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UBC researchers invent helmet that significantly reduces forces to neck during head-first impact

University of British Columbia researchers have invented a sports helmet that reduces direct impact to the neck by up to 56 per cent, according to preliminary tests.

Dubbed *Pro-Neck-Tor*^{TM}, the patent-pending technology features a movable inner shell that guides the head to tilt slightly forward or backward in a head-on impact, thus allowing dissipation of direct loads to the cervical spine. The inner shell mechanism is deployed only when the wearer lands head-first with a certain speed and angle at impact. It works otherwise like existing sports helmets.

For an animation of how the helmet works, visit www.pronecktor.com.

"Existing helmets are not designed to protect the neck and the cervical region of the spine, which happens to be the weakest," says co-inventor Peter Cripton, a Mechanical Engineering assistant professor in the Faculty of Applied Science.

"Pro-Neck-Tor is designed to address potentially debilitating injuries to the neck and spine that often accompany head-first impacts," says Cripton, who is also director of the UBC Injury Biomechanics Laboratory, with facilities at the Vancouver Coastal Health Research Institute.

A head-first impact in sports such as hockey, football, mountain-biking and snowboarding could load the neck with as much force as the weight of five or more people. This force is comparable to that which can be produced in a car accident, such impact could result in spinal cord injury and permanent paralysis.

Approximately 12,000 people suffer spinal cord injuries annually in the U.S., with 10 per cent of these injuries occurring in activities that make use of a helmet. One thousand people suffer spinal cord injuries annually in Canada.

With help from surgeons from the UBC Dept. of Orthopedics' Spine Surgery Division at Vancouver General Hospital, and researchers from the Division of Orthopedic Engineering Research and the International Collaboration on Repair Discoveries (ICORD), Cripton and PhD candidate and co-inventor Tim Nelson have conducted preliminary testing using a mechanical head and neck model.

Results show the Pro-Neck-Tor can reduce both torques and forces to the neck. The forces were reduced by 27 to 56 per cent and torques 19 to 72 per cent, depending on the angle of the impact.

Prof. Peter Cripton is also an associate faculty member in the Dept. of Orthopedics in the **Faculty of Medicine** at UBC. The faculty provides innovative programs in the health and life sciences, teaching students at the undergraduate, graduate and postgraduate levels, and generates more than $200 million in research funding each year.

VCH Research Institute is the research body of Vancouver Coastal Health Authority. In academic partnership with UBC, the institute advances health research and innovation across B.C., Canada, and beyond. www.vchri.ca.

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