

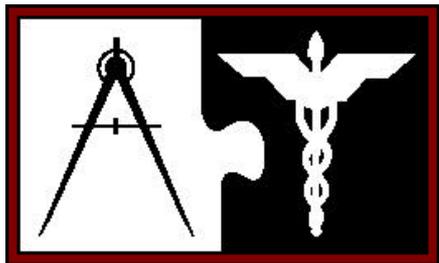


Injuries in the Elderly

December 6, 2001

Washington, DC

CIREN Network



Harborview Injury Prevention
& Research Center
Seattle, WA

Froedtert
Hospital &
Medical College
of Wisconsin
Milwaukee, WI

U of Michigan Program
for Injury Research &
Education, Ann Arbor, MI

UMDNJ-
New Jersey
Medical
School,
Newark,
University of
Maryland, Baltimore

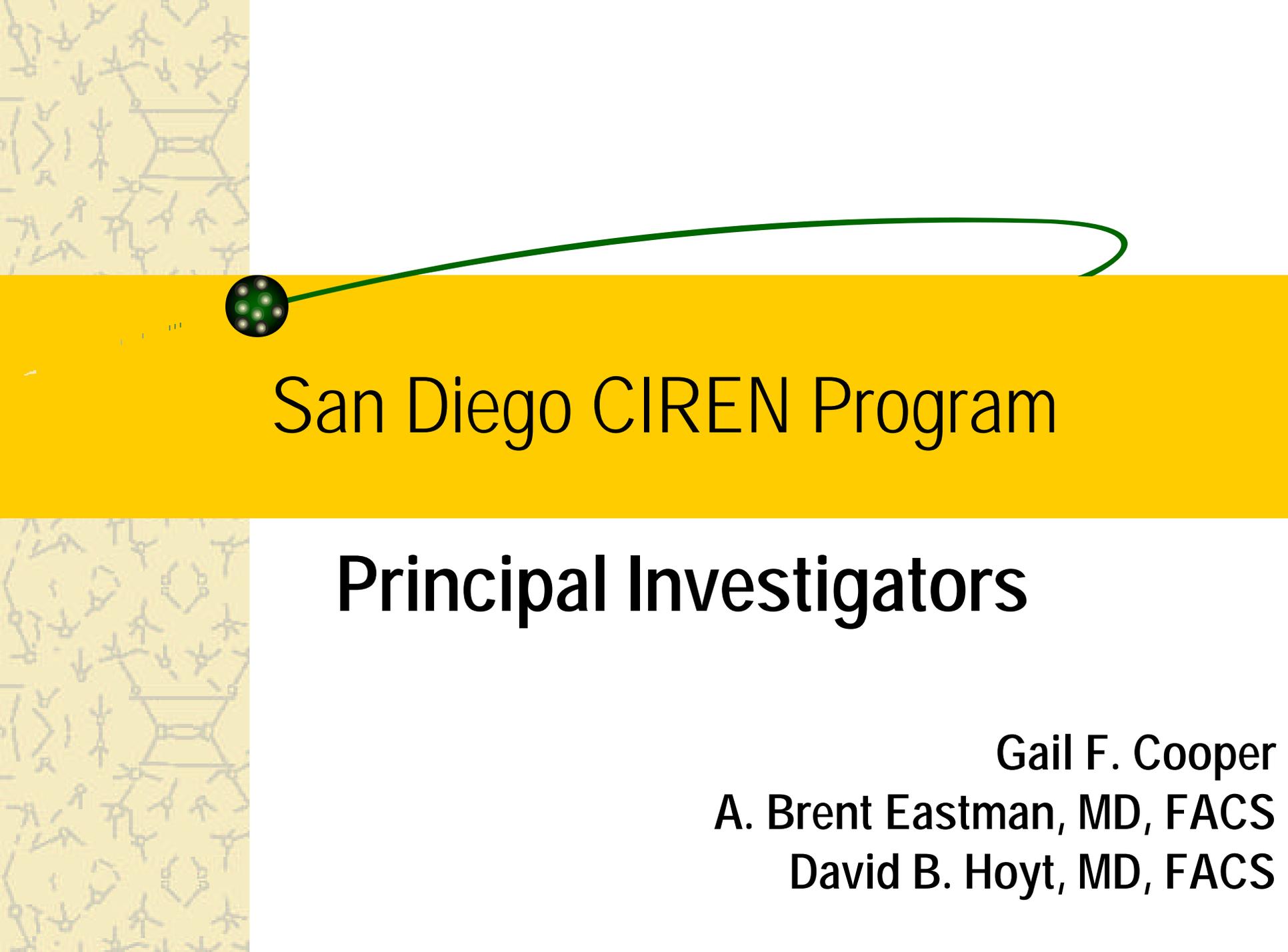
Ford Inova Fairfax Hospital
Falls Church, VA

Children's National
Medical Center,
Washington, DC

San Diego County
Trauma System
San Diego, CA

Mercedes-Benz, U of Alabama at
Birmingham, AL

William Lehman Injury Research Center
University of Miami, FL



San Diego CIREN Program

Principal Investigators

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Presenters

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San Diego CIREN Crashes Involving Elderly Occupants



Number of Elderly Occupants included in CIREN Program	29
Number of Crashes	27

Crash Culpability

 V1 Elderly Driver at Fault	18	67%
 V1 Young Driver at Fault	2	
 V2 Young Driver at Fault	<u>7</u>	
	9	33%

Young Driver Crash Scenarios

Non-elderly

 Drifted out of lane	3	33%
 Lost Control	3	33%
 Failure to Yield	2	22%
 Making Left Turn	1	11%

Elderly Driver Crash Scenarios

Elderly

✘ Failure to Yield	7	39%
✘ Making Left Turn	6	33%
✘ Drifted out of Lane	3	17%
✘ Miscellaneous	2	11%

Driving in wrong lane (1)

Hit gas instead of brake (1)



Culpability Comparison

ELDERLY

Failure to Yield	39%
Making Left Turn	33%
Drifted out of Lane	17%
Miscellaneous	11%

NON-ELDERLY

Failure to Yield	22%
Making Left Turn	11%
Drifted out of lane	33%
Lost Control	33%



Case Comparison

Elderly and Younger Subject
Under Similar Crash Conditions

Left turn from stopped position... near side impact



V1 - 1997 Ford Taurus

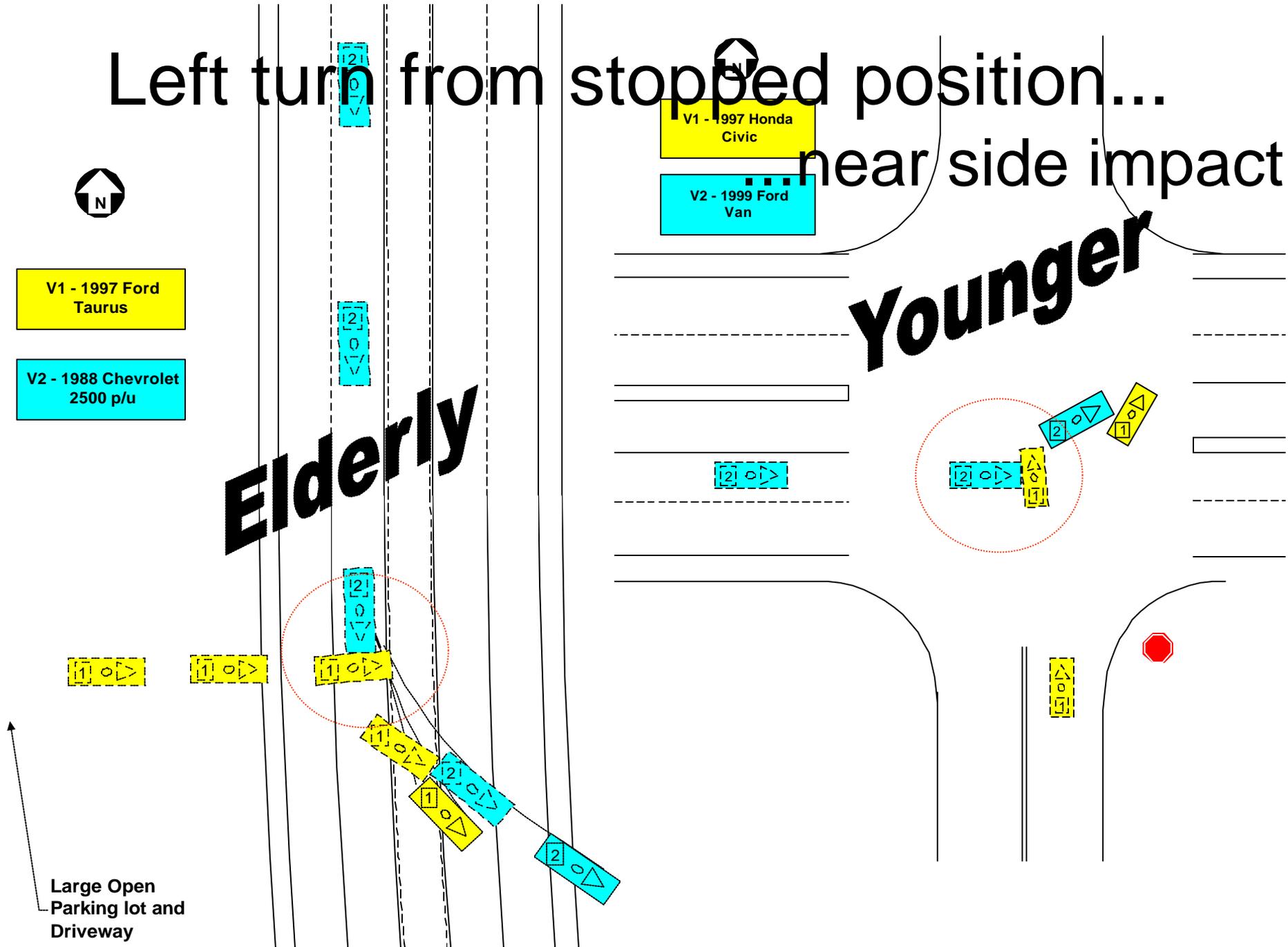
V2 - 1988 Chevrolet 2500 p/u

V1 - 1997 Honda Civic

V2 - 1999 Ford Van

Elderly

Younger



Large Open Parking lot and Driveway



Vehicle Similarities

Elderly Subject:

1997 Ford Taurus versus 1988 Chevrolet 2500 pickup

Size/Stiffness 3/3

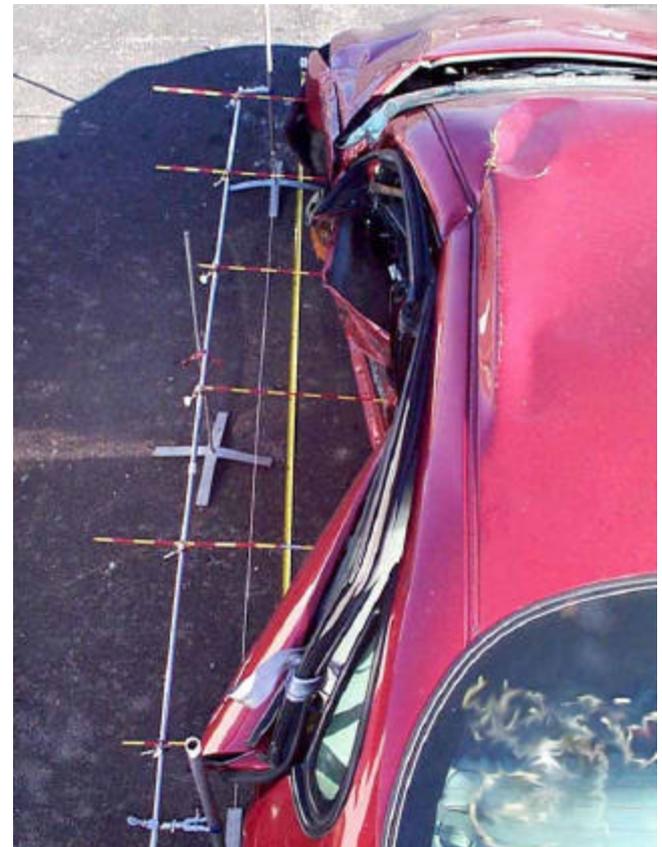
Younger Subject:

1997 Honda Civic versus 1999 E-series Van

Size/Stiffness 3/3

Elderly Subject Vehicle -1997 Ford Taurus

- ✦ Direct Damage Length: 194 cm
- ✦ Maximum Crush: 44 cm
- ✦ PDOF: 280° (-80)
- ✦ CDC: 09LYAW3
- ✦ Delta V (missing veh:)
27 kph
17 mph



Younger Subject Vehicle -1997 Honda Civic

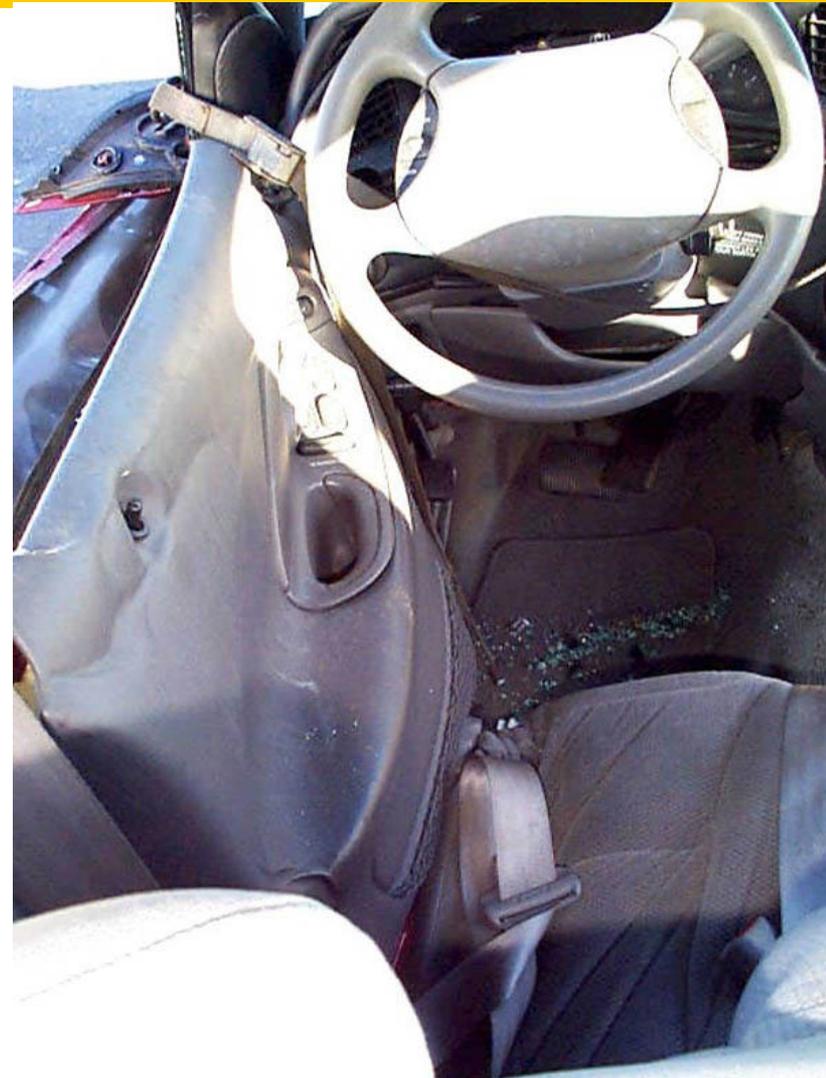
- ✦ Direct Damage Length: 188 cm
- ✦ Maximum Crush: 48 cm
- ✦ PDOF: 290° (-70)
- ✦ CDC: 10LYAW3
- ✦ Delta V (missing veh:)
40 kph
25 m/h



Elderly Vehicle Intrusions

All left side - all lateral

- ☀ Door panel 26 cm
- ☀ "B" pillar 20 cm
- ☀ Sill 19 cm
- ☀ Kick panel 10cm



Younger Vehicle Intrusions

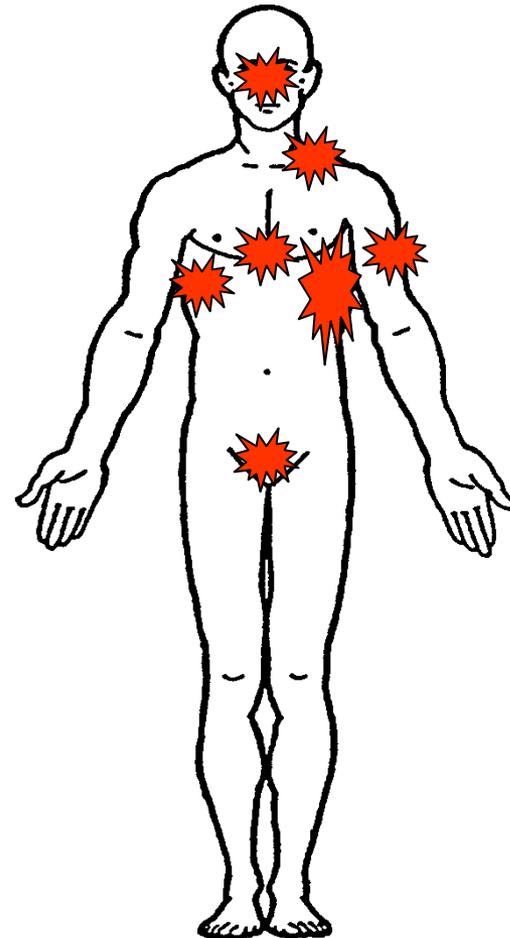
All left side - all lateral

- ✿ B pillar 35 cm
- ✿ front door panel 42cm
- ✿ front roof side rail 15cm
- ✿ front seat back 24 cm
- ✿ rear door panel 34 cm



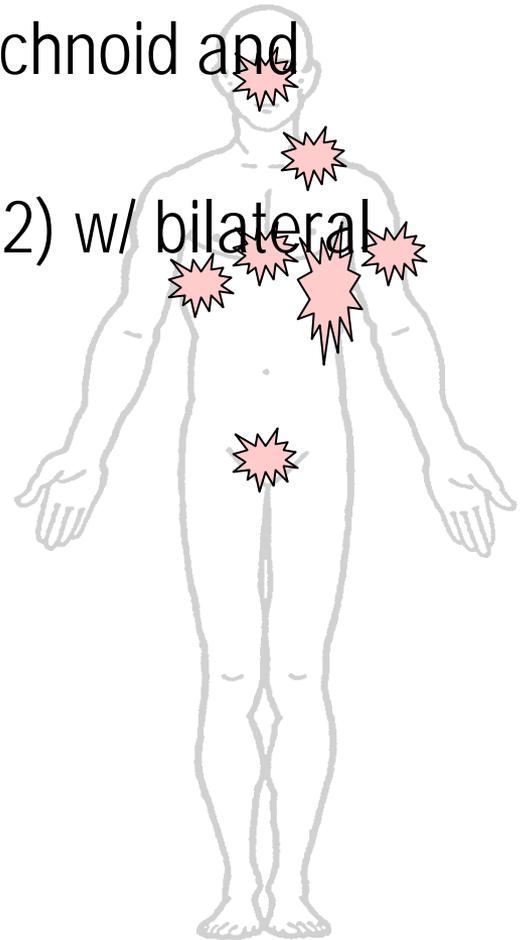
Elderly Occupant

- ✦ 78 year old male
- ✦ 5'7", 202 pounds
- ✦ Restrained driver
 - Manual 3-point lap/shoulder
 - Frontal airbag not deployed



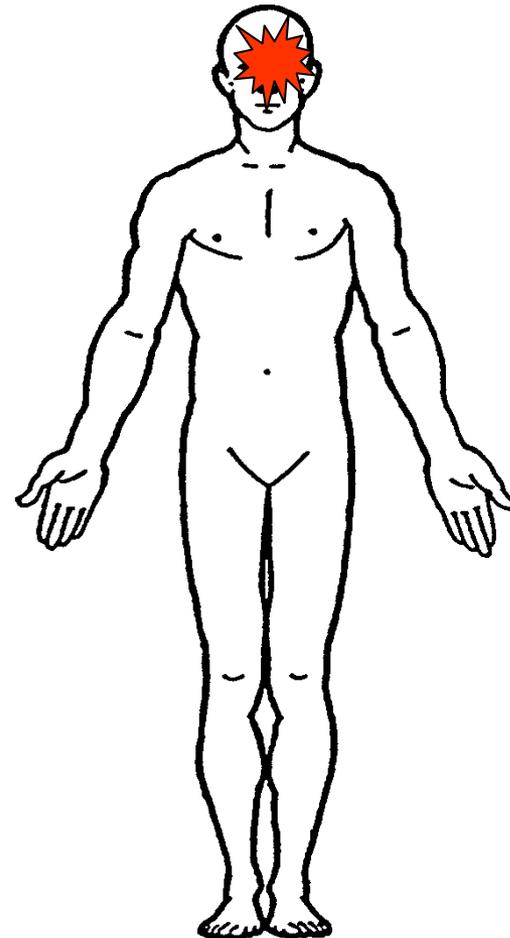
Occupant Major Injuries

- ✦ Hinged basilar skull fracture with subarachnoid and intraventricular hemorrhage
- ✦ Bilateral rib fractures (Right 1-7, Left 1-12) w/ bilateral lung lacerations
- ✦ Right ventricular laceration
- ✦ Transected aorta
- ✦ Left humerus fracture
- ✦ Left clavicle fracture
- ✦ Bilateral pubic rami fractures



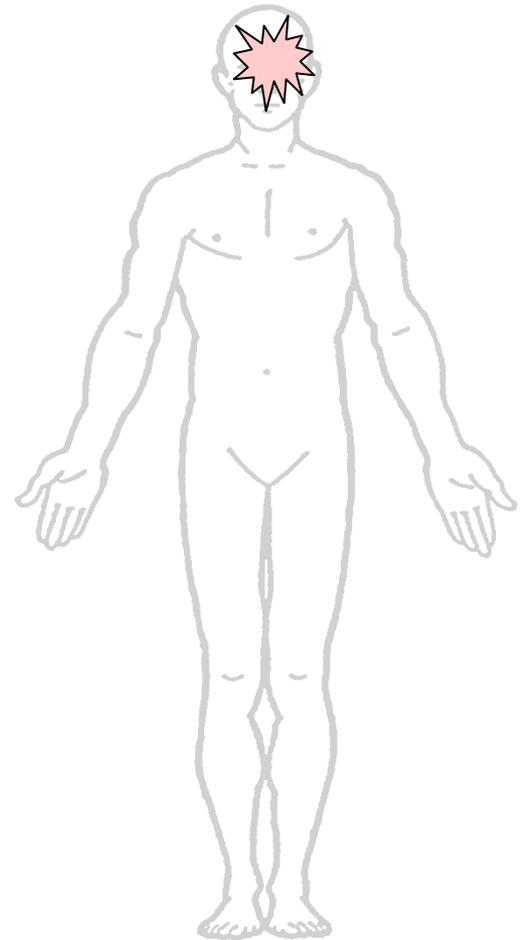
Younger Occupant

- ✦ 27 year old male
- ✦ 5'7", 150 pounds
- ✦ Restrained driver
 - Manual 3-point lap/shoulder
 - Frontal airbag not deployed

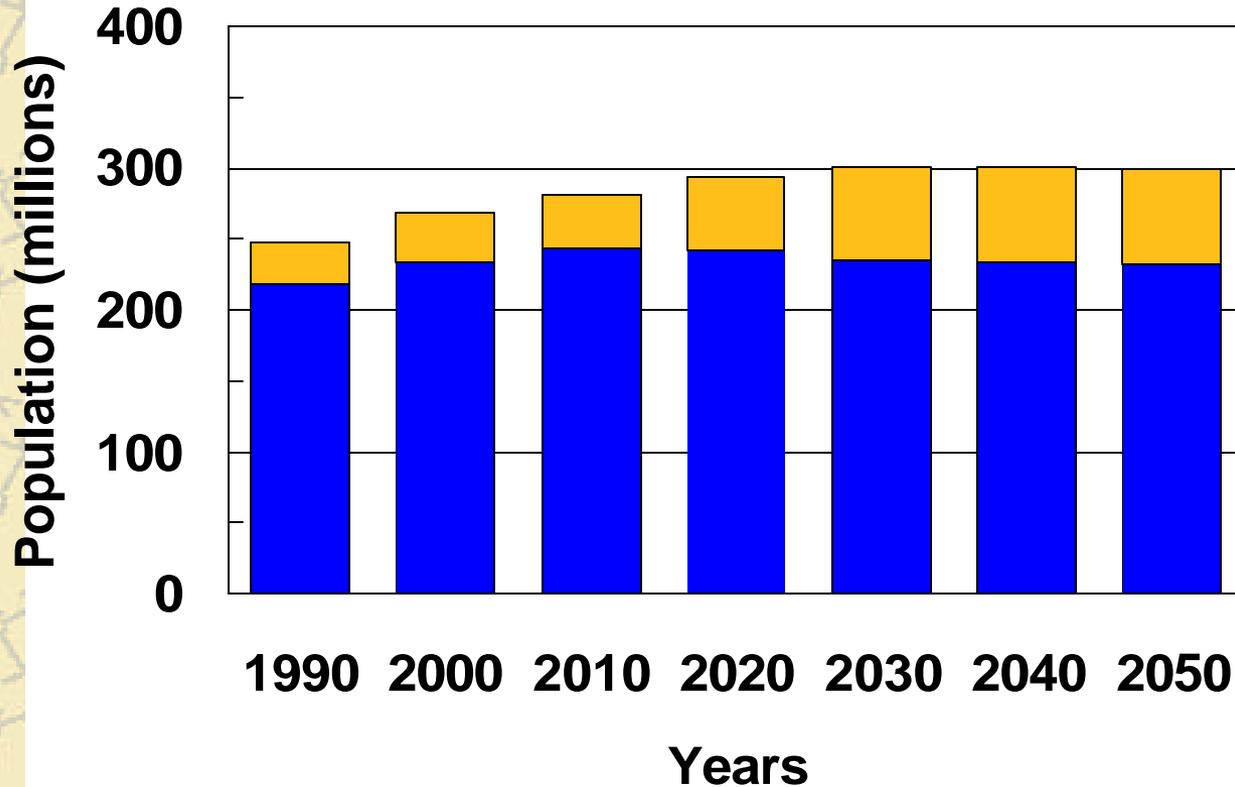


Occupant Injuries

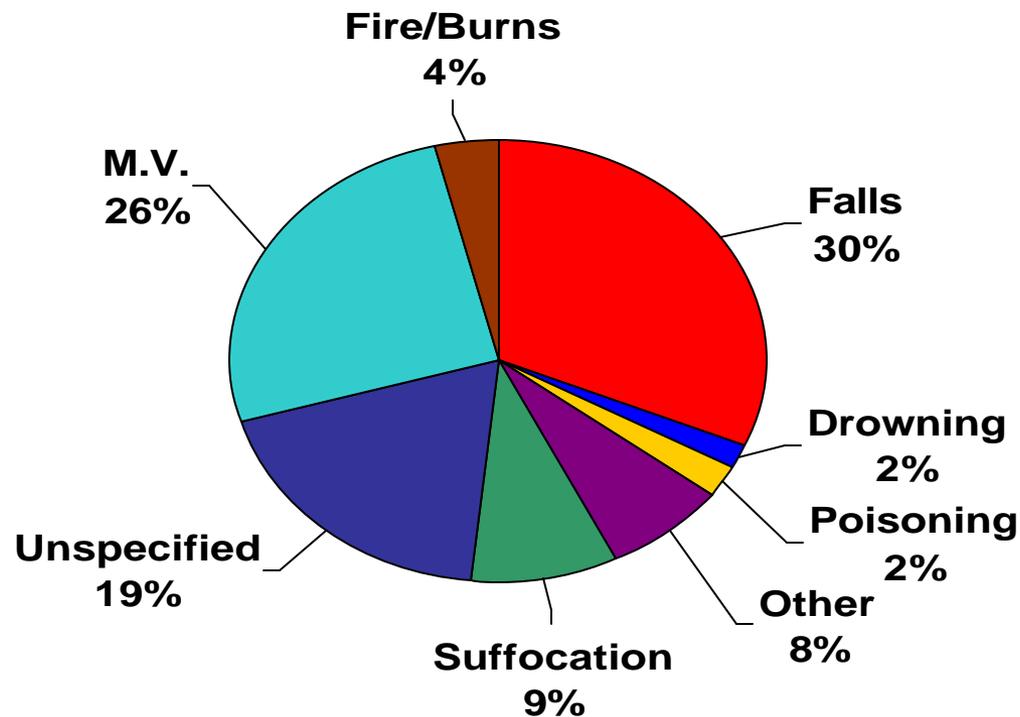
- ✦ Fracture of foramen magnum
- ✦ Bilateral cerebral contusions
- ✦ Subarachnoid hemorrhage
- ✦ Scalp lacerations



Projected Growth in Older U.S. Population



Causes of Unintentional Injury Death Among People 65+, 1998

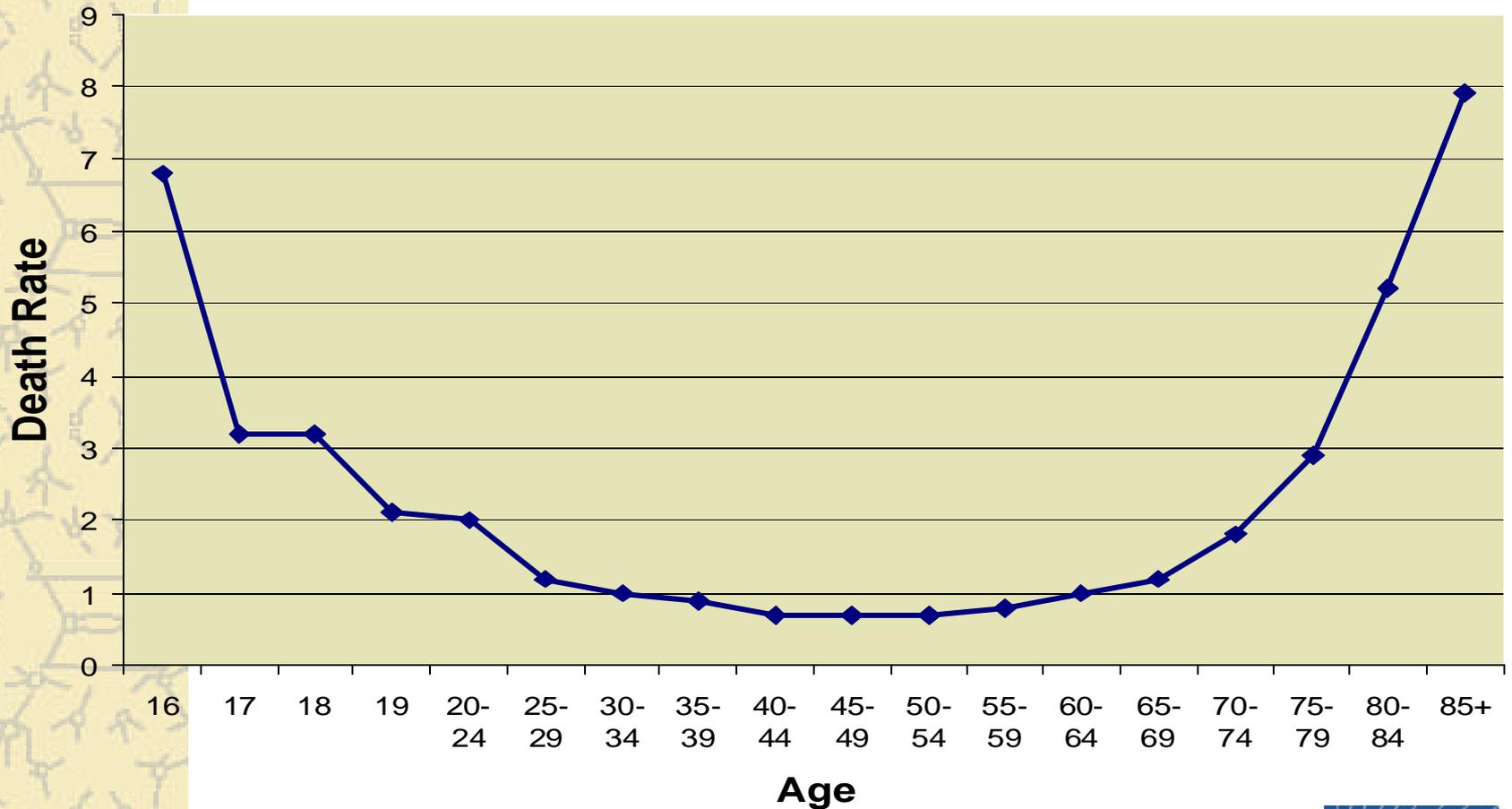




Licensed Drivers Age 65+

- ☀ Currently 26 million licensed drivers
- ☀ 75% of people age 65+ are licensed
- ☀ 40 million licensed drivers by 2020

1996 Motor Vehicle Fatality Rates Adjusted for Miles Driven





1998 Motor Vehicle Deaths and Injuries Among 65+

	<u>Deaths</u>	<u>Injuries</u>
Drivers	4,183	158,000
Passengers	1,841	64,000
Pedestrians	1,168	5,000

CIREN Cases

✦ Total database = 694

✦ Age range = 1 – 100
Mean = 39.7

✦ Sex
M = 354 (51%)
F = 340 (49%)

✦ Total 65 years and over
= 105

✦ Age range = 65 – 100
Mean = 75

✦ Sex
M = 51 (48.6%)
F = 54 (61.4%)

San Diego CIREN

- ✦ 115 Cases
- ✦ Age range = 5 – 87
Mean 39.5
- ✦ Sex
M = 63 (54.8%)
F = 52 (45.2%)
- ✦ LOS range 1 – 68 days
Mean = 9.6
- ✦ ISS range = 1 – 75
Mean = 22.6

SD CIREN: Damage Location 115 Crashes

- 🚗 Front = 83 (72.2%)
- 🚗 Left = 25 (21.7%)
- 🚗 Right = 6 (5.2%)
- 🚗 Undercarriage = 1 (9%)

SD Elderly

- ✦ 15 Cases (3 missing)
- ✦ Age range = 66 - 87
Mean = 75.2
- ✦ Sex
M = 9 (60%)
F = 6 (40%)
- ✦ LOS range = 2 – 24
Mean = 8.8
- ✦ ISS range = 5 – 75
Mean = 21

Thoracic Injuries

- ☀ CIREN - 466 Thoracic Injuries
- ☀ San Diego -110 Thoracic Injuries
14 cases (24.5% of total database)
- ☀ Age range = 66 – 85 years
Mean = 75
- ☀ Type of Crash Damage
Frontal = 13
Side (FMVSS214) = 16

SD Thoracic Injuries

- ✦ Aorta = 4
- ✦ Diaphragm = 1
- ✦ Heart Laceration = 3
- ✦ Lung Contusions = 5
- ✦ Lung Lacerations = 5
- ✦ Rib Fractures = 11
Flail = 4

At-Risk Older Drivers

✦ Older males

Older male drivers out-number females about 2 : 1

✦ Risk increases with

- Number of miles driven
 - Changing functional abilities
 - Certain medical conditions
- About 10% have conditions leading to unsafe driving behaviors



Increased Risk for MVC

- ☀ Neurologic deterioration
 - Dementia
 - Sensory
- ☀ Medications
 - Benzodiazepines
- ☀ Visual risk factors
 - Glaucoma
 - Useful field of view

Useful Field of View

- ☀ Criteria to evaluate:
 - **Visual sensory function**
 - **Slowed visual processing speed**
 - **Impaired visual attention skills**
- ☀ > 40% impairment = 2.5 times more likely to have MVC



Implications

- ☀ **Target at-risk population**
 - Older males
 - Women of “baby boomer” age – indications, driving well into older ages than current 65+ women
- ☀ **Provide education and information to those who assist older adults**
 - *Traffic Safety Plan for Older Persons*
NHTSA 1993
 - Include family, friends, community agencies, healthcare personnel
 - Encourage reporting of unsafe driving behaviors
- ☀ **Customer-focused alternative transportation services**