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## YOUR HEALTH

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# Concussions in male, female varsity hockey players more common than reported: study

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*Western Mustangs Julian Cimadamore (right) checks McGill Redman Francis Verreault-Paul along the boards during the first period of the 2012 CIS men's ice hockey championship game on Sunday, March 25, 2012 in Fredericton, New Brunswick. The occurrence of brain-rattling concussions among both elite male and female hockey players appears to be much higher than reported, suggests a study in which sports medicine doctors were behind the bench observing a season's worth of games. THE CANADIAN PRESS/Mike Dembeck.*

TORONTO - The occurrence of brain-rattling concussions among both elite male and female hockey players appears to be much higher than reported, suggests a study in which sports medicine doctors were behind the bench observing a season's worth of games.

The study, which followed players on two Canadian university teams during the 2011-2012 season, found the incidence of concussions was three times higher in males and more than five times greater in females than most previous research had found.

Surprisingly, perhaps, the rate of concussion among women playing university-level hockey was roughly twice that of their male counterparts.

Five of the 25 male players and six of the 20 females sustained concussions during the season, and one of them experienced a second brain trauma in a subsequent game.

"Those are all significant (findings) to say, 'Look, it's important to understand that we're not reporting this correctly,'" said Dr. Paul Echlin, a sports medicine specialist who oversaw the series of linked studies.

Almost 70 per cent of the hits that caused a concussion were to a player's head and more than 80 per cent of those knocks were deliberate versus incidental, the observers found.

Concussion is a traumatic brain injury that typically results from a blow to the head. Symptoms include headache, confusion, memory loss, dizziness and nausea or vomiting.

Depending on the severity of the concussion, symptoms can last for days, weeks or months.

Concentration and the ability to remember may be impaired; the person can be irritable, depressed and experience marked personality changes; sensitivity to light and noise, along with disturbed sleep, are also common.

With repeated concussions, the brain can be permanently damaged.

But getting coaches and team trainers to recognize when a player may have suffered a concussion and needs to be pulled from the ice for assessment — and possibly from further play for a time — continues to be a huge challenge, said Echlin, who works with injured athletes at the Elliott Sports Medicine Clinic in Burlington, Ont.

"Once you start removing players and testing them, then it becomes oppositional," he said, noting there was "huge pushback" during the study, in which physicians observed 55 regular- and post-season games played by the varsity squads.

As one physician-observer reported: "I had negative feedback from the coach who thought that the study was a waste of money ... he didn't want his players to get assessed in fear that they would be declared as concussed and advised not to play ... the players didn't want to be declared as concussed since it would limit their playing time."

In another incident, a player diagnosed with a minor concussion in the second period was sent back on the ice for the third. At the end of the game, the player said she was still feeling "iffy" and "off" and slightly dizzy.

The study doctor advised that she be excluded from upcoming games to give her brain time to heal, Echlin writes in an editorial overview of three linked studies published in the journal *Neurosurgical Focus*.

While the coach acknowledged the symptoms were concerning and the player "had the rest of her life ahead of her," she challenged the doctor's authority to make the call — even though her own career playing hockey had been ended due to multiple concussions.

"I find that the players and coaches often downplay the symptoms in an effort to get the athlete back into action," said one physician-observer. "I think it relates to the culture of hockey.

"Players are scared to be seen as weak and almost always want to play. Coaches expect their players to 'shake it off' and 'take it for the team' and get back on the ice. I think coaches fail to admit the significance of the symptoms."

Echlin agreed, saying the sports culture — whether around hockey, soccer or football — encourages the idea that "if you can't see it, it doesn't exist. And it's win at all costs."

The linked studies, which involved Canadian and U.S. researchers, used standard neuropsychological tests to assess players for memory and other cognitive deficits indicating concussion. But they also added advanced MRI scanning to determine any changes in players' brains after the hockey season.

As part of the research, players on both teams had pre- and post-season MRI scans. One study that involved researchers at the University of Montreal found metabolic changes in both those with concussions — as well as those without the diagnosed brain trauma.

The finding suggests that instances of sub-concussive damage can add up over a season and lead to alterations in brain function.

In another study using advanced MRI data from just the male players (a study of female players is planned), researchers at Harvard University found changes in the white matter of the brain. White matter consists of nerve tissues that are the "wires" of the brain, transporting neural messages, or impulses, between different regions.

"All of the subjects ... had changes in their white matter," said Dr. Inga Koerte, a senior research fellow at Brigham and Women's Hospital who led the study with Martha Shenton, director of the Psychiatry Neuroimaging Laboratory at Harvard.

Players with a diagnosed concussion had the most pronounced changes in their white matter, which included a thinning of the myelin sheath around nerve fibres.

"We expected that the concussed subjects would have this change," Koerte said Thursday from Boston. But seeing alterations in players without a diagnosed concussion was surprising and concerning, because it suggests athletes playing contact sports are piling up traumatic brain injuries bit by bit over the season.

"So you don't need a concussion to develop white matter changes," she said.

"Right now, we can't really say what it means ... (but) it's important to let the athletes know that they might put themselves at risk of developing brain changes, even though they don't have a concussion."

Echlin said the research shows how commonly concussions occur and how incremental brain injuries can add up over time. "And then can we do something better to identify it and then treat it? And how can we prevent it?"

"Well, preventing it is first of all educating (players, parents and coaches) that when it does happen, then you jump on it. You don't just send that player back to play."

Echlin said the key is to prevent subsequent concussions, which can lead to even more brain damage in young athletes if they are returned to play too soon and not allowed to recover.

"It's tragic, the results of a lot of these brain injuries," Echlin said. "And a lot of them are preventable."