



## ***SJSM Science***

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### **Cumulative effects of the concussion in athletes – a case series**

SJSM students might not have thousands of patients with head injuries; they might have even less athletes suffering brain concussions...

But they know how to recognize, classify, and prioritize the problem

They know how to construct clinical questions

They know where to look for the information and how to gather important and convincing evidence

They know how to interpret the evidence and how to apply it to a problem

And they know how to present and communicate the results of their research...

You don't believe?

Just look at the poster presented on Neuroscience day and keep in mind that they are only MD2!



# Cumulative Effects of Concussions in Athletes: A Case Series

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## OBJECTIVE

To examine the effects of concussion in athletes on risk of development of neurological problems.

## INTRODUCTION

### What is a concussion?:

• Concussion is an injury that the brain sustains inside the skull from a hard collision.

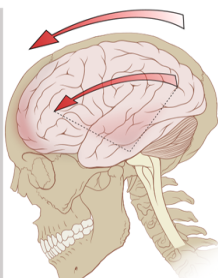
### What are the symptoms of concussion?

• Headaches, dizziness, disorientation, incoherent speech, foginess, loss of consciousness, ringing in ears, sensitivity to loud noises, and incoordination.

• Possible nausea/vomiting, delayed verbal/motor response, confusion/difficulty concentrating, memory loss, and sensitivity to light (Zeigler, 2012)

### Who is at risk for concussion?

• 62, 816 cases of concussive injuries occur every year. American football plays a large part in these reported cases, accounting for about 63% of these injuries (Collins et al., 2004)



Retrieved on Wednesday, June 12, 2013 from [http://en.wikipedia.org/wiki/File:Concussion\\_mechanics.svg](http://en.wikipedia.org/wiki/File:Concussion_mechanics.svg)

## THE PRESENT STUDY

We reviewed clinical cases of concussions in athletes and their risk of long-term neurological disease.

## METHODS

- Search of primary and review literature was performed on the cumulative effects of concussions in athletes
- Three pertinent patient populations were chosen for study: individuals with motor cortex effects, high school athletes, and retired professional American footballers

## RESULTS

### EFFECTS ON MOTOR CORTEX INHIBITION

Concussions lead to an overall decline in motor cortex function.

- Results show that the cortical silent period was much longer in those athletes who had sustained numerous concussions as compared to the cortical silent period of normal patients
- Transcranial magnetic stimulation revealed dysfunction in the motor system, stemming from the abnormalities of the cortical inhibitory system (De Beaumont et al, 2007)

### EFFECTS IN HIGH SCHOOL ATHLETES

There is a significant negative effect on neuropsychological activity in young athletes with history of concussion causing an overall decrease in mental function.

- Athletes who had no history of concussions were performing better in regards to attention and concentration as compared to those athletes who had recently sustained a concussion. (Moser et al, 2005)
- Athletes who presented with no symptoms and had two or more concussions had similar results to those athletes who recently sustained concussions.
- GPA was lower in athletes who were previously concussed.
- The decrease in GPA suggests that mental functioning had decreased because of concussive injuries (Moser et al, 2005).

### LONG TERM EFFECTS IN PROFESSIONAL ATHLETES

Concussion plus LOC > 30 minutes will increase the risk for Alzheimer's disease even after a full

- Previous history or concussions vs. possibility of developing Alzheimer's disease and Mild Cognitive Impairment (MCI) (Guskiewicz et al., 2005)
- 2,552 retired professional football players; average age 53.8, average playing career, 6.6 years
- Survey tested memory skills and identified issues similar to MCI in retired players
  - 61% sustained at least one concussion playing in professional league
  - 24% sustained three or more concussive injuries
  - Fivefold increase in incidence MCI in those who had three or more concussions; threefold increase in incidence of major memory loss as compared to those who retired and had not experienced any concussive injuries
- Conclusion: retired professional football players had an earlier onset of Alzheimer's disease as compared to the entire population of men in America (DeKosky et al, 2010)

## DISCUSSION

- An athlete would not be up to peak performance level if there were decline in function of their motor system, putting them at increased risk of second concussion.
- Head injury prevention, management, and education programs should be implemented in high school and professional athletics to reduce incidence of long-term impact

Concussion in athletes negatively impacts neurological function

## CONCLUSION

Concussive injuries are debilitating on the brain, and correlate with a decline in motor function, memory, and concentration, ultimately leading to an increased risk of Alzheimer's disease.

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