

SportsMed Update

Nov 2007: Issue 4

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In a controlled filed study, repeated low-severity head impacts due to heading in soccer were not associated with any neurochemical changes (serum and cerebrospinal fluid) indicating possible signs of injury to the brain

Title: No neurochemical evidence for brain injury caused by heading in soccer

Authors: Zetterberg H, Jonsson M, Rasulzada A, Popa C, Styruud E, Hietala M, Rosengren L, Wallin A, Blennow K

Reference: Br J Sports Med 2007; 41: 574-577

Type of study: Controlled, clinical trial

Keywords: soccer, brain injury, concussion, heading, neurochemical changes

EB Rating: 7/10

CI Rating: 7.5/10

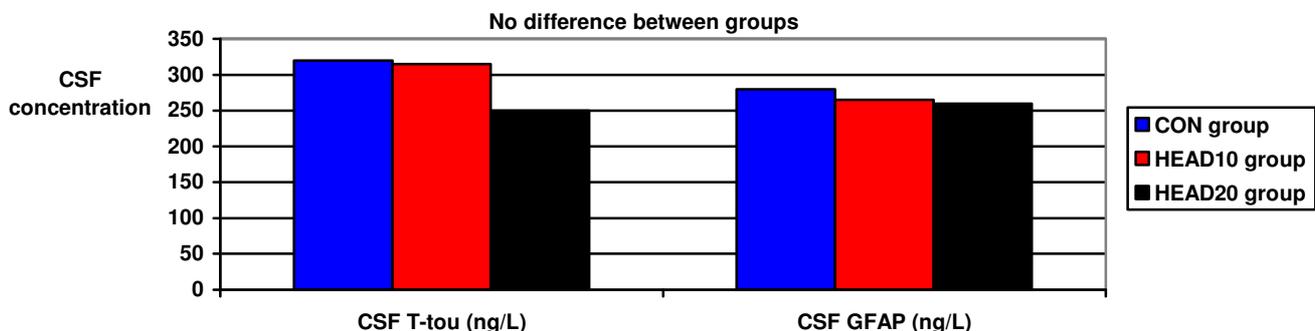
Background: It has been suggested that repetitive heading of a soccer ball can result in injury to the brain

Research question/s: Does repetitive heading of a soccer ball, using a standardized protocol, result in increased levels of biochemical markers for neuronal injury in cerebrospinal fluid (CSF) and the serum?

Methodology:

- Subjects: 23 male amateur soccer players and 10 non-playing control subjects (CON group, mean=24yrs)
- Experimental procedure: All the soccer players were assessed and then participated in a heading training (heading at least 10m after a ball was kicked from 30m). Players were divided into 2 groups (a group that performed 10 headings [HEAD10 (n=10, mean age 26 yrs)] and a group that performed 20 headings [HEAD20, n=13, mean age 23 yrs]). All the players and the subjects in the CON group underwent tests for markers of neural tissue injury in the cerebrospinal fluid (CSF) and serum 7-10 days after the heading session.
- Measures of outcome: CSF markers (neurofilament light protein, total tau, glial fibrillary acidic protein, S-100B and albumin concentrations) and serum markers (S-100B and albumin)

Main finding/s:



- There were no significant differences in the biomarkers (CSF and serum) between groups and the values were in the normal range – there was only a slight increase in CSF S-100B concentration in the CON group – biomarkers also did not correlate with the number of headings

Conclusion/s:

- In a controlled filed study, repeated low-severity head impacts due to heading in soccer were not associated with any neurochemical changes (serum and cerebrospinal fluid) indicating possible signs of injury to the brain

Methodological considerations:

Well conducted study, no measures before headings

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In female soccer player with a history of a single concussion, cognitive functions related to cognitive processing speed are still impaired 6-8 months after injury

Title: Prolonged neuropsychological impairments following a first concussion in female university soccer athletes

Authors: Ellemberg D, Leclerc S, Couture S, Daigle C

Reference: Clin J Sport Med 2007; 17(5): 369-374

Type of study: Case-control study

Keywords: concussion, women, soccer, neuropsychology, sports

EB Rating: 7/10

CI Rating: 7.5/10

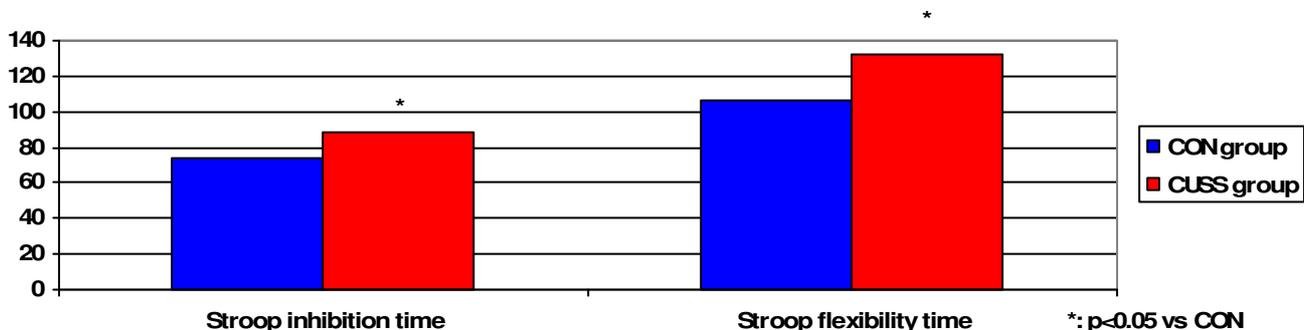
Background: It has been documented that female athletes may be at greater risk of sustaining a concussion, yet the long term cognitive effects from head injuries in females has not been investigated

Research question/s: Is there evidence of prolonged negative cognitive outcome following a concussion in female soccer players?

Methodology:

- Subjects: 10 female university-level soccer players who sustained a concussion injury (CUSS group, age=22.7 yrs), and a non-injured (never concussed) control group (CON group=12, age=22.3 yrs)
- Experimental procedure: Groups had similar years of education, years in university, years playing soccer, and headers per season. Cognitive functioning was assessed (6 to 8 months after a first concussion) in the CUSS and the CON group using a battery of 10 neuropsychological tests (California Verbal Learning Task-CVLT, Ruff 2&7 Selective Attention test – R2&7, Brief Test of Attention – BTA, Symbol Digits Modalities Test – SDMT, Stroop Color Word Test – Stroop, Tower of London DX – TOL, Letter Fluency Test – Fluency, Forward and backward Digit Span – Digit, Simple Reaction Time – SRT, Choice Reaction Time – CRT).
- Measures of outcome: Neuropsychological test battery scores in CUSS and CON group

Main finding/s:



- In the CUSS group, soccer players were significantly slower on tasks that required decision making (complex reaction time), inhibition and flexibility (Stroop), and planning (Tour of London task). There were no significant differences between groups in short- and long-term verbal memory, attention, and simple reaction time

Conclusion/s:

- In female soccer player with a history of a single concussion, cognitive functions related to cognitive processing speed are still impaired 6-8 months after injury

Methodological considerations:

Case control study, no longitudinal data

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In college football players, who did not sustain a concussive episode and only sub-concussive impacts during a season, there is no evidence of deterioration of neurocognitive test scores over the season

Title: Comparison of preseason, midseason, and postseason neurocognitive scores in uninjured collegiate football players

Authors: Miller JR, Adamson GJ, Pink MM, Sweet JC

Reference: Am J Sports Med 2007; 35(8): 1284-1288

Type of study: Case series

Keywords: head injury, sub-concussive injury, concussion, neuropsychology

EB Rating: 6.5/10

CI Rating: 7/10

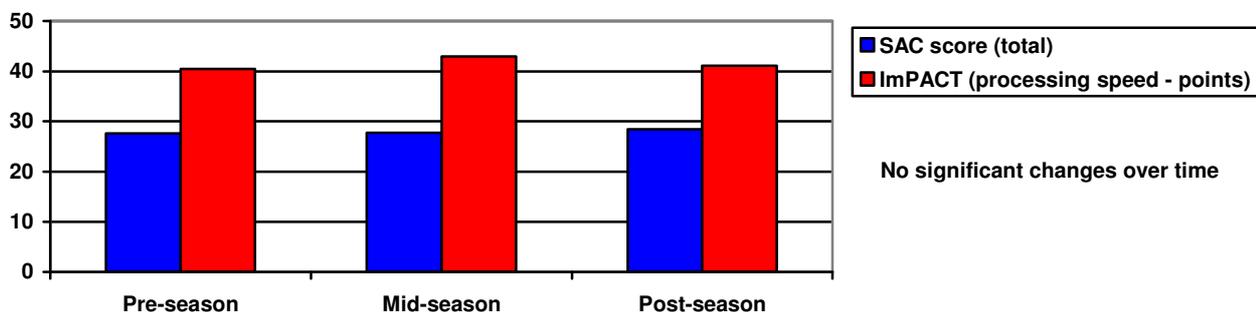
Background: It is not known whether college football players who regularly sustain sub-concussive blows to the head during a season will negatively affect neurocognitive test scores.

Research question/s: Is there is progressive deterioration in neurocognitive function [measured by the Standardized assessment of Concussion (SAC) and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) scores] in collegiate football players over a season?

Methodology:

- Subjects: 58 division III collegiate football players
- Experimental procedure: All the subjects underwent neurocognitive assessment [Standardized assessment of Concussion (SAC) and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) scores] pre-, mid-, and post-season. None of the players had a history of known concussion during the season
- Measures of outcome: Neurocognitive test scores pre-, mid- and post- season (repeated measures ANOVA)

Main finding/s:



- There were no significant changes differences in the overall SAC or ImPACT scores (or in the domains or composites of the tests) over time ($p < 0.05$)

Conclusion/s:

- In college football players, who did not sustain a concussive episode and only sub-concussive impacts during a season, there is no evidence of deterioration of neurocognitive test scores over the season

Methodological considerations:

Case series, no control group

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Ingestion of a non-specific cydo-oxygenase inhibitor (ibuprofen 400mg pre-race and 1200mg during the race) did not significantly alter serum electrolyte concentrations during ultradistance (160km) running - ultradistance running itself caused changes in certain serum markers

Title: Ibuprofen does not affect serum electrolyte concentrations after an ultradistance run

Authors: Dumke CL, Nieman DC, Oley K, Lind RH

Reference: Br J Sports Med 2007; 41: 492-496

Type of study: Non-randomized, controlled. clinical trial

Keywords: NSAID's, ultradistance race, renal function, serum electrolytes

EB Rating: 7.5/10

CI Rating: 8/10

Background: Many ultra-endurance athletes ingest non-steroidal anti-inflammatory drugs (NSAID's) during races, and this may affect renal function and the control of sodium and water metabolism leading to medical complications

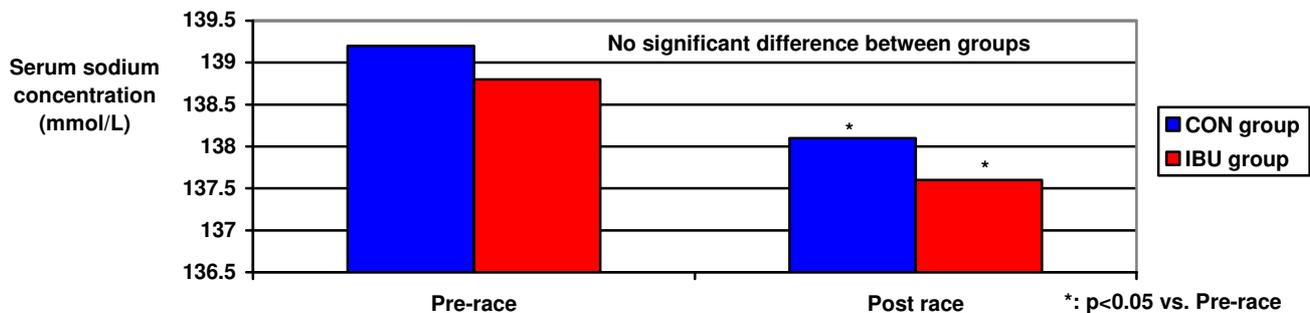
Research question/s: What are the effects of ibuprofen ingestion on serum electrolyte concentrations after a 160 km running race?

Methodology:

- Subjects: 54 runners participating in a 160km running race
- Experimental procedure: In a non-randomized fashion (self selected) runners either ingested ibuprofen before and during the race (IBU group=29, age 47.9 ± 7.4 yrs) (ibuprofen - 600mg before the race and 1200mg during the race), or a control group (CON=25, age 46.8 ± 10.3 yrs) (no ibuprofen). Groups were similar for training volume, race experience, body mass index, body fat, and finishing time. Blood for serum biochemistry determination was obtained before and immediately after the race.
- Measures of outcome: Body weight (BW) pre- and post-race, serum biochemistry pre- and post-race (serum creatine kinase – CK, sodium – Na, potassium – K, chloride – Cl, calcium – Ca, albumin – alb, globulin = gl, blood urea nitrogen – BUN, uric acid, ua, glucose- gluc)

Main finding/s:

- Body weight: There was no significant difference in BW during the race



- Serum biochemical markers: There were no significant differences between groups but over time there were 1) significant ($p < 0.05$) decreases over time in serum concentrations of sodium, potassium, chloride, calcium, albumin and globulin, and 2) significant increases over time in serum concentrations of creatine kinase activity, creatinine, blood urea nitrogen, uric acid and glucose

Conclusion/s:

- Ingestion of a non-specific cydo-oxygenase inhibitor (ibuprofen 400mg pre-race and 1200mg during the race) did not significantly alter serum electrolyte concentrations during ultradistance (160km) running - ultradistance running itself caused significant changes in certain serum markers

Methodological considerations:

Non randomized trial

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Ingestion of an oral corticosteroid (60mg prednisolone daily for 1 week) significantly improved exercise performance (submaximal cycling time trial) but also caused significant alterations in selected hormonal and metabolic responses

Title: Effects of short-term prednisolone intake during submaximal exercise

Authors: Arlettaz A, Portier H, Lecoq A-M, Rieth N, De Ceaurriz J, Collomp K

Reference: Med Sci Sports Exerc 2007; 39(9): 1672-1678

Type of study: Double-blind, randomized, cross-over, clinical trial

Keywords: corticosteroids, athletes, ergogenic effects, time to exhaustion, ACTH, GH, blood glucose

EB Rating: 8.5/10

CI Rating: 9/10

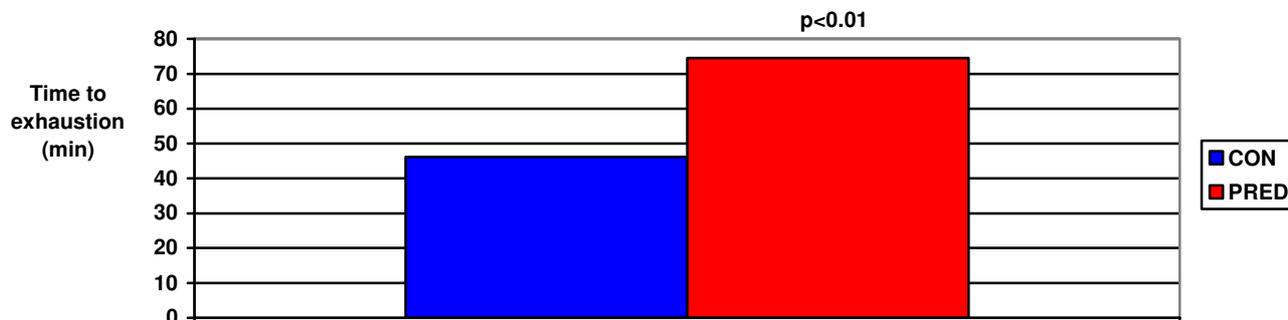
Background: There are very limited data available on the potential ergogenic effects of short term oral corticosteroid ingestion

Research question/s: Does the ingestion of oral prednisolone have ergogenic and metabolic effects during submaximal exercise?

Methodology:

- Subjects: 10 recreational male athletes (age 20.2 ± 0.5 yrs, VO_2 max 56 ± 1.3 ml/kg/min)
- Experimental procedure: All the subjects were assessed, and were then required to complete two cycling trials at 70-75% peak O_2 consumption until exhaustion following either placebo (CON) or oral prednisolone (PRED, 60 mg/day for 1 wk) pre-test treatment. The time to exhaustion was determined, and blood samples were obtained before, during exercise and in recovery
- Measures of outcome: Time to exhaustion (min), metabolic parameters ([ACTH, growth hormone (GH), prolactin (PRL), DHEA, insulin, blood glucose, and blood lactate])

Main finding/s:



- Metabolic parameters: Following PRED ingestion there were significantly lowered basal, exercise, and recovery concentrations of ACTH, DHEA, and PRL - GH concentrations were significantly lowered in the PRED condition after 30 min of exercise. However, blood glucose and insulin concentrations were significantly higher in the PRED condition throughout the experiment, while blood lactate concentrations were increased in the PRED at 10 min of exercise until 10 min of recovery

Conclusion/s:

- Ingestion of an oral corticosteroid (60mg prednisolone daily for 1 week) significantly improved exercise performance (submaximal cycling time trial) but also caused significant alterations in selected hormonal and metabolic responses

Methodological considerations:

Well-conducted study

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