Center for Traumatic Brain Injury

Purdue University
Indiana University School of Medicine

in partnership with

Dartmouth School of Medicine
Harvard Medical School
Richard L. Roudebush VA Medical Center
University of Utah
Tuskegee University
Deployment Medicine International

Response to DOD TBI-MRC
Traumatic Brain Injury

• Signature injury of Iraq and Afghanistan conflicts
  – Est. 22% of casualties have TBI
  – Vietnam: 12-14% of combat casualties had TBI
  – Kevlar body armor and helmets have significantly improved survival rates
  – Vietnam: Mortality from brain injuries was 75% or more

Symptoms of Traumatic Brain Injury

- Soldiers with TBI often have symptoms affecting several areas of brain function
- Headaches, sleep disturbances, and sensitivity to light and noise
- Cognitive changes such as disturbances in attention, memory, language and problem solving
- Behavioral symptoms such as mood changes, depression, anxiety, impulsiveness, emotional outbursts, or inappropriate laughter
- Some symptoms overlap those of post-traumatic stress disorder, many of have both conditions.

Civilian Traumatic Brain Injury

- Estimated 1.5 to 2.5 million civilian TBI cases per year in US
  - 50,000 cases fatal
  - 235,000 hospitalizations
- Exceeds all new cases of cancer
- Estimated $60 billion in medical and indirect costs

Centers for Disease Control and Prevention
Journal of Head Trauma Rehabilitation
National Benefits of Establishing Center for Traumatic Brain Injury

• Prevention of traumatic brain injury
• Improved protective systems
  – Personal
  – Vehicular
• More accurate diagnosis of TBI
  – Pinpoint locations of damage in the brain
  – Precisely determine extent of damage
  – Enable improved surgical and medical treatment protocols
• Development of new drugs to treat TBI
  – Agents to inhibit and repair acute neuronal damage
  – Agents to repair/reverse damage
  – Potential of PEG – potential to be first pharmacological treatment for TBI
• Improved rehabilitation of TBI veterans (& civilians)
• National Resource for TBI Research and Treatment
Indiana Benefits of TBI Center

Direct projected economic development impact

<table>
<thead>
<tr>
<th></th>
<th>Econ impact (5 yrs.)</th>
<th>Econ impact (1 yr.)</th>
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</thead>
<tbody>
<tr>
<td>Total Life Science Funding</td>
<td>$209.8 million</td>
<td>$42.0 million</td>
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<tr>
<td>Federal Life Science Funding</td>
<td>$162.5 million</td>
<td>$32.5 million</td>
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<tr>
<td>New Direct Life Science Jobs</td>
<td>252 direct Life Science Jobs</td>
<td></td>
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<tr>
<td>Indirect Jobs</td>
<td>1,217 Indirect Indiana Jobs</td>
<td></td>
</tr>
<tr>
<td>New Disclosures (PU/IU)</td>
<td>118 disclosures</td>
<td>24 disclosures</td>
</tr>
<tr>
<td>New Patent Filings (PU/IU)</td>
<td>59 patents</td>
<td>12 patents</td>
</tr>
<tr>
<td>Spin Off Companies (IU/PU)</td>
<td>7.5 companies</td>
<td>1.5 companies</td>
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</tbody>
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In addition, as Indiana becomes the national center for neurotrauma research and treatment, patients will travel from across the US to spend their insurance dollars in Indiana. This economic impact will be many times the direct impact given above.

Aleto Consulting Inc.
Institutional Partners

**Purdue University**
- **Engineering**: Impact and blast analysis and models
- **Science**: Large scale computer simulation
- **Veterinarian science**: Histopathology, imaging, animal models
- **Biomedical engineering**: Cellular mechanisms of damage and repair

**Indiana Univ. School of Medicine**
- **Neurological surgery**: Preclinical and clinical trials on protection/recovery of CNS function
- **IU Center for Neuroimaging**: Preclinical and clinical studies of neurocognitive and brain functional outcomes
- **Psychiatry**: Research and clinical trials in anxiety disorders
- **Physical medicine and rehabilitation**, managing TBI and community re-integration
- **Stark Neurosciences Research Institute**: Biology of development and repair of brain and spinal cord
Institutional Expertise

- Impact and blast physics
- Numerical simulation
- Advanced neuroimaging
- Basic neuroscience
- Development of pharmacological agents
- Clinical neurotrauma treatment
- Medical intervention
- Family care

Only place in nation with this array of expertise, and all within a one hour drive
Integrated Basic & Clinical Research Program

Integrated TBI Research Programs

Rehabilitation

- Improved Protective Systems for TBI
- Neuronal Imaging

Prevention

- Blast Physics
- Mechanisms of Neuronal Damage

Science Core

- Neuro-Psychological Assessment
- High Throughput Animal Models

Treatment

- New Pharmacological Treatments for TBI
- National TBI Databases

Effective Rehabilitation for TBI
Current Activities

• Proposal to the DoD TBI-MRC program to establish Center for Traumatic Brain Injury
  $37M / 5 years from DoD for TBI research in Indiana
  Purdue and IU Med School cost share an additional $27M
  Intense national competition

  Letter signed by Gov. Daniels and Indiana congressional delegation supporting the Indiana proposal

• Establishing a Cooperative Agreement with Army Research Office
  ARL is main engineering and development organization in Army
  Purdue/IU Med School/ARL will partner to walk into DoD Medical Command
  Objective: premier provider of R&D at the medical-engineering interface

• Review-edit MURI proposal call from Army Research Office (ARO)
  Cellular and molecular basis for TBI
  $1M/year for 4 years
  Preliminary research to make our proposal more competitive
Emerging Activities

Request to Indiana Congressional Delegation

- **TBI Washington Project**
  $5M/year for 2 years to Purdue & IU Med School
  Phase 1: research in modeling of blast/impact and advanced neuroimaging
  Phase 2: research in cellular response to TBI and new pharmacological treatments

- **Establish DoD National Data Center(s) in Indiana**
  TBI National Data Center + other DoD Centers
  Locate in Merrillville at Purdue Research Park
  Leverage Congressional investment in Northwest Indiana Computational Grid and the Merrillville Research Park

Establish $5M Plus-up in the 2009 Budget

Complete hardware/software infrastructure in Merrillville via Plus-up in 2009 Budget + Leadership in establishing DoD Data Center(s)
Future Opportunities

- Direct funding from the DoD
  - DoD Material Commands for soldier and equipment protection
  - DoD Medical Commands
  - VA Hospitals
- Civilian Neuro-trauma Injury
  - NIH
- Insurance Industry
  - More new cases of neuro-trauma than cancer every year
  - Life-long care for neuro-trauma injuries
- NCAA and Sports Medicine
- Race Car Industry
- Connection with Mascatuck and Crane for testing
- Industrial partnerships
  - new pharmacological agents for neuro-trauma
  - new protection devices for DoD and civilian use

Ultimate Objective:
Indiana is the National Center for Neuro-trauma where patients from across the nation come here to spend their health care dollars