Strategies for Encouraging Vehicle Safety Improvements

Brian O'Neill

President

Insurance Institute for Highway Safety

19th ESV Conference

Washington DC ◆ June 6, 2005

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

New car buyers care about safety features

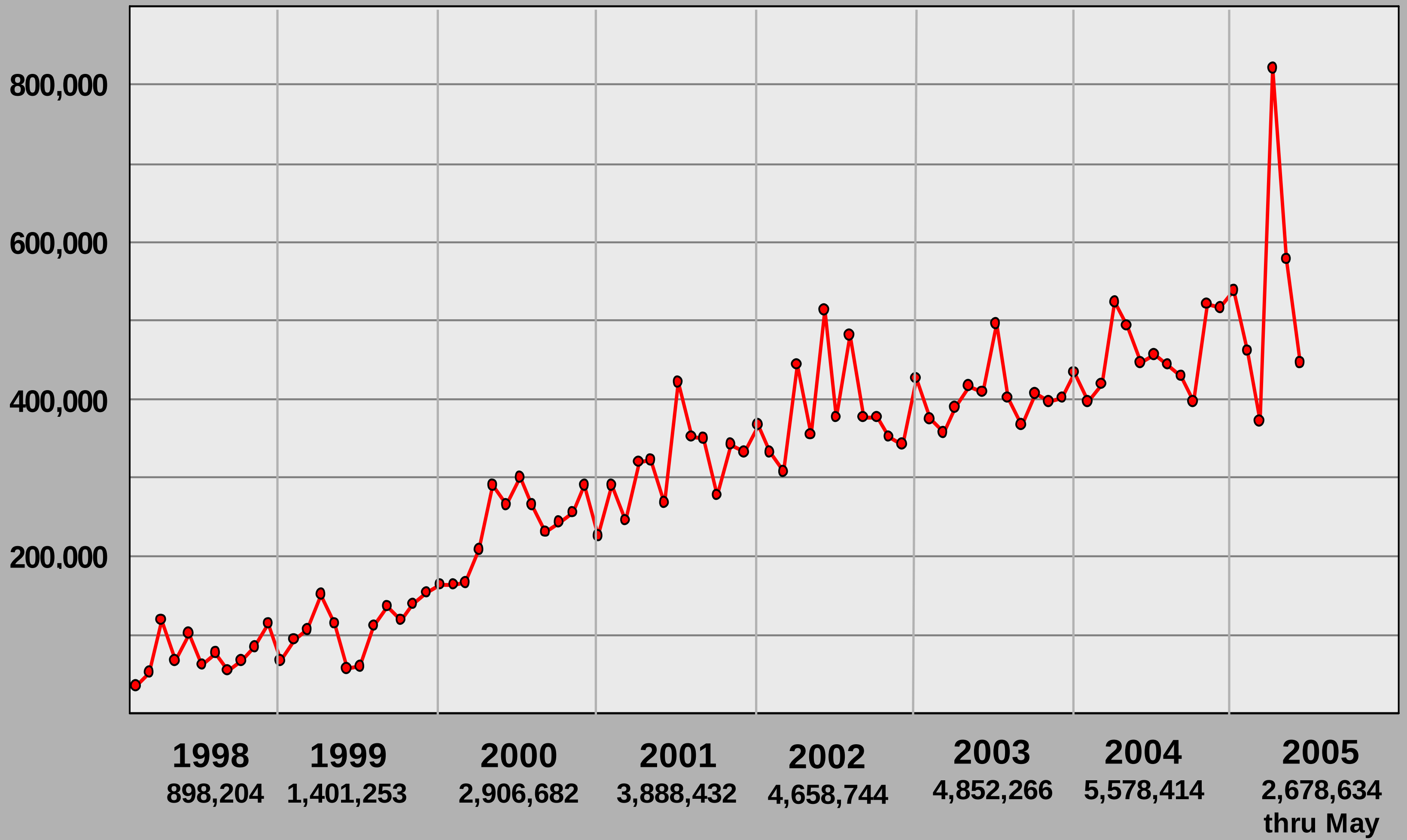
IIHS

Percentage of new car buyers for whom safety features are "extremely" or "very important" reason for buying

1981	64%
1983	67%
1985	73%
1987	74%
1989	76%
1991	77%
1993	79%
1995	83%
1997	83%
1999	84%
2000	85%
2001	85%
2002	81%
2003	81%

Source: DaimlerChrysler New Vehicle Experience

IIHS web visits



IIHS

Much of this interest has been created by crashworthiness rating programs for consumers

Crashworthiness rating programs for consumers

Frontal

- NHTSA and Japanese NCAP

  56km/h full-width rigid barrier tests
- IIHS, EuroNCAP, Australian NCAP, Japanese NCAP

  64 km/h 40 percent offset impacts into deformable barriers

Side

- NHTSA

  61.9 km/h "crabbed" impact of car-like MDB weighing 1,367 kg
- EuroNCAP, Australia NCAP, Japanese NCAP

  50.0 km/h perpendicular impact with car-like MDB weighing 950 kg
- IIHS

  50.0 km/h perpendicular impact with SUV-like MDB weighing 1,500 kg

Rear

- IIHS and others

  Head restraint geometry plus dynamic ratings from 16km/h sled test

IIHS

Crashworthiness rating programs have resulted in improved vehicle designs

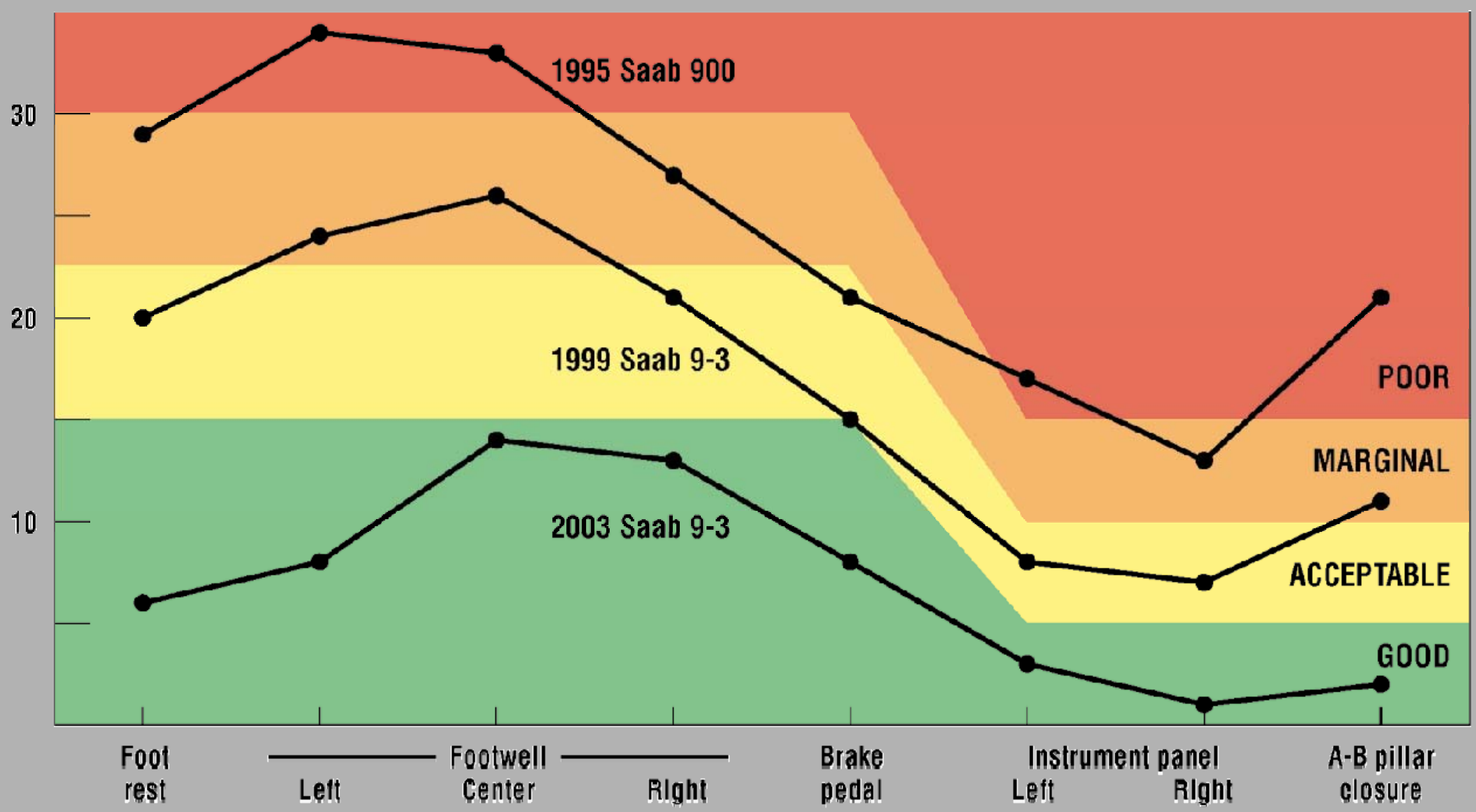
IIHS


Frontal offset crash tests
64 km/h:
1995 Saab 900
1999 Saab 9-3
2003 Saab 9-3

IIHS

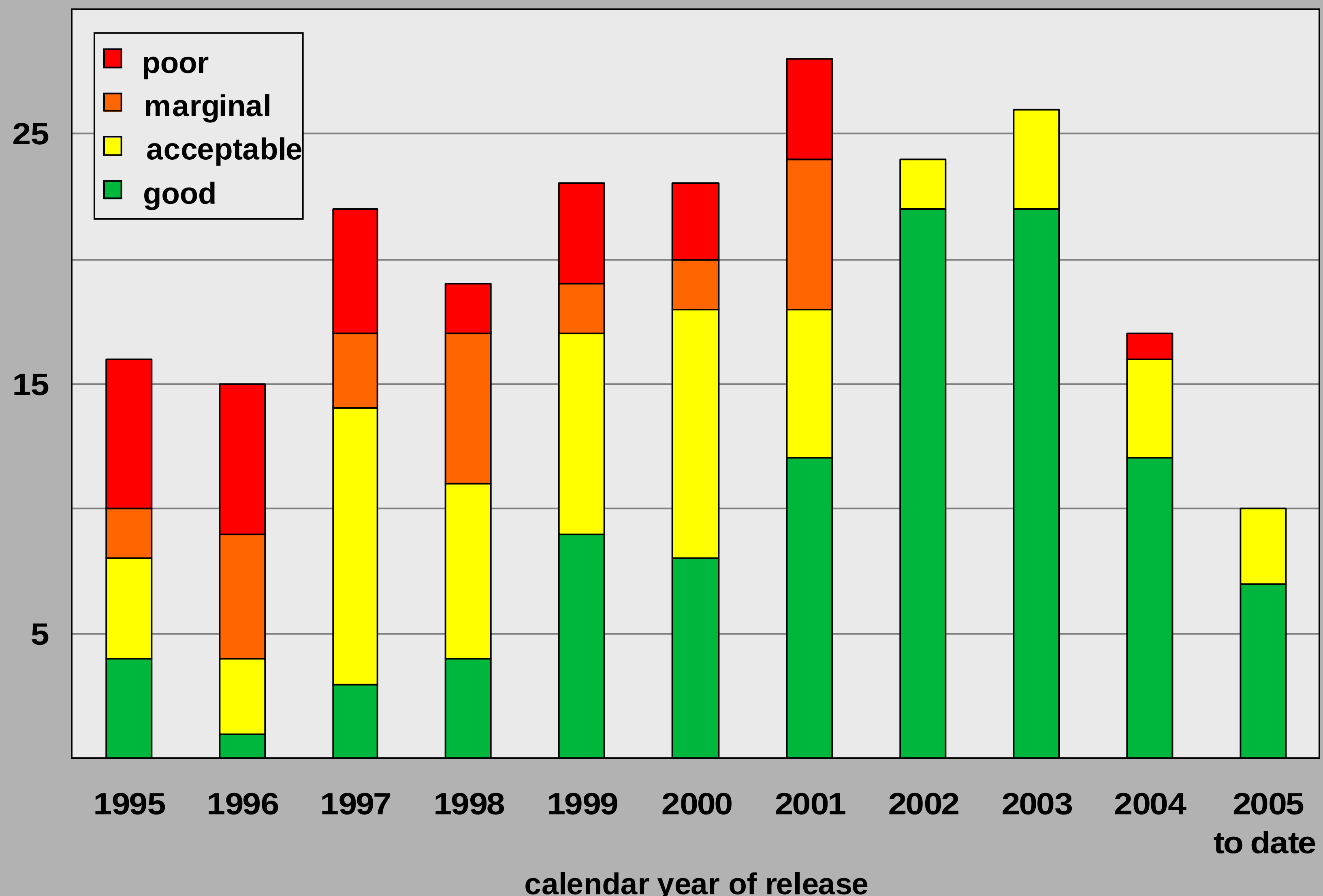
Comparison of three Saab models: 1995, 1999, and 2003

Measured intrusion (cm) in 64 km/h frontal offset tests



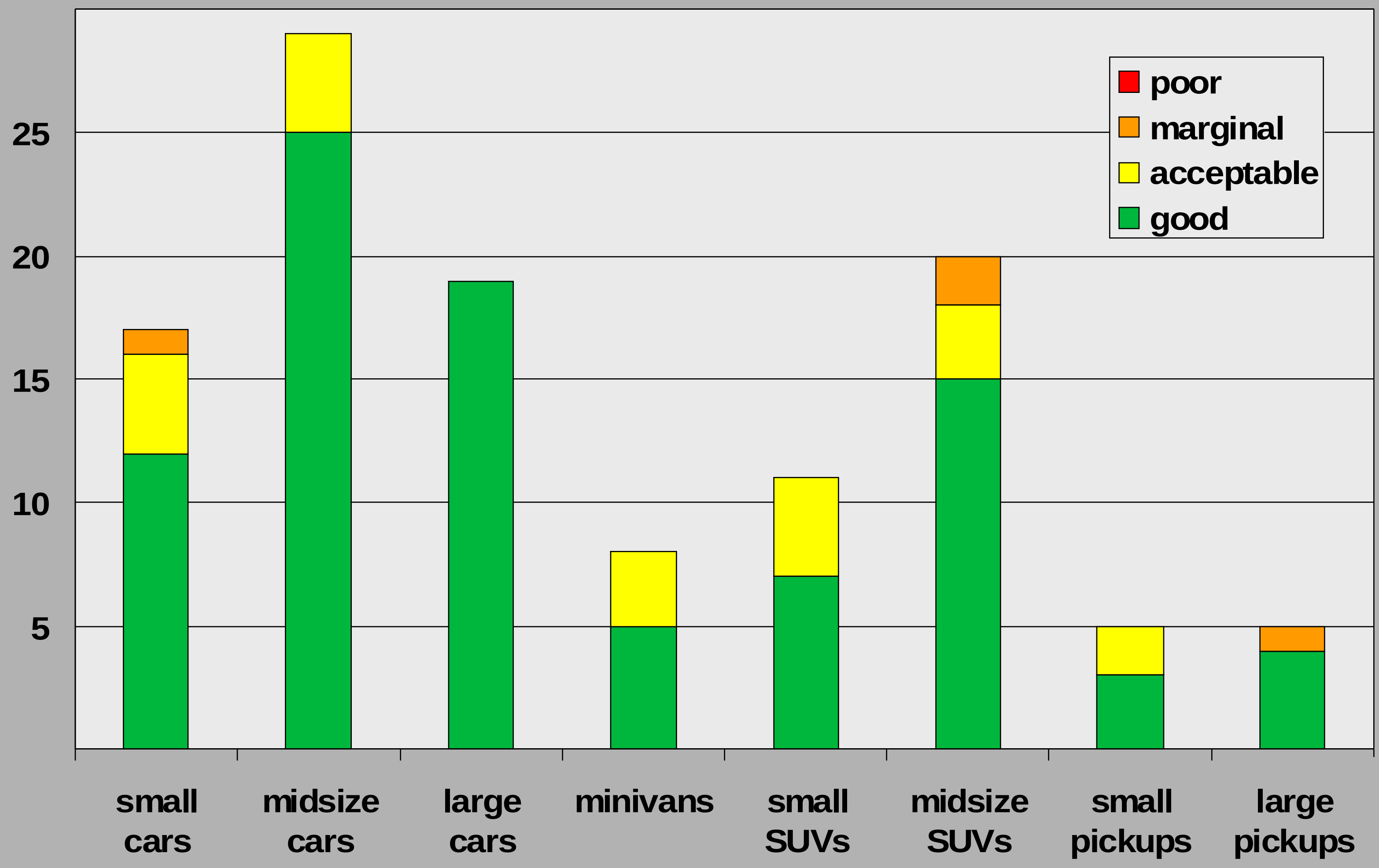
IIHS

IIHS frontal offset crash protection ratings 1995 to 2005



IIHS

Frontal crashworthiness ratings for currently available designs



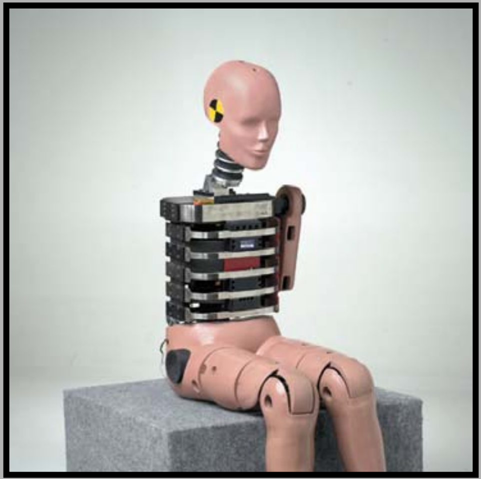
IIHS

Side impact crashworthiness evaluations

Moving deformable barrier crash tests
1,500 kg barrier at 50 km/h

Vehicles tested are rated

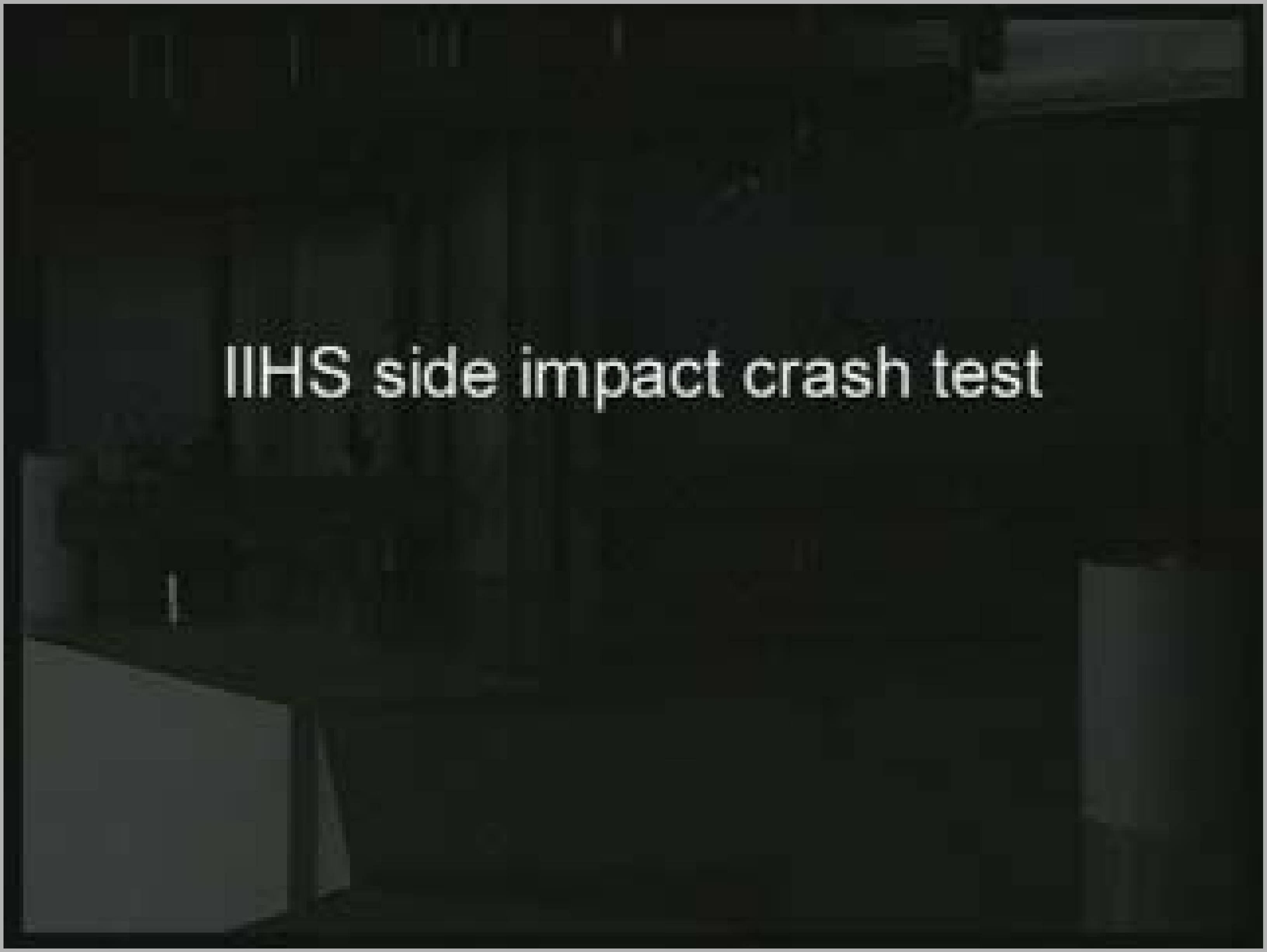
G GOOD A ACCEPTABLE M MARGINAL P POOR



injury measures from SID IIs dummies

head protection

structure



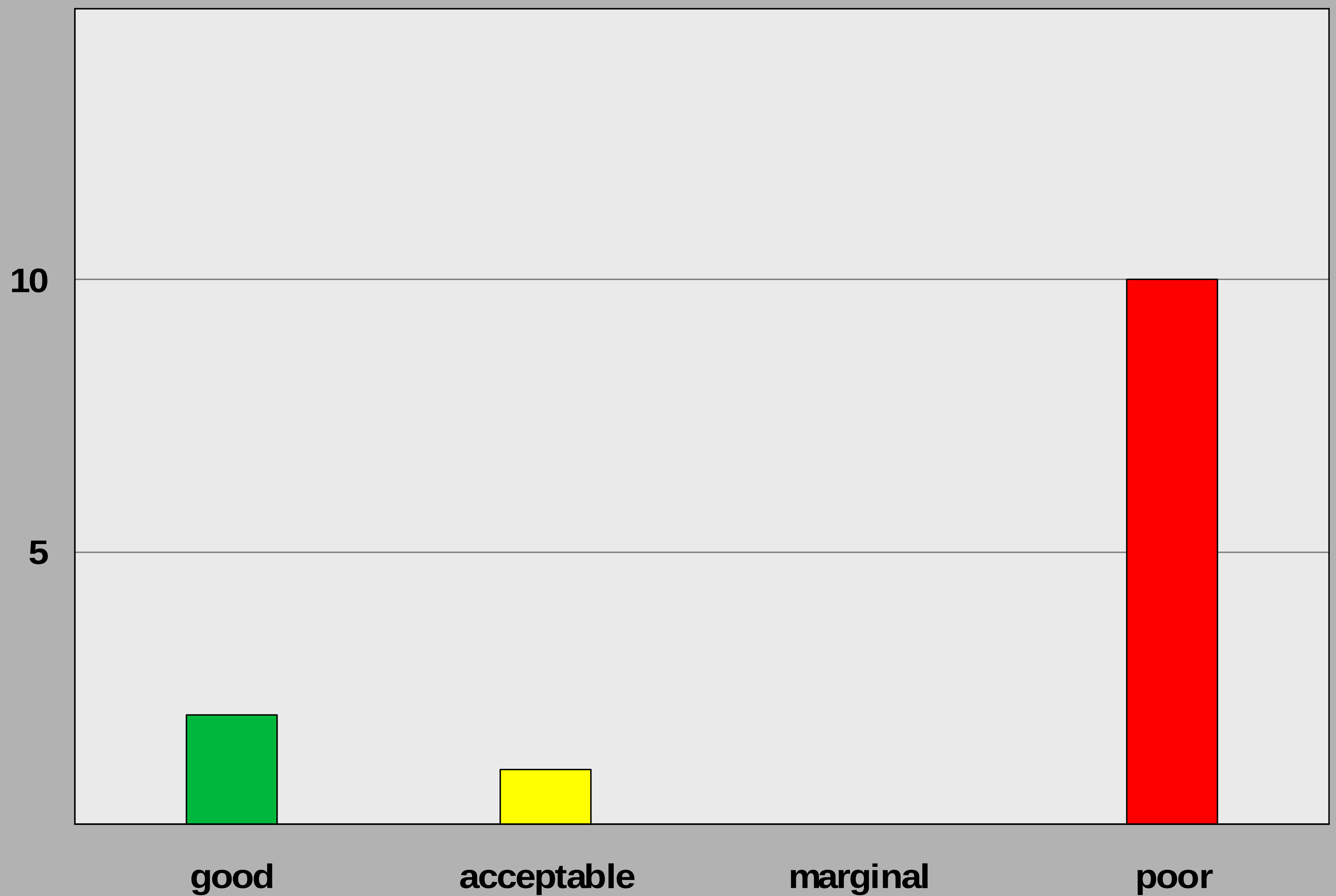
IIHS

Side impact protection ratings are improving rapidly

IIHS

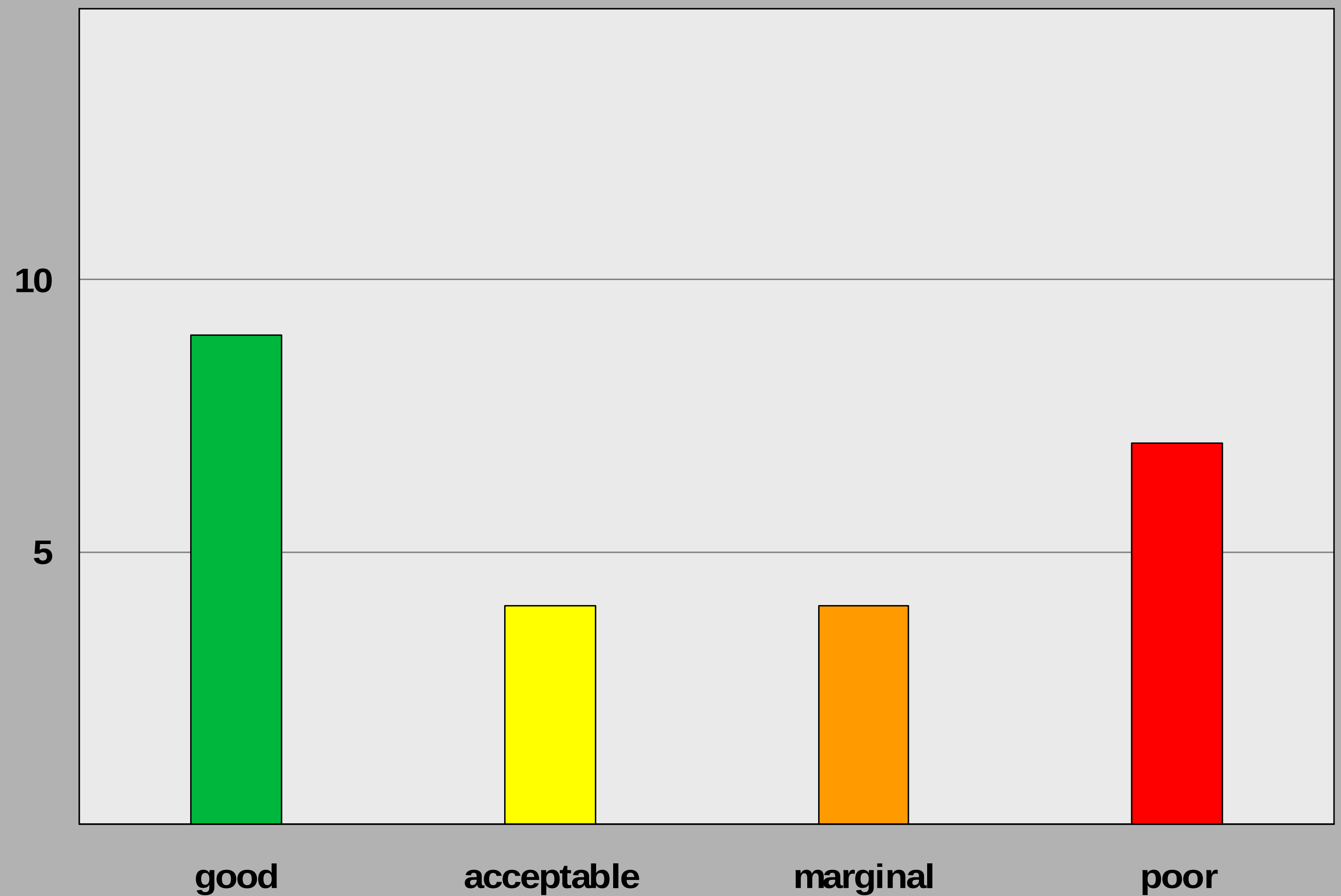
Side impact crashworthiness ratings for midsize cars

April 2004



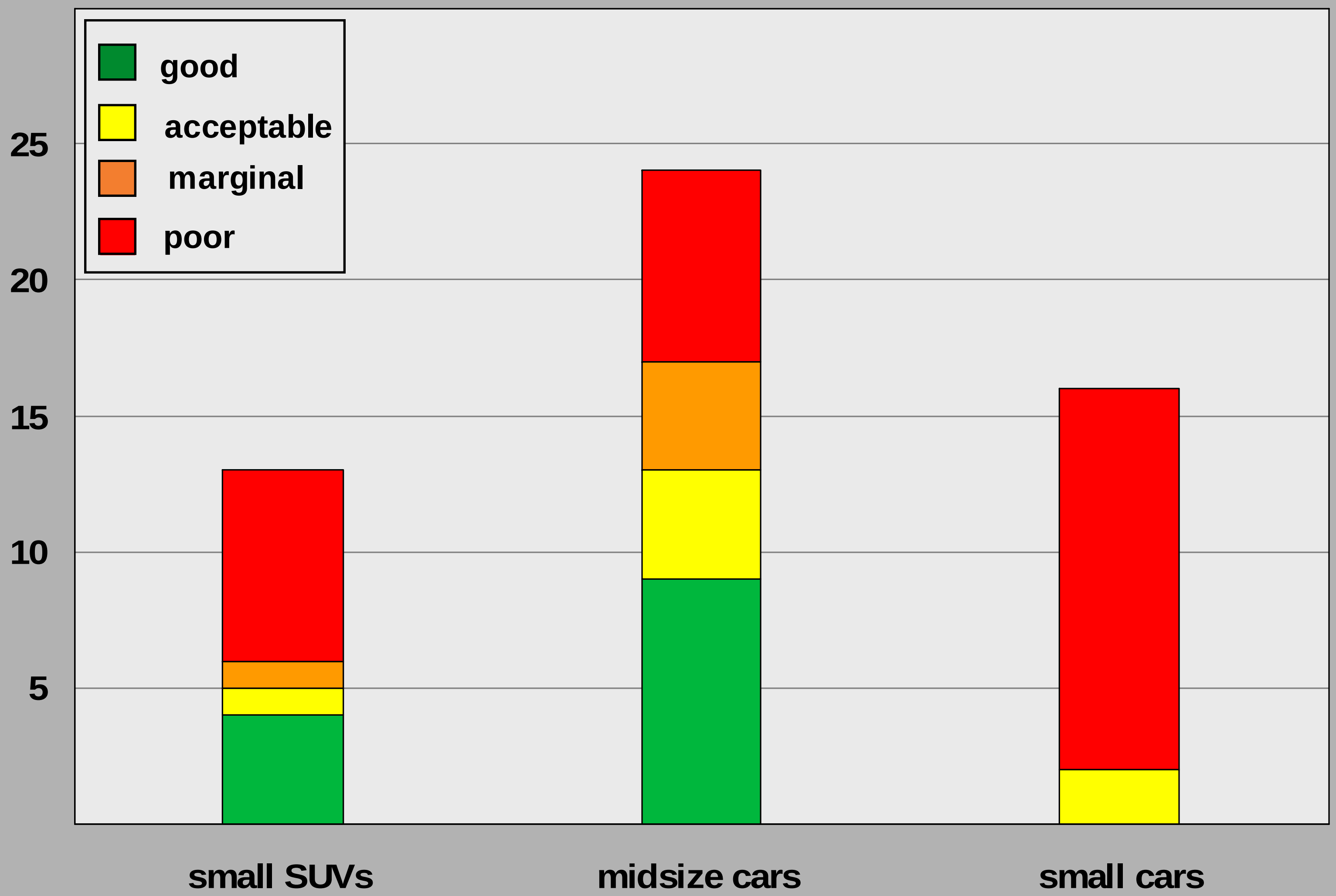
Side impact crashworthiness ratings for midsize cars

June 2005



IIHS

Side impact crashworthiness ratings for currently available designs



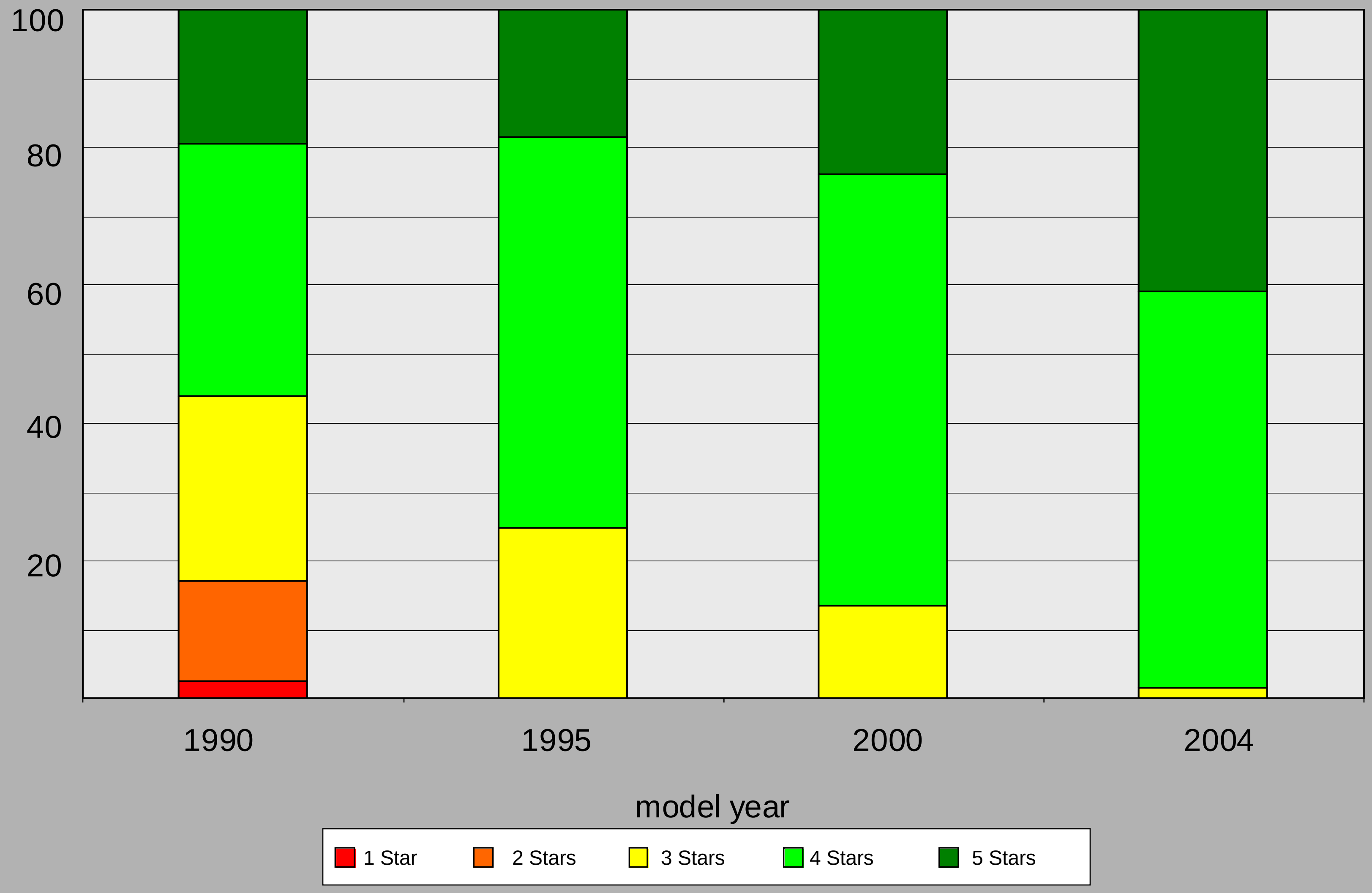
IIHS

NHTSA NCAP has also resulted in improved ratings for front and side crashworthiness

IIHS

NHTSA frontal NCAP ratings for drivers

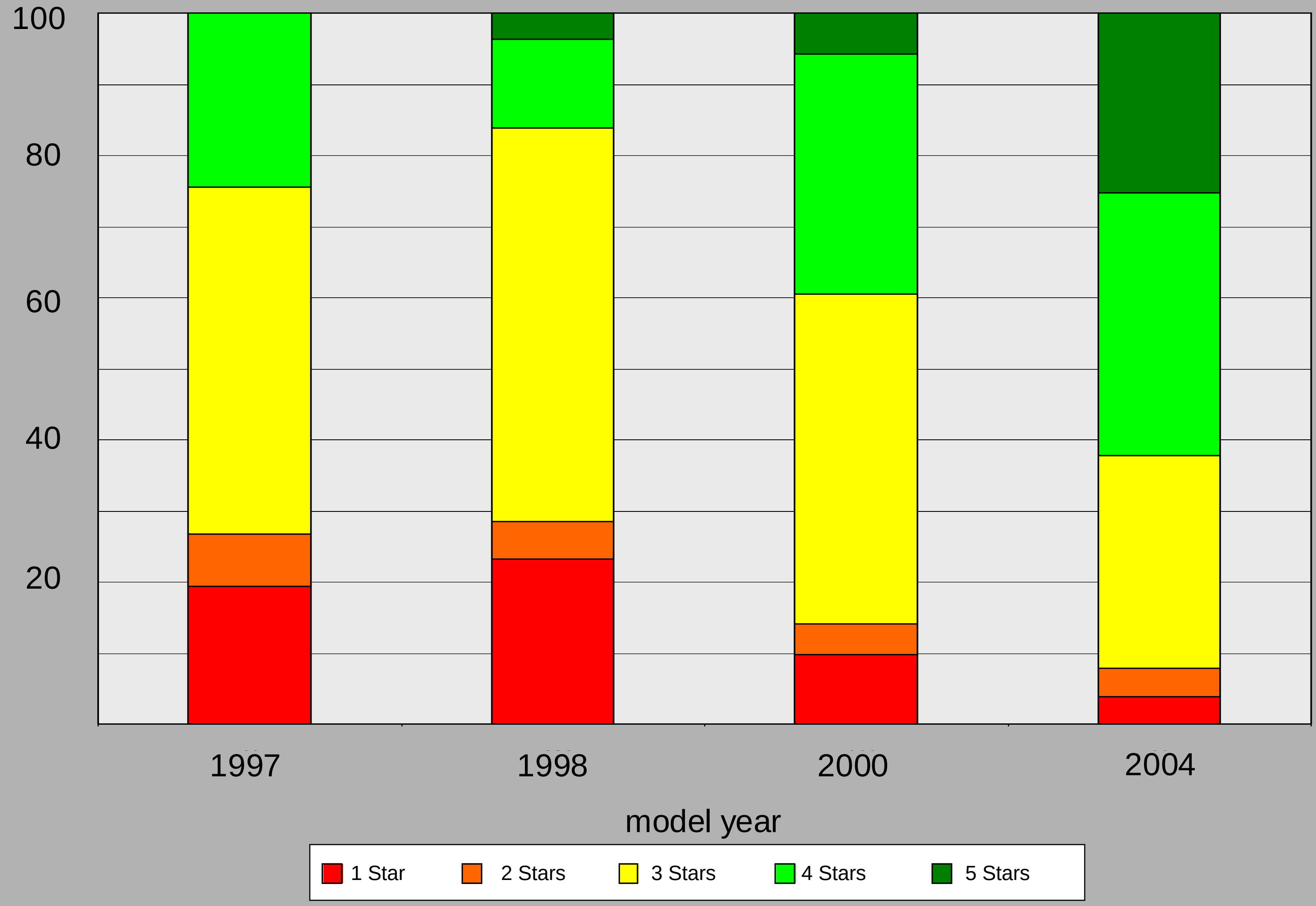
Percent of results by star rating



IIHS

NHTSA side NCAP ratings for drivers

Percent of results by star rating



IIHS

Crashworthiness improvements have reduced real world fatality rates

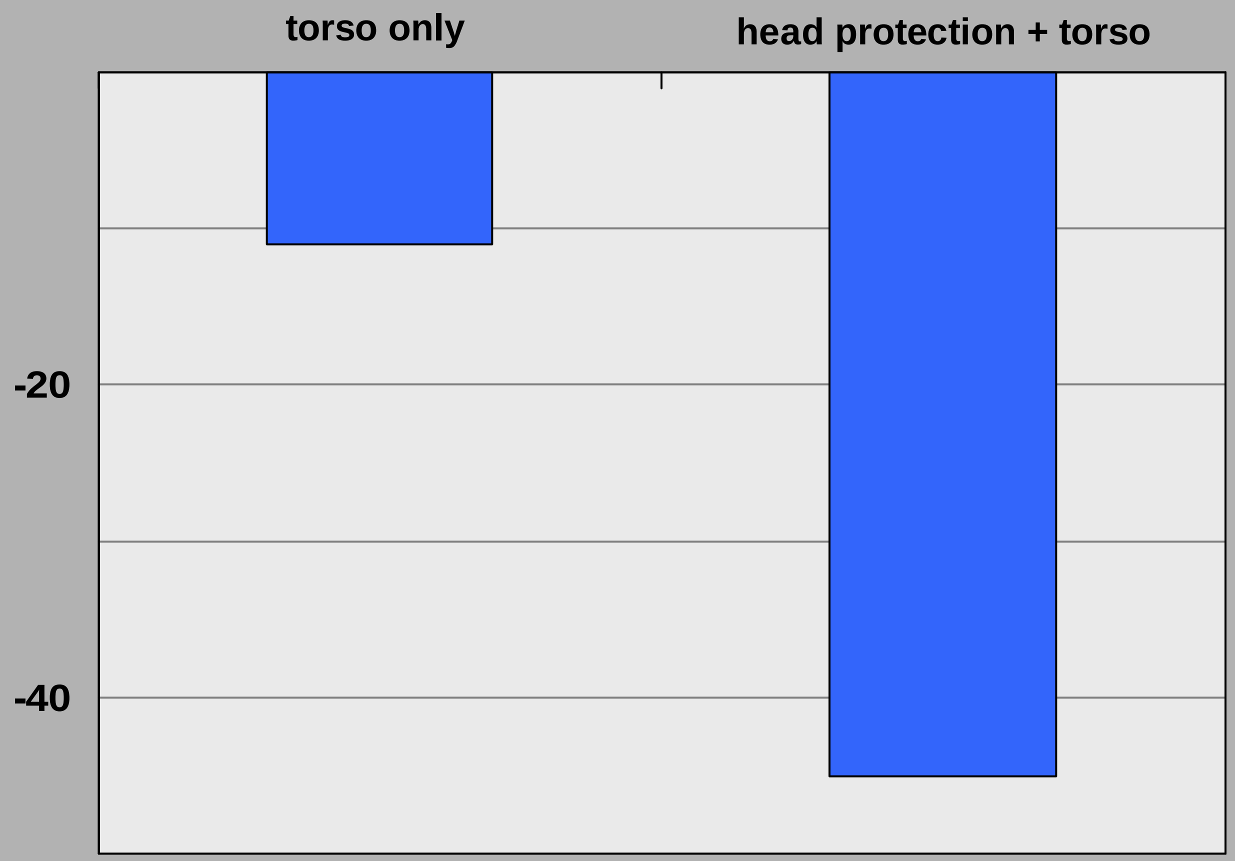
Fatality risk in real world head-on crashes

Percent driver fatality risk reduction by IIHS rating

IIHS

Estimated percent reductions in driver fatality risk in cars struck on the driver side

By type of side airbag, 1999-2001



IIHS

Crash avoidance technology:

Can we promote the same kinds

of improvements?

IIHS

Crash avoidance technologies

- Brake assist
- Run flat tires
- Adaptive cruise control with stop and go braking
- Blind spot detection
- Lane departure warning
- Night vision enhancement
- Backup warning
- Drowsy driver detection
- Blood alcohol concentration monitor
- Plus many more!

How can we assess the effectiveness of crash avoidance technologies?

Test track assessments can be misleading

Consider antilock brakes

- Test track demonstrations: improvements in stopping distances and control, especially on slippery surfaces
- Early real-world results: increases in single-vehicle fatal crashes of vehicles with antilock brakes
- Latest results: increases in fatal crashes have disappeared, but antilock performance still disappointing; no obvious real-world benefits

IIHS

Small scale fleet studies not always good predictors

Consider center high mounted stop light systems

- Intended to reduce the number of rear end collisions by improving braking signal recognition
- Three fleet studies reported large (~50%) reductions in relevant urban crashes
- A study of their effectiveness on the vehicle fleet found 3-7% reductions in crashes

IIHS

Excessive claims are being made for potential benefits of crash avoidance technologies

Example: “Roughly half of all collisions between vehicles could be prevented if each driver would initiate his accident avoiding maneuver approximately half to one second earlier.” (Enke, 1979)

IIHS Status Report

1994

Flawed Study of Crashes In Germany Underlies Many IVHS Safety Claims

Proponents Misrepresent Findings Of 1979 Study to Bolster Claims that IVHS Technologies Can Cut Crashes

One of the main selling points for intelligent vehicle highway systems (IVHS) is the potential to prevent collisions. The premise is that only minor changes in response time would allow drivers to avoid crashes, and IVHS technologies would supply the necessary warning to give drivers more response time.

James Constantino of IVHS America and others bolster their safety claims by pointing to a Daimler-Benz study by Kurt Enke. Specifically, they point to Enke's statement that "roughly half of all collisions between vehicles could be prevented if each driver would initiate his accident avoiding maneuver approximately a half to one second earlier."

IIHS

Ideally evaluations should be based on real world performance, comparing vehicles with and without new technology

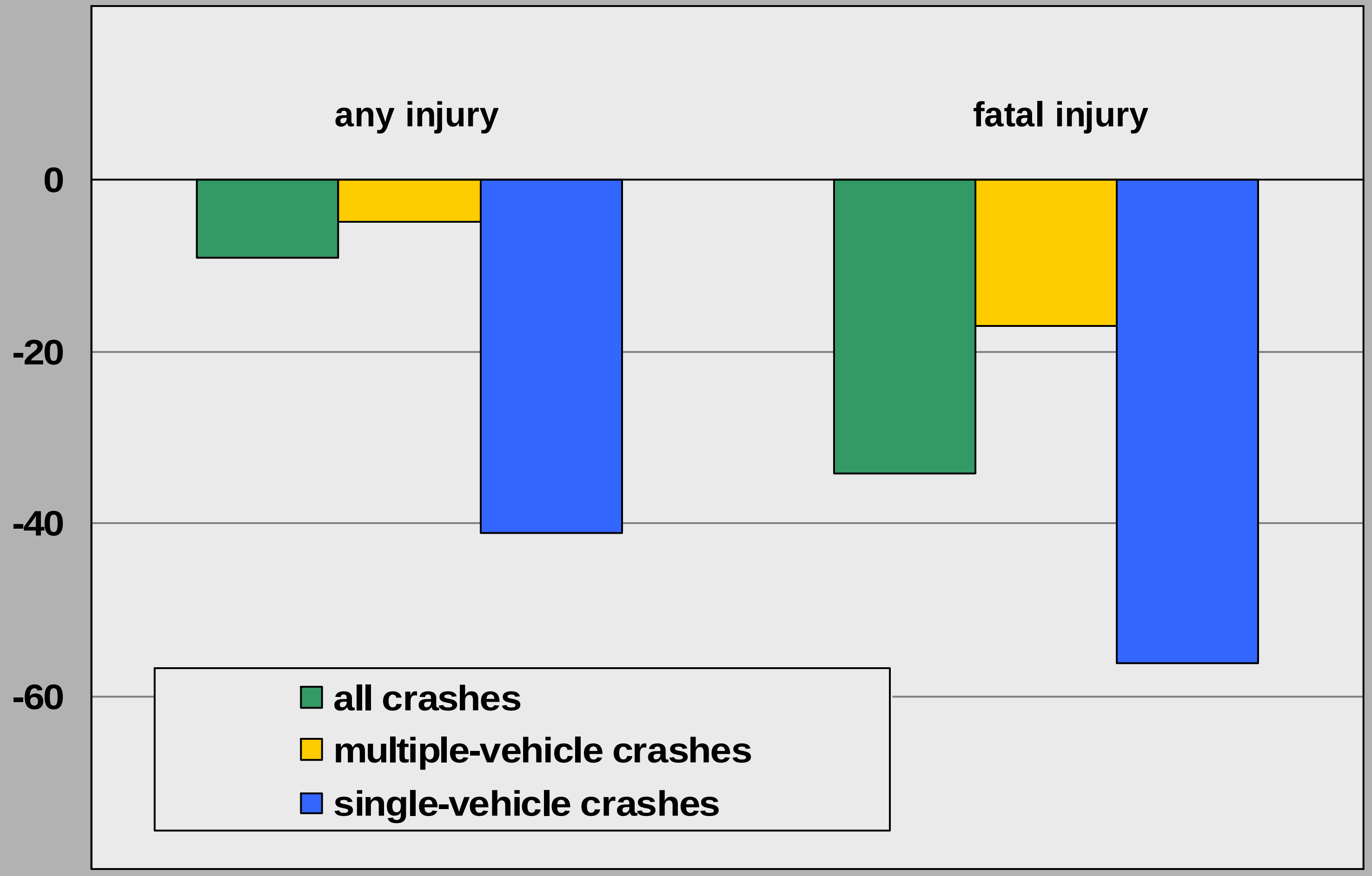
Effectiveness of Electronic Stability Control (ESC)

Methodology

- Comparison of crash rates per registered vehicle for cars and SUVs with standard ESC vs. same vehicle models with optional or no ESC
- 1999-2002 model vehicles from Acura, Audi, BMW, Cadillac, Chevrolet, Jaguar, Lexus, Mercedes, Toyota, Volkswagen, and Volvo

Effects of ESC on crash involvement risk

Percent change in crash rates for vehicles with standard ESC vs. optional or no ESC



IIHS

Electronic Stability Control performs well on test tracks and real world performance also is good


Split-screen:
Vehicle with ESC
compared with
vehicle with ESC deactivated

Problems with real world evaluations of crash avoidance technology

- Require comparisons of vehicles with and without technology that otherwise are the same; yet new features often introduced on new models
- Long delays often occur before valid evaluations are possible, e.g. ESC introduced in 1998 models in the U.S. but first evaluations published in 2004

IIHS

Issues to be considered when assessing potential benefits of crash avoidance technologies

- How big is the problem the technology is intended to address?
- Does the technology noticeably change the driving task? If so are drivers likely to change their behavior in response?
- Does the technology require a driver to react, e.g. respond to a warning? If so what kind of warning?

IIHS

Lane departure warning systems

- How big is the problem?

  Not possible to determine from standard crash data bases.

- Can we learn anything from other research?

  Continuous rumble strips on shoulders of interstates reduce "drift-off-road" crashes by about 20 percent.

  Center line rumble strips on rural two-lane roads reduce frontal and opposing direction side-swipe injury crashes by 25 percent.

Lane departure warning systems

- Does the technology noticeably change the driving task?

  Yes, drivers will be warned when their vehicles cross lines without a turn signal.

- How are drivers likely to respond?

  If warnings are infrequent and similar to highway rumble strips, it seems likely that drivers would respond as they do to rumble strips.

  If warnings are frequent and different from rumble strip warnings, driver responses would be unpredictable.

Conclusions

- Assessing the potential benefits of crash avoidance technologies is not easy
- Most crash data bases do not have sufficiently reliable information to determine the magnitude of the problem each technology is addressing
- Driver responses (when needed for technology to be effective) are difficult to predict
- New assessment methods are needed

IIHS

For more information:

www.iihs.org

INSURANCE INSTITUTE FOR HIGHWAY SAFETY