

The tolerance of the human body to automobile collision impact - a systematic review of injury biomechanics research, 1990–2009

J.L. Forman, F.J. López-Valdés, S. Duprey, D. Bose, E. Pozo de Dios, D. Subit, T. Gillispie, J.R. Crandall, M. Seguí-Gómez

Abstract— Road traffic injuries account for 1.3 million deaths per year world-wide. Mitigating both fatalities and injuries requires a detailed understanding of the tolerance of the human body to external load. To identify research priorities, it is necessary to periodically compare trends in injury tolerance research to the characteristics of injuries occurring in the field. This study sought to perform a systematic review on the last twenty years of experimental injury tolerance research, and to evaluate those results relative to available epidemiologic data. Four hundred and eight experimental injury tolerance studies from 1990-2009 were identified from a reference index of over 68,000 papers. Examined variables included the body regions, ages, and genders studied; and the experimental models used. Most (20%) of the publications studied injury to the spine. There has also been a substantial volume of biomechanical research focused on upper and lower extremity injury, thoracic injury, and injury to the elderly - although these injury types still occur with regularity in the field. In contrast, information on pediatric injury and physiological injury (especially in the central nervous system) remains lacking. Given their frequency of injury in the field, future efforts should also include improving our understanding of tolerances and protection of vulnerable road users (e.g., motorcyclists, pedestrians).

Index Terms— Automobiles; Biomechanics; Injuries; Prevention; Surveillance; Trauma

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has a electronic subscription to Accident Analysis & Prevention, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

Forman, J.L.; López-Valdés, F.J.; Duprey, S.; Bose, D.; Pozo de Dios, E.; Subit, D.; Gillispie, T.; Crandall, J.R.; Seguí-Gómez, M.; "The tolerance of the human body to

automobile collision impact - a systematic review of injury biomechanics research, 1990–2009", Accident Analysis & Prevention, vol.80, pp.7-17. July, 2015.