My research focuses on mechanisms of recovery after neurological trauma. Injuries to the brain and spinal cord invoke numerous, interacting biological processes that work in concert to determine recovery success. Some of these biological processes have contradictory effects at different phases of recovery. For example, mechanisms of synaptic regulation can contribute to cell death in the early phases of recovery but may promote plasticity and restoration of function at later stages. Understanding the mechanisms of recovery in the complex microenvironment of the injured central nervous system (CNS) requires large-scale integration of biological information and functional outcomes (i.e., biomedical informatics). Our work uses a combination of laboratory studies and ‘big-data’ approaches to provide an information-rich picture of the syndrome produced by trauma in translational in vivo models. The long-term goal of this research is to provide system-level therapeutic targets for enhancing recovery of function after brain and spinal injury.