

# Older Occupant Injury Research at NHTSA

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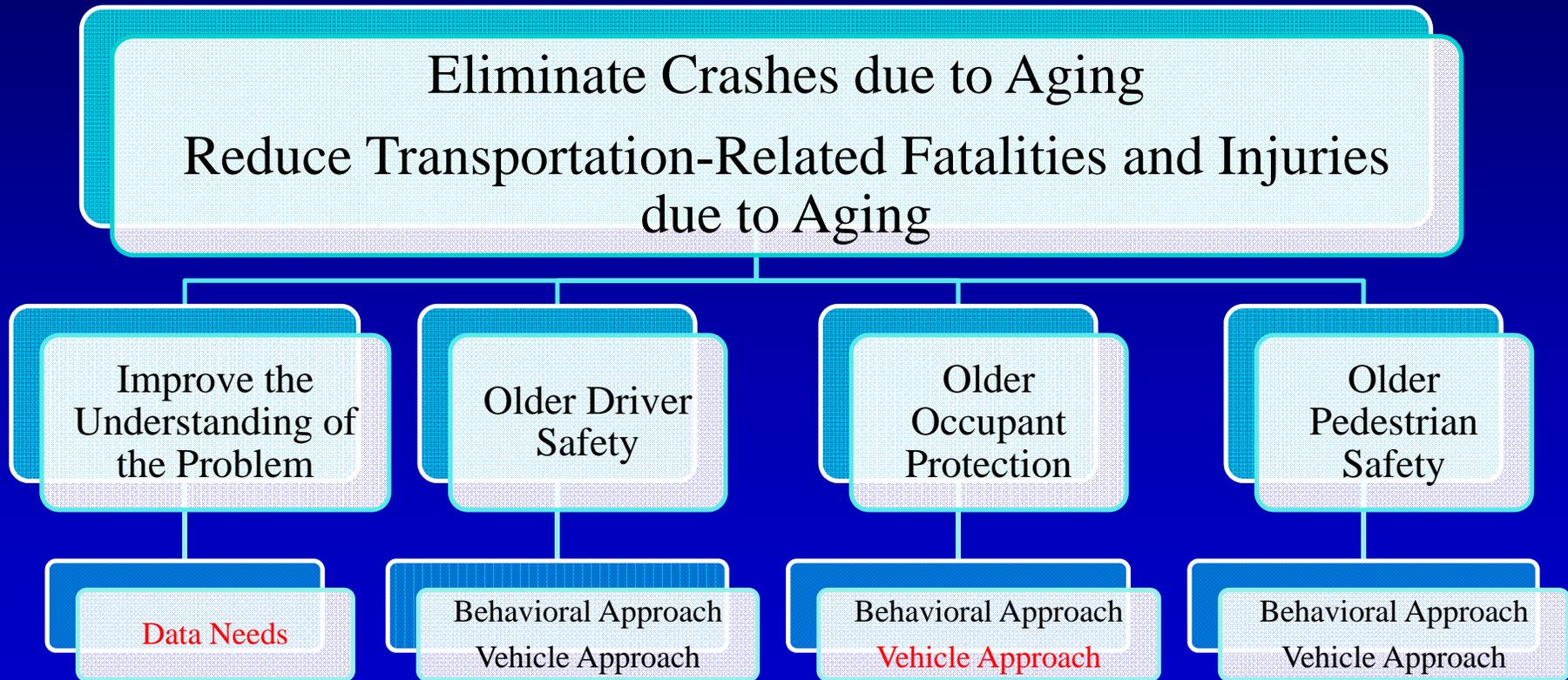
NTSB Safety, Mobility, and Aging Drivers Public Forum

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# An Approach to Older Occupant Research

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# Data Needs: Improve Understanding Older Occupant Injuries

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## ■ Extensive Body of Existing Research

- Several NASS studies conducted on injury incidence by age
- CIREN data can inform more on injury causation/mechanisms

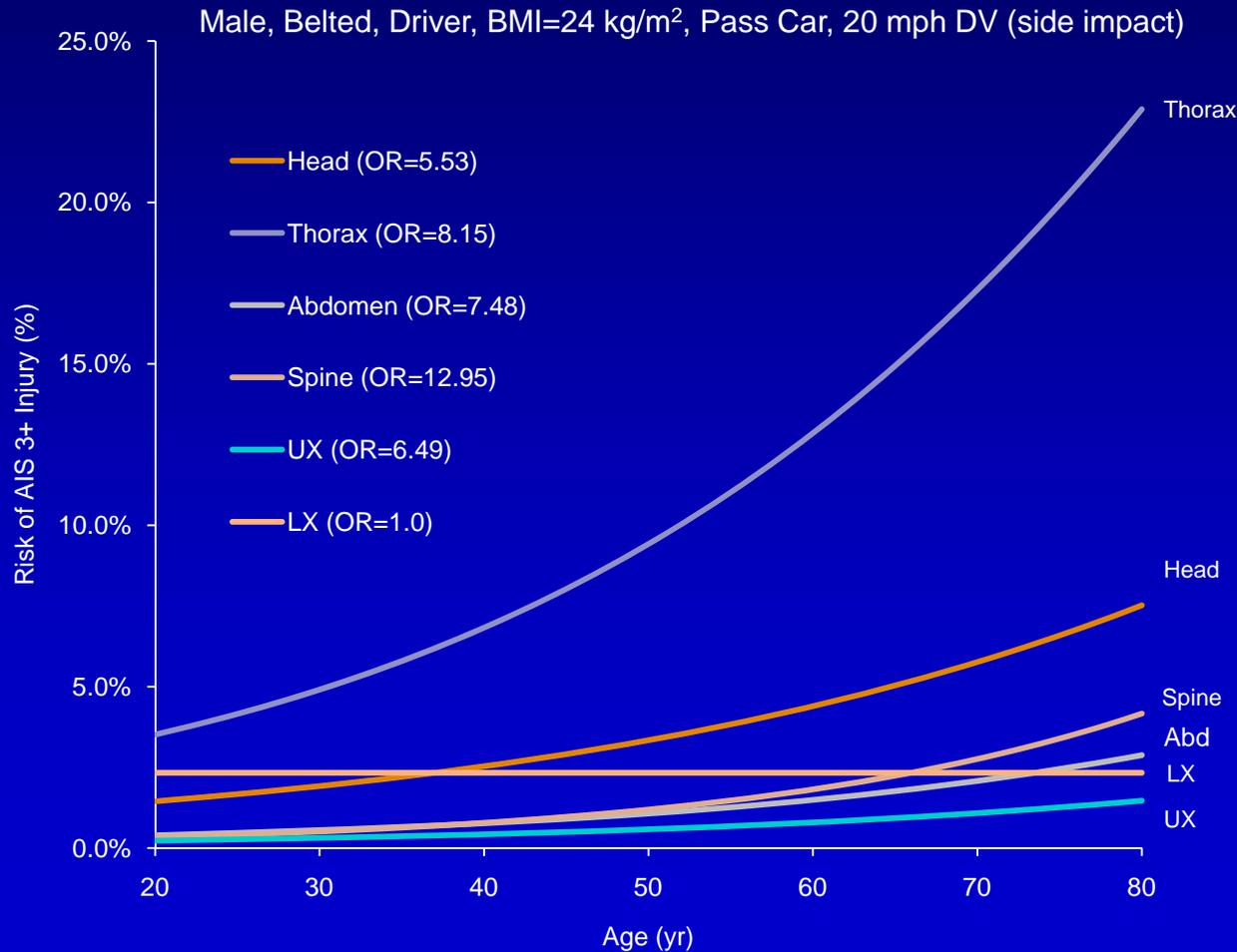
## ■ Specific Injury Analyses for Older Occupants Required

- Effects of gender and body mass index
- Pre-existing medical conditions and co-morbidities
- Injury causation and mechanisms with respect to crash direction and severity
- Age affects severe injury outcome for almost every body region in every crash mode

# Preliminary Data

## (combined NASS-CIREN analysis)

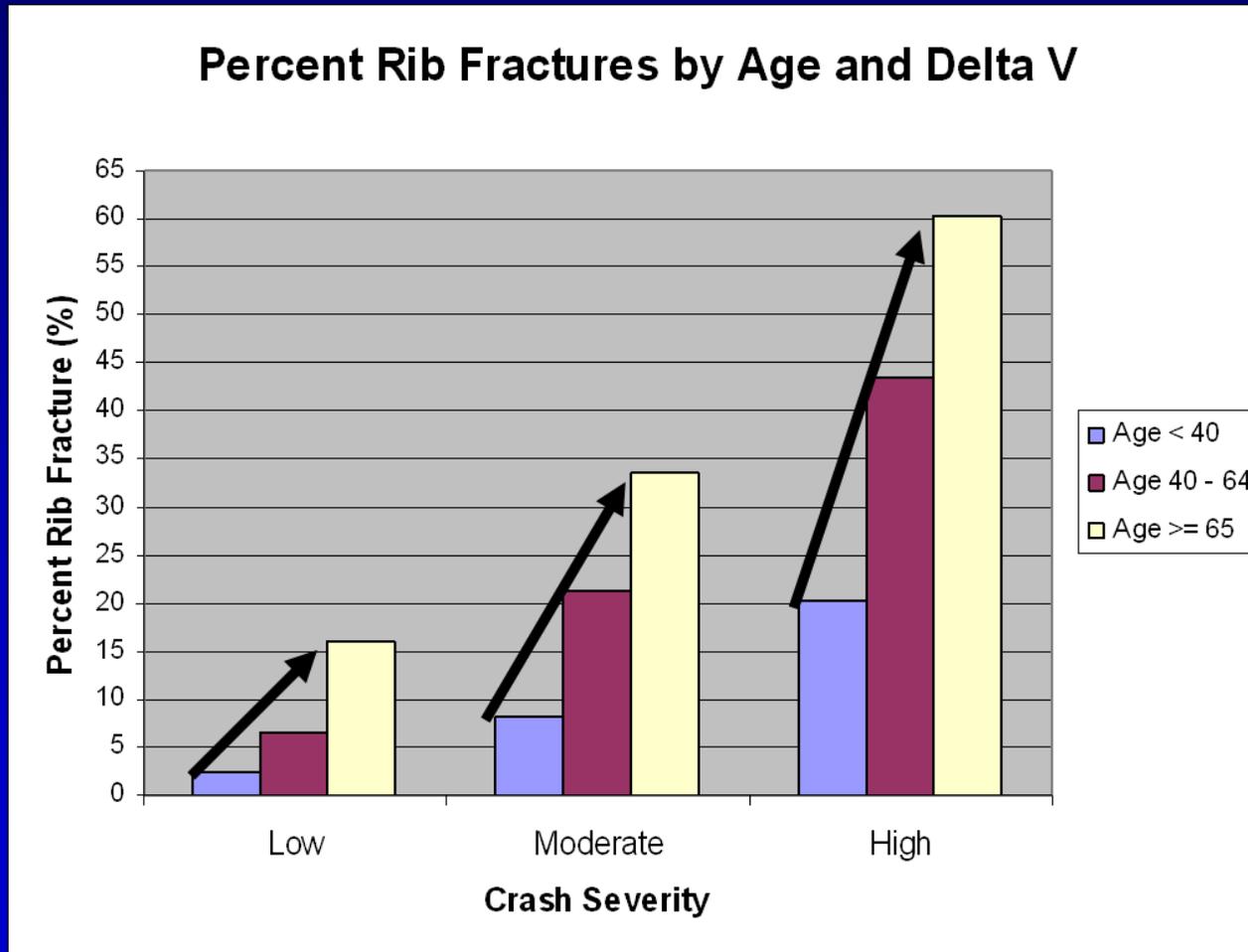
### ➤ Risk of Chest and Head Injuries Increased for Older Occupants



# Preliminary Data

## (2000-2006 NASS)

### ➤ Increased Incidence of Rib Fracture



# NHTSA Biomechanics Research

## (Emphasis on Older Occupant)

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### ■ Data

- CIREN : Injury Causation/Mechanisms
  - Over 300 cases of Older Occupant Injuries with In-Depth Analysis

### ■ Evaluation of Injury Biomechanics

- Thoracic injury research
- Head/Brain injury research

### ■ Evaluation of Crash Dummy Response

- Evaluate current dummies for older occupant biofidelity
- Determine suitability to predict older occupant injury
- Determine revised injury criteria

### ■ Computer Modeling of Older Occupants

# Chest Injury Research

- Characterize Age/Gender Changes in Rib Cage
- Develop Parametric Rib Cage Computer Model

## Model Inputs

Age

Gender

Percentile



## Model Parameters

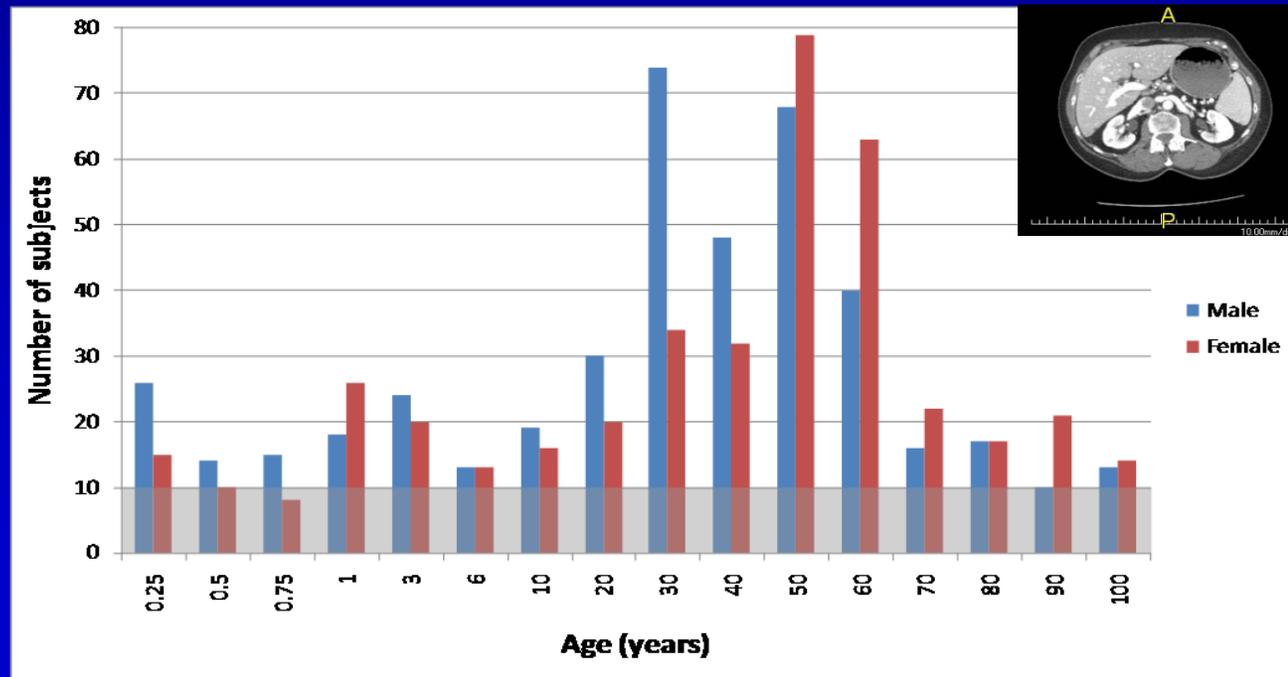
Shape/size mesh

Cortical thickness

Bone density

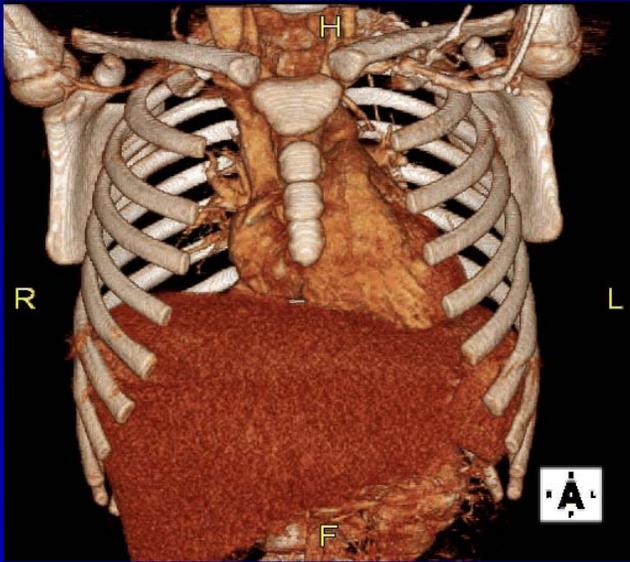
Mechanical properties

Chest CT scans collected, ages 0-100

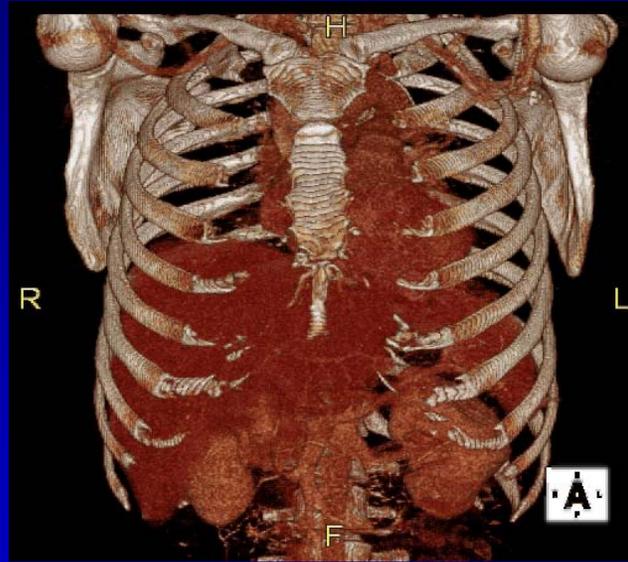


# Chest Injury Research

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6 Year Old



29 Year Old



73 Year Old

# Head Injury Research

- Characterize Age/Gender Changes to Head and Brain
- Develop Parametric Head Computer Model

## Inputs

Age

Gender

Percentile



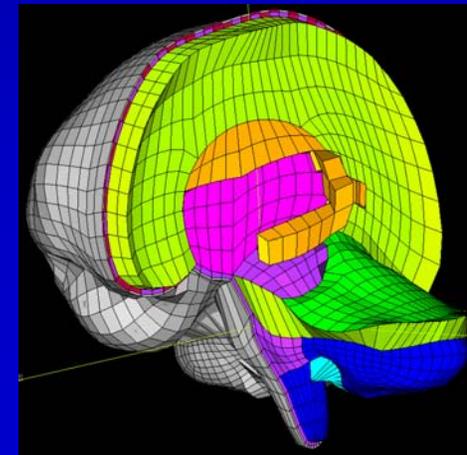
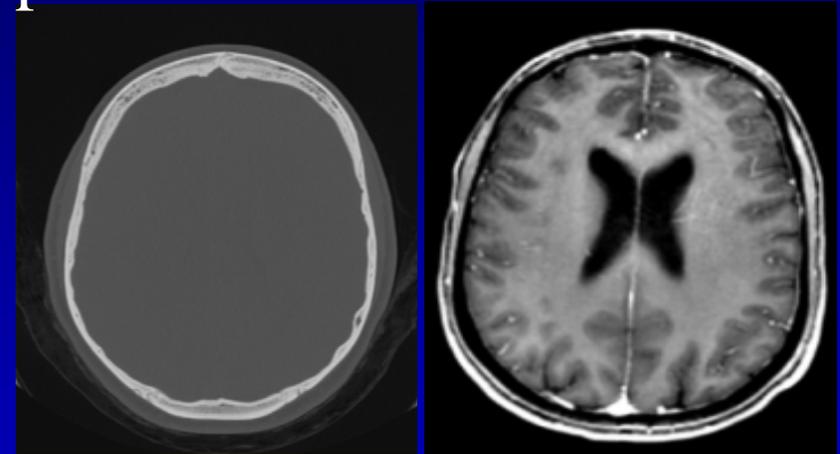
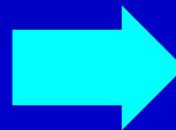
## Brain/Skull Model Parameters

Shape/size mesh

Cortical thickness

Bone density

Anatomic regional geometry



SIMon  
Brain  
Model

# Summary

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- An Approach to Older Occupant Research
- Understanding Injuries and Causation is a Critical Path
- Research Projects Aimed at Most Frequent Injuries
- Determine Dummies, Models and Test Procedures that Address Reducing Incidence and Severity of Injuries for Older Occupants