

Injury Prevention Under the Microscope

Better Understanding Leads to Safer Technology



Engineering

Childhood injuries can seem random, senseless and incomprehensible. At the Center for Injury Research and Prevention, our engineers pinpoint and assess the causes of these injuries to reduce the likelihood of recurrence. Engineers determine how the injury occurred and recommend prevention strategies. The goal of our scientists is to translate field data into improved products for children.

After identifying problems through these surveillance methods, engineers conduct field investigations to determine the sources and mechanisms of injury. Scientists translate these data into computer models and laboratory tests that simulate real-world crashes to explore additional scenarios. The end result is industry-relevant information and increased clinical knowledge.

There are three dimensions to the Center's engineering approach:

1. Field Investigation

The Center's crash investigation team goes into the field to study crashes involving children and adolescents identified through The Children's Hospital of Philadelphia's Level One Pediatric Trauma Center.

After a crash, Center investigators collect detailed information from the scene of the accident, the vehicles, the treating hospital and the family. A multidisciplinary team from the Center and the Hospital meets monthly to evaluate the crash data from many perspectives. This analysis helps determine what causes or prevents pediatric injury in serious crashes.

2. Injury Biomechanics Research

Injury biomechanics research provides quantitative data on how children respond to forces and accelerations experienced in injury-causing events, such as motor vehicle crashes. The focus of this research is to develop improved crash test dummies and injury assessment techniques, to determine mechanisms of injury for enhanced diagnosis and treatment, and to facilitate technology design that prevents or reduces injury severity.

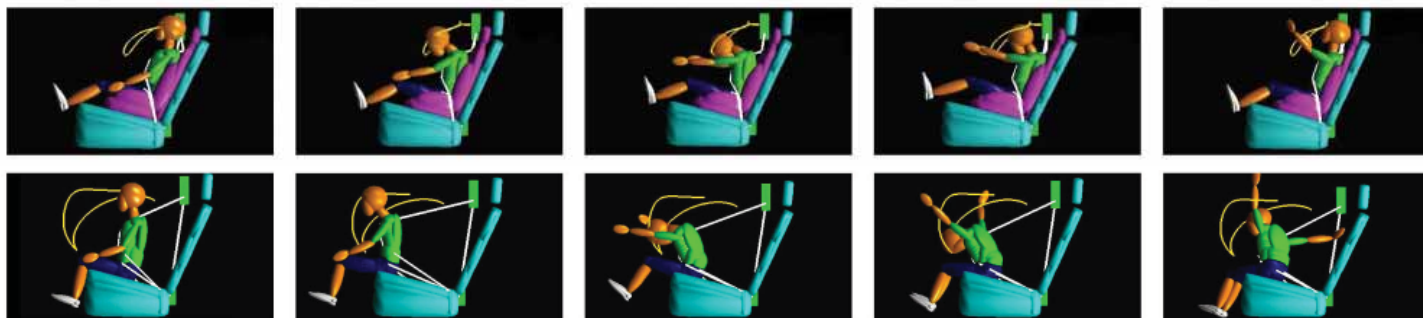
3. Computational Engineering

The Center's computational engineers create multidimensional computer models that replicate children's kinematics in crash simulations. Using real-world results from field investigation as well as the injury biomechanics laboratory, the models help us better understand the mechanisms of injury and improve our ability to test new safety technologies.

In addition to creating models for crash reconstruction, computational engineers produce complex models for other applications, such as product optimization and surgery planning. They create detailed finite element models of the different child restraints available in the market for use in Federal Motor Vehicle Safety Standard 213 simulations and the exploration of child restraint-vehicle interactions. The Center also uses sophisticated driving simulation to study teen drivers under safe conditions.

Action

Collaborations on engineering research, as well as frequent presentation before other researchers, vehicle manufacturers, restraint suppliers and regulators, help to set evidence-based priorities for future research, identify needed safety-design modifications, and inform the development of anthropomorphic test dummies and test procedures. In addition, our research team holds several patents that are available for licensure.



This computer simulation, developed at the Center, demonstrates how a 6-year-old child moves in a 35 m.p.h. crash while restrained in the lap-and-shoulder seat belt with (above) and without (below) a booster seat.

More details are available at www.chop.edu/injury.