

# The effect of soccer headings and match performance on the serum concentration of brain damage markers

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## Background

In the last decade, there has been increasing interest in investigating the relationship between biochemical markers of brain damage and performance in elite athletes. In particular, the markers neuron specific enolase (NSE) and S100b protein have been the subject of active research, as their serum concentrations may indicate the degree of neuronal damage. The aim of the present study was to evaluate the relationship between these biochemical markers and measures of match performance, such as headings and physical activity during a match, in elite male footballers. The study hypothesis was that the increase in brain injury markers would not be associated with heading, but with motor activity or other factors.

## Method

The study was conducted in Moscow, Russian Federation. Elite Caucasian male football players (n=24, mean age 27 years) were included in the study. Inclusion criteria were as follows: male gender, no concussion in the analysed match,  $\geq 75$  minutes of playing time in the analysed match. Exclusion criteria were as follows: goalkeeper position,  $\leq 75$  minutes in the analysed match, refusal to participate in the study. Serum concentrations of NSE and S100b were measured 24 hours before the match and 12 and 40-48 hours after the match. The InStat kinematic system was used to determine headings and match performance variables such as high-intensity running and sprinting.

## Results

Levels of NSE and s100b were significantly higher after the match. No significant correlation was observed between headings, high-intensity running or sprinting and levels of NSE and S100b.

## Conclusion

The concentration of markers of brain damage increased after the match. However, this was not associated with heading, high-intensity running or sprinting. These findings may indicate a possible non-brain origin of the analysed markers or other as yet unidentified factors influencing the concentration of the markers.



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