

## Baroreflex Sensitivity is Impaired in Athletes Following a Sports-Related Concussion

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### ABSTRACT

Sport-related concussions are a major public health concern, with approximately 3.8 million incidences occurring annually in the United States alone. Autonomic nervous system (ANS) dysfunction is implicated in early and later stages of sports-related concussion recovery. Arterial baroreflex, a crucial mechanism by which the ANS controls short-term fluctuations in blood pressure, remains understudied in this population. **PURPOSE:** Examine baroreflex sensitivity (BRS) at rest during acute and sub-acute recovery phases following a sport-related concussion in collegiate athletes in comparison to non-injured athletes as controls. **METHODS:** Athletes (20±1 years) with sports-related concussions were tested on days 3 (N=13), 21 (N=13), and 90 (N=11) following the injury. Control athletes (N=12) were assessed at one time-point. Continuous arterial blood pressure (finger photoplethysmography) and R-R intervals (3-lead electrocardiogram) were obtained at rest for 6 minutes and while subjects were seated in an upright position. BRS was estimated with transfer function analysis to assess the fluctuations in systolic blood pressure and R-R intervals during the time period. Transfer gain in the low-frequency range (0.05– 0.15 Hz) quantified the magnitude of the relationship between changes in systolic blood pressure and R-R interval. Therefore, higher gain indicates higher BRS. A linear mixed model was used to examine symptoms and transfer function variables between the controls and the concussed athletes at the three time points. **RESULTS:** As anticipated, symptoms were worse on day-3 and resolved during the day-21 sub-acute phase. BRS was lower on day-3 (0.656±0.2U; p=0.003), day-21 (0.711±0.29U; p=0.013), and day-90 (0.77±0.27; p=0.04) following the injury compared to the controls (1.05±0.3U). **CONCLUSION:** The findings confirm impairments in baroreflex sensitivity during the acute and subacute recovery phases following a concussion despite symptom resolution. Blunted baroreflex sensitivity following injury may position athletes in a vulnerable situation while performing tasks that elicit sudden changes in blood pressure on and off the field.