

A New Rodent Model of Repeat Mild Traumatic Brain Injury in Adolescents

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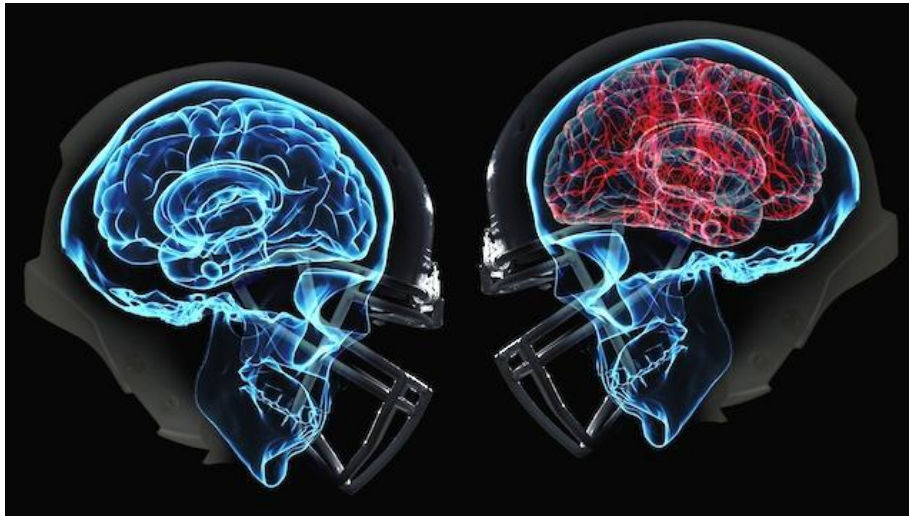
UCD Neurological Surgery Lab

Mentor: Dr. Gene Gurkoff

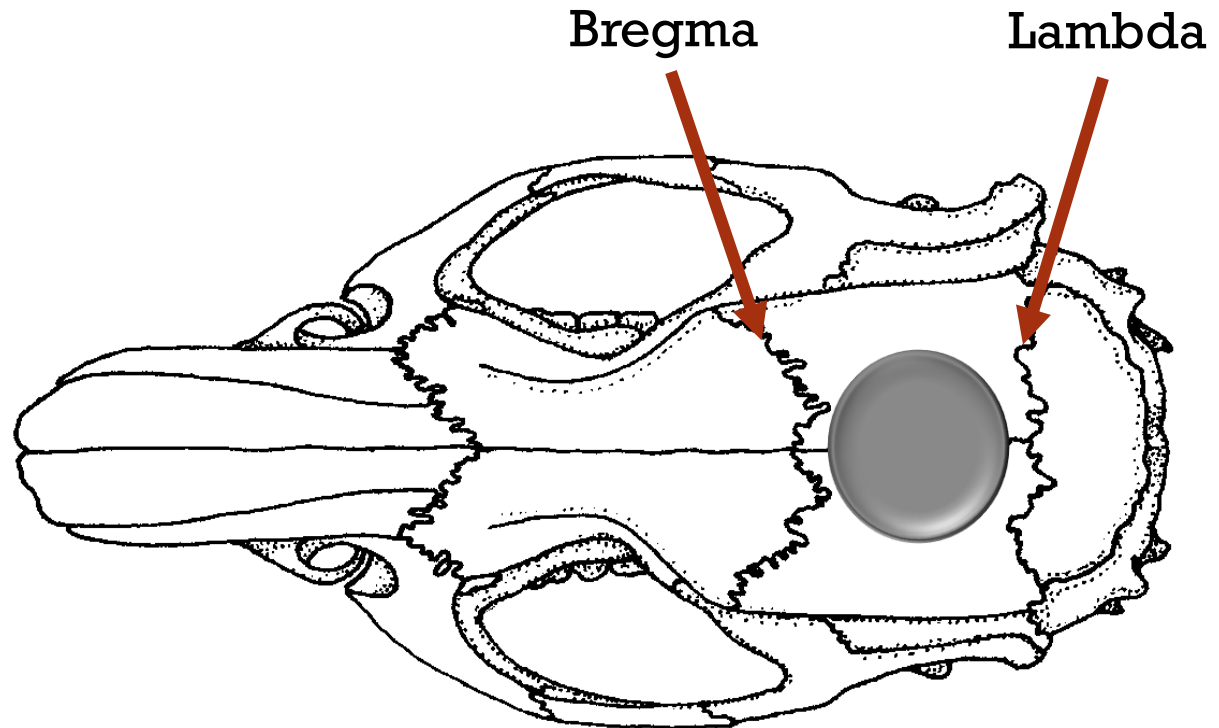
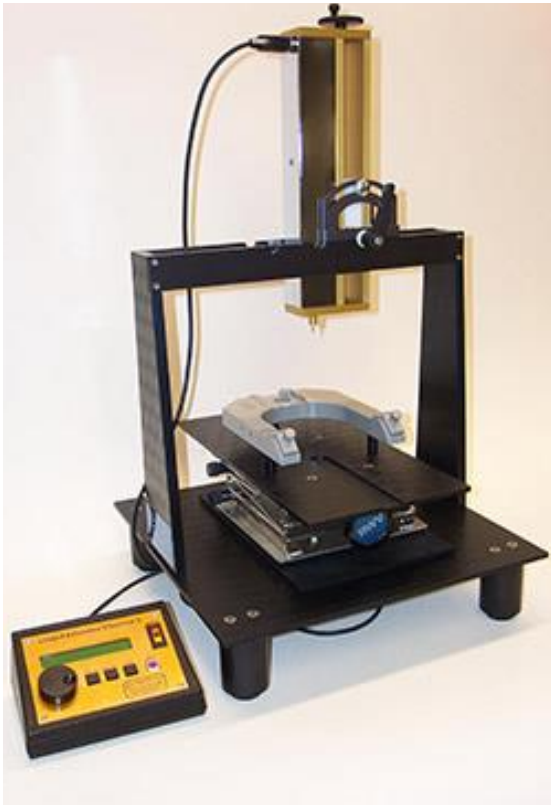


Multiple Traumatic Brain Injuries in Adolescence can produce Lasting Deficits

- Contact sports are a leading cause of mild TBI in adolescents
- Brain injury disrupts normal development, potentially causing chronic problems
 - Profound cognitive and behavioral impairment
 - Lack of gross morphological and motor changes
- Mechanisms and timing of precipitating events is poorly understood



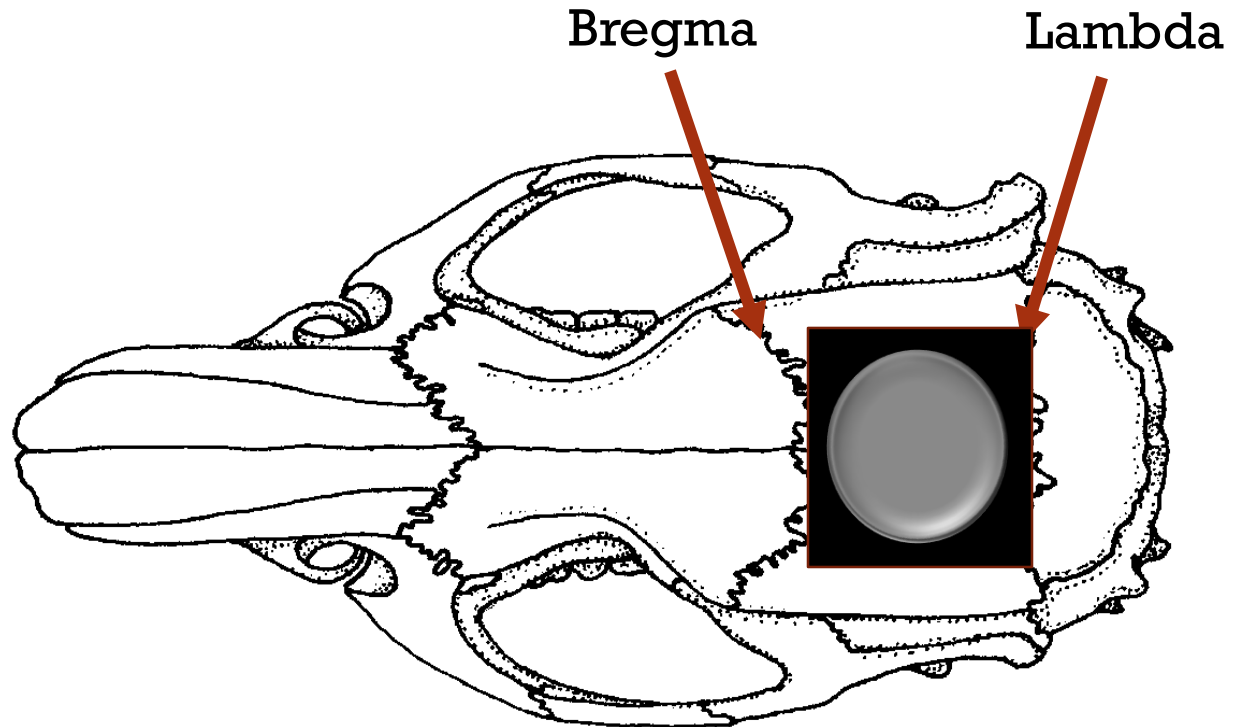
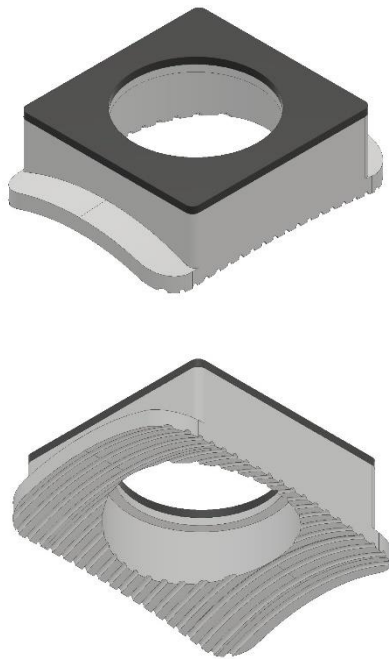
Hypothesis: rat models of repeat TBI can reproduce the cognitive impairment seen in sports-induced concussion



- ✓ Diffuse but precise model of mild sports injury
- ✗ Multiple injuries = multiple survival surgeries



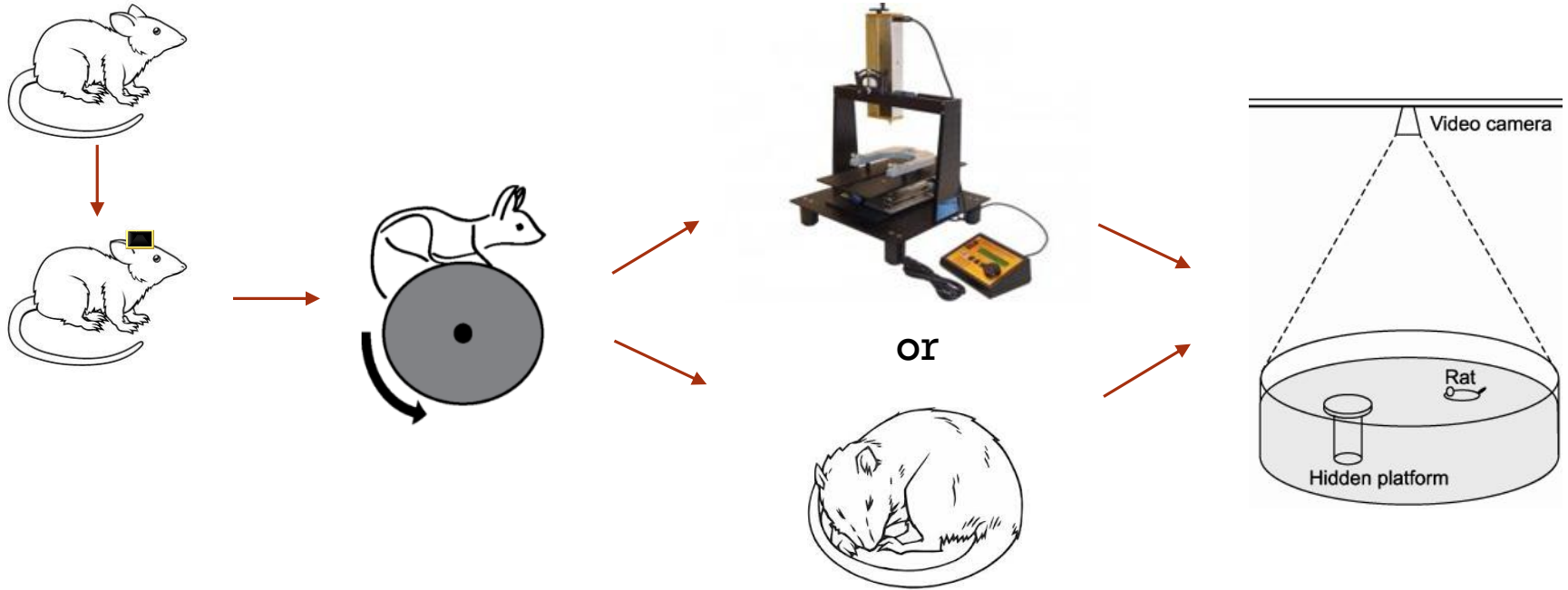
3D-Printed Implants are an Alternative to Performing Multiple Survival Surgeries



- ✓ Less soft tissue trauma and stress
- ✓ Decreased anesthesia time
- ✓ Ability to provide pain medication



Research plan



P31
Implant
surgery

Rotarod
Training and
Baseline test

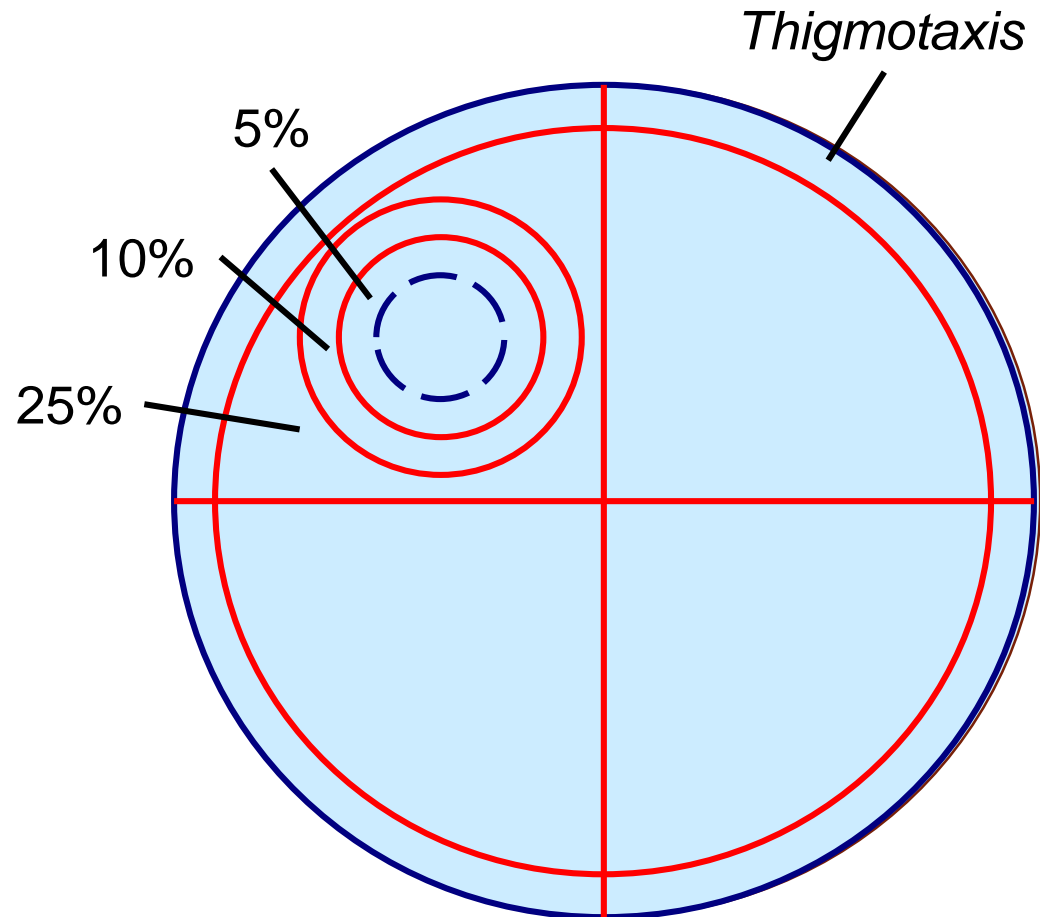
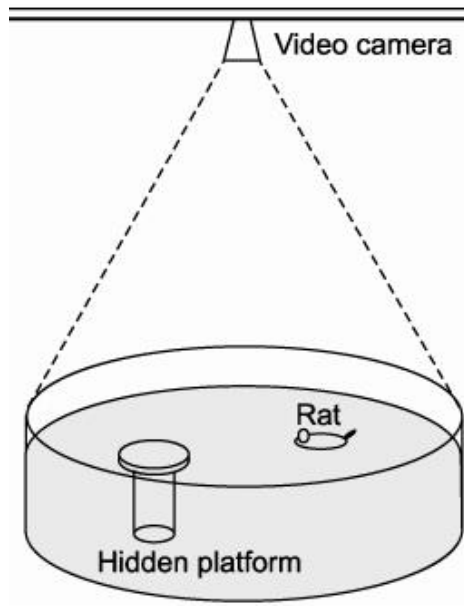
P35, 38, 41
Multiple Injuries
Single Injury
Sham Injury
(n=12)

P48-57
Morris Water
Maze

Post-injury Rotarod testing



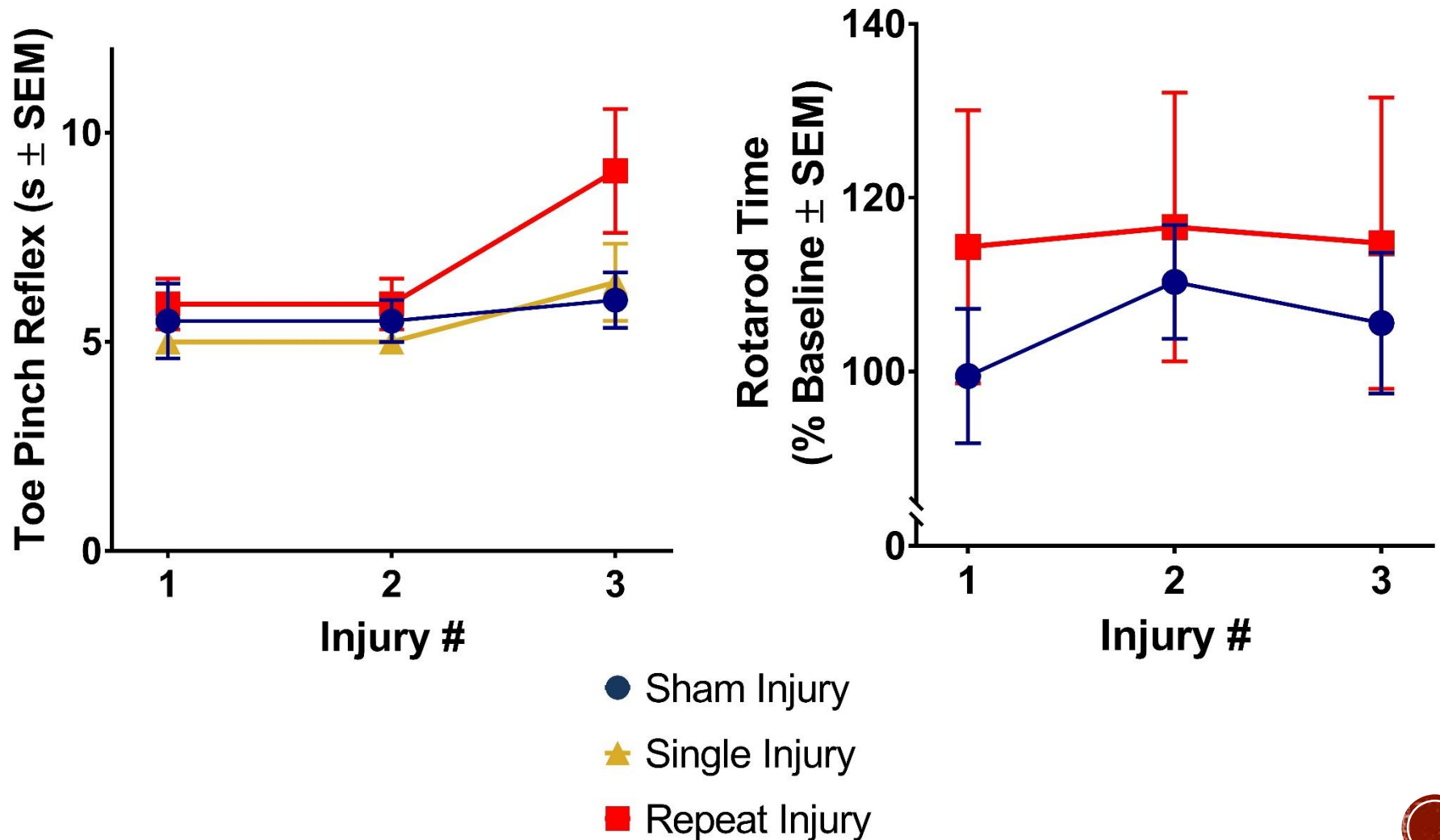
Morris Water Maze



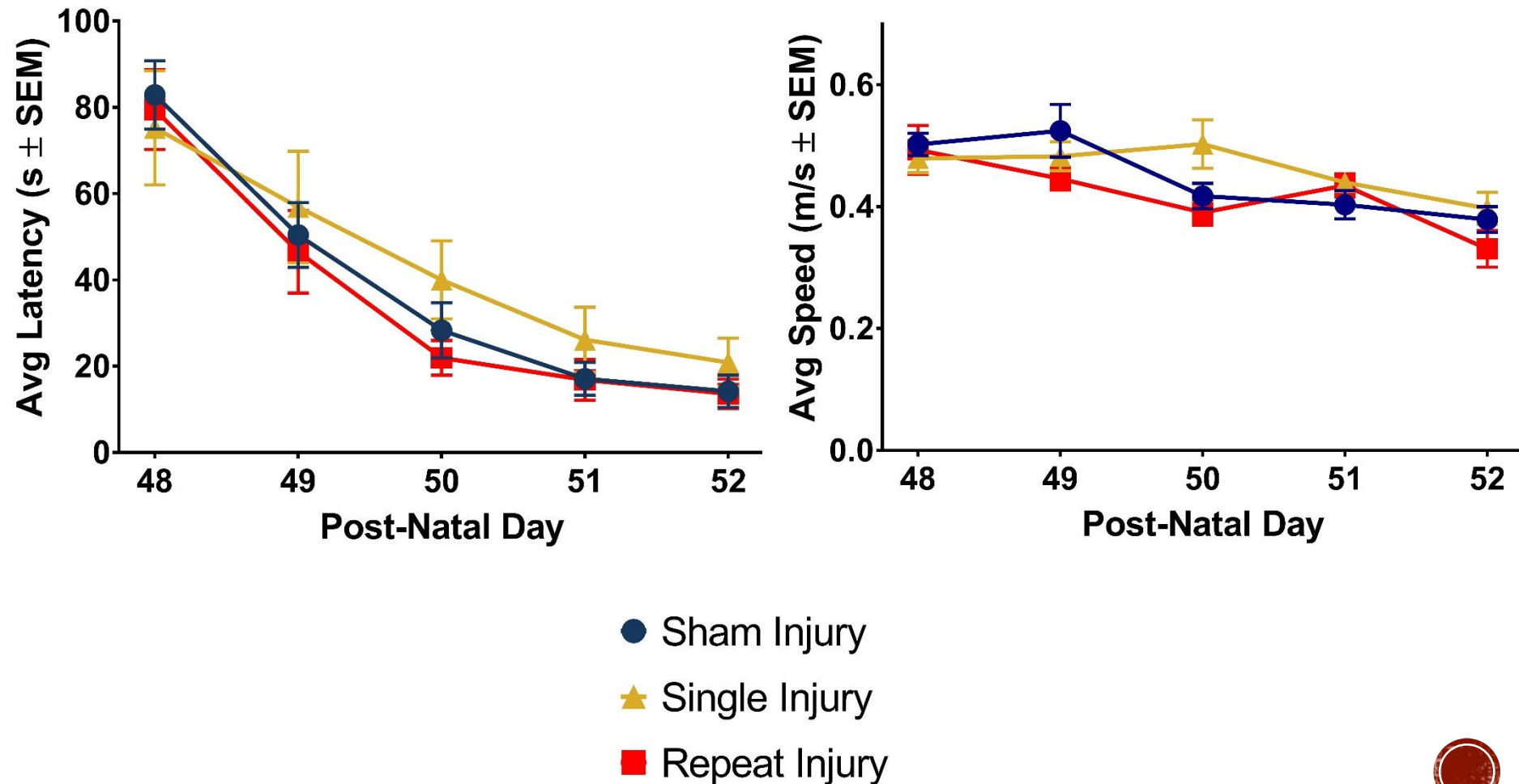
- Acquisition
- Probe
- Video Analysis



Repeat TBI did Not affect Biological Response or Motor Performance

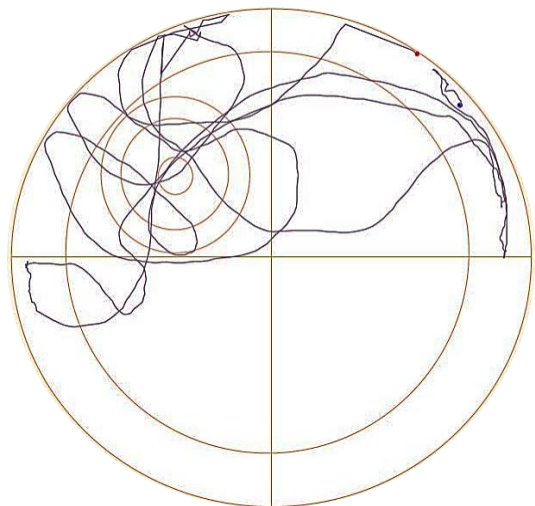


Repeat Injury did Not Impair Acquisition Week Performance

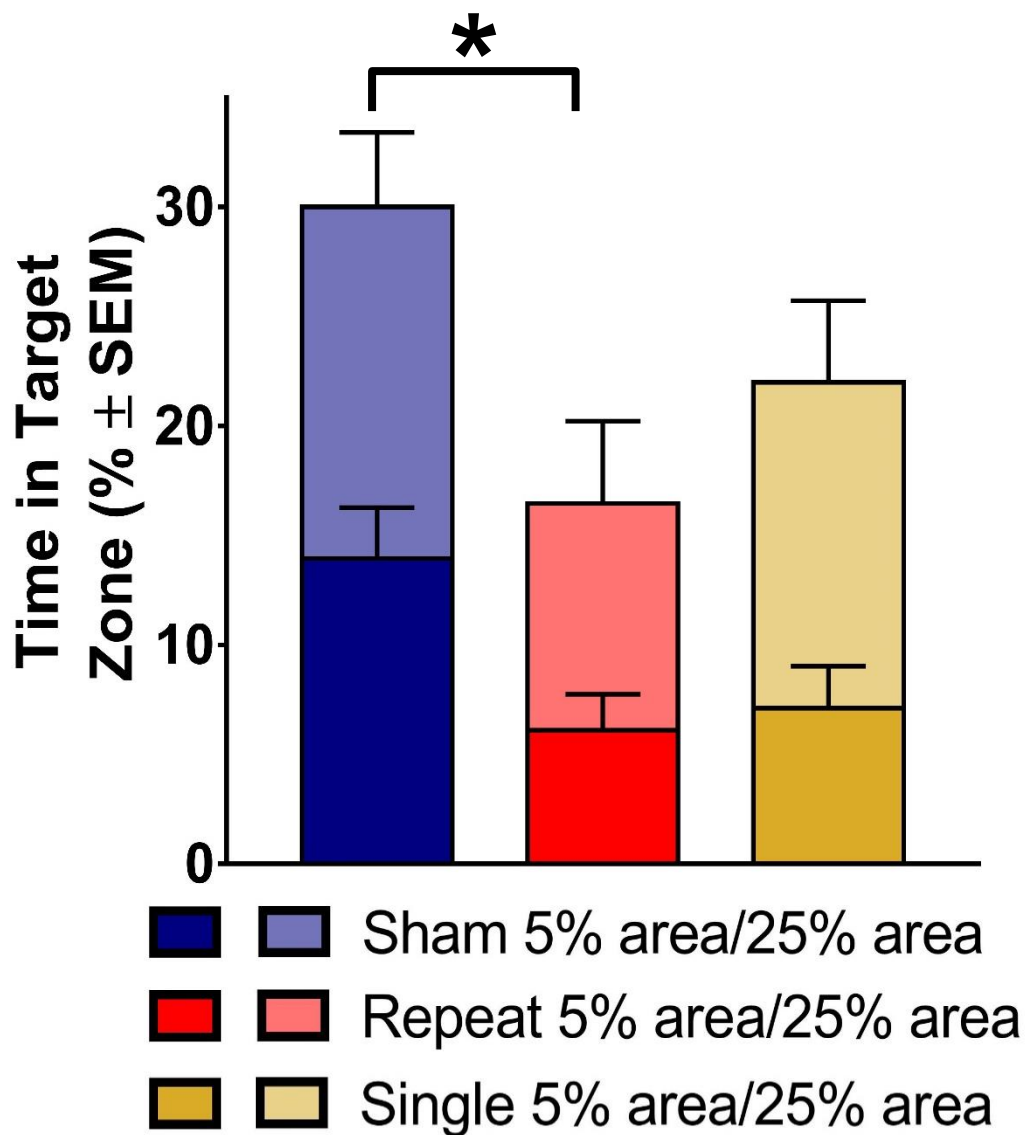
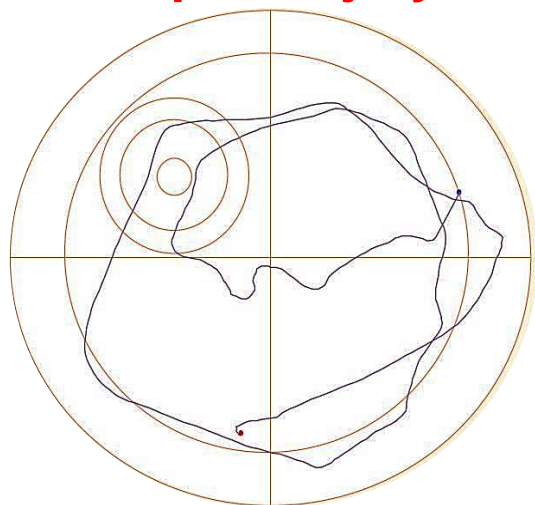


Multiple Injuries Altered Search Strategies on Probe

Sham

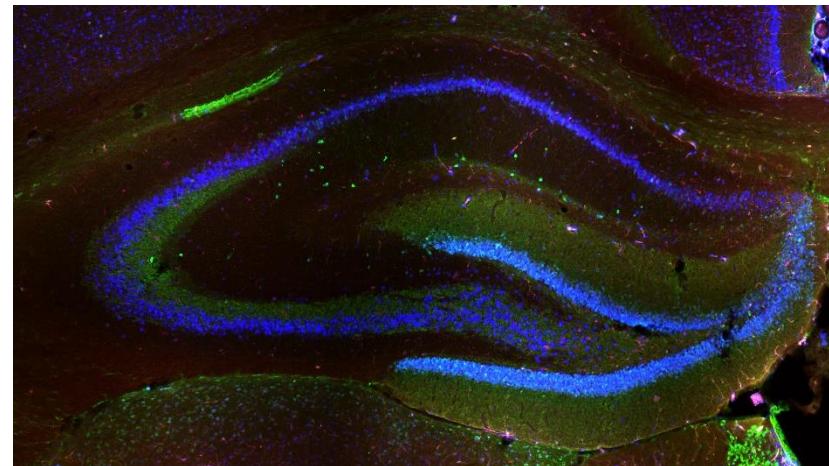


Repeat Injury



Conclusions

- Implant has several advantages
- Promising model of sports-related repeat TBI
 - No biological effects, motor deficits, or gross damage
 - No effect of injury on acquisition
 - Repeat injury altered search strategy on probe trials
- Future directions
 - Histology
 - Additional tasks and materials
 - Assess injury prevention and therapy methods



Acknowledgements

- Gurkoff Laboratory
 - Gene Gurkoff, PhD (mentor)
 - Alex Pevzner, PhD
 - Ali Izadi
 - Kayleen Tercovich
- Prototyping Laboratory
 - Stephen Lucero
 - TEAM Initiative
- Funding from NIH/STAR

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Questions?
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