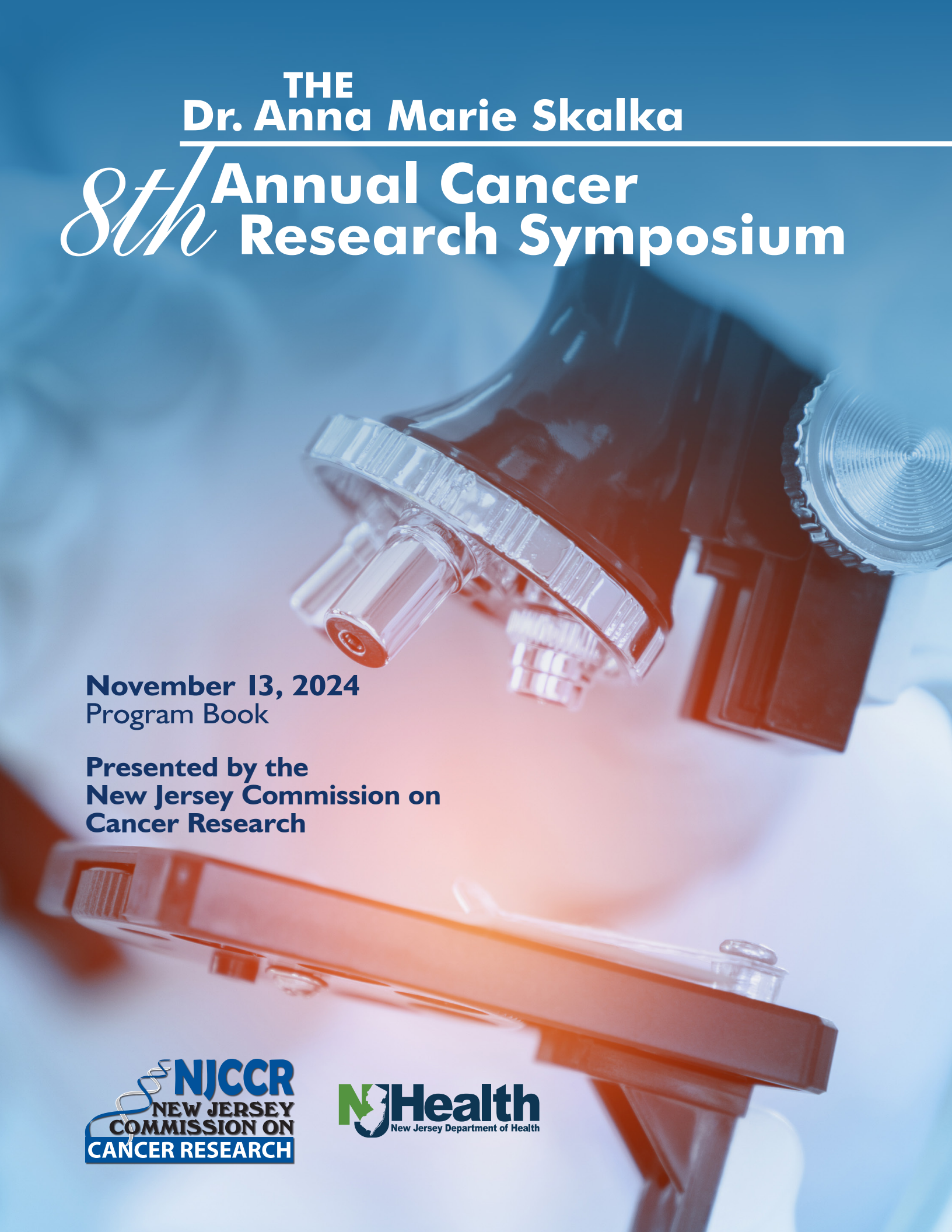
THE Dr. Anna Marie Skalka 8th Annual Cancer Research Symposium



November 13, 2024
Program Book

Presented by the New Jersey Commission on Cancer Research

NJCCR NEW JERSEY COMMISSION ON CANCER RESEARCH

NJHealth New Jersey Department of Health

THE Dr. Anna Marie Skalka 8th Annual Cancer Research Symposium

NJCCR
NEW JERSEY COMMISSION ON CANCER RESEARCH

The New Jersey Commission on Cancer Research was ushered in by the Cancer Research Act in 1983, to support its activities. This Act resulted from the collaborative efforts of people with cancer and their families, clinicians, academicians, scientists, public officials, and representatives of research, pharmaceutical industry, and non-profit organizations.

Agenda at-a-Glance

8:30 am **Registration and Continental Breakfast**

9:00 am **Welcome**
Kenneth Adler, MD, *Chair, NJCCR*

9:10 am **Keynote Address**
New Insights into Molecular Virology of Hepatitis B
Alexander Ploss, PhD
Department of Molecular Biology
Princeton University

10:00 am **2025 Grantee Presentations**
Jessie Yanxiang Guo
Xinlu Han
Heather Derry-Vick
William Rodriguez Jr.
Zhaohui Feng
Sereno Lopez-Darwin
Jeremy Willekens
Liza Elif Guner

11:30 am **Networking Lunch/Poster Sessions**

1:00 pm **Panel Discussion**
Employment, Career Paths and Trends in Cancer
Dr. Soumitra Bhuyan, *Rutgers Bloustein School of Planning and Public Policy*
Dr. Tanya Borsuk, *Rutgers Office for Research*
Dr. Peter Cole, *Robert Wood Johnson Medical School*
Mary O'Dowd, MPH, *Rutgers Global Health Institute*
Dr. Ramy Sedhom, *Penn Center for Cancer Care Innovation*
Antoinette Stroup, PhD, *New Jersey State Cancer Registry and Rutgers School of Public Health*

2:00 pm **Award Presentations**
Legislative Champion Award
Dr. Jonathan Yavelow Mentor Award
Patient Advocate Award

2:30 pm **Concluding Remarks**

3:00 pm **Business Meeting**

NJCCR NEW JERSEY COMMISSION ON CANCER RESEARCH

Mission: *To ensure that the people of New Jersey receive the fullest benefit of our nation's fight against cancer through its promotion of research into the causes, prevention and treatment of this disease.*

Vission: *To promote significant, original research in New Jersey and to fund talented researchers exploring the causes of cancer.*

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NEW JERSEY COMMISSION ON CANCER RESEARCH

Table of Contents

Photography/video will be taken at this event. If you do not want to be filmed or photographed, please speak with a staff member.

- **Legislative Champion Award:** The Legislative Champion Award is given to a state legislator or an individual who has championed cancer research at the state level. Past recipients have championed the New Jersey Commission on Cancer Research's work in funding state cancer research including: support for restoring state funding cuts to cancer research, introducing state legislation that would create a dedicated funding source for cancer research, and additional resources for cancer researchers at the state level in New Jersey.

- **Patient Advocate Award:** The Patient Advocate Award is dedicated to honoring advocates in the community who work to support cancer patients, whether pushing for early detection of cancer, better treatment options for cancer patients, or advocating for cancer research. Past recipients include cancer survivors and zealous advocates who have used their strength to continue the fight to defeat cancer long after treatment is done.

- **Dr. Jonathan Yavelow Mentor Award:** The Dr. Jonathan Yavelow Mentor Award was created to honor the work of Dr. Yavelow, a longtime member of the New Jersey Commission on Cancer Research who dedicated his work to mentor students over his storied career. Dr. Yavelow was a Professor of Biology at Rider University for 35 years and a member of the Commission since 1984. He was a dedicated researcher and beloved by his students, many of whom he mentored throughout the years. Mentorship plays a key role in supporting a successful career in cancer research. Therefore, outstanding mentors in cancer research are eligible for this award.

Legislative Champion Award: James S. McGarry

James McGarry served as the Public Affairs Consultant for the New Jersey Commission on Cancer Research (NJCCR) and has over 25 years of experience in constituent services, policy development, and legislative communications. Mr. McGarry was responsible for the development of strong working relationships with key members of the legislature and congressional delegation. He was also responsible for the implementation of an innovative government affairs program involving diverse critical issues and special interest groups, including the statewide medical and long-term care system, as well as the public health infrastructure.

Prior to his service to the NJCCR, Mr. McGarry was a Gubernatorial appointee to the New Jersey Governor's Advisory Council on AIDS, Council President of the North Plainfield Borough, and Chairman of the Somerset County Library Commission. He continues to provide a variety of community activities and service in Somerset County. During his tenure with the Commission, Mr. McGarry was instrumental in achieving bipartisan support for Senate bill S929 and A2869. He continues to promote the establishment of a $10 million dedicated, non-lapsing fund for cancer research in New Jersey.

Patient Advocate Award: Deborah Q. Belfatto

Deb Belfatto is an experienced community activist who has been a leading champion and advocate for women's health and wellness for more than 30 years. She is passionate about and committed to empowering women, advancing women's health initiatives, forging greater health care equity for women, and improving access for all to quality health and wellness care. As the Founder of Susan G. Komen North Jersey (1997), Ms. Belfatto has served as its Executive Director for 16 years, during which time the organization raised over $20 million that helped fund national breast cancer research initiatives and local grants to community non-profit organizations. After being diagnosed with breast cancer for a second time in 2021 (a new diagnosis, not a recurrence, 35 years after her first one), she launched *Let's Talk Women's Health & Wellness*™, a major movement focused on educating and motivating women to shift their mindset towards prioritizing health and wellness and becoming their own best self-advocates. This movement is built on a

2024 Awardees

foundation of five primary pillars—human connection, physical well-being, spiritual wellness, financial health, and mental health—all of which are essential to achieve true, complete health and wellness. The annual *Let's Talk* full-day symposium, which premiered at the New Jersey Performing Arts Center in 2022, offers plenary sessions, panel discussions, and breakout sessions featuring leading experts, physicians, and wellness professionals integrated with fun and exciting experiences. Over the years, Ms. Belfatto has received recognition for her leadership and contributions to the community from a variety of organizations, magazines, and business publications.

Dr. Jonathan Yavelow Mentor Award: Danelle Devenport, MSc, PhD

Danelle Davenport's research focuses on how cells assemble into highly ordered structures to produce functional organs. Currently, she studies how directional signals instruct cells to organize cellular structures at specific positions and orientations across a tissue. This phenomenon, called planar polarity, can be found in nearly all epithelial tissues but is particularly striking in epidermal structures like scales, feathers, and hairs that are precisely and coordinately aligned over the entire surface of the vertebrate body. Using mammalian epidermis as a model system, Dr. Devenport is dissecting the mechanisms of how cells 'sense' direction and coordinate cellular morphogenesis over long distances. In addition, she focuses on how highly regenerative tissues maintain their precise organization despite continuous proliferation and turnover.

Her honors and fellowships include: the Searle Scholars Award; Vallee Foundation Young Investigator Award; American Cancer Society Research Scholar Award; NIH K99/R00 Pathway to Independence Award; Ruth L. Kirschstein National Research Service Award for postdoctoral research; The Wellcome Trust Fellowship and PhD Studentship; Overseas Research Student Award from Cambridge University; International Student Fellowship from the University of British Columbia; and a Howard Hughes Undergraduate Research Fellowship.

Dr. Devenport received her PhD from the University of Cambridge in 2004 and was a postdoctoral fellow at The Rockefeller University until 2011. She holds an MSc from the University of British Columbia and a BS from Humboldt State University in California.

Grantee Presentations

Jessie Yanxiang Guo, PhD
Category: *Pilot*
Title: *A pilot investigation on autophagy-mediated regulation of antigen-specific T cell and B cell responses in KL lung tumorigenesis and cancer treatment*

Xinlu Han, EngD
Category: *Postdoctoral Fellowship*
Title: *Regulation of urea cycle enzymes in hepatocellular carcinoma*

Heather Derry-Vick, PhD
Category: *Pilot*
Title: *Psychosocial influences on physical health burden among people living with metastatic colorectal cancer in New Jersey*

William Rodriguez Jr., PhD
Category: *Postdoctoral Fellowship*
Title: *Investigating virus-driven remodeling of organelle membrane contacts by oncogenic herpesviruses*

Zhaohui Feng, PhD
Category: *Pediatric*
Title: *Mutant p53 in pediatric osteosarcoma*

Sereno Lopez-Darwin
Category: *Predoctoral Fellowship*
Title: *Designing pathway activity prediction algorithms for spatially-resolved transcriptomics to analyze nutrient partitioning in breast cancer*

Jeremy Willekens, PhD
Category: *Pediatric*
Title: *Understanding the pathophysiology of chemotherapy induced cognitive impairment and identifying early biomarkers in a methotrexate treated juvenile rat model*

Liza Elif Guner
Category: *Predoctoral Fellowship*
Title: *Engineering Lipid Nanoparticles to Target Programmed Death-Ligand 1 (PD-L1) in Pediatric Acute Myeloid Leukemia*

Postdoctoral Research Fellowship Recipients

Postdoctoral Research Fellowship Recipients

Category: Brain

Project Title: ***Astrocyte-derived extracellular matrix proteins in development of the tumor microenvironment. COCR25PDF001***

Yu Sun, ys5931@princeton.edu
Affiliation: *The Trustees of Princeton University*

Brain tumors are a major cause of mortality worldwide, and current cancer therapies used for other types of tumors are not applicable due to the distinctive cell types that reside in neural tumor microenvironment. The extracellular matrix (ECM) assembled by tumor stromal cells has long been recognized as a critical component for mediating cancer growth and invasion. However, the composition of the ECM in brain tumors is not well understood and the stromal cell types in nerve tissues differ from those found in other tissues. Fibronectin (FN) is the foundational ECM protein that is assembled into fibrils by cell surface receptors and is essential for the incorporation of other ECM proteins into the matrix. Fibroblasts are a major source of FN matrix in non-neural tissues and this matrix is important for tumor formation and cell growth. Astrocytes, representing 20%-40% of brain cells, can secrete FN and have been shown to localize to brain tumors suggesting they provide a matrix for brain tumor progression. However, it is unclear whether crosstalk between astrocytes and tumor cells modulates ECM assembly to generate a microenvironment that promotes tumor cell growth. This proposal aims to: 1) determine the composition and functions of astrocyte ECM assembled in the presence of tumor cells, and 2) determine the role of growth factors produced by astrocytes and tumor cells in ECM production. A co-culture model will be utilized to evaluate the assembly of FN fibrils by astrocytes and tumor cells and to access the cellular contributions and organization of the ECM through biochemical and immunofluorescence imaging analyses. RNA-sequencing has identified FN-binding protein genes up-regulated in astrocytes that are assembling FN matrix and two proteins, tenascin-C and periostin, have been implicated in tumor progression. We will determine the effects of these proteins on tumor growth in the context of a FN matrix. To study crosstalk between astrocytes and tumor cells, we will examine the effects of TGF-β on astrocyte FN assembly and a potential role for insulin-like growth factor-1 (IGF-1) and IGF-1 binding proteins (IGFBPs) in this process. This study will provide valuable insights into the composition and function of the tumor-specific ECM of astrocytes and may identify molecules within the brain tumor microenvironment that could be targeted to reduce cancer progression.

Postdoctoral Research Fellowship Recipients

Grant programs are designed to provide scientific opportunities to attract young and seasoned research scientists.

Category: **Breast, Lung & Bronchus, Prostate, Colon & Rectum, Liver**
Project Title: ***Modulation of DNA-double-strand-break induced tumorigenesis by KU70 methylation. COCR25PDF016***

Md Amjad Beg, mb2277@cinj.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences (CINJ)*

In this research on how our bodies repair DNA and its connection to cancer, we're using a special tool called AsiSI. Think of it like tiny molecular scissors that can precisely cut DNA at specific spots. This controlled method helps us see how cells deal with DNA damage and its potential link to cancer. We have three main goal.: First, we want to see how well the AsiSI mouse model can cause DNA damage and observe its effects on cells and the whole body. This exploration helps us figure out if DNA damage might potentially lead to cancer. Second, we're looking into how a change called KU70 methylation affects the repair of DNA damage caused by AsiSI. We want to understand how this change influences how cells respond to damage and if it's connected to cancer. Third, we're investigating the impact of SETD4, a special protein responsible for KU70 methylation, on how DNA damage happens and if it triggers the process of cancer. By using the AsiSI mouse model, we hope to learn more about how our bodies fix DNA damage and how this might be linked to cancer. This knowledge could be crucial for finding new ways to treat cancer in the future.

Category: **Breast, Hematalogic, Colon & Rectum, Brain & Other Nervous System, Thyroid, Ovary, Melanoma of the Skin**
Project Title: ***Assessing YACS' cancer-related conversations through entertainment media narratives. COCR25PDF018***

Meredith Collins, mkc154@cinj.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences (CINJ)*

Young adult cancer survivors (YACS) (ages 18 – 39) often report distress, anxiety, and depression following their diagnosis. Survivors often find it difficult to maintain normal relationships and connections with their friends hesitant to talk about their experiences because they fear feeling unheard or misunderstood. Friends are often unsure of what to say and how to say it. These worries often lead to no one saying anything at all, which can reinforce and elevate distress among survivors.

Postdoctoral Research Fellowship Recipients

Improving both survivors' and friends' comfort in having these cancer related conversations is crucial to diminishing cancer's burden on young adult survivors. Entertainment media narratives, such as movies, and television shows, could help spark these conversations. Regardless of cancer history, entertainment media narratives might allow young people to connect and bond. It's likely that these narratives are the only exposure to cancer that young people have prior to a diagnosis, making these narratives a natural entry point into an uncomfortable and difficult topic.

However, it's unclear how using entertainment media narratives to prompt effective cancer-related conversations might work. What would these conversations look like? How would survivors and their friends respond to this approach? In response to these questions, this project has three goals: (1) Explain the themes of storylines featuring cancer in entertainment media narratives; (2) Describe the conversations prompted by these storylines between survivors and their friends; and (3) Understand YACS' and friends' experiences during those conversations.

To meet our goals, we will first analyze movies targeted to young adults that prominently feature cancer as a part of the plot. We want to know how the movies show the cancer experience and its related challenges. Then, we will select one of the films and use an excerpt from that film to prompt a conversation about cancer between a young adult survivor and one of their friends. We will analyze these conversations to understand what the participants discuss and how the participants support each other. Finally, we will follow up with our survivor and friend participants to understand their experience during the conversation, including whether they found it helpful and how they would suggest implementing it in the real world.

Category: Breast, Hematologic, Colon & Rectum, Brain & Other Nervous System, Kaposi's Sarcoma, Nasopharyngeal
Project Title: *Investigating virus-driven remodeling of organelle membrane contacts by oncogenic herpesviruses. COCR25PDF022*

William Rodriguez Jr. (Presenter), wr6263@princeton.edu
Affiliation: *The Trustees of Princeton University*

Infections by cancer-causing viruses are responsible for over 20% of cancers worldwide. A significant contribution to this global health burden is driven by herpesviruses including Kaposi's sarcoma-associated herpesvirus (KSHV), Epstein-Barr virus (EBV), and Human cytomegalovirus (HCMV). A core feature of herpesvirus infection and spread is the remodeling of host cell organelles to promote replication. The most striking rearrangements is that of the secretory system (i.e. endoplasmic reticulum (ER), golgi, and endosome compartments) into a massive site of virus assembly and egress. By reorganizing the architecture of these organelles,

viruses also seize control of the movement of cellular signals within and between cells across complex tissue microenvironments. Given their critical roles in cell function, these remodeling events are tied to many infection-derived pathologies. However, how herpesviruses reshape organelles to promote replication and the consequences of these changes on virus-driven tumor formation remain poorly understood. Our group recently uncovered that organelle remodeling during viral infection is directly linked to virus-driven changes in membrane contact sites (MCS), dynamic protein bridges between organelles that regulate organelle biology. Next, while studying the cellular virus microenvironment, we also found many of these same membrane contacts are dysregulated in uninfected cells that neighbor infected cells. Among the most significant changes in these MCSs were contacts between the ER and endosomes, which coordinate trafficking of signaling vesicles both within the cell and their release to surrounding tissues, a process directly linked to herpesvirus tumor formation. Our goal is to determine if herpesvirus induced changes in organelle membrane contacts impact virus assembly and egress and how these shifts in organelle contacts promote pro-tumor cell signaling during infection. This study is the first to study organelle contacts during KSHV and EBV infection and to investigate the role of organelle membrane contacts during virus-induced tumor formation. Through this work, we will uncover novel dimensions of cancer virus biology, cancer progression, and cell biology.

Category: Liver

Project Title: ***Cellular factors involved in the formation of hepatitis B virus covalently closed circular DNA. COCR25PDF026***

Andoni Gomez, ag4895@princeton.edu
Affiliation: *The Trustees of Princeton University*

Liver cancer is one of the most common causes of cancer-related deaths. Approximately 80% of all liver cancers are a result of infections with hepatitis B virus (HBV). Hepatitis B virus frequently causes severe liver diseases to which 900,000 people succumb every year. Unfortunately, this number is estimated to increase significantly over the next two decades.

HBV infection can be prevented with a prophylactic vaccine and antiviral therapy can suppress viremia but rarely leads to a cure, i.e. a complete elimination or permanent inactivation of the virus in the body. Concerningly, patients who are on antiviral therapy remain at a highly elevated risk for developing liver cancer. It is widely accepted that any efforts to cure HBV and consequently prevent liver cancer development must break key steps in the HBV life cycle. This is currently impossible because our knowledge of how HBV establishes and maintains persistence is far from complete.

Postdoctoral Research Fellowship Recipients

This study aims to identify host factors that are essential for HBV persistence. To accomplish this, the study will carry out genetic screens and validate potential hits in advanced cell culture and animal models developed in our laboratory.

Collectively, data from the study will provide a far more comprehensive view of how HBV establishes persistence in infected individuals and the knowledge generated will help to develop new, potentially curative, therapeutic approaches in our fight against this liver cancer causing virus.

Category: Hematologic
Project Title: *Preventing Treatment Resistance in AML: Exploiting Mitochondrial Structural Dynamics. COCR25PDF031*

Sofia La Vecchia, sl2210@pharmacy.rutgers.edu
Affiliation: *Rutgers University, Ernest Mario School of Pharmacy, Department of Chem Bio*

Acute Myeloid Leukemia (AML) is the most common cancer of the blood in adults. In 2022 more than 11,000 patients with AML died in the USA. For the past thirty years, the treatment options for AML have not changed and include mainly chemotherapy or bone marrow transplantation using cells from a matched donor. In 2018, a new oral medication, venetoclax, was introduced for the treatment of patients with AML. Under normal conditions, damaged cells commit suicide by activating a self-destruct program, termed apoptosis. This process is intended to prevent damaged cells from harming the host or, potentially, to progress to cancer. Over the past several years, it has become evident that AML cells, along with virtually all other cancer types, have learned to suppress this protective cell death program, and achieve cellular "immortality". Venetoclax reactivates the apoptotic death pathway in AML cells and selectively kills them. The initial responses of AML patients to venetoclax have been encouraging. Unfortunately, 3 out of 10 patients with AML do not respond to venetoclax, and in many patients who do, AML returns following treatment. In my proposed study, I aim to understand why some patients do not respond to this treatment and how leukemia cells escape apoptosis induced by venetoclax. These basic molecular studies will help design more effective therapies for AML and help develop new treatment strategies to control the disease. While our immediate focus is on improving the treatment of AML, our results may offer new therapeutic approaches for patients with other types of cancers, since apoptotic resistance appears to be a fundamental property of nearly all malignancies.

Category: Liver
Project Title: ***Regulation of urea cycle enzymes in hepatocellular carcinoma. COCR25PDF036***

Xinlu Han (Presenter), xh333@pharmacy.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences (CINJ)*

In mammals, most of the waste nitrogen comes from gut bacteria in the form of ammonia. Ammonia is a toxic substance for the brain, and it is cleared by two main pathways: 1) it is converted into urea by enzymes called urea cycle enzymes (UCEs), and the urea is then excreted in urine; 2) it is used by an enzyme called glutamate dehydrogenase (GDH) to make glutamate (Glu), and then another enzyme called glutamine synthetase (GS) uses it to make glutamine (Gln). In recent years, scientists have found that UCEs and Glu/Gln production are involved in the growth and development of tumors in various tissues. It has been suggested that partially increased UCE activity may help tumors grow by making more pyrimidine and polyamine. Similarly, Glu/Gln production is generally thought to help tumors grow in various cancers. Interestingly, although the liver is the main organ that gets rid of ammonia waste, the roles of the two pathways for getting rid of ammonia in liver cancer have not been fully studied. In the most common type of liver cancer, called hepatocellular carcinoma (HCC), UCE expression is often reduced and this is linked to a worse prognosis, while GS expression is often increased and this is linked to a better prognosis. Using mouse models of HCC, we recently found that a molecule called beta-catenin, which can cause liver cancer, reduced the expression of UCEs and increased the expression of GS. We also found that there were higher levels of ammonia in the blood and fluids around the tumors, and this was even worse when GS was removed from the liver. This data suggests that beta-catenin disrupts the balance of nitrogen in the body and that not being able to get rid of ammonia properly helps HCC grow. The main goals of this study are to investigate the roles of UCEs in HCC and to test the idea that lowering ammonia levels could be a treatment for HCC.

Postdoctoral Research Fellowship Recipients

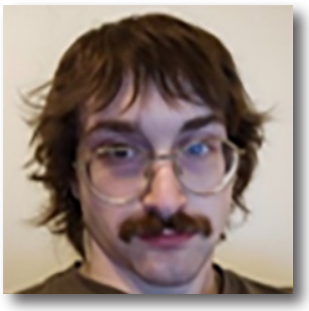
The NJCCR offers Pre- and Post-Doctoral Fellowships to trainees at New Jersey non-profit research institutions with formally established and active graduate research programs.

Predoctoral Research Fellowship Recipients

Predoctoral Research Fellowship Recipients

Category: Kidney & Renal Pelvis
Project Title: *Cytosolic localization of KDM5C and its contributions to kidney cancer. COCR25PRF008*

Eton Victor, eav55@dls.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences*



Clear cell renal cell carcinoma (ccRCC) is a prevalent type of kidney cancer. Like many cancers, it is often caused by changes in certain genes. One gene named KDM5C is frequently missing in ccRCC tumors. This suggests KDM5C may normally help keep ccRCC in check, and when it's missing, tumors can grow more easily. If we understand how KDM5C works, we may be able to find ways to restore its function and treat ccRCC. In our initial research, we discovered that when KDM5C is removed from cells, kidney tumors grow faster because they attract a specific type of immune cell, called neutrophils, into the tumor. These neutrophils actually help the tumor evade our body's immune system. So, in this study, we'll explore ways to counteract this effect by neutrophils and boost our immune system to fight ccRCC.

Interestingly, scientists previously thought that KDM5C mainly operated within the nucleus of cells, where the DNA is stored. This is because it is known to regulate access to DNA. However, our lab has found that KDM5C is mostly located outside of the nucleus, away from the DNA. This is surprising as it raises questions as to why a protein that's supposed to interact with DNA would be found in an area without any genetic material. This project will also investigate what KDM5C is doing in this part of the cell, known as the cytosol, and specifically what other molecules it's interacting with. We'll see if these interactions can shed light on its role in ccRCC and offer more opportunities for developing treatments.

Predoctoral Research Fellowship Recipients

Category: Hematologic
Project Title: ***Engineering Lipid Nanoparticles to Target Programmed Death-Ligand 1 (PD-L1) in Pediatric Acute Myeloid Leukemia. COCR25PRF012***

Liza Elif Guner (Presenter), gunerl47@students.rowan.edu
Affiliation: *Rowan University*

Pediatric acute myeloid leukemia (AML) is the second most common cancer in children. Many cancer treatments, such as chemotherapy and bone marrow transplants, are invasive and have severe side effects. Because of this, there is a push to develop less invasive and more effective cancer therapies. This project serves to address the need for better cancer treatments by using lipid nanoparticles, small drug delivery platforms, to directly target AML cells and stop cancer progression with high levels of safety. Here, we will create lipid nanoparticles specifically to increase immune recognition of cancer cells and decrease cancer cell growth. This therapy will also decrease the level of side effects of traditional treatment methods. Ultimately, this project will help better understand AML as a disease and improve upon ways to target it.

Category: Breast
Project Title: ***Designing pathway activity prediction algorithms for spatially resolved transcriptomics to analyze nutrient partitioning in breast cancer. COCR25PRF016***

Sereno Lopez-Darwin (Presenter), sl1936@princeton.edu
Affiliation: *The Trustees of Princeton University*

Metadherin (MTDH) is an important gene that promotes cancer development with various tumor-supporting effects. One notable effect is its role in metabolism: mice lacking the MTDH gene are leaner, and recent studies have linked it to fat processing. However, we don't fully understand how MTDH controls metabolism in specific cells, such as immune and cancer cells. MTDH is a promising target for cancer treatment, with some of its biological interactions already successfully inhibited to fight cancer. With the growing interest in metabolic therapy for cancer, targeting MTDH's metabolic pathways holds potential for new cancer treatments.

Cancer cells show altered metabolism, a key sign of their disease state. However, developing therapies that target cancerous metabolism is challenging because

Predoctoral Research Fellowship Recipients

cancer and healthy cells share many metabolic features. Many treatments that affect cancer cells also harm healthy cells, particularly immune cells that fight tumors. Understanding these metabolic differences is difficult because current data collection methods can't separate different cell types within a tissue, making it hard to distinguish cancer cell metabolism from that of normal cells.

Gene expression studies, known as transcriptomics, can measure gene activity in single cells. We aim to leverage this single-cell gene expression data by developing computational methods to predict metabolic activity from it. Additionally, by dividing tumors into slices and measuring metabolic and gene expression data in neighboring slices, we will create paired data that allows us to make more accurate predictions.

We will apply these methods to mouse cancer models with and without MTDH. This approach will allow us to understand how MTDH affects the metabolism of cancer and surrounding healthy cells, and thereby identify key enzymes as potential drug targets. Overall, this project can not only yield direct clinical insight into a known cancer gene and its role in regulating metabolism, but also serve as a general framework for investigating the metabolic features of tumors using computational methods.

Category: Breast
Project Title: *Emerin modulation of mechanotransduction facilitates breast cancer metastasis. COCR25PRF018*

Emily Hansen, hansen49@rowan.edu
Affiliation: *Rowan University*

Breast cancer metastasis causes a majority of breast cancer-related deaths. In metastasis, cancerous tumor cells spread through the body by moving into and out of nearby blood vessels by squeezing through gaps in the endothelium. In healthy cells, the nucleus is the major barrier to migration and invasion, as it is large and relatively stiff, preventing movement through small spaces. Nuclei in cancer cells are often smaller and more malleable, allowing for easier metastasis. We showed both invasive breast cancer cell lines and patient samples have less emerin expression, misshapen nuclei, and higher metastasis rates than non-cancerous controls. We hypothesize emerin reduction causes compromised nuclear integrity during metastatic transformation.

The mechanism by which emerin modulates nuclear stiffness is not well understood. Increasing stiffness of the tumor microenvironment (TME) was shown to increase nuclear softening, suggesting emerin may respond to changes in TME through a process called mechanotransduction, where physical stimuli

are converted to cellular signals to cause a response from the cell. Interestingly, this increased stiffness in the TME and subsequent nuclear softening correlates with increased metastasis. Thus, we predict that increased extracellular matrix (ECM) stiffening decreases emerin protein expression to cause nuclear softening. Supporting this hypothesis, we show ECM stiffening decreased emerin expression and altered nuclear integrity.

We posit that emerin is acting as a sensor that responds to extracellular stimuli through the linker of nucleoskeleton and cytoskeleton (LINC) complex by modulating structural and/or transcriptional outcomes to cause nuclear softening and drive metastasis in triple negative breast cancer (TNBC). The LINC complex is the major conduit for transducing mechanical signals (i.e., changes in ECM stiffness) from the cell surface to the nucleus. How emerin transduces these signals and how the loss of emerin causes dysfunctional mechanotransduction during cancer progression has yet to be elucidated. For the first time, our team will use an array of biochemical, biophysical, and cell biological to answer this question. Pursuing this study will lead a greater understanding of how emerin controls breast cancer metastasis and identify novel downstream pathways which may allow us to pinpoint actionable events or druggable targets.

Pilot Research Grant Recipients

Category: Lung
Project Title: ***A pilot investigation on autophagy-mediated regulation of antigen-specific T cell and B cell responses in KL lung tumorigenesis and cancer treatment. COCR25PPR012***

Jessie Yanxiang Guo (Presenter), yanxiang@cinj.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences*

Cancer immunotherapy aims to enhance the immune system's ability to target tumors, including through immune checkpoint blockade (ICB). However, this approach is effective for only a minority of patients, particularly those with immunogenic tumors. Non-small cell lung cancer (NSCLC) with KRAS and LKB1 co-mutations (KL) often presents as an "immune cold" tumor, with reduced immune cell infiltration. Autophagy, the process of self-degradation within cells, plays pivotal roles in various biological functions, including cellular metabolism and stress responses. Growing evidence suggests that autophagy can modulate immune responses by influencing the differentiation of immune cells and cytokine production. Our previous research demonstrated that disrupting host autophagy slows tumor progression and boosts T cell and B cell infiltration in KRAS-driven lung cancer models in mice. However, further Investigating the underlying

Predoctoral Research Fellowship Recipients

The purpose of the Pilot Grants is to provide seed funding for fundamentally sound research projects that address current priority areas.

Pilot Research Grant Recipients

mechanism of host autophagy-mediated antigen-specific T cell and B cell responses during KL lung tumorigenesis is challenging due to the limited mutation burden and weak immunogenicity of conventional mouse models of NSCLC. Thus, we propose generating novel immunogenic preclinical mouse models of lung cancer to investigate how host autophagy critically shapes antigen-specific immune responses in KL lung tumors. We aim to elucidate whether systemic inhibition of host autophagy enhances the effectiveness of ICB for KL lung tumors. This research will advance our understanding of T cell and B cell responses in KL lung cancer and may yield novel therapeutic approaches for lung cancer patients with co-mutations of KRAS and LKB1.

Category: Colon & Rectum

Project Title: ***Psychosocial influences on physical health burden among people living with metastatic colorectal cancer in New Jersey. COCR25PPR018***

Heather Derry-Vick (Presenter), heather.derryvick@hmh-cdi.org
Affiliation: *HMH Hospitals Corporation*

Many people in the United States are living with a type of cancer called metastatic colorectal cancer (mCRC). This means that the cancer has spread to other parts of the body. Better treatments have allowed people to live longer with mCRC, but mCRC can make it difficult for people to live their daily lives and do the things they enjoy. There has been limited research on their well-being and needs. In this study, researchers will learn about the physical health of people with mCRC in northern New Jersey. The researchers want to find out which people with mCRC are having more trouble with their health and day-to-day activities. They also want to find out what helps people with mCRC live well. This study will include 100 people in northern New Jersey who have mCRC. Participants will answer questions about their health, lifestyle (such as diet and sleep patterns), stress, and well-being. They will also complete tests to measure balance, grip strength, thinking, memory, and other parts of their health. They will be asked to donate a small blood sample for future research to look at markers in the blood that relate to cancer. By completing this study, the research team will better understand the health challenges some people with mCRC face. They will also learn about people who are living well with mCRC. This information could lead to new ways to support the well-being of people living with mCRC, which can be tested in future studies.

Pilot Research Grant Recipients

Category: Colon & Rectum, Melanoma of the Skin
Project Title: ***MHC class II peptide loading and the immune response to tumors. COCR25PPR027***

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Studying how the immune system presents antigens through major histocompatibility complex (MHC) class II is crucial to understanding how our bodies fight infections and manage autoimmune diseases. Drugs that activate the immune system, like antiPD1, are the first line treatment for many types of cancer. Despite remarkable success, fewer than 30% of patients have durable responses to these immune checkpoint inhibitor drugs and predicting who will benefit from these treatments is challenging. The MHC class II pathway is essential for effective CD4 T cell anti-tumor responses to these drugs yet there have been no direct studies of this process in the context of cancer. In this application, we propose to study a potent regulator of the MHC class II pathway called H2-O in mice and HLA-DO (DO) in humans. H2-O acts as a brake on MHC class II antigen presentation, affecting which peptides are displayed. If the wrong peptides are shown, the immune system fails to recognize and attack the tumor effectively, even with immune checkpoint therapy. We hypothesize that H2-O plays a critical role in developing strong CD4 anti-tumor responses and will test this idea in this pilot study. These studies are significant because they may uncover new ways to enhance tumor immunity and identify biomarkers to predict how well immune checkpoint therapy will work. Our goal is to pave the way for more effective cancer treatments by targeting these mechanisms.

Pediatric Research Grant Recipients

Pediatric Research Grant Recipients

Category: Hematologic

Project Title: ***Understanding the pathophysiology of chemotherapy-induced cognitive impairment and identifying early biomarkers in a methotrexate-treated juvenile rat model. COCR25PRG001***

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Leukemia is a very treatable disease and most of the children diagnosed with this type of cancer survive. However, about 40 to 70% of children surviving leukemia suffer from cancer treatment side effects, experiencing symptoms like trouble with verbal and visual memory, concentration difficulties, and learning problems. These adverse effects on the brain, caused by chemotherapy, are commonly referred to as "chemobrain". To develop strategies to prevent chemobrain, we need to understand its causes.

This is why our project consists in studying the events taking place within the brain cells after exposure to chemotherapy. To do this, we previously developed a useful experimental model: rats are given chemotherapy at doses similar to what is given to children with leukemia. Many months later, the rats continue to show impaired brain functions, similar to the side effects experienced by children surviving leukemia. We will now use this model to learn how chemotherapy alters the functioning of the genetic material (DNA) within the cells in different parts of the brain. Histones are a group of molecular machineries that can modify the functioning of DNA. We hypothesize that chemotherapy can negatively impact histones in the brain cells, which causes chemobrain. Our project consists in using a cutting-edge technology to study all the histones at one time in the brains of rats suffering from chemobrain.

Additionally, our project will also explore how chemotherapy treatment affects the cerebrospinal fluid, the protective watery liquid that circulates through and around the brain. We think that when chemotherapy is injected into this fluid, it could change its composition, and that these differences can be used to predict the cognitive difficulties often seen in children after treatment. By employing advanced scientific methods, we can analyze all the constituents of cerebrospinal fluid at once in chemotherapy-treated rats. Furthermore, we hypothesize that rats suffering from chemobrain will show specific differences in their cerebrospinal fluid composition. Understanding the changes in the brain and in the cerebrospinal fluid of rats suffering from chemobrain is a crucial step towards understanding and eventually preventing chemobrain in children who have survived leukemia. Our goal is to improve prediction and prevention of chemobrain to significantly improve the lives of children who have beaten leukemia.

Pediatric Research Grant Recipients

Category: Osteosarcoma
Project Title: ***Mutant p53 in pediatric osteosarcoma. COCR25PRG005***

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Osteosarcoma is a type of malignant bone tumors that predominantly affects children, teenagers, and young adults. Despite advancements in chemotherapy and surgery, the five-year survival rate remains stagnant at ~60-70% for osteosarcoma patients and is even lower for osteosarcoma patients with metastasis. Therefore, there is an urgent need for the development of novel therapeutic strategies for osteosarcoma. As a hallmark of cancers, metabolic reprogramming plays a critical role in promoting cancer progression. Tumor suppressor p53 is the most frequently mutated gene in cancers. p53 mutations occur in ~50-60% of osteosarcoma. Currently, the precise role and mechanism underlying mutant p53 in osteosarcoma is poorly understood. Given that p53 is frequently mutated in osteosarcoma, especially in pediatric osteosarcoma, a better understanding of the mechanism of mutant p53 in metabolic reprogramming and in osteosarcoma could lead to the development of novel and effective therapeutic strategies for osteosarcoma, which is urgently needed in the clinic.

Our recent preliminary studies suggest that mutant p53 plays a critical role in promoting osteosarcoma growth and metastasis through inducing metabolic reprogramming. Furthermore, the metabolic reprogramming induced by mutant p53 could be a potential therapeutic target for osteosarcoma. Based on these preliminary results, we hypothesize that promoting metabolic reprogramming is a critical mechanism by which mutant p53 promotes osteosarcoma, and targeting the metabolic reprogramming induced by mutp53 could be a potential therapeutic strategy for osteosarcoma carrying mutant p53. In this proposed study, we will determine the role and mechanism of mutant p53 in osteosarcoma and assess potential therapeutic strategies for osteosarcoma carrying mutant p53.

The goal of this proposed study is to reveal new mechanisms of osteosarcoma and test new strategies to treat osteosarcoma, especially for osteosarcoma carrying mutant p53. Given that p53 mutations are frequently observed in osteosarcoma, we expect that this study will deepen our understanding of the mechanism of mutant p53 in osteosarcoma and have the potential to provide a novel therapeutic strategy for osteosarcoma.

Bridge Research Grant Recipients

Bridge Research Grant Recipients

Category: Pancreas

Project Title: ***Resources to investigate cell-cell interactions in human cancers. COCR25RBG003***

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Tumor microenvironment does not only involve somatic cell-cell interactions, but also functional interactions with tissue-resident microbes, that are emerging as 'dark horse' - key modulators of complex tissue-level functions, inflammation, and immunity in cancer. While histopathological assessment of tissue sections and targeted discoveries in model organisms allowed phenotypic characterization and hypothesis-driven mechanistic studies, However. until recently it was difficult to perform unbiased, high throughput characterization of cell-cell direct and indirect interactions in the context of tissue organization at molecular resolution. Emerging microscopy techniques can render tissues transparent and generate organ-level maps of cellular organization, but those require highly specialized resources.

Recent advances in genomic techniques such as single cell and spatial transcriptomics enabled generating organ-level data on gene expression at cellular and tissue contexts in pathologically normal and malignant tissue types. However, single-cell transcriptomics does not provide insights into cell-cell interactions, and spatial transcriptomics doesn't have single-cell resolution – such that there is a need for user-friendly resources to bridge the gap and to draw quantitative inferences on multiscale tissue organization at a molecular resolution to answer biological questions. In this proposal, we aim to develop innovative computational resources to draw inference about changes in somatic cell-cell physical interactions underlying tissue-level organization in tumors, somatic cell-microbiome interactions in tumor margins and interiors, and statistically model spatially connected processes in tumor microenvironments - which in turn can help answer questions about normal tissue organization and remodeling thereof in cancers. We will benchmark and distribute the computational genomic resources contributing towards reproducible research and community-level resource sharing for advancing our understanding of tissue organization in human cancers.

Category: Lung & Bronchus
Project Title: ***Leveraging the Emergency Department to Address Social Determinants of Health and Reduce Lung Cancer Screening Disparities (The LEAD Study): Bridge Grant Application. COCR25RBG004***

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Lung cancer remains the deadliest cancer worldwide. Lung cancer screening with a low-dose CAT scan of the chest provides an opportunity to diagnose this deadly cancer at an earlier, more treatable stage when cure is possible, yet the majority of people who are eligible for lung cancer screening do not screen. The screening rate for lung cancer is dismally low at 5% among all who are eligible, but even worse for African Americans at 1.7%. These racial disparities in lung cancer screening highlight how critical it is to improve awareness of, and access to, lung cancer screening among all, but especially eligible African Americans. This problem is made worse when social determinants of health (SDoH) are not addressed. SDoH are the non-medical factors that affect health outcomes and reflect the conditions in which people are born, grow, work, live and age.

We know that interventions that address the barriers to lung cancer screening are important, but we must also address SDoH. If a person is struggling with financial insecurity, transportation difficulties, food shortages, or inadequate housing, they may not prioritize cancer screening. We have a unique opportunity where an SDoH screening tool is already embedded within a health system electronic health record (EHR) to leverage the Emergency Department (ED) as a place to reach individuals who may not otherwise engage with the health system who are at increased risk for the development of lung cancer.

Our long-term goal is to improve lung cancer screening among all eligible individuals, but especially address African American lung cancer screening inequities by optimizing community-clinical linkages that address key SDoH as we connect screening-eligible individuals to screening services. Our objective with this research bridge grant application is to (1) examine reach in a non-traditional setting that uses an EHR-embedded SDoH screening tool, and (2) obtain pilot effectiveness data of a lung screening intervention that includes tailored lung screening education (N=100). The impact of this study lies in using an unconventional location to identify individuals eligible for lung cancer screening, moving beyond the typical settings such as primary care practices. Our aim is to intervene and boost lung cancer screening rates by addressing crucial SDoH while delivering tailored education on lung cancer screening.

Bridge Research Grant Recipients

The purpose of the Bridge Grants is to enhance cancer-related research at New Jersey Institutions by providing funding to promising and productive investigators who anticipate a short-term interruption in funding for research projects focused on cancer prevention, diagnosis, treatment, and survivorship.

Bridge Research Grant Recipients

Category: Colon & Rectum, Melanoma of the Skin
Project Title: ***Boosting immunogenicity of the oncolytic virus for tumor immune therapy. COCR25RBG013***

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Cancer cells have many ways to avoid being detected by the immune system, which makes it hard for cancer immune therapy such as immune checkpoint inhibitors (ICIs) to work. Scientists have tried to use cytokines, which are proteins that help expose cancer cells to the immune system, to improve ICI treatments. However, giving cytokines to patients throughout the whole body has caused severe side effects, so it's important to target them directly to tumors.

Vaccinia viruses (VV) are being studied as a way to fight cancer. These viruses can selectively infect and kill tumor cells. However, the clinical results have been modest, so improvements are needed. Originally, it was believed that these viruses eliminated cancer primarily by directly killing tumor cells. However, new evidence suggests that their main function is to make cancer cells more recognizable to the immune system. Therefore, combining cytokines with these viruses can make them more effective and make cytokines less toxic by directly targeting tumor cells.

One promising cytokine is Interleukin 36 (IL36), which helps trigger immune responses when cells die. IL36 is often low in advanced cancers, but delivering IL36 directly to tumors has shown strong anti-tumor effects in animal studies. By adding the IL36 gene to VV and reducing the virus's ability to suppress immune responses, we hope to create a powerful treatment without severe side effects.

Our goals are a) Create humanized mouse models of colorectal cancer; b) Test the anti-tumor effects of our VV-IL36 combination in these mouse models and analyze how it changes the immune response. The data from these studies will help us refine our approach and strengthen our grant application for further research to develop VV-IL36 as a cancer treatment.

Pilot Research Grant Recipients

Category: Other (Anal cancer)
Project Title: ***Preparing for implementation: a mixed methods study for anal cancer screening among people living with HIV in New Jersey. COCR24PPR004***

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The number of new cases of anal cancer and deaths from the disease have been increasing in the United States, especially among people living with HIV. All people living with HIV have a substantially increased risk, but men who have sex with men and live with HIV have the highest risk of anal cancer. Black and Hispanic men and women living with HIV are also more likely to be diagnosed with anal cancer. Infection with anal human papillomavirus (HPV) is common among high-risk groups and can progress to precancerous lesions, which cause anal cancer. A historic randomized trial, which included people recruited from Rutgers New Jersey Medical School in Newark, recently found that diagnosing and treating precancerous lesions can reduce the risk of anal cancer by half. Public health agencies and experts are reviewing the new evidence to make much needed anal cancer screening recommendations. We want to determine how the screening and treatment approach, which is similar to cervical cancer screening, should be integrated in routine care for people living with HIV. However, some practical and logistical issues must be explored and addressed before implementing a new anal cancer prevention program. For example, diagnosing precancerous lesions is a key step in the screening process, but there are very few health care providers with this expertise. We will assess the local health system capacity to provide anal cancer screening, diagnosis, and treatment services and create a plan to make them more widely available. The goal of this study is to develop a highly acceptable anal cancer screening and treatment program with a toolkit specifically designed to support implementation in the Greater Newark Area. We will obtain input from patients and advocates to ensure the program is designed to meet the community's needs and preferences. We will work with experts, health care providers, and hospital leaders to prioritize feasible strategies that will support the program's successful implementation. The research will take place in Essex and Hudson counties, which have some of the highest HIV rates across the state. This study is an important next step to reduce cancer disparities and improve anal cancer prevention for those with the greatest risk of disease.

Pilot Research Grant Recipients

Category: Pancreatic

Project Title: ***Evaluation of the Tumor-Microbiome-Immune Interactions in Malignant Progression of Pancreatic Cystic Neoplasms. COCR24PPR006***

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Pancreatic ductal adenocarcinoma (PDAC) is the third leading cause of cancer-related deaths in the United States, where a lack of effective primary and secondary prevention strategies contributes to frequent clinical presentation in the incurable, metastatic state. Early detection and effective characterization of premalignant lesions can reduce mortality. Intraductal papillary mucinous neoplasms (IPMNs) are the most common type of pancreatic cyst and one of the only known precursors to PDAC. To date, the key determinants of IPMN progression from low-grade cyst to high-grade cyst to PDAC are not well understood. Furthermore, nonwhite patients with IPMN are significantly more likely to have invasive IPMN at surgical resection, mirroring overall patterns of increased incidence and later detection of PDAC amongst nonwhite patients. To date, genetic driver mutations have offered limited clues to observed racial disparities in IPMN progression. We hypothesize that aspects of the tumor microenvironment may hold important clues. While normal pancreas is typically sterile, emerging evidence indicates that microbes colonize the pancreatic tumor microenvironment, influencing key cancer-associated pathways and also tumor-immune interactions. We hypothesize that racial differences in the pancreatic microbiome exist and that such differences may underlie some of the disparities in IPMN-related outcomes – which we propose to examine in this project. This project aims to evaluate tumor-microbiome-immune crosstalk during the stages of malignant progression from IPMN to PDAC in a racially diverse clinical cohort. We aim to: (1) characterize the burden and diversity of IPMN-associated microbes at different stages of dysplastic progression; and (2) evaluate microbial-associated transcriptional changes in pancreatic cystic epithelium and IPMN-associated immune infiltrates. We have already received Scientific Review Board approval and have coordinated with the biorepository to obtain necessary archival samples. Utilizing emerging spatial transcriptomics and sophisticated computational methods developed in our lab, we will systematically recover and denoise microbial signals in human IPMN specimens to assess host-microbiome-immune interactions at near-single-cell resolution. The findings developed from this proposal may: (1) identify clinically-applicable bacterial biomarkers to guide patient surveillance strategies, and (2) provide a novel data-driven, genomic approach for further hypothesis-generating and corroborative studies on causal pathways of microbiome and immune interactions during IPMN dysplastic progression.

Postdoctoral Research Fellowship Recipients

Postdoctoral Research Fellowship Recipients

Category: Breast
Project Title: ***Integrated analysis of imbalanced allelic expression to infer gene regulatory patterns in cancer. COCR24PDF008***

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When two alleles of a gene in a cell are expressed at different levels, allelic imbalance (AI) phenomenon has happened. This phenomenon may occur as a consequence of a genetic variation/rearrangement in regulatory regions, copy-number variation, or epigenetic inactivation of one of the two alleles. Allelic imbalance can be the result of normal physiology (i.e., imprinting, X-chromosome inactivation) and/or cancer signature. Gene regulatory patterns are employed as a causality network-interface to reveal the reason of tumor growth. Using AI as an expression signal, we need to justify a methodology to integrate data to find the underlying mechanism of regulatory patterns to find cancer drivers as of genomic alternations (i.e., mutations in promoter regions or rearrangements). To test this hypothesis, we will develop a quantitative framework for accurately measuring AI, and then integrating DNA, RNA, and methylation data to investigate AIs' underlying mechanisms. We will apply this pipeline to tumor bulk data to assess the consequences of AI on regulatory networks specifically as cancer drivers and to single-cell data to investigate the spatial transcriptomic profiles of co-regulated genes. We aim to discover regulatory pathways in cancer that reveal allelic imbalance as part of their function.

Category: Hematologic
Project Title: ***Development of a novel single-cell transcriptomics analysis toolkit. COCR24PDF015***

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Single cell gene expression studies are rapidly transforming our understanding of cellular processes at the level of single cells, especially in the case of complex diseases such as cancer. In all these studies, the computational analysis of the data plays a vital role. Here, we propose to develop a completely novel single cell gene expression analysis toolkit that will enable more meaningful and impactful biological inferences to be drawn from single cell gene expression studies.

Postdoctoral Research Fellowship Recipients

We will use this toolkit to examine data sets obtained from a study that will explore how blood cancer cells adapt to different environments within the body and how they may be reshaping these environments to avoid detection and response from the immune cells.

Category: Other (Epithelial carcinomas; solid tumors)
Project Title: ***Dissecting the role of Disheveled in the spatial organization of Frizzled during epithelial planar cell polarity establishment. COCR24PDF018***

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The incredible diversity of life-forms in nature and the complexity of shapes and structure of their body plan, arise due to tight coordination in the behavior of thousands of cells that make up the underlying tissue and organs, as the organism develops from a single cell to embryos and finally to adults. As one would appreciate from the fast-paced videos of developing embryos, there are visibly large tissue-scale movements, which are mediated by none other than the collective motion of cells in the embryonic tissue. Fruitful and directional movements can only arise by co-operative action between each constituent cell of the tissue. Thus, to contribute productively to the global movement, each cell must have a local sense of direction. This is very similar, for example, to how every individual must be aligned to a line of thought for any philosophical or political movement to succeed. Such a local sense of direction comes from cellular compasses, set by unique groups of proteins that exclusively populate opposing sides of the cell. In other words, the sense of direction is achieved by positioning unique sets of proteins on anterior (towards the developing head) versus the posterior (towards the developing tail). When such directional signposts are set up by thousands of cells across the plane of a tissue, it gives rise to planar cell polarity and the proteins that are involved can be called planar cell polarity proteins. Losing sense of direction can result in aberrant tissue movements, leading to a wide range of birth defects. This project is focused on studying how such a cellular compass get established so that the cells can decode positional information and the overall orientation of the developing organism.

To move effectively, groups of cancer cells use the same set of planar cell polarity proteins as needed for proper embryonic development. These proteins can specify which direction to move, and the cells can more effectively disseminate

to healthy tissues without spending unnecessary time in deciding the course of their movement. Moreover, the polarity proteins called Disheveled can be used by cancer cells to multiply in an uncontrolled manner. It is therefore critical to check the activity of these proteins so that they cannot be misused by malignant cancer cells. Like humans, proteins are highly interactive entities, and depending on where and when it interacts with whom, they can determine the behavior of cells. The polarity proteins in the embryonic skin behave as dormant directional signposts without triggering excessive proliferation or aggressive migratory behavior in these cells. Learning what keeps them dormant in this tissue can help check their role in aggressive behavior of malignant cancer cells. Therefore, in this project, I plan to study how polarity proteins come together and accumulate at the cell-cell boundaries in the healthy skin tissue and how they create protein assemblies of unique composition at the anterior versus the posterior borders to set up their cellular compasses.

Category: Other (Drug screening and assay development)
Project Title: ***Synthetic discovery of isoform specific TET inhibitors by a novel high-throughput screening assay. COCR24PDF019***

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Every living cell contains DNA, which harbor the information to create and change every protein structure in our body. To regulate which part of the DNA is used to make proteins, it is tagged by a convertible marker. In cancer, these markers are changed in a way to ensure cancer cell rapid growth and longevity. Removal of DNA markers hinders cell growth in some cancers. There are three similar looking proteins performing the task of marker removal called TET. Depending on the cancer type, inhibition of all three TETs has beneficial or detrimental effects on cancers progression. Precise inhibition of each individual TET is crucial to stop growth in particular cancers, but so far, no specific inhibitor drug has been developed. Our goal is to develop a drug for each TET and use them for cancer therapy.

Predoctoral Research Fellowship Recipients

Predoctoral Research Fellowship Recipients

Category: Breast
Project Title: ***Gut microbiome impact on tumor progression and immunotherapy response. COCR24PRF003***

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The treatment of melanoma and other cancers has been revolutionized by the discovery of immune checkpoint blockade, for which the 2018 Nobel Prize in Physiology was awarded. The use of monoclonal antibodies against the programmed cell death protein 1 (PD-1) has been a breakthrough therapy that activates the patient's own immune cells to fight off the cancer. However, tumor response to immune checkpoint blockade is varied, which limits its widespread application. We can classify patients as responders or non-responders to therapy based on their clinical outcomes following anti-PD-1 treatment. In melanoma patients, the gut microbiome composition plays a significant role in patient response to therapy. Furthermore, recent exciting studies showed success improving patient response to immune checkpoint blockade therapy by administering fecal microbiota transplants (FMT) as an adjuvant therapy. Despite the success of these studies in establishing the role of the microbiome in modulating the immune response, we have yet to discover the molecular mechanisms of how bacteria in the gut can modulate tumor response to anti-PD1 therapy. What is the gut microbiome producing that alters the metabolic and immune environment of the host?

Metagenomic sequencing has enabled us to identify key microbiome constituents and active pathways by analyzing the biosynthetic gene clusters upregulated in fecal samples from melanoma patients undergoing immune checkpoint blockade treatment. Implanting germ-free mice with donor microbiomes that express these signatures will allow us to closely inspect how it affects tumor progression along with immune metabolic profiling of the host and tumor. Given our expertise in studying tumor-immune crosstalk using our co-culturing system along with the ex-vivo cultures of donor microbiomes methodology we developed, we can further pinpoint the mechanism of action behind improved response to anti-PD-1 therapy.

Taken altogether, this project will determine the mechanisms by which the gut microbiome modulates tumor progression and response to cancer immunotherapy and identify specific bacterial species and small molecules that can be used to improve the clinical outcomes of immune checkpoint blockade therapy.

Predoctoral Research Fellowship Recipients

Category: Liver

Project Title: ***Evaluation of combination mTOR agonist and CD147-IL15-CAR-NK cell therapy in transgenic human CD147 Hepatocellular Carcinoma models. COCR24PRF004***

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Liver cancer is the second most common cause of cancer-related death worldwide. Liver cancer is caused by hepatitis B virus (HBV) and/or HCV infections; though, high fat diets and excessive alcohol consumption increase the risk of liver cancer developing. The worldwide burden of liver cancer is projected to be over one million cases by 2030. Liver cancer ranks fifth in terms of global cases and second in terms of death for men. Approximately 80% of liver cancer patients die within 12 months post-diagnosis due to limited effective treatments. It is becoming more evident that one's immune system is capable of naturally eradicating tumor cells. However, cancer cells develop different methods to evade the immune system, resulting in uncontrolled tumor growth. Chimeric antigen receptors (CARs) are a new promising approach used in cancer therapy where either the patient's or the donor's blood is used for genetic modification of the immune cells. The engineered cells are grown in the lab and infused into a patient in order to target and kill cancer cells, but not healthy cells. The biomarker which our lab focuses on is called CD147, also known as Basigin (BSG) or extracellular matrix metalloproteinase inducer (EMMPRIN). It is shown to be abundantly present in liver cancer tissues but not healthy tissues. In leveraging this genetic modification technology, our lab has successfully engineered CD147-CAR-natural killer (NK) cells derived from healthy donors' blood to specifically target liver cancer cells. We have shown that CD147-CAR-NK cells significantly control liver cancer progression in immunodeficient mice when the tumor cells are engrafted under the skin of these animals (or subcutaneous engraftment). Though the results are promising, this model does not truthfully represent the development of liver cancer. The cancer cells in a complex organ such as the liver are known to acquire various mechanisms to escape the immune-surveillance of CD147-CAR-NK cells. Since our last discovery, we have been: 1) equipping CD147-CAR-NK cells to functionally excel in the suppressive tumor microenvironment (TME) and 2) establishing a more physiologically and clinically relevant liver cancer model in immunodeficient mice carrying a human CD147 gene. The proposed study will thoroughly evaluate the therapeutic efficacy of

Predoctoral Research Fellowship Recipients

the improved CD147-CAR-NK cells in a more recapitulative hostile liver cancer TME. Completion of the proposed project will accelerate the bench-to-bedside of CD147-CAR-NK cells in treating liver cancer patients.

Category: Hematologic
Project Title: ***Investigating genetic susceptibility for chemotherapy-induced cognitive impairment in a juvenile ApoE4 rat model. COCR24PRF009***

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The number of pediatric cancer cases is expected to significantly increase in the coming years. While survival rates have improved significantly with advances in treatment, many survivors experience a treatment-induced neurocognitive deterioration, described as "chemobrain," leading to inferior quality of life. Despite extensive research into the multifactorial causes of chemobrain, there are no FDA approved drugs to prevent or reduce its severity and the mechanism is unclear. We propose to investigate in a juvenile model to mimic the pediatric population since we predict developing brain is more susceptible to damage when compared to an adult brain. ApoE4 has recently been linked as a genetic predisposition to chemobrain. Not all patients experience chemobrain; therefore, discovery of potential biomarkers for identifying patients who are more prone to developing it prior to their treatment is crucial. These studies will lead to a long-term impact to improve the quality of care/life of not only pediatric patients, but also adult patients, as we are using a broadly used chemotherapeutic agent, doxorubicin. These studies will not only begin to point to key biomarkers to predict patients who will be more susceptible and how to intervene, but it will also allow us to begin to unravel the mechanism for chemobrain. In this study, we will assess if memantine, a drug for dementia that binds to the NMDA receptor and prevents synaptic plasticity changes because of the inhibition of calcium ions, will rescue the effects of chemobrain. Memantine poses as a promising candidate for a preventative measure as it is FDA-approved and previous research indicates that memantine can prevent chemotherapy-related cognitive deficits in a juvenile rat model.

Predoctoral Research Fellowship Recipients

Category: Hematologic
Project Title: ***Dissecting OTUD5 as a novel therapeutic target in leukemia. COCR24PRF011***

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T-ALL is a hematological malignancy that predominantly affects children but can also occur in adults. Cure rates have increased due to recent advances; however, 20-50% of patients still relapse, and therapeutic options are scarce at that point, leading to high mortality rates. Thus, we need to discover new targets for the treatment of T-ALL. Related to this, innovative genetic experiments in vitro have suggested that eliminating a specific gene/protein (OTUD5) might broadly synergize with currently used antileukemic drugs in the clinic. Of note, our preliminary results support this very idea, since using genetic tricks that allow us to eliminate OTUD5 from leukemia cells resulted in significant antileukemic effects on its own, which drastically synergized in combination with Daunorubicin, one of the mainstay chemotherapeutic drugs in T-ALL treatment. However, nothing is known regarding the role of OTUD5 in leukemia. Thus, here we will use cutting-edge techniques in combination with unique novel mouse models to study the specific role and mechanisms of OTUD5 in T-ALL. Overall, our results might translate into better treatments for leukemia patients in the short term.

Category: Other (Cancers that are amenable to photodynamic therapy)
Project Title: ***Leveraging production of reactive oxygen species in photodynamic therapy for the development of a novel drug targeting strategy. COCR24PRF012***

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The broad, long-term goal of this research is to improve cancer therapies by targeting drug delivery to the tumor site and thereby limit the dose of drug and off-target effects. Photodynamic therapy is a current form of cancer treatment that involves the delivery of molecules called photosensitizers that preferentially accumulate in tumors. When the photosensitizers are exposed to specific wavelengths of red light, it causes a reaction that leads to the production of an excess of free radicals called reactive oxygen species (ROS). These free radicals lead to the death of cancer cells, though PDT is often followed by rounds of chemotherapy or other treatments. Our goal

Predoctoral Research Fellowship Recipients

is to combine PDT with a targeted drug delivery system that we are developing that leverages the elevated presence of free radicals. Our system comprises polymers that react with the free radicals to create a polymer net at the site of free radicals production. This net is functionalized to specifically catch a drug or other payload, which can be released from the net by enzymes produced by tumor cells. We had planned to rely on tumor cells to over-produce free radicals. However, with PDT, we can specifically introduce radicals and drive net formation and subsequent drug targeting. In this proposal, we establish compatibility of PDT with our catch-and-release system. Our first aim is to characterize the production of free radicals from different photosensitizers in agar gel models made to mimic tissue. Our second aim is to test these photosensitizers in 3D cell models called spheroids made up of cancer cells followed by analyzing the delivery of our catch-and-release polymer and payload. We will be testing the effects of these on lung cancer, breast cancer, and basal cell carcinoma cells as these are three types of cancer where photodynamic therapy is used and drug resistance occurs. Once complete, we will be prepared to move to pre-clinical animal studies.

Category: Colon & Rectum

Project Title: *CD74 Receptor Activated Paneth Cells Modulate Intestinal Inflammation and Cancer Progression. COCR24PRF017*

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Colorectal cancer is one of the most commonly diagnosed cancers in the United States contributing to 150,000 new cases and 52,000 deaths annually. Inflammation-associated colon cancer is a subtype of colorectal cancer with a very poor prognosis and represents one of the most severe complications resulting from chronic intestinal inflammation. Patients having chronic intestinal inflammation conditions are at a significantly higher risk of developing colorectal cancer if left untreated or the treatment plans fail. Current literature suggests that the pathogenesis of colorectal cancer is associated with genetic, dietary, and environmental risk factors. However, the pathways linking inflammation to colon cancer progression remain incompletely understood at cellular and molecular levels. This project tests a newly discovered immune signaling pathway that could shed light on the missing link from the damaged intestinal epithelial cell lining to the activation and aggregation of inflammatory immune cells at the site of pathology. Our preliminary data suggest that a specialized intestinal epithelial cell type, named the Paneth cell, is activated through a surface receptor by a specific cytokine produced by stimulated white blood cells. These activated Paneth cells may propagate the local inflammation through attracting more inflammatory

immune cells to the site of damage to drive the disease progression. This process, if constitutively and continuously stimulated, may ultimately lead to intestinal tumor formation. I will test above pathway in two specific aims. I will first use microscopic imaging and flow cytometry analysis to map out these receptor-expressing Paneth cells and determine if their activity can be dampened when I delete this surface receptor. I will then use mouse inflammation-associated colon cancer models to determine if by blocking this molecular communication between Paneth cells and inflammatory immune cells, I can reduce the formation or aggressiveness of the colon cancer. This project is significant because it studies an important type of colon cancer with limited treatment strategy. This project is innovative because it studies a new pathway that may mediate the missing link between two types of cells in the inflamed intestine.

Category: Other (Non-specific)
Project Title: ***Elucidating the genetic drivers of immune activation by dendritic cells as novel targets for cancer immunotherapy. COCR24PRF021***

Ryan McNulty, ryan.mcnulty@princeton.edu
Affiliation: *The Trustees of Princeton University*

The human immune system is a complex network of proteins, cells, and tissues that work in a coordinated manner to protect the body against harmful pathogens such as cancerous cells. Over the past few decades, researchers have made significant progress in understanding the mechanism that govern immune system function, leading to the development of a new class of cancer treatments known as immunotherapies which harness the body's own immune system to fight cancer. One promising class of immunotherapies is immune checkpoint inhibitors (ICIs) – drugs which block proteins on the surface of immune cells that normally inhibit immune response. While these checkpoint proteins exist to prevent the body's immune system from overreacting to a particular event and damaging healthy tissue, cancer cells often hijack this mechanism to downregulate the body's immune response and evade detection. ICIs thus act to release the "brake" applied on the immune system and promote a strong immune response by allowing immune cells to better recognize and target cancer cells.

The emergence and clinical success of immune checkpoint inhibitors in the past decade represents a breakthrough in our ability to fight cancer by tuning the biological signals that control the immune system. In this study, we aim to identify additional proteins that regulate the immune response, either by the relay of inhibitory or stimulatory signals, as potential targets for immunotherapies. To

Predoctoral Research Fellowship Recipients

achieve this, we focused our work on dendritic cells, a type of immune cell which plays a specialized role in activation of the immune system. Specifically, DCs recognize foreign agents, such as those produced by cancer cells, in the tissue environment and respond by becoming potent activators of downstream effector cells (such as T cells) which then target and kill the cancer cells. Communication between DCs and T cells is achieved through proteins on the surface of the two cell types that propagate inhibitory or stimulatory signals upon interacting. Therefore, we considered DCs a ripe source of novel immunotherapeutic targets.

In our study, we obtain DC precursors from human donors and block the expression of individual proteins expressed by these cells through modern genetic engineering techniques. We then screen the edited cells for their ability to perform critical immune functions such as activate T cells or migrate upon recognition of antigen. If a protein expressed by DCs is important in mediating immune response, we observe a differential response by the perturbed cells in our screens. With this approach, we can systematically identify proteins that regulate the human immune system and thus are strong candidates for novel cancer immunotherapies. Drugs such as monoclonal antibodies can then be designed to target these regulatory proteins, thus modifying cell behavior and adding to an expanding toolbox of treatments that tune the immune system's response to cancer.

Pediatric Research Grant Recipients

Category: Pediatric (Hematologic)
Project Title: ***Identification of biomarkers for chemobrain in pediatric ALL patients. COCR24PRG001***

Mi Hyeon Jang, PhD, mihyeon.jang@rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences*

While current pediatric cancer treatment approaches are effective, chemotherapy-induced cognitive impairment (CICI or chemobrain) has emerged as a medical problem with a significant negative impact on quality of life in cancer survivors. Hence, we aim to identify biomarkers that can predict and/or mediate susceptibility to cognitive decline, in conjunction to novel therapeutic interventions to treat CICI. In our prior study, we demonstrated that CICI is causally associated with depletion of nicotinamide adenine dinucleotide (NAD+), a key metabolite in energy metabolism that is linked to aging and age-related neurodegeneration. Hence, this study aims to determine if NAD+ loss can be novel prognostic/ diagnostic indicators that can predict/mediate CICI using cerebrospinal fluid (CSF) collected longitudinally from over 3000 children treated with acute lymphoblastic leukemia (ALL) being treated on one of two multi-institutional cooperative group trials. In addition, our preliminary studies also demonstrate that

methotrexate, a chemotherapeutic drug commonly used for treating ALL, increases PARP1 (the main NAD+ consuming enzyme) levels, resulting in NAD+ loss in the adult mouse hippocampus in vivo. This led us to hypothesize that hyperactivation of PARP1 by methotrexate causes NAD+ loss to exacerbate neuronal and cognitive dysfunction. Therefore, we propose to test the hypothesis that PARP1 inhibition (through administration of brain permeable ABT-888; veliparib) could sustain NAD+ levels against methotrexate-induced cellular damage and consequently prevent CICI in non-tumor and primary T-ALL mouse models.

Category: Pediatric (Hematologic)
Project Title: ***Targeting Sprouty Signaling for Overcoming FLT3i Resistance in Pediatric AML. COCR24PRG005***

Jian Huang, MD, PhD, jhuang@coriell.org
Affiliation: *Coriell Institute for Medical Research*

Pediatric Acute myeloid leukemia (AML) is a malignant hematopoietic disease. It is the second most common childhood leukemia and is associated with high rates of chemotherapy resistance and relapse. One major obstacle to greater success with target therapy of pediatric AML is drug resistance. The mechanisms underlying drug resistance in pediatric AML are poorly understood. FLT3 is a cytokine receptor that belongs to the receptor tyrosine kinase (RTK) class III. Activating mutations in FMS-like tyrosine kinase 3 (FLT3) are now recognized as the most common molecular abnormality in AML and FLT3ITD mutations are found in nearly 30% of AML patients. Both Quizartinib (AC220) and gilteritinib are potent and selective second-generation FLT3 inhibitors (FLT3is). AC220 is in clinical trials for the treatment of relapsed or refractory FLT3ITD positive and negative AML patients and as maintenance therapy. Gilteritinib was already approved by the FDA in 2018 to treat patients with relapsed or refractory AML with an FLT3 mutation. However, drug resistance to AC220 and gilteritinib has also been reported through early clinical studies and clinical treatments, respectively. To understand the underlying mechanisms of drug resistance to FLT3i, we undertook an unbiased approach with a novel CRISPR pooled library to screen new genes whose loss of function confers resistance to AC220. In our screen, we identified SPRY3, an intracellular inhibitor of RTK signaling, and demonstrated the re-activation of downstream RTK/Ras/ERK signaling as a major mechanism of resistance to the FLT3i. Furthermore, we also confirmed our findings in primary AML patient samples. We demonstrated that the expression level of SPRY3 is dramatically reduced in AC220 resistant AML samples and SPRY3 deleted primary AML cells are resistant to AC220. Additionally, we treated SPRY3 knockout AML cells with a potent MAP kinase inhibitor demonstrated that it re-sensitized AML

Pediatric Research Grant Recipients

cells to AC220. Importantly, we found that at least two SPRY mutants (SPRY1 and SPRY3 KOs) pediatric AML were resistant to gilteritinib in culture. In this proposal, we hypothesize that Sprouty (SPRY) play critical roles in the response to FLT3i gilteritinib in pediatric AML. The Ras/MEK/ERK pathway regulated by SPRY3 is important for the acquired FLT3i resistance in pediatric AML. Next, we will perform a series of comprehensive studies to explore novel downstream effectors/ interacting partners of SPRY3 in pediatric AML and the molecular mechanisms of their action. Furthermore, we will examine the possibility of translating our findings into new clinical therapies.

Category: Pediatric (Hematologic)
Project Title: ***Poverty, Neuroinflammation, and Symptoms in Childhood ALL. COCR24PRG008***

Beth Savage, PhD, CPNP, CPON, savagebe@sn.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences*

Great strides have been made in the treatment of childhood leukemia, but most children can expect to develop side effects of chemotherapy. These side effects can be quite distressing and for some children, may last long after treatment has ended. A cluster of side effects that occur together in both children and adults receiving chemotherapy consists of fatigue, disturbed sleep, pain, mood changes, and distracted thoughts. Exposure to stress can cause inflammation, which is likely a means by which these symptoms are linked. Research conducted in adults with cancer has demonstrated that stress does cause unexpected inflammation and that those experiencing stress early in life develop worse symptoms following exposure to chemotherapy. Based on this body of research, we seek to determine if these same links between stress, in the household and the neighborhood, increased inflammation, and subsequently, worse symptoms exist in a group of children undergoing leukemia treatment. If successful, this study will lay the groundwork for future research to develop targets in which both stress and the inflammation it leads to can be minimized, thus decreasing the burden of treatment for children with leukemia.

Pediatric Research Grant Recipients

Category: Pediatric (Hematologic)
Project Title: ***Investigating clonal dynamics and transcriptional remodeling during treatment in pediatric acute leukemia. COCR23PRG006***

Daniel Herranz, PharmD, PhD, dh710@cinj.rutgers.edu
Affiliation: *Rutgers Biomedical and Health Sciences*

Pediatric acute myeloid leukemia (AML) is an aggressive tumor of blood cells in the bone marrow that requires intensive treatment. About 15% of childhood acute leukemia are cases of AML, which because of limited therapeutic options and unsatisfactory cure and increasing incidence rates, has become a major and growing clinical problem. AML in children is a different disease from AML in adults; however, its biology and changes under therapies are mostly unknown. We and others have shown that chemotherapy is successful in some patients with pediatric leukemias, but drugs often do not work when a small group of cancer cells have specific changes in their DNA. These mutations, which may not be found by common approaches in the clinic before start of the treatment, change the function of the genes; the cells that have these mutations became the major tumor population when leukemia comes back. In this project, we will analyze patient samples that have been collected before and during treatment and will apply highly sensitive experimental approaches to thousands of single leukemia cells. We will study the origins of childhood AML and will investigate its evolution to relapsed disease, with the goal of finding new ways for doctors to diagnose and treat this devastating childhood disease.

Keynote Speaker

Alexander Ploss, PhD

Alexander Ploss completed his PhD in Immunology at Memorial Sloan-Kettering Cancer Center and Cornell University and postdoctoral training at The Rockefeller University in New York City. Dr. Ploss is the endowed Harry C. Wiess Professor in the Life Science and Molecular Biology, a member of the executive committee of the Center Health and Wellbeing, and a fellow in the Program in Global Health and Health Policy at Princeton University. He is also a full member of the Cancer Institute of New Jersey.

Dr. Ploss' lab is interested in human-tropic viral pathogens, including but not limited to hepatitis viruses and classical flaviviruses. Research in the Ploss lab covers three main areas of investigation: deciphering mechanisms of viral infection/replication; systematically identifying barriers preventing transmission of human viral pathogens to non-primate species; and translating their discoveries into devising experimental systems that are suitable for dissecting host responses to these diseases.

Dr. Ploss serves on various editorial boards, including the National Institutes of Health, and other grant study sections and is a member of the International Coalition to Eliminate HBV. In support and recognition of his work, Dr. Ploss received numerous awards including the Astellas Young Investigator Award from the Infectious Disease Society of America; the Liver Scholar Award from the American Liver Foundation; the Löffler-Frosch Prize from the German Society of Virology; Merck Irving Sigal Memorial Award from the American Society for Microbiology; and the Burroughs Wellcome Fund Investigator in the Pathogenesis of Infectious Disease Award. Dr. Ploss is also an elected Fellow of the American Academy of Microbiology and the American Association for the Advancement of Science.

Panel Discussion:

Employment, Career Paths and Trends in Cancer Research

Soumitra Bhuyan, PhD, MPH

Soumitra Bhuyan, PhD, MPH, is the Executive Director of Health Administration Programs at the Bloustein School of Planning and Public Policy at Rutgers, The State University of New Jersey in New Brunswick. Dr. Bhuyan has served as Visiting Research Scholar at the Center for Health and Wellbeing, Princeton University; and at Deloitte with the Center for Healthcare Solutions. Apart from more than 50 publications in top-tier academic peer-reviewed journals, Dr. Bhuyan's writing has appeared in various regional and national news outlets such as The Hill, ABC News, Becker's Hospital Review, The Star-Ledger, etc. Dr. Bhuyan is an Associate Editor of British Medical Journal Global Health. Dr. Bhuyan and colleagues received the 2017 Charles E. Gibbs Leadership Prize for their research in women's health issues, which is awarded annually to recognize excellence in research on women's health care or policy. Dr. Bhuyan was the recipient of the "Rising Star" award from the American Public Health Association Health Administration Section, which recognizes the outstanding potential in health administration and public health practice. Dr. Bhuyan is an accreditation fellow for the Commission on Accreditation of Healthcare Management Education and serves on the Standards Council.

Tanya Borsuk, PhD

Tanya Borsuk, PhD, is the President of North49 LLC Consulting, a boutique consulting firm focused on Business Development and Strategy for Early- through Late-Stage Biotechs. With over 17 years of experience in Buy and Sell-Side Business Development, VC/Equity Investments, Platform and Pipeline Innovation, Business Insights, and Corporate Strategy across the Global Biotech and Pharmaceutical communities, Dr. Borsuk has worked to drive effective company start-ups and drug discovery across numerous technology

Panel Members

platforms (ex: AI/ML, Molecular Dynamics, Kinases/Small Molecules, mAbs, Cell Therapies) and Therapeutic Areas.

Her previous roles include CBO/Head of BD at Congruence Therapeutics and Sitryx Therapeutics, Vice President of Pipeline Strategy and Alliances at Flagship Pioneering, co-founder and Director of the Search and Evaluation and Hematology & Cell Therapy Business Development teams at Celgene Corporation and Bristol Myers Squibb, head of Global Market Insights at Celgene, and U.S Business Insights for Halaven at Eisai Pharmaceuticals. She began her career in Management Consulting at Easton Associates LLC, a boutique strategic management consulting firm focused on the Biotech and Pharma industries based in New York City.

Tanya holds a doctorate in cell biology and molecular genetics from Rutgers University in New Jersey, a bachelor's degree in biology from Queen's University at Kingston, Ontario, Canada, and a Mini-MBA from the Rutgers University Business School.

Peter Cole, MD

Peter Cole, MD, is the Embrace Kids Foundation Endowed Chair in Pediatric Hematology/Oncology, a tenured Professor of Pediatrics at Rutgers Robert Wood Johnson Medical School, Chief of the Pediatric Hematology/Oncology Service Line for the Rutgers Barnabas Health System, and Director of the New Jersey Pediatric Hematology and Oncology Research Center of Excellence (NJ PHORCE) at the Rutgers Cancer Institute. His research focuses on improving therapy for children, adolescents, and young adults with cancer and blood disorders. He has led international clinical trials testing novel chemotherapy and immunotherapy regimens in collaboration with the Children's Oncology Group. His NIH-funded translational research focuses on the toxic side effects caused by chemotherapy, with an emphasis on chemotherapy-induced cognitive impairment. Dr. Cole is fully committed to the academic development of the next generation of innovative clinicians and scientists, with a track record of mentoring students, trainees, and junior faculty who have gone on to successful academic careers.

Mary E. O'Dowd, MPH

Mary E. O'Dowd is the Executive Director of Health Systems and Population Health Integration for Rutgers Health. She leads and supports multi-disciplinary population health-related programs and research projects by developing partnerships with healthcare and public health partners at the state, local, and community level. In this role, O'Dowd led the development and launch of several key programs including the *Population Health Fellowship* program and *ScreenNJ*. O'Dowd serves on the Board of Directors for University Hospital, in Newark, as the designee of the President of Rutgers University and is a member of several advisory boards including the *Rutgers Institute for Women's Leadership* and the *New Jersey Action Coalition*. In 2021, O'Dowd launched a new podcast series, *On the Pandemic*, which engages university experts and New Jersey health leaders in conversations regarding the critical challenges in the recovery from the COVID-19 pandemic, and published her first book, *Junctures in Women's Leadership Health Care and Public Health*.

Prior to joining Rutgers, Ms. O'Dowd served as the New Jersey Health Commissioner, where she promoted population health initiatives during extraordinary transformation in the healthcare delivery system. She led the Department's response and recovery efforts during unprecedented emergent events including: Hurricane Irene, Superstorm Sandy, Superbowl XLVIII, and the West African Ebola epidemic. Ms. O'Dowd served as Deputy Commissioner and as Chief of Staff at NJDOH, held positions in hospital finance at NYU Medical Center, and in health policy at the NJ Hospital Association and the NJ General Assembly. O'Dowd is a graduate of Rutgers University, Douglass College and the IWL Scholars Program, earned her MPH from Columbia University, completed a hospital finance fellowship at NYU Medical Center. She lives in NJ with her husband and three sons.

Panel Members

Ramy Sedhom, MD

Ramy Sedhom, MD, is an Innovation Faculty member at the Penn Center for Cancer Care Innovation, Assistant Professor of Clinical Medicine in the Division of Hematology & Oncology at the University of Pennsylvania, and Director of Medical Oncology and Palliative Care at Penn Medicine Princeton Medical Center. He led system efforts to develop the Geriatric Oncology Penn Cancer Service Line and now co-leads it. Dr. Sedhom holds multiple research grants in palliative and geriatric cancer care delivery. His work has been published in many high-impact journals including the Journal of Clinical Oncology, Journal of the American Medical Association. He serves on the NCCN Guideline Panel for Older Adults with Cancer, co-chairs the ASCO Palliative Care Communities of Practice and the ASCO Symptom Science and Palliative Care Committee. Dr. Sedhom earned his medical degree from Albany Medical College and completed his internal medicine training and chief residency at Rutgers Robert Wood Johnson Medical School. He completed his oncology fellowship at Johns Hopkins University School of Medicine, and his palliative care fellowship at Memorial Sloan Kettering Cancer Center.

Antoinette M. Stroup, PhD

Antoinette Stroup earned her BS and MS degrees from the University of Utah in Salt Lake City. She went on to earn her PhD from the University of California, Berkeley in Epidemiology. Dr. Stroup is a Professor of Cancer Epidemiology in the Department of Biostatistics and Epidemiology at the Rutgers School of Public Health. She is the Director of the New Jersey State Cancer Registry at the New Jersey Department of Health, overseeing all administrative, operational, and research of the State's population-based cancer surveillance system; and the Principal Investigator for New Jersey's NCI SEER Program contract. Her current research projects include multi-registry collaborations studying risk and outcomes among Latino and Asian race and ethnic subgroups with breast, colorectal, and cervical cancer and African American men with prostate cancer. Dr. Stroup is also the Assistant Director of Research and Catchment Data at the Rutgers Cancer Institute Cancer Health Equity Center of Excellence, where she oversees a team charged with evaluating the Center's catchment area cancer burden and promoting the integration of catchment area priorities into research. Finally, Dr. Stroup teaches an undergraduate course in Cancer Surveillance at the Edward J. Bloustein School of Planning and Public Policy, which is a core requirement for their new undergraduate certificate in Cancer Surveillance and Epidemiology.

Meet the Commission Members

Kenneth Adler, MD
Chair

Dr. Adler specializes in Hematology/Oncology, with a special interest in benign and malignant hematology and in geriatric oncology. He is an attending physician at Morristown Medical Center. He serves as Co-chair of the American Society of Hematology Practice Partnership and is a fellow of the American College of Physicians, a member of the American Society of Clinical Oncology, and the American Society of Hematology. Dr. Adler has been awarded several outstanding honors throughout his career. In 2014, he received the prestigious Augustus Stone Award for his voluntary service to the Morristown Medical Center, and in 2017 he was the Medical Honoree of the American Cancer Society for the Northwest New Jersey. Most recently in 2019, he was honored by the Summit Medical Group at their Annual Gala for his community service.

Dr. Kathleen Scotto, PhD
Vice-Chair

Dr. Scotto is currently Vice-Chancellor for Research and Research Training, Rutgers Biomedical and Health Sciences, and Dean for the School of Graduate Studies, Rutgers, The State University of New Jersey. She received her PhD from the Cornell Graduate School of Medical Sciences. Prior to joining Rutgers, she served as an Associate Professor of Molecular Pharmacology and Experimental Therapeutics at Memorial Sloan Kettering Cancer Center and a Professor with tenure at the Fox Chase Cancer Center. In addition to her administrative roles, Dr. Scotto maintains an active laboratory at Rutgers studying the role of ABC transporters in tumor survival and treatment response.

Wendy Budin, PhD, RN-BC, FAAN

Dr. Budin is Professor and Associate Dean for Faculty Affairs in the Rutgers School of Nursing. Previously, she was the Director of Nursing Research at NYU Langone Medical Center and faculty at NYU College of Nursing. Dr. Budin is involved in an ongoing program of research on psychosocial adjustment to breast cancer. In 2019, she co-authored a book chapter entitled “Theoretical Frameworks and Philosophies of Care,” in Current Trends in Oncology Nursing—Second Edition. Dr. Budin is a Fellow in the American Academy of Nursing and the New York Academy of Medicine NYAM for her achievements. She received the NJ Governor’s Award for Nursing Research and Distinguished Alumnae Awards from the NYU College of Nursing and Seton Hall University, and in 2018 she received the March of Dimes, Nurse of the Year Award for Research.

Meet the Commission Members

Michele Lyne Donato, MD, FACP, CPE, MBA

Dr. Donato is a leader in the care of patients who need stem cell transplantation for cancerous and noncancerous diseases as well as those receiving immunotherapy. She was at the forefront of the development of photopheresis, a technique used to treat patients with chronic graft-versus-host disease (a potential complication of bone marrow and stem cell transplantation in which cells from the donor attack tissues of the recipient). At John Theurer Cancer Center Hackensack University Medical Center, she leads one of the region's largest bone marrow and stem cell transplant programs and one of the world's largest photopheresis centers.

Dr. Donato is presently the Chief of the Stem Cell Transplantation and Cellular Therapy Program, at Hackensack University Medical Center, and is affiliated with Jersey Shore University Medical Center at Hackensack Meridian Health. She received her medical degree from McGill University Faculty of Medicine and has been in practice for more than 20 years. She is actively involved in blood stem cell transplantation research. She has been awarded the Medal of the Governor General of Canada for the Highest Academic Standing, the Denis Dussiaume Award for Academic Excellence, and the McGill University J.W. McConnell Entrance Award

Generosa Grana, MD, FACP

Dr. Grana is the Director of the MD Anderson Cancer Center at Cooper. She is also a Professor of Medicine at Cooper Medical School of Rowan University and an adjunct professor of cancer Medicine at the University of Texas MD Anderson Cancer Center. Dr. Grana completed her fellowship in Hematology and Oncology at Fox Chase Cancer Center and Temple University in Philadelphia where she also completed a Postdoctoral Fellowship in Preventive Oncology. Dr. Grana's clinical and research endeavors at Cooper have focused on breast cancer, cancer genetics, and community outreach interventions aimed at underserved populations. She has received numerous awards including the American Cancer Society Silver Chalice Award and the Susan G. Komen for the cure "Light of Life" Award.

Shawna Hudson, PhD

Dr. Hudson is Vice Chancellor of Dissemination and Implementation Science at Rutgers Health and the Senior Associate Dean for Population Health Research at Rutgers Robert Wood Johnson Medical School. She also is the Founding Director of the Center Advancing Research and Evaluation for Person-Centered Care at the Rutgers Robert Wood Johnson

The NJCCR consists of dedicated volunteer members that are involved, both statewide and nationally, in the field of cancer.

Meet the Commission Members

Medical School. A medical sociologist, she is a full research member of the Rutgers Cancer Institute of New Jersey in the Cancer Prevention and Control Program. She sesrves as Associate Director of the NJ Alliance for Clinical Translation Science (NJACTS), which is a Clinical and Translation Science Award (CTSA) Consortium between Rutgers University, Princeton University, and the New Jersey Insitute of Technology. Dr. Hudson is internationally known for her NIH-funded research that examines long-term follow-up care for cancer survivors and their transition from specialist to primary care and has authored numerous papers and book chapters.

Li Li, PhD

Dr. Li is currently Executive Director at the Novartis Institute for Biomedical Research, where he has worked for over 17 years. He received his PhD, in Toxicology from the University of Texas-Houston School of Public Health. He is a member of the Society of Toxicology and a Board-certified Toxicologist. He is a recipient of numerous awards, most recently the Team Innovation Award for Novartis. In addition, he has co-authored many articles on toxicology innovation in research journals.

Jane Flint, PhD

Dr. Flint is a Professor Emerita of Molecular Biology at Princeton University. Dr. Flint's research focused on investigation of the molecular mechanism by which viral gene products modulate host cell pathways and antiviral defenses to allow efficient reproduction in normal human cells of adenoviruses, viruses that are widely used in such therapeutic applications as gene transfer and cancer treatment. Her service to the scientific community includes membership on various editorial boards, several NIH study sections and the NIH Recombinant DNA Advisory Committee. She also is a founding author of the acclaimed textbook "Principles of Virology," now in its fifth edition.

Loletha C. Johnson, RN, MSN

NJDOH Commissioner's Designee

Loletha Johnson is a public health practitioner with the New Jersey Department of Health, Division of Community Health Services, and oversees the NJ Cancer Education and Early Detection (NJCEED) Program and Office of Cancer Control and Prevention (OCCP). She has an eclectic array of experience working with priority populations to address the most

salient health outcomes and health disparities across the life course. Her forward thinking has led to innovative interventions to reduce mortality and morbidity in at-risk populations across multiple disease states. She has been instrumental in data-driven environmental, systems, and policy initiatives that impact access to health services through addressing social determinants of health barriers to care with multisectoral collaboration, as both a collaborator and program administrator.

Christine Schell, MPA
NJDEP Commissioner's Designee
Christine Schell is currently the Manager of the New Jersey Department of Environmental Protection's Environmental and Public Health Analysis Program (EHPA). A 30-year veteran of the NJDEP, Ms. Schell has managed EPHA for over a year during which time she has facilitated the development and release of the interim NJ Environmental Justice Mapping, Assessment and Protection (NJ EJMAP) Tool and the launch of Healthy Community Planning NJ (HCP-NJ), a joint initiative with NJDOH to provide municipal level environmental and public health data to communities to guide and direct local planning and positively impact public health outcomes. Currently, she leads NJDOH's Healthy NJ 2030's Environmental Health Workgroup in developing meaningful and measurable strategies to address the state's largest environmental public health issues.

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"There's always hope beyond what you see."

Cora Connor
Caregiver

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