



17th Annual Brain Injury Conference

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Abstract Title: How Concussion Has Been Overlooked When Considering Occupant Safety in Motor Vehicle Collisions

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ABSTRACT:

Abstract Theme: Mild TBI / Concussion

Topic(s) of Interest: Clinical Research

Purpose of Project: The purpose of this project was to (1) identify the exact mechanisms by which MVC causes concussion, (2) elucidate deficiencies in vehicle safety systems for concussion prevention, and (3) examine the history of this topic including the decisions made by administrative groups such as the National Highway Traffic Safety Administration (NHTSA) and the Insurance Institute for Highway Safety (IIHS).

Methods, Procedure, Results/Outcome, Conclusion:

The Canadian Concussion Centre (CCC) examined data on 137 motor vehicle occupants who sustained concussion plus persisting concussion symptoms (C+PCS) in motor vehicle collisions (MVC) and examined the shortcomings in current onboard concussion prevention strategies for occupants. Our group performed an extensive review of literature available through relevant academic journals, the NHTSA's publication database, conference proceedings, and other sources. Our team liaised with experts in the field to gather additional information on these topics, including automobile racing safety professionals at Toronto's Indy Car event, biomechanical forensic engineers, and members of our Concussion in MVC committee. We synthesized these findings and our clinical experience in the form of a narrative review to make this information accessible to key decision makers in this field.

We found that the high frequency and severity of MVC concussions was not commensurate with the relatively few concussion prevention strategies dedicated to common types of MVC. For example, we surveyed current research on rear-end collisions and found a paucity of safety systems in place to prevent occupant concussion and little to explain how this aspect of injury prevention went unaddressed by automobile administrative groups. Further, there has been minimal research conducted on how to mitigate the rebound effect in rear-end collisions and prevent relative motion of the head and neck on the trunk of MVC victims; anthropomorphic testing has been insufficiently examined for concussion prevention, especially in women.

A previous lack of knowledge on concussion and a historical focus on preventing whiplash and more severe brain injuries in MVC has caused decision makers to overlook concussion, especially those resulting from rear-end collisions. This problem should be addressed in future work by implementing systems in passenger automobiles that can simulate the effects of the HANS device in motor racing. One limitation of this study was the lack of access to event data recorders for crash reconstruction, which we are striving to overcome in future studies. We hope that our research sparks change from automobile manufacturers, insurers, and road safety organizations by bringing awareness to deficiencies in current concussion prevention strategies in MVC.