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SAFE MOBILITY FOR SENIORS MAKING IT HAPPEN




Outline

- Mission and data (big picture)
 - NHTSA approach (middle-view)
 - Brief look at tools (ground-level)
- 




Big Picture

- Mission
 - Population changes
 - Fragility and frailty
 - Functional changes
 - Data
- 



Mission

- Maintain safe mobility for life
 - Understand and use the data
- 



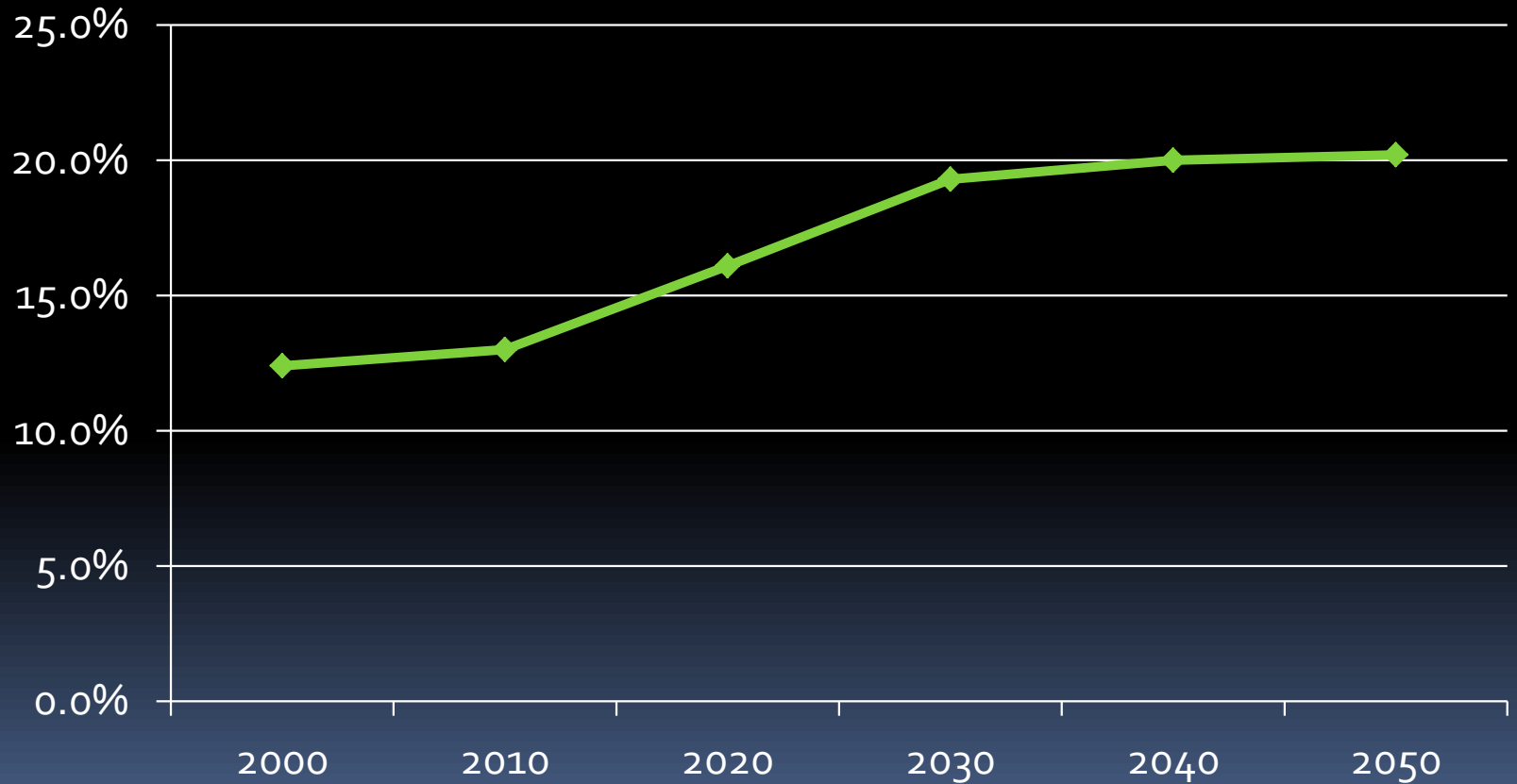
Trip-taking behavior

- People 65 and older take 12% of all trips
 - 88 % in personally-owned vehicles
 - 9% on foot
 - 2% via transit

Source: AARP Public Policy Institute

Demographic necessity

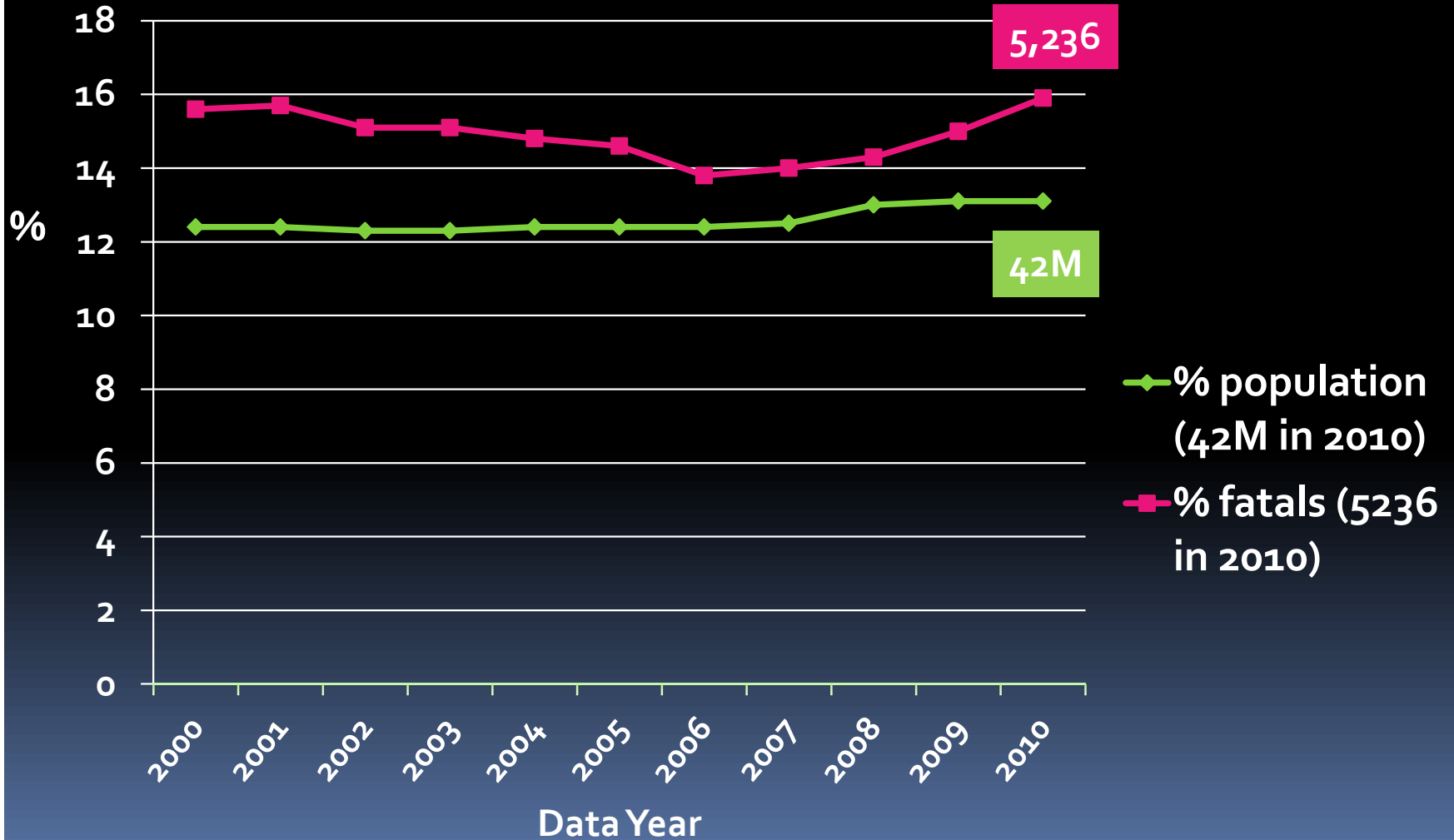
% Population age 65+



US Census Bureau

Data necessity

Population of 65+ (FARS)



Fragility and frailty

- Fragility – likelihood of being injured if in a crash
- Frailty – ability to recover from those injuries

Older and Different (inside and out)

Decreased

Bone Density

Muscle Mass

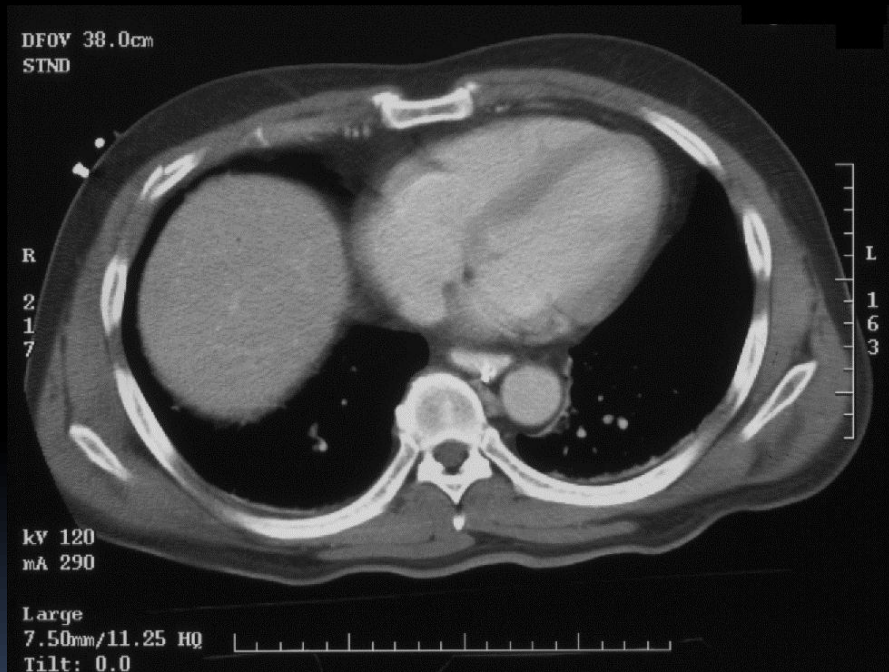
“Tolerance”

Increased

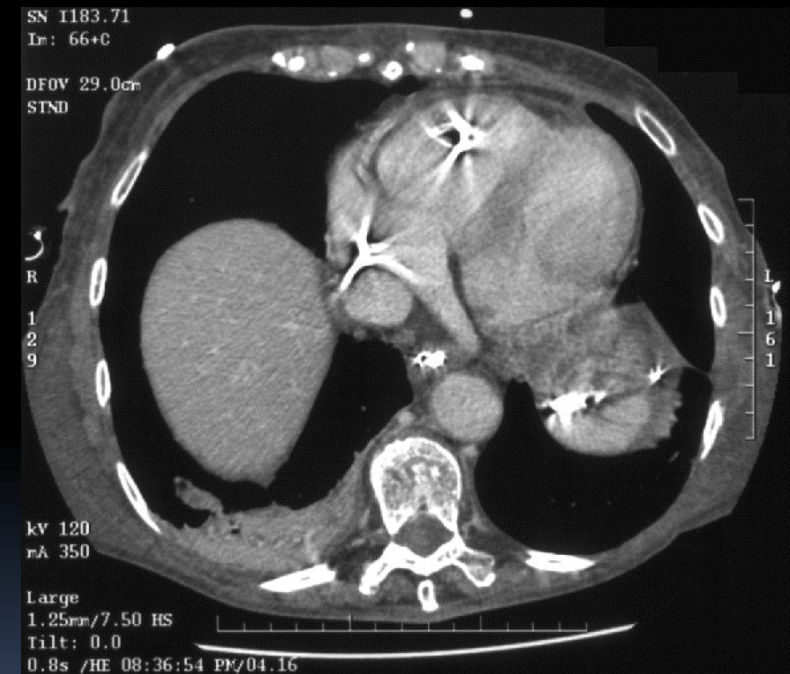
Anatomical Changes

Comorbidities

“Risk”



ADULT

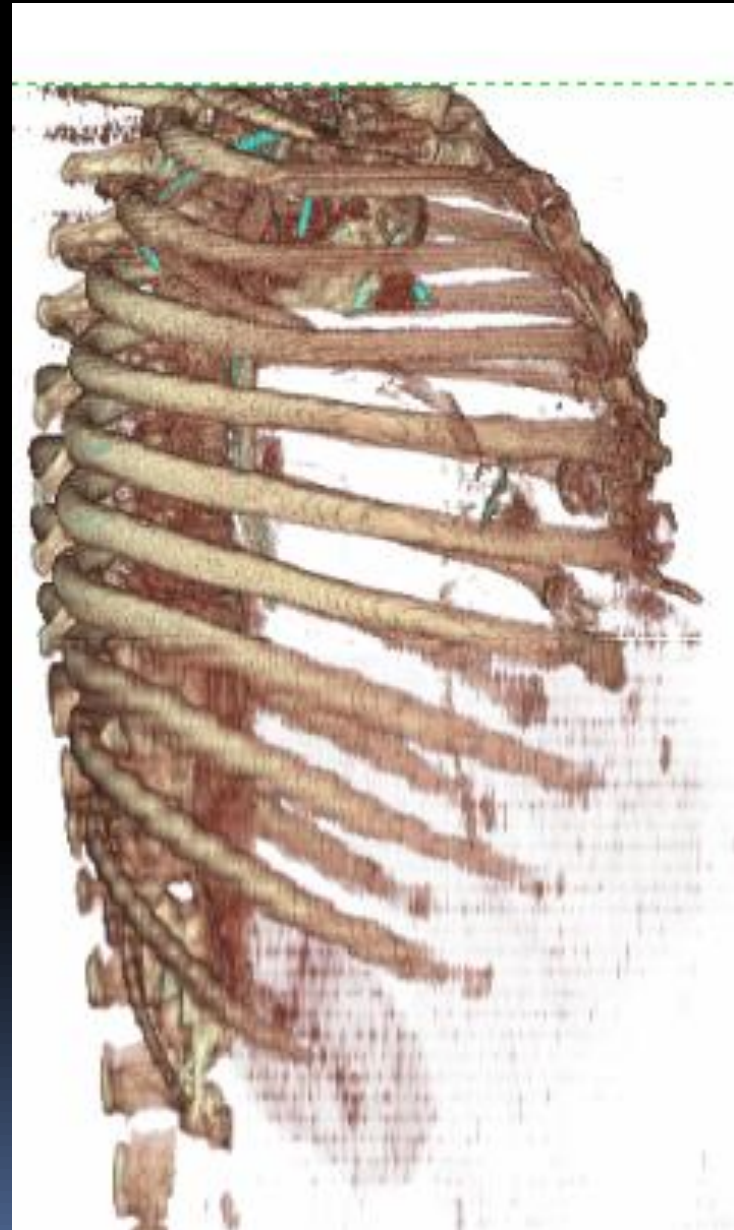


OLDER

Geometry Changes

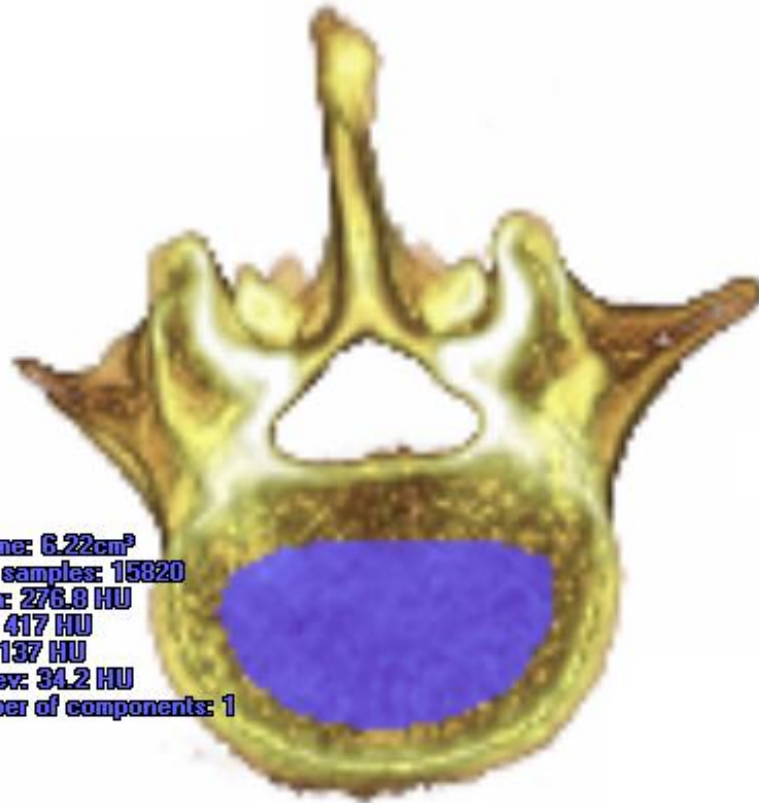


Young Female



Old Male

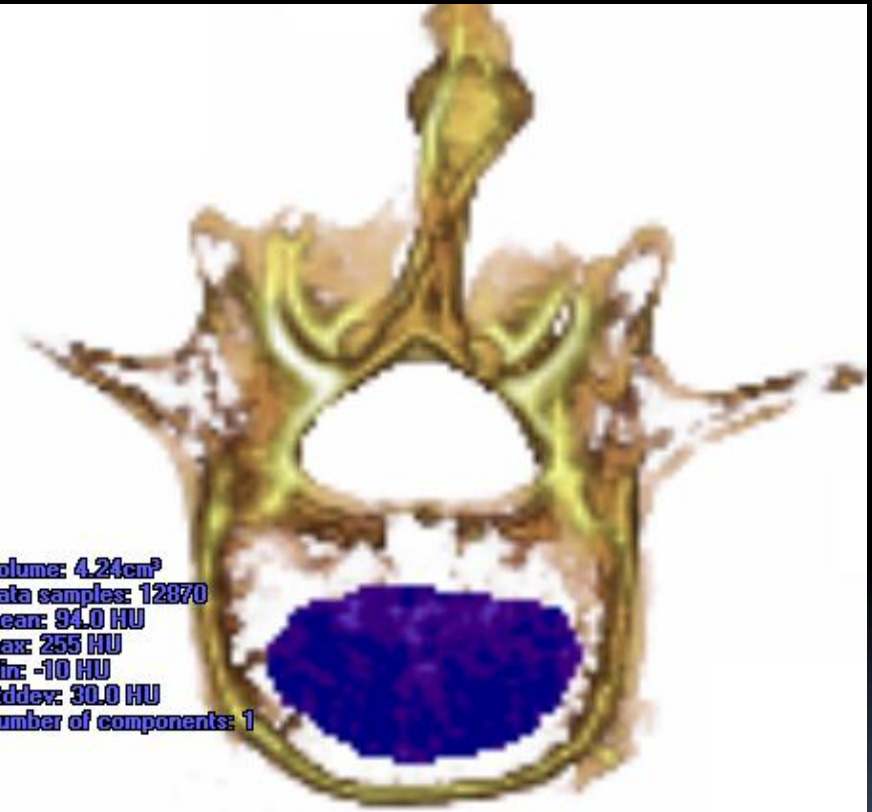
Bone Density Age Differences



volume: 6.22cm³
data samples: 15820
mean: 276.8 HU
max: 417 HU
min: 137 HU
stddev: 34.2 HU
number of components: 1

26-year-old Female

Mean = 276.8 HU



volume: 4.24cm³
data samples: 12870
mean: 94.0 HU
max: 255 HU
min: -10 HU
stddev: 30.0 HU
number of components: 1

79-year-old Female

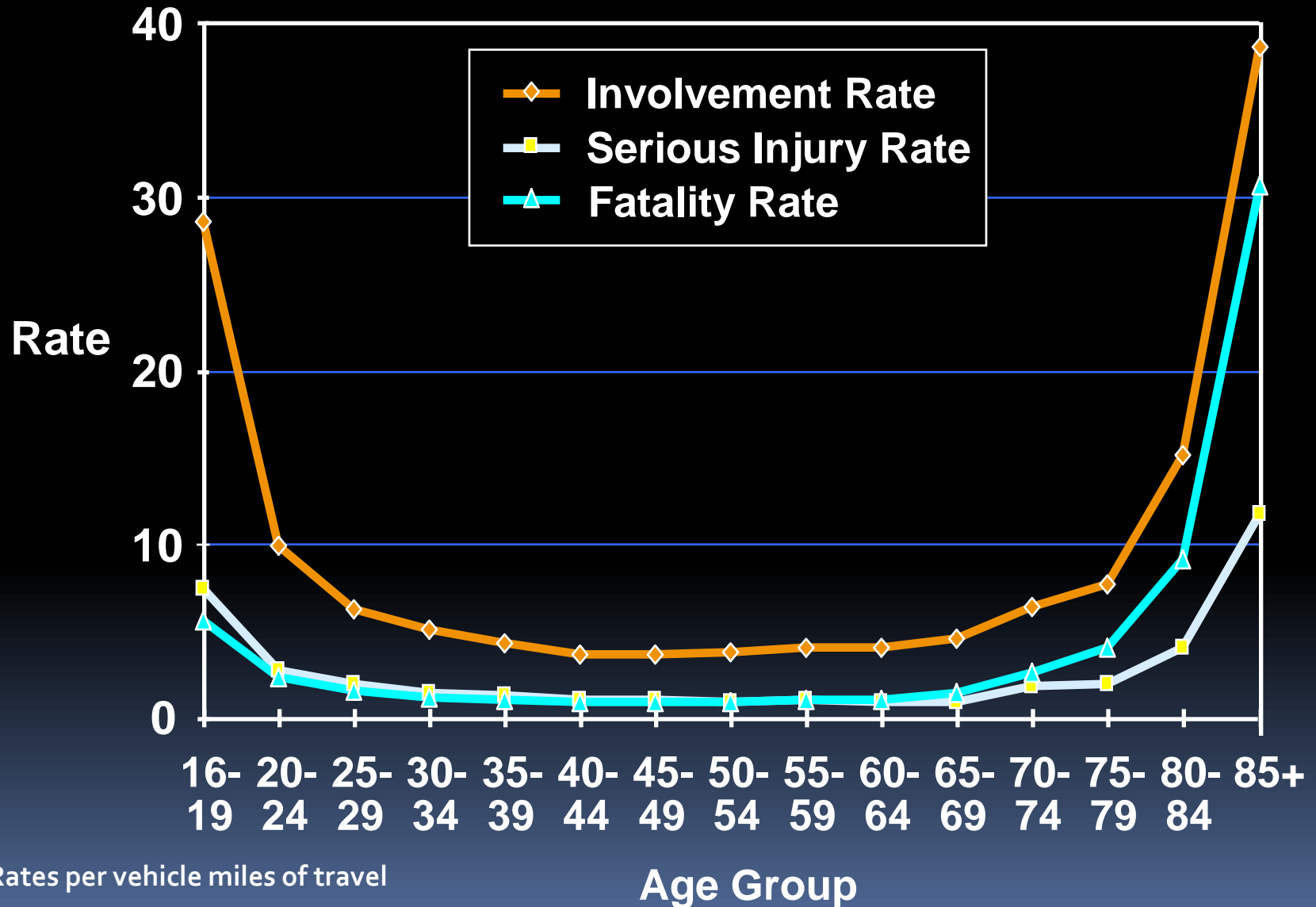
Mean = 94.0 HU




Functional Changes

- Vision
 - Starts around age 40
 - Many deficits can be fixed
- Physical Function
 - Can come from a variety of causes
 - Rehabilitation is individualized
- Cognition
 - Very challenging
 - Insight an issue


Our Challenge: Flatten the Curve





Middle view: What is NHTSA doing?

- Working to meet the challenges we see at that high level.
- 



Middle View: What is NHTSA doing?

- Mission is to save lives and prevent injuries that result from crashes
 - Emphasis is on safety, but mobility is included
- Address
 - Data
 - Vehicle safety, and
 - Behavior
- Do this at a level above general public and to public

Summary of what we know about older drivers

- Most older drivers are safe.
- Most older drivers are aware of their deficits and take steps to limit their risks.
- When in a crash, they are more likely to be injured or killed.
- Community mobility is most likely accessed through privately-owned vehicles as drivers.
- Perceived lack of options *may* influence driving transition.

Known and Unknown for Older People

WE DO KNOW:

Growing Population

Decreasing Agility

Increased Fragility

More Deaths Per Mile

Need to Monitor

Increasing Technology

WE DON'T KNOW:

One Solution

Crash Causation

Tolerance Levels

Deaths and Injury Not in Traffic

How and When to Monitor

Interaction with Technology




Using Data

- GES/FARS – Large and general
- NASS – Limited to on road
- CIREN – Limited to injury
- SCI – Array of inclusion criteria
- CODES-Limited linkage between states
- NEMSIS- Growing (25 states)
- NiTS – Limited resources



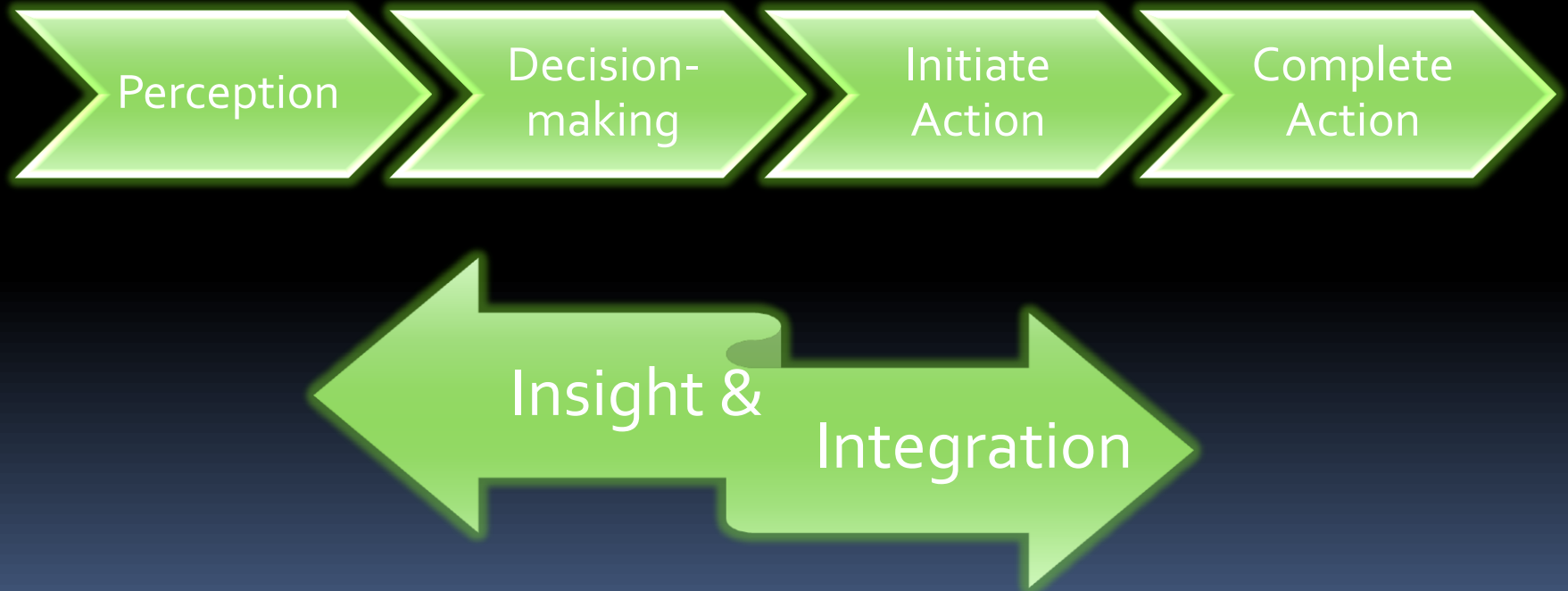
Improving the Vehicle

- Defining fragility
 - Finite Element models (injury tolerance)
 - Injury causation and contributing factors
 - Dummy testing – low speed response
 - Restraint testing
 - Advanced / adaptable restraint evaluation
 - Sled / ATD testing - belt systems / load limiting / pretensioning
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Behavior: Fundamentals of Driving and Community Mobility

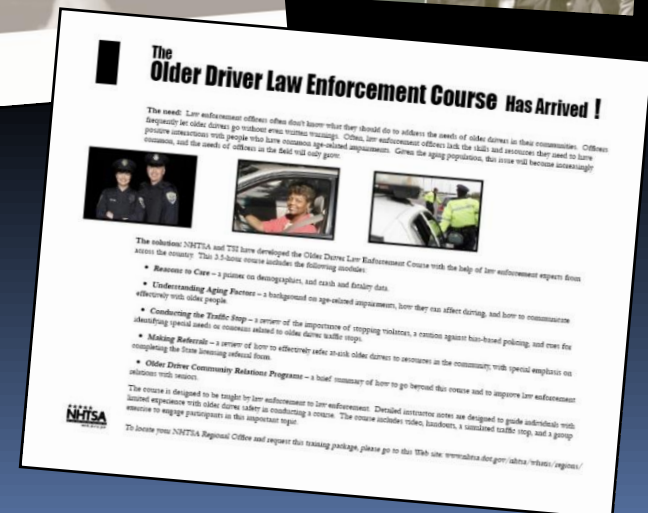
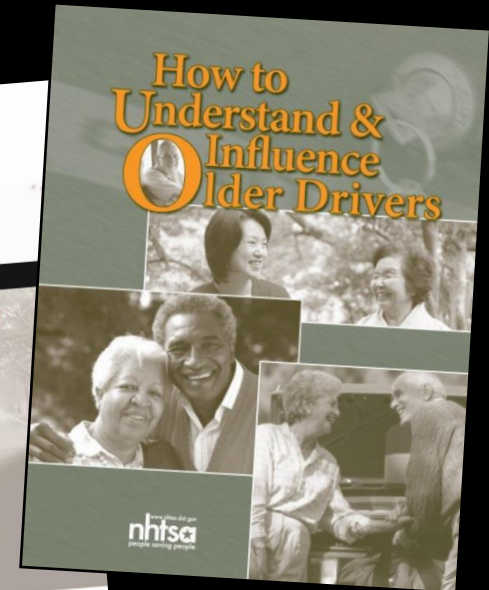
- Functional abilities needed for the complex Instrumental Activity of Daily Living (IADL) of community mobility include:
 - Vision
 - Physical Function
 - Cognition
- Adaptations may be appropriate for vision and physical function, less so for cognition.
- Continuum of community mobility ranges from independent (driving, walking) to dependent (riding)

Functional Abilities and Driving



Changing Driving Behavior

- Encouraging licensing improvements
- Educating key audiences
 - Law Enforcement
 - Medical professionals
 - Social Services
 - Driver Licensing
- Establishing partnerships



Pedestrian Safety

- Do what we know
- Leverage vehicle improvements:
 - Pedestrian Crash Avoidance/Mitigation
 - Global Technical Regulations
- Recognize limits due to frailty and fragility





Ground-level view

- What about older drivers and their caregivers?

Ground-level view

- Driving transitions are hard
- Caregivers need help



■ www.alz.org

A screenshot of a web browser displaying the Alzheimer's Association website. The page is titled "Dementia & Driving Resource Center | Caregiver Center | Alzheimer's Association - Windows Internet Explorer". The URL is "http://www.alz.org/care/alzheimers-dementia-and-driving.asp". The page content includes a "Top Safety Concerns" sidebar with links for "Wandering", "Home Safety", "Dementia & Driving" (highlighted), and "Medication Safety". Below this is a "Find your local Chapter" section with a "Zip code:" input field and a "GO" button. There is also a "Get Weekly E-News" section with a "First name:" input field. The main content area features a heading "Dementia & Driving Resource Center" and a paragraph: "Driving demands quick reaction time and fast decision making — because of this, a person with Alzheimer's will eventually become unable to drive. Dealing with the issue early on can help ease the transition." To the right, there is a "Read more" section with links: "Having the conversation", "Planning ahead", "Signs of unsafe driving", and "Resources". Below the text is a video player titled "Supportive Conversation" showing an elderly couple at a table. A sidebar on the left of the video says "Watch how four families deal with different issues related to dementia and driving." The browser's taskbar at the bottom shows the time as 12:06 PM on 12/3/2012.



Now what?



Thinking about the rest of the day

- What conditions are OK for screening and training?
- What can DMVs do to be better?
- How can we improve the transition from driving to riding?
- Does technology help or provide a false sense of security?
- How can we improve the transportation system when money is tight?
- How can we get people where they need to go?



Thanks!

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