January 1, 2021

LawyerFirst LawyerLast Esquire

SampleFirmName

123 Address St.

CityVille, StateLand 12345

Tel: (012) 345-6789

RE: *Pl1FirstName Pl1LastName; Pl2FirstName Pl1LastName; Third One Third 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]

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

Dear Mr. LawyerLast,

I am in receipt of your correspondence regarding the above-named action. I have reviewed the documentation accompanying your correspondence including medical records, information regarding the subject crash, litigation documents, and other materials.

The purpose of this report is to provide an analysis of the causal relationship between the subject frontal impact collision and Ms. and Mr. Pl1LastName and Mx. Third Name’s subsequently diagnosed disk injuries and need for treatment.

*My qualifications to provide opinions concerning the matters herein, particularly on issues of the causal relationship between trauma and injury, are as follows:*

I am Professor and Chair of Forensic and Legal Medicine with the Faculty of Forensic and Legal Medicine of the Royal College of Physicians (UK), and a consultant in the fields of forensic medicine and forensic epidemiology. I am credentialed as a Fellow of the Royal College of Pathologists (UK), Fellow of the Faculty of Forensic and Legal Medicine (FFLM) of the Royal College of Physicians (UK) and member of the British Association in Forensic Medicine. I hold the following relevant academic degrees and certifications: a Doctor of Medicine degree (Med.Dr.) from Umeå University, a Doctor of Philosophy (Ph.D.) in public health/epidemiology from Oregon State University, a Master of Public Health (MPH) in epidemiology and biostatistics, also from Oregon State University, a master’s degree in forensic medical sciences (MScFMS) with the Academy of Forensic Medical Sciences in the United Kingdom, i.a. In addition to my degreed education, I have completed a 2-year post-doctoral fellowship in forensic pathology at Umeå University in Sweden and hold a Diploma of Legal Medicine (DLM) with the FFLM. I am also a fellow of both the American Academy of Forensic Sciences and the American College of Epidemiology. I am a Fulbright Fellow and held a 3-year roster appointment (2017-20) with the United States Department of State as a Fulbright Specialist in the field of forensic medicine. I serve as tenured Associate Professor of Forensic Medicine at Maastricht University and a joint Clinical Professor of Psychiatry and Public Health and Preventative Medicine at Oregon Health and Science University School of Medicine, where I have taught courses for the past 24 years in forensic medicine, forensic epidemiology, and injury epidemiology. From 2005-2017 I held an appointment as an Adjunct Professor of Forensic Medicine and Epidemiology at the Institute of Forensic Medicine, Faculty of Health Sciences, Aarhus University, Aarhus, Denmark, and am a recent (2020-21) visiting professor at University of Indonesia in the Faculty of Medicine.

I have been a crash reconstructionist since 1996 and have had ACTAR accreditation (the Accreditation Commission on Traffic Accident Reconstruction) since 2005. Over the past >25 years I have participated in the reconstruction of more than 3,000 crashes, including more than 300 fatalities. From 1999 through 2007 I served as a vehicular homicide investigator for law enforcement (consultant to the state medical examiner and special deputy sheriff), and I am a former affiliate medical examiner with the Allegheny County Medical Examiner’s office.

I am a member of the American Society of Biomechanics and have more than 60 scientific publications pertaining to injury biomechanics, including a book for the Society of Automotive Engineering and taught injury biomechanics in a faculty peer-reviewed course at OHSU for 15 years. I have served as a consultant on injury biomechanics to state and federal government.

I am an associate editor of the Journal of Forensic and Legal Medicine and serve or have served as an associate editor or editorial board member of 14 additional scientific peer-reviewed journals. I have published approximately 230 scientific papers, abstracts, book chapters and books on topics that include traffic crash injuries, crash reconstruction, injury causation and injury biomechanics, including the text for Elsevier, Forensic Epidemiology: Principles and Practice (2016). My publications have been cited by other authors more than 4,700 times.

I have provided testimony in more than 400 civil and criminal trials in state and Federal courts throughout the United States, Canada, and Australia. Please see my CV for further details.

At the time of the crash,

***Injury Causation Analysis***

A crash-related injury causation analysis for a specific individual is performed by assessing the risk of injury from the collision and comparing it to the probability that the injuries or conditions would have been present at the same point in time if the collision had not occurred. The process is referred to as a "3-step" injury causation method in which improbable alternative causes are ruled out and the single most likely cause is identified. The analysis is accomplished via the application of crash reconstruction, biomechanical, medical, and epidemiologic (risk assessment) principles.[[1]](#footnote-1),[[2]](#footnote-2) This 3-step methodology has been extensively described in the peer-reviewed literature, been deemed generally accepted by Courts in the United States, and has been adopted as part of case law in the U.S.[[3]](#footnote-3),[[4]](#footnote-4) See the Appendix at the end of this report for more information.

The three fundamental elements or steps of an injury causation analysis are as follows:

Whether the injury mechanism had the potential to cause the injury in question (aka general causation);

The degree of temporal proximity between the injury mechanism and the onset of the symptoms reasonably indicating the presence of the injury; and

Whether there is a more likely alternative explanation for the occurrence of the symptoms at the same point in time (aka differential etiology).

As applied to the facts in the subject case, these 3 steps are as follows:

*Reconstruction of the crash*

*Injury biomechanics*

The subject high speed frontal collision would have produced high loads in Ms. and Mr. Pl1LastName and Mx. Third Name’s entire bodies, as they continued to travel forward inside the vehicle and into the deploying airbags, seatbelts, steering wheel, and dashboard at 10 mph. The loads on Ms. and Mr. Pl1LastName and Mx. Third Name’s spines and spinal disks would have included high levels of compression, rotation, and shear, and would have had the potential to cause any level of injury severity to Ms. and Mr. Pl1LastName and Mx. Third Name, including all of the injuries that they were ultimately diagnosed with. The US National Highway Traffic Safety Administration reports that at an approximately 10 mph crash, nearly AMOUNT% of occupants will sustain some degree of injury that is immediately apparent and requires medical evaluation, around AMOUNT% will sustain a fracture or more significant injury, and around AMOUNT% will sustain a life-threatening injury (i.e., spinal cord injury, skull fracture, etc.).[[5]](#footnote-5)

Thus, all of the injuries diagnosed in Ms. and Mr. Pl1LastName and Mx. Third Name after the subject collision, and the associated treatments that they sought for their symptoms of significant and persisting spinal injury, are entirely explained by the exceedingly dangerous high speed frontal crash that they were exposed to.

**Temporal relationship between the crash and symptoms indicative of injury**

The second step of the injury causation analysis is the assessment of the timing between the trauma and the onset of symptoms indicative of injury. The hallmark of injury is that "you know it when it happens;" *i.e.* the causal relationship between the trauma and onset of the symptoms indicative of the injury is usually close enough in time that it is easy to recognize when the injury was incurred. There are some injuries that exhibit a delayed onset of symptoms, including injuries to intervertebral disks, which can first manifest with identical symptoms to a simple spinal strain. Other injuries are always immediately apparent, such as bony fractures. Some injuries are considered "distracting" from others because the pain they generate distracts attention from other, less painful injuries. There are still other injuries that can "mask" pain from nearby parts of the body through complicated pain accommodation mechanisms that are mediated at the spinal cord and in the brain. The assessment of the timing of the onset of symptoms reasonably attributed to an injury can sometimes be nuanced and complicated, and sometimes requires expert assessment.

Ms. Pl1LastName experienced the onset of symptoms indicative of acute spinal injury immediately after the crash, and he was diagnosed with neck and back injuries directly by 3 days following the crash, including the presentation of lower extremity radicular symptoms, an ominous early sign of injury to the intervertebral disks in the spine. The symptoms and diagnoses progressively evolved and worsened over the weeks and months following the crash and demonstrate a well-documented contiguous chain of causation linking the subject crash and their low back and cervical spinal injuries, and associated need for treatment.

Based on this history, there was a strong temporal relationship between the subject collision and Ms. and Mr. Pl1LastName and Mx. Third Name’s first development of symptoms indicative of spinal injury.

**Alternative explanations**

This last step of the injury causation analysis specific to the individual involves the assessment of the probability of the same symptoms, injuries, diagnoses, and need for treatment occurring at the same point in time, but in the absence of the investigated crash.

This part of the analysis is accomplished in 2 ways; first and most obviously, any competing contemporaneous traumatic cause of injury must be ruled out. There is, however, no such history for Ms. or Mr. Pl1LastName or Mx. Third Name, and the only source of trauma apparent in my review of materials that is temporally proximate to their post-crash injuries is the 01/01/2020 frontal impact crash.

The second part of the analysis requires an assessment of the probability that Ms. or Mr. Pl1LastName or Mx. Third Name would have developed the symptoms and diagnoses of spine injury at the same point in time had they not been initially injured in the 01/01/2020 frontal impact crash. As a generally healthy 12-year-old man, Mr. SAMPLE-P1-LN was at a negligible annual risk of spontaneously developing chronically painful and potentially surgical cervical or lumbar spinal disk derangements; less than 1 in 2,000 is indicated by epidemiologic study and national hospital data.[[6]](#footnote-6) The chance that they were going to develop the onset of chronic neck or low back pain attributable to symptomatic disk derangements on the same day as the crash by pure coincidence is obviously much smaller; less than 1 in 730,000 (the annual risk divided by 365 days). In comparison the risk of acute spine injury in the subject crash was more than 50%, and the risk of a spinal disk injury was likely no less than 1 in 25 in the general population. Based on this comparison of risk during the timeframe of interest, the crash is the most likely cause of Mr. SAMPLE-P1-LN and Mr. SAMPLE-P2-LN’s chronic spinal injuries by >99%.

A relatively common medicolegal question is whether persisting symptoms of back or neck pain after a traffic crash are truly related to the crash, or more probably due to other factors incidental to an acute crash-related injury to the spine. Most typically, the "other factors" that are raised in a medicolegal setting are the presence of pre-existing degenerative changes in the spine, or pre-crash history of low level or sporadic symptoms.

The answer to this question is now decided science. Along with my research colleagues, I have recently published 2 analyses and systematic reviews of nearly 10,000 articles regarding the long-term effects of traffic crash-related injury to the neck and low back and associated chronic pain. , Systematic reviews are considered the most reliable and strongest form of scientific evidence (i.e. Level I evidence), as they consist of a comprehensive synthesis of world literature on a topic. The result of the analyses indicate that when men like Mr. SAMPLE-P1-LN and men like Mr. SAMPLE-P2-LN have persisting neck or back pain after an acute crash-related injury, *more often than not* (>50% of the time) the symptoms are due to the crash, versus all other causes, regardless of pre-crash medical history.

**Conclusions**

Given the contiguous chain of causation from the day of the crash through Mr. SAMPLE-P1-LN's and Mr. SAMPLE-P2-LN’s most recent medical records, the lack of any significant pre-crash history of persisting spine pain and need for treatment in the years prior to the crash, as well as the relative risk of significant and persisting spine injury from the subject frontal impact crash, I conclude that the most probable cause of the post-crash acute and chronic neck and low back injuries described in Mr. SAMPLE-P1-LN's and Mr. SAMPLE-P2-LN’s medical records and summarized in this report, including their symptomatic cervical and lumbar disk derangements, is the subject 1/1/2002 frontal impact crash.

I have examined neither Mr. SAMPLE-P1-LN nor Mr. SAMPLE-P2-LN and I therefore have no opinions about their diagnoses, treatment, or prognoses outside of what is reflected in the medical record. This is not to say that I am not qualified, licensed, and extensively experienced in performing such evaluations, but that I have not done so in this case.

The preceding opinions were given as reasonable medical, and scientific probabilities. I reserve the right to amend any of my opinions should new information come to light.

Very truly yours,



Michael D. Freeman, MedDr, PhD, MScFMS, MPH, FRCPath, FFFLM, FACE, DLM

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Fellow, American College of Epidemiology  
Member, American Society of Biomechanics

1. Melia P et al. Development of the INFERENCE (INtegration of Forensic Epidemiology and the Rigorous EvaluatioN of Causation Elements) approach to causal inference in forensic medicine. Int J Environ Res Public Health 2020;17:8353; doi:10.3390/ijerph17228353. [↑](#footnote-ref-1)
2. Freeman MD. A practicable and systematic approach to medicolegal causation. Orthopedics 2018;41(2):70-2. [↑](#footnote-ref-2)
3. Freeman MD, Centeno CJ, Kohles SS. A systematic approach to clinical determinations of causation in symptomatic spinal disc injury following motor vehicle crash trauma. PM R 2009;1(10):951-6. [↑](#footnote-ref-3)
4. Etherton v. Owner Insurance Company. U.S. District Court of Appeals, 10th Circuit. Case No. 14-1164. [↑](#footnote-ref-4)
5. Wang, J.-S. (2022, May). MAIS(05/08) injury probability curves as functions of delta V (Report No. DOT HS 813 219). National Highway Traffic Safety Administration. [↑](#footnote-ref-5)
6. Nolet et al. Exposure to a Motor Vehicle Collision and the Risk of Future Neck Pain: A Systematic Review and Meta-Analysis. PM R. 2019 Apr 25. doi: 10.1002/pmrj.12173. [↑](#footnote-ref-6)