January 1, 2021

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RE: *Pl1FirstName Pl1LastName; Pl2FirstName Pl1LastName; The Ugly One Ugly Last Name et al. v SampleCaseDefendantName et al., Case No: CaseNoSample, SampleCourtName*

Date of Crash: January 1, 2020

Date of Birth: *Pl1FirstName Pl1LastName:* January 1, 1999 [20 years old at time of crash]

*Pl2FirstName Pl1LastName:* January 2, 1990 [29 years old at time of crash]

*The Ugly One Ugly Last Name:* January 4, 1994 [25 years old at time of crash]

At the time of the crash,

SAMPLE-BIOMECH-LN’s frankly absurd comparisons to everyday activities and volunteer crash tests in no way addressed whether the subject collision could have caused the injuries and sequelae observed in Mr. SAMPLE-P1-LN, the first element of the causal analysis. SAMPLE-BIOMECH-LN’s blanket denial that a mechanism existed in the subject collision for any of Mr. SAMPLE-P1-LN’s diagnosed and persisting injuries is an uninformed assertion with no basis in science, medicine, or the facts in this case and does not constitute an assessment of the plausibility of his injuries resulting from the collision.

SAMPLE-BIOMECH-LN has no information on the pre-crash condition of Mr. SAMPLE-P1-LN’s spine, or any other part of his body. He couldn’t pick him out of a lineup and hasn’t the faintest idea of his tolerance to any type of trauma, including the subject crash. **The tolerance of an individual to forceful external loads is only defined once it has been exceeded,** not based on comparisons to studies of dissimilar forces applied to bits and pieces of dead bodies (part of the basis for SAMPLE-BIOMECH-LN’s opinion). A review of all of the evidence in the subject case clearly established the fact that Mr. SAMPLE-P1-LN’s tolerance was exceeded by the forces of the subject crash.

As SAMPLE-BIOMECH-LN does not (and cannot) dispute any of Mr. SAMPLE-P1-LN’s diagnoses, and he does not provide an alternative explanation for how his diagnosed injuries would have occurred at the same time as the collision, his analysis is incomplete, and fails to account for the undeniable evidence of injury following the crash.

The generally accepted 3-step approach to causation described above dictates that if there are no other contemporaneous competing causes for the injury that are more likely than an investigated plausible cause of the injury, then it is the investigated cause that is the most likely cause. SAMPLE-BIOMECH-LN simply ignored Mr. SAMPLE-P1-LN’s medical history like it never happened; his approach to "assessing" the cause of his injuries was to reject any evidence that he was injured in the first place. SAMPLE-BIOMECH-LN doesn’t consider, much less mention the fact, that there are no plausible competing causes of Mr. SAMPLE-P1-LN’s injuries occurring at the same time as the crash.

The concept of injury thresholds as a bright line below which no injury can occur is one that has been evaluated and rejected by the biomechanical community that is involved with the evaluation of occupant forces in motor vehicle crashes. Injury thresholds have nothing to do with the evaluation of real-world collisions and can never be used to deny the presence of a real-world injury following a collision. This is made clear in an SAE publication (J885) that summarizes human threshold data for use in government crash testing:[[1]](#footnote-1)

"Such [tolerance] specifications are beyond the state-of-the-art in biomechanics except perhaps for a few academic situations. There are several difficulties which prevent a ready establishment of human tolerance levels. First, there are differences in judgment as to the specific degree of injury severity that should serve as the tolerance level. Second, large differences exist in the tolerances of different individuals. It is not unusual for bone fracture tests on a sample of adult cadavers to show a three-to-one load variation. Presumably, variations of at least this magnitude exist in the living population. Finally, most tolerance levels are sensitive to modest changes in the direction, shape, and stiffness of the loading source. The above considerations indicate that complete and precise definitions of human tolerance levels will require large amounts of data based on controlled statistical samples. Only in this way can the influence of age, size, sex, and weight be comprehensively assessed and only in this way can mean loads and statistical measures of scatter be linked to specific tolerance levels."

Crash severity analysis

RECON CRASH RELATED ACCELERATION DELTA V ANALYSIS PLACEHOLDER

*Can the injury potential of the subject collision be determined from crash testing of volunteers?*

SAMPLE-BIOMECH-LN cited to human volunteer crash testing for his opinion that Mr. SAMPLE-P1-LN could not have sustained any significant injury in the subject crash. The comparison between a real-world crash and the results of volunteer crash tests as a means of assessing injury causation is a practice that has been rejected by the relevant scientific and automotive engineering community as improper and unreliable. I have written and had published a number of peer-reviewed papers as well as a book on human volunteer crash testing and can state as a certainty that it is well established in the scientific literature that human volunteer testing (mostly crash testing) is not a valid basis for any determination of injury risk, probability, or cause in real world crashes. *There are no crash tests that have ever been structured like the subject crash (****rear impact of SAMPLE-MDF-DV mph delta V****), as it would be irresponsible to perform such a test.*

Earlier in this report I cited the SAE publication J885 as the basis for a quotation regarding absolute injury thresholds. This paper is an authoritative publication on the topic of human injury thresholds. In the section of the paper, on page 11, under *"4. Introduction to Biomechanics, 4.1 Test Subjects,"* is the following section:

Despite the warning that "true tolerance levels cannot be determined with volunteers" from the authoritative publication on automotive testing and human tolerance, SAMPLE-BIOMECH-LN described and referred to studies primarily consisting of single rear impact collisions of less than 5 mph (with no secondary frontal crash) on healthy male volunteers, and from these papers drew the conclusion that it was essentially impossible for Mr. SAMPLE-P1-LN to have been injured in the subject collision.

Human volunteer crash testing is designed to not produce injury, and the utmost care is taken to ensure that injury is unlikely. The people who volunteer to participate in experimental crash tests are not comparable to those who are injured in similar crashes in many respects, and this includes the plaintiff. For any published crash test, the authors typically must secure Institutional Review Board (IRB) approval in order to assure the safety of the volunteers (this is in accordance with the Declaration of Helsinki, an international treaty on human subject experimentation).

As mentioned earlier, the peer-reviewed authoritative automotive engineering and biomechanical literature specifically states that crash tests are not an appropriate basis for any determination of real-world injury thresholds. In 1999 I published a peer-reviewed paper in the premier journal in the world on Spine surgery at that time (Spine), which specifically criticized some of the volunteer crash test publications cited by SAMPLE-BIOMECH-LN in his report for erroneously claiming an injury threshold from such testing. SAMPLE-BIOMECH-LN presents no evidence to demonstrate that the basic scientific principles described in this 23-year old publication should be violated for his assertions regarding the cause of Mr. SAMPLE-P1-LN’s post-collision diagnoses and need for treatment.

Is any collision comparable to activities of daily living?

As noted above, SAMPLE-BIOMECH-LN claimed that the subject collision produced forces no greater than the loads observed in studies of "activities of daily living." Such comparisons are misleading and deceptive, and based on the junk science premise that if the occupant acceleration value of a crash can be said to be similar to that of some trivial sounding event, then this means that the injury potential of the crash and the trivial event is the same. This antiscientific myth has no application or use outside of the defense of injury litigation.

It should be patently obvious how ridiculous and frankly dishonest the comparison is between any collision and any everyday activity; there is no biomechanical similarity between a crash and an ADL. The direction, duration, and rapidity of acceleration that results in the kind of violent movement that occurs even in a low-speed crash is noncomparable in all respects to the self-generated, slow onset and long duration accelerations of daily activities.

The actual risk of injury from a lower speed crash is not determined by a comparison to an activity that never causes injury, of course. Such determinations are made by examining epidemiologic data regarding real world crashes and the types of injuries that result from them. This is precisely what my colleagues and I did in a recent peer-reviewed research publication, in which we noted the following:

"…the theory that serves as the operating principle for the methodology, that acceleration is a proxy for injury risk in low speed or minimal damage crashes, which is the rationale for the comparison between a crash and non-injurious ADLs, is demonstrably false. Even at the lowest levels of impact severity in a rear impact crash, the results of both crash testing and epidemiologic data from real-world crashes indicate a substantial (i.e., >20%) risk of at least some degree of injury. In contrast, everyday activities are benign events with virtually no injury risk whatsoever.

If the magnitude of the accelerations resulting from crashes and ADLs can be said to be even roughly comparable, this fact only serves as concrete evidence that occupant acceleration is not a proxy for injury risk. "

Regarding the novel nature of such comparisons as a basis for evaluating injury risk, we wrote:

"There is no other example in the biomedical literature in which the established injury risk of any traumatic event is overlooked in favor of a comparison between the acceleration of the event and a non-injurious activity. Although there may be multiple shared attributes of traffic crashes and some ADLs, just as there are multiple shared attributes of stepping down from a stair and falling down a stair (i.e., the travel distances are the same, gravity is 9.81 m/s2 in both scenarios), alluding to the absence of injury while ordinarily walking down stairs sheds no light on the frequency of injury from falling down stairs. The comparison is inapt and should not be made."

If we use the real world 11 km/h [6.8 mph] delta V rear impact injury risk from the present study (54%) and compare it to the highest estimated ADL-related risk (<<1 in 3,650 [0.027%] for sitting), then even using the most conservative estimates, the crash presents a risk of injury that is at least 2,000 times greater than the "high risk" ADL of sitting. This ratio likely underestimates the actual injury risk disparity between frontal-side impacts and ADLs by a factor of at least 10 times.

The National Highway Traffic Safety Administration (NHTSA) has recently published injury risk curves for rear impact crashes, demonstrating a rate of "MAIS 1+" (Maximum Abbreviated Injury Scale injury severity grade of 1 or more) injuries of 27% to 36% for 5 to 10 mph delta V rear impact collisions (see the red bracket in the chart below). Approximately 94% of spinal disk injuries would be included in this category of injuries, as this is the rate at which disk injuries are initially diagnosed as strains in the emergency department in the first day or 2 after a crash, which is the source of the NHTSA data.

The fact that SAMPLE-BIOMECH-LN compared an event (a less than 10 mph rear impact collision) that is irrefutably established by US national crash data to cause injury at least 1 out 4 times to ADLs which virtually never cause injury is a perfect illustration of how misleading and frankly dishonest the comparison is.

Can a biomechanical analysis demonstrate that Mr. SAMPLE-P1-LN was not injured in the subject crash?

Traumatic spinal disk injuries have been described in the peer-reviewed literature as occurring in low to moderate force events, such as minimal damage traffic crashes and roller coaster rides, but also with even more mild forces, including therapeutic manipulation of the spine, and even sneezing. - It is accurate to state that there is no established or generally accepted lower force threshold at which it can be said that an acute intervertebral disk injury in any part of the spine cannot occur. SAMPLE-BIOMECH-LN’s claims to the contrary are contrived and easily disproven, not to mention at odds with the specific facts in Mr. SAMPLE-P1-LN’s case.

SAMPLE-BIOMECH-LN’s offhand claim that a spinal disk could not be "exacerbated" by the subject crash (i.e., either symptomatically activated, or worsened) is a fantasy, with no theoretical, much less factual or scientific basis. In making this entirely speculative and meaningless claim, SAMPLE-BIOMECH-LN engages in magical thinking, which collapses under the slightest bit of scrutiny.

In his report, SAMPLE-BIOMECH-LN twice cited to publications on spinal disk biomechanics by a leading authority on the topic, Prof. Michael Adams. This very same author (Michael Adams PhD), in a 2012 textbook called "The Biomechanics of Back Pain," wrote that

"The magnitude of forces required to cause an individual disc to prolapse cannot reliably be predicted on the basis of gender, age, and spinal level." [page 263],

and that

"Most spinal compressive loading comes from back muscles, and forces are likely to rise to high levels during sudden and alarming incidents. These forces are difficult to quantify in retrospective analysis." [page 264]

and

"Clearly, to assume that the forces acting on the spine during whiplash are small just because the vehicle impacts are usually of low velocity would be a serious mistake. Muscle forces can be magnified in alarming situations, and if the muscles do not have time to react, then the underlying cervical spine is extremely vulnerable to bending." [pages 170-1]

It is clear that SAMPLE-BIOMECH-LN’s approach to providing his opinions regarding Mr. SAMPLE-P1-LN’s injuries is characterized by experts that he deems to be authorities in the field of spinal biomechanics as a "serious mistake."

1. Freeman MD, Leith WM. Estimating the number of traffic crash-related cervical spine injuries in the United States; an analysis and comparison of national crash and hospital data. Accident Analysis and Prevention 2020: doi:https://doi.org/10.1016/j.aap.2020.105571. [↑](#footnote-ref-1)