The 'Cushion Effect' Is Not Protective for Children Involved in Motor Vehicle Crashes.
Calista Harbaugh, MD, Brianna Henderson, Peng Zhang, PhD, Brian Derstine, Sven A. Holcombe, PhD, Stewart Wang, MD, PhD, Peter F. Ehrlich, MD, FACS Journal of the American College of Surgeons, October 2017. Volume 225, Issue 4, e187 - e188

INTRODUCTION: Analytic morphomics (AM) applies computational image processing algorithms to cross-sectional images to perform detailed measurements on morphological features in 3D space. In adults, data suggests that body composition can impact the risk and pattern of injury in motor vehicle crashes (MVC) with increased BMI protecting against abdominal injuries and pelvic fractures. This is known as the "cushion effect." The purpose of this study is to examine the impact of the "cushion effect" on thoracic, abdominal and spine injuries in children involved in frontal MVC.

METHODS: Retrospective chart review and AM were performed on 617 patients admitted to the University of Michigan after MVC. Injury severity was assessed using maximum abbreviated injury score (MAIS) and crash impact rating was derived from crash reporting forms (UD-10). AM measures included visceral fat cross-sectional area, subcutaneous fat cross-sectional area, trabecular bone density and psoas muscle area at L4 vertebral level.

RESULTS: Of the 617 MVC, 212 were frontal crashes and included in the study. The population was 45% male with average age 12.4 ± 5.0 years. Sex, age and impact rating did not correlate with MAIS. Subcutaneous fat cross-sectional area, visceral fat cross-sectional area, bone density and psoas muscle area did not correlate with injury severity for MAIS 2+ abdominal, thoracic or spinal injuries.

CONCLUSIONS: Though subcutaneous fat has previously correlated with decreased abdominal and pelvic injury in adults, this study shows that subcutaneous fat does not impact the risk of thoracic, abdominal or spine injuries in children involved in frontal crashes.