Cancer Research Institute

FALL 2024 POSTDOCTORAL FELLOWS

CRI Cancer Research Institute™

FOREWORD

At the Cancer Research Institute (CRI), we are building a world immune to cancer by investing in the brightest minds at the forefront of immunotherapy. Here, we present the Fall 2024 CRI Irvington Postdoctoral Fellows and Immuno-Informatics Postdoctoral Fellows—16 outstanding researchers from 13 institutions across the U.S. and beyond — embodying our commitment to **People x Biology x Data**.

At CRI, we invest in **people**, not just projects. We empower scientists with the freedom to pursue bold ideas that will transform the future of cancer treatment. As part of this class, we are proud to award four Immuno-Informatics Fellowships – a unique award that supports the intersection of immunology and computational biology to drive forward data-driven advancements for science. The Fall 2024 Class of Fellows bring diverse expertise in tumor immunology, computational biology, and cellular engineering, working on everything from novel immunotherapies for hard-to-treat cancers to AI-driven approaches for predicting treatment responses.

Receiving a CRI Fellowship is a mark of distinction, awarded to exceptional early-career scientists positioned to become future leaders in immuno-oncology. This cohort's ingenuity, dedication, and groundbreaking research are accelerating the development of immunotherapies that save lives. We are honored to support their work as they bring us closer to **building a world immune to cancer**.

Without further ado, I am honored to present the Fall 2024 CRI Irvington and Immuno-Informatics Postdoctoral Fellows!

Alicia Zhou, PhD
Chief Executive Officer
Cancer Research Institute

CRI Cancer Research Institute™

Anca Apavaloaei, PhD

CRI-Carson Family Fellow

Weill Cornell Medicine

SPONSOR: Taha Merghoub, PhD **CO-SPONSOR:** Benjamin Greenbaum, PhD **AREA OF RESEARCH:** All Cancers

PROJECT TITLE: Identification of LINE-1 Derived Antigens for Development of Off-the-Shelf Anti-Cancer Vaccines

Anca Apavaloaei, PhD, is a postdoctoral researcher at Weill Cornell Medicine, where she's pioneering the development of off-the-shelf anti-cancer vaccines targeting LINE-1-derived antigens. LINE-1, a retrotransposon that remains active in cancer cells, could provide a novel source of tumor antigens for immune-targeting therapies. Her research aims to identify these antigens and test if vaccines targeting them could enhance immune responses in a broad range of cancers, from gastroesophageal to melanoma and lung cancer.

With a strong foundation in immunology and data science, Dr. Apavaloaei's journey began in 2013, where her work on MHC class I peptide selection led to important insights into immune recognition of disease. During her PhD at the University of Montreal, she furthered her expertise by applying computational techniques to uncover new tumor antigen targets for vaccine development, culminating in a Best Thesis Award.

"By targeting the unique molecular programs that drive cancer, we can harness the immune system to fight tumors in a more precise and effective way," says Dr. Apavaloaei. Her ongoing work at Weill Cornell, alongside Dr. Taha Merghoub and Dr. Benjamin Greenbaum, is a promising step toward novel cancer immunotherapies.

Hratch Baghdassarian, PhD

CRI Immuno-Informatics Postdoctoral Fellow

Massachusetts Institute of Technology

SPONSOR: Douglas Lauffenburger, PhD **AREA OF RESEARCH:** All Cancers

PROJECT TITLE: Pathways to Potency: Unveiling signaling mechanisms of high efficacy CAR T-cells

Hratch Baghdassarian, PhD, a bioinformatics expert, is developing computational tools to enhance CAR T-cell therapy's effectiveness against cancer. His research has bridged immunology and systems biology, focusing on how cells communicate within the immune system. By creating a method to analyze multi-dimensional data from single-cell RNA sequencing, he is pioneering ways to decode how immune cells adapt to different cancer environments.

His groundbreaking work includes a first-author study in *The New England Journal of Medicine* on a heritable STAT4 mutation causing a rare disease, and the development of Tensor-cell2cell, a tool that accelerates biological discovery by uncovering context-dependent immune cell interactions. He has also extended human metabolic models, shedding light on the Warburg effect in cancer cells, with promising implications for CAR T-cell treatments.

With over 12 published papers, Dr. Baghdassarian's work continues to drive advancements in immunotherapy, providing new strategies to improve cancer treatments and accelerate therapeutic discovery.

Hannah Bell, PhD

CRI Irvington Postdoctoral Fellow

University of Michigan

SPONSOR: Weiping Zou, MD, PhD **AREA OF RESEARCH:** All Cancers

PROJECT TITLE: Beyond lysis: Deciphering the role of perforin-mediated ferroptosis in anti-tumor immunity

Hannah Bell, PhD, is a postdoctoral fellow at the University of Michigan, where she investigates novel mechanisms of immune-mediated tumor cell death. Inspired by her sister's battle with muscular dystrophy, Dr. Bell pursued a career in biomedical research, earning her PhD in Cellular and Molecular Biology at the University of Michigan. Her doctoral work, funded by an NCI F30 award, uncovered key metabolic interactions between bacteria and tumor cells, leading to multiple high-impact publications. With a passion for tumor immunology, she joined the lab of Dr. Weiping Zou to explore T cell proteases and alternative pathways of immune cell cytotoxicity. "My time in Dr. Zou's laboratory has solidified my desire to pursue a career as an academic lab head," she explains, envisioning a future research program dedicated to enhancing immune-mediated killing of tumor cells.

Dr. Bell's current research focuses on perforin, a critical protein in T cell-mediated tumor killing, and its unexpected role in triggering ferroptosis—a form of iron-dependent programmed cell death. Her work suggests that perforin increases intracellular iron levels in tumor cells, inducing ferroptosis and enhancing anti-tumor immunity. Through genetic, pharmacologic, and bioinformatic approaches, she aims to define the molecular mechanisms of this process and assess its impact on metastasis and immunotherapy resistance. By characterizing this novel function of perforin, her research holds potential for developing new therapeutic strategies that leverage ferroptosis to improve cancer treatment outcomes.

With an extensive track record of high-impact publications, national conference presentations, and institutional fellowships, Dr. Bell is dedicated to advancing the field of tumor immunology. Supported by the Cancer Research Institute postdoctoral fellowship, her work will help bridge fundamental immunology with translational applications, ultimately shaping the future of immune-based cancer therapies.

Jesse Boumelha, PhD

CRI Irvington Postdoctoral Fellow

Icahn School of Medicine at Mount Sinai

SPONSOR: Miriam Merad, MD, PhD **AREA OF RESEARCH:** Colorectal Cancer

PROJECT TITLE: Targeting Myeloid Suppressive Programs to Overcome Immunotherapy Resistance in Colorectal Cancer

Jesse Boumelha, PhD, is a postdoctoral researcher at the Icahn School of Medicine at Mount Sinai, where he is exploring the role of myeloid cells in regulating immune responses in colorectal cancer (CRC). His work focuses on understanding how immune responses become dysregulated in CRC, with an emphasis on the role of myeloid cells like macrophages and dendritic cells in controlling the generation of cytotoxic T cells, which are crucial for effective cancer immunity. Dr. Boumelha's research is particularly aimed at developing precise therapeutic interventions to target specific myeloid cell subsets and enhance immune responses in CRC. Supported by the CRI Irvington Postdoctoral Fellowship to Promote Racial Diversity, his work has the potential to uncover new strategies for overcoming immunotherapy resistance and improving clinical outcomes for patients with CRC.

Dr. Boumelha completed his PhD at the Francis Crick Institute in 2023, where he studied anti-tumor immune responses and mechanisms of immune evasion in KRAS-mutant lung adenocarcinoma. His work led to the development of a novel immunogenic model of KRAS-mutant lung cancer, with important findings about the role of B cells and antibodies in immune checkpoint blockade (ICB) responses. He also investigated the therapeutic synergy between KRASG12C inhibitors and ICB, contributing to the understanding of how oncogenic signaling affects immune responses in tumors. Dr. Boumelha's research has broad implications for improving cancer therapies, including the potential to combine targeted therapies with ICB for enhanced anti-tumor immunity.

In his current work at Mount Sinai, under the mentorship of Professor Miriam Merad, Dr. Boumelha is advancing the understanding of myeloid cell function in CRC. His approach combines next-generation immune profiling of both human and mouse CRC tumors to identify novel targets that could improve the effectiveness of immunotherapies. With his deep expertise in multi-parameter flow cytometry and molecular biology, Dr. Boumelha is working toward new therapeutic strategies that could provide meaningful clinical benefits for patients battling CRC, particularly those who do not respond to existing immunotherapies.

Joseph Collins, PhD

CRI Irvington Postdoctoral Fellow

Boston Children's Hospital

SPONSOR: Leonard Zon, MD **AREA OF RESEARCH:** Leukemia, Lymphoma, Multiple Myeloma

PROJECT TITLE: Co-opting Macrophage-Mediated HSPC Quality Assurance Mechanisms to Eliminate Mutant Blood Stem Cells in Clonal Hematopoiesis

Joseph Collins, PhD, is a postdoctoral fellow at Boston Children's Hospital, where he investigates how macrophages regulate blood stem cell quality and how these mechanisms can be leveraged to eliminate mutant stem cells in cancer. With a diverse academic background spanning mechanical engineering, bioengineering, and developmental biology, he has consistently pursued research at the intersection of engineering and biology. His doctoral work at the University of Pennsylvania identified mechanotransducive pathways that govern bone development, culminating in multiple high-impact publications, including a first-author paper in *Developmental Cell*. "I have been driven by and pulled towards curiosity for as long as I can remember," Dr. Collins reflects, a mindset that continues to fuel his groundbreaking research in cancer immunology.

Building on his expertise in mechanobiology and developmental hematopoiesis, Dr. Collins' current research in Dr. Leonard Zon's lab focuses on clonal hematopoiesis (CH), a condition that predisposes aging individuals to blood cancers and clotting disorders. His work aims to harness embryonic macrophage quality-control mechanisms to eliminate mutant, disease-causing blood stem cells. By identifying the endogenous signals that activate protective Beta-2-microglobulin pathways in healthy cells and selectively triggering calreticulin-mediated destruction of malignant stem cells, he hopes to pioneer novel immunotherapies for CH and myeloid disorders.

A rapidly rising scientist in the field, Dr. Collins has already made key contributions, including a second-author publication in *Science* on macrophage-mediated blood stem cell regulation. His research, supported by the Cancer Research Institute, has the potential to transform cancer treatment by reprogramming innate immune processes to selectively eliminate disease-initiating cells. With a long-term goal of leading an independent research lab, Dr. Collins remains committed to uncovering fundamental biological mechanisms and translating them into revolutionary therapies for blood cancers.

Liuhui Fu, PhD

CRI Irvington Postdoctoral Fellow

New York University Grossman School of Medicine

SPONSOR: Dan Littman, MD, PhD **AREA OF RESEARCH:** All Cancers, Allergy

PROJECT TITLE: Characterization of Tolerogenic Antigen-Presenting Cells Inducing Peripheral Immune Tolerance

Liuhui Fu, PhD, is a postdoctoral fellow at the NYU Grossman School of Medicine, where he investigates the role of RORγt+ antigen-presenting cells (RORγt-APCs) in immune tolerance. His research explores how these specialized cells prevent harmful immune responses to gut bacteria and dietary proteins by inducing peripheral regulatory T cells (pTregs). However, this same mechanism may also contribute to immune evasion in cancer, allowing tumors to escape detection by enhancing pTreg activity.

"My academic and research endeavors are deeply rooted in exploring the sophisticated interplay between environmental stimuli and the immune system," Dr. Fu explains, a focus that has shaped his work across mucosal immunology, tumor biology, and metabolic regulation.

Dr. Fu's current research employs cutting-edge lineage-tracing models to uncover the origins and functions of RORγt-APCs. By elucidating how these cells mediate both food tolerance and tumor tolerance, he aims to develop novel therapies that modulate immune responses. His findings could lead to treatments that enhance tolerance in food allergies while breaking immune suppression in cancer, improving immunotherapy outcomes.

A rising leader in immunology, Dr. Fu's research has already made significant contributions, including demonstrating how gut microbial metabolites enhance CD8+ T cell function in cancer therapy and uncovering novel metabolic pathways in allergic immune responses. With a long-term goal of leading an independent research lab, Dr. Fu is committed to advancing our understanding of immune regulation and translating these discoveries into innovative treatments for allergic and inflammatory diseases, as well as cancer.

Liam Hendrikse, PhD

CRI Immuno-Informatics Postdoctoral Fellow

University Health Network, Canada

SPONSOR: Tak Mak, PhD, DSc **CO-SPONSOR:** Trevor Pugh, PhD

AREA OF RESEARCH: Leukemia, Lymphoma, Multiple Myeloma

PROJECT TITLE: Identification of Tumor-Reactive γδ T Cell Receptors to Treat Blood Cancers

Liam Hendrikse, PhD, is developing a novel immunotherapy aimed at overcoming resistance in blood cancers. His project focuses on a unique subset of immune cells called γδ T cells, which have the ability to recognize cancer-associated molecules that are overlooked by current therapies relying on αβ T cell receptors (TCRs) or chimeric antigen receptors (CARs) to target cancer cells. Using advanced computational algorithms, Dr. Hendrikse plans to identify γδ TCRs capable of targeting these resistant cancer cells. His research aims to create predictive models and computer algorithms to tailor therapies for patients with blood cancers who have failed existing treatments.

Dr. Hendrikse's research journey began during his undergraduate years, where he made a groundbreaking discovery of a new herpes virus in Canada lynx, leading to his first publication. This early success sparked his passion for research, which grew through his PhD work on childhood brain cancer at the Hospital for Sick Children. His findings, published in *Nature*, revealed a novel mutation linked to medulloblastoma and a unique genetic mechanism behind tumor initiation.

"I couldn't save my grandmother, but I hope my research will lead to therapies that could save others," says Dr. Hendrikse. His work has the potential to revolutionize treatments for blood cancers and improve outcomes for patients with blood cancers that haven't responded to existing treatments.

Mingeum Jeong, PhD

CRI Irvington Postdoctoral Fellow

Weill Cornell Medicine

SPONSOR: Nicholas Collins, PhD **AREA OF RESEARCH:** Melanoma, Solid Tumors

PROJECT TITLE: Harnessing Calorie Restriction as a Nutritional Intervention to Enhance Anti-Cancer Immunotherapy

Mingeum Jeong, PhD, is pioneering research to improve treatments for solid tumors, which account for 90% of adult cancer cases, including melanoma. One promising strategy, adoptive cell therapy (ACT), involves expanding tumor-infiltrating lymphocytes (TILs) in the lab and reintroducing them to the patient. While ACT has outperformed other therapies like immune checkpoint blockade, it still only benefits a small subset of patients due to the harsh tumor environment. Solid tumors deplete vital nutrients, undermining immune cell function.

Dr. Jeong's work focuses on overcoming this challenge by harnessing caloric restriction (CR), a strategy that has shown promise in improving the survival and functionality of T cells within solid tumors. However, CR is not feasible for all patients. To address this, she plans to identify specific nutrients that can mimic the effects of CR, enhancing immune cell activity without requiring a full reduction in caloric intake.

"Through nutritional interventions, we can optimize the tumor environment to support immune cell function and improve treatment outcomes for solid tumor cancers," says Dr. Jeong. "My goal is to translate my research into practical, accessible dietary strategies that could improve the effectiveness of immune cell therapies for a broader range of patients."

By developing diets that target these key nutrients, Dr. Jeong's research could provide an accessible and effective way to improve immune cell therapies, offering new hope for patients with solid tumors like metastatic melanoma.

Anukriti Mathur, PhD

CRI Irvington Postdoctoral Fellow

University of Massachusetts Chan Medical School

SPONSOR: Katherine Fitzgerald, PhD **AREA OF RESEARCH:** Melanoma and Inflammatory Diseases

PROJECT TITLE: A Novel Activator of the NLRP10 Inflammasome Shapes Skin Immunity and Anti-tumor Activity

Anukriti Mathur, PhD, is a postdoctoral fellow at the University of Massachusetts Chan Medical School, where she investigates how innate immune pathways regulate inflammatory diseases and cancer. Her research focuses on the NLRP10 inflammasome, a key component of the immune system's defense mechanisms, and its role in shaping skin immunity and anti-tumor activity. Specifically, Dr. Mathur is studying a fungal metabolite that triggers inflammation and cell death in human skin cells—a discovery made by her mentor, Katherine Fitzgerald, PhD. By uncovering how this metabolite is recognized by the immune system, her work aims to advance new therapeutic strategies for melanoma, one of the most aggressive and deadly forms of skin cancer.

Dr. Mathur has an extensive background in immunology, having identified three novel activators of the NLRP3 inflammasome during her doctoral research at the Australian National University. Her work has led to key discoveries on the role of guanylate-binding proteins in inflammasome activation and bacterial immunity, as well as the contributions of immune sensors like Ku70 and NLRC4 to cancer resistance. With over 12 peer-reviewed publications, numerous prestigious awards, and leadership roles in scientific organizations, she is a rising expert in the field.

"Understanding how the innate immune system detects and responds to external threats is key to developing novel treatments for both infectious diseases and cancer," says Dr. Mathur. "By targeting inflammasome pathways, we can potentially harness the immune system's natural defenses to fight melanoma more effectively."

Dr. Mathur's research bridges fundamental immunology with translational applications, offering new insights into the interplay between innate immunity and cancer. By targeting inflammasome pathways, her work holds the potential to enhance immune-based therapies for melanoma and other inflammatory diseases, ultimately improving patient outcomes.

Katherine Mueller, PhD

CRI Irvington Postdoctoral Fellow

Children's Hospital of Philadelphia

SPONSOR: Evan Weber, PhD **AREA OF RESEARCH:** All Cancers

PROJECT TITLE: Identifying Molecular Determinants of CAR T-cell Persistence

Katherine Mueller, PhD, is investigating the molecular mechanisms that determine CAR T-cell persistence—why some engineered immune cells continue fighting cancer for years, while others lose effectiveness or die off soon after treatment. CAR T-cells, often described as "living drugs," have transformed cancer therapy, but not all patients experience lasting responses. By identifying key factors that govern CAR T-cell survival, Dr. Mueller's research aims to enhance the durability and effectiveness of this breakthrough treatment.

Dr. Mueller's work centers on FOXO1, a transcription factor that plays a critical role in programming CAR T-cells for long-term function. Using CRISPR-based gene editing and advanced sequencing techniques, she has shown that FOXO1 helps CAR T-cells resist exhaustion and maintain memory-like properties that contribute to their persistence. To further understand this mechanism, she is analyzing CAR T-cells from pediatric clinical trials—comparing those from patients in remission for up to ten years with those from patients who relapsed within six months. Her goal is to uncover how FOXO1 and related gene networks shape CAR T-cell fate.

"By unlocking the molecular programming behind CAR T-cell persistence, we can design next-generation therapies that give more patients durable, long-term remission," says Dr. Mueller. "Transcription factor engineering offers an exciting new frontier to fine-tune CAR T-cells for lasting effectiveness."

With a background in bioengineering, Dr. Mueller has led innovative research on nonviral CAR-T manufacturing, metabolic profiling of engineered T cells, and transcriptional regulation of CAR-T memory. Her work has resulted in multiple high-impact publications, including a recent study in *Nature* demonstrating how FOXO1 overexpression enhances CAR-T persistence and tumor control. By bridging fundamental immunology with translational applications, Dr. Mueller's research is paving the way for more effective and resilient CAR T-cell therapies.

Seongyeol Park, MD, PhD

CRI Immuno-Informatics Postdoctoral Fellow

Stanford University

SPONSOR: Christina Curtis, PhD **CO-SPONSOR:** Edgar Engleman, MD

AREA OF RESEARCH: Breast Cancer

PROJECT TITLE: Organ-specific Cancer-Immune Co-evolution in Metastatic Breast Cancer

Seongyeol Park, MD, PhD, a biomedical scientist trained in both medical and bioinformatics techniques, is tackling the challenges of triple-negative breast cancer (TNBC) treatment. His project at the Stanford Cancer Institute leverages advanced spatial omics to explore how TNBC tumors interact with metastatic organs and respond to immune checkpoint inhibitors (ICIs). By analyzing a unique set of clinical trial specimens, Dr. Park aims to create predictive models of ICI response, which could revolutionize treatment decisions for TNBC and other metastatic cancers.

Having previously worked as an internal medicine doctor and cancer researcher, Dr. Park's PhD in cancer genomics honed his expertise in computational oncology. His work on detecting complex cancer rearrangements and building phylogenetic models has been published in Cell and Nature, contributing significantly to our understanding of cancer evolution.

"I'm focused on understanding how tumors evolve in different organs and how this affects their response to immunotherapy," says Dr. Park. His work promises to improve cancer treatment strategies, ultimately guiding more effective and personalized approaches for metastatic cancer patients.

Parasvi Patel, PhD

CRI Irvington Postdoctoral Fellow

Massachusetts General Hospital

SPONSOR: Ryan Corcoran, MD, PhD **AREA OF RESEARCH:** Colorectal Cancer

PROJECT TITLE: Characterizing the Tumor and Immune Landscape in Response to Distinct Functional Classes of KRAS Inhibitors at Single-Cell Resolution

Parasvi Patel, PhD, is working to improve treatments for colorectal cancer (CRC), a disease increasingly affecting younger adults. About 40% of CRC cases are driven by KRAS mutations, which for years were considered "undruggable." Now, new KRAS inhibitors offer different approaches—some targeting only mutant KRAS, others blocking both mutant and normal KRAS, and some inhibiting multiple RAS proteins across the tumor environment. Dr. Patel's research aims to determine how these drugs reshape both the tumor and the surrounding immune landscape to uncover the best therapeutic strategies.

Using single-cell sequencing and spatial transcriptomics, Dr. Patel is investigating how KRAS inhibitors impact immune cells, particularly T cells, which are critical for attacking tumors. Her work explores how combining KRAS-targeting drugs with immune checkpoint inhibitors, such as anti-PD-1 antibody, could improve patient outcomes. By analyzing patient biopsies and preclinical models, she seeks to identify mechanisms that drive treatment response and resistance, with the goal of refining combination therapies for KRAS-driven CRC.

"By characterizing how different KRAS inhibitors shape the immune landscape, we can develop smarter combination strategies that unleash the full potential of immunotherapy for colorectal cancer," says Dr. Patel.

With a background in cancer biology, genomic stability, and transcriptional regulation, Dr. Patel has led high-impact studies uncovering new therapeutic targets for BRCA1-deficient tumors and exploring replication stress in cancer cells. Now, by integrating tumor-intrinsic mechanisms with immune system dynamics, her research is paving the way for more effective, personalized treatment strategies for KRAS-mutant CRC.

Harrison Sudholz, PhD

CRI Irvington Postdoctoral Fellow

University of California, Berkeley

SPONSOR: David Raulet, PhD **AREA OF RESEARCH:** All Cancers

PROJECT TITLE: Tetracycline Derivatives as a Novel Anti-tumor Immune Stimulant

Harrison Sudholz, PhD, is investigating how the innate immune system—the body's first line of defense—can be harnessed to fight cancer by targeting a novel mitochondrial stress response. The innate immune system plays a crucial role in detecting and responding to infections and cancerous cells by recognizing patterns associated with pathogens or cellular stress.

Dr. Sudholz's research focuses on two tetracycline derivatives, 9-TB and AD, which, although lacking antibiotic activity, inhibit mitochondrial protein translation. This action triggers the mitochondrial unfolded protein response (UPRmt), a cellular process that plays a significant role in stress management and immune activation. His preliminary findings suggest that these compounds could stimulate an immune-mediated antitumor response by activating the innate immune system.

"My research is driven by a desire to understand how mitochondrial stress responses, such as the UPRmt, can be leveraged to enhance innate immunity against cancer," says Dr. Sudholz. "By targeting these pathways, we aim to develop novel therapeutic strategies that complement existing cancer treatments and offer new hope for patients."

Dr. Sudholz plans to use advanced genetic models and RNA sequencing techniques to explore how the UPRmt is connected to immune activation. His work aims to identify key immune pathways and validate these findings using *in vivo* models. By unlocking the mechanisms behind this unique mitochondrial stress response, his research could identify new targets for cancer immunotherapy, advancing the fight against cancer.

Aldo Ummarino, MD, PhD

CRI Irvington Postdoctoral Fellow

Boston Children's Hospital

SPONSOR: Ivan Zanoni, PhD **AREA OF RESEARCH:** Pancreatic Cancer

PROJECT TITLE: A New Immunotherapy for Pancreatic Cancer Based on Interferon-Induced Immunogenic Cancer Cell Death

Aldo Ummarino, MD, PhD, is an emerging leader in cancer research, developing innovative immunotherapies to combat pancreatic cancer. One of the deadliest and hardest-to-treat cancers, pancreatic cancer has proven resistant to conventional immunotherapy. Dr. Ummarino's research focuses on harnessing the power of interferons, immune molecules that can trigger the body's natural defenses to fight tumors. His preclinical studies have shown promising results, with the potential to eliminate pancreatic tumors in mouse models—a breakthrough that could transform treatment for this aggressive cancer.

Dr. Ummarino's scientific journey began in Italy, where his early research in gastric lesions and nematode diagnostics laid the foundation for his passion for cancer research. After earning his MD *cum laude* at the University of Foggia, he moved to Humanitas Research Hospital, one of Italy's top institutions, to deepen his expertise in cancer-related inflammation. During his PhD, Dr. Ummarino worked under renowned cancer researchers Profs. P. Allavena and A. Mantovani, where he explored the potential of innate immune receptors as cancer therapy targets, producing impactful publications and fostering international collaborations.

His work is grounded in a desire to push scientific boundaries and bring real-world impact to patients. "We have the potential to revolutionize the treatment landscape for pancreatic cancer," says Dr. Ummarino. "By targeting innate immune pathways, we could not only eliminate tumors but also identify new treatment targets for patients who desperately need better options."

Dr. Ummarino's research has been supported by prestigious fellowships and collaborations, including a Boehringer Ingelheim Fonds international short-term fellowship at Harvard Medical School. As an early-career researcher, he is poised to make lasting contributions to the field of cancer immunotherapy, with a focus on expanding treatment options and improving patient outcomes worldwide.

Rosa Vincent, PhD

CRI-WoodNext Foundation Postdoctoral Fellow

Baylor College of Medicine

SPONSOR: Cliona Rooney, PhD **AREA OF RESEARCH:** All Cancers

PROJECT TITLE: Engineering Cooperativity Between CAR T-cells and Therapeutic Bacteria to Reshape the Solid Tumor Microenvironment for Lasting Antitumor Immunity

Rosa Vincent, PhD, is a pioneering researcher developing novel therapies that combine engineered CAR T-cells and probiotic bacteria to treat solid tumors. While CAR T-cell therapy has revolutionized treatment for blood cancers, its application to solid tumors has been limited by the harsh tumor microenvironment. Dr. Vincent's innovative approach utilizes probiotic bacteria to deliver cancer-fighting agents directly into tumors, providing a new avenue to enhance CAR T-cell efficacy in these difficult-to-treat cancers.

Dr. Vincent's journey began with her medical residency at Imperial College London, where her CRISPR-based gene editing work earned her the 2014 Prize for Biomedical Research. She then applied her expertise to the development of allogeneic CAR T-cell therapies with Pfizer, targeting key challenges in solid tumors. Motivated to improve the targeting and persistence of CAR T-cells in immunosuppressive environments, she joined Dr. Wendell Lim's Cell Design Labs in 2016, where she utilized synthetic biology to equip CAR T-cells with advanced circuitry to enhance their effectiveness.

Her breakthrough research took a dramatic turn in 2017 when she explored the potential of tumor-colonizing bacteria as a tool to improve CAR T-cell targeting in solid tumors. This led to the creation of the first cross-Kingdom cell therapy platform for solid tumor targeting, which combines the antigen-independent specificity of bacteria with the tumor-killing power of CAR T-cells.

As a CRI-WoodNext Foundation Fellow at CRI, Dr. Vincent is poised to transform cancer treatment through her cutting-edge approach. "This fellowship represents a chance to give back to the community that inspired me and to develop new solutions for the critical challenges of treating solid tumors," says Dr. Vincent. Her work has the potential to redefine cancer immunotherapy, offering hope for patients facing some of the most difficult cancers to treat.

Peter Wang, PhD

CRI Irvington Postdoctoral Fellow

Massachusetts General Hospital

SPONSOR: William Hwang, MD, PhD **AREA OF RESEARCH:** Pancreatic Cancer

PROJECT TITLE: Targeting Nerve Injury to Improve Anti-tumor Responses in Pancreatic Cancer

Peter Wang, PhD, is a postdoctoral research fellow at the Center for Systems Biology and the Center for Cancer Research at Massachusetts General Hospital, where his work focuses on understanding the critical role of nerve invasion in pancreatic cancer progression and treatment response. In pancreatic ductal adenocarcinoma (PDAC)—a cancer with a five-year survival rate of only 13%—perineural invasion (PNI) occurs in nearly all cases. Dr. Wang's research explores how this nerve invasion reprograms the tumor environment, particularly by influencing immune cells like macrophages to suppress immune responses and promote cancer growth.

Dr. Wang's doctoral work at Washington University School of Medicine in St. Louis made significant contributions to understanding macrophage identity and function in the peripheral nervous system. He discovered that peripheral nerve macrophages share a gene expression signature with central nervous system microglia, which helps explain their roles in nerve regeneration. Building on this, his current research investigates how neuroimmune crosstalk influences cancer, particularly how the nervous system modulates both cancer-intrinsic and immune responses. He is developing novel combination therapies that leverage neuromodulation to enhance cancer control and treatment.

With training spanning immunology, neuroscience, cancer biology, and genomics, Dr. Wang is uniquely positioned to uncover new biological mechanisms that could lead to innovative cancer therapies. His work includes the development of co-culture systems and in vivo assays to test the impacts of nerve invasion on tumor growth and immune activity. Additionally, Dr. Wang is testing novel drugs to protect nerves and improve immune responses, with the ultimate goal of discovering new treatment strategies and biomarkers to improve outcomes for patients with pancreatic cancer.

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