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VEHICLE SAFETY TESTING: ARE PEOPLE REALLY DUMMIES?

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ABSTRACT – Vehicle occupant safety is of utmost importance in the design and development of new vehicles. Rigorous and standardized testing is undertaken to evaluate the safety of vehicle occupants in the event of a motor vehicle crash (MVC). Safety testing results are published by The National Highway Traffic Safety Administration (NHTSA) and the Insurance Institute for Highway Safety (IIHS). Full-scale anthropomorphic test devices (ATD) i.e. dummies, are utilized to collect data for different body regions, including the head, neck, thorax and lower extremity. ATD performance and crash data are compared to previously validated thresholds in order to predict injuries in people. The objective of this study is to utilize the Crash Injury Research and Engineering Network (CIREN) to correlate injuries sustained in real world MVCs with test crashes to examine to what degree a predictive relationship can be established.

CIREN crashes were cross referenced to both the NHTSA and IIHS databases, comparing real world crashes with crash testing. Crashes were selected based on make, model and model year 2007-2009, principle direction of force (PDOF), speed, safety systems used, occupant position and demographics. CIREN occupant injuries were catalogued using the Abbreviated Injury Scale (AIS) score and compared to corresponding measurements from the NHTSA and IIHS reports.

Three cars with four occupants were identified as meeting our strictly defined criteria and were matched with existing crash test cases in either the NHTSA or IIHS databases. The threshold for classifying an injury as serious was an AIS $\geq$ 3. Each crash test predicted injury was determined based on a comparison of the body region specific measurement to the accepted thresholds. Injuries observed in the CIREN database were compared to what was predicted based on the NHTSA or IIHS reports. A correlation of crash testing to real life injuries was observed.

A comparison of laboratory findings to real world crashes in the CIREN database indicates that crash tests accurately predict injuries to the head, thorax and lower extremity regions. Additional evaluation revealed significant abdominal trauma sustained by CIREN case occupants. Currently there is no instrumentation available for reliable prediction of solid organ or hollow viscus injuries. Additional research is warranted in the development of tests to predict these serious abdominal injuries.