Brain and Spinal Cord Injury:
Current Status and the Future Hope for Concussion, Encephalopathy, Dementia and Paralysis

September 13, 2017
PERSPECTIVES ON HELMET TESTING

• Background/ History
• Use as tools
• Recent evolution
• Where are things headed?
Helmet Testing History
(Focus on Football)

1973 – NOCSAE standard first published
1978 – NCAA first mandates NOCSAE
1980 – NFHS first mandates NOCSAE

Highly Effective
• 74% drop in head injury fatalities by 1990
• 88% drop in serious head injuries by early 2000’s
NOCSAE Drop Testing

- Focused on skull fracture
  - Definable Parameters
  - 3 accelerometers (x,y,z)
  - Linear force only
  - Severity Index
NOCSAE Drop Testing
NOCSAE Side Impact, 18 fps
Recent Evolution

Rotational Energy

- Research has been indicating rotational forces as a key contributor to concussion for years.
- Viano/NFL/Biokinetics reconstruction work in 2003
- NOCSAE ND081 rotational standard 1/2017
Rotational Impact Testing

- More focus on concussion
  - Broad set of variables
- 9 accelerometers
- Linear and Rotational force
- Flexible neck & Linear Bearing Table
- Actively being implemented today
Pneumatic Ram
Pendulum
NOCSAE ND081

Pneumatic Ram
• Front Boss
Where Things are Headed

Simulation
- Computational Model
- Stress/Strain in the brain
- Coupled with lab testing for validation
- Digital test methods
- Many challenges

Takhounts, 2008
THANKS

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