effects of repetitive subconcussive head impacts. Indeed, most neuroimaging and some serum biomarker tests used in the literature generally present consistent evidence for negative effects of repetitive subconcussive head impacts. However, these tests have limited utility as side-line diagnostic tests. *Purpose:* Investigate whether two prospective side-line tests, sport concussion assessment tool 5 (SCAT 5) and transcranial magnetic stimulation (TMS), have enough sensitivity to detect relatively small and transient electrophysiological and cognitive changes in American football players who are very prone to repetitive subconcussive head impacts. The primary aim of this study is to investigate the effects of subconcussive head impacts on TMS and SCAT 5 performance by comparing contact with non-contact sport athletes. The secondary aim is to investigate the reproducibility and reliability of TMS and SCAT 5 in contact sport athletes. *Methods:* For the first section of the study, we assessed TMS and SCAT 5 measures on seventeen American football players (mean  $\pm$ SD age: 23  $\pm$ 7 years) and seventeen non-contact sport participants (mean  $\pm$ SD age: 24  $\pm$ 3 years) who were recruited for only one session. To assess the day-to-day reliability of each measure, the seventeen American football players were tested for a second time at least seven days following the first session. *Results:* Compared to the TMS day-to-day reliability analysis, SCAT 5 test scores presented poorer reproducibility and higher coefficients of variation (4–6% vs 10–66%, respectively). There were no significant differences in SCAT 5 test scores and corticospinal-silent period between contact and non-contact sport players. *Conclusion:* This is the first study to demonstrate similar electrophysiological and SCAT 5 characteristics between American football players and non-contact sport athletes. Also the electrophysiological changes observed are supported by our highly reliable and reproducible inter-day TMS data.