Use of Biomechanical Testimony in Low Impact Collisions

Wednesday, December 18, 2013
Presented By the IADC Transportation Committee

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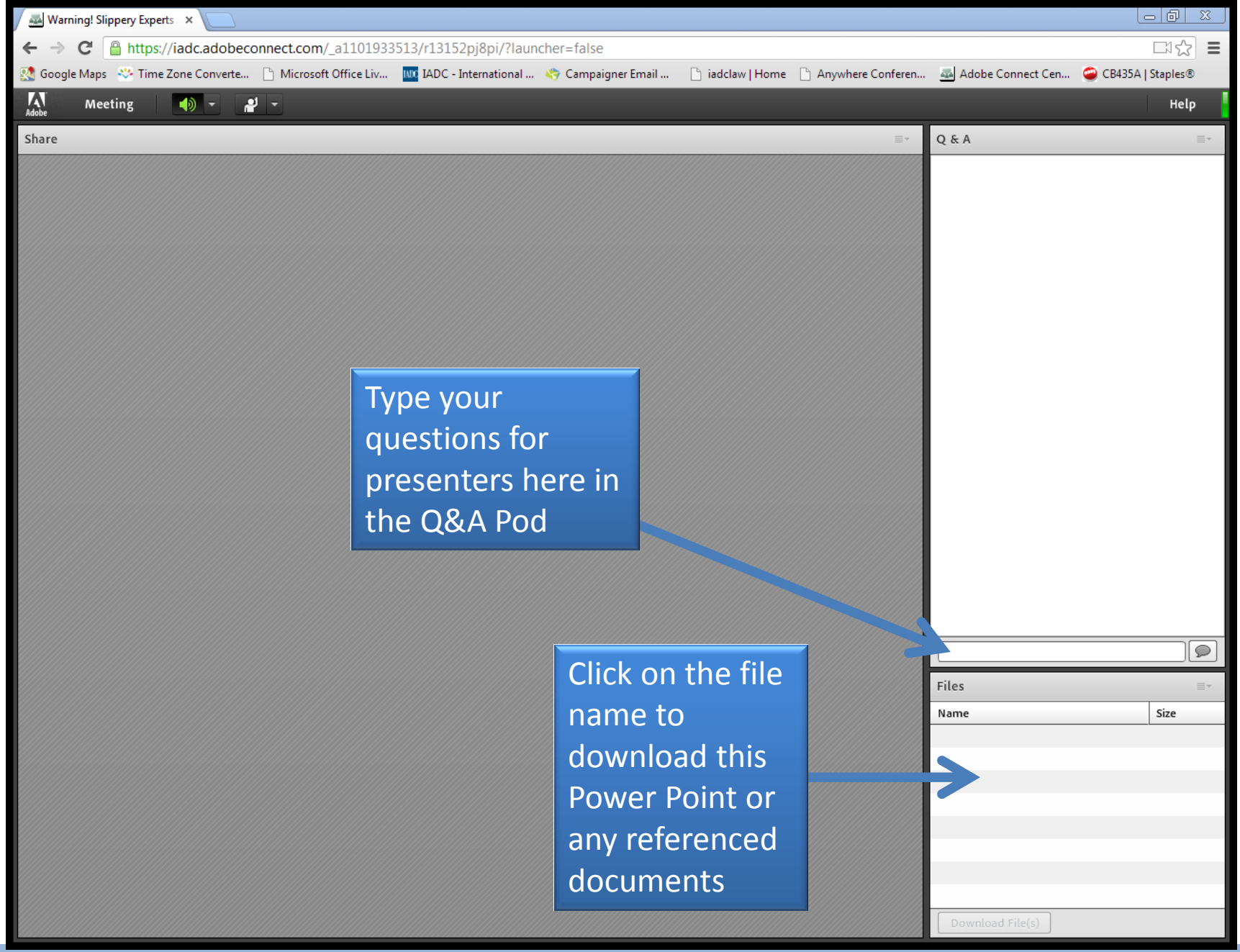
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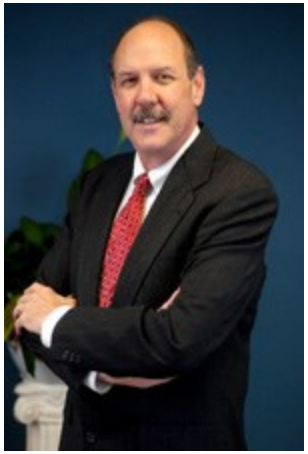

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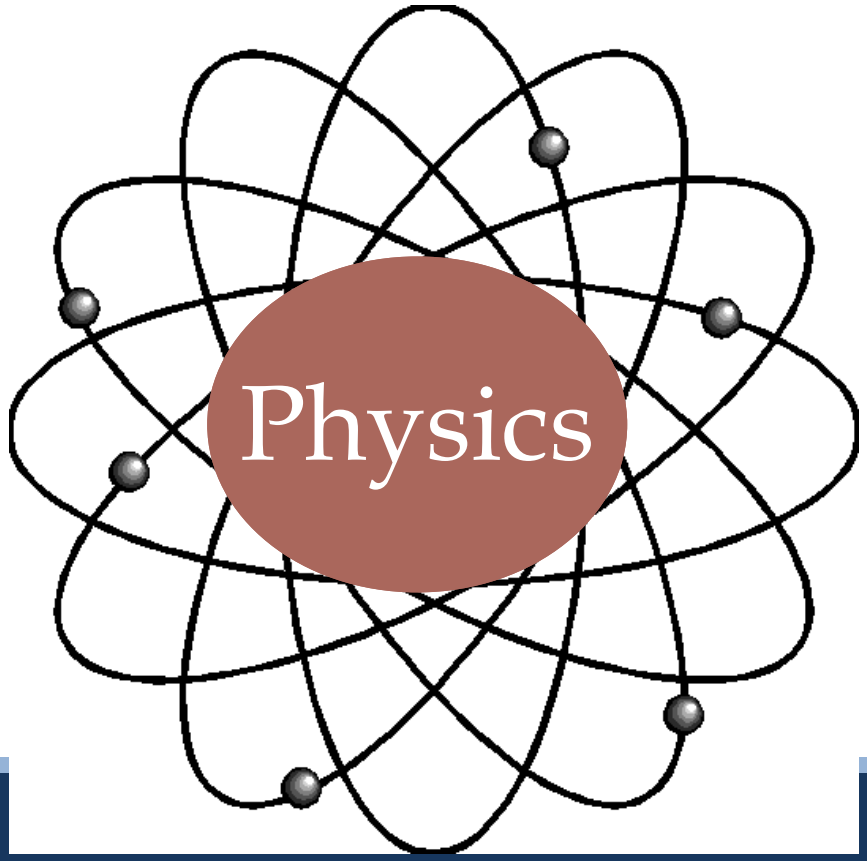
What is Biomechanics?

Where physics meets biology



Biomechanics

- Biomechanics is “a marriage between medicine and engineering in that injury is a purely mechanical process up to the instant it occurs. Once an injury occurs, then it is purely medical.” *Guentzel v. Toyota Motor Corp.*, 768 S.W.2d 890, 895 (Tex. App.—San Antonio 1989, writ denied).

The American Medical Association (AMA), 4th edition of its "Guides to the Evaluation of Permanent Impairment

To decide causation it is necessary to verify **both** of the following.

- The alleged factor ***could have caused*** or contributed to worsening of the impairment, which is a ***medical*** determination.

- The alleged factor ***did cause*** or contribute to worsening of the impairment, which is a ***nonmedical*** determination."

In the 5th edition of the AMA's "Guides to the Evaluation of Permanent Impairment" *Causation* is defined as:

"… an identifiable factor (eg accident or exposure to hazards of disease) that results in a medically identifiable condition. Medical or scientifically based causation requires a detailed analysis of whether the factor ***could have*** caused the condition, based upon scientific evidence and, specifically, experienced judgment as to whether the alleged factor in the existing environment ***did cause*** the permanent impairment. Determining medical causation requires a synthesis of medical judgment with scientific analysis."

MDs - What are they good for?

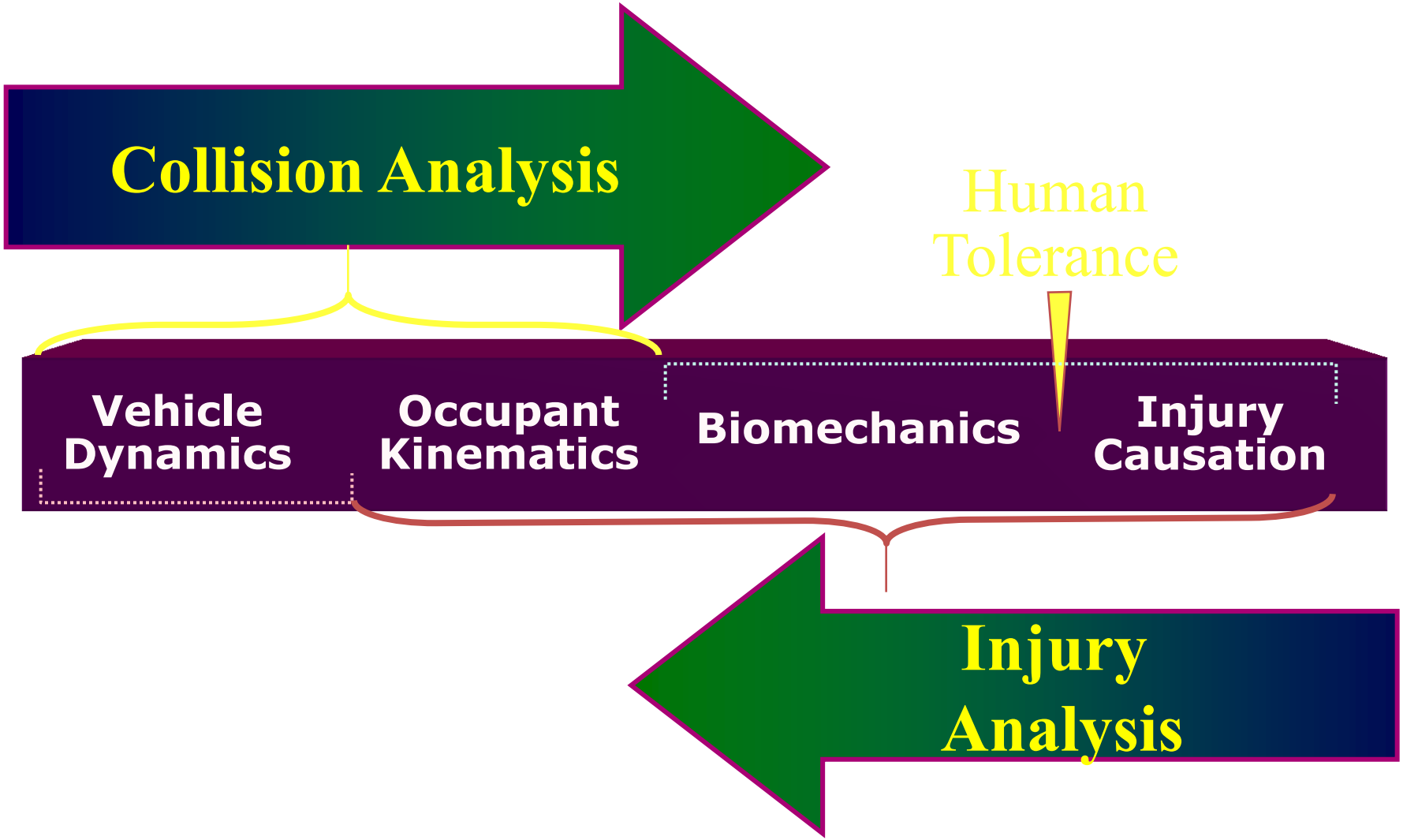
“Absolutely nothing”

MDs are trained to diagnose and treat, they are not trained in causation.

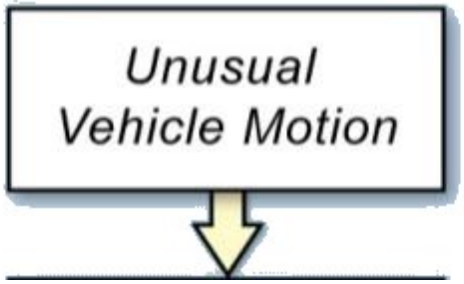
Melhorn, J. M. and W. E. Ackerman, Eds. (2008). Guides to the Evaluation of Disease and Injury Causation. Chicago, IL., American Medical Association.

Components of an injury causation analysis (ICA).

Injury Causation Analysis



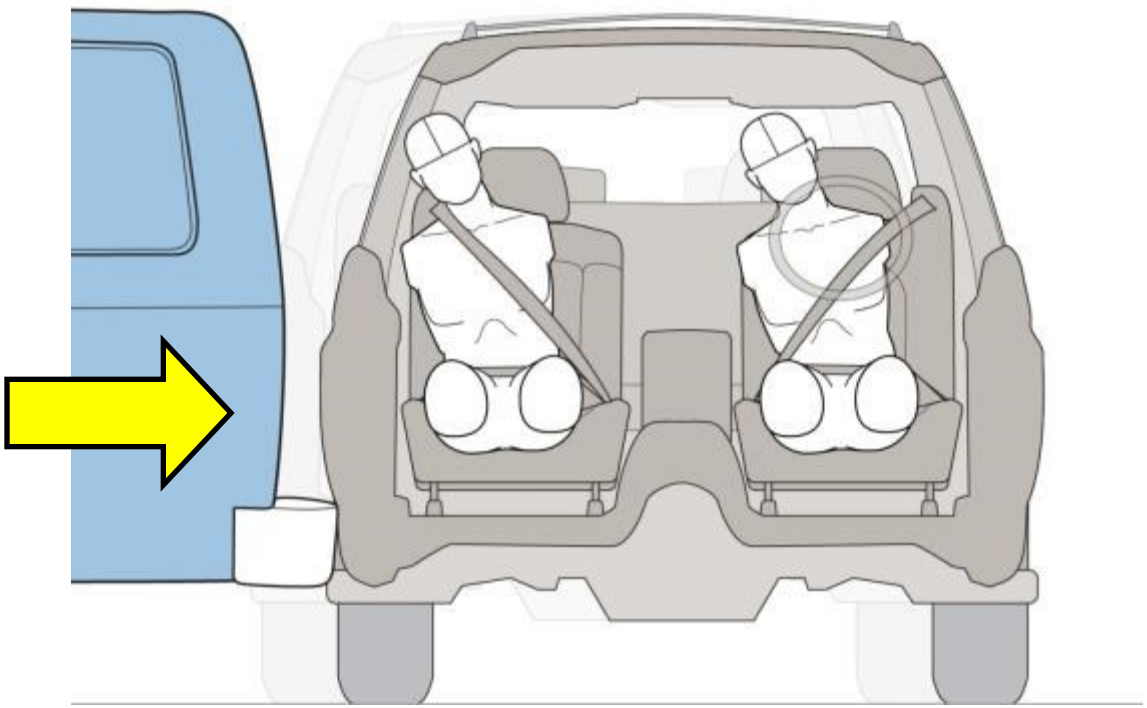
Collision Sequence

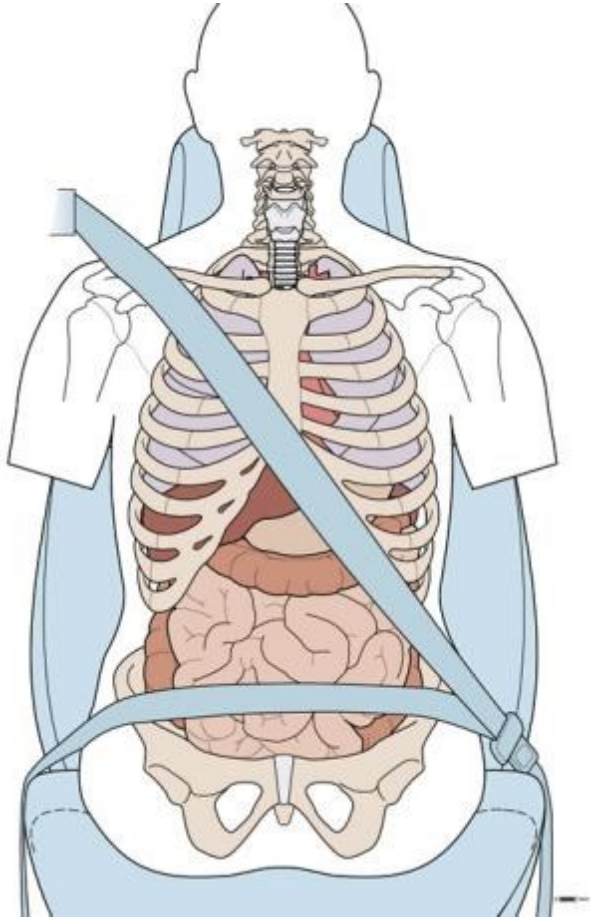


Accident Reconstruction

Occupant Motion

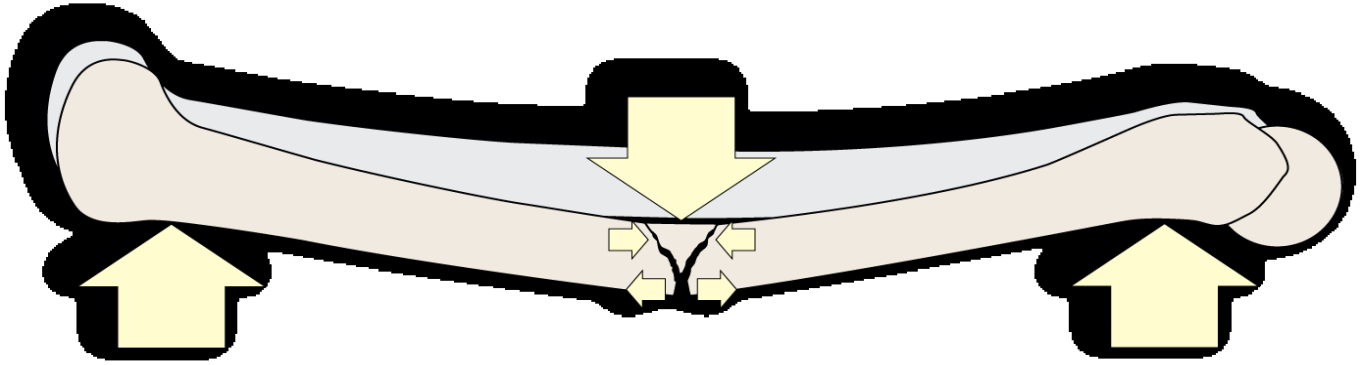
- Vehicle motion dictates occupant motion
- Restraint use dictates extent of motion





Injury Mechanism

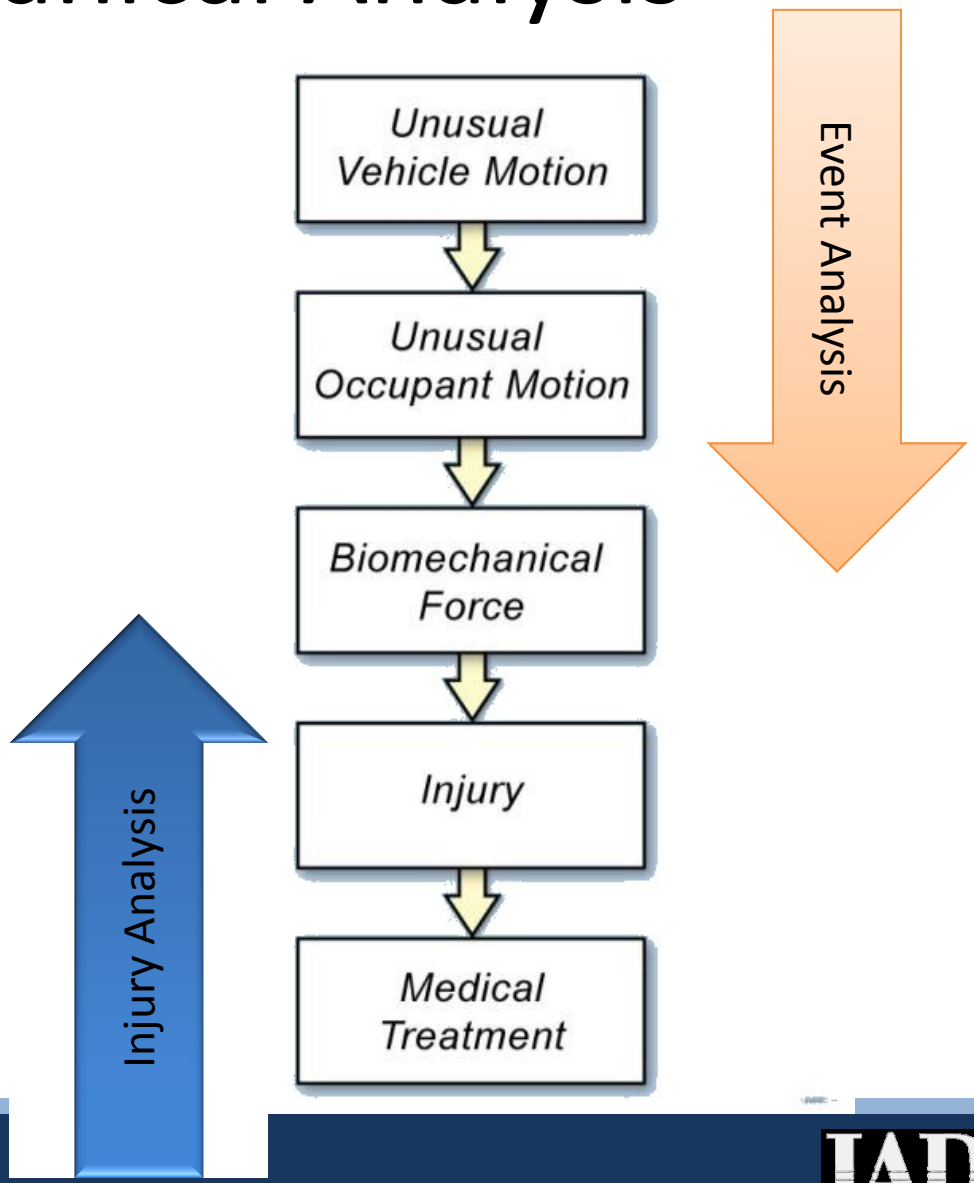
- Injuries DO NOT happen magically.
- A force or combination of forces from a particular direction which produce a specific injury.



A biomechanical analysis outlines the injury mechanisms that are present during an event and can also provide the injury POTENTIAL of a particular event based on the force exposure.

Biomechanical Analysis

- Vehicle response
- Occupant motion
- Biomechanics
  - Injury mechanisms
  - Injury potential
  - Are alleged injuries relate to event



Materials needed for an ICA

- Pictures
- Repair estimates
- Police report
- Witness statements/depos

What would the jury like to hear?

- Injury mechanism for alleged injury
- What mechanisms where present during event
- If injury mechanism present, what was the magnitude of the force
- References to various everyday or sporting activities

1. Understand the Theme

A. This surgery and the resulting "limitations" and "damages" was for a herniated disc.

B. Disc herniations are not caused by the types of forces seen in this accident

   1. No scientific evidence supports plaintiff's claim that this type of accident can cause a disc herniation.
   2. Disc herniations are usually caused by degeneration and/or repetitive trauma, and rarely by a one-time event.
   3. An acute, traumatic disc herniation requires:
      a. Significant compression, and
      b. Hyperflexion

      … *Not* present in this minor accident

2. Cross-Examine the Plaintiff's treating physician in preparation for the appropriate *Daubert* motion.

A. Many things can cause a disc to herniate, isn't that true?

You have had patients who have had this condition and had no specific accident, right?

1. Discs degenerate over time and herniate as a natural result of aging, right?

   a. loss of water content and nutrients
   b. annulus becomes fibrous and cracks develop
   c. disc bulges and nucleus pulposis fills cracks and pushes annulus outward.

2. Risk factors that cause the degeneration process:
    a. Repetitive, heavy lifting with poor back mechanics (that's why workers wear OSHA belts, weight lifters wear belts, etc.)
    b. Obesity
    c. Smoking
    d. Or sometimes it just develops over time

B. What do you know about this accident?

1. Forces?
2. Impact?
3. Direction?
4. What happened to plaintiff during accident?
5. Photo of damage?

C. What is the reliable basis for saying that this accident (show photo) caused this man's herniated disc?

1. What plaintiff told you? ("I did not have back pain before the accident but I had it after the accident")

2. Can you refer me to any peer-reviewed, scientific, medical literature that says it is reliable methodology to take the word of a plaintiff in a lawsuit as a basis for the opinion that the disc herniation was caused by the accident?

D. Are you aware of any study that says a low speed rear-end impact can cause a herniated disc?

E. Do you have any authoritative medical research supporting your opinion that the accident caused a herniated disc?

F. Can you show me anywhere that the concept that a minor impact [or an impact like this (show photo)] causes a herniated disc has been accepted by the relevant scientific or medical community?

G. Isn’t it true that the only place where we see this opinion being expressed is in a lawsuit?

H. The "Eggshell" or "Aggravation" theory

1. Do you have any authoritative medical research supporting your opinion that an accident like this can cause a degenerative disc to herniate?

2. Do you have any reliable, authoritative medical research indicating that a degenerated disc is "weaker" and pre-disposed to herniation by a one-time traumatic event?
   …by an accident like this?

3. In fact:
   Article published in Spine in December, 2006: Caragee, "Does Minor Trauma Cause Serious Low Back Illness?," 31 Spine 2942-2949 (2006)

3. Accident reconstructionist to establish “minor” impact forces

A. But be aware of the “sponsorship cost”
B. The jury is naturally skeptical
C. Calling a witness “legitimizes” the plaintiff’s evidence because they jury assumes that your are calling a witnesses because you need to.
D. And because you think the plaintiff’s evidence is “credible”.

E. Photos of minor impact are often the best evidence.

But some courts will not allow

Unless supported by “expert” testimony

1. Reconstructionist
2. Biomechanical Engineer

4. Use of Biomechanical Expert

A. What does established science conclude about what types of forces are required to cause a disc to herniate?

[Scientific articles, etc.]

B. These forces were not present in this accident

[Basis-accident reconstructions]

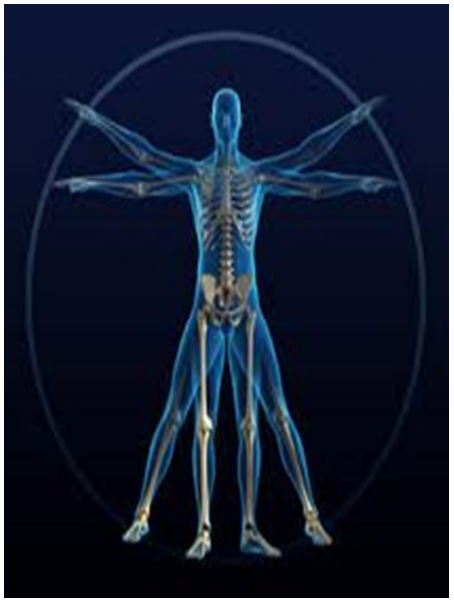
C. No scientific evidence supports the theory that a herniated disc can be caused by the minor forces in this accident

D. This is a question of mechanics, not medicine.

1) Mechanics focuses of mechanical cause and effect.
2) Medicine focuses on diagnosis and treatment

Admissibility of Biomechanical Engineering Testimony

"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." *Laski v. Belwood*, 215 F.3d 1326, 2000 WL 712502 (6th Cir. 2000).



Rule 702

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

(b) the testimony is based on sufficient facts or data;

(c) the testimony is the product of reliable principles and methods; and

(d) the expert has reliable applied the principles and methods to the facts of the case.

Witness Must Be Qualified in Biomechanical Engineering

1. **Formal schooling and academic degrees.**
2. **Licensure.**
3. **Employment.**
4. **Practical experience.**
5. **Specialized Training.**

“Testimony must be based upon sufficient facts or data”

Police reports, reconstruction reports, photos, analysis of reconstruction experts, inspection of vehicles, other expert’s inspections, G factors calculated by accident reconstructionist, medical records, x-rays, MRIs, depositions of witnesses and experts.


POLICE REPORT

Detail of Event:

Actions Taken:

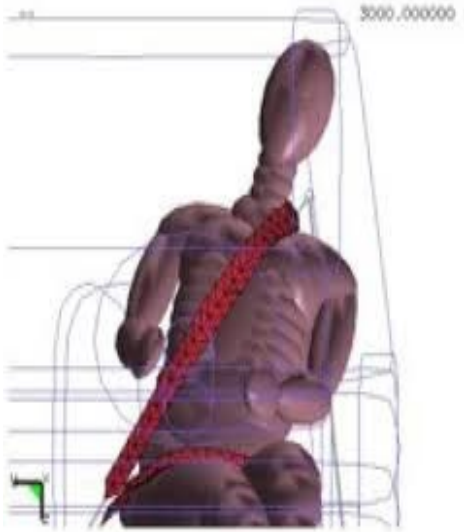
Summary:

“Testimony must be the product of reliable principles and methods”

Review of medical and biomechanical literature including test studies, computer simulations and case studies satisfies this element.

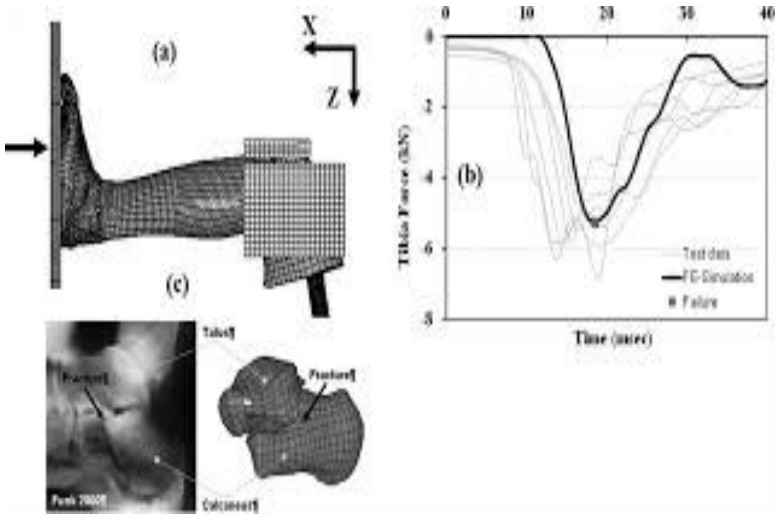
The expert must reliably apply the principles and methods to the facts of the case”

Expert simply needs to testify that he or she applied all of this information to the case using his or her experience, training, knowledge, and understanding of principles of human tolerance, biomechanics and physics in reaching conclusions.



Daubert Factors

1. *Whether the theory or technique can be and has been verified by the scientific method through testing.*
   - Expert need not actively conduct his or her own tests. Process of analyzing data while using experience to interpret the data is permissible.
   - Can use statistical, or other scientific data generated by other in the field. Review of other's human testing satisfies this element.



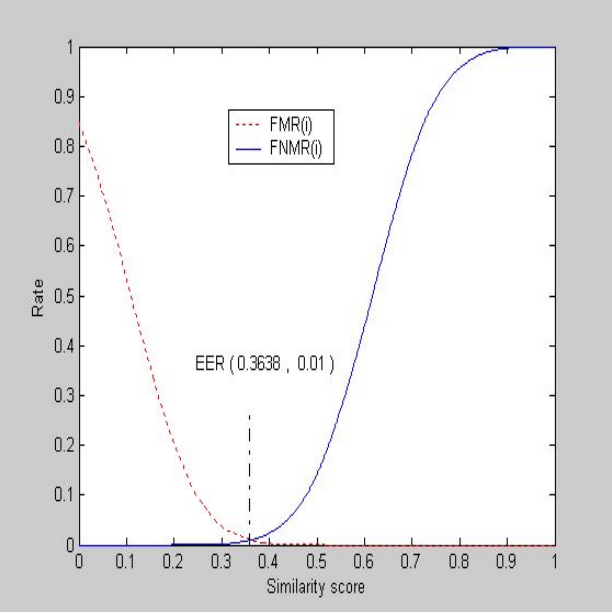
Daubert Factors

2. *Whether the theory or technique has been subject to peer review and publication.*

This is typically dispensed with because the expert's analysis is specialized to the facts of the case and is usually not worthy of industry-wide analysis or peer review.

Daubert Factors

3. *The known or potential rate of error of the technique.*
   - *Need to address this issue. Testimony as to a "reasonable degree of medical or biomechanical certainty" may be insufficient.*
   - *Possibly base opinion on other's testing and literature.*

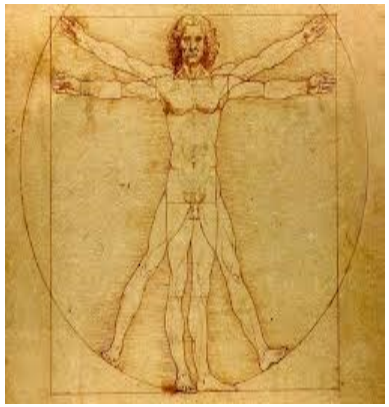


Daubert Factors

4. *Whether the theory or technique has been generally accepted by the relevant scientific community.*
   - *Rely on methodology of other biomechanical engineers.*
   - *There may be no one singular or strict methodology in the industry so this factor is reduced in importance.*
   - *Gathering information and applying one's training, experience, and knowledge to a process of analyzing the information is a reasonable methodology.*

Top 10 Suggestions

1. If expert has underwent a previous Daubert challenge and succeeded, use it.
2. Qualify your expert.
3. Go through each Daubert factor and address. Do not lose on basis of lack of foundation.
4. Limit to biomechanical and do not venture into medicine.
5. Expert should use biomechanical and not medical terminology.



Top 10 Suggestions

6. Retain an accident reconstructionist to identify speeds, angle of impact, G forces, etc. so can rely on data.
7. Expert needs to provide tests (literature), data (from recon expert or medical records), or research (literature).
8. It is proper for biomechanical expert to subject plaintiff's version of the facts to a rigorous analysis and come to an opposite conclusion.
9. Expert should not dispute diagnosis of treating physician.
10. It is ironic that an expert cannot testify as to causation simply because his expertise is biomechanical and not medical, while allowing a medical expert to testify about causation even though he or she has no expertise in biomechanical.

Questions for Presenters?

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