CRI Cancer Research Institute™

2025 CRI INVESTIGATORS

# Technology Impact Award

## CRI Technology Impact Award

The Cancer Research Institute (CRI) Technology Impact Award accelerates innovation by supporting the development of novel technologies that advance cancer immunotherapy. New scientific discoveries increasingly rely on the ability to generate, analyze, and interpret complex biological data. This award provides seed funding to foster collaboration between technology developers and clinical immunologists – uniting expertise in engineering, data science, and biology to unlock deeper insights into the immune system's role in cancer.

By investing in high-risk, high-reward ideas, CRI is laying the groundwork for transformative breakthroughs. Awardees are pioneering tools and approaches that not only expand the frontiers of cancer research, but also enhance clinical decision-making and accelerate the delivery of cures to patients. Since 2017, 39 Technology Impact Awards have been granted across 32 organizations in 13 U.S. states and 7 countries in Asia, Australia, and Europe. New awards of $300,000 are made annually, with a total of $9+ million invested to date.

The 2025 Technology Impact Awards reflect CRI's continued commitment to harnessing the power of data and innovation to solve cancer through immunotherapy – faster, smarter, and with greater impact.

# A Letter from Our CEO

Scientific discovery often begins with a bold question, but answering it requires the right tools. CRI created the Technology Impact Award to empower researchers developing transformative technologies that expand our understanding of the immune system and accelerate breakthroughs in cancer immunotherapy.

The 2025 CRI Technology Impact Award investigators are building the platforms, models, and computational tools that make new lines of inquiry possible. From engineering targeted RNA therapies and computational tools for immune analysis to developing living organ models and enhancing T-cell function, their projects will deepen our knowledge of tumor-immune interactions and drive the next generation of more precise, effective, and durable immunotherapies. Their work lays a critical foundation for future advances, enabling the entire field to move faster and further in the search for cures.

We are proud to support these scientists and the technologies they are pioneering. Their creativity and ingenuity are paving the way to a deeper understanding of cancer and more powerful, personalized treatments for patients everywhere.

With gratitude,

**Alicia Zhou, PhD**
Chief Executive Officer
Cancer Research Institute

CRI-Longhill Charitable Foundation
Technology Impact Award Investigator

# Mark Chong, PhD

Saint Vincent's Institute of Medical Research

## Cell-targeting RNA-LNPs delivering microRNA inhibitors as a novel immunotherapy for cancer

**Research focus:**
Inflammation, regulatory T cells, microRNAs

One of cancer immunotherapy's toughest balancing acts is how to unleash the immune system against tumors without tipping it into overdrive or making it go off target. At the center of this challenge are regulatory T cells, or Tregs, which are specialized immune cells that keep inflammation and autoimmunity in check.

Dr. Mark Chong has discovered that tiny molecules inside Tregs called microRNAs help control how Tregs behave in cancer and that inhibiting them could let the immune system attack tumors more effectively. Stopping these microRNAs has been difficult though because current drugs are unable to get inside Tregs.

In this project, Dr. Chong's team will employ the same technology used in some COVID-19 vaccines – called RNA-lipid nanoparticles (RNA-LNPs) – to develop a new class of drugs that target microRNAs. LNPs are very small, fat-based bubbles that can safely deliver microRNA inhibitors directly into Tregs. This new approach could lead to a powerful new cancer immunotherapy that can work alongside existing treatments to make them more effective.



Technology Impact Award Investigator

# Ang Cui, PhD

Mass General Brigham

## Computational tools for analyzing chemokine network in tumor transcriptomic data

**Research focus:**
Cancer biology, cell communication, chemokines

In the body, immune cells communicate through signaling molecules called cytokines and chemokines to coordinate immune responses. Cytokines and chemokines are particularly important to recruit and organize immune cells in the tumor microenvironment as well as regulate their activity. Dr. Ang Cui is developing next-generation computation tools to decode the immune system's complex messaging system and enable data-driven approaches for new drug development.

Dr. Cui recently created an interactive online dictionary that provides information about how immune cells respond to different cytokines, specifically what genes are turned on or off in cells. In this project, her team will add to the dictionary information about how chemokines influence immune cells.

Her team will also use the companion software they developed, called Immune Response Enrichment Analysis (IREA), to predict key chemokine activities from tumor mRNA data.

By building open access, user-friendly tools that can read and interpret chemokine-driven immune responses, Dr. Cui will help accelerate discoveries in cancer biology and immune regulation. Her work will provide critical insights and enable a more accurate and efficient understanding of how cells communicate to fight cancer.

Technology Impact Award Investigator

# Ayano Kohlgruber, PhD

Boston Children's Hospital

## Determination of CD8 T-cell specificities in immune checkpoint-inhibitor induced arthritis

**Research focus:**
Arthritis, immune checkpoint inhibitors, T cells

While immune checkpoint inhibitors (ICIs) have changed the game by supercharging T cells to fight cancer, for many patients ICIs also trigger autoimmune side effects. These include a form of inflammatory arthritis that resembles rheumatoid arthritis. Dr. Ayano Kohlgruber is investigating the underlying biological mechanism that causes ICI-induced arthritis so that more patients can benefit from these powerful therapies without painful side effects.

Dr. Kohlgruber's research focuses on a specific group of CD8 T cells that rapidly grow and expand after ICI treatment. These cells have similarities with other T cells found in the blood and inflamed joints of affected patients, suggesting they are attacking the body's own tissues rather than just the tumor.

To uncover the self-antigens driving this autoimmune attack, Dr. Kohlgruber will reconstruct T-cell receptors and test their responses with high-throughput genetic screens. Her goal is to figure out exactly what these cells are recognizing and why. This work could lead to better methods for predicting, diagnosinge, and managing ICI-related toxicities.



Technology Impact Award Investigator

# Daniel Puleston, PhD

Icahn School of Medicine at Mount Sinai

## A new approach to cancer drug development through *ex situ* living organs

**Research focus:**
Drug development, living organs, lipid nanoparticles

Traditional research methods, such as clinical trials and lab tests using human cells, can't always capture the complexity of real human tumors, which sometimes limits the applicability of findings to actual patients. Dr. Daniel Puleston has developed a groundbreaking platform that keeps donated, tumor-bearing organs alive outside the body, allowing scientists to safely test therapies and observe how they interact with human tissues in real time.

Using this system, his team is examining how front-line cancer immunotherapies like immune checkpoint inhibitors actually move through human tumors and activate immune cells – a process that is incredibly difficult to study in patients.

Dr. Puleston is also testing cutting-edge delivery methods like lipid nanoparticles (LNPs), which are being explored to carry mRNA-based cancer treatments. LNPs are very small, fat-based bubbles that can safely deliver drugs directly into targeted cells. But, how well LNPs work on tumors is not yet known. Dr. Puleston's revolutionary approach to studying cancer and testing treatments promises to dramatically accelerate drug discovery and time to market approval, offering a clearer, more human view of how cancer therapies really work.

Technology Impact Award Investigators

# Debattama Sen, PhD
# Robert Manguso, PhD

Massachusetts General Hospital

## Engineering "serial killer" T cells to enhance CAR T-cell efficacy in solid tumors

**Research focus:**
CAR T-cell therapy, solid tumors, genetic screens

CAR T cells, often called "living drugs," are engineered from a patient's own immune cells to hunt down and kill cancer. Although CAR T cells have been a breakthrough treatment for patients with blood cancers, their effects can be short-lived, and they are not yet effective for all patients or for all cancer types. Drs. Debattama Sen and Robert Manguso are on a mission to make CAR T-cell therapy work better, for more people, and for longer.

Together they are investigating the rare CAR T cells that are especially powerful – those that can kill cancer cells over and over again, a phenomenon known as "serial killing." The team created a new platform that tracks which specific CAR T cells kill which cancer cells.

To kill a cancer cell, or initiate cell death, CAR T cells release a molecule called Granzyme B. When this happens, the "kiss of death" platform is activated and the cancer cell marks or tags the specific CAR T cell that killed it. The more tags a CAR T cell picks up, the more potent it is.

By studying these high-performing CAR T cells and running large-scale genetic screens, Drs. Sen and Manguso aim to uncover what makes a CAR T cell a true cancer killer and how to engineer more of them. It's a bold approach with the potential to boost CAR T-cell therapy for patients battling both blood cancers and solid tumors.



Technology Impact Award Investigators

Allon Wagner, PhD
University of California, Berkeley

Alexis Combes, PhD
University of California, San Francisco

Arpita Desai, MD
University of California, San Francisco

Matthew Krummel, PhD
University of California, San Francisco

## Towards nudge drugs: An iterative, integrated computational and experimental pipeline for discovery of immune-check-point blockade nudge drug candidates

**Research focus:**
Kidney cancer, combination therapy, machine learning

Traditional cancer therapies often rely on a single drug to do the job, but tumors are complex ecosystems filled with different types of cells interacting in intricate ways. Knowing this, Drs. Allon Wagner, Alexis Combes, Arpita Desai, and Matthew Krummel are rethinking how to fight cancer by shifting the focus from one big punch to a series of well-timed nudges. Their bold idea: what if we could gently steer that ecosystem back to health?

Together the team is developing "nudge drugs" – treatments that may not work alone, but when given in a smart sequence, help reawaken the immune system and gradually push the tumor environment toward lasting tumor control. They will use tumor samples from patients with kidney cancer to test how the tissue responds to different drugs and map out the many possible "states" a tumor can move through.

Drs. Wagner, Combes, Desai, and Krummel will then train an algorithm to predict which drug combinations might best guide the tumor toward a state the immune system can defeat. This nuanced, data-driven strategy aims to transform how cancer is treated by working with the body's natural defenses, one smart step at a time.

# About CRI

The Cancer Research Institute (CRI) is a nonprofit organization dedicated to advancing the field of cancer immunotherapy through rigorous scientific research and global collaboration. Since 1953, CRI has been instrumental in uncovering the fundamental biology of the immune system and its application to cancer treatment, laying the groundwork for breakthroughs such as checkpoint blockade, cancer vaccines, and engineered cell therapies.

**CRI's mission is to create a world immune to cancer by driving scientific discovery, accelerating collaboration, and turning breakthroughs into life-saving treatments.** Our work bridges the gap between discovery and patient impact, ensuring that scientific innovation translates into real-world treatments.

To date, CRI has committed over $560 million to research impacting more than 30 cancer types. Our funding strategy is built on the framework of People × Biology × Data: supporting world-class scientists, deepening understanding of tumor-immune system interactions, and harnessing data to guide discovery and translation. By uniting these elements, CRI catalyzes innovation through our global research ecosystem to drive the next generation of discoveries forward.


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