

Using Biomechanical Testimony in Virginia Product Liability Cases

Putting accident forces and mechanisms of human injuries in proper perspective for the jury

by **Sandra Giannone and Martha Swicegood**

After a car accident, plaintiff sues your client, the car company, and alleges that a defective component of their vehicle injured her or enhanced her injuries. Plaintiff claims that this accident caused a ruptured disk in her back so severe that she can no longer work or function without pain. Plaintiff has multiple medical doctors, including treating doctors from her childhood, prepared to testify that, in spite of her colorful medical history, not only is she gravely injured, but she sustained this ruptured disk in your accident.

You, however, question this causal connection and want to establish that the accident is not the true cause of Plaintiff's current condition. You hire an orthopedic doctor to perform an independent medical examination (IME). He opines that not only is her current condition not as severe as she claims, but that her medical history, rather than this accident, is responsible for her condition. While the value of this testimony cannot be overlooked, the IME doctor did not examine Plaintiff until more than two years after the accident, during which time much has happened, including numerous surgeries on Plaintiff's back. Alone, this may not be sufficiently compelling evidence to overcome that of the plaintiff's many treating doctors.

You now have a medical expert prepared to opine that Plaintiff's medical history and prior surgeries render it highly implausible that

Plaintiff's condition was caused by this accident. You also know that Plaintiff's kinematics during this accident do not lend themselves to her injuries. To bolster your IME doctor, you need someone to testify regarding the magnitude and direction of forces experienced by plaintiff in the accident as well as those forces necessary to rupture a disk. You need a biomechanic.

How Can a Biomechanic Assist the Jury and the Defense?

A good biomechanic can put accident forces in perspective for the jury.¹ The biomechanic begins by examining the accident vehicle and the facts surrounding the accident and ascertains the direction and magnitude of the forces that any occupant or object would experience during the accident. The biomechanic then examines the plaintiff's medical records to obtain data regarding both the plaintiff's pre-accident and post accident condition. The biomechanic can then opine whether the alleged injuries could have been caused to a person with these preexisting conditions exposed to these accident forces.

This systematic and scientific approach will enable the jury to understand the severity of the accident forces and put them in perspective. By using biomechanical analogies, a biomechanic can then explain the forces in your accident in comparison to forces such as

falling out of a 10-story building, having a car dropped on you, riding a rollercoaster, jumping rope, kneeling in church, performing a cartwheel, or walking. These types of comparisons can be invaluable in illuminating accident severity to a jury.

Though they are not trained to treat the human body, biomechanics are nonetheless qualified scientists trained to study the function of the body. They construe the human body as a machine when analyzing loads and forces applied to various parts of the body, including knees, necks and backs. In many ways, biomechanics are no different than other scientists, like chemists and biologists, who do not have medical degrees, do not treat patients, but who nonetheless possess sufficient knowledge, skill, or experience to make the witness competent to testify about how the human body functions under certain conditions.

Medical Doctors Are Not Qualified to Give Force Application Opinions

Medical doctors, absent special training, are not trained to analyze vehicular accident forces. They are not trained to measure them and they cannot scientifically recreate them. Medical doctors are obligated to diagnose and treat injuries or conditions. They have no scientific basis for opining whether certain forces were available in a particular accident

so as to have caused a particular injury.²

Moreover, medical doctor testimony regarding causation is usually based solely on what the plaintiff tells him. This leads to what can be classified as the “temporal relationship” basis for a doctor’s causation opinion at trial: the Plaintiff was in an accident, she reports “new” symptoms to a doctor one week later, and therefore the doctor opines that the accident caused the injury. This approach is characterized by what computer programmers refer to as the “garbage in, garbage out” problem. The doctor’s opinion is limited by the accuracy and veracity of the self-reporting of the person who now wishes to get money from your client. If the Plaintiff fails to provide a complete accident summary and medical history, the doctor surely will opine inaccurately that there is a temporal causal nexus between the incident and symptomology.

The Virginia Courts and Biomechanical Testimony

There are those who would argue that Virginia courts addressing non-medical experts have concluded that the field of biomechanics is junk science and not permissible in Virginia. It is incumbent upon the defense bar not to permit this erroneous reading of the caselaw. As the defense bar, we need to aggressively advocate the use of these uniquely qualified and wholly relevant engineers and attempt to change the perceptions regarding the quality and relevance of their scientific testimony.

Virginia Courts, despite perceptions and lore, permit biomechanical testimony. Courts have struggled to draw the line between the appropriate scope of testimony to permit from legitimate scientists who study the human body (i.e. biomechanics) versus legitimate scientists who treat the human body (medical doctors). Although there is a line regarding

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scope, experts on both sides are permitted to offer opinion testimony.

In the first case to address the issue, *Combs v. Norfolk & Western Railway Company*, 256 Va. 490, 507 S.E.2d 355 (1998), the Supreme Court upheld the trial court’s qualification of a biomechanic to testify regarding the forces and loads placed upon the Plaintiff’s spine during an incident where the Plaintiff fell while working on a toilet. While the Court embraced biomechanic testimony about the forces involved in the fall and their likely impact on the human body, the biomechanic was not permitted to give diagnostic opinions regarding the plaintiffs’ actual injury. *See id.* at 496-97; 358-59. The Court did not preclude a scientist trained to study the human body as a machine from opining about forces and loads as applied to the body.

The Supreme Court recently revisited the biomechanical issue in *Norfolk and Western Railway Co. v. Keeling*, 265 Va. 228, 576 S.E. 2d 452 (2003). In this FELA case, the railroad purported to offer “biomechanical” testimony in the area of vestibular mechanics to examine the biomechanism responsible for the Plaintiff’s fistula becoming symptomatic. However, when asked about the cause, he indicated that it was “infection or something that causes the tissue or the bone to deteriorate.” *Id.* at 234, 457. Plaintiff properly moved to exclude this testimony, because this answer did not

address biomechanical issues and was beyond the scope of a biomechanic’s expertise.

However, *Keeling* does not ban all biomechanical testimony. Rather, it prohibited that particular biomechanic from crossing the line into diagnostic medicine. *See id.* at 235, 457-58. Moreover, the *Keeling* Court intimated that it would have allowed actual biomechanical testimony from this witness, including testimony about pressure in the inner ear, if it received assurances that the questioning would be properly limited. *See id.* This suggests that a biomechanic is a legitimate scientist who can examine whether the forces applied on the human body or a component thereof (the ear) could result in the injury mechanism alleged.

This issue arose recently in the case *Kline v. General Motors* in which the Circuit Court permitted the biomechanic to testify about accident forces and loads. The court’s opinion addressing biomechanical testimony clarifies the law in Virginia and sheds light on the requirements and restrictions for biomechanical testimony.

Kline v. GM: Permitting the Biomechanic Scientist To Opine About The Human Body Machine

In *Kline v. General Motors*, 2003 Va. Cir. LEXIS 319 (Richmond City) (2003), Plaintiff claimed that during a hard-braking non-impact incident, the seat in his pick-up truck abruptly slid forward on its

tracks, resulting in knee contact with the knee bolster and resultant injuries to his back and knee. The incident did not appear to have the mechanism necessary to produce the meniscal tear of the knee complained of by the plaintiff. The defendant retained a highly qualified non-M.D. biomechanic to opine about the low forces in the incident, the mechanical mechanism required to cause a meniscal tear and the force application necessary to cause a meniscal tear. Pretrial discovery illuminated, through the depositions of Plaintiff's treating physicians, that although they had been designated as having "causation" opinions about the incident and the injuries, they were unable and unqualified to render opinions about accident forces and loads.

Upon a motion to exclude the expert, the Court ruled that the biomechanic could testify about the forces experienced by the plaintiff's body in the accident and about the mechanisms necessarily imposed on the human body which result in a meniscal tear, stating he "may testify to the nature of the forces involved, i.e., the direction of the force, the means of determining the amount of the force (the physical laws and factors for determining the amount of force) and the mechanism(s) involved in causing a meniscal tear, i.e., compression and

torsion." *Id.* at 2003 Va. Cir. LEXIS at *3.

The *Kline* court did rule that the biomechanic could not testify that the forces and nature of the impact on the knee were insufficient to cause the meniscal tear *in this plaintiff*, in spite of the fact that the court was quick to note that "[a] biomedical engineer is certainly competent to testify to the mechanics of action of the body and, to some extent, the points at which various body parts cannot function or can become injured, e.g., a certain amount of force concentrated on the forearm is sufficient to cause it to fracture." *Id.* at *5.

In Conclusion: Ensuring Your Biomechanic Is Up to Par

Expert testimony in Virginia must meet the requirements of *Tittsworth v. Robinson*, 252 Va. 151, 475 S.E.2d 261 (1996) (holding that the testimony must assist the fact finder in determining the evidence) and *Tarmac Mid-Atlantic, Inc. v. Smiley Block Co.*, 250 Va. 161, 166, 458 S.E.2d 462, 466 (1995) (holding that the expert testimony must be based on an adequate foundation). Biomechanical testimony can meet these requirements as long as your biomechanic employs a scientifically-based methodology in generating final opinions, and that the expert has considered and excluded all possible variables in

reaching final opinions to ensure reliability.

When medical doctors consider the human body, they think in terms of treatment. Biomechanics construe the human body as a machine that interacts with its physical surroundings. It is not the role of a medical doctor to do a biomechanical assessment of forces, loads and injury mechanism in an accident. Virginia law permits a biomechanic to testify about forces on the body, the types of loads these forces cause, and the types of loads necessary for a particular injury mechanism. If you carefully prepare your biomechanic and do not overreach to elicit opinions from him that are reserved for medical doctors, you can effectively make your point to the jury that the forces, loads and mechanisms required for the injury alleged were not present in your accident. **VBA**

NOTES

1. A number of jurisdictions allow expert opinions in the field of biomechanics. See e.g., *Quintana-Ruiz v. Hyundai Motor Corp.*, 303 F. 3d 62, 66 (1st Cir. 2002) (the biomechanic testified that forearm fractures rarely occur when the arm is three or more inches away from the component part at issue in the vehicle); *Krummel v. Bombardier Corp.*, 206 F. 3d 548, 560 (5th Cir. 2000) (the biomechanic opined that "fractures of the left tibia and fibula can reasonably be expected to occur in a 'bending' break at a force of less than 100 pounds depending upon the exact position of the body"); *Laski v. Bellwood*, 2000 US App. LEXIS 12068, *11 (6th Cir. 2000) (noting that "biomechanics are qualified to determine what injury causation forces are in general and can tell how a hypothetical person's body will respond to those forces, but are not qualified to render medical opinions regarding the precise cause of a specific injury"); *Lamb v. Sears, Roebuck, Co.*, 1 F. 3d 1184, 1190 (11th Cir. 1993) (biomechanic testified that about ease of climbing wall for child of certain size); *Hinds v. General Motors Corp.*, 988 F. 2d 1039, 1044 (10th Cir. 1993) (the biomechanic testified about the vehicle occupant's interaction with the seatbelt during the crash and the resulting occupant's injuries.)

2. To lay a proper foundation for biomechanical testimony, it is important to elicit testimony from the treating physicians that they are not engineers and are not trained to analyze accident forces, loads or occupant kinematics. Doctors will usually readily admit this.

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