



# Spinal Cord Injury and Traumatic Brain Injury Research Grant Program Report

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**Author****Alaina DeSalvo**

Competitive Grants Administrator

Tel: 651-259-3988

[Alaina.DeSalvo@state.mn.us](mailto:Alaina.DeSalvo@state.mn.us)**About the Minnesota Office of Higher Education**

The Minnesota Office of Higher Education is a cabinet-level state agency providing students with financial aid programs and information to help them gain access to postsecondary education. The agency also serves as the state's clearinghouse for data, research and analysis on postsecondary enrollment, financial aid, finance and trends.

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**Minnesota Office of Higher Education**

1450 Energy Park Drive, Suite 350

Saint Paul, MN 55108-5227

Tel: 651.642.0567 or 800.657.3866

TTY Relay: 800.627.3529

Fax: 651.642.0675

Email: [info.ohe@state.mn.us](mailto:info.ohe@state.mn.us)



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# Introduction

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The State of Minnesota established the Spinal Cord Injury and Traumatic Brain Injury (SCI-TBI) Research Grant Program effective July 1, 2015. Minnesota 2015 Session Law, Chapter 69 directed the Commissioner of the Minnesota Office of Higher Education to establish a grant program for institutions in Minnesota to conduct research that would lead to new and innovative treatments and rehabilitative efforts for the functional improvement of people with spinal cord injuries and traumatic brain injuries. Research areas include, but are not limited to, pharmaceutical, medical device, brain stimulus and rehabilitative approaches and techniques. Appendix A provides a copy of the grant program's funding statute.

For the 2018-2019 biennium, \$3,000,000 was made available for each year from the 2017 Omnibus Higher Education Bill (Minnesota 2017 Session Law, Chapter 69) to support the SCI-TBI Grant Program, with a 3% administrative fee. As directed by the program's statute, the Commissioner of the Office of Higher Education, in consultation with the program's Spinal Cord Injury and Traumatic Brain Injury Advisory Council (Advisory Council), will allocate 50 percent of the grant funds to research involving spinal cord injuries and 50 percent to research involving traumatic brain injuries throughout the biennium. A total of \$549,9313 was carried forward from funds unused in fiscal year (FY) 2018, for a grand total of \$3,459,313 available to be granted out to support this initiative in FY 2019.

In FY 2019, the Commissioner of the Office of Higher Education and the Advisory Council awarded a total of \$3,459,313 to support spinal cord injury and traumatic brain injury research and innovation. Nineteen new research projects were funded—nine spinal cord injury research projects and 10 traumatic brain injury research projects.

In July 2018, the Spinal Cord Injury and Traumatic Brain Injury Grant Program was given a Special Revenue Account in order to extend project periods from 1-2 to 3-5 year timelines. Beginning in the FY 2020 competition, grantees will be given 3-5 years to complete their research projects, with a possibility for an extension based on their progress and the complexity of research. The timeline extension is crucial for the completion of projects based on lengthy Institutional Review Board (IRB review) processes and unexpected challenges that occur naturally with complex research and experimentation.

# Spinal Cord Injury and Traumatic Brain Injury Advisory Council

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The 2015 statute language establishing the grant program also established the Spinal Cord and Traumatic Brain Injury Advisory Council. The Commissioner, in consultation with the Advisory Council, has the responsibility of awarding the SCI-TBI grants and developing the program. In 2015, an initial 12-member Advisory Council was set up using the Open Appointments process of the Minnesota Secretary of State’s office. In 2017, the statute language was updated to include two new seats: 1) Veteran with a Traumatic Brain Injury, and 2) Physician Specializing in the Treatment of Spinal Cord Injury. In 2018, Dr. Uzma Samadani, Neurosurgeon and Associate Professor, was chosen to serve as the Advisory Council chair. Several of the 2016 appointments were also up for renewal. The Commissioner of the Office of Higher Education selected the 14-member Advisory Council through the Open Appointments process, coordinated with the Minnesota Secretary of State. The full membership of the Advisory Council is shown below; new members are bolded:

**Table 1. Advisory Council Roster**

<b>Member</b>	<b>Representing</b>
Dr. Uzma Samadani (chair)	Physician specializing in the treatment of traumatic brain injury
Dr. Walter Low	University of Minnesota Medical School
Dr. Peter Grahn	Mayo Clinic
Dr. Mary Radomski	Courage Kenny Rehabilitation Center
Dr. Sarah Rockswold	Hennepin County Medical Center
<b>Dr. Andrew W. Grande</b>	<b>Neurosurgeon</b> (replacing Dr. Ann Parr)
Mr. Robert Wudlick	Person with a spinal cord injury
Mr. Matthew Rodreick	Family member of a person with a spinal cord injury
<b>Ms. Christy Marie Caez Claudio</b>	<b>Person with a traumatic brain injury</b> (replacing Kristina Nozal)
<b>Mr. Seth Thomas</b>	<b>Veteran who has a spinal cord injury</b> (replacing Stephen Thell)
Mr. Joseph Oppold	Veteran who has a traumatic brain injury
Dr. Mark Gormley	Gillette Children’s Specialty Healthcare
<b>Mr. Bruce Richard Everling</b>	<b>Family member of a person who has a traumatic brain injury</b> <b>(replacing Ms. Susan McGuigan)</b>
Dr. Steven Jackson	Physician specializing in the treatment of spinal cord injury

# FY 2019 Proposal Solicitation Schedule and Proposals Received

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## Fiscal Year 2019 Annual Research Grant Proposal Solicitation Schedule

To support research projects with FY 2019 program funding, the following timeline was used to solicit proposals and award grant funds:

- February 1, 2018: Request for Proposals available to applicants
- April 2, 2018: Deadline for receipt of intent to submit forms
- 4:30 p.m., April 12, 2018: Deadline for receipt of proposals
- May 14, 2018: Proposal Review Meeting
- June 1, 2018: Notification of recommendation for grant award
- July 1, 2018 - June 30, 2020: Project funding interval

A copy of the FY 2019 Request for Proposals for the Minnesota Spinal Cord Injury and Traumatic Brain Injury Research Grant Program is provided in **Appendix D**.

## Fiscal Year 2019 Spinal Cord Injury and Traumatic Brain Injury Research Grant Proposals Received

The Spinal Cord Injury and Traumatic Brain Injury Advisory Council received a total of 36 proposals for FY 2019 funding; 18 proposals with a focus on spinal cord injury research, and 18 with a focus on traumatic brain injury research. A combined total of \$9,905,634 was requested. This is the highest volume of applicants that the Office of Higher Education has experienced since the 2015 creation of the grant program. A full list of proposals and applicants can be found in **Appendix B**.

A new funding mechanism was introduced in FY 2019 to categorize/organize proposal submissions and set appropriate parameters around funded projects. Three distinct funding options were created by the Advisory Council. Each tier, with maximum allowable requests and project requirements, are listed below:

### *Tier 1: Pilot Project Grant*

- **Maximum Request:** \$125,000
- **Project Requirements:** Reflects an early investment as the researcher prepares to seek a larger grant award from a federal program or nonprofit organization. Preliminary data is not required.

### *Tier 2: Standard Research Grant*



- **Maximum Request:** \$250,000
- **Project Requirements:** Primarily for research with supporting/preliminary data. If the budget is justifiable, the Standard Research Grant may also fund pilot projects. Applicants are encouraged to attach papers; in press and accepted papers and cited or submitted separately as an appendix.

*Tier 3: Clinical/Translational Research Grant*

- **Maximum request:** \$500,000
- **Project Requirements:** Projects must have concurrent funding or application for funding submitted to federal or industry sources. Preliminary data must be published or in press in a scientific journal and cited or submitted separately as an appendix.

# Grant Selection Process

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At the May 14, 2018 meeting, the Advisory Council completed their reviews of the 36 research proposals submitted to the Office of Higher Education. Of the 36 proposals, 19 were recommended for funding. A total of \$3,459,312 was awarded.

To complete this task, review panels of Advisory Council members were established for each specialty area (traumatic brain injury and spinal cord injury) based on the reviewers' expertise. Each proposal was reviewed and scored by members of the specialty-area review panel reflective of the proposal's research focus. For the review, Advisory Council members with a scientific background gave particular attention to the scientific and technical merit of the proposals, while members with patient or community perspectives gave particular attention to the importance of the proposed research for patients. Proposals were scored individually and discussed during the May meeting. Advisory Council members were required to disclose any conflict of interest with any submitted proposals. If conflict of interest was present, the Advisory Council member did not review the proposal and was excluded from the room when the proposal was discussed.

# FY 2019 Spinal Cord Injury and Traumatic Brain Injury Research Projects

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Pursuant to the language of the statute establishing the research grant program, members of the Spinal Cord and Traumatic Brain Injury Advisory Council reviewed research proposals and recommended proposals for funding to the Commissioner. The Proposal Review Form used by the Advisory Council members is found in **Appendix D**. The 19 FY 2019 projects recommended and funded were:

## Spinal Cord Injury Research

*Spinal Cord Tissue Regeneration through Schwann Cell Seeded Hydrogel Scaffolds with Orientation-Selective Electrical Stimulation, Mayo Clinic, receives \$200,000*

Current knowledge is limited regarding the mechanisms underlying the success of electrical epidural stimulation (EES) and its underlying efficacy. This limitation is due to the lack of spinal cord injury (SCI) in animal models that represent humans with complete paralysis, who possess functionally silent fibers. To address this gap, Dr. Lavrov's laboratory developed a rodent model of SCI in which hydrogel scaffolds containing GDNF expressing Schwann cells and rapamycin-releasing microspheres were implanted into the site of complete spinal cord transection. This model, created in their fiscal year 2018-funded project, determined that EES promotes functional reconnection across the injury. The fiscal year 2019 project builds on this work by characterizing the effects of novel orientation-selective EES on regeneration through a hydrogel scaffold system seeded with genetically modified Schwann cells and drug eluting microspheres that were previously studied extensively without EES. Outcomes of this research will contribute to understanding motor functions enabled after SCI using spinal cord neuromodulation and neurogenerative approaches. It will also provide a platform for synergistic testing and translation of regenerative and neuromodulatory therapies to maximum functional restoration in humans with SCI.

**Principal Investigator:** Dr. Igor Lavrov, 310-980-4457, lavrov.igor@mayo.edu

*Intranasal Insulin to Improve Recovery following Cervical Spinal Cord Injury, HealthPartners Institute, receives \$200,000*

A major obstacle in developing new treatments for spinal cord injury is the blood-brain barrier, which limits many potential beneficial molecules from reaching the central nervous system. Intranasal administration of therapeutics is an innovative approach to rapidly and non-invasively bypass the barrier, targeting drug delivery to the brain and spinal cord. Insulin has anti-inflammatory and neuroprotective properties. Intranasal insulin has been shown to reach the cervical spinal cord at therapeutic concentrations after intranasal administration in mice. In this project, the investigators hypothesize that daily administration of intranasal insulin will improve motor and histological outcomes in mouse models of both acute and chronic injury. If a benefit of intranasal insulin treatment is demonstrated in mice during the project, this discovery could be rapidly translated to a human trial in people with cervical spinal cord injury.

**Principal Investigator: Dr. Leah R. Hanson, 651-495-6352, [leah.r.hanson@healthpartners.com](mailto:leah.r.hanson@healthpartners.com)**

*Direct Comparison of Transcutaneous and Epidural Spinal Stimulation to Enable Motor Function in Humans with Motor Complete Paraplegia, Mayo Clinic, receives \$250,000*

Research efforts over the last decade have shown that electrical stimulation of the spinal cord below the injury results in recovery of functions, such as knee and toe movement as well as standing, in humans that had been paralyzed for several years. The current two main approaches to spinal cord stimulation are epidural electrical stimulation (EES) and transcutaneous spinal stimulation (TSS). Both techniques have positive outcomes, however electrophysiological characteristics have not been directly compared between each approach during functional activities. This project looks to address that gap in research by comparing EES and TSS to evaluate the potential of each approach to enable standing and stepping activities in humans with motor complete paraplegia. The investigators will also examine changes in neuromuscular activity that occur over the course of rehabilitation in the presence of TSS or EES. Finally, they will determine if TSS may serve as a tool to predict how subjects respond to EES. The result will be a direct comparison of TSS and EES electrophysiology during stimulation-enabled functions.

**Principal Investigator: Dr. Kristin Zhao, Dr. Kendall Lee, 507-284-8942, [zhao.kristin@mayo.edu](mailto:zhao.kristin@mayo.edu)**

*New Combinatorial Strategies for Regenerative Repair of the Injured Spinal Cord, Mayo Clinic, receives \$200,000*

New findings demonstrate that the inhibition of Protease Activated Receptor 1 (PAR1) promotes significant recovery of function in experimental models of SCI by reducing inflammation and astrogliosis and stimulating the sprouting of spared axons. This project proposes to determine whether inhibition of PAR1 at acute time points after SCI using conditional gene targeting approaches, or an FDA-approved small molecule inhibitor, improves the capacity for nerve regeneration and recovery of function and any synergistic effects with growth factor therapy. If the investigator's hypotheses are correct, the study will serve to identify a new and highly druggable receptor for pharmacologic modulation to promote nerve regeneration and recovery of function after spinal cord injury. The results of this study have high potential to identify a new treatment strategy to foster nerve regeneration for recovery of function in the acute period after spinal cord trauma.

**Principal Investigator: Dr. Isobel Scarisbrick, 507-284-0124, [scarisbrick.isobel@mayo.edu](mailto:scarisbrick.isobel@mayo.edu)**

*iRehab: Discovering Outpatient Rehabilitative Measures for Epidural Stimulation Assisted Movement, Hennepin Healthcare Research Institute receives \$50,000*

Previous and ongoing studies regarding the use of epidural stimulation for volitional movement in spinal cord injury have laid the groundwork for rehabilitative expansion of newfound motor control. However, individuals with motor complete spinal cord injury have adapted to passive or no use of the paralyzed limbs, resulting in muscle atrophy and deconditioning that complicate the ability to derive benefit from the restoration of volitional control. This project examines two central questions: 1) What is the extent of gain of function in the domains of volitional movement, autonomic cardiovascular performance, bowel, bladder, and sexual function from epidural stimulation in Veterans with spinal cord injury with a conservative rehabilitation program? 2) What experimental

home rehabilitation measures show preliminary effectiveness specific to the gain of function from spinal cord stimulation in terms of compliance and feasibility? The Epidural Stimulation After Neurologic Damage (ESTAND) study, funded by fiscal year 2017 grant funds, will continue at a Veterans Administration (VA) hospital to gather more data to verify initial perceived trends of improvement in volitional movement, autonomic function, and bowel, bladder, and sexual function. Feasibility studies of the different rehabilitation modalities theoretically beneficial to individuals with spinal cord injury who regain function after epidural stimulation use will be performed, and home-based follow-up therapies will be developed to allow Veterans to continue participation without an extended hospital stay. Increasing access to epidural stimulation by recruiting Veterans with a spinal cord injury who may be years out from injury and do not have the ability to undergo intensive rehabilitation in the hospital will help break barriers in the delivery of the resulting treatment to individuals with spinal cord injury that cannot interrupt their lives.

**Principal Investigator:** Dr. David Darrow, 214-564-0623, [darro015@umn.edu](mailto:darro015@umn.edu)

*iOptimize: Optimization of Epidural Stimulation for Spinal Cord Injury, Hennepin Healthcare Research Institute, receives \$300,000*

Preliminary evidence suggests that spinal cord stimulation (SCS) has the capability to restore some volitional movement or autonomic function for people with complete paraplegia. While this mechanism is largely unknown, SCS has been shown to uncover residual pathways within the damaged spinal cord which were previously characterized as functionally complete. There is now mounting evidence that for spinal cord injuries that do not involve complete transection, viable tracts remain that are unable to overcome inherent spinal cord segmental excitation. The central hypothesis of this study seeks to understand the optimal spinal cord stimulation settings, particularly related to the configuration of the electrode, to restore volitional movement and autonomic function in each individual patient and across patients in the study. This research builds on a previous clinical trial study that this investigator spearheaded, the E-STAND Clinical Trial, to determine the effectiveness of intensive setting optimization compared to outpatient optimization over an extended period. Understanding the role of how function and optimal settings may change over time in patients undergoing SCS for SCI is an essential component of understanding how the clinical use of SCS will be optimized for patients with SCI.

**Principal Investigator:** Dr. David Darrow, 214-564-0623, [darro015@umn.edu](mailto:darro015@umn.edu)

*Targeting Estrogen Receptors to Restore Spinal Plasticity in Acute Spinal Cord Injury, Regents of the University of Minnesota, receives \$45,000*

The fundamental hypothesis that drives this project is that activation of spinal cord estrogen receptors is sufficient to restore respiratory motor plasticity in both sexes following acute spinal cord injury. The investigator further postulates that the specific estrogen receptors underlying this effect are different in females and males, a critical finding for future translational studies. This will be achieved by measuring the neural output of the phrenic nerve innervating the diaphragm, the most important respiratory muscle, in rats with experimental cervical SCI. A well-characterized form of respiratory plasticity called long-term facilitation (LTF) is induced with brief episodes of low oxygen or acute intermittent hypoxia (AIH). The investigator will compare the magnitude of AIH-induced LTF in female and male rats after spinal cord injury and determine if plasticity is restored or enhanced through direct activation of estrogen receptors in the spinal cord. Targeting delivery of estrogen pharmacotherapeutics may

represent a “next generation” strategy to directly influence the recovery of respiratory motor function while minimizing the untoward effects associated with systemic estrogen delivery.

**Principal Investigator:** Dr. Brendan Dougherty, 612-624-7466, [bdougher@umn.edu](mailto:bdougher@umn.edu)

*Training Transplanted Spinal Neural Progenitor Cells (sNPCs) to function after Chronic Spinal Cord Injury, Regents of the University of Minnesota, receives \$125,000*

Research has suggested that the formation of an inhibitory glial scar may play a key role in the lack of recovery of lost function due a chronic spinal cord injury. While a minimally-invasive method of removing the glial scar is a promising therapy, it has been demonstrated to recur after removal, thus it is unlikely that this alone will provide significant functional benefit. The aim of this project is to remove the inhibitory glial scar while minimizing collateral effects on functioning spared tissue using a rose Bengal based phototoxic approach. This method will be combined with transplantation of Neuronal Progenitor Cells (sNPCs) to provide a more permissive environment for cell integration. The advantage of this method is that these cells are autologous, and in future human trials will not require immune suppression as potentially required with embryonic or fetal derived neuronal stem cells. The maximum benefit will also require “learning” by the new neurons. The investigators suggest that reinforcing useful connections between neurons will optimize function of the transplanted cells, also referred to as activity-dependent plasticity. Tail nerve electrical stimulation (TANES) will optimize this function and “teach” the new neurons. The central hypothesis guiding this work is that a combination of scar ablation and transplantation of sNPCs along with TANES will result in functional recovery in a rat model of chronic moderate thoracic contusion injury.

**Principal Investigator:** Dr. Ann Parr, Dr. Walter Low, Eric Holmberg, 612-625-4102, [amparr@umn.edu](mailto:amparr@umn.edu)

*Optogenetics for Corticospinal Tract Stimulation in Combination with Transplanted Spinal Neuronal Progenitor Cells after Spinal Cord Injury, Regents of the University of Minnesota, receives \$100,000*

Stimulation of spared circuitry along the corticospinal tract (CST) is currently a promising therapeutic option for restoring function to damaged CST pathways after traumatic spinal cord injury (SCI). However there are still many questions to be answered in terms of the optimization of this technique. Investigators in this study propose to focus on precise stimulation of specific cell groups in the motor cortex while simultaneously offering an improved understanding of the cellular and morphological alterations that occur following stimulation. There are two components to this therapy: 1) the stimulation specific circuitry within the rodent motor cortex that is associated with the hind-limb region, and 2) transplantation of human spinal Neuronal Progenitor Cells (sNPCs), a type of stem cell that has been developed to become spinal neurons after transplantation. The study will first optimize implantation, viral injection and light-evoked stimulation parameters in the motor cortex to maximize functional recovery via the CST. The results will inform the second study, which aims to investigate whether clinical grade sNPCs form functional relays with the endogenous tissue in vivo. Then, both integration patterns of transplanted sNPCs will be enhanced and mapped. This innovative project utilizes an optogenetic strategy to enhance plasticity of specific circuits for functional recovery, and can further provide evidence for the important role of neuromodulation in SCI.

**Principal Investigator:** Dr. Ann Parr, Dr. Walter Low, 612-625-4102, [amparr@umn.edu](mailto:amparr@umn.edu)

## Traumatic Brain Injury Research

*Neuroimaging and Neurovision Rehabilitation (NVR) for Neurocognitive Deficits Secondary to Oculomotor Dysfunction (OMD) in Mild Traumatic Brain Injury (mTBI), Minneapolis Medical Research Foundation, Hennepin Healthcare Research Institute, Center of Magnetic Resonance Research (CMRR), and the University of Minnesota, receives \$250,000*

Mild TBI is a significant cause of disability, especially when symptoms become chronic. This chronicity is often linked to oculomotor dysfunction (OMD), which will continue until properly identified and treated, especially with neuroimaging and neurovision rehabilitation (NVR). Often, neuropsychological testing does not consider OMD in assessing cognitive deficits; therefore, many patients suffering from post-traumatic OMD do not receive the proper care. In this study, mTBI subjects will undergo objective testing by a developmental optometrist to confirm the presence or absence of post-traumatic OMD. At CMRR, task and resting-state fMRI and DTI will be performed on a 3T MRI scanner. The subjects will then receive NVR if they are in the OMD group. Both groups will undergo repeat vision testing by the optometrist at three and six months to confirm that OMD has resolved. Neurocognitive testing, task and resting-state fMRI and DTI will be done at the same points to compare neurocognitive as well as function and structural connectivity changes between the three groups to determine if mTBI patients have similar outcomes to healthy controls. The goals of this research are to better understand neurocognitive changes associated with OMD, the effectiveness of NVR in resolving post-traumatic OMD, and the associated neurocognitive deficits.

**Principal Investigator:** Dr. Sarah Rockswold, 612-873-8700, [sarah.rockswold@hcmr.org](mailto:sarah.rockswold@hcmr.org)

*Correlation between Eyetracking and Developmental Optometry in Oculomotor Dysfunction following Traumatic Brain Injury (TBI), Hennepin Healthcare Research Institute, receives \$125,000*

Traumatic brain injuries can be life altering for individuals who then become at risk for comorbidities such as chronic pain, fatigue, depression, anxiety, and learning difficulties. Often the chronicity and severity of symptoms is linked to oculomotor dysfunction (OMD). No fast, simple to use, diagnostic test available for OMD exists to allow primary care physicians to identify TBI patients appropriate for referral to a developmental optometrist (OD) or for neurovision rehabilitation (NVR). In this project, subjects will undergo objective testing by the OD to confirm the presence or absence of post-traumatic OMD. The subject will then undergo an eye tracking test. Within two weeks, the OMD subjects will then receive NVR at HCMC. After every NVR session, during which the subject's progress is recorded, they will undergo the eyetracking test. The OD will examine them every two months until their OMD has resolved or until one year following their diagnosis. The impact will be a timelier referral to an OD by a non-specialist provider who can recommend and initiate vision interventions which may include prism lenses and/or NVR.

**Principal Investigator:** Dr. Sarah Rockswold, 612-873-8700, [sarah.rockswold@hcmr.org](mailto:sarah.rockswold@hcmr.org)

*Cortical Spreading Depolarization after Severe Traumatic Brain Injury, Hennepin Healthcare Research Institute, University of Minnesota, receives \$160,000*

Traumatic brain injury (TBI) is the leading cause of morbidity and mortality in young individuals. No intervention restores function to brain tissue damaged or lost in the initial traumatic insult; therefore, the focus is minimizing secondary brain injury. The goal of this project is to investigate the feasibility of using subdural grid electrodes in conjunction with novel analytical algorithms to determine cortical foci producing cortical spreading depolarizations (CSDs) in severe TBI. This will be achieved by recruiting a small cohort of severe TBI patients requiring the removal of the skull to treat or prevent intracranial hypertension to undergo simultaneous subdural electrode strip placement with subsequent continuous electrocorticography (ECoG) during their ICU stay. Novel algorithms will be applied to ECoG recordings to determine the geometry and temporal dynamics of each CSD wave. Finally, CSD foci will be registered on brain imaging to evaluate the relationship of their genes to structural pathology. In addition, ECoG, or the analysis, state space reconstruction, and spectral analysis will be used. This approach attempts to better understand the data to develop new treatments for obliterating or preventing CSDs in patients with severe TBI.

**Principal Investigator:** Dr. Samuel Cramer, Dr. David Darrow, Dr. Thomas Bergman, 612-624-6666, [cram0080@umn.edu](mailto:cram0080@umn.edu)

*Combined tDCS and Cognitive Training to Reduce Impulsivity in Patients with Traumatic Brain Injury, Center for Veterans Research and Education, receives \$250,000*

One of the most common behavioral changes following TBI is the emergence of impulsive behavior, which has been associated with destructive, suicidal, and aggressive behavior and is related to poor rehabilitation program adherence. In this project, the investigator proposes a neuroplasticity-based intervention approach utilizing transcranial direct current stimulation (tDCS) to alter brain neuroplasticity combined with cognitive training tasks selected to functionally target cognition and brain circuits that are impaired in those TBI patients with impulsive behavior. The primary objective of this study is to investigate the effect of a novel neuroplasticity-based intervention that combines cognitive training and tDCS to reduce impulsivity and to improve outcomes and quality of life for those who have suffered a TBI. Further, the investigator will examine the effects of “dose” of the intervention based on the cumulative time of stimulation over a number of sessions. Knowledge gained from this study can be used to inform the development of a safe and cost-effective treatment approach for impulsivity and other cognitive behavioral problems following TBI.

**Principal Investigator:** Dr. Casey Gilmore, 612-467-2261, [casey.gilmore2@va.gov](mailto:casey.gilmore2@va.gov)

*Head-Mounted Display Virtual Reality in the Treatment of Upper Extremity Function in Acute TBI Rehabilitation: A Comparison Study to Conventional OT Treatment Alone, Center for Veterans Research and Education, receives \$121,417*

Many modalities of occupational therapy (OT) provided to individuals receiving acute care for traumatic brain injury involve task practice with a focus on performing activities of daily life. Virtual reality (VR) use in OT is currently limited to two-dimensional games which incorporate this task practice. The goal of this project is to develop virtual reality environments that integrate OT concepts, but with greater variety of visual, auditory, and



haptic feedback. This will be achieved by providing intervention and control groups of patients admitted to the Polytrauma/TBI program standard therapy, plus VR therapy, and only standard therapy for upper extremity rehabilitation, respectively. Multiple upper extremity motor scales will be recorded weekly to track the progress of individuals in each group. An analysis of variance will be performed using the upper extremity motor scales to determine differences. The outcome measures will assess the impact of VR as they directly relate to everyday upper extremity motor function.

**Principal Investigator:** Dr. Brian T. Fay, 612-467-5285, [brian.fay@va.gov](mailto:brian.fay@va.gov)

*Evolution of Acute and Chronic Effects on Neuronal Activity and Morphology following Mild Cerebral Cortical Traumatic Brain Injury using Multi-Scale Optical Imaging in Behaving Mice, Regents of the University of Minnesota, receives \$200,000*

Given the prevalence, potential long-term adverse effects, and economic costs, there is a great need to understand the acute and secondary pathophysiological mechanisms underlying mild traumatic brain injury (mTBI). This project uses a suite of novel imaging tools that allow real-time, multi-scale imaging from the level of population and network dynamics down to the activity and synaptic morphology of single neurons in the awake, behaving mouse. These tools allow longitudinal real-time imaging of the effects of mTBI from the activity of neuronal populations down to the activity and synaptic morphology of single neurons across the cortex. The project tests the hypothesis that mTBI results in both short- and long-duration changes in cerebral cortical activity and neuronal morphology. These changes result in neuronal circuit dysfunction and behavioral abnormalities. This study has the potential for discovering and developing more effective treatments for mTBI by providing a mechanistic understanding of the effects of mTBI across scales, ranging from cerebral cortical neuronal network activity to single cell activity and morphology.

**Principal Investigator:** Dr. Timothy Ebner, 612-624-1560, [ebner001@umn.edu](mailto:ebner001@umn.edu)

*The Roles of Tau in Chronic Traumatic Encephalopathy, Regents of the University of Minnesota, receives \$250,000*

The pathological hallmarks of chronic traumatic encephalopathy (CTE) are deposits of hyperphosphorylated tau at the sulcal depth of the cortex as well as perivascular regions. While the broad presence of tau pathologies in CTE supports that tau is a key mediator for chronic neural deficits in CTE, it is still unknown how mechanical injuries of neurons lead to tau pathologies and tau-mediated synaptic deficits. The central hypothesis that guides this project is that mechanical stretching causes tau missorting to dendritic spines, leading to tau-mediated neural deficits in CTE. There are two aims in the project: 1) to first use computational simulation to estimate the mechanical strains, strain rates, and stresses during an impact TBI in the human brain, and then use the same modeling approach to predict the mouse brain surface displacements necessary to mimic CTE-induced trauma in in vivo experiments; and 2) to build a novel in vivo taupathy model of transgenic mice expressing GFP-tagged tau in order to estimate how mechanical stretching affects tau missorting and synaptic function. The students will likely unravel novel signaling molecules, which may become new drug targets. Additionally, the new model can be used to screen drugs for the prevention and treatment of CTE.

**Principal Investigator:** Dr. Dezhi Liao, 612-626-3522, [liao020@umn.edu](mailto:liao020@umn.edu)

*Harnessing Exosomes as a Biomarker and Therapeutic Approach to Traumatic Brain Injury, Regents of the University of Minnesota, receives \$124,978*

Recent advances in cellular and molecular biology have identified exosomes, a subclass of microvesicles, which bud off from the plasma membrane of cell-carrying microRNAs and proteins which play an important role in cell-to-cell signaling. In the healthy brain, exosomes are hypothesized to regulate the microenvironment. During times of cellular stress and injury, however, exosomes can provide a snapshot of the state of the cell. Furthermore, exosomes are capable of crossing the blood-brain barrier which, therefore, makes it an ideal candidate for non-invasive diagnostics of injury severity. This pilot study will utilize a well-characterized rodent model of controlled cortical impact (CCI) in which increasing impactor force correlates with increasing neurological deficits and exacerbated neuropathology. In Specific Aim 1, the investigator will extract peripheral blood from rodents with mild-, moderate-, or severe-injury throughout primary and secondary injury phases. Exosomes isolated from the blood will be analyzed through RNA sequencing and mass spectrometry to provide unbiased differential expression, relative to uninjured brains. In Specific Aim 2, the investigators will inject exosomes derived from umbilical cord blood stem cells to attempt to reduce primary inflammation from reactive astrocytes and activated microglia following CCI. Animals will be assessed through various neurological tests and post-mortem immunohistochemical assays to determine functional and structural benefits of stem cell derived exosome therapy.

**Principal Investigator:** Dr. Andrew Grande, 612-624-6666, [grande@umn.edu](mailto:grande@umn.edu)

*Reprogramming Astrocytes into Neurons to provide Therapeutic Benefit in TBI, Regents of the University of Minnesota, receives \$124,999*

Over the last decade, some advances have been made in acute neurosurgical management of TBI which have primarily impacted the mortality rate associated with TBI but has had little effect on permanent disability. Preclinical advances in neuro-restorative therapy following stroke have included the use of cellular reprogramming in which reactive astrocytes are converted into functional neurons leading to functional recovery. This pilot study will focus on cellular reprogramming to generate new neurons both in vitro and in vivo. Using the controlled cortical impact (CCI) model in rodents, the investigator will reprogram astrocytes reactivated after TBI using reprogramming techniques which have been used extensively in previous stroke studies. The laboratory will first evaluate the timeline of astrocyte proliferation after TBI and then use target reactive astrocytes for reprogramming. Animals will be evaluated for therapeutic effect with behavioral studies and by assessing degree of brain injury. Newly-formed neurons will be characterized with immunohistochemistry and genomic studies. The proposed therapy in this study aims to regenerate lost neurons after TBI, leading to functional recovery.

**Principal Investigator:** Dr. Andrew Grande, 612-624-6666, [grande@umn.edu](mailto:grande@umn.edu)

*Acute Biomarkers for Traumatic Brain Injury Across the Severity Scale, Hennepin Healthcare Research Institute, receives \$382,918*

This project seeks to create an objective, multimodal classification scheme for TBI that improves the validity of future clinical trials by allowing patients to be stratified into study groups based on pathology. The investigator aims to achieve this by addressing three fundamental aspects of TBI: mechanism of injury, pathology impacts after injury, and timing of injury. Evaluating mechanism of injury, both primary and secondary insults, alongside the

pathology impacts will address the etiological and pathoanatomical classification of TBI, respectively. Further, quantification of objective measurements longitudinally will address the differences in deficits and improvements of TBI patients with respect to time and severity of injury. This approach is a significant shift in current TBI research by utilizing novel methods with comprehensive objective measures (blood-based biomarkers, eye-tracking, and MRI) in the acute, subacute, and chronic cases of TBI. It will circumvent the current lack of treatment for TBI patients by developing a protocol for accurate stratification of patients for clinical trials and ultimately success in treatment for TBI.

**Principal Investigator:** Dr. Uzma Samadani, 612-873-7497, [uzma.samadani@hcmcd.org](mailto:uzma.samadani@hcmcd.org)

# 2019 Timeline and Anticipated Outcomes

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The project directors for FY 2019 research projects have a time period of July 1, 2018 (or the grant execution date) through June 30, 2020 for conducting their project. If additional time is needed, they will be offered a no-cost one-year extension, extending the contract end date to June 30, 2021.

Updated progress and/or outcomes of the projects listed in this report will be disseminated to the public during the biannual Minnesota Spinal Cord Injury and Traumatic Brain Injury Research Symposium. The date of the event is to be determined, but an invitation will be extended to legislators at that time.

The Spinal Cord Injury and Traumatic Brain Injury Advisory Council anticipates that through the innovations cited in the recommended research projects, and collaboration with other nationally-recognized researchers, the novel outcomes from the funded projects should lead to advances in the fields of spinal cord injury and traumatic brain injury.

## **Appendix 1: Copy of Statute**

## LAWS OF MINNESOTA 2017

### **136A.901 SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY RESEARCH GRANT PROGRAM.**

#### **Subdivision 1. Grant program.**

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The commissioner shall establish a grant program to award grants to institutions in Minnesota for research into spinal cord injuries and traumatic brain injuries. Grants shall be awarded to conduct research into new and innovative treatments and rehabilitative efforts for the functional improvement of people with spinal cord and traumatic brain injuries. Research topics may include, but are not limited to, pharmaceutical, medical device, brain stimulus, and rehabilitative approaches and techniques. The commissioner, in consultation with the advisory council established under section [136A.902](#), shall award 50 percent of the grant funds for research involving spinal cord injuries and 50 percent to research involving traumatic brain injuries. In addition to the amounts appropriated by law, the commissioner may accept additional funds from private and public sources. Amounts received from these sources are appropriated to the commissioner for the purposes of issuing grants under this section.

#### **Subd. 2. Report.**

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By January 15, 2016, and each January 15 thereafter, the commissioner shall submit a report to the chairs and ranking minority members of the senate and house of representatives committees having jurisdiction over the Office of Higher Education, specifying the institutions receiving grants under this section and the purposes for which the grant funds were used.

### **Sec136A.902 SPINAL CORD AND TRAUMATIC BRAIN INJURY ADVISORY COUNCIL.**

#### **Subdivision 1. Membership.**

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The commissioner shall appoint a 14-member advisory council consisting of:

- (1) one member representing the University of Minnesota Medical School;
- (2) one member representing the Mayo Medical School;
- (3) one member representing the Courage Kenny Rehabilitation Center;
- (4) one member representing Hennepin County Medical Center;
- (5) one member who is a neurosurgeon;
- (6) one member who has a spinal cord injury;
- (7) one member who is a family member of a person with a spinal cord injury;
- (8) one member who has a traumatic brain injury;
- (9) one member who is a veteran who has a spinal cord injury;
- (10) one member who is a veteran who has a traumatic brain injury;
- (11) one member who is a family member of a person with a traumatic brain injury;
- (12) one member who is a physician specializing in the treatment of spinal cord injury;
- (13) one member who is a physician specializing in the treatment of traumatic brain injury; and
- (14) one member representing Gillette Children's Specialty Healthcare.

**Subd. 2. Organization.**

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The advisory council shall be organized and administered under section [15.059](#), except that subdivision 2 shall not apply. Except as provided in subdivision 4, the commissioner shall appoint council members to two-year terms and appoint one member as chair. The advisory council does not expire.

**Subd. 3. First appointments and first meeting.**

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The commissioner shall appoint the first members of the council by September 1, 2015. The chair shall convene the first meeting by November 1, 2015.

**Subd. 4. Terms of initial council members.**

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The commissioner shall designate six of the initial council members to serve one-year terms and six to serve two-year terms.

**Subd. 5. Conflict of interest.**

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Council members must disclose in a written statement any financial interest in any organization that the council recommends to receive a grant. The written statement must accompany the grant recommendations and must explain the nature of the conflict. The council is not subject to policies developed by the commissioner of administration under section [16B.98](#).

**Subd. 6. Duties.**

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The advisory council shall:

- (1) develop criteria for evaluating and awarding the research grants under section [136A.901](#);
- (2) review research proposals and make recommendations by January 15 of each year to the commissioner for purposes of awarding grants under section [136A.901](#); and
- (3) perform other duties as authorized by the commissioner.

**Appendix 2: 2019 Spinal Cord Injury and  
Traumatic Brain Injury Research Grant  
Program Applicants**



**Table 1. Spinal Cord Injury Research Grant, Proposals Received**

Title and Applicant	Amount Requested
<p><b>Applicant:</b> Mayo Clinic  <b>Principal Investigator:</b> Dr. Igor Lavrov  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Spinal Cord Tissue Regeneration through Schwann Cell Seeded Hydrogel Scaffolds with Spatial-Selective Electrical Stimulation</i></p>	\$250,000
<p><b>Applicant:</b> Visyn Inc./University of Minnesota  <b>Principal Investigator:</b> Jeff Thielen  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>An Augmented Reality System for Improving Motor Function After Spinal Cord Injury</i></p>	\$124,345
<p><b>Applicant:</b> AbiliTech Medical, Inc.  <b>Principal Investigator:</b> Steven Seme  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Development of a Powered Hand Grip Device to Restore Independence for Individuals with Spinal Cord Injury</i></p>	\$250,000
<p><b>Applicant:</b> Minneapolis VA Health Care Service  <b>Principal Investigator:</b> Dr. Christine M. Olney  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Supine Exergaming for Functional Recovery of Persons with SCI Post Surgery</i></p>	\$249,976
<p><b>Applicant:</b> Minneapolis VA Medical Center  <b>Principal Investigator:</b> Dr. John M. Looft  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Improving Shoulder Health for Persons with SCI through an Ergonomic Wheelchair</i></p>	\$250,000
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. James R. Dutton  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Toward Treatment of Spinal Cord Injury with Orthotopic Neural Grafts Derived from Human Pluripotent Stem Cells</i></p>	\$250,000
<p><b>Applicant:</b> HealthPartners Institute  <b>Principal Investigator:</b> Dr. Leah R. Hanson  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Intranasal Insulin to Improve Recovery following Cervical Spinal Cord Injury</i></p>	\$249,864
<p><b>Applicant:</b> Mayo Clinic  <b>Principal Investigator:</b> Dr. Kristin Zhao, Dr. Kendall Lee  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Direct Comparison of Transcutaneous and Epidural Spinal Stimulation to Enable Motor Function in Humans with Motor Complete Paraplegia</i></p>	\$498,584
<p><b>Applicant:</b> Mayo Clinic  <b>Principal Investigator:</b> Dr. Isobel A. Scarisbrick  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>New Combinatorial Strategies for Regenerative Repair of the Injured Spinal Cord</i></p>	\$250,000

Title and Applicant	Amount Requested
<p><b>Applicant:</b> Hennepin Healthcare – HCMC/Minneapolis Medical Research Foundation, Minneapolis VA  <b>Principal Investigator:</b> Dr. David Darrow  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>iRehab: Discovering Outpatient Rehabilitative Measures for Epidural Stimulation Assisted Movement</i></p>	\$248,715
<p><b>Applicant:</b> Hennepin Healthcare – HCMC/Minneapolis Medical Research Foundation, University of Minnesota  <b>Principal Investigator:</b> Dr. David Darrow  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>iOptimize: Optimization of Epidural Stimulation for Spinal Cord Injury</i></p>	\$499,968
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Jacob E. Montgomery  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Exploring Roles of the Serotonergic System in Promoting Recovery from Spinal Cord Injury</i></p>	\$125,000
<p><b>Applicant:</b> Lite Run LLC  <b>Principal Investigator:</b> Douglas Johnson, Bruce Wigness  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Evaluation of a Novel Gait Training Device using a Pressure Suit to Support Body Weight</i></p>	\$488,484
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Brendan J. Dougherty  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Targeting Estrogen Receptors to Restore Spinal Plasticity in Acute Spinal Cord Injury</i></p>	\$250,000
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Walter C. Low  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Stem Cells for Treating Acute Spinal Cord Injury</i></p>	\$123,521
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Ann M. Parr, Dr. Walter C. Low  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Training Transplanted Spinal Neuronal Progenitor Cells (sNPCs) to Function after Chronic Spinal Cord Injury</i></p>	\$244,855
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Ann M. Parr, Dr. Walter C. Low  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Optogenetics for Corticospinal Tract Stimulation in Combination with Transplanted Spinal Neuronal Progenitor Cells after Spinal Cord Injury</i></p>	\$124,313
<p><b>Applicant:</b> NeuroRecovery Technologies, Inc.  <b>Principal Investigator:</b> Dr. Sujin Lee  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Non-invasive Transcutaneous Spinal Cord Stimulation (tSCS) for Recovery of Hand-Arm Function after Spinal Cord Injury</i></p>	\$500,000
<p><b>TOTAL AMOUNT REQUESTED</b></p>	<b>\$4,977,625</b>

**Table 2. Brain Injury Research Grant, Proposals Received**

Title and Applicant	Amount Requested
<p><b>Applicant:</b> The College of St. Scholastica  <b>Principal Investigator:</b> Dr. Alexandra Borstad  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Developing a Preventative Model of Care for Individuals with TBI: The Mobility Check-Up</i></p>	\$118,561
<p><b>Applicant:</b> Minneapolis Medical Research Foundation - HCMC  <b>Principal Investigator:</b> Dr. Sarah Rockswold  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Neuroimaging and Neurovision Rehabilitation (NVR) for Neurocognitive Deficits secondary to Oculomotor Dysfunction (OMD) in Mild Traumatic Brain Injury (mTBI)</i></p>	\$250,000
<p><b>Applicant:</b> Minneapolis Medical Research Foundation - HCMC  <b>Principal Investigator:</b> Dr. Sarah Rockswold  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Correlation between Eyetracking and Developmental Optometry in Oculomotor Dysfunction following Traumatic Brain Injury (TBI)</i></p>	\$125,000
<p><b>Applicant:</b> Minneapolis Medical Research Foundation - HCMC/U of M  <b>Principal Investigator:</b> Dr. Samuel Cramer/Dr. David Darrow/Dr. Thomas Bergman  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Cortical Spreading Depolarization after Severe Traumatic Brain Injury</i></p>	\$250,000
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Lester R. Drewes  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>BHB/M (D-beta hydroxybutyrate/Melatonin) for Traumatic Brain Injury</i></p>	\$250,000
<p><b>Applicant:</b> Minneapolis VA Health Care System  <b>Principal Investigator:</b> Dr. Michelle D. Peterson  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Electroencephalogram and Eyegaze Tracking as indicators in the Treatment of Disorders of Consciousness</i></p>	\$124,200
<p><b>Applicant:</b> Minneapolis VA Health Care System  <b>Principal Investigator:</b> Dr. Casey S. Gilmore  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Combined tDCS and Cognitive Training to Reduce Impulsivity in Patients with Traumatic Brain Injury</i></p>	\$494,252
<p><b>Applicant:</b> Minneapolis VA Health Care System  <b>Principal Investigator:</b> Dr. Brian T. Fay  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Head-Mounted Display Virtual Reality in the Treatment of Upper Extremity function in Acute TBI Rehabilitation: A comparison study to conventional OT treatment alone</i></p>	\$121,417
<p><b>Applicant:</b> Hennepin Healthcare – HCMC/Minneapolis Medical Research Foundation and University of Minnesota  <b>Principal Investigator:</b> Dr. Uzma Samadani  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Sports Related Concussion Outcome Optimization</i></p>	\$500,000

Title and Applicant	Amount Requested
<p><b>Applicant:</b> Minneapolis Medical Research Foundation  <b>Principal Investigator:</b> Dr. Uzma Samadani  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Acute Biomarkers for Traumatic Brain Injury Across the Severity Scale</i></p>	\$499,835
<p><b>Applicant:</b> Hennepin Healthcare - HCMC/Minneapolis Medical Research Foundation and the University of Minnesota  <b>Principal Investigator:</b> Dr. Adam Khan  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Vagus Nerve Stimulation to Augment Recovery from Traumatic Brain Injury: Evaluation of Patients with Moderate Injury</i></p>	\$124,920
<p><b>Applicant:</b> Hennepin Healthcare - HCMC/Minneapolis Medical Research Foundation and the University of Minnesota  <b>Principal Investigator:</b> Dr. Uzma Samadani  <b>Funding Tier:</b> Tier 3  <b>Title:</b> <i>Improving Functional Outcomes through Optimization of Surgical Subdural Hematoma Evacuation Technique</i></p>	\$489,882
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Bernadette T. Gillick  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Understanding Recovery and Development in Pediatric Brain Injury: A multi-modal assessment of cortical excitability</i></p>	\$250,000
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Timothy J. Ebner, Dr. Samuel W. Cramer, Dr. Clark C. Chen, and Dr. Suhasa B. Kodandaramaiah  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>Evolution of Acute and Chronic Effects on Neuronal Activity and Morphology following Mild Cerebral Cortical Traumatic Brain Injury using Multi-Scale Optical Imaging in Behaving Mice</i></p>	\$250,000
<p><b>Applicant:</b> Brain Check Medical LLC  <b>Principal Investigator:</b> John Borgos  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Device to Track Functional Recovery during TBI Rehabilitation</i></p>	\$124,965
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Dezhi Liao  <b>Funding Tier:</b> Tier 2  <b>Title:</b> <i>The Roles of TAU in Chronic Traumatic Encephalopathy</i></p>	\$250,000
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Andrew W. Grande  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Harnessing Exosomes as a Biomarker and Therapeutic Approach to Traumatic Brain Injury</i></p>	\$124,978
<p><b>Applicant:</b> University of Minnesota  <b>Principal Investigator:</b> Dr. Andrew W. Grande  <b>Funding Tier:</b> Tier 1  <b>Title:</b> <i>Reprogramming Astrocytes into Neurons to Provide Therapeutic Benefit in TBI</i></p>	\$124,999

Title and Applicant	Amount Requested
<b>TOTAL AMOUNT REQUESTED</b>	<b>\$4,928,009</b>

**Appendix 3: Copy of FY 2019  
Request for Proposals**



**OFFICE OF HIGHER EDUCATION**  
**1450 Energy Park Drive, Suite 350**  
**St. Paul, MN 55108**  
**651-642-0567 or 1-800-657-3866**

**REQUEST FOR PROPOSALS FOR THE MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN  
INJURY ANNUAL RESEARCH GRANT PROGRAM**

**Laws of Minnesota 2017**  
**Chapter 89, Article 1, Section 2**

**DEADLINES**

**Intent to Submit Form – April 2, 2018**  
**Grant Proposal – April 12, 2018**

**PROJECT PERIOD:**

**July 1, 2018 – June 30, 2020**

Alternative Format:

Upon request, the Request for Proposals can be made available in an alternative format by contacting Alaina DeSalvo, Minnesota Office of Higher Education, 1450 Energy Park Drive, Suite 350, St. Paul, MN 55108, phone (651) 259-3988, fax (651) 642-0675. TTY users should contact the Minnesota Relay Service at 1-800-627-3529 and request assistance in contacting the Minnesota Office of Higher Education.

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM  
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**REQUEST FOR PROPOSALS  
MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM  
FISCAL YEAR 2019**

February 1, 2018  
Minnesota Office of Higher Education

**I. OVERVIEW AND FUNDING AVAILABILITY**

The state of Minnesota established the Spinal Cord Injury and Traumatic Brain Injury Grant Program effective July 1, 2015. Minnesota 2015 Session Law, Chapter 69 directed the Commissioner of the Minnesota Office of Higher Education to establish a grant program for institutions in Minnesota for research into new and innovative treatments and rehabilitative efforts for the functional improvement of people with spinal cord and traumatic brain injuries. Research areas may include, but are not limited to, pharmaceutical, medical device, brain stimulus, and rehabilitative approaches and techniques. See Appendix A for a description of the grant program and advisory council membership and duties.

Based on fiscal year 2018/2019 biennium funding, \$3,000,000 will be available each year from the 2017 Omnibus Higher Education Bill to support the Spinal Cord Injury and Traumatic Brain Injury Grant Program. Three percent of this appropriation will be used for program administration. The Commissioner of the Office of Higher Education, in consultation with the program's advisory council shall award 50 percent of the State grant funds for research involving spinal cord injuries and 50 percent to research involving traumatic brain injuries. In addition to the amounts appropriated by law, the commissioner may accept additional funds from private and public sources. To supplement fiscal year 2019 funding for the spinal cord injury research grants, a \$15,000 donation was provided by the Get Up Stand Up to Cure Paralysis Foundation. Therefore, \$1,470,000 is available to fund initiatives focusing on spinal cord injury research, and \$1,455,000 is available to fund initiatives focusing on traumatic brain injury research.

The overall objective of this program is to foster and encourage innovative research for treatment and rehabilitative techniques for spinal cord and traumatic brain injuries. In fiscal year 2019, three funding options are available through the Minnesota Office of Higher Education. Each tier, with maximum allowable request and project requirements, are listed below:

**Tier 1: Pilot Project Grant**

- Max Request: \$125,000
- Project Details: Reflects an early investment as the researcher prepares to seek a larger grant award from a federal program or nonprofit organization. Preliminary data is not required.

**Tier 2: Standard Research Grant**

- Max Request: \$250,000
- Project Details: Primarily for research with supporting/preliminary data. If the budget is justifiable, the Standard Research Grant may also fund pilot projects. Applicants are encouraged to attach papers; in press and accepted papers and cited or submitted separately as an appendix.

**Tier 3: Clinical/Translational Research Grant**

- Max request: \$500,000
- Project Details: Projects must have concurrent application or funding from federal or industry sources. Preliminary data must be published or in press in a scientific journal and cited or submitted separately as an appendix.

Spinal Cord Injury and Traumatic Brain Injury research proposals will be funded up to a maximum total request of for the Fiscal Year 2019 grant period, which includes indirect costs set at 8% of total direct costs.

## **II. ELIGIBLE GRANT APPLICANTS**

Eligible grant applicants must be lead institutions/organizations located within Minnesota and fall into one or more of the following categories: public/state controlled institution of higher education; private institution of higher education; nonprofit with 501(c)(3) IRS status (other than institution of higher education); nonprofit without 501(c)(3) IRS status (other than institution of higher education); small business; and for-profit organization (other than small business).

Eligible principal investigators must have the skills, knowledge, and resources necessary to carry out the proposed research. This program is not for postdoctoral fellowships, therefore postdoctoral fellows will not be considered as principal investigators. Collaborations are encouraged with Minnesota-based researchers as well as researchers located outside the state of Minnesota.

## **III. RESTRICTIONS**

Successful proposals will be relative to the topic of spinal cord and brain injury and have high scientific merit.

The grant award period will be the 24 months from July 1, 2018 through June 30, 2020.

The principal investigator must be affiliated with a Minnesota-based research institution/organization.

**Organizations selected for a fiscal year 2019 award may have limited to no input on the State grant agreement. If you would like to review a sample grant agreement prior to submitting a proposal, or have any questions on what modifications to the contract are allowable, please contact Kelly Gibson ([Kelly.Gibson@state.mn.us](mailto:Kelly.Gibson@state.mn.us)).**

## **IV. FINANCIAL REVIEW PROCESS FOR NON-GOVERNMENTAL ORGANIZATIONS**

All Non-Governmental Organizations (NGO's) applying for grants in the state of Minnesota must undergo a financial review prior to a grant award made of \$25,000 and higher. In order to comply with [Policy on the Financial Review of Nongovernmental Organizations](#) ([https://mn.gov/admin/assets/08%2006%20grants%20policy%20revision%20Dec%202016%20final\\_tcm36-265656.pdf](https://mn.gov/admin/assets/08%2006%20grants%20policy%20revision%20Dec%202016%20final_tcm36-265656.pdf)).

Please submit one of the following documents with your application, based on the following criteria:

- Grant applicants with annual income of under \$50,000, or who have not been in existence long enough to have a completed IRS Form 990 or audit should submit their most recent board-reviewed financial statements.
- Grant applicants with total annual revenue of \$50,000 or more and less than \$750,000 should submit their most recent IRS Form 990.
- Grant applicants with total annual revenue of over \$750,000 should submit their most recent certified financial audit.

## **V. PROPOSAL SUBMISSION**

Proposals must be submitted by **Thursday, April 12, 2018 at 4:30 pm**. There is no limit on the number of proposals that an eligible applicant may submit.

Applicants **are required** to use the format that follows. The proposal must be self-contained within specified page limitations. Internet Web site addresses (URLs) may not be used to provide information necessary to the review because reviewers are under no obligation to view the Internet sites. For the application, the following areas must be identified and addressed in the order shown.

1. Proposal Cover Sheet as the first page of the document. *Use Appendix B.*
2. Principal Investigator/Institutional Assurance Form. *Use Appendix C.*
3. Program Abstract summarizing the focus, delivery, and desired outcome of the proposed research. *Use Appendix D.*
4. Table of Contents with pagination.
5. Research Plan not to exceed (10) numbered, double-spaced pages using 12-point Times Roman font. Do not double space charts, tables, or graphs. This page limit excludes the documents reference in numbers 1-4 and numbers 6-11.

*The Research Plan should address the project period and funding requested, show the scope of the overall project and justify how the proposed research will provide new or innovative treatments and rehabilitative efforts for functional improvement of people with spinal cord and traumatic brain injuries.*

The Research Plan narrative should be structured in accordance with the following format:

**Introduction:** Provide an explicit description of how the proposed research will meet the goals of the research grant program. Review the most significant previous work and describe the current status of research in the field. Document with references. Describe any preliminary work the principal investigator/collaborator has done which lead to this proposal.

**Specific Aims:** List the specific aims.

**Procedural Methods:** Give details of the research plan, including a description of the experiments or other work proposed; the methods; species of animals, techniques to be used; the kinds of data expected to be obtained; and the means by which the data will be analyzed or interpreted. If clinical studies are involved, give details of responsibility for patient selection and patient care. Include a discussion of pitfalls that might be encountered, and of the limitations of the procedures proposed. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. Describe the principal experiments or observations in the sequence in which they will be conducted, and indicate a tentative schedule of the main steps of the investigation.

**Significance:** Describe how the proposed project addresses a critical barrier to progress in the field. Discuss any new and innovative ideas and contributions that the project offers. Make clear the potential importance of the proposed project for stimulating further research or attracting federal grant support.

**Facilities Available:** Describe the facilities available for this project including laboratories, clinical resources, office space, animal quarters, etc. List major items of equipment available for proposed work.

**Collaborative Arrangements:** If the proposed project requires collaboration with other investigators, describe the collaboration and provide evidence to assure the reviewers that the other collaborators agree (letters of support in the appendix).

6. Reference page citing research-based references that support proposed activities.

7. Budget and Budget Justification Pages. On the budget page list the direct costs for all budget categories. Supplies and other costs must relate directly to performance of the projects. Indirect costs cannot exceed 8% of total direct costs. All costs must be specifically justified on the one page budget justification form. *Use Appendix E.*
8. Senior/Key Personnel Report. Provide required information for senior/key personnel. *Use Appendix F.*
9. Biographical Sketch of Principal Investigator and Senior/Key Personnel including his/her bibliographies; 4-page maximum for each individual. *Use format of Appendix G.*
10. Other Grant Support for Principal Investigator and Senior/Key Personnel. Indicate current support relevant to the proposed project; 3-page maximum for each individual. *Use format of Appendix H.*
11. Additional Appendices are allowed and may contain such items as letters of agreement from collaborators, letters of support, additional scientific materials, etc. **Do not** include the applicant institution's public relations or promotional materials.
12. Intent to Submit Proposal Form. So that OHE staff may plan for proposal review, return the INTENT TO SUBMIT form (Appendix I) by April 2, 2018.

## **VI. PROPOSAL REVIEW CRITERIA**

Despite three funding tiers, all proposals will be evaluated according to the following criteria:

1. Significance (1-9 points)
  - The proposed project addresses an important problem or a critical barrier to progress in the field.
  - If the aims of the project are achieved, scientific knowledge, technical capacity, and/or clinical practice will be improved.
  - Successful completion of proposed project aims will change the concepts, methods, technologies, treatment, or rehabilitative services that drive this field.
2. Innovation (1-9 points)
  - The proposal challenges and seeks to shift current research or clinical practice paradigms by using novel theoretical concepts, approaches or methodologies, instrumentation, or interventions.
  - A refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions is proposed.
3. Approach (1-9 points)
  - The overall strategy, methodology, and analyses are well-reasoned and appropriate to accomplish the specific aims of the proposed project.
  - Potential problems, alternative strategies, and benchmarks for successes are presented.
  - If the project is in the early stages of development, the proposed strategy will establish feasibility and manage particularly risky aspects of the proposed project.
  - If the project involves human subjects and/or NIH-defined clinical research, plans are in place for Protection of Human Subjects and inclusion (or exclusion) of individuals on the basis of sex/gender, race, and ethnicity,

as well as the inclusion (or exclusion) of children, justified in terms of the proposed scientific goals and research strategy.

4. Investigator(s) (1-9 points)

- The PI, collaborators, and other researchers are well suited for the project.
- Early Stage Investigators or New Investigators have appropriate experience and training.
- Established Investigators have demonstrated an ongoing record of accomplishments that have advanced their field(s).
- If the project is collaborative or multi-PI, the investigators have complementary and integrated expertise and their leadership approach, governance, and organizational structure are appropriate for the project.

5. Appropriateness of Facilities/Environment (1-9 points)

- The scientific environment in which the work will be done will contribute to the probability of success.
- Institutional support, equipment and other physical resources available to the investigators are adequate for the proposed project.
- The project will benefit from unique features of the scientific environment, subject populations, or collaborative arrangements.

6. Budget (narrative evaluation comments only)

- The budget is clear, concise, and justified by narrative describing proposed costs.
- The budget is cost effective and reflective of RFP and program objectives.

The assignment of points during the proposal review process will be reflective of National Institutes of Health guidelines.

## **VII. PROPOSAL REVIEW PROCESS**

Upon receipt by OHE, proposals will be reviewed to determine if all required materials are included and if the proposal responds to program requirements. **Incomplete proposals, late proposals, and proposals not responding to submission guidelines and proposals from ineligible applicants will not be judged.**

Qualifying proposals will be reviewed and recommendations made by members of the Spinal Cord and Traumatic Brain Injury Advisory Council. The strengths and weaknesses of each proposal will be reviewed in accordance with the criteria described under Section V, Proposal Review Criteria. A formal decision on the recommendations of the advisory council will be made in May, 2018.

## **VIII. GRANT ADMINISTRATION REGULATIONS**

### **Conflict of Interest**

Advisory council members must disclose in a written statement any financial interest in any organization that the council recommends to receive a grant. The written statement must accompany the grant recommendations and must explain the nature of the conflict.

### **Grant Award Process**

Grant contracts will be processed electronically through the Statewide Integrated Financial Tools (SWIFT), the state's accounting system, after approval of awards and acceptance of negotiated awards by the project director.

## **Applicable Regulations**

All contracts will contain an audit clause indicating that the relevant records, documents, and accounting procedures and practices of the grantee are subject to examination by the grant contracting agency and either the legislative auditor or the state auditor, as appropriate, for a minimum of six years.

## **Fiscal Procedures**

All Spinal Cord Injury and Traumatic Brain Injury Research Grant Program funds should be assigned to individual accounts which can be readily identified and verified. If an institution receives more than one grant, separate accounts should be established for each grant. Once a grant contract has been fully executed, the grant award will be made. Submission of an interim narrative report and an interim statement of project expenditure will be required. Final narrative and financial reports must be submitted and approved prior to grant closeout. Request to change project activities, project personnel, or to move funds between approved budget lines must be submitted in advance, with appropriate justification. Unexpended funds must be returned to the Office of Higher Education. Expenditures in excess of approved budget amounts will be the responsibility of the grant recipient.

## **Final Reports**

Each approved project must submit a final narrative and financial report within sixty (60) days of the conclusion of grant activities. Program financial reports must be submitted from and signed by the office of the institution's chief fiscal officer. At a minimum, the final narrative report must include the reporting that documents how well the objectives of the research program have been met.

Copies of materials which resulted from the grant should be submitted along with the final narrative report or as materials are subsequently published.

## **Attribution**

Program material must bear the following acknowledgement:

*"Funds for this research project were provided by the State of Minnesota Spinal Cord Injury and Traumatic Brain Injury Research Grant Program administered by the Minnesota Office of Higher Education."*

## **Publications from Funded Research Projects**

Copies of all publications from funded research projects must be provided to the Minnesota Office of Higher Education.

## **Ownership of Copyrights and Patents**

Ownership of any copyrights, patents, or other proprietary interests that may result from grant activities, shall be governed by applicable federal and state regulations and local institutional/organizational policies.

## **IX. AFFIRMATIVE ACTION CERTIFICATION**

Affirmative Action Certification: For all contracts estimated to be in excess of \$100,000, Responders are required to complete and submit the attached "Affirmative Action Data" page. As required by Minnesota Rules, part 5000.3600, "It is hereby agreed between the parties that Minnesota Statutes, section Minn. Stat. §363A.36 and Minnesota Rules, parts 5000.3400 - 5000.3600 are incorporated into any contract between these parties based upon this specification or any modification of it. Any applications for grants that exceed \$100,000 that do not include the Affirmative Action Data Page form with the application will fail this component.

## **X. GRANT CLOSE-OUT, SUSPENSIONS, AND TERMINATION**

Close-out: Each grant shall be closed out as promptly as feasible after expiration or termination. In closing out the grant, the following shall be observed:

- Upon request, the Office of Higher Education (OHE) shall promptly pay the grant recipient for any allowable reimbursable costs not covered by previous payments.
- The grant recipient shall immediately refund the OHE any unobligated balance of cash advanced to the grant recipient.
- The grant recipient shall submit all financial, performance, evaluation, and other reports required by the terms of the grant.
- The close-out of a grant does not affect the retention period for State and/or Federal rights of access to grant records.

Suspension: When a grant recipient has materially failed to comply with the terms of a grant, OHE may, upon reasonable notice to the grant recipient, suspend the grant in whole or in part. The notice of suspension will state the reason(s) for the suspension, any corrective action required of the grant recipient, and the effective date.

Termination: OHE may terminate any grant in whole, or in part, at any time before the date of expiration whenever OHE determines that the grant recipient has materially failed to comply with the terms of the grant. OHE shall promptly notify the grant recipient in writing of the termination and the reason(s) for the termination, together with the effective date.

The grant recipient may terminate the grant in whole or in part upon written notification to OHE, setting forth the reasons for such termination, the effective date and, in the case of partial termination, the portion to be terminated.

## **XI. TIMELINE FOR PROPOSALS, AWARDS, AND FUNDED PROJECTS**

- February 1, 2018: Request for Proposals available to applicants
- April 2, 2018: Deadline for receipt of intent to submit forms
- 4:30 p.m., April 12, 2018: Deadline for receipt of proposals
- June 1, 2018: Notification of recommendation for grant award
- July 1, 2018 - June 30, 2020: Project funding interval (funding interval starts with date of grant contract encumbrance)

Two formats of proposal submission are required:

1. Submit the complete final proposal as a .pdf document to [Alaina.DeSalvo@state.mn.us](mailto:Alaina.DeSalvo@state.mn.us).
2. Submit **one original and three copies of the complete final proposal, stapled in the upper left corner. To conserve paper, please make copies two-sided. Do not place proposals in binders or covers.** Hand deliver or mail complete copies of the final proposal to:

Alaina DeSalvo, Competitive Grants Administrator  
Minnesota Office of Higher Education  
1450 Energy Park Drive, Suite 350  
St. Paul, MN 55108-5227

Proposals sent by U.S. mail should be sent with sufficient time to be processed and arrive by the deadline; the applicant is responsible for making sure the complete proposal arrives on time. Using a time-sensitive delivery service or hand delivery is recommended.

Note for hand-delivered applications: Directions to the Office of Higher Education can be found at: <http://www.ohe.state.mn.us/mPg.cfm?pageID=1847>. Use of the North building entrance (by the flag poles) is required.

**All proposals must arrive by 4:30 p.m., April 12, 2018.**

**Any final proposal materials submitted late will not be accepted.**

All proposals will be acknowledged upon receipt. **Each late or ineligible applicant will be notified that its application will not be considered.**



**XII. APPENDIX A: COPY OF STATUTE**

**LAWS OF MINNESOTA 2017**

**136A.901 SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY RESEARCH GRANT PROGRAM.**

**Subdivision 1. Grant program.**

---

The commissioner shall establish a grant program to award grants to institutions in Minnesota for research into spinal cord injuries and traumatic brain injuries. Grants shall be awarded to conduct research into new and innovative treatments and rehabilitative efforts for the functional improvement of people with spinal cord and traumatic brain injuries. Research topics may include, but are not limited to, pharmaceutical, medical device, brain stimulus, and rehabilitative approaches and techniques. The commissioner, in consultation with the advisory council established under section [136A.902](#), shall award 50 percent of the grant funds for research involving spinal cord injuries and 50 percent to research involving traumatic brain injuries. In addition to the amounts appropriated by law, the commissioner may accept additional funds from private and public sources. Amounts received from these sources are appropriated to the commissioner for the purposes of issuing grants under this section.

**Subd. 2. Report.**

---

By January 15, 2016, and each January 15 thereafter, the commissioner shall submit a report to the chairs and ranking minority members of the senate and house of representatives committees having jurisdiction over the Office of Higher Education, specifying the institutions receiving grants under this section and the purposes for which the grant funds were used.

**Sec136A.902 SPINAL CORD AND TRAUMATIC BRAIN INJURY ADVISORY COUNCIL.**

**Subdivision 1. Membership.**

---

The commissioner shall appoint a 14-member advisory council consisting of:

- (1) one member representing the University of Minnesota Medical School;
- (2) one member representing the Mayo Medical School;
- (3) one member representing the Courage Kenny Rehabilitation Center;
- (4) one member representing Hennepin County Medical Center;
- (5) one member who is a neurosurgeon;
- (6) one member who has a spinal cord injury;
- (7) one member who is a family member of a person with a spinal cord injury;
- (8) one member who has a traumatic brain injury;
- (9) one member who is a veteran who has a spinal cord injury;
- (10) one member who is a veteran who has a traumatic brain injury;
- (11) one member who is a family member of a person with a traumatic brain injury;
- (12) one member who is a physician specializing in the treatment of spinal cord injury;
- (13) one member who is a physician specializing in the treatment of traumatic brain injury; and

(14) one member representing Gillette Children's Specialty Healthcare.

**Subd. 2. Organization.**

---

The advisory council shall be organized and administered under section [15.059](#), except that subdivision 2 shall not apply. Except as provided in subdivision 4, the commissioner shall appoint council members to two-year terms and appoint one member as chair. The advisory council does not expire.

**Subd. 3. First appointments and first meeting.**

---

The commissioner shall appoint the first members of the council by September 1, 2015. The chair shall convene the first meeting by November 1, 2015.

**Subd. 4. Terms of initial council members.**

---

The commissioner shall designate six of the initial council members to serve one-year terms and six to serve two-year terms.

**Subd. 5. Conflict of interest.**

---

Council members must disclose in a written statement any financial interest in any organization that the council recommends to receive a grant. The written statement must accompany the grant recommendations and must explain the nature of the conflict. The council is not subject to policies developed by the commissioner of administration under section [16B.98](#).

**Subd. 6. Duties.**

---

The advisory council shall:

- (1) develop criteria for evaluating and awarding the research grants under section [136A.901](#);
- (2) review research proposals and make recommendations by January 15 of each year to the commissioner for purposes of awarding grants under section [136A.901](#); and
- (3) perform other duties as authorized by the commissioner.

**XIII. APPENDIX B: PROPOSAL COVER SHEET**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM 2019 PROPOSAL FOR FUNDING**

PRINCIPAL INVESTIGATOR: \_\_\_\_\_

RANK, DEPARTMENT, and SCHOOL, if appropriate: \_\_\_\_\_

INSTITUTIONAL AFFILIATION: \_\_\_\_\_

E-MAIL ADDRESS OF PI \_\_\_\_\_ PHONE NUMBER OF PI: \_\_\_\_\_

ADDRESS OF PRINCIPAL INVESTIGATOR: \_\_\_\_\_

TITLE OF PROPOSAL: \_\_\_\_\_

FUNDING TIER: [ ] Pilot Project Grant [ ] Standard Research Grant [ ] Clinical/Translational Research Grant

PROJECT PERIOD: July 1, 2018 to June 30, 2020

AMOUNT REQUESTED:

DIRECT \$ \_\_\_\_\_

INDIRECT \$ \_\_\_\_\_ (Maximum 8%)

TOTAL \$ \_\_\_\_\_ (Award request may not exceed \$1,697,500 in total for all projects.)

	APPROVAL		PROTOCOL #	DATE
	YES	NO		
RECOMBINANT DNA?	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
HUMAN SUBJECTS?	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
VERTEBRATE ANIMALS?	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
DOES THIS PROJECT INVOLVE CLINICAL RESEARCH?	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

**AUTHORIZED REPRESENTATIVE INFORMATION**

To the best of my knowledge and belief, all data in this proposal are true and correct. The document has been duly authorized by the governing body of the applicant.

Institution's Authorized Representative for Approving Proposal Submission (*Please type or print name clearly*):

\_\_\_\_\_  
Title: \_\_\_\_\_

Phone: ( ) \_\_\_\_\_ E-mail Address \_\_\_\_\_

Signature of Institution's Authorized Representative for Approving Proposal Submission:

\_\_\_\_\_ Date \_\_\_\_\_

**XIV. APPENDIX C: PRINCIPAL INVESTIGATOR/INSTITUTIONAL ASSURANCE FORM**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY RESEARCH GRANT PROGRAM**

Principal Investigator/Institutional Assurance:

“The undersigned agrees to accept responsibility for the scientific and technical conduct of the research project and for provision of required progress reports if a grant is awarded as the result of this proposal.”

\_\_\_\_\_

Date                                      Principal Investigator Signature

\_\_\_\_\_

Date                                      Institutional Official Signature

**XV. APPENDIX D: PROGRAM ABSTRACT**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN  
INJURY RESEARCH GRANT PROGRAM**

PROJECT TITLE:

APPLICANT INSTITUTION:

BACKGROUND TO THE RESEARCH TOPIC:

THE QUESTION(S) OR CENTRAL HYPOTHESIS OF THE RESEARCH:

THE GENERAL METHODOLOGY TO BE USED:

INNOVATIVE ELEMENTS OF THE PROJECT:

IMPACT ON TREATMENTS AND REHABILITATIVE EFFORTS FOR FUNCTIONAL IMPROVEMENT OF PEOPLE WITH SPINAL CORD OR TRAUMATIC BRAIN INJURIES:

(Use of this form is required. Abstract is limited to one page.)

**XVI. APPENDIX E: BUDGET AND BUDGET JUSTIFICATION**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN  
INJURY FISCAL YEAR 2019 RESEARCH GRANT PROGRAM**

Principal Investigator (Last, First, Middle): \_\_\_\_\_

DETAILED BUDGET FOR BUDGET PERIOD					From	Through	
PERSONNEL <i>(Applicant organization only)</i>		TYPE APPT. <i>(months)</i>	% EFFORT ON PROJ.	INST. BASE SALARY	DOLLAR AMOUNT REQUESTED <i>(omit cents)</i>		
NAME	ROLE ON PROJECT				SALARY REQUESTED	FRINGE BENEFITS	TOTAL
	Principal Investigator			\$	\$	\$	\$
	Collaborator			\$	\$	\$	\$
				\$	\$	\$	\$
				\$	\$	\$	\$
				\$	\$	\$	\$
				\$	\$	\$	\$
				\$	\$	\$	\$
<b>SUBTOTALS</b>					\$	\$	\$
CONSULTANT COSTS							\$
SUPPLIES							\$
PATIENT CARE COSTS							\$
OTHER EXPENSES							\$
OTHER EXPENSES							
OTHER EXPENSES							
TOTAL DIRECT COSTS FOR BUDGET PERIOD							\$
INDIRECT COSTS <i>(8% of Direct Costs)</i>							\$
TOTAL COSTS							\$
<b>TOTAL REQUESTED RESEARCH GRANT PROGRAM FUNDS</b>							\$

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM**

BUDGET JUSTIFICATION:

**XVII. APPENDIX F: SENIOR KEY PERSONNEL REPORT**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM**

Principal Investigator (Last, First, Middle): \_\_\_\_\_

<b><u>SENIOR/KEY PERSONNEL REPORT</u></b>	Project Title:
---	----------------

All Senior/Key Personnel for the budget period must be listed below.

Name	Degree(s)	Role on Project (e.g. PI, Res. Assoc.)	Institutional Affiliation	Effort Devoted to Project		
				Cal	Acad	Sum



**XVIII. APPENDIX G: BIOGRAPHICAL SKETCH OF PRINCIPAL AND SENIOR/ KEY PERSONNEL**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM**

Principal Investigator (Last, First, Middle): \_\_\_\_\_

**BIOGRAPHICAL SKETCH**

Provide the following information for the **Principal Investigator and any key personnel. DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
------	----------------

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training and residency training, if applicable.)*

INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY

A. Personal Statement

B. Positions and Honors

C. Selected Peer-reviewed Publications

**XIX. APPENDIX H: OTHER GRANT SUPPORT FOR PRINCIPAL INVESTIGATOR AND SENIOR/ KEY PERSONNEL**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY  
RESEARCH GRANT PROGRAM**

Principal Investigator (Last, First, Middle): \_\_\_\_\_

**OTHER GRANT SUPPORT:** Provide active support for the **Principal Investigator and any key personnel**. Other Support includes all financial resources, whether Federal, non-Federal, commercial or institutional, available in direct support of an individual's research endeavors, including but not limited to research grants, cooperative agreements, contracts, and/or institutional awards. Training awards, prizes, or gifts do not need to be included.

It is critical that the Other Support page be clear and detailed, and include funding through program projects, centers, joint grants, and other programs as well as the role of the person in each grant and any potential overlap. Both Active and Pending support should be listed.

Include all information noted below for each proposal/award:

**NAME OF INDIVIDUAL**

**ACTIVE/PENDING**

<b>Project Number</b>	<b>Dates of Project</b>	<b>Person Months (Cal/Academic/ Summer)</b>
<b>Source</b>	<b>Annual Direct Cost</b>	
<b>Title</b>		

**Major Goals of Project**

**Overlap**

**XX. APPENDIX I: INTENT TO SUBMIT FORM**

**April 2018 Intent to Submit Proposal for  
Minnesota Spinal Cord Injury and Traumatic Brain  
Injury Research Grant Program**

If your institution intends to apply for funding under the Spinal Cord Injury and Traumatic Brain Injury Research Grant Program, please provide the Office of Higher Education with the following information:

Principal Investigator's Name \_\_\_\_\_

Institution/Organization \_\_\_\_\_

Address \_\_\_\_\_

Telephone (\_\_\_\_) \_\_\_\_\_ E-mail \_\_\_\_\_

*Check the blank as it applies to your proposal:*

- Research project for functional improvement of people with spinal cord injury
- Research project for functional improvement of people with traumatic brain injury

*Check the blank as it applies to your proposal's funding tier:*

- Tier 1: Pilot Project Grant
- Tier 2: Standard Research Grant
- Tier 3: Clinical/Translational Research Grant

*Please return this form by April 2, 2018, to:*

*Kelly F. Gibson, Office & Administrative Assistant  
Competitive Grant Programs  
Minnesota Office of Higher Education  
1450 Energy Park Drive, Suite 350  
St. Paul, MN 55108-5227*

*Intent to Submit:*

*Responses may be sent by fax to (651) 642-0675  
or by e-mail to [kelly.gibson@state.mn.us](mailto:kelly.gibson@state.mn.us)*

**The Office of Higher Education (OHE) requests this information solely to help prepare for the proposal review process. Submission of an Intent to Submit form is not required for proposal submission. If you inform the OHE of your intent to apply, but subsequently decide not to do so, please notify the OHE accordingly.**

**Appendix 4: Annual Research Grant  
Proposal Review Form**

**MINNESOTA SPINAL CORD INJURY AND TRAUMATIC BRAIN INJURY RESEARCH GRANT PROGRAM**

**MINNESOTA OFFICE OF HIGHER EDUCATION PROPOSAL  
REVIEW FORM FOR FISCAL YEAR 2019**

Application No. \_\_\_\_\_ Reviewer No. \_\_\_\_\_ Funding Requested: \_\_\_\_\_ Tier: \_\_\_\_\_  
Principal Investigator(s) \_\_\_\_\_

**OVERALL IMPACT**

Reviewers will provide an overall impact score to reflect their assessment of the likelihood for the project to exert a sustained, powerful influence on the research field(s) involved, in consideration of the following five scored review criteria, and additional review criteria. An application does not need to be strong in all categories to be judged likely to have major scientific impact. **Please reference the FY2019 Reviewer’s Handbook for instructions and tips on how to accurately score proposals.**

Overall impact: Provide a paragraph summarizing the factors that informed your Overall Impact score. (Score: 1-9) Score \_\_\_\_

**SCORED REVIEW CRITERIA**

Reviewers will consider each of the five review criteria below in the determination of scientific and technical merit, and give a separate score for each.

1. Significance (Score: 1-9) Score \_\_\_\_\_

**Strengths**

**Weaknesses**

2. Investigator(s) (Score: 1-9) Score \_\_\_\_\_

**Strengths**

**Weaknesses**

3. Innovation (Score: 1-9)

Score \_\_\_\_\_

**Strengths**

**Weaknesses**

4. Approach (Score: 1-9)

Score \_\_\_\_\_

**Strengths**

**Weaknesses**

5. Environment (Score: 1-9)

Score \_\_\_\_\_

**Strengths**

**Weaknesses**





2019