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The Magnitude of Translational and Rotational Head Accelerations Experienced by Riders During Downhill Mountain Biking.

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Introduction
To determine the magnitude of translational and rotational head accelerations during downhill mountain biking.
Design

Methods
Observational study. Sixteen male downhill cyclists (age 26.4 ± 8.4 years; stature 179.4 ± 7.2 cm; mass 75.3 ± 5.9 kg) were monitored during two rounds of the British Downhill Series. Riders performed two runs on each course wearing a triaxial accelerometer behind the right ear. The means of the two runs for each course were used to determine differences between courses for mean and maximum peak translational (g) and rotational accelerations (rads/s^2) and impact duration for each course.

Results
Significant differences ($p < 0.05$) were revealed for the mean number of impacts (>10 g), FW = 12.5 ± 7.6, RYF = 42.8 ± 27.4 ($t_{(22.96)} = -4.70$; $p < 0.001$; 95 % CI = 17.00 to 43.64); maximum peak rotational acceleration, FW = 6805.4 ± 3073.8 rads/s^2, RYF = 9799.9 ± 3381.7 rads/s^2 ($t_{(32)} = -2.636$; $p = 0.01$; 95 % CI = 680.31 to 5308.38); mean acceleration duration FW = 4.7 ± 1.2 ms, RYF = 6.5 ± 1.4 ms ($t_{(32)} = -4.05$; $p < 0.001$; 95 % CI = 0.91 to 2.76) and maximum acceleration duration, FW = 11.6 ± 4.5 ms, RYF = 21.2 ± 9.1 ($t_{(29.51)} = -4.06$; $p = 0.001$; 95 % CI = 4.21 to 14.94). No other significant differences were found.

Conclusions
Findings indicate that downhill riders may be at risk of sustaining traumatic brain injuries and course design influences the number and magnitude of accelerations.

Key words:

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