2018 Seed Funding Competition Awardees

Title: Nanoparticle delivery of a therapeutic peptide for PTSD. **PI: Fang Liu**

Abstract: PTSD (post-traumatic stress disorder) can develop after exposure to severe psychological trauma, leaving patients with disabling anxiety, nightmares and flashbacks. PTSD affects approximately one fifth of military combat veterans and victims of physical assault, with 9% of all Canadians affected. Current treatment for PTSD consists of cognitive behavioral therapy combined with serotonin reuptake inhibitor antidepressants, but overall functioning and outcomes remain poor. Better methods for prevention and treatment are clearly needed, but are hampered due to limited knowledge of molecular mechanisms for the pathophysiology of PTSD. We have recently discovered a new molecular target that could be effective for preventing and treating PTSD. We want to develop a nanoparticle package for the peptide that can modulate the molecular target and that can be used in human clinical trials. It is difficult to get peptides into the brain, and a nanoparticle vehicle is a proven strategy to deliver drugs and peptides into the brain. The molecular target for treating PTSD is an interaction between the glucocorticoid receptor (GR) and another regulatory protein, FKBP5. GR is an important component of the stress regulation endocrine system that uses cortisol to control many body functions. The GR-FKBP5 interaction is increased in patients with PTSD, but not in people exposed to trauma who did not develop PTSD, nor in other healthy people. We created a peptide that can disrupt this interaction and that can prevent and reverse fear memory-related behaviour in animal models of PTSD. We predict that this peptide will also be effective in humans for preventing or treating PTSD and this grant proposal is soliciting funding to support the development of the nanoparticle delivery system. If successful, we will have produced a practically-viable formulation for our PTSD treatment peptide that can then be used in human clinical trials. Our peptide would be the first PTSD treatment targeting a core element of the pathophysiology of PTSD and holds the potential to be given to patients after trauma exposure, like an antidote, to prevent the later development of PTSD. Not only would this be a major improvement in our approach to helping patients with PTSD, it also represents a new paradigm for preventing psychiatric disorders in general.