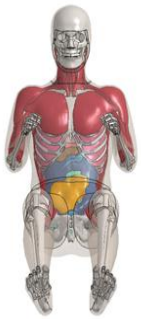

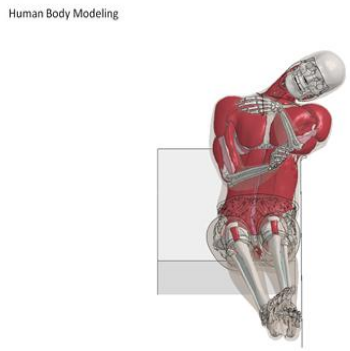

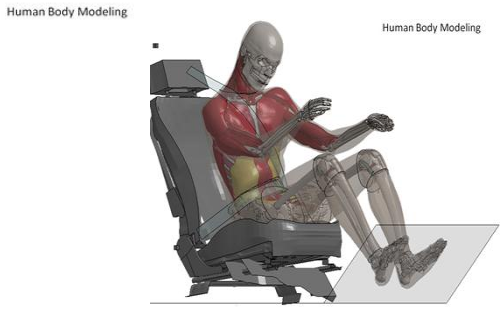

Side Impact and Rear Impact Crashes

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Biomechanics & Trauma conducts cooperative and collaborative research with other organizations around the world to develop tools that help mitigate injury and death in motor vehicle crashes. Crash test dummies are developed and tested and NHTSA's fleet of crash test dummies are maintained within this group.

Human Modeling

Computer modeling of human tissue could be traced back to 1950s. However, the knowledge of material characteristics and tolerance of human tissue necessary to build and utilize high fidelity human models was lacking up until recently. Stable mathematical codes capable of simulating high energy impacts, such as those occurring in car crashes, also experienced major advances in recent years allowing for simulation of not only the complex kinematics of human body during the crash event, but also predict the onset and severity of potential injury. NHTSA is one of the sponsors of GHBMC, Global Human Body Models Consortium.

GHBMC is a consortium of seven auto makers and one supplier created to consolidate individual research and development activities in human body modeling into a single global effort to advance crash safety technology.

Many motor vehicle occupants are at increased risk of injury due to physical differences that affect their interaction with the vehicle interior and restraints as well as their response and tolerance to crash loading. Older occupants may sustain more severe injuries due to weaker bones and calcified tissues. Occupant shape, which is associated with body mass index, can lead to suboptimal restraint fit. Vulnerable occupant research seek to identify the unique challenges of protecting all motor vehicle occupants.

Vulnerable Occupants

Many motor vehicle occupants are at increased risk of injury due to physical differences that affect their interaction with the vehicle interior and restraints as well as their response and tolerance to crash loading. Older occupants may sustain more severe injuries due to weaker bones and calcified tissues. Occupant shape, which is associated with body mass index, can lead to suboptimal restraint fit. Vulnerable occupant research is underway to identify the unique challenges of protecting all motor vehicle occupants:

- Older Occupants
- Obesity

Obesity has been shown to affect injury risk in crashes. This study examines the effects of body mass index on seat belt fit by measuring belt fit in a laboratory study of 54 men and women. The results suggest obesity introduces effective slack into the seat belt by routing the belt further away from the skeleton, which may affect injury risk due to more severe contacts with the interior and “submarining” in frontal crashes.

- Child Occupants
- Unattended Children

Many crash victims will experience the following symptoms at some point in time following the car crash:

- Neck pain and/or stiffness
- Blurred vision
- Difficulty swallowing
- Irritability

- Fatigue
- Dizziness
- Pain between the shoulder blades
- Pain in the arms or legs, feet and hands
- Headache
- Low back pain and/or stiffness
- Shoulder pain
- Nausea
- Ringing in the ears
- Vertigo
- Numbness and tingling
- Pain in the jaw or face

Brain Injury Research

According to the Centers for Disease Control and Prevention (CDC) traumatic brain injury (TBI) is an important public health problem in the United States. TBI is frequently referred to as the "silent epidemic" because the complications from TBI, such as changes affecting thinking, sensation, language, or emotions, may not be readily apparent. The most recent CDC report (Frieden et. al, 2010) estimates 1.7 million people sustain a TBI annually, of them 52,000 die. The report finds that among all age groups, motor vehicle-traffic (MVT) was the second leading cause of TBI (17.3%) and resulted in the largest percentage of TBI-related deaths (31.8%).

CIREN

The Crash Injury Research and Engineering Network (CIREN) is a collaborative effort between NHTSA Human Injury Research, trauma physicians, and experts in the fields of impact biomechanics and mechanical engineering. This collaboration collects detailed data on crashes resulting in serious or disabling injury.