The biomechanics of concussion: toward better diagnosis and prevention

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Screening and prevention of concussion

Problem:
- Number one risk factor for concussion is history of prior concussion
- Repeat concussions can contribute to permanent brain damage

Government solution:
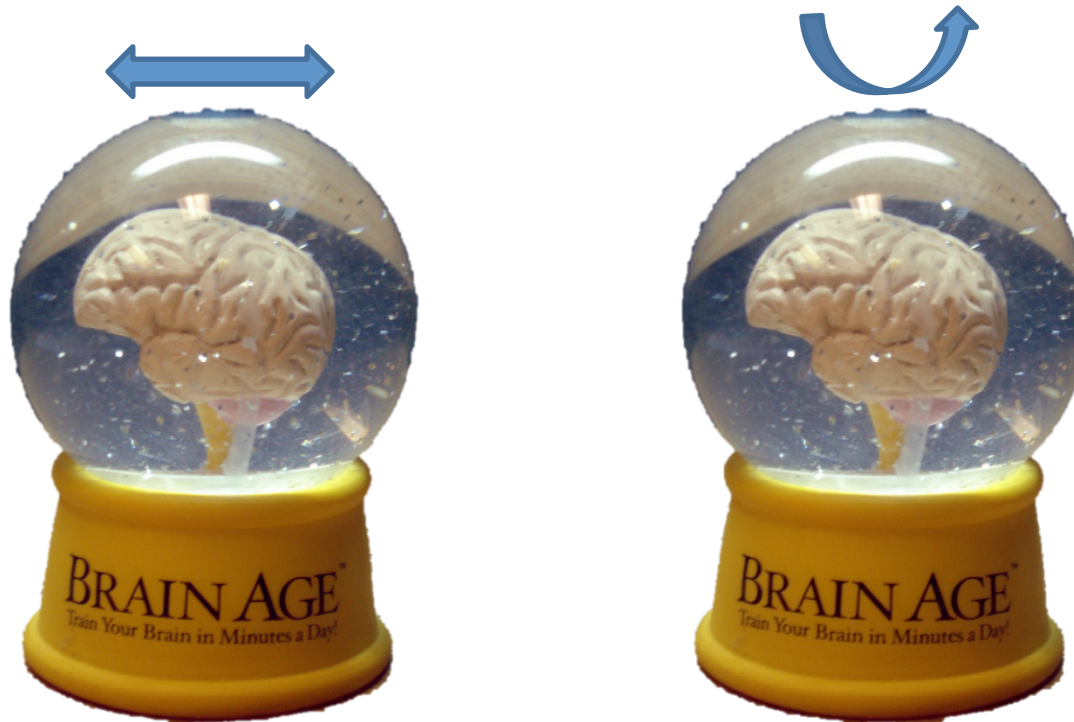- Lystedt Law in all 50 states to prevent repeat injury

Technology solutions:
- Screening
  - Must have a way to detect likely concussions: wearable sensors
- Prevention
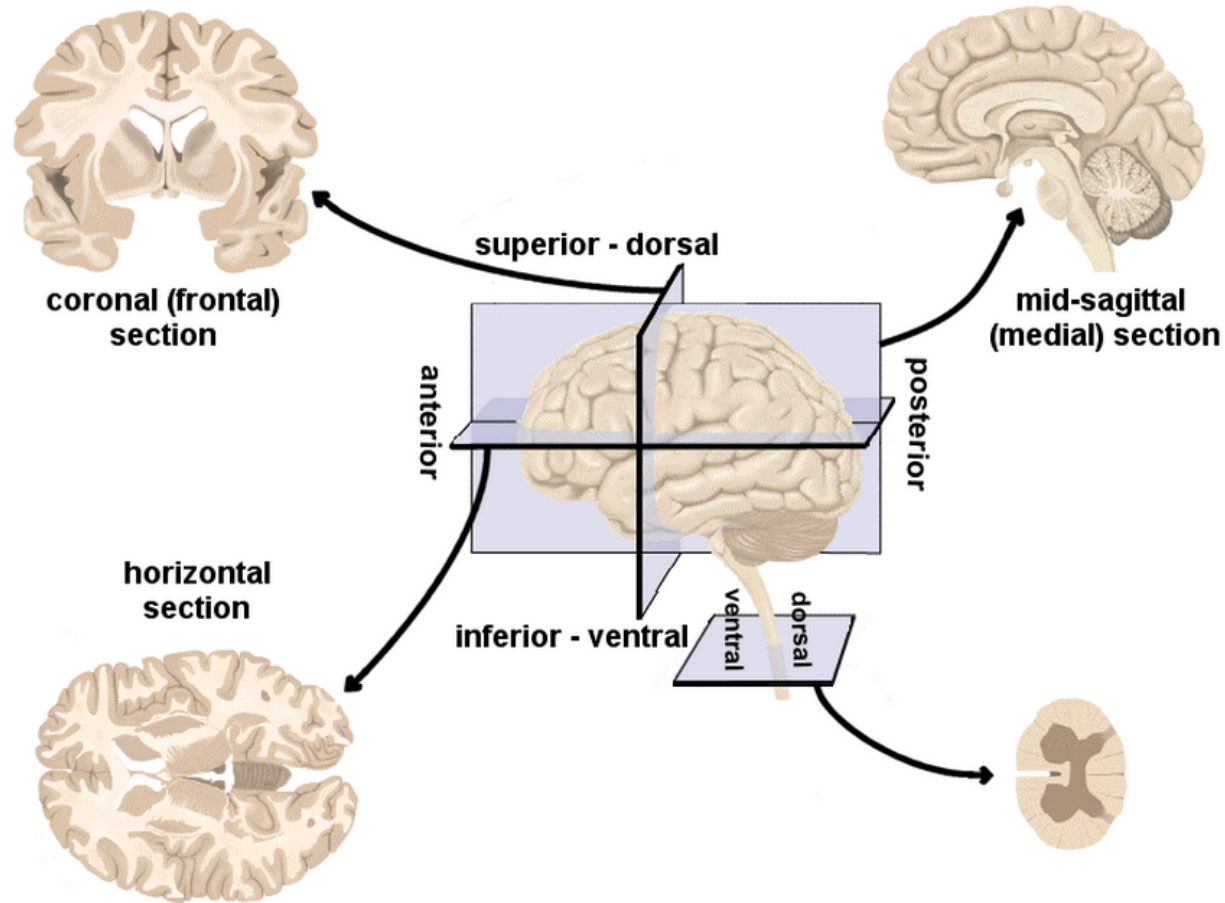 - Helmets prevent skull fracture, but can they prevent concussion?
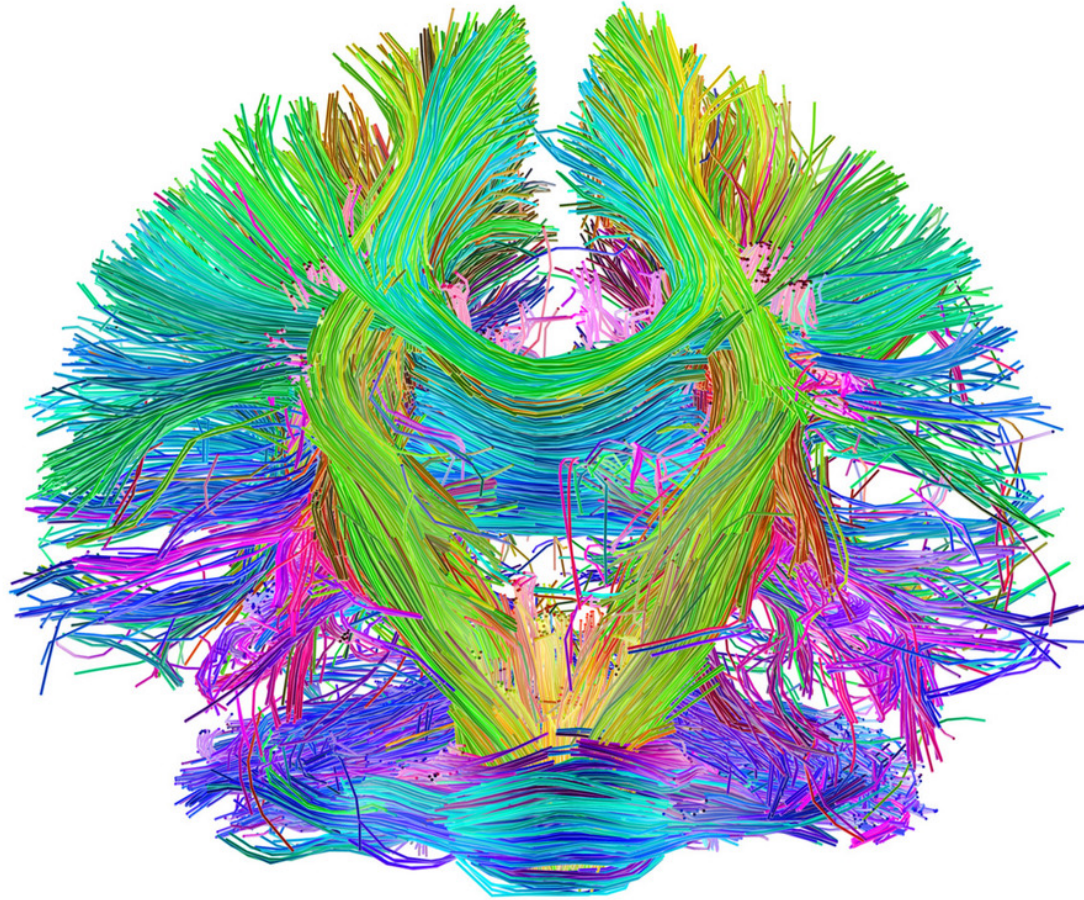
What causes a concussion?
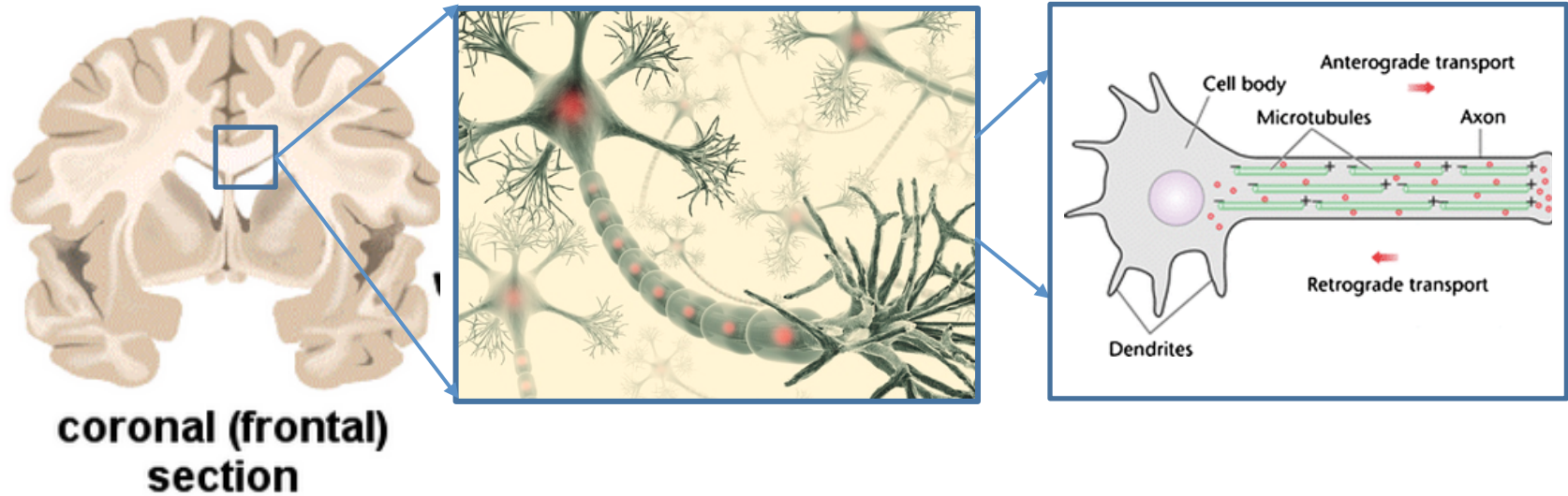
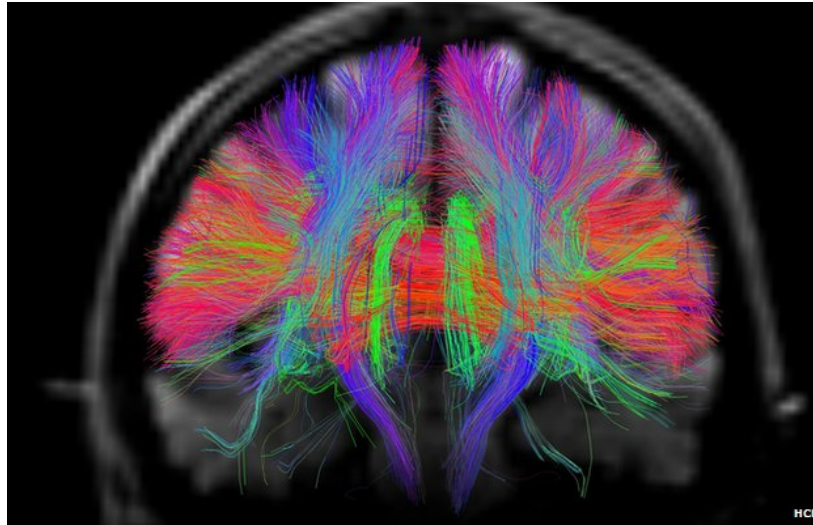- Head translation vs. head rotation

Are all impact directions the same?

Concussion disrupts brain wiring

Axon and microtubule damage

coronal (frontal) section

Cell body
Microtubules
Axon
Anterograde transport
Retrograde transport
Dendrites

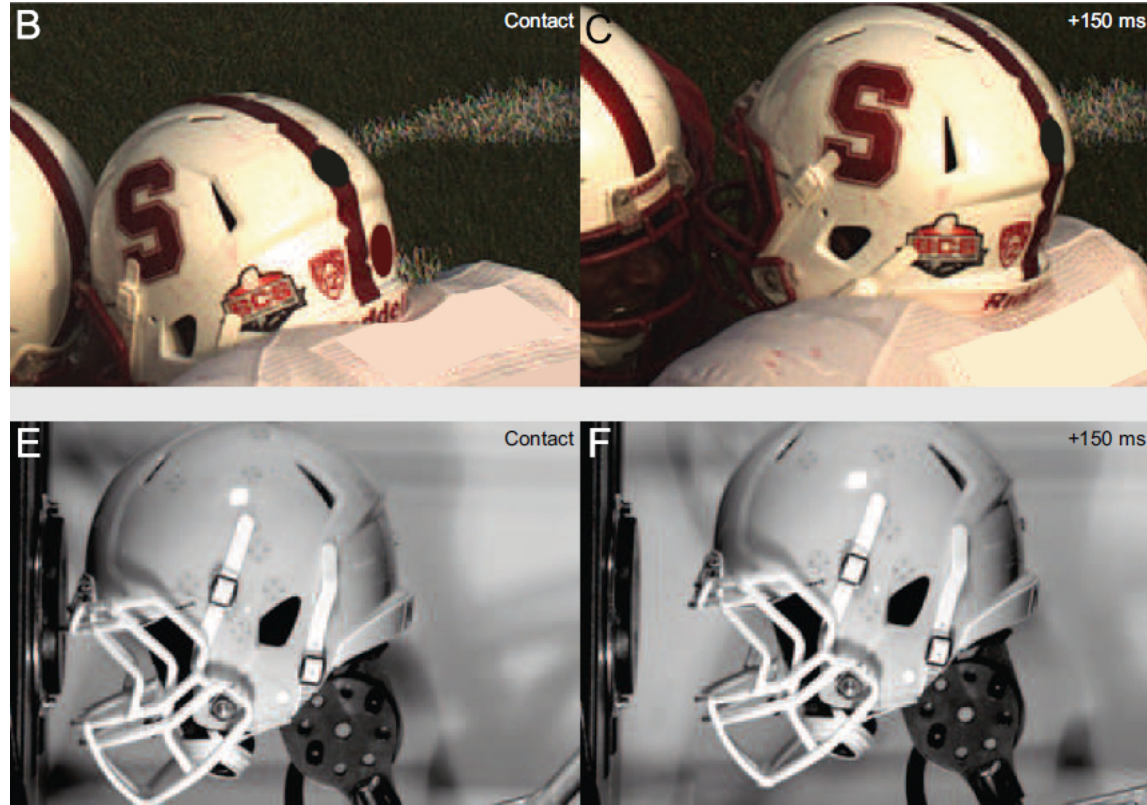# Measure skull motion as a surrogate for brain

Soft tissue and textile motion at high-speed

Removed for proprietary purposes

Helmets and rotational acceleration

NOCSAE Drop Test

Removed for proprietary purposes

Acknowledgements

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