

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

By Tom Jennings, VP, ARCCA, Inc.

Every fleet, safety, and risk manager has been exposed to litigation involving questionable plaintiff injuries from low-speed collisions (less than 5 to 8 mph) by their commercial vehicles. Oftentimes these “nuisance claims” are settled by insurers, self-insurers, and third-party administrators 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.

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

Employing the laws of physics and human tolerance, ARCCA's biomechanics analyze the forces of the impact and whether a mechanism of injury existed during the impact. They 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.

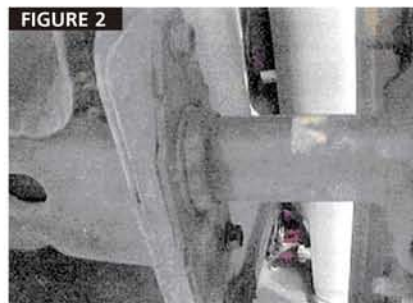


A biomechanical analysis often can reveal many claimed injuries to be quite unlikely given the forces involved in the incident. Some low-speed claims may involve claimants with real back, shoulder, wrist, and knee injuries, but the vehicle contact forces in this type of incident usually do not approach the level required to produce an injury mechanism consistent with the claimed injuries or cause forces high enough to produce an 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.

Utilizing an ARCCA biomechanical-oriented accident reconstruction and injury mechanism analysis often can produce a strong defense against these claimed injuries. Examining accident reports, medical files, damage appraisals, photos and more, the 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 LSI Analysis

When analyzing low-speed injuries, ideally you should take digital photographs (which can be printed later) of all involved vehicles, being sure to show the areas of contact. If possible, circle the vehicle and take photographs from all sides, not just the impact area. Document the



Typical Low-Speed Injuries Claimed

- ▶ Carpal tunnel
- ▶ Dental trauma
- ▶ Herniated discs
- ▶ Compression fractures
- ▶ Cervical, thoracic, and lumbar spine strain and sprain
- ▶ TMJ
- ▶ Rotator cuff
- ▶ ACL tear
- ▶ Whiplash
- ▶ Headaches
- ▶ Spasms
- ▶ Tingling
- ▶ Vision and hearing loss
- ▶ Lack of stamina
- ▶ Migraines
- ▶ Loss of balance and orientation

interior, airbags, dashboard, and steering wheel. Reviewing the photographs of the plaintiff's vehicle often reveals only minor cosmetic damage and no structural damage (Fig. 1). Photograph the bumper shock isolators, if so equipped, because it can reveal impact forces (Fig. 2). Several years later at trial, there may be claims of being pushed into the vehicle ahead by secondary impacts. Get the photos now to refute such future claims.

Other important elements that aid in analyzing a low-speed injury are medical reports (claimant's and other occupants), damage/repair appraisals for each vehicle involved, depositions, police reports, witness accounts, other occupants' injuries and seating locations, and diagnostic module data from the airbag, if available.

Determining the range of speed at impact also is critical. Biomechanics can calculate the acceleration forces on

The Damaged Vehicles



the subject vehicle and occupants and compare the alleged injuries to the force (based on the laws of physics) present in the collision. They can scientifically determine whether there was sufficient force to create the injury mechanism necessary to cause the alleged injuries.

Another essential component to consider when analyzing the collision is the incident description. What happened? Typical reports that should be reviewed when available are the 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, and insurance invoices.

Information ARCCA looks at are expert AutoStats and VINDeCoder data sheets for involved vehicles and Insurance Institute for Highway Safety's *Damage Repair Costs in Four Low-Speed Crash Tests at Five MPH*.

From an injury perspective, the biomechanical engineer can use the

claimant's age, height, weight, seat-belt usage, and the laws of physics to determine the relative motion of the claimant and the vehicle at the time of impact.

According to the laws of physics, when a vehicle is struck 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 occupants' bodies away from the seat back. Certainly, any minimal rebound energy is well within the range of protection of the available seat belt.

With the above facts in hand, the ARCCA biomechanic 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.

Final Report

The final opinions of a biomechanic are based upon an objective scientific analysis of the incident. Accepted scientific principles are utilized 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 can

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not be solely relied upon 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 the sufficient amount of the information as 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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