

## **Biomechanical response targets for physical and computational models of the pediatric trunk**

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### **Abstract-**

**Objectives:** This paper quantifies pediatric thoracoabdominal response to belt loading to guide the scaling of existing adult response data and to assess the validity of a juvenile porcine abdominal model for application to the development of physical and computational models of the human child.

**Methods:** Table-top belt-loading experiments were performed on 6, 7, and 15 year-old pediatric post-mortem human subjects (PMHS). Response targets are reported for diagonal belt and distributed loading of the anterior thorax and for horizontal belt loading of the abdomen.

**Results:** The pediatric PMHS exhibited abdominal response similar to the swine, including the degree of rate sensitivity. The thoraces of the PMHS were as stiff as, or slightly more stiff than, published adult corridors.

**Conclusions:** An assessment of age-related changes in thoracic stiffness suggests that the effective stiffness of the chest increases through the fourth decade of life and then decreases, resulting in stiffness values similar for children and elderly adults.

**Index Terms-** Biomechanics, Injury, Impact, Traffic safety, Anthropomorphic test devices, Human body models, Pediatric, PMHS

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