

Injuries Sustained in Low-Speed Collisions: Fact or Fiction?

By Tom Jennings

Do the alleged injuries fit the vehicle damage? Does the force of the crash equate to the probability of injury? There are many ways that the vehicle helps you determine the force of the crash.

The “Damaged” Vehicles

Every fleet, safety and risk manager has been exposed to litigation involving questionable plaintiff injuries from low-speed collisions (from rear, side or front) by their commercial vehicles. Often, these “nuisance claims” are settled by insurers, self-insurers and third-party administrators (TPAs) because they have no viable alternative to refute the claimed injuries. However the science of the events is often overlooked or simply not explored because adjusters, safety experts and risk managers may be unaware of available legal defenses.

Biomechanics is “the study of the mechanics of a living body, especially of the forces exerted by muscles and gravity on the skeletal structure” (*American Heritage Dictionary*). By education, a mechanical engineer (usually) has advanced degree(s) in human anatomy, physiology, tolerance of biological tissue, neuroscience, kinematics and dynamics to name a few.

A low-speed impact is generally considered to be less than 5 to 8 mph. Employing the laws of physics and human tolerance, ARCCA biomechanics analyze the forces of the impact and whether a mechanism of injury existed during the impact. ARCCA biomechanics may not necessarily question the presence of the injury. However, they will evaluate whether there were forces and an “injury mechanism” present in this collision sufficient to produce the alleged injury.

A biomechanical analysis can often reveal many claimed injuries to be quite unlikely given the forces involved in the subject incident. Some low-speed claims may involve claimants with real back, shoulder, wrist and knee injuries, but the vehicle contact forces in this incident did not approach the level required to 1) produce an injury mechanism consistent with the claimed injuries; and 2) produce forces high enough to receive any injury

at all. In other words, we may not dispute that the claimant has the injuries, but may very well question whether they could have been received during this event.

Using an ARCCA biomechanical-oriented accident reconstruction and injury mechanism analysis can often produce a strong defense against these claimed injuries. Examining records such as accident reports, medical files, damage appraisals and photos, an ARCCA biomechanic will formulate

an opinion/report as to whether there were forces sufficient to produce an injury mechanism that could cause the alleged injuries

Elements of an LSI Analysis

Photographs: Ideally, photos (digital and print) of all vehicles should be taken, showing the areas of contact. If possible, “walk the clock.” While circling the vehicle, take photographs from all sides, not just the impact area. Photograph the bumper shock isolators if so equipped. Photograph the interior, airbags, the dashboard and steering wheel. Several years later at trial there may be claims of secondary impacts such as “pushed into vehicle ahead.” Take the photos now to refute such future claims.

Medical reports: Claimant’s (and other occupants if possible).

Damage/repair appraisals: For each vehicle involved.

Depositions: Make sure the right questions are included.

Police reports: If any.

Witness accounts: If any.

Also determine whether there were other occupants, injuries or seating location(s). In addition, if available, collect



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supplemental restraint (airbag) diagnostic module data (black box).

With This Information, What Can We Hope to Achieve?

Determine the range of speed at impact. Calculate the “g” or acceleration forces on the subject vehicle and occupants.

Compare the alleged injuries to the force (based on the Laws of Physics) present in this collision. Scientifically determine whether there was sufficient force to create the “injury mechanism” necessary to cause the alleged injuries.

Typical Information to be Analyzed

Incident Description: What happened?

Typical reports reviewed (when available):

- police accident report;
- insurer’s investigation report;
- medical records ;
- deposition transcripts;
- plaintiff’s answers to defendant’s interrogatories;
- color photographs of incident scene, including both vehicles;
- auto body shop repair estimates;
- auto repair report;
- insurance invoices.

ARCCA data include:

- expert AutoStats and VINDeCoder data sheets for involved vehicles;
- Insurance Institute for Highway Safety, damage repair costs in four low-speed crash tests at 5 mph.

The vehicle photographs are relevant in the consideration and analysis of the physical forces in the subject incident. Review of the photographs of the plaintiff’s vehicle often reveals only minor cosmetic damage and no structural damage. Inspection of the bumper shock isolators can reveal impact forces.

Kinematic Analysis

Using the claimant’s age, height, weight, seatbelt usage and the laws of physics, the biomechanical engineer determines relative motion of the claimant and the vehicle at the time of impact.

According to the laws of physics, when a vehicle is contacted in the rear, it will move forward if there is enough energy. If there was forward motion of the vehicle, the process would result in a rearward motion of all occupants’ bodies relative to the interior of the vehicle, which would cause all occupants’ bodies to load into the seat and seat back structure, thus coupling their motion to the accelerating vehicle. The low accelerations resulting from these collisions would cause little or no rebound of occupant’s bodies away from the seat back. Certainly, any minimal rebound energy is

well within the range of protection of the available seat belt.

Discussion

With these facts in hand, the ARCCA biomechanical will review the claimed injuries one by one, addressing whether or not there were sufficient forces present in this event that could have produced an injury mechanism to have caused each of the alleged injuries.

Conclusion

The final opinions are based on an objective scientific analysis of the subject incident. Accepted scientific principles are used to determine the crash severity and occupant kinematics, thus enabling an evaluation of injury mechanisms, if any. Subjective findings, such as verbal medical history, may be useful in injury diagnosis, but they cannot be solely relied on in causally relating a reported injury to a

specific event. This is the job for a biomechanic.

Every case and every injury is different. However, the laws of physics are constant and apply identically to every collision. With a sufficient amount of the information outlined above, an accident reconstruction can be completed and an objective biomechanical analysis can determine whether there was an injury mechanism present to cause the claimed injuries and to support those findings in a court of law. ■

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