

STATUS INSURANCE INSTITUTE FOR HIGHWAY SAFETY REPORT

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SURVIVING SIDE CRASHES

As the driver of this car was turning left out of a parking lot, she was struck by an approaching SUV. The impact was severe, and vehicle damage was extensive. However, the driver escaped unscathed. She didn't even seek medical attention. A likely reason was the side airbag that cushioned her head, chest, and abdomen during the collision. These are reducing driver deaths in cars struck on the near (driver) side by an estimated 37 percent. Airbags that protect the torso (chest and abdomen) but not the head are reducing deaths by 26 percent, a new Institute study has found. The study expands and updates a 2003

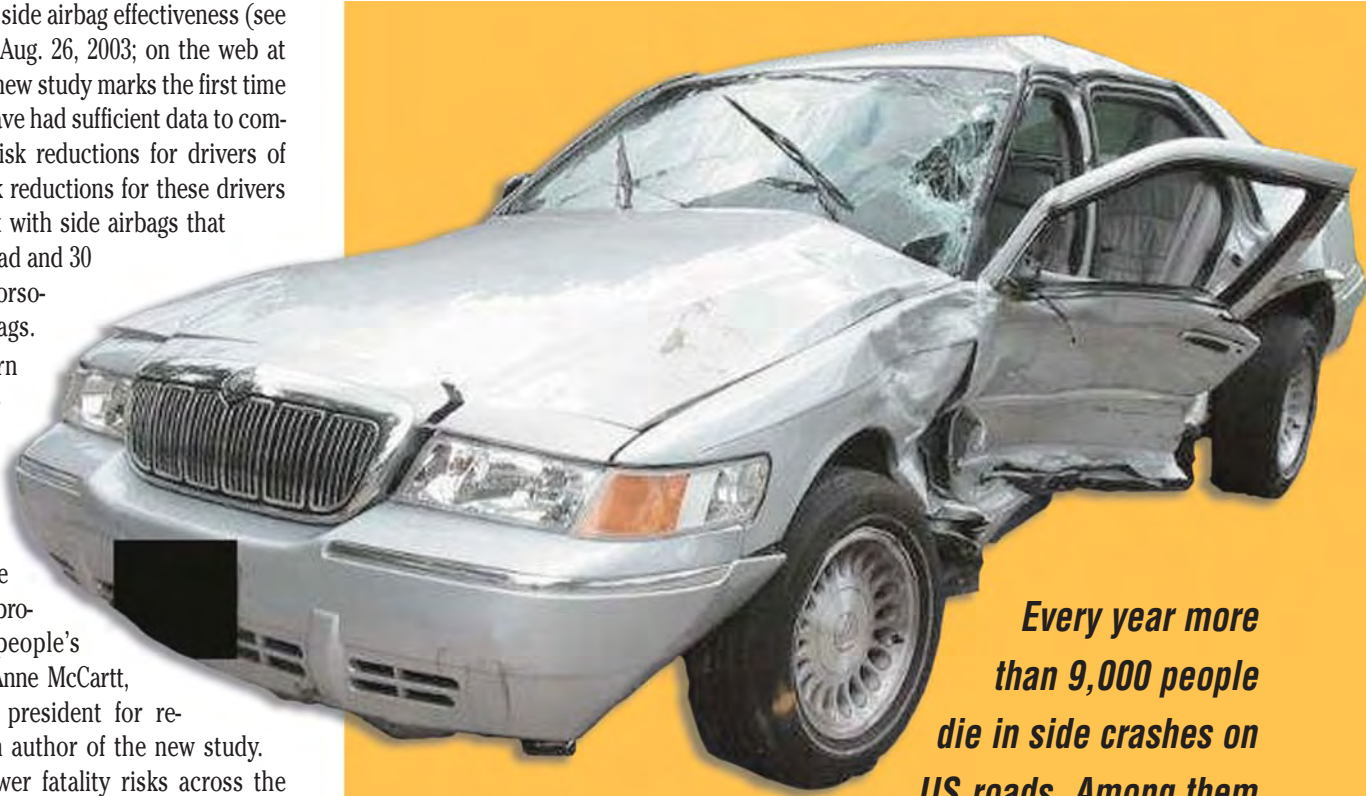
assessment of side airbag effectiveness (see *Status Report*, Aug. 26, 2003; on the web at iihs.org). The new study marks the first time researchers have had sufficient data to compute fatality risk reductions for drivers of SUVs. The risk reductions for these drivers are 52 percent with side airbags that protect the head and 30 percent with torso-only side airbags.

“The pattern in both studies is clear. Side airbags are saving lives, and the most effective ones include protection for people’s heads,” says Anne McCartt, Institute vice president for research and an author of the new study. “We found lower fatality risks across the board — among both older and younger drivers, male and female drivers, and drivers of smaller cars as well as much larger passenger vehicles.”

Head-protecting side airbags reduce driver fatality risk when cars are struck by SUVs and pickup trucks, not just by other cars. This is important because risks go up for people in cars that are struck in the side by the higher riding vehicles. In particular, the car occupants’ heads are vulnerable to being struck.

Auto manufacturers are cooperating to reduce vehicle incompatibilities in both side and front collisions that lead to occupant injuries in struck cars (see *Status Report*, April 28, 2005; on the web at iihs.org). A big part of this effort is to equip all passenger vehicles with head-protecting side airbags.

Not all side impacts involve one vehicle striking another one. Some of these crashes involve a single vehicle that goes out of control, leaves the road, and then hits a tree or a utility pole, for example. Side airbags provide some protection in these crashes as well as in collisions involving two vehicles.



Every year more than 9,000 people die in side crashes on US roads. Among them are the drivers of these three cars, all of whom died of head injuries. None of them was protected by side airbags, which reduce fatality risk. Side airbag designs that include protection for car drivers’ heads are reducing the risk by 37 percent.



Benefits in older versus newer vehicles:

In 2003 Institute researchers produced estimates of the benefits of side airbags in preventing car driver deaths. The main findings were a 45 percent fatality risk reduction for drivers of cars with head-protecting side airbags and an 11 percent risk reduction with side airbags that protect the torso but not the head.

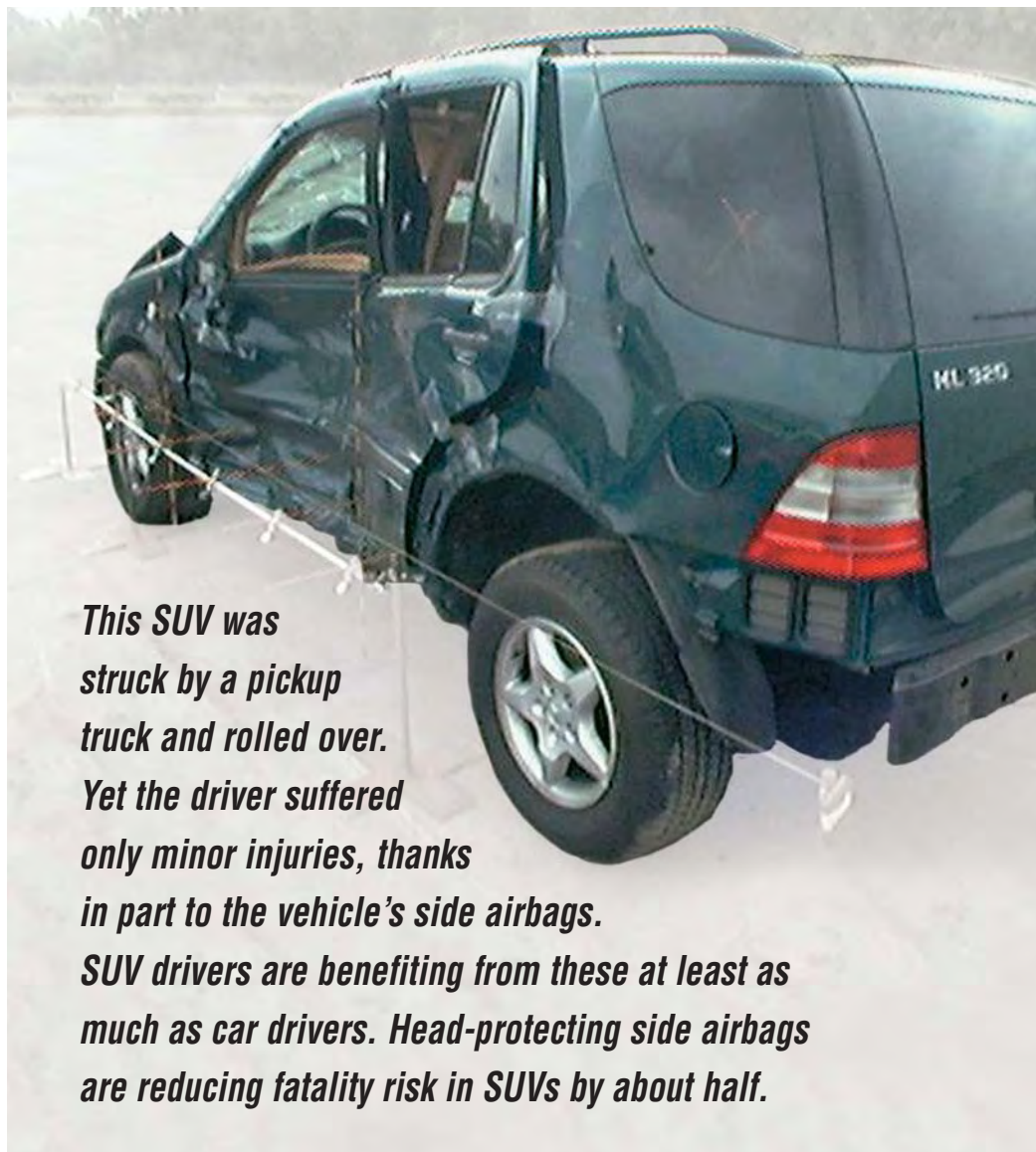
This study was based on 1997-2002 model cars in crashes during 1999-2001. The Institute's new study includes three sets of effectiveness estimates. One is based on the same car models as the 2003 study. Researchers also analyzed the effectiveness of side airbags in newer cars (2001-04 models during 2000-04) and for a combination of newer and older cars (1997-2004s).

Estimates of side airbag effectiveness in SUVs are based on newer models only (2001-04s during 2000-04). Not enough earlier models had side airbags to compute reliable effectiveness estimates.

Both the 2003 study and the new one are based on data from the federal Fatality Analysis Reporting System and General Estimates System. The authors of both studies calculated fatality risk in cars without side airbags, with head-protecting side airbags, and with airbags that protect people's torsos but not their heads (almost all vehicles with head-protecting airbags provide torso protection too).

One main difference is that the new study reflects more years of data — still a relatively small dataset but enough to compute separate results for SUVs. Another important difference is the new study's refined method of accounting for differences among drivers and for vehicle differences besides the presence or absence of side airbags.

Both the older study and the new one reveal side airbag benefits, but the estimates of effectiveness differ. The best estimates from the new analyses, based on the combined set of vehicles (1997-2004s), show somewhat smaller benefits of head-protecting side airbags and larger benefits of torso airbags, compared with the earlier study. The difference in effectiveness for



This SUV was struck by a pickup truck and rolled over. Yet the driver suffered only minor injuries, thanks in part to the vehicle's side airbags. SUV drivers are benefiting from these at least as much as car drivers. Head-protecting side airbags are reducing fatality risk in SUVs by about half.

these two airbag types was smaller when researchers looked at newer cars only (2001-04 models during 2000-04).

“These variations in the findings depending on the datasets of vehicles aren't surprising. Side airbags are relatively new, and datasets still are small. This means fluctuations in results are to be expected,” McCartt says. “What's important is the consistency of the overall pattern. Regardless of what vehicle model years we included, side airbag benefits were revealed, and the benefits were greater for head-protecting side airbags than for torso-only ones.”

These findings track results of the Institute's side crash tests conducted since 2003

for consumer information (see *Status Report*, June 28, 2003; on the web at iihs.org). All 33 current models with good ratings in this test are equipped with head-protecting side airbags. Very few poor performers are.

To compare vehicles' front, side, and rear crashworthiness ratings, go to iihs.org.

Side airbags proliferate in 2006 models: Although federal regulations don't require side airbags in passenger vehicles, more and more manufacturers are installing them. In part this is because of a voluntary agreement among automakers, forged in 2003, to improve occupant protection in side impacts with SUVs and pickups — an agreement that essentially *(continues on p.7)*

EVENT DATA RECORDERS WON'T BE REQUIRED

More than half of all new cars sold in the United States have event data recorders, or EDRs, that investigators can use to peer into the crucial seconds before and during crashes for information like vehicle speed, braking, belt use, and impact severity. New federal rules, effective for 2011 passenger vehicle models, are expected to broaden EDR usefulness by standardizing the data that are collected. But the rules fall short of requiring EDRs.

"There are things EDRs can tell you about a crash that investigators can't," says Susan Ferguson, Institute senior vice president for research. "The new rules are going in the right direction by requiring the collection of uniform data, but the government should have gone further and mandated EDRs in all new passenger vehicles."

EDRs extend the information from airbag crash sensors, which measure vehicle decelerations to determine if a serious crash is occurring and whether airbags should inflate. The EDR gathers information from these sensors and in some cases from other vehicle systems, storing it in its memory in the event of a crash.

These devices have grown more sophisticated with new airbag technologies. EDRs are used in some manufacturers' automatic systems that notify call centers when serious crashes occur.

The information EDRs collect varies by automaker, and data retrievability is mixed. The federal rules aim to not only standardize the data but also make it easier for researchers, law enforcement personnel, and others to download the information. The government directed the manufacturers to ensure by licensing pacts or other means that technology is commercially available to retrieve the data from EDRs. And for the


first time automakers will have to tell consumers if the vehicles they're buying are equipped with EDRs, satisfying some concerns about privacy.

Under the new rules, EDRs have to record a minimum set of specified data in a uniform format to answer questions about crash severity, vehicle dynamics, and safety systems up to five seconds before impact and a third of a second afterward. Did the driver apply the brakes? How fast was the vehicle going? Was the driver's safety belt buckled? What was the maximum speed change of the vehicle during the impact? If an EDR records more information, such as steering before impact and whether electronic stability control was operating, the rules specify the format and time period for recordation.

Investigators and insurers can use objective information like this to get a better understanding of what's happening before and during collisions and to secure more reliable and complete measures of the severity of crashes. In some cases, EDRs also can help to determine who's culpable in crashes.

Regulators say they didn't feel compelled to require EDRs in all new passenger vehicles because about 64 percent already have them. This is expected to grow to 85 percent by the 2010 model year.

Ford, General Motors, Isuzu, Mazda, Mitsubishi, Subaru, and Suzuki voluntarily equip all of their passenger vehicles with EDRs (information as of 2005 models). More than half of all Toyotas have EDRs. Other vehicle manufacturers, mostly German and Korean plus some Japanese, don't bother. Vehicles from BMW, Daewoo, Honda, Hyundai, Kia, Mercedes, Nissan, Porsche, and Volkswagen don't have EDRs, according to federal estimates.



When a car skidded and crashed on an icy road in Massachusetts, killing a passenger, EDR data established the driver was speeding. She was charged with vehicular homicide. In contrast, a driver facing the same charge in Florida was cleared when data from his car's EDR indicated he hadn't been speeding at the time of a fatal crash. Besides such specific uses, EDR data have enormous potential to help researchers understand the circumstances and severities of crashes.

"It makes no sense for EDRs not to be in every new vehicle, whether automakers voluntarily install them or the government tells them to," Ferguson says. "The information EDRs can provide is critical in understanding how people are injured in crashes, especially as auto manufacturers incorporate more sophisticated technologies into their fleets. If EDRs were standard equipment, researchers as well as the automakers themselves would have a wider pool of reliable data to help evaluate occupant pro-

QUESTIONS ABOUT EDRs? WE'VE GOT ANSWERS

What's an EDR? Popularly called a “black box,” an event data recorder (EDR) collects certain information from a vehicle immediately before and during a crash or near-crash — not all crashes but most of the serious ones. An outgrowth of airbag control modules, some recorders indicate only whether the airbag was properly armed and whether there was a signal to inflate. These devices aren't considered true EDRs, so they aren't covered under the government's new rules (see facing page). Devices that record vehicle speed before a crash or speed change during the impact are defined under the federal rules as EDRs.

Are all EDRs alike? No, those in current models vary in terms of the information they collect. Under the federal rules that will apply to 2011 and later models, devices defined as EDRs must record 15 data elements, including vehicle deceleration, in specific formats. More advanced EDRs may record information from the engine control module, antilock brakes, and other systems. Advanced EDRs also may log more information during a crash including, for example, time from impact to frontal airbag deployment, deployment level, and time from impact to maximum velocity change.

Who owns the data? Who has access? EDRs and the data they store belong to vehicle owners. Police, insurers, researchers, automakers, and others may gain access with owner consent. Without consent, access may be obtained through a court order. For crashes that don't involve litigation, especially when police or insurers are interested in assessing fault, the insurers may be able to access the EDRs in their policyholders' vehicles based on contract provisions. However, some states prohibit the contracts from requiring policyholders to consent to access.

Are EDRs used for crash notification? Automatic notification systems are designed to alert emergency responders, including police and medical personnel, when crashes occur. These systems use data from EDRs, airbag sensors, and global positioning systems to identify the occurrence of crashes, their severity, and the location of involved vehicles. This information is sent by cellphone to emergency dispatchers or to a private call center that forwards it to local 911 operators.

For more detailed answers to these questions plus other Q&As on EDRs, go to iihs.org/research.



ARE EDRs REQUIRED?

No, passenger vehicles don't have to have them, but many automakers are equipping their vehicles voluntarily. The EDRs shown here are from Ford and General Motors vehicles, all of which have the devices. So do Isuzus, Mazdas, Mitsubishiis, Subaru, and Suzukis. EDRs aren't in vehicles from BMW, Daewoo, Honda, Hyundai, Kia, Mercedes, Nissan, Porsche, or Volkswagen.

tection technologies and answer other crashworthiness questions.”

The federal rules cover EDR-equipped passenger vehicles that are manufactured after September 2010. Certain manufacturers will get a year's extension. The National Highway Traffic Safety Administration, which issued the rules, says that “with certain modest modifications, many current EDR systems can meet our goals of facilitating [automatic crash notification] and improving crash reconstructions.”

TRUCKER FATIGUE isn't lessening; 1 of every 5 drivers reports falling asleep at truck wheel

When a tractor-trailer overturned on a Maryland road, it spilled lumber onto the roadway below (right) and killed a motorist. The same week in a nearby Virginia community, a jury awarded \$17 million to the family of a 17 year-old killed in a truck crash.

Even worse was a Florida crash in which a truck hit a van (below right), killing all seven of the van's child passengers. When their grandfather learned of the tragedy, he suffered a fatal heart attack.

A common aspect of these crashes is truck driver fatigue. The Maryland trucker had been driving for 16 hours without rest. The one in Virginia fell asleep at the wheel. The Florida trucker had napped only briefly during the past 34 hours. He didn't brake before hitting the van.

The Institute has been surveying truck drivers since 2003 to see how changes in federal work-hour rules are affecting the fatigue problem (see *Status Report*, July 16, 2005; on the web at iihs.org). The trend during the past two years, under the latest set of federal rules, is for truckers to drive even more hours than they were reporting in 2003 surveys, exacerbating fatigue. Nearly 1 of every 5 truckers in 2005 reported driving more per day than before the current work-hour rules took effect in 2004. The proportion who reported falling asleep at the wheel at least once during the past month increased from about 13 percent in 2003 to 21 percent in 2005.

This is why the highway safety community is anticipating the Federal Motor Carrier Safety Administration's pending plans for electronic recorders in trucks to monitor drivers' hours. This step comes two years after a federal appeals court prodded the agency for its "passivity" on recorders and 20 years after the Institute first asked the government to require recorders in trucks (see *Status Report*, Aug. 1, 2004; on the web at iihs.org; see also *Status Report*, Nov. 8, 1986).



(continued from p.3) will result in all cars, SUVs, and pickups having head-protecting side airbags by the 2010 model year.

About three of every four new car and SUV models already have standard or optional side airbags that include head protection. These are huge increases since side airbags were introduced in a handful of models in the mid-1990s (see *Status Report*, May 4, 1996).

The airbags vary by design. Some descend from the vehicle roof to protect the heads of occupants in both front and back seats. Combination side airbags inflate from vehicle seats or sometimes doors to protect occupants' torsos and their heads too.

Pickup trucks aren't matching the pattern of rapidly being equipped with side airbags. Fewer than half of all pickups have any side airbags, standard or optional.

"When every passenger vehicle on the road has side airbags that include head protection for front-seat occupants, we can save as many as 2,000 lives per year," McCartt concludes.

For a copy of "Efficacy of side airbags in reducing driver deaths in driver-side car and SUV collisions" by A.T. McCartt and S.Y. Kyrychenko, write: Publications, Insurance Institute for Highway Safety, 1005 N. Glebe Rd., Arlington, VA 22201, or email publications@iihs.org.

ROBERT McDERMOTT, strong champion of the Institute since the 1980s, died last month at 86

Brigadier General Robert F. McDermott will be remembered for multiple accomplishments in his Air Force career and subsequent tenure as chairman of one of the nation's leading insurers, USAA. In the highway safety community, he'll be remembered as an advocate of loss control or, as McDermott himself put it, "relieving the burden of suffering." His motives were both humane and economic.

The insurance industry has "the opportunity to save lives," McDermott said in 1987. "Remembering that we are in a profession that deals with life and death — and not just tangentially — tells us who we are and why we are different from the rest of the pack."

This commitment led McDermott to champion the Institute's work, serving on the board of directors for a decade (1984-93). Joining with former Institute president William Haddon, Jr., M.D., McDermott undertook a national effort in the 1980s to quantify and publicize the hazards of driving small cars compared with larger ones (see *Status Report*, Dec. 30, 1982). He also touted the benefits of airbags before they became widely available, praising Ford for putting them in affordable vehicles and buying airbag-equipped vehicles for his company's fleet.

As chairman of the Institute when Haddon died in 1985, McDermott led the board of directors in appointing Brian O'Neill to lead the organization. McDermott helped to ensure a smooth transition into O'Neill's presidency (1985-2006) and the continuation of Haddon's legacy.

"McD will be remembered as a strong highway safety voice, even advocating some activities that were controversial at the time," O'Neill says. Current Institute president Adrian Lund adds that "this organization wouldn't be what it is today without General McDermott."



The elderly driver of this Cadillac Seville survived the impact when his car was struck by a large SUV in an intersection. He did suffer injuries, including fractures of the ribs and pelvis, but the inflation of the side airbag from the Seville's driver seat helped to save his life.

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