

Tracking devices explore concussions on the playing field

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Former Western Mustang football player, and current Kinesiology graduate student, Kody Campbell shows off the gForce Tracker device, which monitors the impact of hits on the football field. The device is discretely tucked away in the helmets of the Mustangs players. Credit: Paul Mayne, Western News

Kody Campbell admits to having his bell rung a few times. As a Mustangs football player for five years (2007-11), Campbell never

sustained a concussion himself, but knows of many others who did. He is well aware the hard hits which deliver those head injuries are not leaving the game anytime soon.

Out of the game, and pursuing a master's degree in Kinesiology, Campbell now tackles the science behind the hard hits and the triggers of concussions.

"The thing with concussions is they are very hard to understand," Campbell said. "One way you can start to understand is through biomechanics. Looking at it bio-mechanically, you're trying to understand how big the accelerations are when heads are receiving these hits. From there, you can calculate the forces and try and understand better what time of acceleration is potentially going to lead to a concussion."

Campbell knows simply asking [players](#) 'how they feel' after a big hit isn't going to create accurate data. So, he's taking a crash course and, literally, getting into a player's head – well, his helmet, at least.

Teaming up with gForce Tracker Inc., a company from Markham, Ont., Campbell has outfitted 49 Mustang helmets with data-tracking devices, each roughly the size of a domino. With this technology, he is able to track – in real time, if necessary – every hit a player gives or receives.

"We are the first university in Canada to conduct this sort of research," said Campbell, who received support from Mustangs head coach Greg Marshall. Projects like this have been under way in The States for several years.

"There is (no data) out there for Canadian football players at the moment. In Canada, the football field is longer and wider; there are different rules, three downs instead of four; so the style of play is

different, meaning the data, I think, will be different."

Built into each miniature device, known as a gForce Tracker , are tri-axial linear accelerometers which measure every impact that exceeds a specified threshold. Once it reaches that level, the device starts saving the data straight to Campbell's laptop on the sidelines. The device also has a gyroscope built into it to measure rotation acceleration, or how fast the head is moving at the time of impact.

As a former player himself, Marshall had no hesitations when approached by Campbell and his idea of 'plugging in' his players.

"I thought this was a great idea," said Marshall, who this past spring became involved with the See the Line initiative in London, to raise awareness surrounding athletes and concussions. "Kody had talked to me about the device and I really felt anything we could do to make sure we're coaching right, to make sure we're doing everything we can for our players, that we're in."

Marshall added the Mustangs have a top medical team to look after the players and monitor any concussion symptoms, including strength coach Jeff Watson, whom Marshall believes is on the cutting-edge of [strength training](#) in the neck to add support and reduce concussions.

So far, no concussions have been reported this season.

"Football is a sport that, if we ignore this, it's going to come back and bite us," Marshall said.

Campbell, who monitors players on both offense and defense, hopes to make some headway for Canadian collegiate players, to the point of knowing which position is more vulnerable to hits, how many, at what speed and whereabouts they land.

"It's very exciting to be seeing all the data come in," Campbell said.

"One of the interesting things I've seen so far is how the data reflects the different level of practices, when coach Marshall and the players are backing off or going full."

Although not a doctor, and not trying to be one, Campbell is able to make suggestions to the medical staff about certain hits he has data on.

"The goal is to get information and quantify what is going on. For every hit a player takes, it gives me a time. So, I can go back to the film and confirm whether or not it was a measured hit, or simply a player pissed off and throwing his helmet. I can start to break it down and have the potential to calculate how fast the player was going when he received the hit, and how fast the other player was going who gave the hit."

Marshall said having access to this data will help him coach and, more importantly, keep his players safe from potential life-threatening injuries.

"If we get one (concussion), what type of hit was it, what sort of force did we see, and why is that person getting a [concussion](#) with that hit when another person had all these others hits and didn't?" he said, adding he's in regular contact with Campbell throughout the season.

"At the end of the season, we will be able to go through everything and be able to say 'these things happened' and perhaps we can evaluate the helmets, perhaps evaluate our training. Is our strength training done properly, is it happening to freshmen players who may not have been involved with our strength training and neck-strengthening program? There are lots of things we'll be able to look at and make the game safer for our players."

Marshall even sees such research as common place in the years to come.

"Down the road, I see it being part of what we do. And not just for research, but part of what we do on a regular basis," he said. "We need to make the game safer for our players, and if that means drastic changes to some of the rules, or some of the techniques we're doing, then that's a good thing."

For now, Campbell is thrilled to combine his school work with his love of football. And if more than just a thesis comes out of this, even better.

"It's exciting and nervous at the same time," he said. "The goal is to get information and quantify what is going on. There is no data on this at all in Canada, so it will be great to get this information flowing."

Provided by University of Western Ontario

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