

BrainShield to enhance football helmet effectiveness

October 14 2015



SFU researcher Daniel Abram applies Brain Shields to the Hansworth Secondary high school football team's helmets.

Researchers at Simon Fraser University's Surrey campus have developed an impact-diverting decal that, when affixed to a helmet, can significantly reduce the sharp twisting and compression of the brain that

occurs during most helmet impacts.

For football teams, it could be a game changer. The technology has been tested and is now available for use on the field.

A sharp twisting or jiggling and [compression](#) of the brain are known to be among the main factors causing head injury and concussion, says Daniel Abram, a postdoctoral fellow in the School of Mechatronics Systems Engineering (MSE).

"Our goal is to take helmet performance during impact to the next level," says Abram, who is also chief technology and operating officer at Shield-X Technology Inc., an SFU spin-off company established to develop and manufacture Brainshield.

Abram has affixed Brainshield decals on the helmets of two B.C. [high school football](#) teams, and other teams are set to follow. North Vancouver's Handsworth Secondary and Vernon Secondary school football teams are starting to use them during practices this week. Abram is continuing to share the benefits of the decals with B.C. high school and recreational teams. Among Brainshield advocates is former B.C. Lions player and SFU alumnus Angus Reid.

Brainshield is the result of six years of research and development at SFU, led by Abram together with MSE Director Farid Golnarghi and professor Gary Wang.

"In a collision situation, safety helmets nearly always contact the ground or other object barriers at an angle, causing both compression and swift rotation of the head," explains Abram, who co-founded the Head Injury Prevention Lab at SFU's Surrey campus. "While research studies show that the brain tissues are considerably more sensitive to rotation than compression, the majority of helmets are only designed to protect the

head against compression of the brain."

With a first-of-its-kind micro-engineered layer, Brainshield can be applied like a decal or sticker to the outer shell of any helmet. The design, which has been refined over the past year to be thinner and lighter, consists of a 'sandwich' of materials that are 1-mm thick and weigh about 12 grams.

Brainshield works by disengaging the helmet's outer shell from the frictional force of the impacting surface, resulting in significantly reduced rotation of the head. By allowing the force to spread on a larger area, it also reduces compression of the brain. This all happens in a fraction of a second.

In a 2014 study that tested Brainshield on the helmets of SFU's football team, the number of reported concussion cases during the season dropped from 14 to just four the following year.

Abram says there are many factors that relate to concussion and head injury; protective equipment is only one of these. Age, weight, a player's strength, location and direction of the impact, whether or not it was anticipated, and previous head trauma are also contributing factors.

He hopes crowd-funding will yield enough funds to manufacture the Brainshield in high volume in early 2016.

Provided by Simon Fraser University

Citation: BrainShield to enhance football helmet effectiveness (2015, October 14) retrieved 16 September 2024 from

<https://phys.org/news/2015-10-brainshield-football-helmet-effectiveness.html>

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