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# INSURANCE INSTITUTE FOR HIGHWAY SAFETY

## NEWS RELEASE

July 25, 2004

VNR: Mon., 7/26, 10-10:30 am EDT (C) IA (formerly Telstar) 6/Trans. 22  
and again 7/26, 1-1:30 pm EDT (C) IA 5/Trans. 19; fed in rotation

### **NEW CRASH TEST RESULTS:**

#### **SMALL SUV FROM TOYOTA IS 1ST TO EARN 'DOUBLE BEST PICK' DESIGNATION FOR BOTH FRONT AND SIDE CRASHWORTHINESS**

ARLINGTON, VA — The 2004 Toyota RAV4 equipped with optional side airbags is the first vehicle to earn good ratings and "best pick" designations for both front and side impact crashworthiness tests conducted by the Insurance Institute for Highway Safety — a "double best pick." The Institute rates vehicles on how well they protect occupants in front and side crashes, assigning each vehicle a rating of good, acceptable, marginal, or poor. The better performers among the good vehicles in front and side tests are designated "best picks." Vehicles that earn "best pick" designations in both tests are "double best picks."

"Results for this small SUV show manufacturers can provide good protection for occupants in the two most common kinds of serious crashes," says Institute chief operating officer Adrian Lund. "Unfortunately Toyota hasn't made side airbags standard, and the RAV4 without side airbags is still rated poor for side impact protection."

The Institute also tested the Subaru Legacy, which earned a good rating and a "best pick" designation in the frontal test but a marginal rating in the side impact test. This midsize inexpensive car was redesigned for the 2005 model year. The RAV4 was tested because of the recent addition of side airbags and because Toyota made some changes to this vehicle's front-end structure to improve frontal crash performance. Both the RAV4 and the Legacy belong to groups of vehicles that the Institute evaluated in earlier front and side crashes (see Attachment 2).

— MORE —

In the Institute's frontal offset test, a vehicle strikes a deformable barrier at 40 mph. The vehicle is offset so that only 40 percent of the front end strikes the barrier on the driver side. In offset tests, a smaller area of the front end must manage the crash energy than in full-width tests. Injury measures are taken from a dummy representing an average-size male (50th percentile) positioned in the driver seat.

In the Institute's side impact test, a moving deformable barrier strikes the driver side of a passenger vehicle at 31 mph. The barrier weighs 3,300 pounds and has a front end shaped to simulate the front of a typical pickup or SUV. In each side-struck vehicle are two instrumented dummies the size of a short (5th percentile) female. One dummy is positioned in the driver seat, and one is in the rear seat behind the driver.

**RAV4 improves in both tests:** This is the third version of the RAV4 evaluated in the Institute's frontal test.

"In the first frontal crash test in 1998, the RAV4 was a marginal performer," Lund says. The dummy's head hit the window frame during the crash. Its knee hit a metal flange under the steering column, which punctured the dummy's vinyl "skin." High accelerations were recorded on the dummy's head and chest. There also was a likelihood of injury to the left leg.

The RAV4 was redesigned in 2001, and its performance improved. "But it still was rated only acceptable in the frontal test," Lund says. High accelerations were recorded when the dummy's head struck the steering wheel through the driver airbag, and forces on both legs indicated the possibility of injuries. For 2004 model RAV4s manufactured after December 2003, Toyota made structural modifications to improve offset test performance.

"RAV4s with the modifications are much improved," Lund says. "The dummy's movement during the crash was well controlled, and injury measures taken from the head, neck, and chest all were low. The new RAV4 is now a good performer and a 'best pick' in the frontal test."

**RAV4's side test results improve with side airbags:** In the Institute's first set of side impact tests of small SUVs, the 2003 RAV4 was among seven designs that earned the lowest rating of poor. Only the Subaru Forester with standard side airbags and the 2001-04 Ford Escape with optional side airbags earned good ratings. The Hyundai Santa Fe with standard side airbags was rated acceptable.

"In 2003 you couldn't buy a RAV4 with side airbags," Lund points out. "The side structure was rated marginal, and because there were no head protection airbags the driver dummy's head was struck by the intruding barrier. Measures also showed the likelihood of major torso injuries and pelvic fractures. The 2004 RAV4 equipped with optional side airbags is a huge improvement. The structure is better, but side airbags with head protection made the biggest difference compared with the old RAV4."

Forces recorded on the driver and passenger dummies were "dramatically lower," Lund adds. "This time, the driver dummy's head was cushioned by the curtain airbag and wasn't struck by the barrier."

A torso airbag deploying from the seat also helped to reduce injury forces on the lower body of the driver dummy.

"When the Institute began frontal offset crash testing in 1995, manufacturers made big improvements in the protection vehicles provide to occupants in frontal crashes," says Lund. "The side impact test is now driving similar improvements in protection for occupants in side crashes. But only buyers of RAV4s who opt for the side airbags get good protection in side impacts. All manufacturers should provide side airbags with head protection as standard equipment."

**Side airbags are reducing risks in real-world crashes:** Institute research shows that in vehicles with side airbags to protect the head, the risk of a fatal injury is reduced by 45 percent among drivers of cars struck on the driver side. Side airbags that protect the chest and abdomen, but not the head, also are reducing deaths but are less effective (about a 10 percent reduction in deaths). Before the availability of head-protecting airbags, there was virtually nothing to pre-

vent people's heads from being struck by intruding vehicles or rigid objects like trees or poles in serious side impacts.

**Legacy earns top rating in frontal test:** The driver space was maintained with little intrusion into the occupant compartment. Dummy movement was well controlled, and all injury measures were low.

"The Legacy performed well across the board in the frontal test and earns a good rating and a 'best pick,'" Lund says.

**Subaru recalls Legacy after side impact test:** The Institute conducted two side impact crash tests of the Legacy. In the first test, the standard side curtain airbag deployed improperly, so the driver dummy's head was hit by the intruding barrier. Subaru found that the side airbags weren't folded correctly at the factory where they were produced. Subaru corrected the problem and recalled Legacy models manufactured earlier. When the Institute tested another Legacy with the modified airbags, the driver side curtain inflated properly.

"The heads of the front and rear dummies were protected by the airbag," Lund says, "but other measures taken from the driver dummy indicated the likelihood of rib fractures and internal organ injuries plus the possibility of pelvic fractures. These kept the Legacy from earning a higher than marginal rating."

The Institute recently tested 13 midsize car designs, and only the Honda Accord and Toyota Camry with optional side airbags earned good ratings. The Chevrolet Malibu with side airbags was acceptable. The rest were poor (see Attachment 2, p.2).

**How vehicles are evaluated:** The Institute's frontal crashworthiness evaluations are based on results of frontal offset crash tests at 40 mph. Each vehicle's overall evaluation is based on three aspects of performance — measurements of intrusion into the occupant compartment, injury measures from a Hybrid III dummy positioned in the driver seat, and analysis of slow-motion film to assess how well the restraint system controlled dummy movement during the test.

Each vehicle's overall side evaluation is based on injury measures recorded on two instrumented SID-IIIs dummies, assessment of head protection countermeasures, and the vehicle's structural performance during the impact. Injury measures obtained from the two dummies, one in the driver seat and the other in the rear seat behind the driver, are used to determine the likelihood that the driver and/or passenger would have sustained serious injury to various body regions. The movements and contacts of the dummies' heads during the crash also are evaluated. This assessment is more important for seating positions without head-protecting airbags which, assuming they perform as intended, should prevent injurious head contacts. Structural performance is based on measurements indicating the amount of B-pillar intrusion into the occupant compartment. Some intrusion into the compartment is inevitable in serious side impacts, but any intrusion that does occur should be uniform both horizontally and vertically and shouldn't seriously compromise the driver or passenger space.

**End five-page news release on front & side crash test results**

**Attachment 1: front & side ratings of 2 vehicles, RAV4 & Legacy**

**Attachment 2: ratings of small SUVs & midsize inexpensive cars**

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**For more information go to [www.iihs.org](http://www.iihs.org)**

ATTACHMENT 1: NEWLY TESTED VEHICLES, P.1 OF 1

**SUBARU LEGACY**  
MIDSIZE INEXPENSIVE CAR  
STANDARD SIDE AIRBAGS

**FRONTAL EVALUATION BASED ON  
40 MPH FRONTAL OFFSET CRASH TEST**  
2005 models; test vehicle = 3,298 lbs.

OVERALL  
FRONTAL RATING

G **BEST PICK frontal**

STRUCTURE/  
SAFETY CAGE

G

INJURY MEASURES

Head/neck	Chest	Leg/foot (right/left)	
G	G	G	G

**SIDE EVALUATION BASED ON IMPACT  
INTO DRIVER SIDE BY MOVING DEFORMABLE  
BARRIER REPRESENTING FRONT OF SUV**

TESTED WITH STANDARD SIDE AIRBAGS  
2005 models; avg. test vehicle = 3,322 lbs.

OVERALL  
SIDE RATING

M

HEAD  
PROTECTION

Driver	G
Rear passenger	G

INJURY MEASURES

Head/neck	Torso	Pelvis/leg
G	P	M
G	G	G

STRUCTURE/  
SAFETY CAGE

A

**DOUBLE  
BEST  
PICK**

**TOYOTA RAV4**  
SMALL SUV  
OPTIONAL SIDE AIRBAGS

**FRONTAL EVALUATION BASED ON  
40 MPH FRONTAL OFFSET CRASH TEST**  
2004 models (mfg. after 12/2003); test vehicle = 3,126 lbs.

OVERALL  
FRONTAL RATING

G **BEST PICK frontal**

STRUCTURE/  
SAFETY CAGE

G

INJURY MEASURES

Head/neck	Chest	Leg/foot (right/left)	
G	G	G	A

**SIDE EVALUATION BASED ON IMPACT  
INTO DRIVER SIDE BY MOVING DEFORMABLE  
BARRIER REPRESENTING FRONT OF SUV**

TESTED WITH OPTIONAL SIDE AIRBAGS  
2004 models; test vehicle = 3,195 lbs.

OVERALL  
SIDE RATING

G **BEST PICK side**

HEAD  
PROTECTION

Driver	G
Rear passenger	G

INJURY MEASURES

Head/neck	Torso	Pelvis/leg
G	G	G
G	G	G

STRUCTURE/  
SAFETY CAGE

A

GOOD **G** **M** MARGINAL  
ACCEPTABLE **A** **P** POOR






















Note: Side impact crash test ratings can be compared across vehicle type and weight categories. However, **frontal crash test ratings cannot be compared across vehicle categories** because the kinetic energy involved in the frontal test depends on the speed and weight of the test vehicle, and the impact is more severe for heavier vehicles.

## ATTACHMENT 2: OVERALL CRASHWORTHINESS EVALUATIONS P.1 OF 2

Small SUVs	OVERALL FRONTAL EVALUATION	OVERALL SIDE EVALUATION	HEAD RESTRAINTS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">NEWLY TESTED</div> <div style="background-color: green; color: white; border-radius: 50%; padding: 5px; display: inline-block; margin-top: 10px;">DOUBLE BEST PICK</div> <p style="text-align: center;"><b>TOYOTA RAV4 WITH OPTIONAL SIDE AIRBAGS</b>            Front: 2004 models (mfg. after 12/2003);            test vehicle = 3,126 lbs.            Side: 2004 models;            test vehicle = 3,195 lbs.</p>	G	BEST PICK frontal G	BEST PICK side G
<p style="text-align: center;"><b>SUBARU FORESTER STANDARD SIDE AIRBAGS</b>            Front: 2003-04 models; test vehicle = 3,197 lbs.            Side: 2003-04 models; avg. test vehicle = 3,192 lbs.</p>	G	BEST PICK frontal G	active restraint
<p style="text-align: center;"><b>HYUNDAI SANTA FE STANDARD SIDE AIRBAGS (MFG. AFTER 3/2002)</b>            Front: 2001 (mfg. after 3/2/2001)-04 models; test vehicle = 3,836 lbs.            Side: 2002 (mfg. after 3/2002)-04 models; test vehicle = 3,922 lbs.</p>	G	A	G A depends on seat
<p style="text-align: center;"><b>HONDA CR-V WITHOUT OPTIONAL SIDE AIRBAGS</b>            Front: 2002-04 models; test vehicle = 3,347 lbs.            Side: 2002-04 models; test vehicle = 3,327 lbs.</p>	G	BEST PICK frontal M	G
<p style="text-align: center;"><b>MITSUBISHI OUTLANDER WITHOUT OPTIONAL SIDE AIRBAGS</b>            Front: 2003-04 models; test vehicle = 3,439 lbs.            Side: 2003-04 models; test vehicle = 3,444 lbs.</p>	G	BEST PICK frontal P	G
<p style="text-align: center;"><b>HONDA ELEMENT WITHOUT OPTIONAL SIDE AIRBAGS</b>            Front: 2003-04 models; test vehicle = 3,494 lbs.            Side: 2003-04 models; test vehicle = 3,508 lbs.</p>	G	BEST PICK frontal P	A
<p style="text-align: center;"><b>TOYOTA RAV4 WITHOUT OPTIONAL SIDE AIRBAGS</b>            Front: 2004 models (mfg. after 12/2003); test vehicle = 3,126 lbs.            Side: 2001-04 models; test vehicle = 3,113 lbs.</p>	G	BEST PICK frontal P	G
<p style="text-align: center;"><b>SATURN VUE WITHOUT OPTIONAL SIDE AIRBAGS</b>            Front: 2002-04 models; test vehicle = 3,534 lbs.            Side: 2002-04 models; test vehicle = 3,519 lbs.</p>	G	BEST PICK frontal P	G
<p style="text-align: center;"><b>JEEP WRANGLER SIDE AIRBAGS NOT AVAILABLE</b>            Front: 1997-2004 models; test vehicle = 3,247 lbs.            Side: 1997-2004 models; test vehicle = 3,391 lbs.</p>	A	M	M
<p style="text-align: center;"><b>SUZUKI GRAND VITARA/VITARA CHEVROLET TRACKER SIDE AIRBAGS NOT AVAILABLE</b>            Front: 1999-2004 models; test vehicle = 3,223 lbs.            Side: 1999-2004 models; test vehicle = 3,280 lbs.</p>	A	P	G A depends on seat
<p style="text-align: center;"><b>LAND ROVER FREELANDER SIDE AIRBAGS NOT AVAILABLE</b>            Front: 2002-04 models; test vehicle = 3,549 lbs.            Side: 2002-04 models; avg. test vehicle = 3,545 lbs.</p>	A	P	A P depends on seat
<p style="text-align: center;"><b>FORD ESCAPE/MAZDA TRIBUTE WITHOUT OPTIONAL SIDE AIRBAGS</b>            Front: 2005 models; test vehicle = 3,580 lbs.            Side: 2001-05 models; test vehicle = 3,479 lbs.  <i>Note re side evaluation: 2005 model with            redesigned side airbags to be tested</i></p>	A	P	G A P depends on seat

G	GOOD
A	ACCEPTABLE
M	MARGINAL
P	POOR

ATTACHMENT 2: OVERALL CRASHWORTHINESS EVALUATIONS P.2 OF 2

Midsize inexpensive cars 4-door models	OVERALL FRONTAL EVALUATION	OVERALL SIDE EVALUATION	HEAD RESTRAINTS
<b>HONDA ACCORD</b> WITH OPTIONAL SIDE AIRBAGS Front: 2003-04 models; test vehicle = 3,186 lbs. Side: 2004 models; test vehicle = 3,157 lbs.	G 	G	 depends on seat
<b>TOYOTA CAMRY</b> WITH OPTIONAL SIDE AIRBAGS Front: 2002-04 models; test vehicle = 3,276 lbs. Side: 2004 models; test vehicle = 3,203 lbs.	G 	G	 depends on seat
<b>CHEVROLET MALIBU</b> WITH OPTIONAL SIDE AIRBAGS Front: 2004 models; test vehicle = 3,183 lbs. Side: 2004 models (mfg. after 2/2004); test vehicle = 3,250 lbs.	G	A	
NEWLY TESTED <b>SUBARU LEGACY</b> STANDARD SIDE AIRBAGS Front: 2005 models; test vehicle = 3,298 lbs. Side: 2005 models; avg. test vehicle = 3,322 lbs.	G 	M	
<b>HONDA ACCORD</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2003-04 models; test vehicle = 3,186 lbs. Side: 2003-04 models; test vehicle = 3,190 lbs.	G 	P	 depends on seat
<b>TOYOTA CAMRY</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2002-04 models; test vehicle = 3,276 lbs. Side: 2004 models; test vehicle = 3,197 lbs.	G 	P	 depends on seat
<b>MAZDA 6</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2003-04 models; test vehicle = 3,086 lbs. Side: 2003-04 models; test vehicle = 3,137 lbs.	G 	P	 depends on seat
<b>MITSUBISHI GALANT</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2004 models; test vehicle = 3,395 lbs. Side: 2004 models (mfg. after 10/2003); test vehicle = 3,386 lbs.	G	P	 depends on seat
<b>NISSAN ALTIMA</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2002-05 models; avg. test vehicle = 3,150 lbs. Side: 2005 models; test vehicle = 3,095 lbs.	G	P	 depends on seat
<b>CHEVROLET MALIBU</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2004 models; test vehicle = 3,183 lbs. Side: 2004 models (mfg. after 2/2004); test vehicle = 3,254 lbs.	G	P	
<b>DODGE STRATUS/CHRYSLER SEBRING</b> WITHOUT OPTIONAL SIDE AIRBAGS Front: 2001-04 models; test vehicle = 3,252 lbs. Side: 2001-04 models; test vehicle = 3,126 lbs.	A	P	 depends on seat
<b>SUZUKI VERONA</b> SIDE AIRBAGS NOT AVAILABLE Front: 2004 models; avg. test vehicle = 3,385 lbs. Side: 2004 models; test vehicle = 3,404 lbs.	A	P	
<b>SATURN L SERIES</b> STANDARD SIDE AIRBAGS (OPTIONAL 2001) Front: 2000-04 models; test vehicle = 3,192 lbs. Side: 2001-04 models; test vehicle = 3,210 lbs.	A	P	
<b>HYUNDAI SONATA/KIA OPTIMA</b> STANDARD SIDE AIRBAGS Sonata front: 1999-2004 models; test vehicle = 3,131 lbs. Sonata side: 1999-2004 models; test vehicle = 3,277 lbs. Optima front: 2001-2004 models; test vehicle = 3,131 lbs. Optima side: 2001-04 models; test vehicle = 3,277 lbs.	A	P	
<b>PONTIAC GRAND AM/OLDSMOBILE ALERO</b> SIDE AIRBAGS NOT AVAILABLE Front: 1999-2004 models; test vehicle = 3,080 lbs. Note re side evaluation: 2005 replacement model to be tested	P	see note	

 GOOD  
 ACCEPTABLE  
 MARGINAL  
 POOR