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Low-Speed Rear Impact Collision

Conference of the Society of Automotive Engineers: A Synopsis

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On August 8-9, 1994 I attended the Low-Speed Rear Impact Collision technical workshop of the Society of Automotive Engineers in Irvine, California. The following are some of my observations and thoughts.

The program was organized by a gentleman from Collision Research and Analysis, Inc. I was initially disappointed in the speakers who addressed the audience of engineers, designers, physicians, accident reconstructionists, attorneys, and scientists. Several of the speakers had no advanced degrees and, despite the titles they awarded themselves (research engineer, etc.), they appeared to be accident reconstructionists with a decidedly defense-biased attitude. (More than 80 percent of the clients of accident reconstructionists are defense lawyers). Side comments concerning the "green poultice syndrome" were met with predictable audience snickers. They shared their work on seatback stiffness testing and simple rear impact crash testing, but there is nothing particularly interesting to report. One of the researchers who served as volunteer in a very low speed crash test was not wearing his restraint system. When asked why by one of the audience, he replied, "It doesn't make any difference if they are used in low speed impacts." Hmmmm.

The program also included plaintiff and defense attorneys. Both naturally followed party lines. The plaintiff lawyer pointed out that it is important to be able to show actual damage to a vehicle and provided several examples that attested to significant collisions in cars that appeared, to the untrained eye, undamaged. Bolts on the frame that were bent or sprung seatbacks were a few examples. The defense attorney discussed the problems of reliability of the science used in the courtroom, citing as a recent example the case of *Dauber vs. Merrill Dow*. The proposed use of "qualified juries" (i.e., those with special education or knowledge) in complicated cases will not come into being, in his opinion.

Dennis Schneider, PhD, president of Biokinetics Engineering, Inc., discussed some of the recent research leading up to our current state of knowledge of whiplash. Most of what he reviewed can be found in chapter one of my textbook (Whiplash Injuries: The Cervical Acceleration/Deceleration Syndrome, First Edition).⁴ His talk was lucid and enlightening. Alan Nahum, MD, spoke very briefly. I thought his notions were out of date. He used dated photographs from Ian Macnab's work to describe the whiplash phenomenon despite more recent work that has necessitated a modification of some of Macnab's models. Nahum told us, for example, that the chin will strike the chest during the flexion phase. In fact, of course, it will not.

Nahum shared the stage with Mark Gomez, PhD. Dr. Gomez gave a from-the-ground-up discussion of whiplash beginning with anatomy which I am sure was appreciated by the non-physicians in the audience. I would disagree with some of his comments, however. He said the discs do not fail in whiplash -- only the end plate or the disc/bone interface. His group experimented with the serial cutting of spinal ligaments (sounded to me like something that White and Panjabi had done) to assess their contribution to spinal stability. Interestingly, they found that the radiographic appearance was not altered by cutting the posterior ligaments.

Several engineers from Biodynamic Engineering, Inc., were on hand to share their findings from crash testing with human volunteers (themselves actually). You will not have access to this material because their "clients" will not allow them to publish their results -- a practice that runs counter to the general aims and philosophy of science. Carley Ward, PhD, the president, remarked later that the research was to be used to refute injury claims in "fraud" cases. I might add that I have had personal experience with one of these engineers. He testified for the defense in a case where I was acting as an expert for the plaintiff and stated confidently that he could precisely calculate the g forces that had been delivered to the low back of the plaintiff (merely by looking at a photograph of her car). In fact, of course, you cannot. Among other things, as an example, you must determine if the bumper isolators were functional at the time of the accident.

The presentation of the research was interesting but generally misleading. The speakers compared the effects of the low speed rear impact with amusement park rides and I was sure that most of the attendees must have concluded that it would be nearly impossible for an injury to occur under such trivial conditions. However, mingling with them later I found it heartening that many didn't buy it.

Overall, I was not pleased with the first day. None of the presenters were physicians and therefore had had no real patient contact, nor did they have any understanding of human anatomical and physiological

systems. I sensed that we had spent the entire day using relatively contrived and artificial crash simulations along with applied principles of physics and engineering to "prove" that people are unlikely to be injured in low speed rear impact collisions. Epidemiological data, outcome studies, and animal research were never discussed.

The next day Donald Huelke, PhD, well known for his work in the development of the AIS scale and other projects relating to injury mechanisms in crashes, shared a new finding coming from Europe. It has been discovered that during the whiplash injury a pulse of CSF is injected under high pressure into the nerve root sleeves and may be responsible for some radicular syndromes. This has not yet been published.

Richard Howard, MD, and Whit McConnell, MD, principals of the Biodynamic Research Corporation, discussed their earlier work on full scale human volunteer crash testing¹ and their most recent work (as yet unpublished). You may recall Howard as the lead author of a rather "interesting" paper that suggested that the TM joint is subjected to no more trauma in whiplash than "everyday chewing"² -- a paper that has been highly criticized in dental circles³ and widely applied in defense strategies. Using split bite blocks in the mouths of test subjects (again, the authors themselves) they concluded that whiplash at low speeds would be about as stressful as "vigorously flossing your teeth." Hmmmm. I might point out that the "clients" of BRC are automobile insurance carriers and manufacturers. The results of all of this research have actually been quite enlightening and I have discussed the implications of it at length in the newest edition of my textbook⁴ which will be released in December. You should be aware, however, that their work is frequently mischaracterized in medical-legal settings -- much to the disadvantage of plaintiffs and treating doctors. Usually this takes the form of extrapolating beyond the collected data. The research shows that significant forces are applied to the head and neck, and adds greatly to our knowledge of the kinematics of these collisions. It does not prove, however, as it is frequently claimed, that persons other than "robustly healthy" middle-aged males, who are perfectly seated and restrained and prepared for an impending controlled crash, with no brakes applied, and with no second collisions, are not likely to be injured.

Also, of course, it is possible to support an incorrect hypothesis. I don't mean to belittle their important contribution to science, but it reminds me of the famous Austrian physiologist who experimented with frogs. He amputated one limb and ordered the frog to jump. It did. He then amputated another and then another. Again, when ordering to, the frog jumped. When the fourth limb was amputated the frog would not jump, providing the scientist's hypothesis that frogs become deaf when all four limbs are missing.

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