

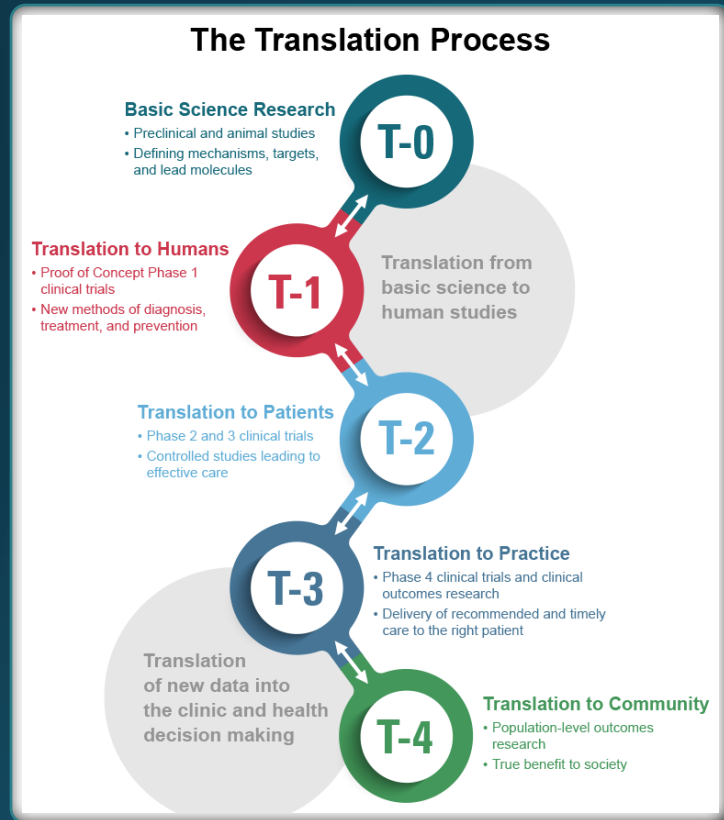
Animal Models

Janna L. Harris, PhD



The views expressed here are my own and do not represent the views of KUMC or The Jackson Laboratory.

Why animal models?



- Essential tools to understand the pathophysiology of TBI and to test therapies
- Rats and mice are the species of choice for most basic science research in TBI
- Allow a high degree of control over the injury and the subject
- Model many aspects of the physiology, structure, and function of the human brain
- For aging research: median lifespan of most rat and mouse strains is ~2 years

Advances...

- Animal models have shown how the cellular and molecular mechanisms of TBI differ in an older vs a younger adult brain

and Research Gaps

- **Geriatric TBI is under-represented in animal model TBI studies**
- Lack of therapeutic efficacy studies
- Mostly males
- Mostly moderate-severe TBI
- Animal studies exclude the common comorbidities and medications of the geriatric population

Challenges

- Working with aged animal models is time-intensive and resource-intensive
- Availability of aged cohorts may be limited
 - National Institute on Aging colonies
 - Commercial sources
- Phenotypes of normal aging may affect study outcomes
- Age-related conditions and frailty necessitate larger study cohorts

The Takeaway

We need more basic science research to focus on geriatric TBI



Best Practices

- Use models that replicate the biomechanical properties of geriatric TBI in humans
- Use both sexes
- Model TBI + comorbidities
- Model TBI + medications
- Ensure that functional outcomes are appropriate/optimized for age
- Include translational outcome measures in animal studies (biomarkers, MRI, etc.)

Thank You

Additional Reading

- Iboaya, Harris et al. 2019. Models of Traumatic Brain Injury in Aged Animals. doi: 10.1177/1545968319883879
- NIA aged rodent colonies: <https://www.nia.nih.gov/research/dab/aged-rodent-colonies>
- Key considerations for research in aged mice: <https://youtu.be/MCB2RvBqGQc>