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Traumatic Brain Injury: Translation from Animal Models and Genetics to Improving Outcomes

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Traumatic Brain Injury
Translation from Animal Models and Genetics to Improving Outcomes

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Traumatic Brain Injury (TBI) is due to a sudden forceful, mechanical injury to the brain.

TBI Type

- Blunt/Closed
- Penetrating
  - Gun Shot Wounds
  - Shrapnel

The severity of TBI is determined by the Glasgow Coma Scale on presentation.

### The Glasgow Coma Scale (GCS)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Scale Responses</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye opening</td>
<td>Spontaneous</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>To voice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>To pain</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Verbal response</td>
<td>Oriented</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Confused conversation</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Words (inappropriate)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Sounds (incomprehensible)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Best motor response</td>
<td>Obeys commands</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Localizes</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Withdraws</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Flexion Posture</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Extension Posture</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>3 - 15</strong></td>
</tr>
</tbody>
</table>

Jennett and Bond Lancet 1975
Traumatic Brain Injury is a real public health problem in the U.S. (and worldwide).

Appr. 1.7 million Americans sustain a TBI annually

- 52,000 Deaths
  - All moderate-severe
- 275,000 Hospitalizations
  - All severities, predominantly moderate-severe
- 1,365,000 Emergency Department Visits
  - All severities, predominantly mild
- ??? Receiving Other Medical Care or No Care*


• 25% of these are moderate-severe TBI.
Falls and motor vehicle accidents are the most common causes of adult TBI.

- Falls are the leading cause of TBI
- Fall-related TBIs in older adults aged ≥75 years is increasing

Among all age groups, motor vehicle crashes and traffic-related incidents result in the largest % TBI-related deaths (31.8%).
Long-term effects and poor outcomes require research to improve outcomes and develop new therapies.

- Memory
- Reasoning
- Communication
- Understanding
- Expression
- Depression
- Anxiety
- Personality changes
- Aggression
- Social inappropriateness

Direct medical costs and indirect costs (lost productivity) of TBI:
~ $76.5 billion in the U.S. in 2010

From: http://www.cdc.gov/traumaticbraininjury/statistics.html