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Western University researchers develop concussion blood test with 90-per-cent accuracy rate

By ALLAN MAKI

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When Mark Daley first tabulated the results, he thought he might be wrong. They seemed too obvious; "like a lab exercise that I set for students." And yet there it was – a way to tell if someone had suffered a concussion, and all it required was a drop of their blood.

After two years of blood profiling, researchers associated with Western University have been fine-tuning a test that can determine if a person has suffered a concussion. The test comes with a 90-per-cent accuracy rate, a previously unheard count in the medical community working to unlock the mysteries of the brain.

According to Daley, Western's associate vice-president of research, the test bore results when he and lead researcher Dr. Douglas Fraser decided to tweak their approach. Rather than seek a single bio-marker to identify if a concussion had occurred, Daley and Fraser took a broader approach and looked at the chemicals known as metabolites that are carried in the blood stream. After examining 174 metabolites, numbers were set, comparisons made – concussed versus non-concussed – and the findings were significant enough to be published in last month's edition of medical journal *Metabolomics*.

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"We're certainly not the first to propose a blood test for concussions," Daley acknowledged. "The bulk of the prior work had been people looking for *the* bio-marker for concussions – what protein, what metabolite, what will they tell us if someone has got a concussion or not? It makes sense as a starting point; it's simple and it makes the test really easy to do if it works out. But when Doug and I were talking, we asked, 'What if the body being so complex this change doesn't occur in just one metabolite? But what if you looked at all the metabolites that we have access to and there's this signature?'"

Twelve concussed male athletes and 17 non-concussed male athletes gave blood and had their metabolites examined.

"If it's two players who are concussed, they will look very similar," Daley said. "And if it's two players who are not concussed they'll look very different [from the concussed players]. That was one of the first visualizations I did. You could just see the results staring you right in the face."

Separating concussions from other conditions [post-traumatic stress disorder, headaches, anxiety] has not always been easy or accurate. Even among athletes in contact sports such as hockey and football, brain autopsies have found wildly different circumstances. Two athletes who played the same sport, position and for the same amount of time can present differently. One can have brain damage; the other not. While a blood test can't prevent initial concussions from happening, it can alert the athlete he or she needs to rest or run the risk of suffering a second, more critical concussion.

Dr. Carmela Tartaglia, a neurologist at the Krembil Neuroscience Centre's memory clinic, and a researcher with the Canadian Concussion Centre, has followed the work at Western and its connotations. While she is hopeful a blood-test solution will some day confirm concussions, as well as how to prevent them, she said by e-mail "the quest for blood-based bio-markers for traumatic brain injury has been ongoing for decades ... "This particular study was done on a very few number of people, included only male adolescents and did not factor out many variables that can affect the results such as diet, time of day, gender, etc. The authors point out the limitations of their study and correctly state that much further work is required to validate their approach," Tartaglia added. "We remain optimistic that one day, a blood test for concussion will be found and will await further results of the current approach."

It's anticipated that the concussion research being done in London could lead to additional advancements. Daley has spoken about Point of Care, a way of testing people for a concussion at the place where it occurred. The device would be "about the size of a toaster" and could be used by trainers of youth hockey teams. The trainers could do a test on the bench and know if the risk of repetitive brain trauma was too dangerous.

"I went into this [project] with the expectations of, 'I'll meet some neat people and we'll do some work and we'll find out this doesn't work,'" Daley said. "It turned out this was the one time in 10 that things actually did work out."

References

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