

# **Biofidelity Assessment of the 6 Year Old ATDs in Side Impact**

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## **Abstract**

*The objective of this study was to assess and compare the current lateral impact biofidelity of the Q6, Q6s, and HIII 6 year old anthropometric test dummies' (ATDs) head, neck, shoulder, thorax, abdomen, and pelvis through lateral impact testing.*

*A series of lateral impact pendulum tests, vertical drop tests, and WSU sled tests, based on the procedures detailed in ISO/TR 9790<sup>1</sup> and scaling based on known research of 50th percentile male testing to the 6 year old using Irwin et. al. (2002)<sup>2</sup> was performed on the 6 year old ATDs. The data collected from the three different ATDs was filtered using the SAE J211<sup>3</sup> standard, aligned using the methodology spelled out in Donnelly and Moorhouse (2012)<sup>4</sup>, and compared for each body region tested (head, neck, shoulder, thorax, abdomen, and pelvis). In addition, the biofidelity performance for the three ATDs in lateral impact was assessed against the scaled biofidelity targets published in Irwin et al. (2002), as well as the biofidelity target assessment published in Rhule et. al. (2013)<sup>5</sup>.*

*Preliminary results showed that the Q6s performed more closely to the outlined biofidelity targets than the Q6 or the HIII 6 year old at all tested body regions. Even though the Q6s showed improved lateral impact performance, it did not meet all biofidelity targets. Further work needs to be performed to determine if the biofidelity targets for the 6 year old ATDs in side impact, currently based on scaled down 50th percentile male testing, are appropriate. Future research is to be performed to evaluate the validity of the current 6 year old lateral impact biofidelity targets based on the lateral impact testing biofidelity assessment of surrogates of appropriate size and weight.*

<sup>1</sup> ISO/TR 9790 Technical Report, "Road Vehicles - Anthropometric Side Impact Dummy - Lateral Impact Response Requirements to Assess the Biofidelity of the Dummy," First Edition 1999-12-01.

<sup>2</sup> Irwin, A., et. al., "Guidelines for Assessing the Biofidelity of Side Impact Dummies of Various Size and Ages," STAPP Car Crash Journal, Vol. 46 (November 2002), 297-319.

<sup>3</sup> SAE International Surface Vehicle Recommended Practice, "Instrumentation for Impact Test – Part 1 – Electronic Instrumentation," SAE Standard J211 -1, Rev. Dec. 2003.

<sup>4</sup> Donnelly, B.R. and Moorhouse, K., "Optimized Phasing of PMHS Response Curves for Biofidelity Targets," IRCOBI Conference, 2012, IRC-12-51.

<sup>5</sup> Rhule, H., et. al., "A Methodology for Generating Objective Targets for Quantitatively Assessing the Biofidelity of Crash Test Dummies," 23rd Enhanced Safety of Vehicles Conference, 2013, Paper No. 13-0138.