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ON-SITE OFFICE OF DEFECTS INVESTIGATION POTENTIAL UNINTENDED ACCELERATION INVESTIGATION

CASE NUMBER - IN10023
LOCATION - TEXAS
VEHICLE - 2007 TOYOTA AVALON
CRASH DATE - January 2008

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

Technical Report Documentation Page

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16. <i>Abstract</i> This on-site investigation focused on a 2007 Toyota Avalon, which was alleged to have experienced an Unintended Acceleration (UA) that led to a loss of control by the driver. The 59-year-old male driver of the Toyota had a history of seizures. He had been involved in three prior crashes in a six month period, which authorities determined were related to his seizures. The last of those crashes occurred in the morning hours of the same day as this crash. In this crash, the driver of the Toyota was westbound approaching a 4-leg urban intersection. The traffic signals were on the red phase for westbound traffic. A 2000 Infiniti Q45, a 2004 Pontiac Grand Am, and a 2006 Cadillac CTS were stopped at the intersection in front of the Toyota. As the Toyota approached the intersection, the right side plane impacted the left side view mirror of the Cadillac (event 1). The front plane of the Toyota then impacted the back plane of the Infiniti (event 2). The Infiniti rotated counterclockwise as the two vehicles remained engaged and the right front corner of the Toyota impacted the left fender of the Pontiac (event 3). The driver of the Toyota was transported by ambulance to a hospital where he was treated in the emergency room and released. The driver of the Infiniti sustained a fatal injury. The drivers of the Cadillac and the Pontiac were not injured. The SCI inspection of the Toyota's accelerator pedal revealed that it functioned smoothly and did not bind when pushed fully down and released. Inspection of the left front and right rear brake pads and rotors of the Toyota revealed no evidence of overheating from prolonged brake application. The Toyota's floor mat had been moved prior the SCI inspection. There was no evidence on the floor mat of interaction with the accelerator pedal.					
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This on-site investigation focused on a 2007 Toyota Avalon (**Figure 1**), which was alleged to have experienced an Unintended Acceleration (UA) that led to a loss of control by the driver. The Crash Investigation Division (CID) of the National Highway Traffic Safety Administration (NHTSA) was notified of this crash by the NHTSA Office of Defects Investigation (ODI). The NHTSA/CID assigned this investigation on June 25, 2010. This crash involved the Toyota, a 2006 Cadillac CTS, a 2000 Infiniti Q45, and a 2004 Pontiac Grand AM. The crash occurred in January, 2008, at 1220 hours, in Texas and was investigated by the city police department. The Toyota was inspected and the Event Data Recorder (EDR) was imaged on August 5, 2010 using the manufacturer's EDR readout tool with software version 1.1.0. The imaged EDR data was read and printed with version 1.4.1.1 of the readout tool software. The crash scene was inspected on August 4, 2010. The driver's wife was interviewed on July 13, 2010. The driver could not be interviewed since he is currently incarcerated related to this crash. This report is based on the police crash report, vehicle inspection, exemplar vehicle inspection, EDR data, crash scene inspection, interview with the driver's wife, on-scene photographs, a Texas newspaper article, occupant kinematic principles, and evaluation of the evidence.



Figure 1: The damaged 2007 Toyota Avalon

This crash occurred prior to the following recalls: NHTSA recall campaign number 09V388000. The recall documentation indicated that Toyota was to begin mailing recall notification letters to owners in December 2009. This recall addressed accelerator pedal entrapment and involved modifying the accelerator pedal. Redesigned accelerator pedals were to be available beginning in April 2010. A software modification was also to be installed that would ensure that the brake overrides the accelerator in the event both the brake and accelerator pedals are applied.

NHTSA recall campaign number 10V017000: This recall was to begin in February 2010. It addressed the interaction of the friction lever with the sliding surface inside the accelerator pedal sensor assembly, which could result in the accelerator pedal becoming harder to depress, slower to return, or becoming mechanically stuck in a partially depressed position. Toyota was to install a reinforcement bar in the accelerator pedal, which would allow the accelerator pedal to operate smoothly.

The driver's wife stated during the SCI interview that the driver had a history of seizures. She reported that at the time of the crash he was taking anti-seizure medication¹. In May 2009 the driver was diagnosed with Orthostatic Hypotension². It was reported in a Texas newspaper article that a Texas jury found that the driver had neglected his medical condition and found him legally responsible for this crash. The article also reported that the driver had been involved in three crashes in a six month period prior to this crash. It was reported that authorities had determined the cause of those crashes was related to his seizures. The most recent of the three crashes occurred during the morning hours on the same day as this crash. The driver had impacted a curb with the Toyota's right front wheel, which bent the rim and deflated the tire. The driver replaced the wheel and continued driving the vehicle. The damaged wheel was found in the trunk of the Toyota during the SCI inspection. The driver's wife stated that on the morning of this crash, the driver had run several errands. She estimated that the time from his last stop to this crash was approximately 20 minutes. The driver had no recollection of this crash or what transpired immediately prior to the crash.

CRASH CIRCUMSTANCES

Crash Environment: The crash occurred during daylight hours and clear weather conditions at a 4-leg intersection on a westbound 7-lane, undivided, one-way service road for an interstate highway. The roadway had one U-turn lane, two left turn lanes, two through lanes, one right turn/through lane, and one right turn lane. Each lane was approximately 3.8 m (12.5 ft) in width with the exception of the first left turn lane from the left, which was 4.5 m (14.8 ft) in width. Roadway pavement markings consisted of solid white turn lane lines, solid white turn arrows, broken white through lane lines, solid white stop bar, and a designated pedestrian crossing. The intersection was controlled by 3-phase traffic signals. The roadway pavement was dry, level concrete and the speed limit was 56 km/h (35 mph). The Crash Diagram is on page 12 of this report.

Pre-Crash: The Toyota was driven by a restrained 59-year-old male. He was westbound in the first left turn lane from the left approaching the intersection (**Figure 2**). The traffic signals were on the red phase for westbound traffic. The Infiniti was stopped at the intersection in the first



Figure 2: Approach of the Toyota westbound in the outside left turn lane

¹. The driver's wife provided a list of the following medications the driver was taking at the time of the crash: Dilantin [(Phenytoin) 300 mg/day, anti-seizure medication], Lamictal [(Lamotrigine) 400 mg/day, anti-convulsive medication), Methadone (10 mg as needed for back pain), Lipitor (10 mg/day for high cholesterol), Nexium (40 mg/day for acid reflux), Calcium Gluconate (2 mg/day for hypocalcemia), Vitamin D (400 IU/day, vitamin supplement).

². The driver's wife provided a copy of a letter from the driver's physician that described orthostatic hypotension as an involuntary condition that is caused by a malfunction of the nerves that regulate the baroreceptor reflex of the venous reservoirs in the legs and the abdomen. The condition causes an insufficient quantity of blood to be delivered to the heart causing the person to lose consciousness.

left turn lane from the left. The Pontiac was stopped at the intersection in the second left turn lane from the left. The Cadillac was stopped behind the Pontiac.

EDR Pre-Crash Data: The Toyota readout tool software indicated that pre-crash data recording is not supported by this module. The following table presents the data that was reported in the Toyota’s EDR pre-crash tab. Please note that two rows of data were present for the -1.0 second time increment. Also “N/A” was indicated in the header for “Speed”, “Engine”, and “Brake” but not “Accelerator.”

Sec	Speed (N/A)	Engine (N/A)	Accelerator	Brake (N/A)
-5.0	0	0	OFF	OFF
-4.0	0	0	OFF	OFF
-3.0	0	0	OFF	OFF
-2.0	0	0	OFF	OFF
-1.0	0	0	OFF	OFF
-1.0	0	0	OFF	OFF

Crash: The right side plane of the Toyota impacted the left side view mirror of the Cadillac (event 1). The Toyota continued westbound and the front plane (**Figure 3**) impacted the back plane of the Infiniti (**Figure 4**, event 2). The Infiniti rotated counterclockwise as the two vehicles remained engaged and the right side plane of the Toyota impacted the left fender of the Pontiac (event 3). The Infiniti rotated counterclockwise approximately 100 degrees and came to final rest on the west side of the intersection heading southeast. The Toyota rotated clockwise approximately 180 degrees and came to final rest on the west leg of the intersection in the inside through lane. The Pontiac and Cadillac remained in the inside left turn lane.



Figure 3: Damage on the front plane of the Toyota from the impact with the back plane of the Infiniti

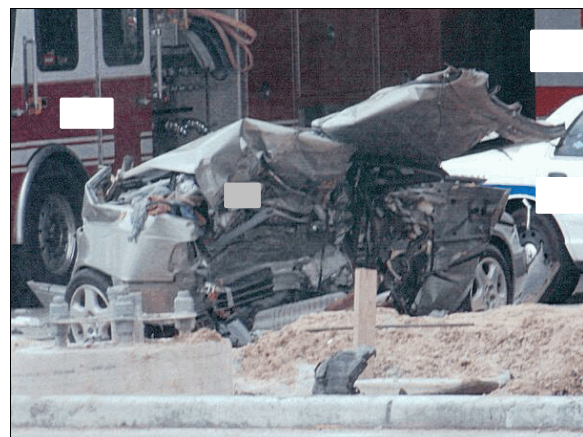


Figure 4: Back right view of the damaged Infiniti (on-scene photo provided by wife of the Toyota’s driver)

Post-Crash: The police, emergency medical personnel, and rescue personnel responded to the crash scene. Rescue personnel mechanically removed both front doors from the Toyota and removed the driver from the vehicle. He was transported by ambulance to a hospital where he was treated in the emergency room and released. Rescue personnel cut the roof of the Infiniti and removed the driver from the vehicle. She was transported by ambulance to a hospital where she expired from her injuries. The drivers of the Cadillac and the Pontiac were not injured. The Toyota and the Infiniti were towed due to damage. The Pontiac and Cadillac were driven from the crash scene.

CASE VEHICLE

The 2007 Toyota Avalon was a front wheel drive, 5-passenger, 4-door sedan (VIN:4T1BK36B37U-----) that was manufactured in November 2006. The driver was renting the vehicle at the time of the crash. The vehicle was equipped with a 3.5-liter, V-6 engine, a 5-speed automatic transmission, and 4-wheel anti-lock disc brakes with electronic brake force distribution. The front row was equipped with bucket seats, adjustable head restraints, lap-and-shoulder safety belts, driver and front right passenger frontal air bags, driver knee air bag, seat-mounted side impact air bags, and side impact inflatable curtain (IC) air bags that provided protection for the front and second row outboard seating positions. The second row was equipped with a bench seat with folding backs, lap-and-shoulder safety belts, adjustable head restraints, and Lower Anchor and Tethers for Children (LATCH) in the outboard seating positions.

CASE VEHICLE DAMAGE

Exterior Damage Event 1: No damage was found on the right side plane of the Toyota from the police-reported impact with the Cadillac’s left side view mirror. It’s possible that the damage from this impact resided on the mirror on the Toyota’s right front door. The right front door had been removed by rescue and was not present at the SCI vehicle inspection.

Exterior Damage Event 2: The Toyota sustained front plane damage from the impact with the back plane of the Infiniti. The direct damage began at the front left bumper corner and extended 86 cm (33.9 in) across the front bumper. The crush measurements were taken on the bumper bar and the residual maximum crush was 69 cm (27.2 in) occurring at C2. The table below presents the front crush profile.

Units	Event	Direct Damage		Field L	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	Direct	Field L
		Width CDC	Max Crush								±D	±D
cm	2	86	69	152	67	69	66	56	38	0	-7	0
in		33.9	27.2	59.8	26.4	27.2	26.0	22.0	15.0	0.0	-2.8	0.0

Damage Classification Event 2: The CDC for the front plane impact was 12FYEW3 (0 degrees). The Damage with CDC Only algorithm of the WinSMASH program calculated the Toyota’s total

Delta V as 88.0 km/h (54.7 mph). The longitudinal and lateral velocity changes were -88.0 km/h (-54.7 mph) and 0.0 km/h, respectively. Based on the damage on both vehicles, the results were reasonable. The EDR recorded the maximum velocity change as 77.4 km/h (48.1 mph).

Exterior Damage Event 3: The impact on the right front corner with the left fender of the Pontiac was minor and the damage on the Toyota was masked by the front plane damage from event 2.

The manufacturer's recommended tire size was P215/55R17. The Toyota was equipped with the recommended size tires. The vehicle's tire data are shown in the table below.

Tire	Measured Pressure		Vehicle Manufacturer's Recommended Cold Tire Pressure		Tread Depth		Damage	Restricted	Deflated
	kPa	psi	kPa	psi	milli-meters	32 nd of an inch			
LF	Flat	Flat	221	32	7	9	Sidewall cut	Yes	Yes
LR	138	20	221	32	4	5	None	No	No
RR	138	20	221	32	3	4	None	No	No
RF	Flat	Flat	221	32	9	11	None	Yes	Yes

Vehicle Interior: The inspection of the interior of the Toyota revealed no discernable evidence of occupant contact. There was no deformation of the steering wheel rim.

The front doors were jammed shut and had been mechanically removed by rescue personnel. The back doors remained closed and operational. Based on the on-scene photographs, the windshield was in place and cracked from impact forces. The glazing in the back doors and backlight were undamaged.

The vehicle sustained 4 intrusions in the driver's space. The toe pan intruded longitudinally 13 cm (5.1 in), while the floor pan intruded vertically 5 cm (2 in). The lower left A-pillar intruded 6 cm (2.4 in) and the left instrument panel intruded 5 cm (2 in).

ACCELERATOR PEDAL, FLOOR MAT, AND BRAKE COMPONENTS

The SCI inspection revealed that the driver's floor mat appeared to have been moved following the crash since debris was found under the floor mat and the floor mat attachment clips were missing. The driver's wife stated during the SCI interview that the driver's right foot was entrapped under the brake pedal following the crash. It is possible that the floor mat was removed during the extrication of the driver from the vehicle. There was no discernable evidence of all weather floor mat usage. Inspection of the CTS accelerator pedal and the floor mat revealed no discernable evidence of interaction between the two. The product codes for the driver's floor mat were PT548 07C50, PPI-7P36L3, and LEFT FRONT. The brake pedal arm and accelerator pedal

arm had both made impressions in the carpet from the intrusion of the toe pan. The brake pedal was rotated clockwise slightly. There was no damage to the accelerator pedal. The lateral distance between the accelerator pedal and the brake pedal was 11 cm (4.3 in, **Figure 5**). On an exemplar vehicle this measurement was 6 cm (2.5 in). The face of the accelerator pedal was 1 cm (2.4 in) forward of the face of the brake pedal. On an exemplar vehicle this distance was 4 cm (1.6 in). The accelerator pedal was 4 cm (1.6 in) in width and 12 cm (4.7 in) in height. The brake pedal was 11.5 cm (4.5 in) in width and 7 cm (2.8 in) in height. The distance between the centerline of the driver's seat and the right edge of the brake pedal was 5 cm (2 in). The longitudinal distance from the brake pedal to the front of the driver's seat cushion was 49 cm (19.3 in). The accelerator pedal was pushed fully down and released three times. Each time it functioned smoothly and did not bind. **Figure 6** shows the CTS accelerator mechanism housing. The product numbers on the accelerator housing were 78110-07011, 0631782A, and 44830315055 LHD. The left front and right rear wheels were removed and the brake rotors and brake pads were inspected. Both brake rotors were rusted. The brake pads on each wheel showed no evidence of overheating (**Figures 7 and 8**) from prolonged braking.



Figure 5: The Toyota's brake and accelerator pedal, each increment on the measurement rod is 5 cm (2 in)



Figure 6: The CTS accelerator pedal mechanism housing (arrow)



Figure 7: The bottom portion of the outside brake pad (arrow) on the left front wheel of the Toyota

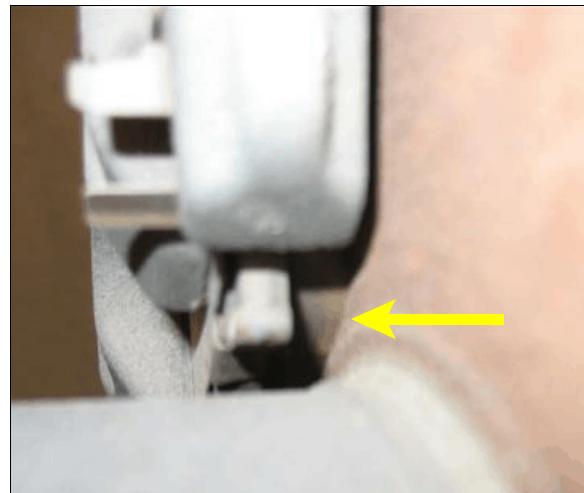


Figure 8: The top portion of the outside brake pad (arrow) on the right rear wheel of the Toyota

Due to crash related electrical problems, it was not possible to image the EDR via connection to the diagnostic link connector. The Air Bag Control Module (ACM), which contains the EDR was removed from the vehicle and the data was imaged via direct connection to the ACM using the manufacturer’s EDR readout tool with software version 1.1.0. The imaged data was subsequently read and printed using version 1.4.1.1 of the readout tool software. The EDR recorded data for two frontal events. The event indicated as the “Latest/Frozen BANK1, Event counter 2” was related to the impact with the back plane of the Infiniti. The event indicated as the “Next most recent BANK0, Event counter 1” was possibly related to the curb impact, which occurred prior to this crash. The data recorded by the EDR are presented below.

“Latest/Frozen BANK1, Event counter 2”: The EDR recorded the driver safety belt switch status as “Belted.” The driver’s seat position was recorded as “RW.” The transmission shifter position was recorded as “N/A.” The deployment time for the driver’s frontal air bag was recorded as 0 ms. The deployment stage for the air bag was recorded as “Hi,” which is understood to indicate a stage two deployment. The EDR recorded 153.6 ms of velocity change data which are presented in the following table. A column was added to convert mph to km/h.

ms	Vel Chg (mph)	Vel Chg (km/h)	ms	Vel Chg (mph)	Vel Chg (km/h)	ms	Vel Chg (mph)	Vel Chg (km/h)
10.2	0.7	1.1	61.4	25.4	40.9	112.6	41.9	67.4
20.5	2.3	3.7	71.7	29.5	47.5	122.9	44.2	71.1
30.7	4.9	7.9	81.9	33.9	54.6	133.1	45.8	73.7
41.0	7.7	12.4	92.2	36.0	57.9	143.4	47.0	75.6
51.2	14.6	23.5	102.4	39.1	62.9	153.6	48.1	77.4

“Next most recent BANK0, Event counter 1”: The EDR recorded the driver’s safety belt switch status as “Belted.” The driver’s seat position was recorded as “RW.” The transmission shifter position was recorded as “N/A.” The following table presents the velocity change data recorded for this event.

ms	Vel Chg (mph)	Vel Chg (km/h)	ms	Vel Chg (mph)	Vel Chg (km/h)	ms	Vel Chg (mph)	Vel Chg (km/h)
10.2	0.4	0.6	61.4	0.2	0.3	112.6	0.2	0.3
20.5	0.5	0.8	71.7	0.2	0.3	122.9	0.4	0.6
30.7	0.5	0.8	81.9	0.4	0.6	133.1	0.4	0.6
41.0	0.4	0.6	92.2	0.4	0.6	143.4	0.2	0.3
51.2	0.2	0.3	102.4	0.2	0.3	153.6	0.0	0.0

The Toyota was equipped with a Certified Advanced 208-Compliant (CAC) frontal air bag system that consisted of dual stage driver and front right passenger frontal air bags, driver knee air bag, driver seat position sensor, seat belt switch sensors, retractor mounted pretensioners and a front right passenger weight sensor. Based on the Holmatro Rescuer's Guide to Vehicle Safety Systems, the frontal air bag sensors were located on the inner fenders. The driver's frontal air bag and knee air bag deployed in this crash. The manufacturer has certified that the vehicle is compliant to the Advanced Air Bag portion of the Federal Motor Vehicle Safety Standard (FMVSS) No. 208.

The Toyota was also equipped with a side impact air bag system that consisted of front seat-mounted side impact air bags and roof rail-mounted side impact inflatable curtain (IC) air bags. Based on the Holmatro Rescuer's Guide to Vehicle Safety Systems, the IC air bag inflators were located within the roof side rails above the C-pillars and the side impact sensors were located within the lower B-and C-pillars. Neither of the front seat-mounted side impact air bags nor the IC air bags deployed in this crash.

The driver's frontal air bag was located within the steering wheel hub. The air bag module cover was a two flap configuration constructed of pliable vinyl. The top cover flap was 12 cm (4.7 in) in width and 7 cm (2.8 in) in height. The bottom cover flap was 12 cm (4.8 in) in width at the top, 6 cm (2.4 in) in width at the bottom, and 8 cm (3.1 in) in height. An inspection of the cover flaps revealed that they opened at the designated tear points and were undamaged. The deployed air bag was 63 cm (24.8 in) in diameter. There were two vent ports on the back of the air bag at the 11 and 1 o'clock positions. There were several blood deposits on the front lower left quadrant of the air bag. These appeared to be spatters and not direct occupant contact. There were also several small cuts in the air bag material, probably from flying glass. There was no discernable evidence of occupant contact scuffs or tissue transfers.

The driver's knee air bag was located within the lower left instrument panel and deployed through two rectangular cover flaps. Each cover flap was 25 cm (9.8 in) in width and 4 cm (1.6 in) in height. The cover flaps opened at the designated tear points and were undamaged. The knee air bag was 60 cm (23.6 in) in width and 24 cm (9.4 in) in height. It had been cut out of the air bag module. There were no discernable occupant contact marks on the air bag.

MANUAL RESTRAINT SYSTEM

The Toyota was equipped with lap-and-shoulder safety belts for all seating positions. The driver's safety belt consisted of continuous loop belt webbing, an Emergency Locking Retractor (ELR), sliding latch plate, and an adjustable upper anchor that was located in the full down position. The front right passenger safety belt was similar, but was equipped with an ELR/Automatic Locking Retractor (ALR). Both safety belts were equipped with retractor-mounted pretensioners. The driver's pretensioner actuated in this crash. The second row lap-and-shoulder safety belts consisted of continuous loop belt webbing, sliding latch plates, ELR/ALRs, and fixed upper anchors.

The inspection of the driver's safety belt assembly revealed historic usage scratches on the latch plate, load abrasions on the latch plate belt guide, and load abrasions on the safety belt webbing. The abrasions on the belt webbing were located 106 cm (41.7 in) above the stop button. This evidence indicated that the driver was restrained by the lap-and-shoulder safety belt at the time of the crash. The EDR also recorded the driver's safety belt switch status as "belted."

CASE VEHICLE DRIVER KINEMATICS

The driver of the Toyota [59-year-old male, 188 cm (74 in) and 75 kg(165 lbs)] was seated in an unknown posture restrained by the lap-and-shoulder safety belt. At the SCI vehicle inspection, the seat track was adjusted to between middle and rear position and the seat back was reclined 50 degrees. The adjustable head restraint was located in the full down position and the distance from the top of the seat back to the top of the head restraint was 19 cm (7.5 in).

The driver's medical records stated that the driver had a seizure while driving. The impact to the back of the Infiniti displaced the driver forward and opposite the 12 o'clock direction of force and he loaded the safety belt, which caused a contusion on the left shoulder, chest, abdomen, and right hip. The driver loaded through the frontal air bag and contacted the steering wheel with his head, which caused a blunt head trauma and a laceration on the left forehead. He sustained a fractured right ankle from contact with the brake pedal. He also sustained a laceration on the top left side of his head and multiple extremity abrasions from flying glass. Rescue personnel mechanically removed the front doors to extricate the driver from the vehicle.

CASE VEHICLE DRIVER INJURIES

The driver was transported by ambulance to a hospital where he was treated in the emergency room and released. The table below presents the driver's injuries and injury sources.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
1	Blunt head trauma ³ with	unknown 115099.7,0	Steering wheel hub and/or spokes and rim	Probable	Interviewee (relative)
	history of seizure disorder and a small tonic seizure ⁴ in ER				Emergency room records
2	Laceration, scalp, on top left side of head 2.3 cm (0.9 in)	minor 190602.1,2	Steering wheel rim	Probable	Emergency room records

³ Wife of driver reported that husband sustained a concussion and had traumatic cataracts from the concussion he received and went totally blind. He was blind for several months and then had surgery on each eye and now his sight has been restored.

⁴ According to the medical records he had a seizure while driving. Driver had a history of seizures which the medical records did not characterize, and driver had a small seizure activity while being examined in the emergency room. The following term is defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:
tonic (ton'ik) [Gr. tonikos]: 1. producing and restoring the normal tone. 2. characterized by continuous tension.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
3	Laceration, on left forehead, above left eye, 1.4 cm (0.6 in)	minor 290602.1,7	Steering wheel hub and/or spokes	Probable	Emergency room records
4	Contusions (bruises) on left shoulder, not further specified	minor 790402.1,2	Torso portion of safety belt system	Certain	Interviewee (relative)
5	Contusions (bruising) visualized on chest	minor 490402.1,4	Torso portion of safety belt system	Certain	Emergency room records
	across chest from left shoulder to right hip				Interviewee (relative)
6 7	Contusions (bruises) across lower abdomen, including one 30.5 x 10.2 cm (12 x 4 in) over right hip	minor 590402.1,1 590402.1,8	Lap portion of safety belt system	Certain	Interviewee (relative)
8 9	Abrasions, multiple, on extremities, not further specified	minor 790202.1,9 890202.1,9	Noncontact injury: flying glass, unknown source	Possible	Emergency room records
10	Fractured right ankle ⁵ , not further specified	moderate 852002.2,1	Floor, foot controls	Probable	Interviewee (relative)

FIRST OTHER VEHICLE

The 2006 Cadillac CTS was a rear wheel drive, 5-passenger, 4-door sedan (VIN: 1G6DP577460-----) equipped with a 3.6-liter V6 engine. The vehicle was also equipped with four wheel anti-lock disc brakes, traction control, and electronic stability control. The front row was equipped with bucket seats, lap-and-shoulder safety belts, dual stage driver and front right passenger frontal air bags, seat-mounted side impact air bags, and side impact inflatable curtain (IC) air bags protecting all outboard seating positions. The second row was equipped a bench seat, lap-and-shoulder safety belts, and Lower Anchors and Tethers for Children (LATCH). The manufacturer has certified that the vehicle is compliant to the Advanced Air Bag portion of the Federal Motor Vehicle Safety Standard (FMVSS) No. 208.

Exterior Damage: The police crash report indicated that the Cadillac sustained damage to the left side view mirror. The vehicle was driven from the crash scene. It was not inspected.

First Other Vehicle's Driver: The police crash report indicated that the driver of the Cadillac (37-year-old, female) was restrained by the lap-and-shoulder belt. The driver sustained no injury and was not transported to a medical facility.

⁵ Wife of driver indicated that right foot was entrapped under the brake pedal.

SECOND OTHER VEHICLE

IN10023

The 2000 Infiniti Q45 was a rear wheel drive, 5-passenger, 4-door sedan (VIN: JNKBY31A9YM-----) equipped with a 4.1-liter, V8 engine, automatic transmission, and redesigned driver and front passenger frontal air bags.

Exterior Damage: Based on the on-scene photographs, the Infiniti sustained extensive damage on the back plane from the impact with the Toyota. The direct damage was offset slightly to the right. The vehicle was towed from the crash scene due to damage. The Infiniti was under the control of a plaintiff's attorney and was not inspected.

Damage Classification: The CDC for the back plane damage on the Infiniti was estimated from the on-scene photographs as 06BDEW6 (180 degrees). The Damage with CDC Only algorithm of the WinSMASH program calculated the Infiniti's total Delta V as 78.0 km/h (48.5 mph). The longitudinal and lateral velocity changes were 78.0 km/h (48.5 mph) and 0.0 km/h, respectively. Based on the damage on both vehicles, the results were reasonable.

Other Vehicle's Driver: The driver of the Infiniti (50-year-old, female) was restrained by the lap-and-shoulder safety belt. She was transported by ambulance to a hospital where she expired from her injuries.

THIRD OTHER VEHICLE

The 2004 Pontiac Grand Am SE1 was a front wheel drive, 5-passenger, 4-door sedan (VIN: 1G2NF52EX4M-----) equipped with a 3.4 -liter, V6 engine, a 4-speed automatic transmission, and four wheel anti-lock brakes. The front row was equipped with bucket seats, lap-and-shoulder safety belts, and redesigned driver and front right passenger frontal air bags. The second row was equipped a bench seat, lap-and-shoulder safety belts, and Lower Anchors and Tethers for Children (LATCH).

Exterior Damage: The police crash report indicated that the Pontiac sustained damage on the left fender from the impact with the Infiniti. The vehicle was driven from the crash scene. It was not inspected.

Third Other Vehicle's Driver: The driver of the Pontiac (53-year-old, female) was restrained by the lap-and-shoulder belt. The driver sustained no injury and was not transported to a medical facility.

