DIRECTORY OF GRANT AWARDS
2024 GRANT CYCLE

NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

2024 GRANT CYCLE

DIRECTORY OF GRANT AWARDS FOR SPINAL CORD INJURY AND DISEASE RESEARCH

DECEMBER 2023

NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

This data was compiled in compliance with the New Jersey Commission on Spinal Cord Research's statutory mandate, N.J.S.A. 52:9E-1, "…to compile a directory of spinal cord research being conducted in the State."

The information contained within this directory is not all-inclusive. The research projects and researchers listed in this directory are all based in the State of New Jersey and have applied to and received funding during the fiscal year 2024 grant cycle. The research projects are not categorized or listed in any order.

This directory is not a complete listing of all scientific research being performed within the State of New Jersey due to the proprietary nature of the research being conducted at various institutions throughout the State. In addition, institutions are not obligated to share their research information with the New Jersey Commission on Spinal Cord Research.

Please feel free to contact the New Jersey Commission on Spinal Cord Research at P.O. Box 360, 25 S. Stockton Street, Trenton, New Jersey, 08625. The Commission's office can be reached by telephone at 609-913-5005, or by e-mail at NJCSCR@doh.nj.gov.

For information on the New Jersey Commission on Spinal Cord Research's grant award process, grant applications and deadlines, please see: www.state.nj.us/health/spinalcord.

2024 MEMBERSHIP INFORMATION

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NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

EXPLORATORY RESEARCH GRANT RECIPIENT:

Jeanne Zanca, Ph.D.
Kessler Foundation
CSCR24ERG001
$199,485

Personal Assistance Services and Secondary Complications Among People with SCI: Development of a National Survey

This project will develop and pilot the Spinal Cord Injury Personal Assistance Services Survey (SCI-PASS), the first survey designed for large-scale implementation to assess the relationship between personal assistance service quality and secondary complication-related outcomes for people with SCI.

This project will help develop strategies to prevent secondary complications of spinal cord injury by creating the SCI Personal Assistance Services Survey (SCI-PASS), a survey that will enable assessment of the relationship between personal assistance services and the occurrence of secondary complications of spinal cord injury (SCI).

Many people with spinal cord injury rely on personal assistance services, in which hands-on help is provided to complete important daily tasks needed to prevent and manage secondary complications of SCI. The COVID-19 pandemic has disrupted the already fragile system of personal assistance services, creating a crisis for people with SCI who rely on these services to maintain health and function. Existing data sources, such as the National Spinal Cord Injury Model Systems Database and Center for Medicare and Medicaid Services Claims database, provide little information on use of personal assistance services and no information on unmet needs or satisfaction. A survey capable of assessing the relationships between personal assistance service quality and secondary complications would help identify identification of targets for intervention to improve these important services, and help people with SCI receive the assistance they need to prevent secondary complications of SCI.

The proposed project will design, pilot-test, and implement a survey to assess PAS service utilization, quality (as measured by satisfaction with personal assistance services and unmet needs), and the relationship between personal assistance services and secondary complication-related outcomes (occurrence of complications, emergency department visits, rehospitalization). In the first phase of the project, the survey will be constructed using a combination of relevant items from surveys related to SCI and secondary complication-related outcomes, combined with new items informed by input from SCI community members and service providers. A series of focus groups will be conducted with people with spinal cord injury, family caregivers, personal assistance providers, and spinal cord injury professionals to identify appropriate content for the survey. Survey items would then be developed and pilot-tested with people with spinal cord injury who would provide input on the relevance and clarity of items through a series of cognitive interviews. The revised survey would then be implemented to gather preliminary data

to characterize use of personal assistance services, identify unmet needs, assess current levels of satisfaction, and identify variables associated with secondary complication-related outcomes. These data would also be used to inform sample size calculations for a future large-scale survey.

The survey and preliminary data provided by this investigation would facilitate future applications to the National Institute on Disability, Independent Living, and Rehabilitation Research, National Institutes of Health, or Department of Defense to conduct an appropriately-powered, national survey and would inform advocacy and policy efforts pertaining to training of direct care workers, service provision models, and payment for the personal assistance services people with SCI need to prevent secondary complications.

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NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

EXPLORATORY RESEARCH GRANT RECIPIENT:

Adam Gormley, Ph.D.
Rutgers, The State University
CSCR24ERG003
$200,000

Sustained Release of Chondroitinase and BDNF to Promote Neurogenesis

The goal of this project is to develop a drug delivery system to continuously treat spinal cord injuries with pro-neurogenic proteins.

After spinal cord injury, a scar forms on the spinal cord that prevents reconnection of neural pathways resulting in lifetime disability. To address this problem, two synergistic drugs (chABC and BDNF) have been proposed to reduce scar burden and encourage neuron growth across the injury. Unfortunately, these fragile biological drugs must be locally delivered at the site of injury for weeks at a time to be effective. To address this unmet need, a novel drug delivery system is proposed to encapsulate and sustainably deliver chABC and BDNF for extended periods. The approach capitalizes on recent developments in artificial intelligence, robotics, and novel biomaterials to efficiently load both drugs into carrier microparticles with greatly enhanced stability when compared to modern methods. As these carrier microparticles dissolve, both drugs will be released in a highly predictable and sustained manner. In doing so, this project hopes to maximize the potential of these important drugs.

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NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

INDIVIDUAL RESEARCH GRANT RECIPIENT:

Michael La Fountaine, EdD, ATC, FACSM
Seton Hall University
CSCR24IRG001
$558,904

Exploring the Impact of Calcitonin Gene-Related Peptide on the Pain Experience of Persons with Chronic Spinal Cord Injury

The current proposal seeks to demonstrate that a group of persons living with chronic SCI will have a greater pain experience due to having a combination of CGRP-related genes (i.e., susceptible genotype from CGRP) and a prior history of sustaining a TBI when compared to those with chronic SCI, a non-susceptible CGRP genotype and no TBI history.

Up to 65% of persons with chronic spinal cord injury (SCI) report chronic pain. Pain after SCI can present as neuropathic and/or nociceptive pain in one or more body locations. The persistent pain experience is associated with increased rates of psychopathology, disability burden and reduced quality of life (QOL). Underlying pain mechanisms need to be better understood to improve pain treatment and relief. In a study of the human spinal cord, researchers found that levels of calcitonin gene-related peptide (CGRP) were increased to reflect that an abnormal spouting of sensory fibers had ensued after injury. The origins of the emergence of CGRP after injury are not fully understood, but its thought to results from nerve damage. A small cohort study demonstrated that ~60% of newly injured persons with SCI sustained a co-occurring traumatic brain injury (TBI) at the time of their injury. Similar to SCI, brain trauma has been shown to impact CGRP activity and contribute to varied pain experiences after injury. We suspect that those persons with SCI in whom a positive lifetime history of TBI is present are more likely to experience a multiplicative effect of CGRP activity on pain outcomes following SCI, especially if they possess a genetic susceptibility from CGRP genes.
The current proposal seeks to demonstrate that a group of persons living with chronic SCI will have a greater pain experience due to having a combination of CGRP-related genes (i.e., susceptible genotype from CGRP) and a prior history of sustaining a TBI when compared to those with chronic SCI, a non-susceptible CGRP genotype and no TBI history. The proposed investigation is a small-scale, cross-sectional, proof-of-concept study in 100 persons living with SCI that have American Spinal Injury Association Impairment Scale (AIS) of A, B, C, or D and any level of injury. The study will include men and women between the ages of 21 and 69 with chronic SCI (>6 months after injury). A single study visit will be performed to collect biospecimen (i.e., blood, saliva) to isolate the plasma concentrations of CGRP and for genotyping of CGRP-related genes. Self-reported metrics of pain intensity, type and location will be obtained, and their effects will be examined across multimodal metrics of psychological well-being, independence and QOL. A lifetime history of TBI will also be obtained.
Obtaining evidence to demonstrate that CGRP plays a critical role in chronic pain is of substantial clinical importance in the chronic SCI cohort due to the availability of Food and Drug Administration (FDA) approved CGRP receptor antagonists and anti-CGRP monoclonal

antibodies that interfere with CGRP activity. Thus, an understanding of CGRP's role in exacerbating the pain experience after SCI would serve to inform on the development of future clinical trials of a non-opioid approach to managing chronic pain in this underserved population. Success of these trials would be expected to decrease the number of opioid and non-opioid medications that are used to obtain sustainable pain relief in persons living with chronic SCI.

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NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

INDIVIDUAL RESEARCH GRANT RECIPIENT:

Silvana Lopes Costa, Ph.D.
Kessler Foundation
CSCR24IRG002
$569,006

Using the Eyes to Study the Brain

We will test the sensitivity, reliability, and usability of the Kessler Foundation eye-tracker based cognitive assessment (KF ECTA) to assess cognitive functions in people with SCI. The KF ECTA was developed using study team expertise in cognitive assessment and SCI and assesses the cognitive functions most often impacted by SCI, as well as areas with a limited number of motor-free tests available, such as visuospatial processing, non-verbal memory, and specific aspects of executive control.

Cognitive functions (the ability to execute mental operations) are often impaired among people with traumatic spinal cord injury (tSCI) and are estimated to affect up to 60% of people who live with tSCI. One of the biggest challenges when examining cognitive functioning in people with tSCI is that the vast majority of the tests available require upper limb function to respond (e.g., hand pointing, typing, squeezing, etc.). In fact, in our ongoing studies examining cognitive functions in people with tSCI, participants demonstrated significant difficulties executing cognitive tasks that require a motor response and often our assessments are significantly impacted by the absence of motor-free cognitive tests. Clinicians and researchers are thus limited regarding the available tests they can use to assess cognitive functions. This is particularly important because a detailed assessment of cognitive abilities is essential to fully understand the impact of the tSCI and plan an effective multidisciplinary rehabilitation program. Thus, it is fundamental that we develop and test new methods to assess cognitive functions that can be used with all people with SCI, independent of their level of motor functioning.
The present proposal aims to test an eye-tracker based (hands-free) cognitive assessment, developed by the study team. Instead of using the upper limbs to provide a response, such as writing, this technology requires participants to provide responses by fixating their eyes in specific locations on a monitor. This technology has been used successfully in our ongoing pilot studies with people with tSCI and has been used in the past with high success in other populations with similar motor disabilities.
The results of this study will help researchers and clinicians to better assess cognitive functions in people with SCI, independent of their motor abilities. Additionally, in the future, this hands-free cognitive assessment can be use with other populations who also have high prevalence of motor disabilities, such as, people with traumatic brain injury, amyotrophic lateral sclerosis, multiple sclerosis, stroke, among others.
Detailed cognitive assessments are critical for the development of efficient rehabilitation programs, which are known to significantly improve quality of life and performance on everyday activities. Additionally, a detailed cognitive assessment is essential to fully understand the impact of spinal cord injury and plan for successful return to work and daily life activities.

By the end of the current study, clinicians and researchers will have a new tool to examine cognitive functions in SCI. The use of eye-tacking technology to assess cognitive functions has several advantages: 1) it is a hands-free methodology, thus accessible to all people with SCI independent of upper limb motor ability; 2) it is not invasive and is well tolerated by people with disabilities; 3) it has minimal secondary effects, the most common of which is mild fatigue, similar to reading/using a computer for a long period of time; 4) besides the initial investment in the eye tracker, it is an inexpensive technology and does not require a dedicated space (thus feasible to be available in hospitals).
The ability to assess cognitive functions independent of level of motor functioning will be a breakthrough that will have a major impact on our understanding of cognitive abilities after tSCI. Significant implications follow regarding the way we assess and rehabilitate cognition in people with tSCI. This proposal has the potential to significantly improve the way we assess cognitive functioning in SCI, both in research and clinical settings. Our proposal not only targets a poorly studied area in tSCI, but also has the potential to directly contribute to advance the treatment and management of tSCI.

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NEW JERSEY COMMISSION ON SPINAL CORD RESEARCH

INDIVIDUAL RESEARCH GRANT RECIPIENT:

KiBum Lee, Ph.D.
Rutgers, The State University of New Jersey
CSCR24IRG005
$583,071

Effective Modulation of Inflammation for Enhanced SCI Repair Using a Hybrid LNP-Peptide Hydrogel Drug Delivery System (DDS)

We propose to develop an injectable hydrogel that can deliver controlled drug delivery of lipid nanoparticles (LNP) to target foamy macrophages at the spinal cord injury (SCI) lesion site, which can reduce neuroinflammation and address the shortcomings of current immunotherapy to achieve an improved treatment outcome for SCI.

Developing reliable therapeutics for spinal cord injuries (SCIs) is a significant challenge due to the complex nature of the injury. The SCI process begins when mechanical force applies to the spinal cord, leading to the destruction of cells in the immediate vicinity, known as the primary injury. The primary injury then triggers cascades of secondary injury processes that can persist for months or even years in the host, such as inflammation sustained by microglia and macrophages. The inflammatory response directly contributes to loss of neurological function, endogenous neural cell degeneration disrupted connectivity and compromised sensorimotor recovery.
Macrophage activities that produce an excess of pro-inflammatory cytokines can result in inflammation of the spinal cord, disruption of the vasculature, an alteration of hemodynamics, and an increase in oxidative stress. Inflammation has an adverse effect on the regenerative capacity of neurons and oligodendrocytes. Hence, reducing neuroinflammation is a viable and efficient method for improving neural regeneration. Previous studies have shown that lowering neuroinflammation using foamy macrophage inhibition can improve tissue regeneration capacity after CNS injury. Foamy macrophages play a significant role in this inflammatory process, leading to lipid-laden macrophage formation and inflammation. Therefore, novel therapeutic agents combined with a controlled drug delivery system (DDS) targeting foamy macrophages would be promising to alleviate inflammation and enhance regeneration for functional restoration.
To address the challenges mentioned, we propose to design and develop an innovative hybrid LNPs and peptide-hydrogel-based drug delivery system to effectively treat spinal cord injuries by targeting foamy macrophages. Our approach involves merging our recently developed 3D-peptide hydrogel system with our intelligent lipid nanoparticle (LNP) platform to generate a LNP-PepGel DDS. This LNP-PepGel system aims to i) regulate the immune response in foamy macrophages following injury, ii) attenuate foamy macrophage-mediated fibrosis, and iii) enhance the treatment of SCI, using sustained drug delivery of cyclodextrin and therapeutic molecules. Our system uses a gel called LNP-PepGel that supports the growth of new nerve cells while also releasing molecules that reduce inflammation in specific immune cells. Additionally, the system continuously releases a drug called Torin-2, which helps remove harmful substances

from cells and reduces the release of inflammatory chemicals from immune cells. This combined approach is expected to improve the effectiveness of the treatment and help reduce inflammation and promote nerve cell growth after spinal cord injury.
Overall, our proposed advanced drug delivery system demonstrates a significant advancement in treating spinal cord injuries and can potentially improve patient outcomes.

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