UW Neurological Surgery Summer Program
Horner Lab
Institute for Stem Cell & Regenerative Medicine

TIARA ADLER
Dr. Horner’s Lab

- Interaction between glial and neural cells following CNS challenge
  - Mechanisms of adult stem cell-derived lesion remodeling/repair
  - Gliogenesis and gliosis in neural degeneration
- Lab uses cellular and molecular techniques on rodent models to induce repair and regeneration after SCI
Spinal Cord Injuries

**Causes of Spinal Cord Injuries**

N = 1,275,000

- Motor Vehicle Accident: 311,000 (24%)
- Fall: 112,000 (9%)
- Accident Working: 362,000 (28%)
- Sporting/Recreation Accident: 206,000 (16%)
- Victim of Violence: 57,000 (4%)
- Birth Defect: 34,000 (3%)
- Natural Disaster: 8,000 (1%)
- Other: 76,000 (6%)
- Unknown/No Response: 109,000 (9%)

**Average Yearly Expenses**

<table>
<thead>
<tr>
<th>Severity of Injury</th>
<th>First Year</th>
<th>Each Subsequent Year</th>
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<tbody>
<tr>
<td>High quadriplegia (C1-C4)</td>
<td>$775,567</td>
<td>$138,923</td>
</tr>
<tr>
<td>Low quadriplegia (C5-C8)</td>
<td>$500,829</td>
<td>$56,905</td>
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<tr>
<td>Paraplegia</td>
<td>$283,388</td>
<td>$28,837</td>
</tr>
<tr>
<td>Incomplete motor function at any level</td>
<td>$228,566</td>
<td>$16,018</td>
</tr>
</tbody>
</table>

Christopher & Dana Reeve Foundation
Injury Characterization and Effect on Mobility

- **Purpose:** to compare different size injuries effects on animals without any treatment and to describe the injury itself
- **4 groups of animals**
  - Group 1: 0.8mm SCI
  - Group 2: 0.7mm SCI
  - Group 3: Surgery but no injury
  - Group 4: No surgery, no injury
- **Post-op behavioral tasks included:** Catwalk, IBB and cylinder
Injury Device

- Touches surface of cord with known force
- Highly reproducible
- High velocity injury... 20 milliseconds
- Major improvement since 1911 Allen Rod + Weight Model
Catwalk

- Automated gait system
- Developed for analysis of locomotor function in SCI models
- Subjects walk across an illuminated glass platform while recorded from underneath
  - Stride pattern, paw swing speed, stance duration, and pressure
C4 Injury Data

Days

Seconds

0.8mm disp
0.7mm disp
No surgery

Left front paw
Tissue Processing + DAPI Staining

- Study of two essential enzymes in oligodendrocyte development
- Injection of virus at 5 days
  - Prevents expression of Ehmt2 and Suv39h1 histones
  - Proven to work in vitro
- Perfused 5≈ days post-injection
- DAPI is a nuclear stain that recognizes cells rather than artifacts
Thank you!

Dr. Richard Ellenbogen
Jim Pridgeon
Christina Buckman
Dr. Phillip Horner
Don Maris
Amanda Fischedick
Dr. Sarah Mondello