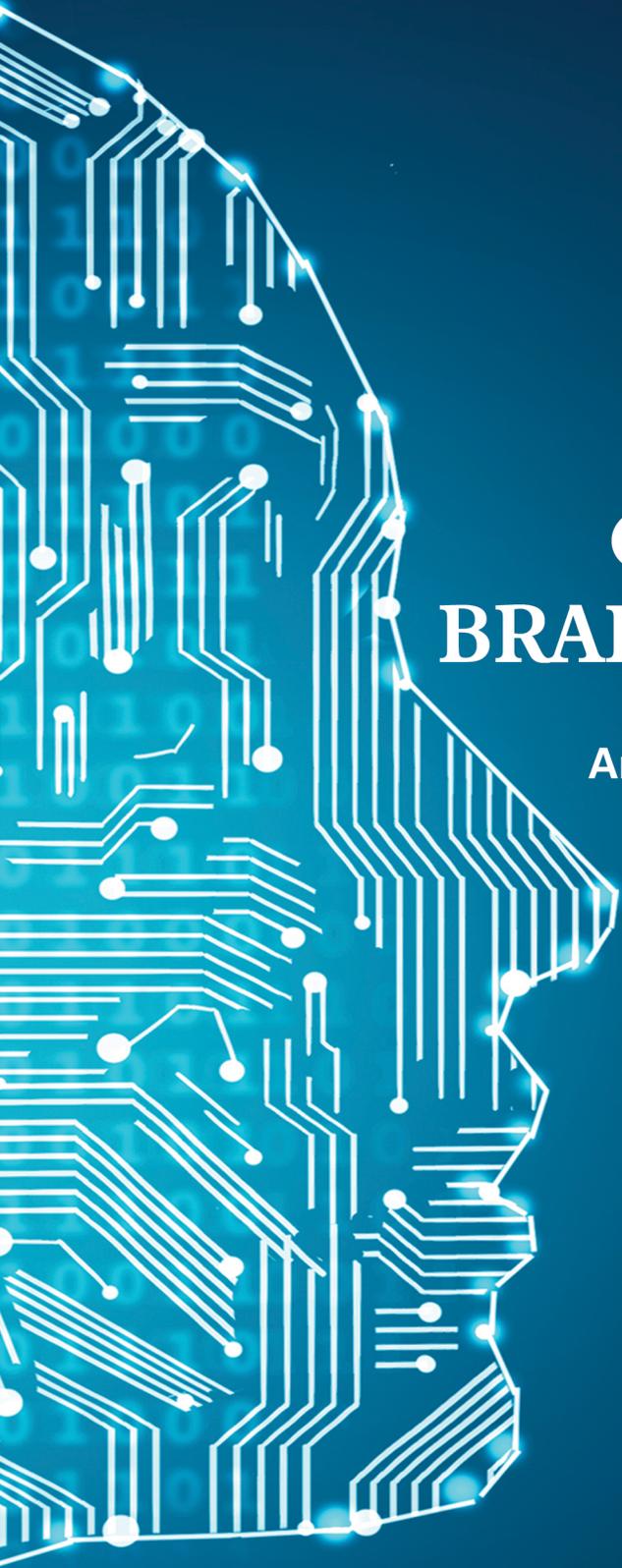




NJCBIR 2017

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

Annual Report State Fiscal Year 2017



NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

2017 ANNUAL REPORT

January 30, 2018

The Honorable Phil Murphy, Governor
Office of the Governor
State House
PO Box 001
Trenton, New Jersey 08625

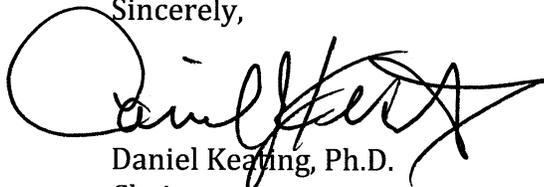
Dear Governor Murphy:

On behalf of the New Jersey Commission on Brain Injury Research, I am pleased to present the Annual Report for Fiscal Year 2017.

Once again, the Commission has had an active and productive year. We recently completed the 11th annual competition for research projects directed at mechanisms of neural regeneration and repair, and are confident that these efforts will make significant contributions to our knowledge of recovery from traumatic brain injury, the development of effective interventions, and ultimately to the improvement of the quality of life for people who have sustained catastrophic brain injuries.

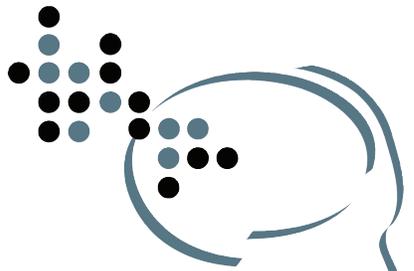
I would like to acknowledge the efforts and enthusiasm of all the Commissioners during the past year, as well as the New Jersey Department of Health for their valuable support and contributions.

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel Keating", written over a large, circular scribble.

Daniel Keating, Ph.D.
Chairman

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH



NEW JERSEY COMMISSION ON
BRAIN INJURY
RESEARCH

2017 ANNUAL REPORT

New Jersey Commission on Brain Injury Research Members of the Commission at the time of publication (2018)

**Meiling Chin, MBA, Chairperson
Daniel Keating, Ph.D.
Richard Boergers, Ph.D., ATC
Shonola Da-Silva, M.D., MBA
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Dennie Todd
Magda Schaler-Haynes, JD, MPH**

Commission Personnel

**Christine Traynor, Administrator
Mary Ray, Fiscal Administrator**

ACKNOWLEDGEMENTS

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

Commission Office

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The New Jersey Commission on Brain Injury Research was established in 2004 to fund brain injury research projects in New Jersey.



Since 2007, the New Jersey Commission on Brain Injury Research (Commission) has awarded over \$37 million to individual scientists at various academic and research institutions and approved 100 separate scientific research projects.

- Since 2007, forty-nine scientific research projects have been completed.
- Progress made by researchers has been presented in abstracts, scientific conferences, symposia, and meetings.
- Commission programs have facilitated scientific interaction and research

collaborations, in New Jersey as well as out-of-state.

- Success in achieving Commission funding has resulted in academic and career advancement for New Jersey researchers.

❖ Two grant programs were offered in Fiscal Year 2017:

- Individual Research Grants
- Pilot Research Grants

❖ 2017 Achievements:

- Thirty-seven applications requesting \$11 million were submitted.
- Nine awards were made in 2017 totaling \$2,259,416.
- Two Individual Research grants totaling \$1,042,488, and seven Pilot Research grants totaling \$1,216,928 were approved.

INTRODUCTION

This report is written in accordance with the enabling Statute, which stipulates that the Commission shall provide a report to the Governor and the Legislature on the status of the Commission’s activities and the results of its funded research efforts.¹ The Brain Injury Research Act created the New Jersey Commission on Brain Injury Research and the New Jersey Brain Injury Research Fund to support its activities. The Brain Injury Research Act resulted from the collaborative efforts of people with brain injuries and their families, clinicians, scientists, public officials, and representatives of research, rehabilitation, and non-profit organizations.

The Commission provides the opportunity for New Jersey to become a leader in traumatic brain injury research, as our program was the first of its kind in the nation. The Commission serves as a role model for other states to follow in search of medical research, treatments and interventions. The early recognition of unmet needs in traumatic brain injury research is paving the way to develop methods of regeneration and repair.

BACKGROUND

Traumatic brain injury (TBI) is a major cause of death and disability in the United States. TBIs contribute to about 30 percent of all injury deaths.² Every day, 153 persons in the United States die from injuries that include TBI. For those who survive a TBI³, they may experience effects that last a few days, or alternatively the rest of their lives. Effects may include: impaired thinking or memory, movement, sensation (e.g., vision or hearing), or emotional functioning such as personality changes and depression.

Motor vehicle injuries represent the leading cause of traumatic brain injury deaths in the nation. In 2013, about 2.8 million TBI related emergency department (ED) visits, hospitalizations, and deaths occurred in the United States. Of the 2.8 million motor vehicle injuries, TBI contributed to the deaths of nearly 50,000 people, 282,000 hospitalizations and 2.5 million ED visits⁴.

It is estimated that 12,000 to 15,000 New Jersey residents suffer brain injuries from traumatic events each year, of which 1000 are fatal. Approximately 175,000 New Jersey residents are currently living with disabilities that result from TBI. The total cost of ED visits, hospitalizations, and deaths related to traumatic brain injuries, either alone or in combination with other injuries, exceeds \$82 billion annually.⁵

1 P.L. 1968, c.410 N.J.S.A. 52:9EE-1, et seq. Enabling statute is attached hereto as "Attachment A".

2 Centers for Disease Control and Prevention, (2016). "Traumatic brain injury in the United States: fact sheet." Available at: http://www.cdc.gov/traumaticbraininjury/get_the_facts.html.

3 Ibid.

4 Ibid.

5 Based on 2015 estimates from the Centers for Disease Control and the New Jersey Department of Health Center for Health Statistics.

NEW JERSEY BRAIN INJURY REGISTRY

The “Brain Injury Research Act” mandated the establishment of a central registry of people who sustain brain injuries throughout the state. This registry consists of a database that provides information on the incidence and prevalence of brain injuries and serves as a resource for research, evaluation, and information on traumatic brain injuries. The Registry collects brain injury data from New Jersey hospitals, and provides data analysis for health professionals. See data and tables attached hereto as “Attachment B”.

NEW JERSEY’S COMMITMENT TO BRAIN INJURY RESEARCH

The Brain Injury Research Act anticipates that brain injury research will lead to effective treatments and cures for brain injuries and relieve other consequences of brain injury.

New Jersey is a leader in supporting research aimed at developing effective interventions and cures for disabilities associated with traumatic brain injury. The Commission provides research grant programs for both established scientists and young researchers committed to the goals of brain injury research. The Commission also supports the New Jersey Department of Health, which maintains a database of traumatic brain injuries in New Jersey.

Now in its thirteenth year of operation, the Commission has funded 100 scientific research projects and supported individual scientists at institutions around the State. Its impartial and scientifically rigorous application and review process has helped make the Commission vital to New Jersey’s best scientists in their pursuit of brain injury research.

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

1. MISSION AND GOALS

The Commission’s mission is to encourage and promote innovative brain injury research projects in New Jersey through the funding of approved research projects at qualifying research institutions in the State of New Jersey.

The Commission supports meritorious research projects that advance the understanding of traumatic brain injuries and is committed to accelerating research to develop effective interventions and treatment for the disabilities associated with traumatic brain injury.

Simply stated, the Commission's goals are:

- To advance and accelerate brain injury research,
- To promote collaboration among brain injury researchers in New Jersey,
- To promote the development of brain injury researchers and their research capabilities for obtaining federal and other external funding, and,
- To encourage innovative research.



Brain injury is often misdiagnosed, misunderstood and under-funded. Until there is a cure, people who sustain brain injuries must have timely and equal access to expert trauma care, specialized rehabilitation, lifelong disease management and individualized support services. This is critical for individuals to live healthy, independent and satisfying lives. The State of New Jersey benefits in savings on medical and support costs as well as research activities for treatments and cures for brain injuries and their effects.

2. OBJECTIVES

The Commission is committed to accelerating research to develop effective interventions and cures for the disabilities associated with traumatic brain injury. Its primary objectives are:

- To advance the field of brain cell repair and regeneration in New Jersey's research community, by encouraging established scientists to apply their expertise to brain injury research.
- To foster collaborative, interdisciplinary approaches to brain injury research.
- To develop models of neural repair and regeneration that establishes a basis for additional scientific investigation.
- To develop models of neural repair and regeneration after brain injury that can lead to clinical interventions.
- To stimulate epidemiological analysis of the New Jersey Traumatic Brain Injury Registry data to improve injury prevention, develop treatment guidelines and enhance patient outcomes.
- To promote dissemination of the research findings generated by those scientists supported by the New Jersey Commission on Brain Injury Research.
- To develop and evaluate clinical interventions that lead to improved treatment and function after traumatic brain injury.

MEMBERSHIP AND ORGANIZATION

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

3. MEMBERSHIP AND ORGANIZATION

Created as a semi-independent public body, the New Jersey Commission on Brain Injury Research is “..allocated in, but not of..” the New Jersey Department of Health. It is subject to all the administrative rules and procedures of the Department, but is not part of the Department’s budget.

The Commission establishes and oversees the administrative operations of the grants making process as well as other 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 a three-year term.

Two Commission seats are designated by Statute to represent the state’s major academic research institutions and stakeholders.⁶ Public members provide a diversity of backgrounds and interests united by a shared commitment to brain injury research. 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, eight public members – at least one licensed physician, an individual with a brain injury, a parent of an individual with a brain injury, one public member appointed by the President of the Senate, and one public member appointed by the Speaker of the Assembly.

All public members shall be residents of the State, or otherwise associated with the State, and shall be known for their knowledge, competence, experience or interest in brain injury medical research.

Any qualified person wishing to be considered for appointment may submit his or her name to the Governor’s Office of Appointments.⁷

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 prior to presenting them to the Commission.

⁶ New Jersey Statute (N.J.S.A. 52:9EE-1)

⁷ Information on how to apply can be found on the following website at: <http://www.state.nj.us/governor/admin/bca>

RESEARCH FUNDING PRIORITIES

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

4. ADMINISTRATION

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

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

5. FUNDING

Under the enabling Statute, the work of the Commission is supported entirely by a one-dollar surcharge on all 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 Brain Injury 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.⁸ The guidelines offer applicants detailed guidance and instruction on funding criteria and policies.

The Commission funds research activities that hold the promise of developing effective treatments, interventions and cures for the disabilities associated with traumatic brain injury. An array of grant programs is offered including Individual Research Grants, Fellowships, Pilot Research Grants and Programmatic Multi-Investigator Research Grants. The areas of research listed below highlight the focus of current emphasis and funding.

⁸ The full text appears on the website at: www.nj.gov/health/njcbir.

GRANT APPLICATION AND REVIEW PROCESS

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

Basic Studies

- Study strategies to promote neuronal growth and survival, encourage the formation of synapses, enhance appropriate myelination, restore axonal conduction, replace or regenerate injured brain cells, or otherwise improve function after brain injury.
- Evaluate the 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 brain injury in animal models and in the human brain, specifically documenting the cellular systems vulnerable to injury and the functional losses which occur.
- Perform translational research on the mechanism and interventions that promote recovery of function after brain injury.

Clinical Studies

- Demonstrate efficacy of innovative rehabilitation strategies based on basic research that offer promise to promote recovery of function (e.g., physiologic function, cognitive impairment, activity limitation, social participation, quality of life) through their clinical application.
- Demonstrate mechanisms of action and rehabilitation intervention based on changes in brain activity (e.g., functional imaging), neurocognitive function, or psychosocial factors (e.g., resilience).
- Perform comparative effectiveness research to evaluate the relative risks and benefits of alternative rehabilitation interventions intended to promote recovery of function.
- Conduct epidemiological studies of the New Jersey Traumatic Brain Injury Registry data, to identify contributions of demographic and risk factors, patient transport, rehabilitation and physical therapy, and medical/surgical interventions to population treatment and outcomes.

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. 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 New Jersey's Grant Management system. The on-line process ensures broad access, convenience, flexibility, and greatly reduces administrative workloads for applicants, the Commission office, and the Scientific Merit Review Panel.

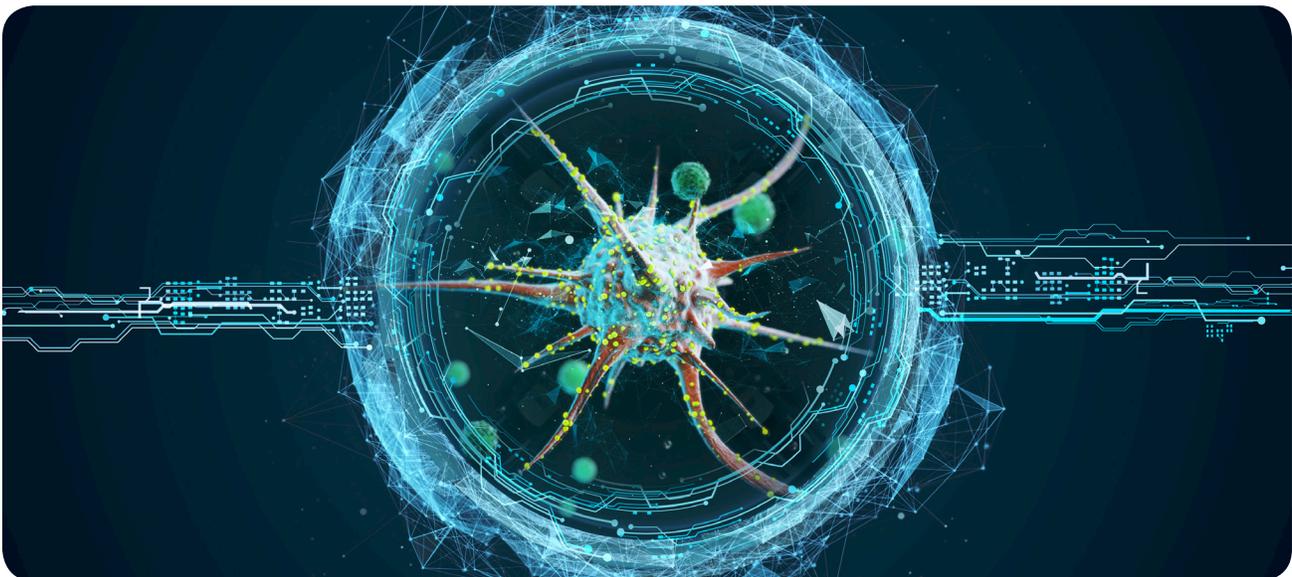
Grant Review Process

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 three-person panel appointed by the office of the Commission. The 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.



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

CURRENT GRANT PROGRAMS

Grant programs are designed to provide opportunities attractive to a wide range of researchers. Awards are intended to promote collaboration among brain injury researchers in New Jersey and encourage innovative research. The intent is not to provide long-term support for research. It is expected that 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 Grant offers encouragement to graduate students and post-doctoral researchers. The Programmatic Multi-Investigator Grant supports collaborative research from at least three investigators from different laboratories, and the Pilot Research Grant enables researchers to pursue a new direction in brain injury research, or encourages new investigators who want to gather preliminary data for larger research projects, the Brain Injury Core Facilities Grant was designed to make research more efficient and provides state-of-the-art equipment and highly skilled staffing to support researchers with centralized expertise.

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

INDIVIDUAL RESEARCH GRANTS

- Individual Research Grants support senior scientists to explore meritorious novel scientific and clinical ideas.
- Up to \$540,000 for up to three years (\$180,000 per year).
- The key goal is to enable established researchers to test and develop pilot data needed for future funding.

FELLOWSHIP GRANTS

- Postdoctoral and Graduate Student Fellowships engage promising young investigators in brain injury research.
- All fellowships include an annual stipend, research allowance and travel budget.
- Post-doctoral Fellowships are three-year awards based on years of relevant research experience since obtaining a doctoral degree and range from \$64,550 to \$83,376 a year.
- Graduate Fellowships are three-year awards with a total award of \$33,500 per year.

SUMMARY AND PERFORMANCE RECORD

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

PILOT RESEARCH GRANTS

- Enable independent investigators to pursue a new direction in brain injury research, or new investigators who want to gather preliminary data for larger research projects.
- Up to \$180,000 for a two-year award (\$90,000 per year).

PROGRAMMATIC MULTI-INVESTIGATOR RESEARCH GRANTS

- Support collaborative research from at least three investigators from different laboratories.
- Preference is given to proposals that demonstrate complementary approaches to addressing a research question through multi-disciplinary investigations.
- Collaborations are encouraged among independent laboratories within the same institution or among laboratories from different institutions.
- Up to \$720,000 per year for up to three years with a maximum of \$2.1 million.

BRAIN INJURY CORE FACILITIES GRANTS

- Brain Injury Core Facilities Grants make research more efficient and productive by providing services and technologies that cannot be readily reproduced in individual laboratories in an efficient, cost-effective manner.
- Provides state-of-the-art equipment along with highly skilled staffing to support researchers.
- Makes use of sophisticated technologies and equipment to provide researchers with access to centralized expertise and service.
- Provides education and training opportunities for aspiring researchers.
- Up to \$1,500,000 is available to provide researchers with an opportunity to facilitate the establishment of new Brain Injury Core Facilities.

2007- 2017 SUMMARY AND PERFORMANCE RECORD

Since 2007, the Commission has funded 100 separate scientific research projects by scientists at New Jersey academic and research institutions. These awards represent an investment in brain injury research of over \$37 million.

Approximately 35 grant applications are received annually; approval of ten or more new grant awards totaling \$3 to \$4 million are made.

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

QUALIFIED RESEARCH INSTITUTIONS

NEW JERSEY COMMISSION ON BRAIN INJURY RESEARCH

NEW JERSEY QUALIFIED RESEARCH INSTITUTIONS

Under the Brain Injury 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 Brain Injury Research.

- University of Medicine & Dentistry of New Jersey
- Rutgers, The State University of New Jersey
- Kessler Foundation
- Stevens Institute of Technology
- Princeton University
- Cooper University Hospital/Health System
- Atlantic Health Systems Hospital Corporation
- St. Barnabas Medical Center
- Edge Therapeutics, Inc.
- The Center for Neurological & Neurodevelopment Health LLC, Clinical Research Center of NJ, & The Center for Neurological & Neurodevelopment Health II, Inc. – NeurAbilities
- Centra State Medical Center
- Montclair State University
- Coriell Institute for Medical Research
- New Jersey Institute of Technology
- Hackensack University Medical Center
- International Brain Research Foundation
- Englewood Hospital Research
- JFK Neuroscience Institute, JFK Health System & Seton Hall University School of Health and Medical Sciences
- Rowan University
- Morristown Medical Hospital & Medical Center
- Veterans Administration NJ Health Care System & Veterans Biomedical Research Institute
- The College of New Jersey
- Visikol, 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 brain injury research.

2017 YEAR IN REVIEW

The Commission developed policy guidelines to accommodate what promises to be an exciting research agenda for the New Jersey science community.

Grant programs are designed to provide opportunities attractive to a wide range of researchers. Awarded grantees and grantee institutions have capitalized on the opportunities afforded by the availability of Commission funding through advancement of individual careers, increased institutional investment, and applying for additional outside funding.

2017 Overview & Applications

The Commission has been in existence for thirteen years and is in its 11th grant cycle. In 2017, two types of grant programs were offered and included: Individual Research Grants, and Pilot Research Grants. The Commission allocated up to \$2.5 million for brain injury research projects, but it is not required to award any, or all that amount.

A total of 37 grant applications were received. Nine grants were awarded totaling \$2,259,416. The grant awards included two Individual Research Grants, and seven Pilot Research Grants.

2017 Outreach and Development Efforts

The Commission maintains an ongoing interest in expanding brain injury research in New Jersey. Direct contacts, attendance at events and meetings, plus website and publication resources are some of the ways used to publicize grant opportunities throughout the state.

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

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

2017 Grant Cycle Information

Grant Application Deadline: October 5, 2016

Award Notification Date: May 30, 2017

Available Grant Programs:

- Individual Research Grants
- Pilot Research Grants

GRANTS PROGRAM FOR 2018

Due to budgetary limitations, the Commission will not offer any new grants in the Fiscal Year 2018 grant cycle.

FINANCIAL STATEMENT

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

Revenue obtained from the statutory one-dollar surcharge is collected and forwarded to the State Treasurer for deposit into the New Jersey Brain Injury Research Fund. Interest earned on the money collected, through the Division of Investments, New Jersey State Department of Treasury, is credited to the Fund.

State Fiscal Year 2017 Fund Balance Statement:

	SFY 2017 <i>Projected</i>	SFY 2017 <i>Actual</i>	SFY 2018 <i>Projected</i>
Opening Fund Balance (July 1)	\$467,613	\$733,831	\$326,753
Revenues			
Assessments ¹	\$3,600,000	\$3,788,415	\$3,600,000
Investments Earnings - Interest ²	\$12,000	\$68,145	\$12,000
Total Revenue:	\$3,612,000	\$3,856,560	\$3,612,000
Total Funds Available	\$4,079,613	\$4,590,391	\$3,938,753
Disbursements and Expenses			
Spending Plan Reduction		\$ -	
Disbursements to Grantees ³	\$ 3,100,000	\$ 4,199,773	\$3,100,000
Total disbursements	\$ 3,100,000	\$ 4,199,773	\$3,100,000
Expenses			
Administrative & Office expense	\$110,000	\$17,160	\$110,000
Professional Review Panel	\$50,000	\$32,871	\$50,000
NJCSCR Registry		\$0	\$0
Total expenses	\$160,000	\$50,031	\$160,000
Total Disbursements and Expenses	\$3,260,000	\$4,249,804	\$3,260,000
Closing Fund Balance (June 30)	\$819,613	\$340,587	\$678,753

¹Net revenue variance.
²Funds plus interest deposited annually in January.
³Funds for Multi-Year grants.

Below is a project summary of the Individual Research Grant recipients:

CBIR17IRG006

Bonnie L. Firestein, Ph.D.

Rutgers University

Dept. Cell Biology & Neuroscience

\$502,500

Project Title: *Identification of Biomarkers of TBI in Brain-Derived Exosomes*

We will develop a new method for the detection of biomarkers for the diagnosis and potential treatment of TBI.

Traumatic brain injury (TBI) is the leading cause of death in people under 45 years of age in the United States and continues to have an enormous impact on public health. Although some progress has been made in reducing the annual incidence of TBI through brain injury prevention, there remains a tremendous need to develop biomarkers for the diagnosis of TBI to improve treatment for those who have suffered a TBI.

In this proposal, we use a novel method to identify potential biomarkers in vesicles released from the brain into the circulating blood for the diagnosis of TBI. We will determine whether proteins, RNA, and DNA in these vesicles, called exosomes, are present in different amounts in the blood of animals that have experienced a TBI than in control animals. In addition, we will determine whether these exosome components

change in response to treatment with rapamycin, which we have shown promotes recovery after TBI.

Our ultimate goal in the future is to use the identified biomarkers to diagnose those in New Jersey who have suffered a TBI and use the biomarkers to develop individual therapies.

Contact Information:

Bonnie L. Firestein, Ph.D.

Rutgers University

Dept. Cell Biology & Neuroscience

604 Allison Road

Piscataway, NJ 08854-8082

848-445-8045

firestein@biology.rutgers.edu

Below is a project summary of the Individual Research Grant recipients:

CBIR17IRG019

Steven Levison, Ph.D.

Rutgers University BHS

\$539,988

Project Title: *Protecting Subcortical White Matter and Promoting Remyelination After TBI*

We will test the hypothesis that subacute LIF administration after an adolescent concussive injury will reduce damage and increase the production of new myelinating glia to restore axonal conduction.

Concussions are prevalent among adolescents due to sports-related injuries and car accidents and until recently, the consequences of concussion were under-appreciated problem. In New Jersey, the financial burden of pediatric and adolescent TBI is ~\$20 million/year in hospital costs alone (NJCBIR Annual Report). Given this enormous financial burden, the emotional burden placed on caregivers and the fact that injuries evolve differently in youths than adults, there is strong rationale to study the consequences and treatment of concussions in healthy adolescents.

Over the past 2 years we have developed a new model of adolescent concussive brain injury in mice and we have established that a naturally produced injury signal known as leukemia inhibitory factor (aka LIF) dampens the degree of secondary brain in-

jury. But, the increase in LIF after injury is short-lived, therefore, we have hypothesized that extending the time when LIF is present will be beneficial. We have shown that LIF can be delivered in nose drops and that these nose drops containing the LIF deliver it far into the brain where it reduces the extent of damage and improves performance on behavioral tasks. But LIF is not only a neuroprotective molecule, it also promotes repair; therefore, an important goal of our future studies will be to not only study the neuroprotective benefits of LIF administration, but also to establish its regenerative potential in our adolescent model of adolescent concussive brain injury.

Contact Information:

Steven Levison, Ph.D.

Rutgers University BHS

205 South Orange Avenue

Cancer Center H1226

Newark, NJ 07103

973-972-5162

Steve.levison@Rutgers.edu

Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL007

Barry D. Waterhouse, Ph.D.

Rowan University

\$172,874

Project Title: *Impact of Repetitive Mild Traumatic Brain Injury on Attention and Catecholamine Efflux in Prefrontal Cortex*

This study will evaluate the effects of repetitive concussion on attention in rats, and on the therapeutic actions of Ritalin® to reduce attention deficits following repetitive concussion.

The proposed pilot project will focus on the effect of repeated concussive events on specific dimensions of cognitive function; sustained and flexible attention. The ability to engage and alternate between these two modes of attention is critical to management of everyday tasks and workflow. Under normal conditions the catecholamine transmitter systems in the brain regulate attention and other cognitive functions. Following concussion, also referred to as a mild traumatic brain injury (TBI), many executive functions including attention can be compromised for days, weeks, or months following injury leading to poor performance in the classroom and workplace. After experiencing a single concussion individuals are more vulnerable to future head injury and may likely experience more severe and/or more prolonged symptoms following repeated head trauma.

Although many studies have focused on the consequences of single concussive events, fewer investigations have examined outcomes following repeated instances of concussion. Experimentally-induced mild TBI in rats serves as a useful model of concussion.

The proposed work will characterize the effects of repetitive mild TBI on well-established rat models of sustained and flexible attention. Additional experiments will measure neurotransmitter release in brain regions responsible for regulating attention and examine the ability of methylphenidate (Ritalin®), a drug that elevates transmitter levels, to attenuate or reverse the effects of repetitive mild TBI on attention. As such, the project will seek to validate animal models of repetitive brain injury and attention for future study, investigate mechanisms of repetitive TBI, and evaluate methylphenidate as candidate drug for treating the consequences of repetitive head injury. This work is particularly relevant for treatment of New Jersey residents who experience multiple concussions as a result of participation in contact sports or military combat.

Contact Information:

Barry D. Waterhouse, Ph.D.

Rowan University

42 E. Laurel Road, Suite 2200

Stratford, NJ 08084

856-566-6417

waterhouse@rowan.edu

Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL021

Peii Chen, Ph.D.

Kessler Foundation

\$177,593

Project Title: Home-based Arm and Hand Exercise (HAHE) to Improve Upper Limb Function after Traumatic Brain Injury

This pilot study will evaluate the feasibility of the HAHE protocol and generate pilot data needed to develop a programmatic area of research that can be supported by funding from federal agencies.

Arm and hand dysfunction, although not widely recognized, is a common and devastating consequence of TBI. Recommendations have been published that encourage clinicians to include upper extremity retraining within the TBI population; however, very little research exists that will help inform treatments for this population. In order to address this important knowledge gap, there is urgency to broaden the scientific evidence critical to informing upper limb rehabilitation for TBI survivors.

The proposed study will do just that by using a task-specific visuomotor exercise protocol that emphasizes upper limb movements which can be practiced by patients in their homes. This new home-based arm and hand exercise (HAHE) protocol is expected to improve functional recovery and quality of life among individ-

uals with chronic upper limb impairment after moderate-to-severe TBI.

The proposed project is innovative in 1) that the exercise protocol integrates treatment elements established in stroke rehabilitation into a single treatment modality for TBI survivors, 2) the utilization of an alarm timer to achieve high treatment intensity by reminding patients of repetitive practices at home, and 3) the treatment aims to improve not only visuomotor coordination, but also patient-centered outcomes.

The success of the proposed 2-year pilot project will evaluate the feasibility of the treatment protocol and home setting, and will generate pilot information needed to develop a programmatic area of research that can be supported by additional funding from federal agencies.

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Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL020

Namas Chandra, Ph.D.

New Jersey Institute of Technology

\$152,747

Project Title: *Divergent Mechanisms of Early Cellular Injury in High-Rate Blast and Slow Impact TBI Determine Long-Term Neurological Outcomes*

This multidisciplinary study will determine the nature of early neuropathology after high-rate blast brain injury and their contribution to development of epilepsy and memory deficits.

Blast-related traumatic brain injury (TBI) is the most common brain injury sustained by combat troops in recent wars and is considered a signature injury of ongoing wars. In addition to wars, industrial explosions and current asymmetric warfare expose civilian populations to blast brain injuries as well. Impact brain injury, typically from falls, hits or being thrown against hard objects is known to increase the risk for epilepsy and lead to long-term and cognitive deficits. However, the specific risk for development of epilepsy after an isolated exposure to blast pressures is completely unknown. The limited data on blast brain injury indicates that the nature and evolution of cellular damage to brain tissue is different in blast and impact brain injuries.

Therefore, characterizing the cellular consequence of blast and impact injury under

comparable experimental conditions can lead to insights into specific disease processes and possible behavioral markets for blast injury. Thus, identifying the risk for development of epilepsy after blast brain injury and the underlying cellular and network mechanisms is essential to identify differences in disease progression after different forms of TBI and if evaluation and management strategies need to consider the nature of the injurious event.

Here, we will use a shock-tube blast injury model that has been validated by direct comparison to field data and combined long-term behavioral and electrophysiological monitoring to determine the development of epileptic seizures after blast brain injury and impact brain injuries at similar pressures. Multidisciplinary approaches will be used to determine how these physically different blast and impact injury affects brain tissue and subsequent neurobehavioral, cellular and network functional outcomes. Our studies will eliminate the existing knowledge gap concerning epileptogenesis after primary blast injury.

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Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL012

Xiaobo Li, Ph.D.

New Jersey Institute of Technology

\$180,000

Project Title: *Discovering the Neurobiological Substrate of Inattention in Children Post-Traumatic Brain Injury*

This project focuses on understanding the neurobiological underpinnings of attention deficits in children post traumatic brain injury (TBI).

TBI is a major public health concern, and the leading cause of disability and death in children in the U.S. Clinicians and families report that a variety of attention deficits occur in children post TBI, and significantly contribute to poor academic and social performances, and negatively impact quality of life. However, little is known about the brain mechanism of the attention deficits in children post TBI.

Based on our long-term research experiences in attention deficits in children, we hypothesize that injury induced anatomical and functional alterations in prefronto-parietal network play the central role in inattention in children post TBI. We propose to investigate both microstructural-level anatomical and functional mechanisms of TBI induced inattention in children, by 1) utilizing DTI to study the white matter alterations; 2) utilizing neurite orientation

dispersion and density imaging (NODDI, a multi-shell diffusion MRI technique for estimating the microstructural complexity of dendrites and axons) to study the neuronal level gray matter alterations; and 3) task-based (attention network test (rANT)) to assess the functional brain networks for alerting, orienting, and executive control steps of attention processing, in children who have TBI induced persistent symptoms of inattention.

This study will have a significant impact on effective interventions and cures for children post TBI, by shedding light on the neural mechanisms of inattention in children post TBI, and suggesting the neurobiological target for treatment of this severe and common condition. It will further provide the neural foundation for us to investigate the biological correlate of treatment efficacy in children post TBI.

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Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL025

Nancy Chiaravalloti, Ph.D.

Kessler Foundation

\$177,260

Project Title: *Modification and Pilot Testing of the mSMT for Improving Learning and Memory in School-Aged Children with TBI*

This project entails both a modification of the mSMT for children with TBI and pilot testing of the pediatric mSMT to begin to establish efficacy.

Cognitive deficits following TBI often lead to the inability to function optimally at school, maintain employment, engage in social activities, participate in the community fully and experience optimal quality of life. Deficits in new learning and memory are common and the effective treatment of this deficit should serve to significantly improve multiple aspects of daily living including the ability to function effectively in social, educational and occupational situations and overall quality of life.

The currently proposed study addresses a critical need in the clinical care of school-aged children with TBI through the modification of an existing, documented effective treatment protocol for learning and memory deficits in persons with moderate to severe TBI, the modified Story Memory Technique (mSMT).

We will also conduct a small study to begin to examine post-treatment improvements in school-aged children with moderate to severe TBI. The documentation of the efficacy of the mSMT in children with TBI has the potential to greatly improve the everyday functioning and overall quality of life of this important population. The results of this study therefore have the potential to change clinical practice, inform policy, and improve the lives of children and adolescents living with TBI.

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Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL022

Ekaterina Dobryakova, Ph.D.

Kessler Foundation

\$177,214

Project Title: *Investigation of Neural Mechanisms during Feedback Learning in Individuals with Traumatic Brain Injury*

The goal of the current study is to examine neural mechanisms associated with learning through immediate and delayed feedback in individuals with traumatic brain injury. Traumatic brain injuries (TBIs) affect nearly 15,000 New Jersey residents every year and over 175,000 residents are already living with a disability due to a TBI. Many individuals with TBI also endure countless hours of rehabilitation, much of which involves learning and relearning tasks necessary to live a happy and normal life. This study will push the boundaries of medical research by taking a step forward at truly understanding the functional basis for learning. This knowledge will lead to better, more effective treatments for car accident victims, veterans, and various other TBI patients in our State of New Jersey.

In order to learn successfully, a person needs clear feedback to correct errors they may make and to improve their performance on a specific task. With effective feedback, a patient could apply the skills they learn during rehabilitation to their day-to-day lives. However, we have yet to

explore how the brain functions during learning in individuals with TBI.

The proposed study focuses on the feedback aspect of learning, which can be presented either immediately or after a delay following the completion of a task. Previous studies suggest that individuals with TBI have issues with a specific brain region responsible for learning through immediate feedback, known as the striatum. But delayed feedback involves a different brain region. Thus, even though individuals with TBI may have difficulty learning through immediate feedback, they may still learn at a normal rate using delayed feedback.

The proposed study utilizes functional magnetic imaging (fMRI) to examine this hypothesis, as well as brain regions involved in learning through immediate and delayed feedback in individuals with TBI. The results of this investigation will provide a basis for modifying feedback that rehabilitation clinicians provide during their time with patients to achieve the best possible outcome following treatment.

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Below are the project summaries of the Pilot Research Grant recipients:

CBIR17PIL024
Soha Saleh, Ph.D.
Kessler Foundation
\$179,240

Project Title: *Combining Physical and Mental Practice for the Rehabilitation of Upper Extremity Movement Impairments secondary to Traumatic Brain Injury*

This proposal investigates the therapeutic benefit of combining mental practice with physical training for the recovery of hand function and its related effect on brain connectivity in TBI patients.

Many individuals with sustained moderate to severe traumatic brain injury suffer from impairment in hand movement and coordination, which often can prevent them from returning to work or resuming a fully active life. Effective treatments require long repeated intensive physical therapy training. Unfortunately, the amount and therefore the benefit of the therapy is often limited by attention deficits, fatigue and physical weakness.

This project proposes to combine physical and mental practice to achieve intensive training without inducing fatigue while maintaining high engagement during training sessions. The study will investigate the therapeutic benefit of combining physical and mental practice compared to physical practice alone for recovery of hand move-

ment and coordination. The project will also assess how the intervention is effective at re-normalizing brain activity and the interaction between different regions associated with hand movement and control that were affected by the injury. Ultimately this study will provide valuable information on the benefit of combining mental and physical practice to help guide the design and development of more effective rehabilitation therapy.

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ATTACHMENT A

Brain Injury Research Act

An Act establishing a New Jersey Commission on Brain Injury 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.52:9EE-1 Short title.

1. This act shall be known and may be cited as the “Brain Injury Research Act.”

C.52:9EE-2 Definitions relative to brain injury research.

2. As used in this act:

“Approved research project” means a scientific research project, which is approved by the commission and which focuses on the treatment and cure of brain injuries.

“Commission” means the New Jersey State Commission on Brain Injury Research established pursuant to this act.

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

“Qualifying research institution” means the University of Medicine and Dentistry of New Jersey and Rutgers, The State University of New Jersey and any other institution approved by the commission, which is conducting an approved research project.

C.52:9EE-3 New Jersey State Commission on Brain Injury Research.

3. a. There is established in the Executive Branch of the State government, the New Jersey State Commission on Brain Injury 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, 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 of New Jersey; six

public members, appointed by the Governor with the advice and consent of the Senate, one of whom shall be a licensed physician in this State and one of whom shall be a person with a brain injury; and two public members, one of whom shall be appointed by the President of the Senate and one of whom shall be appointed by the Speaker of the General Assembly. All public members shall be residents of the State or otherwise associated with the State, and shall be known for their knowledge, competence, experience or interest in brain injury medical research.

c. The term of office of each public member shall be three years, but of the members first appointed, three shall be appointed for terms of one year, three for terms of two years, and two 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.52:9EE-4 Duties of commission.

4. The commission shall:

a. Review and authorize approved research projects, emphasizing projects that study nerve regeneration as a means to a cure for brain injury, and 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 brain injury research projects;

e. Compile a directory of all brain injury 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.52:9EE-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, the use of moneys from the “New Jersey Brain Injury Research Fund” established pursuant to section 9 of P.L.2003, c.200 (C.52:9EE-9) to meet the operating expenses of the commission, 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 brain injury 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 brain injury;
 - 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.52:9EE-6 Election 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.52:9EE-7 Direct applications for funds.

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 brain injury research.

C.52:9EE-8 Central registry of persons who sustain brain injuries.

8. a. The commission shall establish and maintain, in conjunction with the Department of Health, a central registry of persons who sustain brain 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 brain injuries and that will serve as a resource for research, evaluation and information on brain injuries and available services.

b. The commission shall require the reporting of all cases of brain 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 brain 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 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.) and P.L.2001, c.404 (C.47:1A-5 et al.).

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 brain injury to the commission and who fails to comply with the provisions of this section shall be liable to a penalty of up to \$100 per unreported brain 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 Brain Injury Research Fund” established pursuant to this act.

C.52:9EE-9 “New Jersey Brain Injury Research Fund.”

9. a. There is established in the Department of the Treasury a nonlapsing revolving fund to be

known as the “New Jersey Brain Injury Research Fund.” This fund shall be the repository for moneys provided pursuant to subsection f. of R.S.39:5-41. Moneys deposited in the fund, and any interest earned thereon, shall be used for the purpose of making grants for brain injury research projects at qualified research institutions approved by the New Jersey State Commission on Brain Injury Research, and for the purpose of meeting the operating expenses of the commission.

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 is 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 shall be added to the amount of each fine and penalty imposed and collected through a court 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 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 through a court 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.

f. Notwithstanding the provisions of subsections a. and b. of this section, during the period beginning on the effective date of this act and ending five years thereafter, \$1 shall be added to the amount of each fine and penalty imposed and collected through a court 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 “Autism Medical Research and Treatment Fund” established pursuant to section 1 of P.L.2003, c.144 (C.30:6D-62.2).

g. Notwithstanding the provisions of subsection a. and b. of this section, \$2 shall be added to the amount of each fine and penalty imposed and collected by a court 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 Forensic DNA Laboratory Fund” established pursuant to P.L.2003, c.183. Prior to depositing the moneys into the fund, the State Treasurer shall forward to the Administrative Office of the Courts an amount not to exceed \$475,000 from moneys initially collected pursuant to this subsection to be used exclusively to establish a collection mechanism and to provide funding to update the Automated Traffic System Fund created pursuant to N.J.S.2B:12-30 to implement the provisions of this subsection.

The authority to impose additional fines and penalties under this subsection shall take effect 90 days after the effective date of P.L.2003, c.183 and shall expire five years thereafter. Not later than the 180th day prior to such expiration, the Attorney General shall prepare and submit to the Governor and the Legislature a report on the collection and use of DNA samples under P.L.1994, c.136. The report shall cover the period beginning on that effective date and ending four years thereafter. The report shall indicate separately, for each one-year period during those four years that begins on that effective date or an anniversary thereof, the number of each type of biological sample taken and the total cost of taking that type of sample, and also the number of identifications and exonerations achieved through the use of the samples. In addition, the report shall evaluate the effectiveness, including cost effectiveness, of having the samples available to further police investigations and other forensic purposes.

h. 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 Brain Injury Research Fund” established pursuant to section 9 of P.L.2003, c.200 (C.52:9EE-9). The Administrative Office of the Courts may retain an amount equal to \$475,000 from the moneys which

it initially collects pursuant to this subsection, prior to depositing any moneys in the “New Jersey Brain Injury Research Fund,” in order to meet the expenses associated with utilizing the Automated Traffic System Fund created pursuant to N.J.S.2B:12-30 to implement the provisions of this subsection and serve other statutory purposes.

C.52:9EE-10 Regulations.

11. The commission shall adopt 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 180th day following enactment.

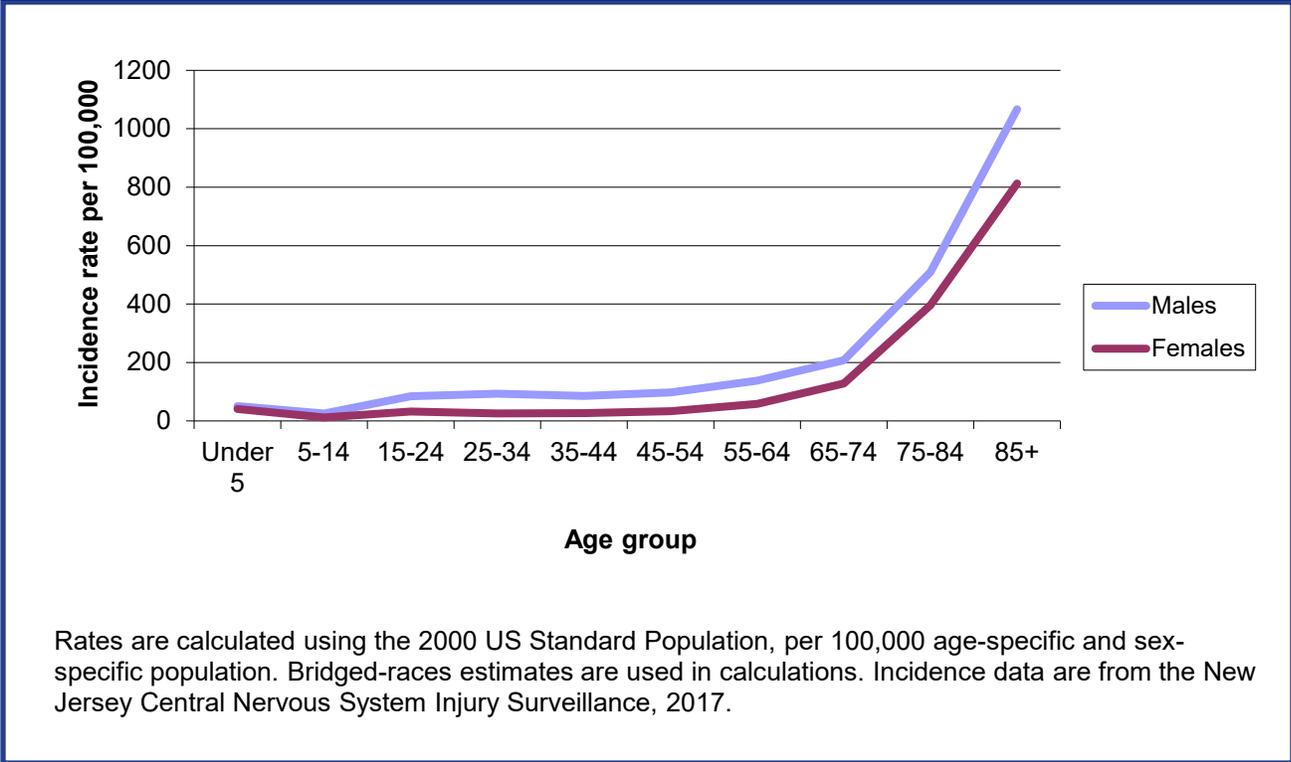
Approved January 2, 2004.

ATTACHMENT B

**NEW JERSEY BRAIN INJURY REGISTRY
New Jersey Traumatic Brain Injury Surveillance System**

Traumatic Brain Injury Rates by Age and Gender New Jersey, 2015

	Males	Females
Under 5	50.6	40.8
5-14	25.3	11.9
15-24	84.8	31.9
25-34	93.4	25.6
35-44	85.3	26.3
45-54	97.8	33.4
55-64	138.0	58.5
65-74	207.4	128.0
75-84	509.5	395.4
85+	1066.8	812.7



Age-Adjusted Traumatic Brain Injury Incidence Rates, New Jersey, 2014-2015

	2014		2015		Rate difference 2014-2015
	N	Rate ¹	N	Rate	
All traumatic brain injuries	9,876	100.9	9,198	93	-7.83%
Mechanism of Injury					
Motor Vehicle (Traffic)	1,687	18.7	1,366	15.0	-19.79%
Fall	5,669	55.4	5,365	51.8	-6.50%
Assault	1,687	18.7	1,366	15.0	-19.79%
Self-injury	38	0.4	43	0.5	25.00%
Gender					
Male	5,777	131.8	5,464	123.8	-6.07%
Female	4,099	72.7	3,734	81.6	12.24%
Race²					
White	6,457	96.8	5,896	87.3	-9.81%
Black/African American	1,213	103.6	1,267	108.7	4.92%
Hispanic	1,285	90.0	1,185	82.8	-8.00%
Fatality³					
Fatal	1,138	11.52%	1,169	12.71%	10.30%
Non-fatal	8,738	88.48%	8,029	87.29%	-1.34%

¹ Rates are age-adjusted using the 2000 US Standard Population, calculated per 100,000. Bridged-race estimates are used in calculations.

² Race/ethnicity information is missing for 630 (6.4%) of 2014 TBI incidents and 509 (5.5%) of 2015 TBI incidents.

³ "Fatal TBI" includes out of hospital deaths and inpatient deaths with TBI listed in the multiple cause of death fields, and hospitalized deaths of patients with "severe" TBI who have no TBI listed specifically in the cause of death fields. "Non-fatal TBI" are inpatients who may have died but had only mild or moderate severity TBI, or inpatients who were discharged from the hospital "alive".

Incidence data are from the New Jersey Central Nervous System Injury Surveillance, 2017, and includes all New Jersey resident hospitalizations in New Jersey hospitals and deaths of New Jersey residents regardless of state of death.

Discharge Disposition of the Major Causes of Traumatic Brain Injuries, 2016

Cause of injury	Home, routine		Extended inpatient care ¹		Home, with services ²		LTC, nursing, hospice ³		Rehab		Left AMA		Dischrg/Txr w planned readmission ⁴		Died		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Motor vehicle (traffic)	807	60.8	134	10.1	46	3.5	16	1.2	225	17.0	21	1.6	0	-	78	5.9	1,327
Falls	1,598	37.2	1,174	27.3	306	7.1	194	4.5	698	16.3	41	1.0	1	**	281	6.5	4,293
Assault	346	77.8	24	5.4	2	**	3	**	20	4.5	24	5.4	0	-	26	5.8	445
Self-inflicted	11	30.6	12	33.3	0	-	0	-	4	**	0	-	0	-	9	25.0	36
Other and Unknown	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0
Total	2,762	45.3	1,344	22.0	354	5.8	213	3.5	947	15.5	86	1.4	1	**	394	6.5	6,101

Hospitalization data are from the New Jersey Central Nervous System Injury Surveillance, 2016; percentages are based on New Jersey residents admitted to New Jersey hospitals, all outcomes.

"TBI" excludes ICD-10-CM S09.90 (Unspecified head injury).

** Percentages not calculated for under 5 observations.

Notes:

¹ Includes: Discharges/transfers to other short term general care hospitals, skilled nursing and intermediate care facilities, federal hospitals, psych units, and critical access hospitals

² Includes: Discharges/transfers to home with either a home health service provider or IV therapy

³ Includes: Discharges/transfers to long-term care facilities, Medicaid certified nursing facilities, and hospice

⁴ Includes: Discharges/transfers to home/self care, short term general hospitals, skilled nursing and intermediate care facilities, custodial or supportive care facilities, cancer centers or children's hospitals, home with services, law enforcement, federal hospitals, Medicare swing-bed facilities, rehab facilities, long-term care, Medicaid-certified nursing facilities, psych hospitals, critical access hospitals, and others not elsewhere classified; with planned inpatient readmission to an acute care hospital. (New beginning in 2013)