NJCSCR 2022

New Jersey Commission on Spinal Cord Research

Annual Report 2022

THE GREAT SEAL OF THE STATE OF NEW JERSEY

NJ Health
New Jersey Department of Health

State of New Jersey Commission on Spinal Cord Research

Annual Report 2022

New Jersey Department of Health

A Message From the Commission Members

Dear Governor Murphy,

On behalf of the New Jersey Commission on Spinal Cord Research, we are pleased to present the Annual Report for 2022.

Commission grant programs have increased the importance of spinal cord injury research, have brought new spinal cord injury researchers into the State of New Jersey, and have laid the groundwork for new research and leveraged additional grants and funding.

Each funded research project has the potential to contribute significantly to the development of treatments and cures for the paralysis and secondary complications that accompany spinal cord injury.

These grants facilitate the basic research findings necessary to compete successfully for larger National Institutes of Health, and National Science Foundation awards.

We wish to thank you, and the State of New Jersey for continued support of spinal cord injury research.

Respectfully Submitted By,

The New Jersey Commission on Spinal Cord Research Members

Members of the Commission

John Del Colle, *Chairperson*
Carolyn Daniels, D.H.Sc., M.Ed.
Carolann Murphy, PA

ACKNOWLEDGEMENTS

The New Jersey Commission on Spinal Cord Research would like to express its sincere appreciation to all present and past Commission members, and the New Jersey Department of Health staff.

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Executive Summary

The New Jersey Commission on Spinal Cord Research was established in 1999 to fund spinal cord injury research projects in New Jersey. Since 2001, the New Jersey Commission on Spinal Cord Research (Commission) has awarded over $62.1 million to individual scientists at academic and research institutions and approved 264 separate scientific research projects.

- Progress made by researchers has been presented in abstracts, scientific conferences, symposia, and meetings.
- Commission programs have facilitated wider scientific interaction and numerous active research collaborations, along with out-of-state researchers.
- Success in achieving Commission funding has resulted in academic and career advancement for New Jersey researchers, including doctoral dissertations.
- Numerous successful applications to the National Institutes of Health, the National Science Foundation and other organizations based on the Commission's grants have been made.

Introduction

This report is written in accordance with the enabling Statute, which stipulates that the Commission shall provide a report to the Governor and Legislature on the status of the Commission's activities and the results of its funded research efforts.[1]

The Spinal Cord Research Act created the New Jersey Commission on Spinal Cord Research and the New Jersey Spinal Cord Research Fund to support its activities. This Act resulted from the collaborative efforts of people with spinal cord injury and their families, clinicians, scientists, public officials, and representatives of research, rehabilitation and non-profit organizations.

Background

Spinal cord injuries can be some of the most devastating and life-changing injuries a person can sustain. Depending on the severity and location of the injury, a spinal cord injury can cause paralysis and death. Spinal cord injury has long been regarded as a virtually hopeless diagnosis with a grim prognosis. However, innovative approaches to rehabilitation and modern medicine have extended life expectancy from months to years and even decades. Many people with permanent injury can now live vital and productive lives. More recently, breakthroughs in research and new horizons in the life sciences are moving us closer to finding cures for spinal cord injuries.

1- N.J.S.A. C.52:9E-1 et seq. Enabling statute is attached hereto as "Attachment A."

Executive Summary

Spinal cord injury impacts individuals and families across the State and nation. Though young men remain at greatest risk, the number of women and older people suffering a spinal cord injury is increasing. Motor vehicle crashes remain the leading cause of spinal cord injury, followed by falls and acts of violence such as gunshot wounds.[2]

The economic and human cost of these injuries remains huge. Better therapies are needed, and the task of research is more demanding than ever. Paralysis resulting from spinal cord injury may no longer be "an ailment not to be treated," but the search for the answers remains among the greatest challenges to medical science and the healing arts.

New Jersey Spinal Cord Registry

The Spinal Cord Research Act mandated the establishment of a central registry of persons who sustain spinal cord injuries other than through disease, whether or not the injury results in a permanent disability. The Registry captures incidence and prevalence data on spinal cord injuries and serves as a resource for research, evaluation and information on spinal cord injuries.

New Jersey's Commitment to Spinal Cord Research

New Jersey is a leader in funding research aimed at the repair of spinal cord injuries. The Commission, created in 1999 under New Jersey's Spinal Cord Research Act, represents the successful culmination of years and determined effort to enlist New Jersey in the fight. The Commission offers research grant programs for both established scientists and younger researchers committed to spinal cord injury research.

Now in its 23rd year of operation, the Commission has funded 264 scientific research projects and supported individual scientists at research institutions in New Jersey. Its impartial and scientifically rigorous application and review process has helped make the Commission vital to New Jersey's scientific investigators in their pursuit of developing effective therapies for spinal cord injury.

The Commission remains committed to broadening its portfolio of institutional grantees and increasing the size and diversity of its funding activities. Through outreach activities, the Commission encourages participation by all research organizations with an interest in spinal cord research.

Spinal cord injuries can be some of the most devastating and life-changing injuries a person can sustain. Depending on the severity and location of the injury, a spinal cord injury can cause paralysis and death.

2- National Spinal Cord Injury Facts and Figures at a Glance. https://www.nscisc.uab.edu/Public/Facts%202016.pdf.

New Jersey Commission on Spinal Cord Research

Mission and Goals

The Commission's mission is to encourage and promote scientific research projects that advance the understanding of spinal cord injury and explore potential therapeutic strategies at qualifying research institutions in New Jersey. Through its grant programs and related activities, the Commission reinforces New Jersey's preeminence as a center of biomedical research, and a leader in neuroscience, neurotrauma and spinal cord research.

Simply stated, the Commission's goals are:

- To support meritorious research projects that advance the understanding of spinal cord injury and explore potential therapeutic strategies.
- To support the progression of research from bench to bedside.
- To enhance the reputation of New Jersey as a focus of biomedical research, and
- To facilitate the initiatives of New Jersey scientists to obtain larger grants from sources such as the National Institutes of Health and the National Science Foundation.

Objectives

The Commission is committed to accelerating research to develop effective interventions and cures for disabilities such as paralysis that are associated with spinal cord injury. Its primary objectives are:

- To develop and implement spinal cord research grant programs.
- To solicit, review, and administer grant awards in support of scientifically meritorious research projects.
- To promote development of spinal cord research projects that focus on treatments, cures, and on those that prevent or treat secondary biological conditions resulting from spinal cord injury, and
- To support the progression of research from laboratory to animal and clinical applications.

More specifically, the Commission works to:

- Advance the field of spinal cord research in New Jersey by encouraging established scientists to apply their expertise to spinal cord research.
- Foster collaborative, interdisciplinary approaches to spinal cord research.
- Nurture future generations of spinal cord researchers by supporting young scientists and postdoctoral fellows.
- Prevent or treat secondary biological conditions resulting from spinal cord injury.
- Disseminate the research findings generated by scientists supported by the Commission.

Membership and Organization

Created as a semi-independent public body, the Commission is "…allocated in, but not of…" the New Jersey Department of Health. The Commission is subject to all the administrative rules and procedures of the Department, but it is not a part of the Department's budget.

The Commission establishes and oversees the administrative operations of the grant-making process as well as other program activities that are implemented by its administrative staff. Eleven uncompensated Commissioners are appointed by the Governor with the advice and consent of the Senate and serve three-year term.

The Commission will always have one or more individuals from each of the following institutions and categories

The Commissioner of the New Jersey Department of Health, or designee, Rutgers, The State University of New Jersey; one representative of the federally designated Spinal Cord Injury Model System (Kessler Foundation); one representative from the American Paralysis Association (Christopher & Dana Reeve Foundation); and six public members - at least one licensed physician and one person with a spinal cord injury.

All public members shall be residents of the State, or otherwise associated with the State and should provide a diversity of backgrounds and interests united by a shared commitment to the cause of spinal cord research.[3]

Any qualified person wishing to be considered for appointment may submit his or her name to the Governor's Office of Appointments.[4]

Public meetings are held at least four times a year. Members are recused from discussing or voting on matters in which they may have a potential conflict. A Chair and Vice Chairperson are elected and preside over all formal proceedings.

The Commission also maintains committees that meet and provide an informal structure to discuss issues on an ad hoc basis in advance of presenting them to the full Commission.

New Jersey Commission on Spinal Cord Research

The Commission's mission is to encourage and promote scientific research projects that advance the understanding of spinal cord injury and explore potential therapeutic strategies at qualifying research institutions in New Jersey.

3- National New Jersey Statute (N.J.S.A.52:9E-1 et seq.)

4- Information on how to apply can be found on the following website at: http://www.state.nj.us/governor/admin/bca

New Jersey Commission on Spinal Cord Research

Administration

The Commission's administrative office provides the vital linkages and services to implement its programs and ensure the integrity of its operations. The administrative staff manages the day-to-day operations, including grant program administration, interaction with applicants and grantees, contract administration, budgeting and financial matters, record-keeping and reporting.

Administrative staff schedule and facilitate all activities, manage the scientific merit review process, negotiate with outside vendors, and maintain the necessary relationships within state government.

Funding

The Commission's administrative office provides the vital linkages and services Under the enabling Statute, the work of the Commission is supported entirely by a one-dollar surcharge on all New Jersey traffic and motor vehicle fines or penalties. Monies generated from these fines or penalties are collected by the State Treasurer for deposit into the New Jersey Spinal Cord Research Fund. All grant programs and other activities are funded entirely from this dedicated source. No part of the operating budget is paid for out of New Jersey's general tax revenue.

Research Funding Priorities

The Research Program Guidelines set forth the Commission's scientific agenda, research criteria and areas of interest.[5] The guidelines offer applicants detailed guidance and instruction on funding criteria and policies.

The Commission funds research activities that hold promise of developing effective interventions and cures for paralysis and other consequences of spinal cord injury and disease. An array of grant programs is offered including Individual Research Grants, Fellowship Research Grants, Exploratory Research Grants, and Spinal Cord Techniques Training Travel Grants. The areas of research listed below highlight the focus of current emphasis and funding to:

- Study strategies to promote neuronal growth and survival, encourage the formation of synapses, enhance appropriate myelination, restore axonal conduction, replace injured cells, or otherwise improve function after spinal cord injury.
- Evaluate efficacy of drugs and other interventions that prevent or reduce secondary neuronal injury or providing insight into the mechanisms causing progressive damage.
- Define anatomical characteristics of spinal cord injury or disease in well-defined animal models and in the human spinal cord, specifically documenting the cellular systems vulnerable to injury or disease and the functional losses which occur as a result thereof.
- Elucidate biological or physical mechanisms underlying approaches to improve functions compromised by spinal cord injury, e.g., bladder, bowel, and sexual function, and alleviate chronic pain, spasticity, and severe hypertension.
- Develop strategies to prevent or treat secondary complications arising from injury or disease to the spinal cord.
- Develop innovative restorative rehabilitation strategies to promote recovery of biological function.
- Translate basic and pre-clinical findings into clinical application.
- Support the investigation of promising new approaches.

The Commission funds research activities that hold promise of developing effective interventions and cures for paralysis and other consequences of spinal cord injury and disease.

5- The full text appears on the website at: www.nj.gov/health/njcscr.

Grant Application and Review Process

The grants review process was modeled on the National Institutes of Health standards and procedures to provide an impartial and rigorous review of research proposals.[6] This effort has been largely successful and has earned respect from grantees and applicants.

Application Process

The grant application process is now entirely electronic utilizing the State of New Jersey's System for Administering Grants Electronically (SAGE).[7] The online process ensures broad access, convenience, flexibility and greatly reduces administrative workloads for applicants, the Commission office, and the Scientific Merit Review Panel.

Grant Review Process

The grant review process consists of a three-step review.

- First, all grant applications are reviewed by the Commission's administrative staff to ensure compliance with New Jersey Statutes and regulations and to ensure accuracy.

- Second, an independent relevance review is conducted by a four-person panel appointed by the office of the Commission. The Independent Relevance Review Panel determines the relevance of all applications to the Commission's mission, priorities and Research Program Guidelines, and will assign scientific reviewers for each proposal that meets the relevancy requirements. In the event the panel determines that an application does not meet those requirements, the application will be triaged, and will not be forwarded for independent scientific merit review.

- Third, members of the Independent Scientific Merit Review Panel convene to evaluate all grant applications forwarded by the Independent Relevance Review Panel applying the criteria described below. This panel will assign scores to each application and make funding recommendations to the Commission. If it is determined that an ad hoc expertise is needed, additional scientific referees may be used.

Recommendations and Authorization

The Independent Scientific Merit Review Panel will forward its recommendations to the Commission for final review and action. Grants triaged by either the Independent Relevance Review Panel and/or the Independent Scientific Merit Review Panel will not be forwarded to the Commission and will not be funded.[8]

6- https://www.nih.gov/sites/default/files/about-nih/nih-director/testimonies/nih-policies-procedures-promoting-scien

7- https://njsage.intelligrants.com/Login2.aspx?APPTHEME=NJSAGE

8- The authority to authorize or not authorize grants is fully vested in the Commission according to New Jersey Statute (N.J.S.A. C.52:9E-1).

Current Grant Programs

Grant programs are designed to provide scientific opportunities attractive to a wide range of researchers. Awards are intended to promote collaboration among spinal cord researchers in New jersey and encourage innovative research. The intent is not to provide long term support for research. It is expected this initial support will lead investigators to acquire the necessary levels of preliminary data, so they may compete successfully for federal grant support.

The Individual Research Grant is designed to fund senior independent researchers, while the Fellowship Research Grant offers encouragement to graduate students and postdoctoral researchers. The Exploratory Research Grant enables researchers to apply innovative ideas from other areas of science to spinal cord injury and repair, and the Spinal Cord Injury Techniques Training Travel Grant offers applicants the ability to participate in training courses on spinal cord injury techniques.

Inter–institutional and/or inter-state collaboration is strongly encouraged. Complete details on all grant programs are available on the Commission's website.[9]

Individual Research Grants

- Individual Research Grants support senior scientists to explore meritorious
  novel scientific and clinical ideas.
- Up to $600,000 for up to three years ($200,000 per year).
- A key goal is to enable established researchers to test and develop pilot data needed for future funding.

Fellowship Research Grants

- Postdoctoral and Graduate Student Fellowships engage promising young investigators in spinal cord research.
- All fellowships include an annual stipend, research allowance and travel budget.
- Postdoctoral Fellowships run for three years with a total award of $150,000; ($50,000 per annum).
- Graduate Fellowships run for two years with a total award of $60,000; ($30,000 per annum).

Exploratory Research Grants

- Enable independent investigators to apply their specific expertise to spinal cord research.

Grant programs are designed to provide scientific opportunities attractive to a wide range of researchers. Awards are intended to promote collaboration among spinal cord researchers in New jersey and encourage innovative research.

9- https://nj.gov/health/spinalcord/

Current Grant Programs

- Develop preliminary data needed to justify higher levels of funding.
- Apply innovative ideas from other areas to spinal cord research.
- Encourage inter-institutional and/or inter-state collaborations.
- Allow up to $200,000 for a two-year non-renewable grant.

Spinal Cord Injury Techniques Training Travel Grants

- Offer applicants the ability to participate in training courses on spinal cord injury techniques.
- Applicants may select a course on their own or attend a course at either Rutgers, The State University of New Jersey, or the Spinal Cord Injury Research Training Program located at Ohio State University.
- A one-time per applicant non-renewable award of up to $5,000 is provided.

2001-2022 Summary and Performance Record

Since 2001, the Commission has invested $62,140,771 in New Jersey scientists. Scientific interest in the field of spinal cord injury research remains strong due to the ongoing investment of these funds.

Approximately 32 grant applications are received annually; approval of ten or more new grant awards totaling $2 to $3 million are made.

Due to its continued investment in spinal cord injury research, the number of New Jersey researchers interested in the field is growing.

Grant Applications

To date, the Commission has received 833 applications by scientists at New Jersey academic and research institutions. These awards represent an investment in spinal cord injury research, which cumulatively total $221 million in grant funding requests.

The Commission has explored a range of grant programs that provide opportunities for both senior and young researchers, and larger programs for establishing new spinal cord research facilities and support for professorships.

Applications for Individual Research grants typically account for about two-thirds of the total. These projects are aimed at advancing the field in significant ways and result in scientific publications as well as additional funding.

Grant Funding Awards

Individual Research Grants awarded to established investigators are the mainstay of spinal cord research in New Jersey. These projects aim at advancing the field in significant ways and are most productive as measured by publications and applications for additional funding.

The Fellowship Research Grant program is the Commission's most cost-effective initiative, as measured by the number of researchers supported per grant dollar. The Commission is committed to bringing new researchers and promising students into the field. Its programs of Graduate and Postdoctoral Fellowships have been a success, in both numbers and qualified applicants.

The Commission has explored a range of grant programs that provide opportunities for both senior and young researchers, and larger programs for establishing new spinal cord research facilities and support for professorships.

New Jersey Qualified Research Institutions

Under the Spinal Cord Research Act, funds may only go to researchers affiliated with "New Jersey Qualified Research Institutions." The following organizations have been designated as Qualified Research Institutions by the New Jersey Commission on Spinal Core Research.

- **Rutgers, The State University of New Jersey**
- **Kessler Foundation**
- **Princeton University**
- **Coriell Institute for Medical Research**
- **New Jersey Institute of Technology**
- **VA New Jersey Health Care System & Veterans Biomedical Research Institute**
- **Stevens Institute of Technology**
- **Drew University**
- **Hackensack Meridian Health JFK Medical Center – The Neuroscience Institute**
- **Progenitor Cell Therapy, LLC**
- **Hackensack Meridian School of Medicine at Seton Hall University**
- **Wyeth Research/Pfizer**
- **TRIM-edicine, Inc.**
- **Rowan University**
- **Cooper University Hospital & Cooper Medical School of Rowan University**
- **Hackensack Meridian Health**
- **Celvive, Inc.**
- **Montclair State University**
- **St. Joseph's University Medical Center**
- **GENERATION Biotech**
- **Neuropair, Inc.**

The Commission is committed to broadening its portfolio of institutional grantees and increasing the size and diversity of its funding activities. Through outreach activities, the Commission encourages participation by all research organizations with an interest in spinal cord research.

Commission's Achievements

Although a cure for spinal cord injury remains elusive, the investment of millions of dollars by the Commission and other organizations has led to a wealth of new knowledge and insights that hold promise for effective therapies and cures. Below is a summary of the Commission's achievements

- Grantees and their institutions have capitalized on the opportunities afforded by the availability of Commission funding. Scientific knowledge and careers have been advanced as well as institutional revenue and scientific achievements.
- The Commission has been a major factor in fostering the interest and continued involvement in spinal cord research within the State of New Jersey.
- Numerous scientific articles reporting on the work funded by Commission have appeared in peer-reviewed scientific publications, and several articles are about to be published. Progress made by researchers has been presented in numerous abstracts, scientific conferences, symposia, and meetings.
- The grant programs have facilitated greater scientific interaction and research collaborations, both in New Jersey and nationally.
- Success in achieving funding has resulted in academic and career advancement for New Jersey researchers, including doctoral dissertations. Applications to the National Institutes of Health, the National Science Foundation, and other organizations have been submitted, due to the work funded by the Commission.

The Commission is committed to broadening its portfolio of institutional grantees and increasing the size and diversity of its funding activities.

2022 Year in Review

In 2022 the Commission witnessed its 23rd year of operation. Twenty-six applications were submitted with requests for funds totaling $4.6 million.

Due to the State of Emergency declared by Governor Phil Murphy to combat the Coronavirus pandemic, and the resulting financial impact to the New Jersey Commission on Spinal Cord Research's Trust Fund, it was determined to make available and offer two grant programs in Fiscal Year 2022 – Exploratory Research Grants and Fellowship Research Grants.

Information on existing grant awards can be found within the Research Grant Directories located on the Commission's website:– www.nj.gov/health/spinalcord/.

Publication of Grant Programs

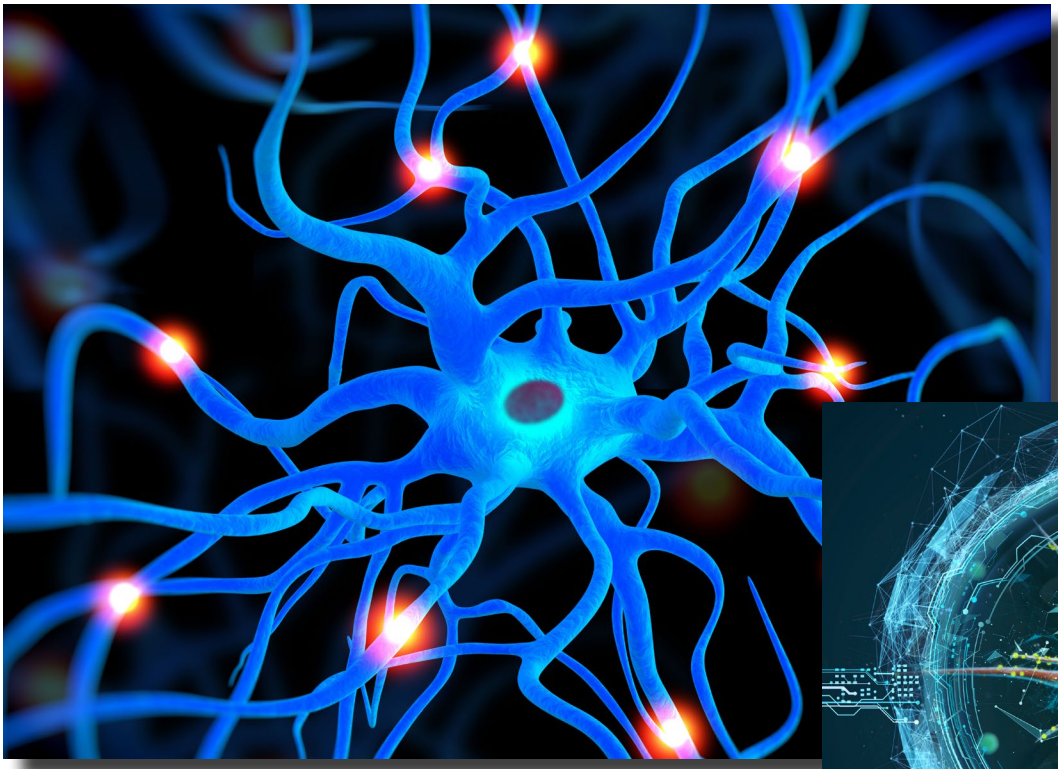
Official Notices of Fund Availability advise interested parties of the Commission's grant programs. These notices are published annually on the Commission's website and in the New Jersey Department of Health's Directory of Grant Programs.[10]

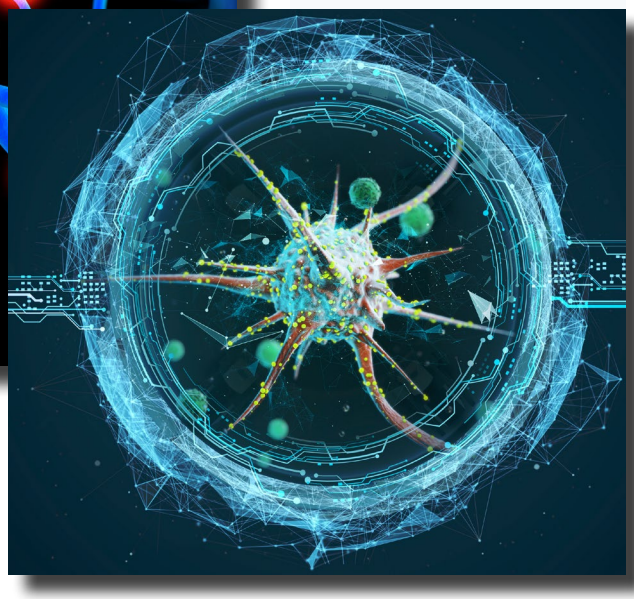
2023 Grant Cycle Information

Grant Application Deadline: May 2, 2022
Award Notification Date: November 30, 2022

Available Grant Programs:

- Exploratory Research Grants
- Fellowship Research Grants





10- NJ Department of Health Directory of Grant Programs: www.healthapps.state.nj.us/noticeofgrant/noticegrants.aspx

Financial Statement

The activities and programs of the Commission are supported by the New Jersey Spinal Cord Research Fund as established by the Act. A one-dollar surcharge is imposed on all fines or penalties from motor vehicle or traffic violations. This revenue surcharge is collected and forwarded to the New Jersey State Treasurer. The funds are then deposited annually in an interest-bearing account designated as the New Jersey Spinal Cord Research Fund.

State Fiscal Year 2022 Fund Balance Statement:

	SFY 2022 *Projected*	SFY 2022 Actual	SFY 2023 *Projected*
Opening Fund Balance (July 1)	*$2,529,331*	$2,020,949	*$3,224,304*
Revenues			
Assessments[1]	*$1,750,000*	$2,704,736	*$2,500,000*
Investments Earnings - Interest[2]	*$5,000*	$2,735	*$6,000*
Total Revenue:	*$1,755,000*	$2,707,471	*$2,506,000*
Total Funds Available	*$4,284,331*	$4,728,420	*$5,730,304*
Disbursements and Expenses			
Spending Plan Reduction		$ 43,790	
Disbursements to Grantees[3]	*$3,000,000*	$1,263,598	*$3,000,000*
Total disbursements	*$3,000,000*	$ 1,307,388	*$3,000,000*
Expenses			
Administrative & Office expense	*$340,000*	$173,227	*$180,000*
Professional Review Panel	*$20,000*	$23,500	*$25,000*
NJCSCR Registry	*$0*	$0	*$0*
Total expenses	*$360,000*	$196,727	*$205,000*
Total Disbursements and Expenses	*$3,360,000*	$1,504,115	*$3,205,000*
Closing Fund Balance (June 30)	*$924,331*	$3,224,304	*$2,525,304*

[1] *Net revenue variance*

[2] *Funds plus interest deposited annually in Jan.*

[3] Funds for Multi-year grants

Exploratory Research Grant Recipient:

Silvana Lopes Costa, Ph.D.
CSCR22ERG009
Kessler Foundation
$199,800

Project Title

Using Eye Movements as a Biomarker of Dual-Diagnosis in Acute Spinal Cord Injury: A Proof-of-Concept Study

Examine the feasibility of using eye movements as a biomarker of cognitive dysfunction in persons with acute traumatic spinal cord injury with concomitant brain injury, termed dual diagnosis.

There are approximately 17,500 new traumatic spinal cord injuries (tSCI) each year, with roughly 285,000 persons living with tSCI in the US alone. While tSCI is defined primarily by motor and sensory impairments, an increased number of research studies have shown that cognitive impairments (impairments in the ability to perform complex operations such as reading and understanding a book) are frequent in both acute (less than 1 year after injury) and chronic (>1 year after the injury) tSCI. Specifically, it is estimated that as many as 60% of individuals with tSCI display some degree of cognitive impairment.

A dual-diagnosis of tSCI and traumatic brain injury (TBI; tSCI-TBI) occurs when patients have specific clinical and diagnostic features of both disorders resulting from trauma. Dual diagnosis is estimated to affect between 25-60% of the tSCI population. Studies have shown that individuals with tSCI-TBI show poorer outcome following rehabilitation with decreased quality of life. Diagnosis of tSCI-TBI is frequently performed retrospectively by examining acute care medical records. However, emergency medical services and/ or acute care medical records often do not contain basic information necessary to diagnose the presence and severity of TBI, especially in the presence of life-threatening issues such as those often caused by spinal trauma. Accurately identifying tSCI-TBI is therefore one of the biggest challenges clinicians and researchers face when examining cognitive functions and treating individuals with tSCI. Thus, there exists a need to develop more sensitive measures to identify the presence of TBI in tSCI during acute and chronic phases.

The present study aims to examine the feasibility of using eye movements as a biomarker of cognitive dysfunction in tSCI in two subgroups of individuals with acute tSCI: (1) tSCI (i.e., no history of TBI at the time of the traumatic event) (2) tSCI-TBI (moderate to severe TBI); in both cases a group of able-bodied individuals will serve as a comparator sample (participants without tSCI).

The present proposal is highly relevant to the mission of the NJCSCR and its research program in several ways. First, the current study proposes innovative approach to

the identification of cognitive deficits in tSCI, using eye movements as a biomarker of brain dysfunction. Eye movements have been successfully used in other neurological pathologies such as Parkinson's disease, dementia and TBI, to study brain pathology and disease progression, but they have not yet been examined in tSCI. Second, the current study will increase our understanding of cognitive dysfunction in acute tSCI by examining the difference between individuals with tSCI with and without concomitant TBI. This is a fundamental step to diagnose and treat cognitive impairments in tSCI, a frequent and debilitating secondary biological condition resulting from tSCI. Third, the current study will provide information on the impact of cognitive deficits on QOL in acute tSCI, which has been shown to be substantially reduced in other cognitively impaired neurological populations. Fourth, this proposal will provide preliminary data which can be used to inform best practices, namely identifying the factors that dictate the need to examine different aspects of cognition in different tSCI groups (tSCI-TBI and tSCI). Finally, the current proposal will allow the research team (with a junior PI) to collect preliminary data and test the feasibility of this line of research. Results will be used as leverage to develop and apply for NIH funding to conduct a larger-scale research study. Thus, the current proposal is a fundamental step in the development of efficient assessments and rehabilitation programs, which will increase QOL and community integration in persons with tSCI, the primary goal of the NJCSCR.

Contact Information
Silvana Lopes Costa, Ph.D.
Kessler Foundation
120 Eagle Rock Avenue Suite 100
East Hanover, NJ 07936
973-324-8458
scosta@kesslerfoundation.org

Exploratory Research Grant Recipient:

Sridhar Kannurpatti, Ph.D.
CSCR22ERG018

Rutgers, The State University of New Jersey
Biomedical & Health Sciences
New Jersey Medical School
$193,911

Project Title

Imaging pain after Cervical Spinal Cord Injury and Assessment of a Novel Flavinoid Treatment

The ability of kaempferol (a natural flavinoid) to modify sensorimotor reorganization after a cervical SCI in rats and consequently diminish pain behavioral outcomes will be investigated.

Fiscal Year 2022 Research Grant Awards

Nationally over 200,000 people live with chronic physical disabilities and chronic pain after sustaining spinal cord injuries (SCI) in the United States and New Jersey accounts for at least a few thousand of these patients. Cervical spinal injuries are the most frequent (62% of all SCIs) leading to sensorimotor disabilities accompanied by chronic neuropathic pain. While most patients with SCI develop neuropathic pain at some point during their rehabilitation, current clinical data suggests the prescription of opioid-based medicines for longer durations and at higher morphine-equivalent doses as the only effective option for SCI pain management. Pain also hinders motor recovery during SCI rehabilitation in humans due to overlap of motor and sensory pain pathways and competition between them. This gap in understanding the exact nature of spine and brain reorganization after an SCI in preclinical animal models, using imaging measures similar to that available in the clinic on SCI patients, is an impediment to the development of novel paint treatments.

The proposed study aims to characterize imaging biomarkers related to pain across both the spinal cord and the brain and test a novel (non-opioid) compound on its ability to prevent the development of pain after a cervical SCI. Our prior studies on this naturally occurring compound, kaempferol (generally present in vegetables and fruits in trace quantities) established it as a successful treatment against traumatic brain injury (TBI) in rats. Our recent investigations testing the effect of kaempferol treatment in the rat model of cervical SCI showed promising results, where it prevented the development of pain after SCI. The proposed study will explore further on kaempferol's ability to modify sensorimotor reorganization after an SCI using imaging and the specific kaempferol-induced changes in the spinal cord and brain that associate with the diminished pain behavior. The successful outcomes of this project will lead to a potential non-opioid based treatment to prevent pain after SCI that can be clinically translated SCI patients.

Contact Information

Sridhar Kannurpatti, Ph.D.
Rutgers, The State University of New Jersey
Biomedical & Health Sciences
ADMC-5 Room 575
30 Bergen Street
Newark, NJ 07103
973-972-7417
kannursr@njms.rutgers.edu

Fiscal Year 2022 Research Grant Awards

Exploratory Research Grant Recipient:

Stella Elkabes, Ph.D.

CSCR22ERG014

Rutgers, The State University of New Jersey

Biomedical & Health Sciences

$200,000

Project Title

Neuropathic Pain in Spinal Cord Injury: A New Target and Underlying Mechanisms

The role of the neuronal calcium extrusion pump, plasma membrane calcium ATPase 2, in neuropathic pain mechanisms in the dorsal horn will be investigated following a spinal cord contusion injury. One of the major complications associated with spinal cord injury (SCI) is the development of chronic neuropathic pain, which affects over 50% of individuals with SCI. This debilitating condition severely reduces the quality of life, has a high priority for the affected population, and is challenging to treat because available therapies, which include opioids, are not effective and have serious adverse effects. Despite advances, our knowledge of the mechanisms underlying neuropathic pain in SCI is limited and there is an urgent need for the discovery of novel mechanisms that can help the identification of new targets for therapeutic interventions. This could facilitate the development of more effective and better-targeted treatment strategies.

Studies performed in the laboratory found a coincidence between a reduction in the level of a calcium pump, namely plasma membrane calcium ATPase 2 (PMCA2) in the spinal cord (SC), and increased sensitivity to pain in mice affected by SCI as well as mice with a paralytic, inflammatory disease that mimics multiple sclerosis (MS). The reduction in PMCA2 occurred in SC regions involved in pain mechanisms. In the case of the MS model, the decrease in PMCA2 was observed only in the diseased mice that manifested neuropathic in addition to motor deficits. In contrast, PMCA2 levels were not altered in mice that displayed motor disability without neuropathic pain. This further supported the potential involvement of PMCA2 in neuropathic pain mechanisms. However, the causal link between a reduction in PMCA2 and neuropathic pain has not been established.

In the SC, PMCA2 is found exclusively in nerve cells, including those that mediate pain mechanisms and convey pain information from the SC to the brain. PMCA2 expels extra calcium ions from inside the nerve cell to the environment outside of the cell to maintain a proper calcium balance. This is an important function because an accumulation of calcium inside nerve cells activates mechanisms that cause overexcitability of the cells, which is believed to be a cause of neuropathic pain. Moreover, increased calcium inside nerve cells promotes the production of molecules that foster pain. After injury, a decrease in PMCA2 in nerve cells that mediate pain could elevate calcium levels within the cell, activating thus mechanisms of neuropathic pain.

The studies proposed in the present application will establish the causal link between a decrease in PMCA2 in the SC and increased sensitivity to pain and will determine whether restoration of PMCA2 in the SC, by use of gene delivery, alleviates neuropathic pain in subacute and chronic SCI. In addition, the mechanisms leading to neuropathic pain following a reduction in PMCA2 will be explored. The investigations will be performed in both male and female mice to determine whether the involvement of PMCA2 in pain mechanisms shows sex bias. It is anticipated that the studies will identify PMCA2 as a new target for therapeutic interventions and will advance the understanding of mechanisms underlying neuropathic pain in SCI.

Contact Information
Stella Elkabes, Ph.D.
Rutgers, The State University of New Jersey
Biomedical & Health Sciences
205 South Orange Avenue F-1204
Newark, NJ 07103
201-349-8666
elkabest@njms.rutgers.edu

Exploratory Research Grant Recipient:

Bharat Biswal, Ph.D.
CSCR22ERG026
New Jersey Institute of Technology
$199,887

Project Title
Investigating Altered Brain Connectivity after SCI using fNIRS

We propose to use fNIRS, a relatively new neuroimaging method, to determine the neurovascular correlates of cognitive function and cerebrovascular reactivity in patients with spinal cord injury.

Spinal cord injury (SCI) is characterized by damage to the spinal cord which can either temporarily or permanently alter its function. This leads to neurological changes in both the spinal and supraspinal levels of the central nervous system. Rehabilitation often focuses on the spinal cord itself and neglects direct observation of neural activity, partly due to the high costs of routine functional magnetic resonance imaging (fMRI) procedures. Due to the lack of neuroimaging studies investigating the neurovascular dynamics after SCI, it is not clear how functional brain reorganization is altered in cognitive processing areas after SCI. This is important to understand since individuals with SCI have a 13 times greater risk of cognitive impairment than able-bodied individuals and commonly report symptoms of depression and anxiety, which may interfere with rehabilitation.

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Therefore, we plan to use functional near-infrared spectroscopy (fNIRS) to investigate cognitive function in individuals with SCI. This technology uses light to quantify the brain's hemodynamic changes and is more portable and suitable for studying SCI than fMRI. By using fNIRS, we can detect functional brain differences between individuals with SCI and able-bodied individuals, in both cognitive task and resting conditions. We will evaluate cognitive performance on working memory and attention tasks. Additionally, we will evaluate neurovascular function using a breath-hold task. This study will provide insight on brain reorganization in cognitive processing areas after SCI, which will aid in our understanding of the neuropsychological consequences after SCI. Our goal is to progress the development of effective rehabilitation treatments and biomarkers for successful recovery using fNIRS.

Contact Information
New Jersey Institute of Technology
619 Fenster Hall
Newark, NJ 07102
973-596-8380
biswal@njit.edu

Exploratory Research Grant Recipient:

KiBum Lee, Ph.D.
CSCR22ERG023
Rutgers, The State University of New Jersey
Department Chemistry & Chemical Biology
$200,000

Project Title

Direct Conversion of Reactive Astrocytes into Neurons for Combined Immunomodulatory and Cell Replacement Therapy after Spinal Cord Injury

This exploratory proposal aims to develop a nanoparticle-based transcription factor for both immunomodulatory and cell replacement therapy for the treatment of spinal cord injury.

Trauma to the spinal cord can result in devastating deficits. However, unlike many other areas of the body, the spinal cord cannot regenerate after injury leading to long term, incurable deficits. One of the reasons for this is the complex and inhibitory environment of the spinal cord that is highly inflammatory and made up of the glial and fibrotic scar. One of the significant components of this scar is reactive A1 astrocytes that promote inflammation and inhibit axon regeneration.

To this end, we aim to mitigate the inflammatory environment while simultaneously providing a cell source for cell replacement therapy by converting A1 reactive astrocytes into functional neurons. This process is termed trans

differentiation and has been demonstrated using viral vectors that express the transcription factors ASCL1 or NeuroD1. However, the use of viral vectors for therapies is limited by the many side effects caused by viral vectors including immunogenicity, genomic integration, and cytotoxicity.

In order to overcome these limitations, our lab has developed a platform termed NanoScript that can replicate the structure and function of natural transcription factors using a synthetic nanoparticle-based system. This proposal aims to develop a novel biodegradable peptide NanoScript that targets ASCL1 and NeuroD1 to study the direct conversion of reactive astrocytes into functional neurons both in vitro and in vivo. These studies will give us a further understanding of the role of A1 astrocytes in neuroinflammation as well as provide a therapeutic strategy for bridging the lesion left after spinal cord injury.

Contact Information
KiBum Lee, Ph.D.
Rutgers, The State University of New Jersey
Department Chemistry & Chemical Biology
123 Bevier Road
Piscataway, NJ 08854
848-445-2081
kblee@chem.rutgers.edu

Fellowship Research Grant Recipient:

Mark Gradwell, Ph.D.
CSCR22FEL011

Rutgers, The State University of New Jersey
W. M. Keck Center for Collaborative Neuroscience
$150,000

Project Title

Identifying spinal circuits contributing to maladaptive plasticity following SCI

We genetically target a new subpopulation of excitatory interneuron, 5-HT6R-expressing neurons, to determine their intrinsic excitability, connectivity, and functional role before and after SCI.

Over 1.2 million people in the United States, and 6000 New Jersey residents live with spinal cord injury (SCI). Annually, roughly 500 New Jersey residents are hospitalized with SCI. In these patients, the prevalence of SCI associated pain and muscle spasticity is alarmingly high, with > 70% of the injury population suffering from chronic neuropathic pain and > 80% exhibiting muscle spasticity. These conditions have proven difficult to treat, largely due to a limited understanding of the cells within the spinal cord that are responsible for their development.

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Without first identifying the cells responsible for the development of pain and spasticity it is challenging to develop targeted therapeutic interventions. The reason it has been challenging to identify these cells to date is because there are many different cell types, all with different roles within the spinal cord. Until recently we have not had the appropriate tools to study specific neuron types to better understand these roles.

My research utilizes exciting new mouse genetic tools that allow me to visualize and test the function of specific cells within the spinal cord. I will use these tools to determine how one particularly interesting cell type contributes to neuropathic pain and spasticity behaviors. Neuropathic pain and spasticity are both likely due to the over excitability of neurons that process touch information. This over excitability allows for touch signals to excite cells that communicate pain (neuropathic pain) as well as over-excite cells responsible for movement (spasticity). The cells I am interested in process touch information. Importantly, following SCI it is likely these cells become more excitable. Therefore, these cells are ideally placed to play a role in the neuropathic pain and spasticity that often develops following SCI. I will test what happens to these cells following injury – do they become more excitable? I will test who these cells talk to before and after injury – do they 'gain access' to the pain or movement cells? Finally, I will test if activating these cells causes pain behaviors or muscle spasticity or if inhibiting these cells alleviates pain and spasticity following injury.

My study provides an essential framework and key tools to improve SCI therapeutics. When sensory information arrives at the spinal cord different cells must process this information before sending it to the correct output (e.g., touch, pain, movement). Following SCI, these signals may become crossed so touch can cause pain or inappropriate movements. This work helps us to understand which cells receive the touch information, who they normally talk to, and why they might talk to someone else following injury. Once we identify the cells responsible for this crosstalk, we can begin to specifically target them with therapeutics. For example, recent exciting evidence suggests that spatiotemporally controlled epidural electrical stimulation (EES) enables voluntary waking in SCI patients. Similarly, work using transplantation strategies to provide new neural cells to promote recovery has shown great promise. Learning more about the cells that are involved in recovery vs. pain and spasticity will help refine these approaches to selectively promote activity in cells that lead to functional recovery while avoiding activity of those that cause pain and spasticity.

Contact Information

Mark Gradwell, Ph.D.
Rutgers, The State University of New Jersey
W. M. Keck Center for Collaborative Neuroscience
Abraira Lab, Nelson Building
604 Allison Road

Piscataway, NJ 08854
862-888-1612
Mark.Gradwell@rutgers.edu

Fiscal Year 2022 Research Grant Awards

Fellowship Research Grant Recipient:

Michael Rallo
CSCR22FEL015
Rutgers, The State University of New Jersey
Biomedical & Health Sciences
Department Neuroscience & Cell Biology
$60,000

Project Title

The Role of Hedgehog Signaling as a Mediator of Diverse Reactive Gliosis Phenotypes Following Traumatic Spinal Cord Injury

This project will evaluate the novel role of a developmental pathway, Hedgehog signaling, in regulating the cellular response to traumatic spinal cord injury.

Tissue repair and regeneration following traumatic spinal cord injury (SCI) is mediated by a coordinated multi-cellular response. Astrocytes, a predominant cell type present in the brain and spinal cord, play a critical role in maintaining the health of central nervous system (CNS) tissue (i.e., brain and spinal cord) at rest. In response to CNS injury or disease, astrocytes undergo the conserved process of reactive gliosis to repair tissue damage. While this response is observed in a variety of disease states, such as SCI and stroke, and Alzheimer's and Parkinson's diseases, there is little understanding of how this process is regulated and may contribute to disease progression or recovery.

The research proposed here will explore the novel role of Hedgehog (Hh) signaling – a pathway active during nervous system formation and implicated in recovery from CNS damage – in regulating the astrocytic response to a penetrating form of traumatic SCI. Our preliminary findings suggest that Hh signaling directs astrocytes in responding to the injury and restoring normal, healthy tissue at that site.

Targets of this pathway will be identified through state-of-the-art genetic techniques, including RNA sequencing, with the hope of uncovering novel treatment strategies. The current availability of approved pharmacologics that target Hh signaling underscores the clinical importance of studying this pathway in the setting of traumatic SCI.

Contact Information
Michael Rallo
Rutgers, The State University of New Jersey

Fiscal Year 2022 Research Grant Awards

Biomedical & Health Sciences
Department Neuroscience & Cell Biology
675 Hoes Lane West
Piscataway, NJ 08854-3925
845-699-6932
michael.rallo@rutgers.edu

Fellowship Research Grant Recipient:

Zachery Finkel
CSCR22FEL016
Rutgers, The State University of New Jersey
Department Biomedical Engineering
$60,000

Project Title

Safety and Efficacy Study of Gsx1 Gene Therapy for Spinal Cord Injury

We are testing the safety and effectiveness of AAV-based Gsx1 gene therapy to regenerate cells after spinal cord injury and restore locomotor function.

Spinal cord injury affects a large portion of the population and results in lower quality of life for patients. In the United States alone, 18,000 new cases of debilitating spinal cord injury (SCI) occur on average each year. Many avenues have been investigated to treat spinal cord injury, with the aim to produce more cells, the basic unit of life, into the damaged tissue. The Cai lab has recently demonstrated that lentivirus mediated Gsx1 expression promotes functional recovery after SCI in a hemi section injury mouse model. Lentivirus may cause random insertional mutation and immediate treatment is not available on site of SCI incidents. The goal of this project is to determine the safety and efficacy of Gsx1 gene therapy using adeno- associated virus (AAV) in a clinically relevant contusion SCI model and determine the time window of effective treatment. The completion of this project will advance our understanding of the molecular mechanisms of stem cell regulation in the adult injured spinal cord. Thus, this proposed project addresses the ongoing initiative of NJCSCR to develop new therapies to improve the care and quality of life of SCI patients.

Contact Information

Zachery Finkel
Rutgers, The State University of New Jersey
Department Biomedical Engineering
599 Taylor Road, 2nd Floor
Piscataway, NJ 08854
856-371-3205
zf99@scarletmail.rutgers.edu

Attachment A
Chapter 201

An Act establishing a New Jersey Commission on Spinal Cord Research, supplementing Title 52 of the Revised Statutes and amending R.S.39:5-41.

Be It Enacted *by the Senate and General Assembly of the State of New Jersey:*

C.52:93E-1
Short title.

1. This act shall be known and may be cited as the "Spinal Cord Research Act."

C.52:93E-2
Definitions relative to spinal cord research.

2. As used in this act:

a. "Approved research project" means a peer reviewed scientific research project, which is approved by the commission and which focuses on the treatment and cure of spinal cord injuries and diseases that damage the spinal cord.

b. "Commission" means the New Jersey Commission on Spinal Cord Research established pursuant to this act.

c. "Institutional support services" means all services, facilities, equipment, personnel and expenditures associated with the creation and maintenance of approved research projects.

d. "Qualifying research institution" means the University of Medicine and Dentistry of New Jersey; Rutgers, The State University; Princeton University; the Kessler Medical Rehabilitation Research and Education Corporation; the Coriell Institute for Medical Research; and any other research institution in the State approved by the commission.

C.52:93E-3
New Jersey Commission on spinal Cord Research.

3. a. There is established in the Executive Branch of the State government, the New Jersey Commission on Spinal Cord Research. For the purposes of complying with the provisions of Article V, Section IV, paragraph 1 of the New Jersey Constitution, the commission is allocated within the Department of Health and Senior

Spinal Cord Research Act

The activities and programs of the Commission are supported by the New Jersey Spinal Cord Research Fund as established by the Act.

Spinal Cord Research Act

Services, but notwithstanding that allocation, the commission shall be independent of any supervision or control by the department or by any board or officer thereof.

b. The commission shall consist of 11 members, including the Commissioner of Health and Senior Services, or his designee, who shall serve ex officio; one representative of the University of Medicine and Dentistry of New Jersey; one representative of Rutgers, The State University; one representative of the federally designated Spinal Cord Injury Model System; one representative from the American Paralysis Association; and six public members who are residents of the State knowledgeable about spinal cord injuries and who include at least one physician licensed in this State and at least one person with a spinal cord injury. The members shall be appointed by the Governor with the advice and consent of the Senate.

c. The term of office of each appointed member shall be three years, but of the members first appointed, three shall be appointed for a term of one year, four for terms of two years, and three for terms of three years. All vacancies shall be filled for the balances of the unexpired terms in the same manner as the original appointments. Appointed members are eligible for reappointment upon the expiration of their terms. A member shall continue to serve upon the expiration of his term until a successor is appointed.

The members of the commission shall not receive compensation for their services, but shall be reimbursed for the actual and necessary expenses incurred in the performance of their duties as members of the commission.

C.52:93E-4
Responsibilities of commission.

4. The commission shall:

a. Review and authorize approved research projects, for which purpose the commission may establish an independent scientific advisory panel composed of scientists and clinicians who are not members of the commission to review proposals submitted to the commission and make funding recommendations to the commission;

b. Apportion all available funds to qualifying research institutions to finance approved research projects and necessary institutional support services;

c. Ensure that funds so apportioned to approved research projects are not diverted to any other use;

d. Take steps necessary to encourage the development within the State of spinal cord research projects;

e. Compile a directory of all spinal cord research projects being conducted in the State; and

f. Provide the Governor and the Legislature with a report by January 30 of each year describing the status of the commission's activities and the results of its funded research efforts.

C.52:93E-5
Authority of commission.

5. The commission is authorized to:

a. Adopt rules and regulations concerning the operation of the commission, the functions and responsibilities of its officers and employees and other matters as may be necessary to carry out the purposes of this act;

b. Maintain offices at such places within the State as it may designate;

c. Employ an executive director and other personnel as may be necessary, whose employment shall be in the unclassified service of the State, except that employees performing stenographic or clerical duties shall be appointed pursuant to Title 11A (Civil Service) of the New Jersey Statutes;

d. Design a fair and equitable system for the solicitation, evaluation and approval of proposals for spinal cord research projects;

e. Apply for and accept any grant of money from the federal government, which may be available for programs relating to research on the spinal cord;

f. Enter into contracts with individuals, organizations and institutions necessary or incidental to the performance of its duties and the execution of its powers under this act; and

g. Accept gifts, grants and bequests of funds from individuals, foundations, corporations, governmental agencies and other organizations and institutions.

C.52:93E-6
Election, duties of officers.

6. The commission shall annually elect a chairman and a vice-chairman from among its members. The chairman shall be the chief executive officer of

the commission, shall preside at all meetings of the commission and shall perform other duties that the commission may prescribe.

The executive director shall serve as secretary to the commission and shall carry out its policies under the direction of the chairman.

C.52:9E-7
Direct application for funds permitted.

7. Nothing in this act shall preclude a qualifying research institution or any other research facility in the State from directly applying for or receiving funds from any public or private agency to conduct spinal cord research.

C.52:93E-8
Establishment, maintenance of central registry.

8. a. The commission shall establish and maintain, in conjunction with the Department of Health and Senior Services, a central registry of persons who sustain spinal cord injuries other than through disease, whether or not the injury results in a permanent disability, in order to provide a database that indicates the incidence and prevalence of spinal cord injuries and which will serve as a resource for research, evaluation and information on spinal cord injuries and available services.

b. The commission shall require the reporting of all cases of spinal cord injuries, except those caused through disease, and the submission of specified additional information on reported cases as it deems necessary and appropriate.

The commission shall, by regulation, specify the health care facilities and providers required to make the report of a spinal cord injury to the registry, information that shall be included in the report to the registry, the method for making the report and the time period in which the report shall be made.

c. The reports made pursuant to this section are to be used only by the commission and the Department of Health and Senior Services and such other agencies as may be designated by the commission or the department and shall not otherwise be divulged or made public so as to disclose the identity of any person to whom they relate; and to that end, the reports shall not be included under materials available to public inspection pursuant to P.L.1963, c.73 (C.47:1A-1 et seq.).

d. No individual or organization providing information to the commission in accordance with this section shall be deemed to be, or held liable for, divulging confidential information. Nothing in this

section shall be construed to compel any individual to submit to medical, commission or department examination or supervision.

e. A health care facility or health care provider who is required to report a spinal cord injury to the commission that fails to comply with the provisions of this section shall be liable to a penalty of up to $100 per unreported spinal cord injury case. A penalty sued for under the provisions of this section shall be recovered by and in the name of the commission and shall be deposited in the "New Jersey Spinal Cord Research Fund" established pursuant to this act.

C.52:93E-9
"New Jersey Spinal Cord Research Fund."

9. a. There is established in the Department of the Treasury a nonlapsing revolving fund to be known as the "New Jersey Spinal Cord Research Fund." This fund shall be the repository for moneys provided pursuant to subsection e. of R.S.39:5-41. Moneys deposited in the fund, and any interest earned thereon, shall be used exclusively for the purpose of making grants for approved spinal cord research projects at qualified research institutions.

b. Any costs incurred by the department in the collection or administration of the fund may be deducted from the funds deposited therein, as determined by the Director of the Division of Budget and Accounting.

10. R.S.39:5-41
Amended to read as follows:

Fines, penalties; forfeitures, disposition of; exceptions.

39:5-41. a. All fines, penalties and forfeitures imposed and collected under authority of law for any violations of R.S.39:4-63 and R.S.39:4-64 shall be forwarded by the judge to whom the same have been paid to the proper financial officer of a county, if the violation occurred within the jurisdiction of that county's central municipal court, established pursuant to N.J.S.2B:12-1 et seq. or the municipality wherein the violation occurred, to be used by the county or municipality to help finance litter control activities in addition to or supplementing existing litter pickup and removal activities in the municipality.

b. Except as otherwise provided by subsection a. of this section, all fines, penalties and forfeitures imposed and collected under authority of law for any violations of the provisions of this Title, other than

those violations in which the complaining witness is the director, a member of his staff, a member of the State Police, a member of a county police department and force or a county park police system in a county that has established a central municipal court, an inspector of the Board of Public Utilities, or a law enforcement officer of any other State agency, shall be forwarded by the judge to whom the same have been paid as follows: one-half of the total amount collected to the financial officer, as designated by the local governing body, of the respective municipalities wherein the violations occurred, to be used by the municipality for general municipal use and to defray the cost of operating the municipal court; and one-half of the total amount collected to the proper financial officer of the county wherein they were collected, to be used by the county as a fund for the construction, reconstruction, maintenance and repair of roads and bridges, snow removal, the acquisition and purchase of rights-of-way, and the purchase, replacement and repair of equipment for use on said roads and bridges therein. Up to 25% of the money received by a municipality pursuant to this subsection, but not more than the actual amount budgeted for the municipal court, whichever is less, may be used to upgrade case processing.

All fines, penalties and forfeitures imposed and collected under authority of law for any violations of the provisions of this Title, in which the complaining witness is a member of a county police department and force or a county park police system in a county that has established a central municipal court, shall be forwarded by the judge to whom the same have been paid to the financial officer, designated by the governing body of the county, for all violations occurring within the jurisdiction of that court, to be used for general county use and to defray the cost of operating the central municipal court.

Whenever any county has deposited moneys collected pursuant to this section in a special trust fund in lieu of expending the same for the purposes authorized by this section, it may withdraw from said special trust fund in any year an amount which is not in excess of the amount expended by the county over the immediately preceding three-year period from general county revenues for said purposes. Such moneys withdrawn from the trust fund shall be accounted for and used as are other general county revenues.

c. (Deleted by amendment, P.L.1993, c.293.)

d. Notwithstanding the provisions of subsections a. and b. of this section, $1.00 shall be added to the amount of each fine and penalty

imposed and collected under authority of any law for any violation of the provisions of Title 39 of the Revised Statutes or any other motor vehicle or traffic violation in this State and shall be forwarded by the person to whom the same are paid to the State Treasurer. In addition, upon the forfeiture of bail, $1.00 of that forfeiture shall be forwarded to the State Treasurer. The State Treasurer shall annually deposit those moneys so forwarded in the "Body Armor Replacement" fund established pursuant to section 1 of P.L.1997, c.177 (C.52:17B-4.4). Beginning in the fiscal year next following the effective date of this act, the State Treasurer annually shall allocate from those moneys so forwarded an amount not to exceed $400,000 to the Department of Personnel to be expended exclusively for the purposes of funding the operation of the "Law Enforcement Officer Crisis Intervention Services" telephone hotline established and maintained under the provisions of P.L.1998, c.149 (C.11A:2-25 et al.).

e. Notwithstanding the provisions of subsections a. and b. of this section, $1 shall be added to the amount of each fine and penalty imposed and collected under authority of any law for any violation of the provisions of Title 39 of the Revised Statutes or any other motor vehicle or traffic violation in this State and shall be forwarded by the person to whom the same are paid to the State Treasurer. The State Treasurer shall annually deposit those moneys so forwarded in the "New Jersey Spinal Cord Research Fund" established pursuant to section 9 of P.L.1999, c.201 (C.52:9E-9). In order to comply with the provisions of Article VIII, Section II, paragraph 5 of the State Constitution, a municipal or county agency which forwards moneys to the State Treasurer pursuant to this subsection may retain an amount equal to 2% of the moneys which it collects pursuant to this subsection as compensation for its administrative costs associated with implementing the provisions of this subsection.

C.52:93E-10
Rules, regulations pertinent to spinal cord research.

11. The commission shall adopt such regulations pursuant to the "Administrative Procedure Act," P.L.1968, c.410 (C.52:14B-1 et seq.) as are necessary to carry out the provisions of this act.

12. This act shall take effect on the 90th day following enactment.

Approved September 13, 1999.

Staff Contact Information

New Jersey Commission on Spinal Cord Research

New Jersey Department of Health

25 Stockton Street
2nd Floor Rear
PO Box 360
Trenton, NJ 08625
NJCSCR@doh.nj.gov

Christine Traynor

Administrator
New Jersey Commission on Spinal Cord Research
New Jersey Department of Health
(609) 913-5005
(609) 943-4213 (Fax)
Christine.Traynor@doh.nj.gov

Mary Ray

Fiscal Manager
New Jersey Commission on Spinal Cord Research
New Jersey Department of Health
(609) 913-5005
(609) 943-4213 (Fax)
Mary.Ray@doh.nj.gov

State of New Jersey Commission on Spinal Cord Research

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