



**Department
of Health**



Health Research Science Board

Biennial Report

January 1, 2017 to December 31, 2018

I. INTRODUCTION

Each year in New York, nearly 15,000 women are diagnosed with breast cancer and over 2,600 women die from the disease. It is estimated that one in eight women will develop breast cancer sometime during her life. While men are also diagnosed with breast cancer, the incidence is very rare. About 150 men are diagnosed with breast cancer each year in New York.

The Health Research Science Board (HRSB) of the New York State Department of Health (DOH) was established pursuant to Chapter 279 of the Laws of 1996 (amended by Chapter 219 of the Laws of 1997, Chapter 32 of the Laws of 2008 and Chapter 60 of the laws of 2014). The legislation is codified in Title 1-B of Article 24 (§ 2410-2413) of the New York State Public Health Law (PHL).

The HRSB's mission, is to support innovative breast cancer scientific research and education projects within New York State. The HRSB solicits, receives and reviews grant applications from New York State organizations for research and education programs focusing on the causes, prevention, screening, treatment and cure of breast cancer and may include, but are not limited to mapping of breast cancer, and basic, behavioral, clinical, demographic, environmental, epidemiologic and psychosocial research.

The HRSB also considers requests for the release of confidential pesticide information for specific health-related research projects from the Pesticide Sales and Use Database, maintained by New York State Department of Environmental Conservation (DEC) in conjunction with Cornell University.

Meetings of the HRSB are announced at least two weeks in advance whenever possible and are open to the public. Meeting agendas are posted on the Wadsworth Center's website at: <https://www.wadsworth.org/extramural/breastcancer/meetings>. A recording of each meeting is available via the DOH's public website <https://www.health.ny.gov/events/webcasts/archive/> for 30 days after a meeting, opening the proceedings to a wide audience.

II. MAJOR ACTIVITIES OF THE BOARD

2017 Requests for Applications (RFAs)

In 2017, two RFAs were released:

1. Peter T. Rowley Breast Cancer Scientific Research Projects Round 4 (Rowley) and
2. Patricia S. Brown Breast Cancer Risk Reduction Education Research Projects Round 5 (Brown).

The Rowley mechanism provides researchers the opportunity to try new methods and approaches in breast cancer research. Any investigative approach appropriate to the application topic may be pursued, including but not limited to, basic, translational, clinical, demographic, mapping, epidemiological, environmental, behavioral or psychosocial research. Approximately \$1.8 million was available to support approximately five (5) awards from this RFA.

The Brown mechanism encourages development and implementation of innovative pilot projects in breast cancer risk reduction education with rigorous evaluation and revision. Contracts are expected to produce medically and scientifically accurate educational programs and materials that can be shown to be effective in increasing knowledge and promoting the adoption of evidence-based breast cancer risk reduction behaviors. Approximately \$540,000 was available to fund approximately two (2) awards from this RFA.

Also in 2017, applications from the Healthcare Practitioner Breast Cancer Education Research Projects Round 1 (HCP) RFA were due. Contracts funded under this RFA are expected to produce medically and scientifically accurate educational programs and materials that can be shown to be effective in increasing health literacy and motivating patients to be full participants in their breast health. Approximately \$810,000 was available to support approximately three (3) awards from this RFA. One (1) application was peer reviewed in 2017 and the HRSB would meet to consider the application for funding in 2018.

Peer Review

The DOH uses a contractor to manage the scientific and technical merit of the peer-review process for evaluating applications for funding. During the reporting period, the peer review contractor, American Institute of Biological Sciences provided peer review services for the above mentioned funding opportunities. The independent peer-review process is intended to obtain the highest quality review of applications by expert scientists, clinicians, educators and survivors/advocates.

Recommended Awards

At its June 18, 2018 meeting, the HRSB made recommendations for awards to the Commissioner of Health. The HRSB recommended funding two (2) awards from the Brown Round 5 RFA and seven (7) awards from the Rowley Round 4 RFA, totaling \$513,000 and \$2.46 million, respectively. The HRSB recommended five (5) “approve, but not funded” meritorious Rowley Round 4 applications, in the event a funded organization should decline an award. Although, no awards were recommended for funding the HCP Round 1, the HRSB recommended more meritorious Rowley awards than originally anticipated. Applicants received their letters of award or regret along with the peer-reviewed critiques. Resulting contracts began on January 1, 2019. Details of the recommended awards can be found in [Appendix I](#).

2018 RFAs

At its June 18, 2018 meeting, the HRSB approved the release of the next round of three (3) RFAs: HCP Round 2, Brown Round 6, and Rowley Round 5. The HCP Round 2 mechanism was released because the HRSB recognizes the need for innovative breast cancer educational programs for healthcare practitioners is great and is ongoing as advances occur and practices evolve. These research projects will focus on developing programs to enhance the ability of healthcare practitioners and students to become partners with their breast cancer patients and to communicate accurately and effectively with patients, survivors, and patients’ families. A summary of these procurements to date is listed below:

1. Rowley (Round 5) RFA
 - This RFA was released on October 2, 2018 and applications were due on December 6, 2018
 - \$2.16 million is available to support approximately five (5) to seven (7) awards
 - Applications were peer reviewed in February 2019
 - The HRSB will meet in the spring 2019 to recommend meritorious applications for funding
 - Contracts from this RFA will begin in fall 2019 for a multi-year term of up to two years
2. Brown (Round 6) RFA
 - This RFA was released on October 4, 2018 and applications were due on January 3, 2019

- \$270,000 is available to support approximately one (1) award
- Applications were peer reviewed in February 2019
- The HRSB will meet in the spring 2019 to recommend a meritorious application for funding
- Contracts from this RFA will begin in the fall 2019 for a multi-year term of up to three years

3. HCP (Round 2) RFA

- This RFA was released on November 13, 2018 and applications were due on January 3, 2019
- \$540,000 is available to support approximately two (2) awards
- The HRSB will meet in the spring 2019 to recommend meritorious applications for funding
- Contracts from this RFA will begin in the fall 2019 for a multi-year term of up to three years

The HRSB decided that these RFAs will be released every year and the funding programmed for the Brown and HCP RFAs will alternate every subsequent year to ensure breast cancer research and education projects are continuously supported in New York.

III. PROGRESS OF BREAST CANCER RESEARCH PROJECTS

By December 2018, ten (10) Rowley Round 3 contracts totaling \$3.5 million would complete their second year. The scientific progress resulting from these two-year awards can be found in [Appendix II](#).

IV. PROGRAM FUNDS

The Breast Cancer Research and Education Fund (Fund), is financed primarily through voluntary contributions from a check-off mechanism on the New York State Income Tax form authorized in § 97-yy of the State Finance Law. Cumulative donations from the inception of this fund through December 31, 2018 are \$20,279,798, including donations from the voluntary tax return check off, one-half of the proceeds from the Drive for the Cure specialty License plates authorized by Tax Law § 209-D and 627 and Vehicle and Traffic Law § 404-q and since 2000, State matched funds pursuant to State Finance Law § 97-yy, as amended by Chapter 550 of the Laws of 2000. In addition, there is nothing to prevent the receipt of grants, gifts or bequests made to the Fund.

To date, approximately \$20 million in breast cancer research and education funding has been programmed to support 124 research and education projects.

V. PUBLIC HEARING & BOARD RECOMMENDATIONS

The HRSB held a public hearing on June 18, 2018. The details are listed in [Appendix III](#).

Comments and Recommendations Presented by the Public at Annual Public Hearings

PHL § 2413 requires the reporting of a summary of the comments and recommendations presented by the public at the Board’s public hearings.

No comments were presented by the public at the Board’s public hearing on June 18, 2018.

Board Recommendations

PHL § 2413 requires reporting of the recommendations from the Health Research Science Board including, but not limited to, the types of data that would be useful for breast cancer researchers and whether private citizen use of residential pesticides should be added to the reporting requirements.

The HRSB continues to support the recommended changes to the Pesticide Reporting Law (Article 33, Title 12 of the Environmental Conservation Law) that were proposed in the SFY 2014-2015 budget. No changes were made to the law. The Status of Agency Actions on HRSB Recommendations on Pesticide Reporting 2000-2016 can be found in [Appendix III](#).

VI. REQUESTS FOR ACCESS TO CONFIDENTIAL PESTICIDE-RELATED DATA

Chapter 279 established a Pesticide Sales and Use Database, maintained by the New York State Department of Environmental Conservation (DEC) in conjunction with Cornell University, pursuant to the New York State Environmental Conservation Law (ECL) § 33-1201 through § 33-1207. The database contains mandated reports of pesticide applications by all commercial applicators. In addition, entities that offer restricted-use pesticides for sale to private applicators for use in agricultural crop production must report any such sales.

The data include: 1) reports of pesticide applications submitted to DEC by commercial applicators and technicians; 2) reports of sales of restricted pesticides to private applicators; and 3) reports of general-use pesticide sales for use in agricultural crop production. While a large portion of the database is public, some of it is confidential and may only be released to those engaging in human health-related research, pursuant to the Board's approval and contingent on compliance with established criteria.

Researchers seeking confidential pesticide registry information or pesticide application information can access pertinent documents at <http://www.health.state.ny.us/environmental/pesticide/reporting/> or by contacting the DOH toll-free at 1-800-458-1158. The following researcher access documents will be provided: Request for Pesticide Registry or Pesticide Application Information; Guidelines to Restrict the Dissemination by Researchers of Confidential Pesticide Registry and Pesticide Application Information; Agreement to Maintain Confidentiality; and an information sheet that summarizes these documents in lay language.

During this reporting period, no applications were received from researchers for use of the confidential pesticide sales and use data in human health-related studies.

VII. BOARD MEMBERSHIP AND STAFF SUPPORT

The HRSB is comprised of 17 voting members, three (3) non-voting regional members and three (3) non-voting ex-officio members appointed by the Governor and legislative leaders. At this time there are two (2) gubernatorial candidates in process to fill vacancies. Five (5) voting seats and one (1) non-voting seat are to be filled by legislative leadership. Members serve three-year terms. The composition of the HRSB and staff support to the HRSB can be found in [Appendix IV](#) and [V](#), respectively.

APPENDIX I

Peter T. Rowley Breast Cancer Scientific Research Projects (Round 4) Awards **The anticipated contract dates are January 1, 2019 through December 31, 2020**

Organization	Project Title	Investigator(s)	Recommended Funding
Albert Einstein College of Medicine	Somatic Mutation Rate in Mammary Epithelial Cells and Peripheral B-Lymphocytes as Risk Factor for Breast Cancer	Cristina Montagna, Ph.D., Jan Vijg, Ph.D.	\$360,000
Research Foundation for SUNY, Stony Brook University	Effects of Anesthetics on Lung Metastasis in Mouse Models of Breast Cancer	Jun Lin, M.D., Ph.D.	\$360,000
Research Foundation for SUNY, University at Buffalo	The Microbiome in the Etiology and Prevention of Breast Cancer	Jo L. Feudenheim, Ph.D.	\$359,024
Icahn School of Medicine at Mount Sinai	Sensing Cell Geometry: A Novel Checkpoint Critical for Breast Tumor Suppression	Jose Silva, Ph.D.	\$360,000
Albert Einstein College of Medicine Sub-applicant: Northwell Health	High Throughput Functional Genomics to Guide Precision Care	Harry Ostrer, M.D., Kenan Onel, M.D., Ph.D.	\$326,910
Cornell University	Histone Citrullination in Estrogen Receptor Signaling and Breast Cancer	Scott A. Coonrod, Ph.D.	\$358,832
Research Foundation for SUNY, University at Albany	A Simultaneous Phase and Scatter Imaging Towards a Clinical System for Early Stage Breast Cancer Diagnosis	Jonathan C. Pertruccelli, Ph.D., Carolyn A. MacDonald, Ph.D.	\$335,905

Organization	Project Title	Investigator(s)	Recommended Funding
The Trustees of Columbia University in the City of New York	Milk Associated Markers and Breast Optical Spectroscopy Study (MAMA BOSS)	Jasmine A. McDonald, Ph.D., Mary Beth Terry, Ph.D.	Approve, but not funded
University of Rochester	A New Approach to Prevent Implant Scarring and Failure After Breast Cancer and Radiotherapy	Richard P. Phipps, Ph.D.	Approve, but not funded
Albert Einstein College of Medicine	Novel Use of Listeria to Combat Metastatic Breast Cancer	Claudia Gravekamp, Ph.D.	Approve, but not funded
Yeshiva University	Estrogen Signaling Downstream of mTORC1 in Breast Cancer	Marina K. Holz, Ph.D.	Approve, but not funded
Roswell Park Cancer Institute Sub-applicant: Research Foundation for SUNY, University at Buffalo	Novel Approach to Breast Cancer Immunotherapy: Targeting Products of Abnormal Splicing Events Induced by Chemotherapy	Yurij Ionov, Ph.D., Jun Qu, Ph.D.	Approve, but not funded

Patricia S. Brown Breast Cancer Risk Reduction Education Research Projects (Round 5) Awards
The anticipated contract dates are January 1, 2019 through December 31, 2021

Organization	Partnering Organization	Project Title	Investigator(s)	Recommended Funding
The Research Foundation of CUNY obo Hunter College	Korean Community Services of Metropolitan New York, Inc.	A Culturally Tailored Education Program to Reduce Breast Cancer Risk in Korean Immigrant Women	Jin Young Seo, Ph.D., So-hyun Park, Ph.D.	\$245,002
Icahn School of Medicine at Mount Sinai	Gilda's Club NYC	Development of an Intergenerational Breast Health Community Education Program for Black Women: Reducing the Risk for Triple Negative Breast Cancer in Black Women through Breastfeeding	Lina Jandorf, M.A., Sly R. Jamilia, Ph.D., Torres Migdalia, M.A.	\$268,599

APPENDIX II

Peter T. Rowley Breast Cancer Research Project and Postdoctoral Fellowship (Round 3) projects

Progress Reporting Period 1/1/18-6/30/18

Contract Term 1/1/17-12/31/18

10 Awards, Procurement Total: \$3,560,955

1. Cold Spring Harbor Laboratory

Mikala Egeblad, Ph.D.

Sub-Applicant, New York University School of Medicine

\$345,800

Modulating Innate-adaptive Immune Cell Interactions for the Immunotherapy of Breast Cancer

Introduction/Background: T cells, a type of immune cell, play a central role in immune surveillance of cancer, including breast cancer. T cells can kill cancer cells, but only when properly instructed to do so, for instance by signals from macrophages, another immune cell type. Clinical results suggest that an anti-cancer immune response against triple negative breast cancer can be achieved by manipulating T cells. However, in estrogen and progesterone hormone receptor (HR)-positive breast cancer, activation of T cells will likely be insufficient because of inhibitory signals from macrophages. Therefore, this project, focuses on HR-positive breast cancer.

Researchers have found that they can activate macrophages with an existing class of drugs – Toll-like Receptor (TLR) agonists – so they boost T cells' ability to kill breast cancer cells. In addition, such activated macrophages also kill cancer cells directly.

Progress Toward Specific Aims: Researchers previously identified a TLR agonists that could activate macrophages isolated from tumors, both mouse and human tumors, so they kill cancer cells instead of stimulating tumor growth in cell culture models. Since their last reporting period, they have acquired data showing that the treatment with the TLR agonist can halt tumor growth and prevent metastases in mice.

Future Directions: Researchers are testing the effect of the treatment in additional models, as well as identifying molecular markers predicating positive response to the treatment.

Impact: Upon completion of this proposal, researchers will have demonstrated whether co-stimulating macrophages and T cells represents a novel way to treat breast cancer. Several TLR agonists are FDA approved, e.g., used to improve the response to vaccines. If successful, findings from their work could be rapidly translated into the clinic to provide a benefit to patients with metastatic disease.

2. Health Research Incorporated, Roswell Park Cancer Institute

Sharon S. Evans, Ph.D.

\$360,000

Novel Mechanism of Immune Subversion by Myeloid-Derived Suppressor Cells in Aggressive Breast Cancer

Introduction/Background: Cancer immunotherapy is a major advance for the treatment of advanced and metastatic breast cancer. While immunotherapy has been successful in a significant proportion of metastatic breast cancer patients (~20%), a major challenge remains since most patients fail to respond to current immunotherapy regimens. This project investigates a novel mechanism of

resistance to immunotherapy that involves a subset of immune cells known as myeloid-derived suppressor cells (MDSC). The central goal of the project is to test the hypothesis that MDSC set up a roadblock to immunotherapy by preventing the interaction of killer T lymphocytes with tumor targets.

Progress Toward Specific Aims: Researchers have made substantial progress on their two main objectives. For Aim 1, they found that MDSC located near tumor vessels within primary and metastatic breast tumor nodules act directly on blood vessels to prevent recruitment of tumor-reactive killer T cells. They further found that MDSC travel in clusters within the bloodstream which may account for their efficient trafficking to primary and metastatic breast tumor lesions. For Aim 2, they showed that therapeutic depletion of MDSC within tumors results in mobilization of killer T lymphocytes to tumor sites, thus allowing them to hone in on breast cancer targets.

Future Directions: The next phase of preclinical experiments will continue to investigate the negative impact of intratumoral MDSC on the recruitment of killer T lymphocytes to tumor sites in models of mouse and human breast cancer; and the role of MDSC in limiting the effectiveness of immunotherapy regimens in current use in US clinical trials for advanced and metastatic breast cancer.

Impact: This investigation generated the first direct evidence that MDSC contribute to immune escape by blocking access of tumor-specific killer T cells to breast cancer targets. Specifically, their data establishes for the first time that intratumoral MDSC act directly on tumor vessels to block trafficking of CD8⁺ cytotoxic effector T cells to the tumor microenvironment, thereby denying access of T cells to tumor cell targets. New discoveries are expected to help guide future testing of the therapeutic benefit of strategic depletion of MDSC prior to the initiation of immunotherapy in breast cancer patients.

3. New York University School of Medicine

Robert J. Schneider, Ph.D.

\$360,000

Reversing Tamoxifen Resistance in Estrogen Receptor Positive Breast Cancer

Introduction/Background: Estrogen Receptor positive (ER+) breast cancers comprise the majority (~70-80%) of breast cancers. Anti-estrogen therapy is the cornerstone of therapy for ER+ breast cancers, but resistance occurs in more than 30% of patients who will relapse and often die of metastatic disease. There is a concerted research effort to reverse resistance to tamoxifen and prevent breast cancer metastasis and death.

Progress Toward Specific Aims: Researchers published in the Journal of Genes & Development at the end of 2017 that represented much of their work funded by this grant. They reported a major part of the molecular mechanism for tamoxifen resistance involving selective translational upregulation of a small number of cancer stem cell-like genes. In the interim they have validated the increased translation of these mRNAs. Importantly, they have narrowed the list of key genes/mRNAs to about six that they are presently testing by siRNA/shRNA silencing in tamoxifen-resistant ER+ breast cancer cell lines to confer sensitivity, and cDNA overexpression in ER+ tamoxifen-sensitive cell lines to confer resistance. They have also assembled a panel of breast cancer tissue biopsies from tamoxifen sensitive and tamoxifen resistant tumors from patients which will soon be tested for the increased expression and protein levels of identified genes/mRNAs and to determine whether tamoxifen resistance is associated with an increased cancer stem cell like, ER- type phenotype.

Future Directions: Researchers will test the gene signature they developed for tamoxifen resistance by comparing signatures for tamoxifen resistance and sensitivity in patient tumor biopsies. They are testing the roles of identified mRNAs by silencing these genes using siRNA and shRNA technologies to test their individual importance in conferring tamoxifen resistance when translationally overexpressed, and re-sensitization when silenced.

Impact: This study has the potential to significantly impact the approach to treating tamoxifen resistance in ER+ breast cancer which could change clinical practice. In fact, their published results have sparked real interest from biotech and pharmaceutical companies to develop a clinical approach for the treatment of tamoxifen-resistant breast cancer based on their reported findings.

Publications: Geter, P.A., Ernlund, A.W., Bakogianni, S., Alard, A. Arju, R. Giashuddin, S., ... & Schneider, R.J. (2017). Hyperactive mTOR and MNK1 phosphorylation of eIF4E confer tamoxifen resistance and estrogen independence through selective mRNA translation reprogramming. *Genes & Development*, 31(22):2235-2249. doi: 10.1101/gad.305631.117.

4. State University of New York Upstate Medical University

Juntao Luo, Ph.D.

\$360,000

Structure-based Nanocarrier Design for Targeted Cabazitaxel Delivery to the Advanced Breast Cancer Brain Metastases

Introduction/Background: Triple negative breast cancers have very high chance to develop brain metastasis. The blood brain barrier prevents chemodrug to reach breast cancer brain metastasis (BCBM) for treatment. Therefore, novel drug formulations and efficient delivery approaches are highly demanded to treat BCBMs. Researchers propose to develop an efficient nanocarrier for the tumor-targeted delivery of a potent drug, cabazitaxel, for BCBM treatment.

Progress Toward Specific Aims: Researchers have refined the strategy for computational and rational design of telodendrimer nanocarrier. A series of nanocarriers have been synthesized to improve the stability of cabazitaxel nanoformulation and prolong the release profile. Optimized nanocarriers have been identified for further *in vitro* and *in vivo* testing. In Aim 2, they tested the *in vitro* toxicity of new drug nanoformulations. In Aim 3, they have implanted intracranial breast cancer xenograft in nude mice and the tumor targeting and biodistribution properties of the optimized nanoformulations have been evaluated in these mice. They are currently implanting more intracranial tumor models for treatment studies.

Future Directions: Researchers will finalize *in vivo* toxicity study of nanoformulation and continue the *in vivo* treatment for Aim 3.

Impact: A new strategy for nanocarrier design has been developed through the combinational group contribution to maximize drug nanocarrier interactions. Stable nanoformulation can be developed to reduce side effects of cabazitaxel and increase breast cancer targeting, including intracranial metastasis. It is promising to be translated into clinical practice to apply the third generation of taxane drug to treat breast cancer brain metastasis.

Publications: Zhong, Y., Zeberl, B., Wang, X., & Luo, J. (2018). Combinatorial approaches in post-polymerization modification for rational development of therapeutic delivery systems. *Acta Biomaterialia*, (73)21-37. doi: 10.1016/j.actbio.2018.04.010.

Wang, X., Shi, C., Wang, L., & Luo, J. (2018). Polycation-Telodendrimer Nanocomplexes for Intracellular Protein Delivery. *Colloids and Surfaces B: Biointerfaces*, 162: 405-414. doi: 10.1016/j.colsurfb.2017.12.021.

Guo, D., Shi, C., Wang, X., Wang, L., Zhang, S., & Luo, J. (2017). Riboflavin-Containing Telodendrimer Nanocarriers for Efficient Doxorubicin Delivery: High Loading Capacity, Increased Stability, and Improved Anticancer Efficacy. *Biomaterials*, (141)161-175. doi: 10.1016/j.biomaterials.2017.06.041

Wang, L., Shi, C., Wright, F.A., Guo, D., Wang, X., Wang, D., ... & Luo, J. (2017). Multifunctional Telodendrimer Nanocarriers Restore Synergy of Bortezomib and Doxorubicin in Ovarian Cancer Treatment, *Cancer Research*, 77(12), 3293-3305. doi: 10.1158/0008-5472.CAN-16-3119.

Wang, X., Shi, C., Zhang, L., Lin, M., Guo, D., Wang, L., ... & Luo, J. (2017). Structure-Based Nanocarrier Design for Protein Delivery. *ACS Macro Letter*, 6 (3), 267–271. doi: 10.1021/acsmacrolett.6b00982.

5. The Research Foundation of CUNY, City College of New York

David Jeruzalmi, Ph.D.

\$347,200

Laying the Foundation for Combination Therapy Against Breast Cancer: Analysis of Human Shelterin-DNA Complex

Introduction/Background: Researchers are investigating the shelterin protein complex, a large ensemble that protects telomeric DNA from erosion. The shelterin protein complex consists of six proteins (called TRF1, TRF2, POT1, RAP1, TIN2, and TPP1) that assemble on telomeric DNA to protect the ends of eukaryotic chromosomes. The major goals of this project are to assemble the shelterin – DNA complex from purified proteins and to begin to perform low resolution structural analyses of the assembled complex.

Progress Toward Specific Aims: This project encompasses three aims: to express and purify the six proteins, which comprise the shelterin complex; to reconstitute the shelterin complex alone or in complex with telomeric DNA; and to perform low-resolution structural analyses and initiate crystallization trials of shelterin. During this reporting period, researchers have recombinantly expressed and purified three of the six proteins (RAP1, TRF1, and TIN2) that comprise the core shelterin complex.

Future Directions: Researchers are continuing their efforts to express and purify TRF2, POT1, and TPP1. Reconstitutions will be carried out with recombinant shelterin and oligonucleotides that are models for the telomere. Experiments to optimize this oligonucleotide for the length of the double and single stranded segments will be performed as necessary to achieve the smallest oligonucleotide that still displays nanomolar affinity.

Physical and structural analysis of shelterin and shelterin-DNA analyses will be carried out using static and dynamic light scattering studies to reveal the hydrodynamic behavior and molecular mass of the shelterin complexes. In addition, small angle X-ray scattering (SAXS), a solution technique that provides estimates for the molecular mass, volume, radius of gyration and the maximum diameter of a molecule will also be used to study shelterin complexes. Once complexes of appropriate quality are obtained, they will examine them using negative stain electron microscopy. Structure determination by cryogenic electron microscopy and/or X-ray crystallography will be applied, as appropriate, to samples that emerge from their process.

Impact: The shelterin complex contains the TRF1, TRF2, POT1, RAP1, TIN2, and TPP1 proteins. Except for the structures of component proteins, very little is known about the architecture of the complete shelterin-telomeric DNA complex, and this has hampered the search for agents that target breast cancer. To fill this gap, researchers will reconstitute the complex from recombinantly produced proteins, and apply X-ray structural methods to discover insights into its structure and function. Their work will provide a treasure trove of previously inaccessible molecular targets against which to design more effective drugs.

6. The Research Foundation for SUNY Stony Brook

Chia-Hsin Chan, Ph.D.

\$359,999

A New Strategy and Tool to Tackle Cancer Stem Cells and Metastasis in Triple-negative Breast Cancer

Introduction/Background: Triple-negative breast cancer (TNBC) is defined by no or low expression of estrogen receptor (ER), progesterone receptor (PR) and Her2/neu, and accounts for about 15-20% of breast cancer. TNBC is one of the most aggressive cancer subtypes that has high probability of relapse, spread and poor clinical outcomes. To date, there are very limited treatment options for TNBC. TNBC features with aberrantly hyperactivated epithelial-mesenchymal transition (EMT) pathway and enriched cancer stem cells (CSCs). The goal of their research is to identify biological accelerants critical for EMT and CSC, hallmarks of this cancer subtype.

Progress Toward Specific Aims: To achieve their goal, researchers proposed to explore the role and regulation of the E3 ubiquitin ligase TRAF6 in EMT and cancer stem cells (CSCs) activation in Aim 1. In the previous reporting periods, they have established that TRAF6 is indeed an activator of EMT pathways and CSCs. Moreover, they identified that MDM2 is a novel regulator of Twist through an E-cadherin reporter assay-based screening. In this reported period, they further investigated the role of MDM2 in CSC functions regulated by Twist. Their results indicate that MDM2 protein contributes to the maintenance of the CSC population, demonstrating that MDM2 is a potential therapeutic target for TNBC.

Additionally, researchers proposed to evaluate whether inhibition of TRAF6 can be a potential strategy to prevent or delay progression and drug resistance of TNBC in Aim 2. They strived to evaluate the effect of TRAF6 inhibition on the development of triple-negative breast tumors and used miR-145 as an alternative approach to target TRAF6 expression. They showed that miR-145 by reducing TRAF6 expression, successfully reduced the expression of mesenchymal markers, recapitulating the effect of TRAF6 knockdown. They also showed that targeting TRAF6 expression by miR-145 decreased the population and activity of CSCs in TNBC cells.

Future Directions: Researchers will continue to elucidate the potential effect of miR-145 on tumor suppression in animal models. They will determine whether TRAF6 targeting by miR-145 considerably improves the efficacy of standard chemotherapy on TNBC cells and CSCs. Additionally, they will assess if co-targeting of TRAF6 and Skp2 by miR-145 and the Skp2 inhibitor cpd #25 retards or prevents the progression of TNBC.

Impact: The knowledge gained from their work will advance the understanding of why TNBC generally recurs quickly after chemotherapy and they will create new approaches for the development of effective therapeutics.

Publications: LA, TH., Chan, CH. (2017). Just How Critical is Epithelial-to-Mesenchymal Transition (EMT) to Metastatic Dissemination? *Journal of Pharmacology and Clinical Trials*. 8-10. doi: <https://doi.org/10.29199/JPCT.101015>.

7. The Research Foundation for SUNY Stony Brook

Scott Powers, Ph.D.

\$350,302

Single-cell Barcoding to Study Breast Cancer Evolution and Drug Resistance

Introduction/Background: The overall goal of this project is to develop and apply new research tools that will help the study of breast cancer progression and the development of resistance to treatments.

Researchers are developing new tools such as single-cell genomic technologies that allow all the individual cells of a breast tumor to be independently assayed. Previously, breast cancer cells were studied “in bulk,” that is, the entire tumor was homogenized and analyzed as if it was all one single cell. However, breast tumors are comprised not only of malignant epithelial cells, but also blood vessels and a variety of immune cells.

Progress Toward Specific Aims: One Specific Aim is to track at the single-cell level the response of breast cancer cells to therapeutic inhibitors and the development of resistance. Researchers have made additional observations supporting the existence of a common program in the development of early resistance that is shared with other cancer types. They also determined that lentiviral introduction of barcodes into mammary epithelial cells in culture is a highly effective method for tracking lineages *in vitro*. A second Specific Aim is to track breast cancer progression at the single-cell level. They have successfully executed this aim, using (1) single-cell RNA-seq of both *in vivo* murine models of breast models and human breast cancer samples, and (2) tracking single cell lineages of mammary epithelial cells, following transduction with a pooled library of different CRISPR-Cas9 deletions of tumor suppressors and growth under restrictive conditions.

Future Directions: Researchers have not yet been successful in tracking single cell lineages using barcoded breast cancer cells following therapeutic inhibition. To ensure completion of this Aim, they are requesting a no-cost extension.

Impact: Researchers believe their results will impact their understanding of breast cancer evolution, particularly resistance to therapies, and the genomic basis of intratumor breast cancer heterogeneity.

8. The Research Foundation for SUNY Upstate Medical University

Mira Krendel, Ph.D.

\$360,000

Myosin 1e as a Potential Therapeutic Target in Breast Cancer

Introduction/Background: Not all breast tumors will progress to invasive/metastatic breast cancer. Some mammary tumors are slow-growing and non-invasive, and patients with these types of tumors have a good prognosis and can be treated conservatively. However, at this time, it is not known what factors separate tumors that remain non-invasive from the more aggressive, metastatic tumors, making it important to identify markers of aggressive tumors. In this project, researchers are aiming to determine how the protein called myosin 1e (Myo1e), which is found in mammary tumors, contributes to tumor progression and metastasis, and whether it can serve as a marker of highly invasive tumors.

Progress Toward Specific Aims: Researchers have found that mammary tumor cells lacking Myo1e exhibit features reminiscent of the normal mammary cells in lactating mammary glands. Moreover, Myo1e-null mammary cells utilize signaling pathways that normally are turned on during lactation. Based on these results, they propose that loss or inhibition of Myo1e directs mammary tumor cells on the path to differentiation and milk secretion instead of the road to malignant transformation and invasion. They are currently working on verifying the specific molecular targets of Myo1e activity identified during this project.

They have also found that chemical inhibition of class I myosins decreases the ability of mammary tumor cells to migrate and invade. These findings suggest that class I myosins may represent a promising target for anti-metastatic drug development.

Future Directions: Researchers plan to determine how Myo1e regulates signaling events that control mammary cell differentiation and milk secretion. They will also continue their experiments aimed at inhibiting myosin activity to prevent metastasis.

Impact: These studies help us understand the role of Myo1e as a marker of metastatic cancer and determine whether it can be used as a target for drug development in breast cancer treatment.

9. University of Rochester

John G. Frelinger, Ph.D.

\$357,747

Amplifying Immune Responses to Breast Cancer Using a Novel IL-2 Therapy to Limit Side Effects and Enhance Efficacy

Introduction/Background: Immunotherapy has great promise for the treatment of breast cancer. Cytokines are key molecules that can enhance immune responses. The cytokine Interleukin-2 (IL-2) is a powerful agent that has immense potential to enhance anti-tumor immune responses. However, when delivered systemically, IL-2 can cause very serious side effects. This project is designed to minimize the side effects of IL-2 while maintaining its efficacy.

Progress Toward Specific Aims: Researchers have developed an innovative Interleukin-2 (IL-2) fusion protein (FP) that is inactive but can be activated by proteases over-expressed by breast cancer cells. They have shown that the IL-2 FPs can be cleaved *in vitro* by these proteases resulting in enhanced IL-2 activity. Moreover, they have shown that genetic variants of IL-2 can preferentially activate immune cells known to be important in effective anti-tumor immune responses. They have also developed a way to obtain sustained expression of proteins *in vivo*. They found that the IL-2 in the context of the FP is functionally inhibited *in vitro* and *in vivo*, a major finding. They have also been able to identify a set of genes that provide a signature that is associated with breast tumor rejection caused by expression of IL-2 in the tumor microenvironment.

Future Directions: Researchers will continue their characterization of the IL-2 FPs using approaches resulting in high sustained levels of the FP *in vivo*. Using tools, they have developed, they will analyze the ability of the FPs to change the tumor microenvironment and control tumor growth.

Impact: Harnessing the immune response to eliminate breast cancers is their long-term goal. Their approach exploits a powerful immune stimulating mediator called IL-2. This approach is designed to minimize side effects while maintaining its efficacy. If successful, this will result in improved treatment of breast cancer.

10. University of Rochester

Mark Noble, Ph.D.

\$359,907

Safer and More Effective Treatment of Luminal Breast Cancer and Overcoming Tamoxifen Resistance

Introduction/Background: Treatment of luminal breast cancer (LBC) with tamoxifen (TMX) is one of oncology's outstanding success stories, but resistance to TMX develops in many patients. Overcoming acquired TMX resistance is particularly challenging as over 30 different means by which cancer cells achieve resistance have been discovered, and many of these mechanisms also confer resistance to other anticancer agents.

Examination of the resistance mechanisms that have been reported indicates many of them can be controlled by a single enzyme, called c-Cbl, offering a possible new means of overcoming resistance. The challenge in harnessing c-Cbl activity to treat cancer, however, is that malignant cancers, including

basal-like breast cancers (BLBCs, which are intrinsically TMX resistant), produce inhibitory proteins that prevent normal c-Cbl activation. Their preliminary studies suggest a similar problem may contribute to acquired TMX resistance in LBC cells.

Researchers have discovered means of restoring c-Cbl function- and conferring TMX sensitivity - in tumors as severe as BLBC and even in glioblastoma (one of the most malignant of all tumors). Moreover, because their approaches are based on discovering new properties of drugs approved for other purposes, their approaches are candidates for rapid transfer to clinical investigations at a fraction of the cost of developing new drugs. This research has been so successful that their treatments for glioblastoma are already moving to clinical analysis. In addition, as their approaches exploit differences between normal and cancer cells, their treatments are more selectively toxic for cancer cells than they are for normal cells and thus should cause fewer and less severe side effects.

Researchers now propose to pursue the clues indicating that a similar strategy can be successfully applied to overcoming acquired TMX resistance in LBCs. Success in this effort will provide new therapeutic strategies suitable for rapid transition from the laboratory to the clinic.

Progress Toward Specific Aims: Researchers are completing multiple *in vivo* analyses demonstrating that their initial hypotheses were correct, and that TMX resistance in LBC cells is controlled by inhibition of c-Cbl. They have pharmacological agents that restore c-Cbl function and restore sensitivity to TMX. They also increase sensitivity to cyclophosphamide.

Future Directions: The critical ongoing experiments are studies *in vivo* to extend their understanding of treatment efficacy and safety, as well as increasing their understanding of the cellular and molecular effects of this entirely new treatment approach.

Impact: If studies continue to progress in the manner they are thus far, they will have discovered a new means of treating tamoxifen resistance in LBCs and will have done so in a manner that enables rapid translation to clinical studies.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Materials Management, Bureau of Pest Management
625 Broadway, 9th Floor, Albany, New York 12233-7254
P: (518) 402-8788 | F: (518) 402-9024
www.dec.ny.gov

APPENDIX III

Annual DEC update to the Health Research Science Board (June 2018) Provided by Scott Menrath on behalf of Richard Dickinson, Chief of the Pesticide Reporting & Certification Section, NYSDEC

2017 Annual Report

DEC staff are currently processing the 2017 annual reports. Staff are working with submitters to help them correct their reports as needed, following up with applicators and technicians who are delinquent in submitting their reports, and imposing violations on those applicators and technicians who have failed to report. It is too early in the process to make any accurate assessments of the quality of data that has been submitted.

2016 Annual Report Data

Letters were mailed December 30, 2016 to the regulated community reminding them to file an annual report of pesticide applications and/or sales made in 2016. A total of 16,928 applicators, technicians, aquatic antifouling paint applicators, and 291 commercial permittees were required to submit an annual report. The reports were due February 1, 2017.

Overdue notices were mailed in March 2017 to 1,675 applicators and technicians and 33 commercial permittees notifying them we had not received their 2016 report. Many of the individuals receiving this notice responded. Notices of Violation and Consent Orders were mailed May 10, 2017 to 835 applicators, technicians and aquatic antifouling paint applicators and 11 commercial permittees that still had not submitted a report as required. Sixty-two applicators, technicians, and commercial permittees paid the fine to resolve their violation. Violations were resolved or removed for 66 applicators, technicians and aquatic antifouling paint applicators and commercial permittees for various reasons (lost mail, typographical errors, extenuating circumstances). A total of 8,683,069 records (which includes sales and applications) were reported for 2016. Of those, 7,747,947 (89%) were submitted electronically and 935,122 (11%) were submitted on paper reports.

2015 Annual Report Data

Letters were mailed January 2, 2016 to the regulated community reminding them to file an annual report of pesticide applications and/or sales made in 2015. A total of 16,610 applicators, technicians, aquatic antifouling paint applicators, and 300 commercial permittees were required to submit an annual report. The reports were due February 1, 2016.

Overdue notices were mailed in March 2016 to 1,686 applicators and technicians and 25 commercial permittees notifying them we had not received their 2015 report. Many of the individuals receiving this notice responded. Notices of Violation and Consent Orders were mailed April 20, 2016 to 762 applicators, technicians and aquatic antifouling paint applicators and 2 commercial permittees that still had not submitted a report as required. Fifty-eight applicators, technicians, and commercial permittees paid the fine to resolve their violation. Violations were resolved or removed for 135 applicators, technicians and aquatic antifouling paint applicators and commercial permittees for various reasons (lost mail, typographical errors, extenuating circumstances). A total of 7,855,160 records (which includes sales and applications) were reported for 2015. Of those, 6,976,070 (88%) were submitted electronically and 909,090 (12%) were submitted on paper reports.

Available Annual Reports

Annual Pesticide Reporting Law (PRL) sales and use summary reports are available on DEC's website from 1997 through 2013. The DEC identified gross errors that affected the data statewide for **2006, 2007, 2008, 2009 and 2010**. DEC and Cornell staff worked together to correct and publish that data. Subsequent to that the 2011, 2012 and 2013 data, aggregated and summarized by zip code and County, was made available to the public on DEC's website. Although the data has not been finalized, summarized data from 2014, 2015 and 2016 is now available on the Cornell website: <http://psur.cce.cornell.edu/>

Uses of the Data

Over the life of the PRL, a significant amount of staff time and resources have been invested in managing the data reported. DEC and Cornell receive, review and aggregate the data by zip code and County for public use. Only health researchers who have been approved by the Health Research Science Board (HRSB) can access and use the site-specific application and sales data. Data about pesticide applications, or data that can approximate it, is necessary for investigating potential environmental impacts from such use. This is important in terms of fulfilling the mandate under Title 7 of Article 33 of the Environmental Conservation Law (ECL) to utilize water quality information in making pesticide product registration decisions as well as implementing other DEC initiatives. Municipalities, public interest groups and others also can and do use the annual aggregated data for education, outreach and other purposes.

Only two entities have ever requested the confidential, site specific-data, and none have requested it since 2006. The New York City Department of Health and Mental Hygiene (NYC DOHMH) requested the confidential data in 2006 for a health study on birth outcomes in New York City; and Cornell University's Water Resources Institute (one of DEC's contractors for groundwater monitoring) requested the confidential data in 2006 to inform their decisions about where to monitor groundwater outside of Long Island and New York City.

Efforts to Improve Data Quality

The large volume of data submitted in the annual reports has proven cumbersome to manage. Also, a large number of errors in many individual reports has caused the quality of the data to be suspect. Based on the suspect quality of the data and other factors, the HRSB recommended in 2013 that the pesticide reporting database be abolished. Following the Board's recommendation, but in light of the need for aggregated data for education, outreach, monitoring and investigation purposes mentioned above, the Governor proposed sweeping changes to the PRL in his SFY 2014/15 Executive Budget which were intended to improve data quality, utility and timeliness. Those changes were not enacted.

Since then DEC has attempted to improve data quality in several ways. DEC met with representatives of several associations representing commercial and private applicators to discuss their concerns and questions about recordkeeping and reporting. Beginning in 2014 annual report reminder letters sent to applicators in January included more detailed instructions than in the past, along with examples of common reporting errors to avoid. DEC also drafted guidance on recordkeeping and reporting, shared it with several applicator associations for review and comment, and posted it on DEC's website in 2016. Finally, although not a new procedure, Cornell developed a program a number of years ago that reviews the annual report data and identifies errors. Cornell then provides a report of those errors to DEC.

For the 2016 Annual Reports, DEC has continued the process of reviewing paper reports as they are received. This requires a significant amount of staff time and diverts staff from other duties. When errors are identified, the report is set aside, and the submitter is contacted to correct the report. Similarly, staff at Cornell also reviewed the electronic reports for errors as they were received. When an error was identified, the report was rejected, and the submitter was contacted to make any necessary corrections. This has proven to result in a demonstrable and dramatic improvement in the quality of the data imported into the database. As stated before, Cornell runs a program that reviews the data and provides us with a spreadsheet of errors found. In the past that spreadsheet would contain roughly 3,000 errors. The report received on the most current year's data contained just over 900 errors, which represents a reduction of some two-thirds.

DEC is also in the midst of a project to develop a comprehensive, in-house pesticide program database, which is replacing multiple, separate databases maintained by Cornell. A planned future phase will move the pesticide reporting database to DEC. It is anticipated this will include the development of a web-based portal for submission of pesticide annual reports, which will be designed to make reporting easier and improve data quality by preventing some, but not all, common data input errors. Other methods that might streamline and simplify electronic reporting for applicators will be evaluated and pursued at that time.

As noted above, concerns about the efficiency and utility of the data for health research purposes led the Board to recognize in 2013 “that the pesticide database no longer meets its primary purpose, to provide scientifically useful information regarding a relationship between pesticide use and human health, and recommends that the database should be abolished.” The Board therefore recommended that §§ 33-1205 and 33-1207 of the ECL be modified so that reporting of pesticide use and sales would no longer be required and related provisions of the Public Health Law be modified as appropriate.

Despite DEC and Cornell's efforts to improve the submitted data, significant and serious concerns remain about its quality and the tremendous resources expended to collect and manage this voluminous data, which is not being utilized as originally envisioned in the PRL. While the current site-specific PRL data may not be used or useful for health research purposes, it is important and necessary to collect some form of pesticide use and sales data for monitoring, investigation, trend analysis, outreach and education, and other evaluations. DEC continues to recommend that the PRL be modified to accomplish these purposes.

PRL Audit

The PRL program has been undergoing an audit conducted by the Office of the New York State Comptroller (OSC) since the summer of 2017. OSC should make the final report available by the end of 2018.

Reports on Pesticide-Related Topics

The following reports on pesticide-related topics have been issued since the Board's inception. The Legislative mandates for the reports are noted in parentheses:

- Data Sets Collected and Maintained by New York State Government that May Assist Researchers Engaged in Breast, Prostate or Testicular Cancer Research, January 1999 [Public Health Law § 2412]

- Pesticide Use and Pesticide Exposure, May 1999 [Public Health Law § 2411(1)(f)]
- Reference List: Pesticide Use and Pesticide Exposure, May 1999 [Public Health Law § 2411(1)(f)]
- Reference List: Pesticide Use and Pesticide Exposure, September 2002 [Public Health Law § 2411(1)(f)]
- Comparison of Pesticide Reporting and Pesticide Use, February 2000 [Public Health Law § 2411(1)(g)]
- Survey Results and Recommendations – Pesticide Reporting Law, February 2001 [Public Health Law § 2413]
- Results of the 2002-2003 Survey on Pesticide Reporting and Board Recommendations, March 2005 [Public Health Law § 2413]
- Household Pesticide Use Report to the Health Research Science Board, June 2009 [Public Health Law § 2413]

Copies of these reports or information about the Board’s pesticide-related activities may be obtained by calling the DOH toll-free at 1(800) 458-1158, extension 2-7950.

Status of Agency Actions on HRSB Recommendations on Pesticide Reporting 2000-2018

SOURCE*	RECOMMENDATION	STATUS
	Recommendations not requiring a change in legislation	
2000(2)	1. Continue to inform researchers of the availability of funds for research on cancer and of the availability of the pesticide data for research.	This is an ongoing effort. The availability of funds continues to be publicized. A web page describing and linking to the Pesticide Sales and Use Database has been added to NYSDOH’s Environmental Public Health Tracking web site.
2000(3), 2006 (2), 2010 (5)	2. DEC should emphasize accurate reporting of the data by continuing to develop and implement quality assurance and quality control procedures. Incorporate checks on the following (2006):	This is an ongoing effort. (See also #5 in this section.) DEC reinstated checking of paper reports as they are received, an activity suspended for a period due to resource constraints. Electronic reports are also reviewed as they are received. Reports with errors are rejected and the submitter contacted to correct the report. Programs continue to be used to identify and correct errors in the database. DEC is developing an in-house pesticide database that is expected to include a web-based portal for reporting that will have input requirements that will improve data quality by preventing

SOURCE*	RECOMMENDATION	STATUS
	<ul style="list-style-type: none"> a. very similar amounts reported for multiple ZIP codes b. liquids reported as pounds and solids as gallons c. quantities reported at county and ZIP code levels that differ by more than an order of magnitude d. outliers. 	<p>some, but not all common errors. DEC continues to speak at outreach events in an attempt to clarify reporting requirements and also continues to meet with various associations which represent the regulated community in hopes of reducing submissions with errors.</p>
2000(4c)	3. Explore ways to assist the pest control industry with the difficulty of reporting amount of concentrate when commercial applicators deal with diluted material.	<p>This is an ongoing educational effort. DEC has done extensive telephone outreach on a case-by-case basis and group meetings and presentations educating applicators how to report correctly. Programs conduct quality checks to find quantities that appear to fall outside of accepted parameters. Not all such errors are detected. However, staff review the “out of range” quantities they identify and contact the responsible applicators and businesses. With the approval of the applicator or business, staff corrects the reporting errors. The input requirements for the web-based portal for reporting being developed will also partially address this issue (see #2 in this section.)</p>
2000(4d)	4. Explore ways to assist reporting of locations without street address (e.g., rights of way, streams, parks, and aerial applications), such as use of a Geographic Information System (GIS) approach.	<p>This is an ongoing effort. A GIS approach cannot currently be used for reporting in all areas of the state; some options, such as reporting mile markers, stream tributary numbers, etc., have been implemented, while others are still being explored. DEC has also posted guidance on reporting and recordkeeping on its website that explains and provides examples of appropriate address information to include in PRL annual reports.</p>
2000(4e)	5. Explore methods to increase or improve reporting, possibly through development of additional outreach	<p>DEC has continued to meet with several associations of commercial and private applicators to discuss issues that the regulated community has with reporting requirements. More detailed instructions on reporting are sent</p>

SOURCE*	RECOMMENDATION	STATUS
	and/or enforcement activities and electronic reporting.	to applicators annually, including examples of common errors to avoid. Enforcement actions are taken each year against applicators and sellers that do not report. Over 85% of the more than 7 million records reported for 2014 (sales and applications) were reported electronically.
2006 (3), 2010 (3)	6. Explore the possibility of making available an application line-item dataset with no confidential information for counties and ZIP codes.	DEC will explore the feasibility of a line-item dataset for counties and ZIP codes. This initiative would require additional resources.
2006 (4), 2010 (4)	7. To county and ZIP code data, explore the possibility of adding number of applications, license type to distinguish structural and landscaping activities, and summary statistics (mean, median, maximum).	DEC will explore the feasibility of adding the number of applications to county and ZIP code data. In most cases, reports are not submitted by an individual applicator, but by businesses, listing all applicators in their employ. In addition, many applicators have multiple categories of certification. Therefore, license type cannot be determined for each application. This initiative would require additional resources.
2006 (5), 2010 (8)	8. Explore ways to include fields from the Pesticide Product Ingredient and Manufacturer System (PIMS) or to include the ability to link to PIMS or to the EPA Pesticide Product Information System.	There are links to PIMS available on the website, but not within the report data. This would require major programming changes to the database. This initiative would require additional resources.
2006 (7)	9. Increase DEC's budget and the funds provided by contract to Cornell.	The funds allocated under the Environmental Protection Fund (EPF) for PRL-related activities has varied yearly and has not allowed for increased contract funding for Cornell's activities.

SOURCE*	RECOMMENDATION	STATUS
2010 (1)	10. Release publicly available data for 2006 and subsequent years	Errors in data reported for 2006-2010 were identified and corrected. Annual reports for 2006-2009 were posted on the DEC web site in 2014, and the data were added to the searchable database on the Cornell web site. The 2010 through 2013 annual reports were posted on the DEC web site and the data has been added to the searchable database on the Cornell website. The 2014 through 2016 data were added to the Cornell searchable database and made available to the public in 2018.
	Recommendations that may require a change in legislation	
2006(1), 2010 (2)	Allow local health agencies access to the confidential data for surveillance purposes	Researchers including local health agencies can apply to the Health Research Science Board for access to the confidential data. One of the criteria for releasing the data is that the data have to be used for human health-related research. Some forms of surveillance may be considered research, while other forms may not meet the criterion for human health-related research. A change in law would be required to allow local health agencies access to the confidential data without requesting the data from the Health Research Science Board.
	Recommendations requiring a change in legislation	
2013	The Board found that the pesticide database no longer meets its primary purpose, to provide scientifically useful information regarding the relationship between pesticide use and human health, and recommended that the database should be abolished.	Changes to the Pesticide Reporting Law intended to improve data quality, utility, and timeliness were proposed in the SFY 2014/15 Executive Budget. Those changes were not enacted in the final budget. However, the deficiencies in the PRL have not been eliminated despite steps to mitigate them.

SOURCE*	RECOMMENDATION	STATUS
	the crop/site for private applicator sales of general use pesticides intended for agricultural purposes.	
2000(L4)	4. DEC should identify options for including data on pesticides purchased and applied by private citizens in the database and report on these options to the Board, and should review the upcoming reports from Wisconsin and Oregon, which are currently conducting scoping studies of this issue.	The Board reviewed results of Oregon's pilot survey on household use reporting and voted not to pursue such a survey in New York because of questionable usefulness and the greater cost of conducting such a survey in New York.
2006 (L1), 2010 (6)	5. Mandate electronic reporting.	An electronic reporting option is in place and was emphasized at workshops held throughout the state and by direct mailing to applicators and sellers. Due to extensive outreach efforts, electronic reporting has increased, with over 85% of the more than 7 million records reported for 2014 (sales and applications) reported electronically. However, to mandate electronic reporting would require a statutory change.
2006 (L4)	6. Revise the requirement for the length of time that commercial applicators, sellers of pesticides, and private applicators must maintain records, to a period of not less than 7 years.	This would require a change in statute. The law currently states that records must be maintained for a period not less than 3 years.

SOURCE*	RECOMMENDATION	STATUS
	Recommendations that have been implemented	
2000(4a)	1. Include a reference in the report to the Governor and Legislature to the Pesticide Poisoning Registry Report from NYSDOH.	Done. The annual report to the Governor and Legislature now includes a reference to the Pesticide Poisoning Registry.
2000(4b)	2. Include a reference in the report to the Governor and Legislature to documents that will provide information on the potential for specific pesticides to leach into the groundwater.	Done. The annual report to the Governor and Legislature includes a reference to documents that provide information on the potential for specific pesticides to leach into the groundwater.
2002-03(3)	3. Include in the biennial reports references to studies that have been stimulated or influenced by the database as examples of how PSUR data could stimulate higher-level research.	A list of studies published in the scientific literature that were stimulated or influenced by the PSUR data appeared in the 2003-04 biennial report. Additional publications are presented in each subsequent report.
2000(1), 2006 (1)	4. NYSDEC should express data in both pounds of product and pounds of active ingredient.	Done. This requires knowing the specific gravity of every product registered in NYS. DEC altered its internal processes to capture this information as products are registered. It has taken several years to capture most of the specific gravities for the 14,000 registered products. DEC made significant progress toward expressing data in both pounds of product and pounds of active ingredient. DEC and Cornell developed a website which provides active ingredient summarizations of the data, starting with year 2003 data.
2002-03(2)	5. Modify the web sites for ease of use and flexibility in creating reports.	The active ingredient website provides a more modern look and feel. It provides multi-year searching capabilities. It also incorporates a number of features that enhance the site's usability. For example, to make it easier to identify which zip codes to use in a search, the

SOURCE*	RECOMMENDATION	STATUS
		user can select all the zip codes that are contained in or partially contained in a county. Documents have been added to the site to assist in pesticide product searches, including FAQs, a data dictionary, and glossary.
2002-03(4)	6. Explore the possibility of using pesticide-poisoning data in conjunction with the PSUR data.	Using pesticide poisoning data in conjunction with the PSUR data would not be productive since about 99% of the pesticide poisoning reports involve improper use of unrestricted pesticides that can be purchased at retail outlets, such as hardware stores and home centers. These products are not included in the PSUR database. However, DOH is exploring the usefulness of the PSUR data for environmental health surveillance as part of the Environmental Public Health Tracking Program.
2006 (6)	7. Explore ways to decrease the time from a researcher's request for the confidential data to receipt of the data.	The Committee on Access to Pesticide Registry and Pesticide Application Information modified its process to improve efficiency by incorporating a pre-review process whereby 3 members of the committee review the application to determine if it has enough information for the committee to make an informed decision. Without delaying scheduling of a meeting of the Board, staff members work with the applicant to obtain any additional information needed before the meeting.
2002-03(1)	8. Explore whether the data can be aggregated by different categories such as use category, different geographical units, etc.	Done. The active ingredient website contains data aggregated by use category (fungicides, insecticides, herbicides, etc.), as well as statewide, county, zip code or DEC Region.

*Year of survey from which recommendation originated, with number from the original table or list.

APPENDIX IV

Roster of Members

January 1, 2017 - December 31, 2018

Douglas Conklin, Ph.D., Chair¹
State University of New York at Albany
Albany, NY

Beverly Canin¹
Breast Cancer Options, Inc.
Kingston, NY

Maria Torroella Carney, M.D.⁵
North Shore-Long Island Jewish Health System
Great Neck, NY & New Hyde Park, NY

Victoria Derbyshire, Ph.D.³
New York State Department of Health
Commissioner's Designee
Albany, NY

Jeanette Dippo, R.N., M.S.²
State University of New York College at Cortland
Cortland, NY

Donald W. Distasio¹
Onondaga, NY

Susan K. Gibbons, M.D.^{1,5}
Albany Medical Center
Albany, NY

M. Suzanne Hicks, M.S.W.¹
Rensselaer, NY

Diana E. Lake, M.D.¹
Memorial Sloan-Kettering Cancer Center
New York, NY

Annette T. Lee, Ph.D.¹
The Feinstein Institute of Medical Research
Manhasset, NY

Catherine Putkowski-O'Brien, L.C.S.W.²
Research Foundation of the City University of New
York; Licensed Certified Social Worker Private
Practice
Staten Island, NY

Regina Resta, M.D.^{1,4}
New York Oncology Hematology, P.C.
Troy, NY

Charles L. Shapiro, M.D.^{1,5}
Mount Sinai Hospital; Dubin Breast Center;
Tisch Cancer Institute
New York, NY

James L. Speyer, M.D.¹
New York University School of Medicine,
New York University Clinical Cancer Center
New York, NY

Marc Wilkenfeld, M.D.¹
Winthrop University Hospital
New York, NY

- ¹ Voting member as of December 31, 2018
- ² Non-voting member as of December 31, 2018
- ³ Ex-officio non-voting member
- ⁴ Appointed during 2017-2018
- ⁵ Service concluded during 2017-2018

APPENDIX V

STAFF SUPPORT TO THE BOARD

DEPARTMENT OF HEALTH

Wadsworth Center

Carlene Van Patten

Associate Director for Administration

Andrea Garavelli¹

Extramural Grants Administration Director,
Executive Secretary to the HRSB

Teresa K. Ascienzo

Charles J. Burns

George Cotich, Jr.

Ed McCormick

Farrah M. O'Brien

Brian Rourke¹

Mary Thatcher¹

Jeannine Tusch

Extramural Grants Administration

**Center for Environmental Health
Bureau of Environmental and
Occupational Epidemiology**

Syni-An Hwang, Ph.D.

Carole Ju, M.S.²

Ryan MacFee¹

**Division of Legal Affairs
Bureau of House Counsel**

Joan K. Harris, Esq.²

Jonathan B. Karmel¹

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**Division of Materials Management
Bureau of Pest Management**

Richard Dickinson

Scott Menrath, P.E.

¹ Service commenced during 2017-2018

² Service concluded during 2017-2018