

NHTSA Side Crash Protection Program

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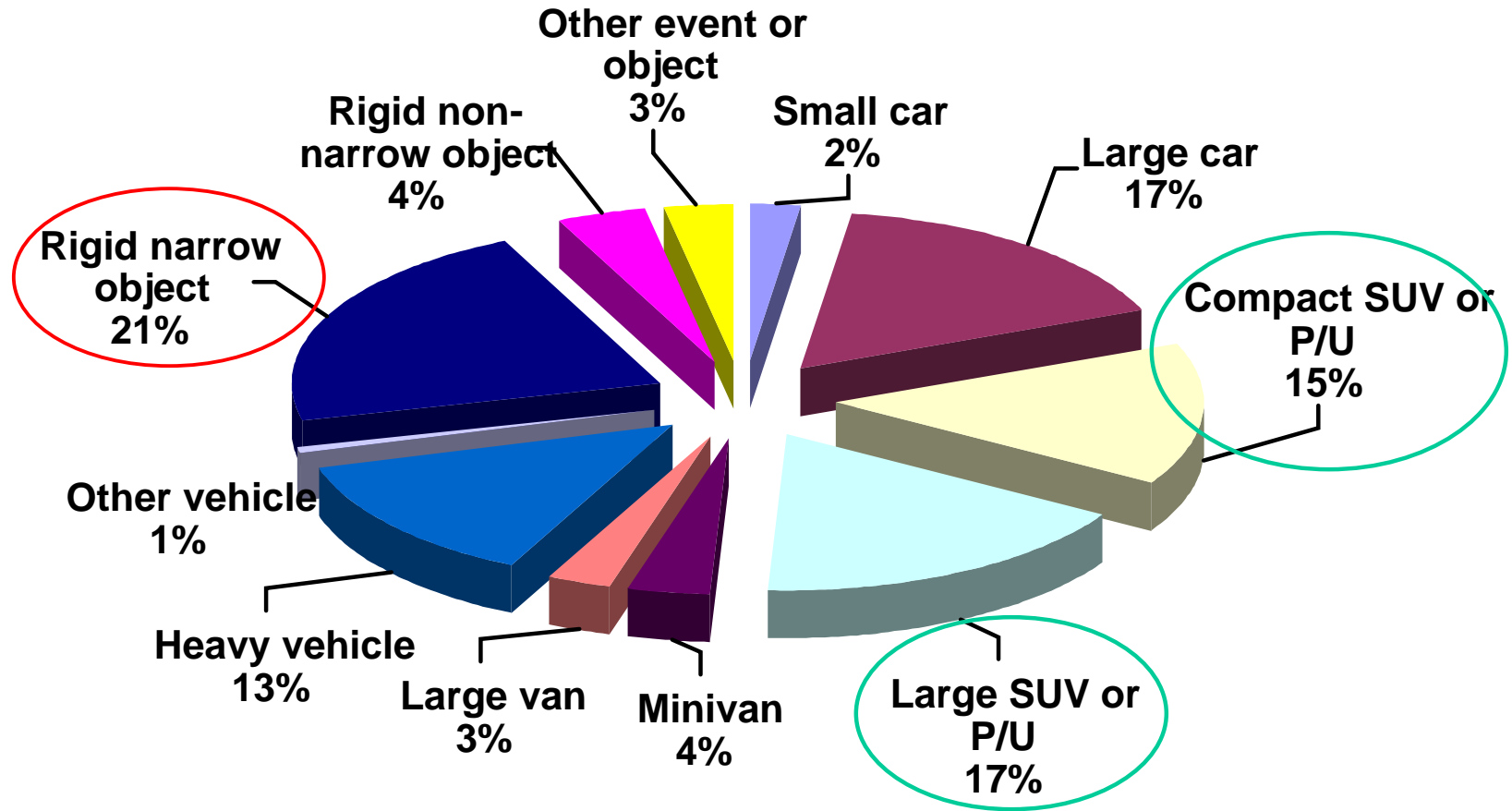
**Crashworthiness III: Side/Compatibility
SAE Government/Industry Meeting
May 12, 2004**

Outline

- **Synopsis of current safety problem**
- **Research goals**
- **Side impact pole test development**
- **Crash test results for 50th male and 5th female dummies**

- **Side impact safety problem**

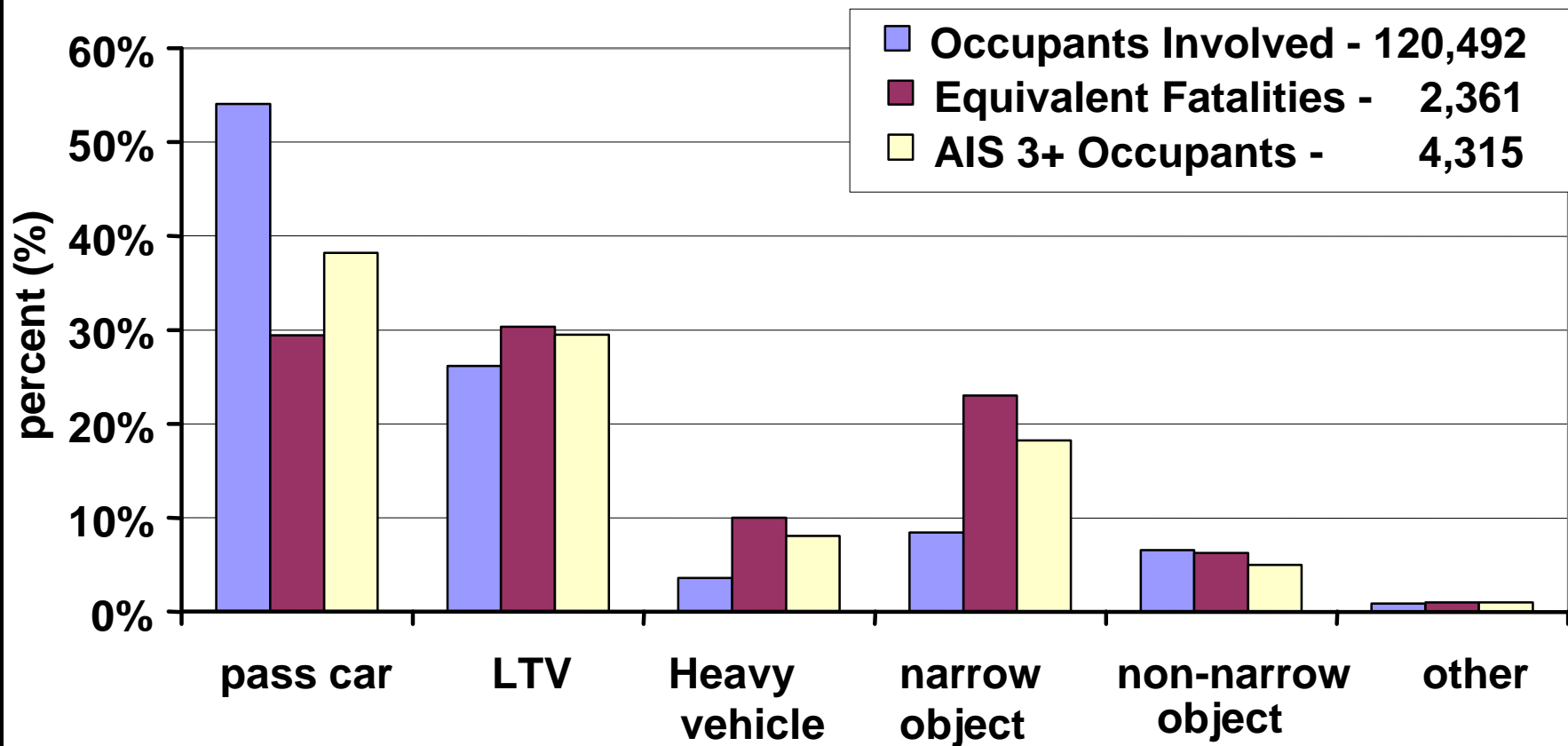
2001 FARS Nearside Nonrollover Fatalities, MY 1995+ Struck Vehicle



n = 2,312

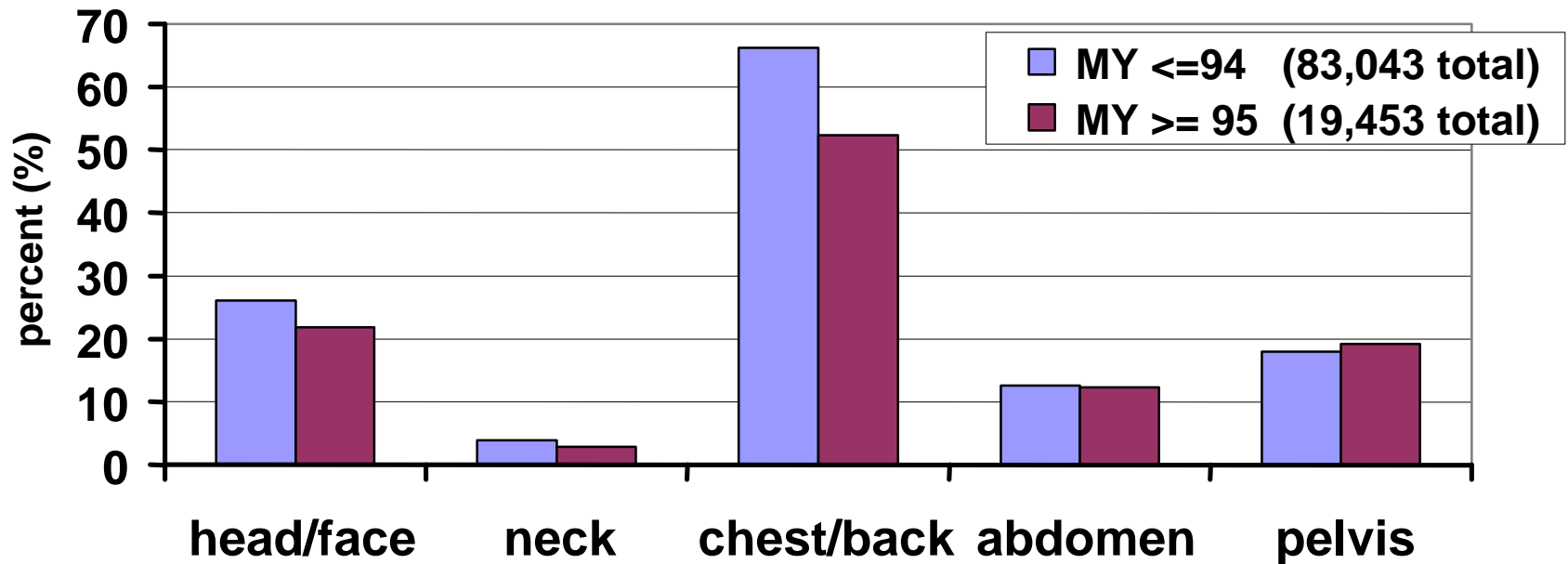
Fatalities and Injuries by Crash Partner

1995-2001 Weighted NASS/CDS Nearside Impacts
Struck Vehicle MY 95+



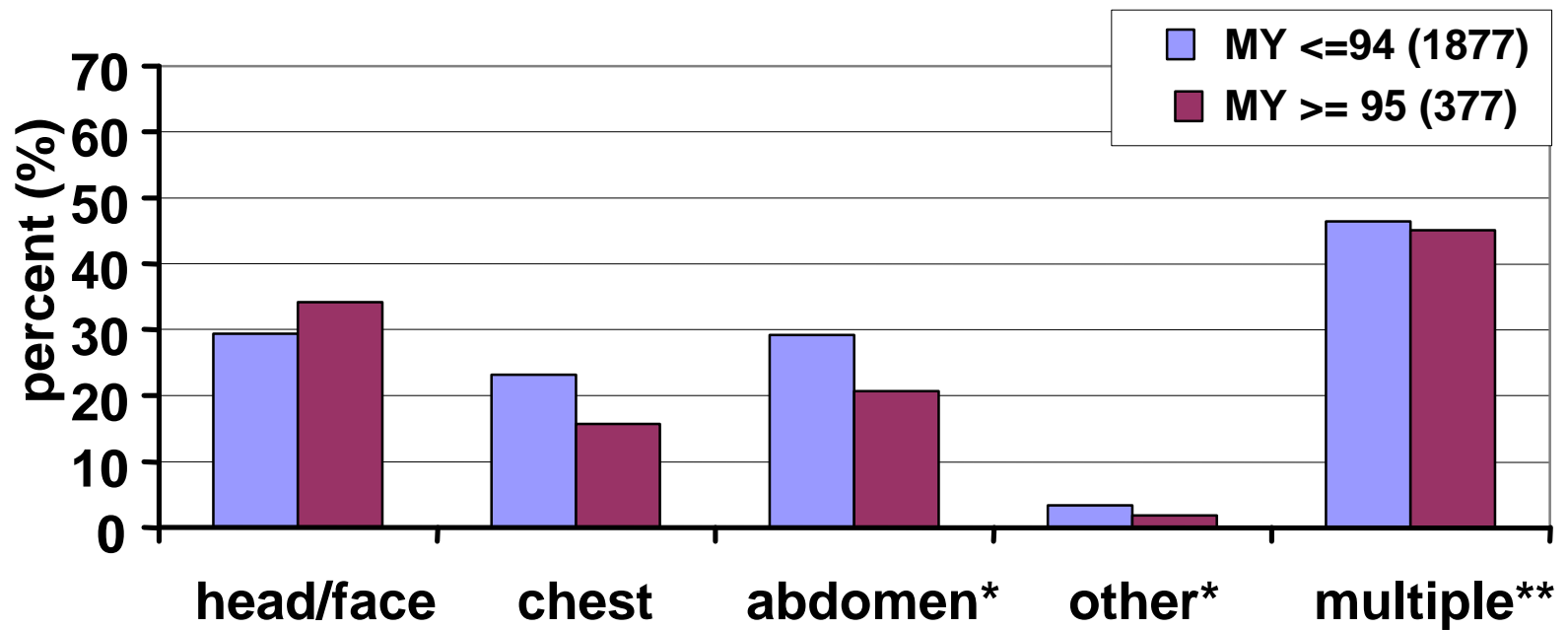
Nearside Seriously Injured Belted Occupants

1995-2001 Weighted NASS/CDS Nearside Impacts



Nearside Belted Occupants Fatalities

1995-2001 Weighted NASS/CDS Nearside Impacts



* sample < 20 for all MY

** sample < 20 for MY >= 95

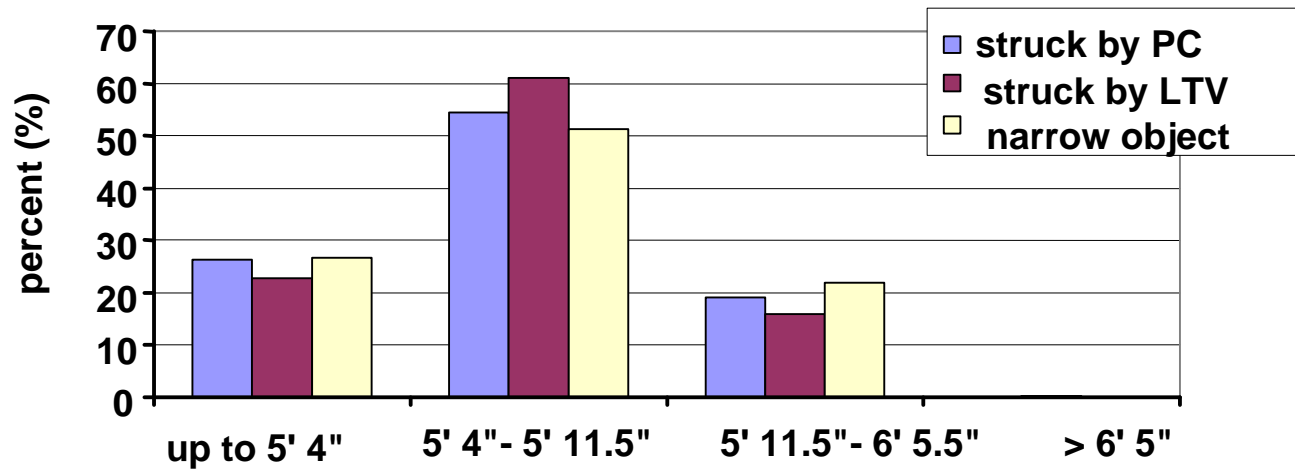
1997-2002 NASS/CDS Side Impacts with No Rollover

- **59% of fatalities in side impact had a brain injury*** (5,617 of 9,452 annual estimates)

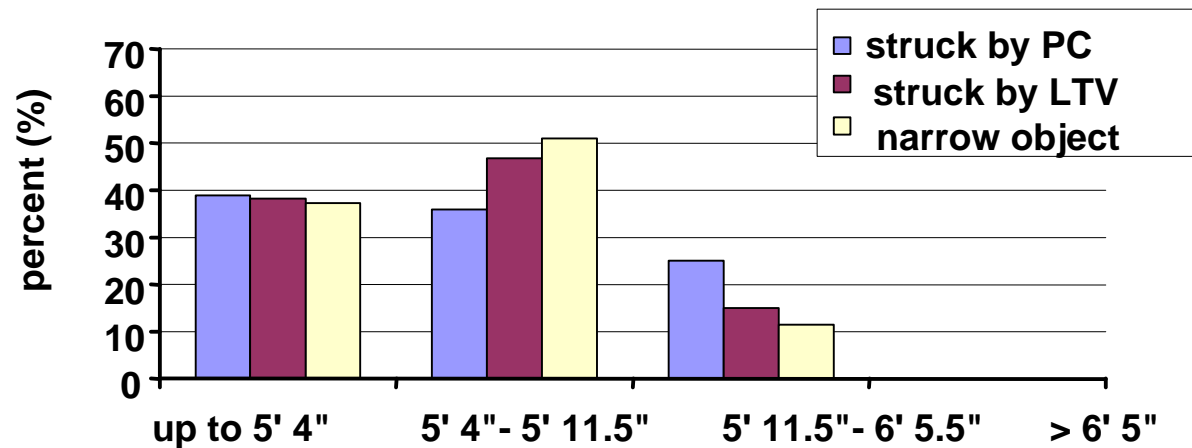
*either alone or in combination with another injury

Nearside seriously injured occupants by height

1995-2001 Weighted NASS/CDS Nearside Impacts



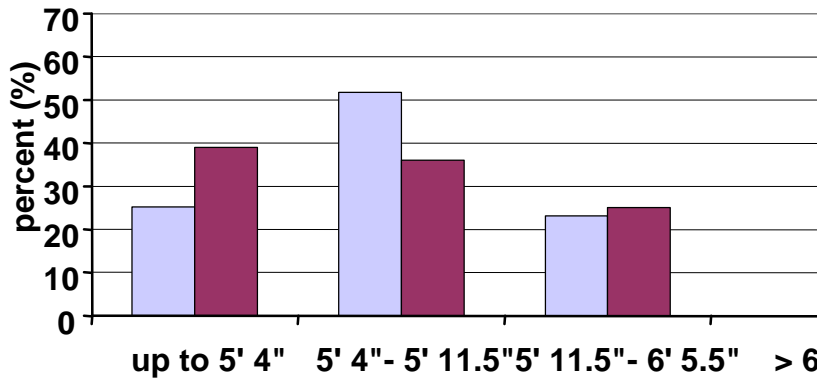
MY 95+ →



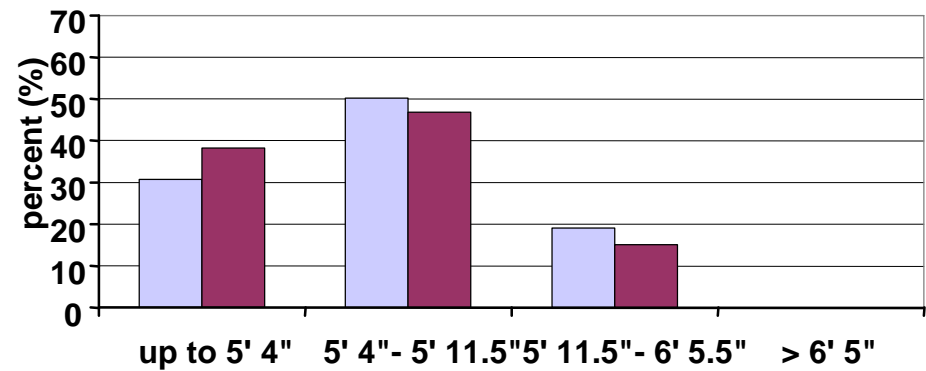
The small size occupant is more at risk of serious injury in side impacts irrespective of crash partners

MY 95+ side struck Vehicles

Struck by a Passenger Car

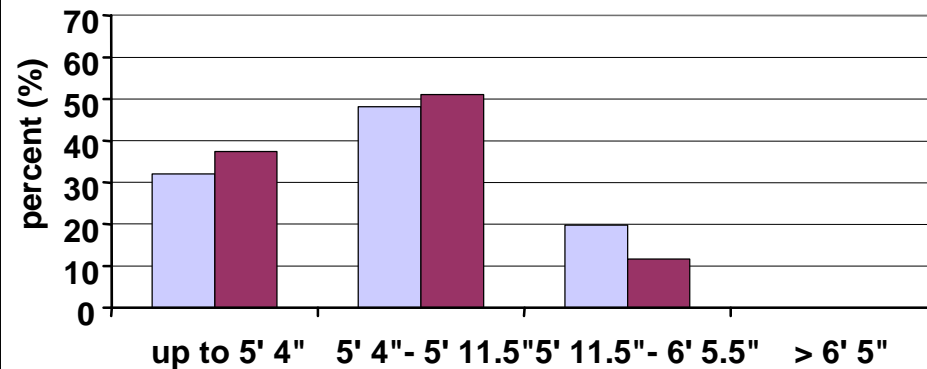


Struck by an LTV



■ Occupants Involved
■ MAIS3+

Narrow Object Crashes



Side Impact Research Goals

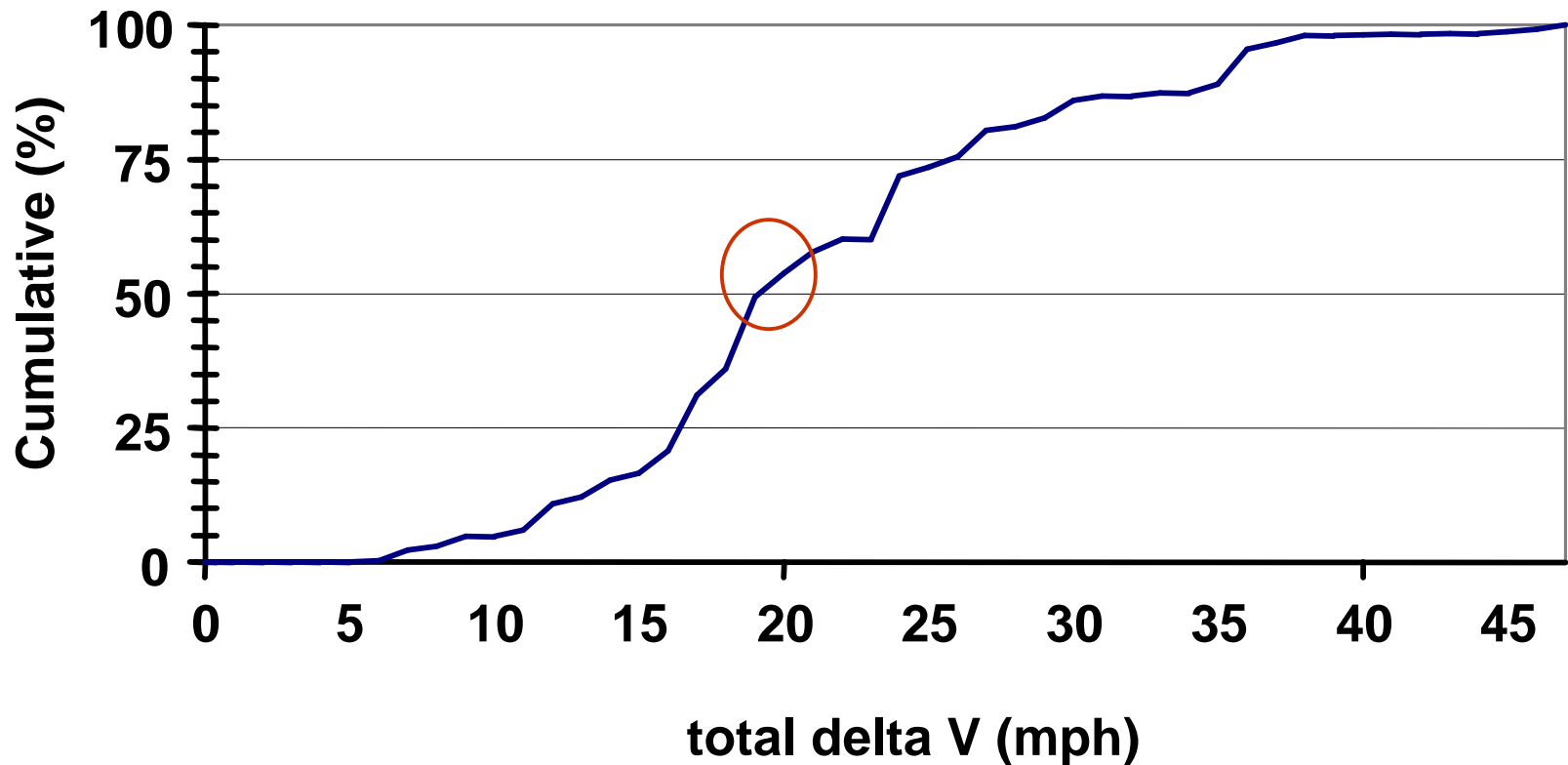
- Existing FMVSS 214 established minimum requirements for thoracic and pelvic protection for occupants in car-to-car side crashes
- ***Research Goals:*** Promote head protection & improve protection for other body regions for all light vehicles; provide protection for a wider segment of population using advanced side impact dummies (both 50th male and 5th female)

- **Side impact pole test development**

Motivation: Representative pole test will promote head protection for all vehicle classes (including heavier and high-hooded LTVs); will also improve structure and provide self-protection when side struck by LTVs

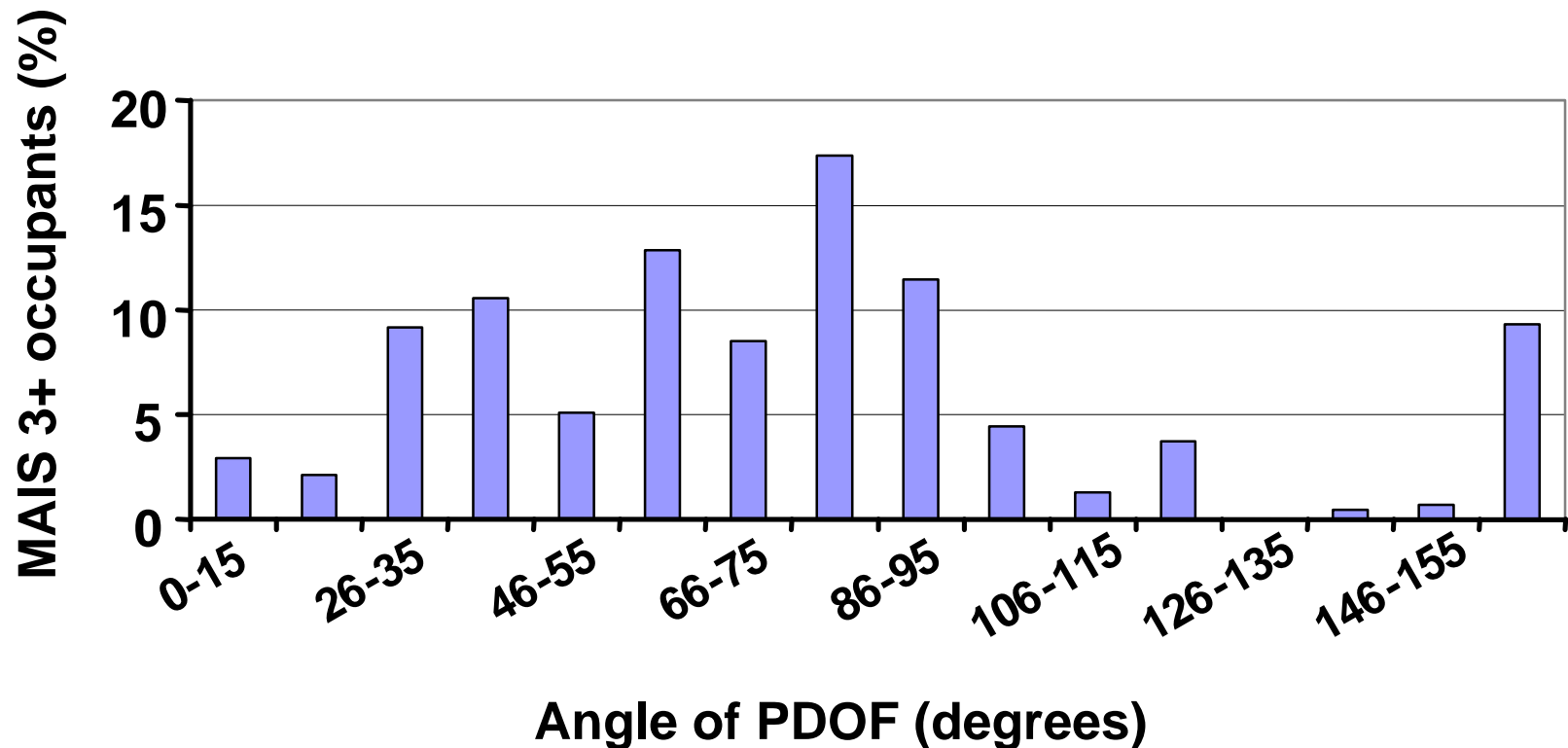
Narrow Object Side Crashes Total Delta V

Weighted 1990-2001 NASS/CDS Near Side Impacts, All MY
Belted Occupants With MAIS 3+ injuries



Narrow Object Side Crashes Angle of Approach

Weighted 1990-2001 NASS/CDS Near Side Impacts, All MY
Belted Occupants With MAIS 3+ injuries

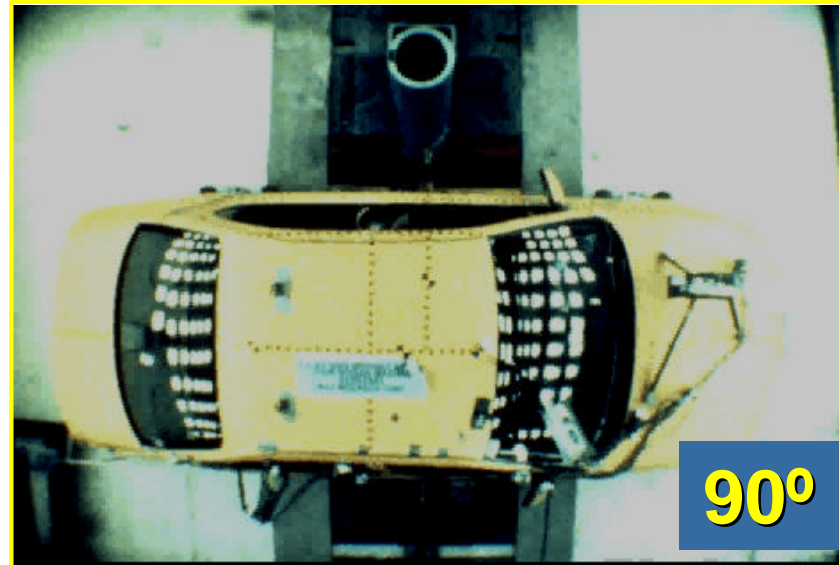


Oblique Pole Test

**20 mph closing speed
and 75° anticlockwise
angle of approach**



**Optional 201P: 18 mph
closing speed and 90°
angle of approach**



- **Crash test results for 50th male and 5th female dummies**

Oblique Pole Test – 50th male

		HIC36	Rib Defl (mm)	Lower Spine (Gs)	Abd Force (N)	Pubic Force (N)
99 Maxima*	head/chest combo	5,254	35.7	45.1	1,196	2,368
00 Saab 9-5*	head/chest combo	243	49.9	58.3	1,382	2,673
99 Volvo S80	curtain + thorax	329	48.6	51.2	1,547	1,127
00 Saab 9-5	head/chest combo	171	49.4	49.0	1,366	1,733
04 Honda Accord	curtain + thorax	446	30.7	49.9	1,437	2463
04 Camry	curtain + thorax	405	43.4	50.6	1,165	1,849

Note : dummy driver seated per 201P otherwise mid-track

Oblique Pole Test – 5th female

		HIC36	Rib Defl (mm)	Lower Spine (Gs)	Abd. Defl (mm)	Pelvis Force** (N)
03 Camry	curtain + thorax*	512	33.8	78	42.3	4,580
00 Saab	head/chest combo	2,233	31.7	67	29.5	6,045
02 Explorer	curtain*	4,595	37.4	101	46.8	7,141
04 Honda	curtain + thorax	397	25.8	56	23.8	6128

Note : dummy driver seated full forward in seat

*** Air bags deployed remotely 11-13 ms**

****Sum of Iliac and Acetabular loads**

FMVSS 214 Tests – 50th male

		HIC36	Rib Defl (mm)	Lower Spine (Gs)	Abd Force (N)	Pubic Force (N)
Side NCAP Tests – Driver Data						
01 Focus	None	272	47.6	81.5	1858	3629
02 Impala	head/chest combo	138	50.8	67.0	1364	2442
03 Corolla	None	350	44.3	70.8	1986	3374
FMVSS 214 Tests – Driver Data						
01 Focus	None	137	36.3	59.7	1648	2833
02 Impala	head/chest combo	69	45.7	49.3	1225	1788
04 Honda	curtain + thorax	109	36.9	37.5	557	1983

FMVSS 214 Tests – 5th female



		HIC36	Rib Defl (mm)	Lower Spine (Gs)	Abd. Defl (mm)	Pelvis Force* (N)
Side NCAP Tests – Driver Data						
01 Focus	None	570	42.5	95	43.7	5298
02 Impala	Head/Chest Combo	164	42.9	63	49.6	3364
FMVSS 214 Tests – Driver Data						
01 Focus	None	181	30.4	72	37.9	5621
02 Impala	Head/Chest Combo	76	26.0	52	35.1	2753
01 Buick Le Sabre	Thorax	130	41.2	67	39.8	4,672
04 Honda Accord	Curtain + Thorax	103	44	51	44	5429

*Sum of Iliac and Acetabular loads