Weekly Colloquium
Wednesday, 10/12/2016, 12:30pm, Billings Building – Rosedale Conference Room

"Mild TBI and learning impairments in an organotypic slice culture model"

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Abstract
Traumatic brain injury (TBI) continues to be a major socio-economic problem with more than 50,000 deaths per year and costing over $75 billion. To better understand the effects of mechanical stimuli (of various kinds) on brain function, we have developed in vitro models of TBI that utilize organotypic brain slice cultures. With these models, we have previously developed tolerance criteria to determine safe levels of deformation of brain tissue that could be used to engineer better safety systems to prevent TBI. More recently, we have focused on how mechanical stimuli may alter neuronal activity and electrophysiological function within hippocampal neuronal networks of long-term organotypic brain slice cultures. Surprisingly, evoked electrical activity was resilient to moderate mechanical stimuli. However after less severe injury, i.e. mild TBI, the network could no longer remodel (learn) as measured by a loss of long term potentiation (LTP). Our recent findings suggest that a disruption of dendritic organization may underlie these deficits. We are also using our models to test therapeutic interventions to rescue LTP and have found an intervention that is effective even when treatment is delayed up to 6 hours after injury. The long-term goal of our research effort is to reduce the socio-economic costs of TBI by helping others to engineer better protection systems using our tolerance criteria and by developing novel treatments.

Recent Publications
