







The Center for Discovery & Innovation (CDI) was established in 2019 to tackle some of the world's most urgent health challenges related to cancer, infection, and behavioral health. CDI brings together exceptional scientists, clinicians, and industry experts in a cutting-edge research environment that prioritizes the practical application of innovative science to deliver real-time solutions for patients.

Over the past four years, CDI has experienced remarkable growth. It now comprises 27 state-of-the-art laboratories with a team of over 180 scientists and staff, along with research commitments exceeding \$175 million. CDI's early achievements include forging valuable clinical partnerships in the field of

cancer through collaborations with the John Theurer Cancer Center and the Georgetown Lombardi Comprehensive Cancer Center. Together, they have made significant advancements in understanding cancer recognition, detection, prevention, and therapy. Notably, CDI has placed particular emphasis on developing next-generation immunotherapies for blood cancers and solid tumors. The COVID-19 pandemic, which emerged less than a year after CDI's inception, highlighted the critical need for advanced molecular diagnostics, laboratory capabilities, and the ability to effectively respond to infectious disease outbreaks. CDI played a pivotal role in developing groundbreaking technologies for diagnostics, surveillance strategies, and treatments, which proved crucial in addressing and mitigating the public health crisis caused by the pandemic.

While the urgency of the pandemic has diminished, CDI remains dedicated to creating solutions that can prevent future crises caused by new pandemic viruses or threats posed by antibiotic resistance. To this end, CDI has established two National Institutes of Health (NIH)-designated national centers of excellence: the Center of Excellence in Translational Research (CETR) and the Metropolitan AntiViral Drug Accelerator (MAVDA). The CETR program is focused on developing next-generation antibiotics to overcome drug resistant bacterial health threats, while MAVDA supports the accelerated development of new drugs for SARS-CoV-2, other coronaviruses, and potentially pandemic-causing viruses.

The CDI operates on a real-time discovery and translation model, structured around four key thematic areas:

- Cancer: Researching hematologic malignancies and solid tumors to push the boundaries of understanding cancer development, improving treatment strategies, and even preventing its progression at a molecular level.
- Infectious Diseases: Addressing high-threat bacterial, fungal, and viral infections through innovative approaches.
- Immunology: Advancing cell-based and other immunotherapies to enhance the field of immunology and its clinical applications.
- Behavioral and Neurocognitive Health: Exploring the intersection of behavioral health and neurocognitive conditions, striving to develop effective interventions and treatments.

"12 out of top 25 grants from NIH awarded to investigators in New Jersey were received by the CDI" CDI places significant emphasis on disease prevention, both locally and globally, particularly concerning cancer and community and healthcare-related infections. The CDI develops and implements novel technologies for population and behavioral health and actively recruits world-class researchers to drive further advancements in these areas. To address the diverse range of 21st-century challenges, CDI has established dedicated institutes such as the Cancer Prevention Precision Control Institute, the Institute for Multiple Myeloma and Lymphoma, and the Institute for Immunologic Interventions.

In addition to its research endeavors, CDI is committed to engaging with the public and maintaining relevance in their lives. It strives to ensure that patients, their families, friends, and future patients are aware of the cutting-edge scientific work being conducted on their behalf. CDI achieves this through robust community outreach initiatives and by leveraging the extensive network of hospitals and healthcare resources provided by Hackensack Meridian Health.

Notably, CDI shares its location with the Hackensack Meridian School of Medicine, which enhances collaborative opportunities and strengthens their partnership. Both institutions are situated on the historic site formerly occupied by the Hoffmann-La Roche Institute of Molecular Biology, a renowned global center for medical innovation from the 1960s to the 1990s.

Once again, a new translational science hub to benefit human health has emerged at this historic location, and its growth and progress continue unabated. At the HMH-CDI in New Jersey, a new chapter in transformative applied science is being written. Join CDI on this exciting journey.

David S. Perlin, Ph.D.

Chief Scientific Officer and Executive Vice President Hackensack Meridian *Health* Center for Discovery & Innovation (CDI)



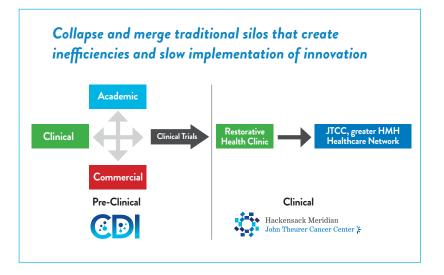
A New Age for Health Innovation: The Hackensack Meridian Center for Discovery & Innovation

(CDI) is an academic-based entrepreneurial center with a mission to develop and translate innovations arising from a new renaissance in biomedical sciences. The goal is to improve clinical outcomes for patients with life threatening, disabling and chronic diseases and conditions, including cancer, infectious diseases, autoimmune, inflammatory and other serious illnesses. Our vision is to transform today's insights into tomorrow's new standard of care.

The diagnosis, prevention and treatment of cancer, infectious diseases, as well as other life-threatening and disabling diseases, has been catapulted into a new age spurred by major research advancements in genetics, genomics, immunology, drug discovery, cell biology and bioengineering.

This has led to transformative, game-changing therapies including the use of engineered cell-based components within the human immune system to overcome various cancers. New developments in the real-time profiling of genes and genomes allows us to personalize medicine to improve therapies and outcomes and help predict new diseases. Massive changes are occurring in science which impact therapy and diagnostics and the CDI is at the forefront. We can now effectively and efficiently manipulate the human immune system to cure diseases that were once untreatable.

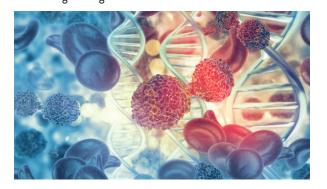
To accomplish our goals, the CDI has effectively overcome existing barriers for creating medical solutions by embedding academic researchers, physician scientists and pharma/biotechnology partners within a common translational science ecosystem that is driven by unmet clinical needs. By collapsing historic silos that are inefficient, we can move innovative science forward for patients by overcoming impediments for rapid development



We have unique capabilities and partnerships that enable us to respond rapidly to ensure health reliability and provide actionable intelligence.

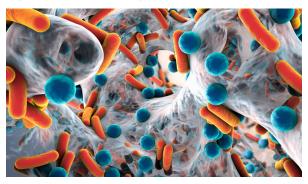
CDI Thematic Areas of Focus

Cancer
Hematologic Malignancies and Solid Tumors



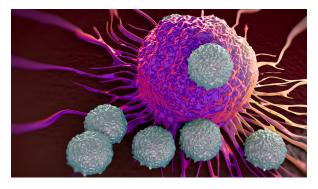
Infectious Disease

High threat of bacterial, fungal and viral infections



Immunology

Cell-based and other immunotherapies; inflammatory and autoimmune disorders



Behavioral and Neurocognitive Health





Extraordinary Leadership



Sol J. Barer, Ph.D. Chairman of the Board Chair of the Board of Directors, Teva Pharmaceuticals; Managing Partner, SJ Barer Consulting



David S. Perlin, Ph.D. Chief Scientific Officer and Executive Vice President, CDI Professor of Medical Sciences, Hackensack Meridian School of Medicine Deputy Director, Consortium Integration and Strategic Initiatives, Georgetown Lombardi Comprehensive Cancer Center Professor of Microbiology and Immunology, Georgetown University

Center for Discovery & Innovation Board of Directors

The Center for Discovery & Innovation's Board of Directors includes world-renowned minds with proven records of success.

Jay Galeota President and Chief Executive Officer,

Inheris BioPharma, Inc.

Robert C. Garrett, FACHE

Chief Executive Officer. Hackensack Meridian Health

Roger D. Kornberg, Ph.D.

Winzer Professor of Medicine Department of Structural Biology Stanford University Nobel Prize in Chemistry, 2006

Garry A. Neil, M.D.

Chief Medical Officer, Cerecor, Inc.

Andrew L. Pecora, M.D., F.A.C.P., C.P.E.

Chief Executive Officer. Outcomes Matter Innovations; Professor of Medicine and Oncology, Georgetown University School of Medicine; Associate Dean, Technology and Innovation, Hackensack Meridian School of Medicine

Tom Polen

Chief Executive Officer and President, BD (Becton, Dickinson and Company)

Harlan F. Weisman, M.D.

Chief Executive Officer. Chairman of the Board, Flame Biosciences Managing Director, And-One Consulting, LLC

Clinical Leadership

David S. Siegel, M.D., Ph.D.

Founding Director of the Institute for Multiple Myeloma, Hackensack Meridian Health Center for Discovery & Innovation; Chief of the Multiple Myeloma Division, John Theurer Cancer Center; Professor of Medicine, Georgetown University Medical Center and Rutgers University, New Jersey Medical School

Andre Goy, M.D., M.S.

Chair and Director, Chief of Lymphoma and Director of Clinical and Translational Cancer Research, John Theurer Cancer Center; Lydia Pfund Chair of Lymphoma, Hackensack Meridian School of Medicine; Professor of Medicine, Georgetown University Medical Center

Louis M. Weiner, M.D.

Director, Georgetown Lombardi Comprehensive Cancer Center, Georgetown University Medical Center Director, MedStar Georgetown Cancer Institute, MedStar Health Chairman, Department of Oncology, Georgetown University School of Medicine Francis L. and Charlotte G. Gragnani Chair, Georgetown University Medical Center

Ihor Sawczuk, M.D., FACS

President of Academics. Research and Innovation, HMH Founding Chair, HMH Research Institute Associate Dean of Clinical Integration and Professor, Chair Emeritus of Urology at the Hackensack Meridian School of Medicine

World-Class Faculty This academic-based entrepreneurial center is comprised of accomplished faculty members who have been recruited from leading academic centers including Weill Cornell Medicine, Columbia University, Albert Einstein College of Medicine, Boston University, Rutgers University, Memorial Sloan Kettering Cancer Center and the National Institutes of Health. Areas of expertise include genomics, epigenetics, drug resistance, stem cell biology, drug discovery, diagnostics and biomarker development, and pharmacology. These areas confront critical unmet needs in targeting a variety of cancers including multiple myeloma, lymphoma, breast cancer, brain tumors, and other deadly cancers, and address crucial medical problems in diabetes, sepsis, and opportunistic bacterial, fungal and viral infections. In total, the inaugural faculty have published more than 2,500 peer-reviewed papers in leading journals such as Science and Nature, New England Journal of Medicine, mBio and The Lancet. In addition, they bring more than 85 grants and contracts, 25 NIH and other government grants to the CDI, as well as numerous contracts with foundations, Pharma and biotech companies with research commitments exceeding \$175 million.



Abraham Aragones, M.D.

Cancer disparities, developing models to enhance cancer screening and prevention in minority populations.



Jigar Desai, Ph.D.

Investigating immune mechanisms responsible for mucosal and systemic fungal control



Jim Balkovec, Ph.D.

Discovery and development of novel anti-infective drugs against resistant bacterial, fungal and viral infections



Thomas Dick, Ph.D.

Discovery of new medicines for treatment of TB and lung disease caused by Non-Tuberculous Mycobacteria.



Claire L. Carter, Ph.D.

Next generation imaging technologies to elucidate the biomolecular networks that drive disease progression in brain tumors and infectious diseases, with the goal of identifying druggable targets, for the development of curative therapies



Rena Feinman, Ph.D.

Influence of the gut microbiome on antitumor immunosurveillance in patients with multiple myeloma (MM)



 ${\sf Lisa\ Carter-Bawa,\ Ph.D.,\ MPH,\ APRN,\ ANP-C,\ FAAN}$

Improving patient engagement and outcomes while addressing cancer disparities through innovative patient-clinician interventions



Martin Gengenbacher, Ph.D.

Immunopathology of bacterial pathogens and vaccine development



Neeraj Chauhan, Ph.D.

Biology and disease mechanisms of fungal pathogens of the Candida genus, primarily Candida albicans and Candida auris.



Derek Hanson, M.D.

Treatments for rare brain tumors, specifically embryonal tumor with multilayered rosettes (ETMR).



Liang Chen, Ph.D.

Genomic epidemiology of antimicrobial resistance and infectious disease.



Barry Kreiswirth, Ph.D.

Molecular genetics of drug resistant Gram negative and Gram positive pathogens; overcoming health care associated infections.



Véronique Dartois, Ph.D.

Pharmacology of hard-to-cure infections by high-threat pathogens.



Sivia Lapidus, M.D.

Pediatric rheumatologist/translational researcher physician scientist investigating underlying pathogenesis, specifically immunological mechanisms as well as genetic underpinnings, of autoinflammatory diseases and hyperinflammation occurring from infections such as COVID-19.



Heather Derry-Vick, Ph.D.

Examining pathways by which stress/behavioral factors impact health and quality of life in adults with cancer and other chronic conditions



Olivier Loudig, Ph.D.

Biomarker (miRNA) discovery in breast cancer, and research projects on biomarker discovery in lung, prostate, and pancreatic cancers.

World-Class Faculty (continued)



Binfeng Lu, Ph.D. Mechanism-driven design of next-generation immunotherapy drugs for cancer.



Erika Shor, Ph.D.

Drivers of genome instability and emergence of drug resistance in fungal pathogen Candida glabrata.



Alvin Makohon-Moore, Ph.D. Evolutionary dynamics of cancer.



Kevin Tong, Ph.D.Modeling the genetic progression of colorectal cancer for targeted therapies and personalized medicine.



Liancai Mu, M.D., Ph.D.
Peripheral nerve injury, muscle reinnervation, and pathophysiological mechanisms of swallowing and speech disorders caused by neurological diseases.



Benjamin Tycko, M.D., Ph.D.Genetics and epigenetics in human development and disease.



Jyothi Nagajyothi, Ph.D.
Targeting immune/metabolic mechanisms of adipocytes/adipomes to identify biomarkers in the pathogenesis of metabolic syndromes, cancer, and cardiopulmonary diseases and to discover drug targets.



Hai-Hui Xue, M.D., Ph.D.
Thymocyte development and
T lymphocyte differentiation in
response to infections and vaccination.



Chinwe Ogedegbe, M.D., MPH
Development of Public Health strategies to address social determinants of health to reduce cancer risk and improve outcomes in patients with chronic diseases



Johannes Zakrzewski, M.D.
Development of innovative therapies for the treatment of myeloma, lymphoma, and other cancers, as well as T-cell deficiency.



David S. Perlin, Ph.D.
Diagnosing and overcoming drug-resistant fungal and bacterial infections in cancer, transplant and other high-risk patients.



Yi Zhang, M.D., Ph.D.
Epigenetic therapy for programming T cell immunity and sensitizing tumors to immunotherapy.



Vidmantas Petraitis, M.D.

Development and investigation of pharmaceutical agents with favorable pharmacokinetic/pharmacodynamic characteristics using advanced preclinical animal

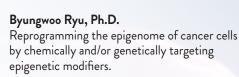


Yanan Zhao, M.D., Ph.D.
Molecular diagnostics of infectious diseases
(viral, bacterial, and fungal infections) and preclinical
antifungal/antibacterial drug development.



Rachel Rosenstein, M.D., Ph.D.
Pathogenesis of cutaneous complications of cancer therapies.

Research Faculty



Nadine Alvarez, Ph.D. - Pre-clinical research aimed at drug discovery and vaccine development.

Emmanuel Dumont, Ph.D - Using artificial intelligence methods for pattern recognition in genomics and medicine.

Milena Kordalewska, Ph.D. - Molecular mechanisms of drug resistance and stress tolerance in human fungal pathogens, especially Candida auris.

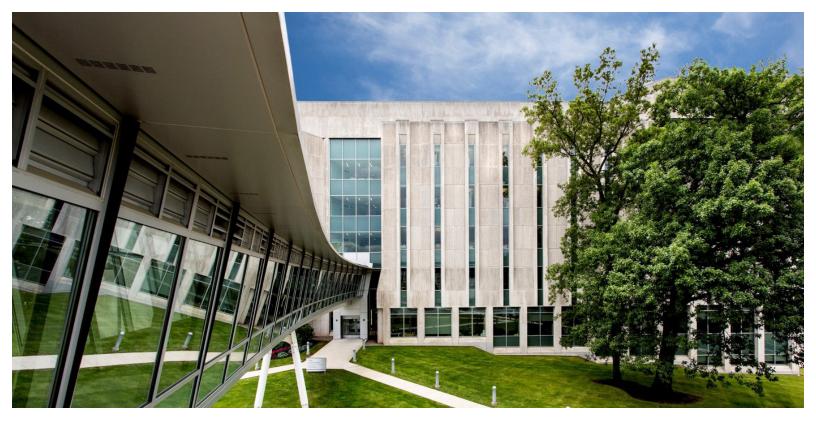
Natalia Kurepina, Ph.D. - Molecular epidemiology of mycobacteria including Mycobacteria tuberculosis. Virulence factors and drug targets.

Gary Kwok, Ph.D. - Digital health innovation for adolescents and young adults (AYA) with cancer

Claudia Manca, Ph.D. - Antimicrobial resistance and infectious disease.



Jansy Sarathy, Ph.D.
The development of relevant in vitro assays for tuberculosis drug discovery.



State-of-the-Art Facilities and Resources

The CDI's core facilities include:

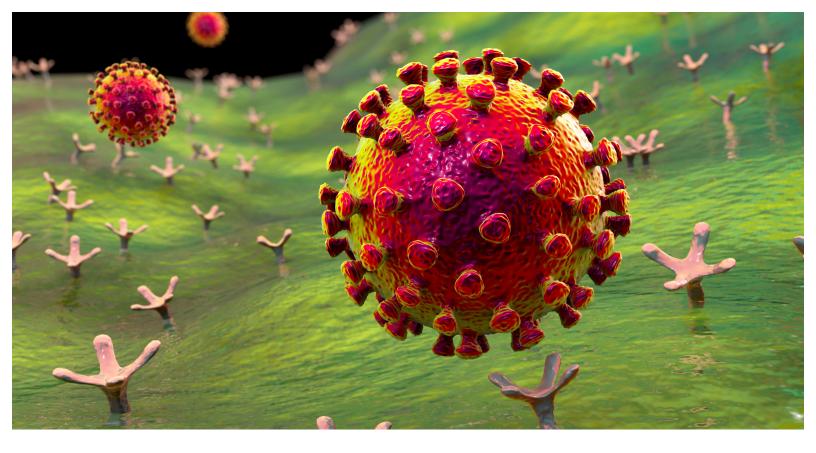
- **State-of-the-art microscopy** and other imaging equipment.
- An asvanced Flow Cytometry Core Facility that includes high parameter fluorescent activated cell sorting (FACS) and flow cytometry instruments and services.
- Mass spectrometry facilities equipped with stateof-the-art instrumentation providing cutting-edge technologies and expertise to researchers within CDI and the local scientific community.
- Clinical Immunology Core that provides state-of-art immunological services and specialized technology; expertise and leadership, and collaborative support in immunological research
- Genomics and Epigenomic Core provides targeted genomic services to researchers. Services are focused on targeted SNP genotyping and DNA methylation analyses, via high-throughput library preparations followed by Nextgen sequencing.
- BioRespository facilitates discovery and innovative research to improve medical care by using high quality annotated biospecimens for Scientists from Hackensack Meridian Health, other universities, and government-based companies.
- Research Animal Facility (RAF) a six-story, 39,000 GSF building, that was customized to meet the unique needs of scientists and researchers in the fields of genetics, infectious diseases, oncologic and regenerative medicine.

- Biosafety Level 3 (BSL-3) containment laboratories, including a 3,000 GSF ABSL-3 facility, to safely study infectious pathogens. Renovations to include an additional 1900 GSF of BSL-3/ABSL-3 space is currently under construction with an opening date of March 2024.
- Unique skybridge linking research facilities and School of Medicine, enabling scientists and research staff to easily interact
- A high-tech auditorium, board room and 4 video conferencing centers serve as venues for both internal and external speakers to present their research to CDI scientists, faculty and medical students.
- An additional 60,000 GSF of lab space is available for expansion of the research enterprise.

A Unique Biomedical Research and Life Sciences Hub

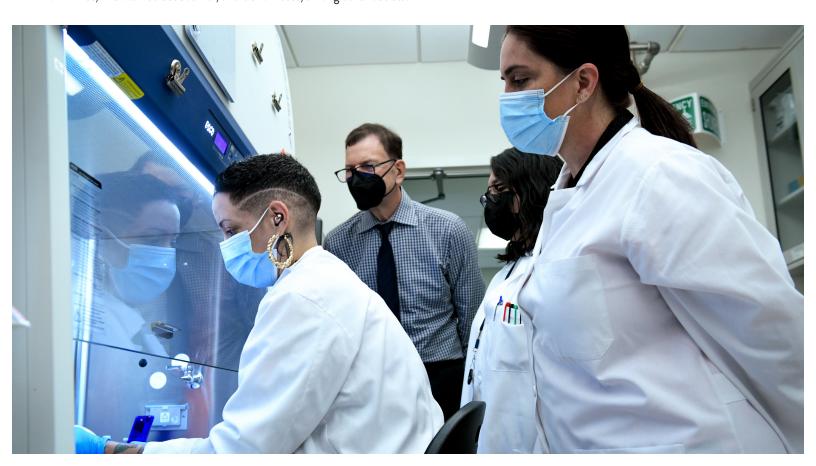
CDI is co-located on the Interprofessional Health Sciences Campus that includes the Hackensack Meridian School of Medicine and the Seton Hall College of Nursing and School of Health and Medical Sciences.

The 116-acre campus is located on the former site of Hoffman La Roche in Clifton and Nutley, N.J., and the CDI resides at the former home of the Roche Institute of Molecular Biology, "The Birthplace of Interferon." The CDI continues and extends this legacy as a life sciences hub devoted to science innovation, medical education, and biotechnology development. The site also includes the North American headquarters for Eisai Inc., and the regional hub for Quest Diagnostics.



The CDI Response To COVID-19...

CDI science is guided by unmet medical need and is intended to address clinical urgency. There has been no greater challenge posed to patient and community health than COVID-19, which struck less than a year into the CDI's existence. The scientists and staff members, including experts in global infectious diseases, embraced this unprecedented challenge. They have played a critical role in impacting clinical care through development of novel diagnostics, improved antiviral therapy, and support of numerous clinical trial regimens. CDI scientists are also studying the biology of the virus, host factors that impact disease progression, and discovery and development of novel drug candidates. The work was covered variously by The New York Times, The Wall Street Journal, and 60 Minutes, among other outlets.





...and Forging the Way to Face the Next Global Health Challenges



A unique collaborative enterprise of academic and pharmaceutical experts in New York City and Northern

New Jersey have formed a regional drug accelerator to address the urgent need to develop novel antiviral treatments for SARS-CoV-2, its variants, other coronaviruses and pandemic viruses, and as well as future viral threats. The Metropolitan AntiViral Drug Accelerator, or MAVDA, will be funded by a three-year, \$65,141,731 million grant from the National Institutes of Health (NIH) and the National Institute of Allergy and Infectious Disease (NIAID)'s Antiviral Drug Discovery (AViDD) Centers for Pathogens of Pandemic Concern program. MAVDA combines world-class virologists and academic

drug finders from Rockefeller University, Columbia University and Memorial Sloan-Kettering Cancer Center (MSK) in New York City, and the Hackensack Meridian Center for Discovery & Innovation (CDI), Rutgers University and Princeton University in New Jersey, Yale University in Connecticut, University of Arizona in Arizona, University of California San Diego in California, along with proven antiviral drug developers Merck, the Tri-Institutional Therapeutics Discovery Institute (Tri-I TDI), and Aligos Therapeutics. MAVDA's mission will be to discover, optimize and test innovative small molecule antiviral drugs to target coronaviruses (CoVs), emphasizing SARS-CoV-2, and one or more select RNA viruses with pandemic potential. The goal is to rapidly develop drugs which can be given orally, and in an outpatient setting, in the near future.





Treating Cancer...

The Institute for Immunological Intervention (3i)

The Institute for Immunologic Intervention at the CDI investigates T cell development in the thymus and T cell immune responses in peripheral tissues. The Institute is dedicated to advancing the understanding of T cell development, immunity to infections, tumor immunity, alloimmunity, and autoimmunity. By fostering collaborations with the CDI, John Theurer Cancer Center, and the Georgetown Lombardi Comprehensive Cancer Center, our institute strives to apply this knowledge towards innovative strategies that enhance the effectiveness of cancer immunotherapy, interventions for autoimmune and alloimmune conditions, and the prevention of infections.



The Institute for Multiple Myeloma and Lymphoma

The landscape of partnerships in biomedical research and development is rapidly evolving. The Institute for Multiple Myeloma and Lymphoma, supported by a major philanthropic investment in 2017 by a long-time pharmaceutical partner, is a combination of a large institute, academic drug discovery center, and risk-sharing model, funded through philanthropic investment and future commercialization initiatives. Our decadeslong industry collaboration, strengthened by the transformational gift last year, will benefit patients and their families, scientists, physicians, and shareholders, while also spurring economic development in northern New Jersey – all stemming from the joint commitment to cure multiple myeloma. The Institute for Multiple Myeloma and Lymphoma will hasten the development of breakthrough ideas to their full expression in clinical trials and approved interventions, ultimately offering life-saving care for patients.



... and Preventing It from Even Occurring.

The Cancer Prevention Precision Control Institute (CPPCI)

The CPPCI aims to create a transformational translational research Institute within the Center for Discovery & Innovation that connects science to practice with a tripartite mission focused on reducing disparities, improving patient outcomes through improved patient-clinician communication leveraging novel digital and social media outreach tools, and community-engaged participatory research methods.

Lisa Carter-Bawa, Ph.D., MPH, APRN, ANP-C, FAAN, leads the CPPCI.



- Leverage opportunities for community engagement in the greater New Jersey area to improve patient outcomes through cross-cutting cancer prevention and control-focused research;
- Increase the 'precision' of cancer prevention and control through tailored interventions as opposed to a 'one size fits all' approach;
- Employing innovative quantitative, qualitative, and mixed methods research methodology;
- Build a complementary research team at CDI that cross collaborates with the Georgetown Lombardi CPC research team to improve patient outcomes in the New Jersey and District of Columbia catchment areas (and beyond);
- Develop a community advisory board of diverse citizen scientists who represent the communities we serve to advise the CPPCI leadership quarterly on research needs, foci of clinical interest, and broader direction;
- Build a diverse, robust extramural funding portfolio; and
- Recruit and retain diverse, talented, innovative scholars making a meaningful contribution to advance the state of population sciences in cancer prevention and control.

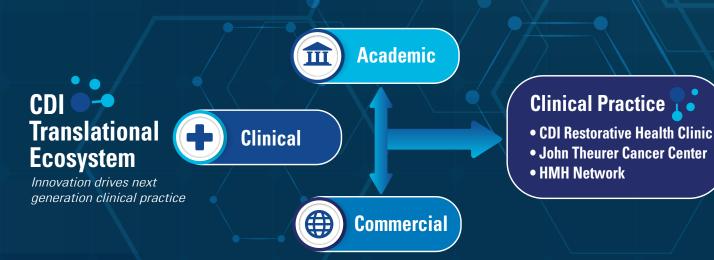
A Unique Translational Science Ecosystem

The CDI was established to take advantage of the extensive clinical assets of one of the region's largest and most comprehensive health care systems. As an academic accelerator, the CDI represents a unique translational ecosystem to integrate academic scientists with clinicians as well as small and large companies with the objective of taking innovative science and moving it rapidly into clinical settings to improve patient outcomes.

Collaborations distinguish CDI including its interest in partnering with innovative life science companies - some of which will be located on site in state-of-the-art research and development (R&D) lab and office space. This highly integrated network includes the strong partnerships of researchers, physicians and health care professionals at Hackensack Meridian Health's 17 network hospitals as well as the faculty and medical students of the School of Medicine located on campus. Other partners are HMH's John Theurer Cancer Center, the National Cancer Institute-designated

Georgetown Lombardi Comprehensive Cancer Center, and the New York Genome Center which provide access to thousands of patients and greatly expand CDI's impact.

CDI Translational Ecosystem accelerates science application for patients by developing tests, treatments, and preventions for unmet clinical needs. This involves CDI scientific teams collaborating with experienced medical professionals and researching specific diseases in-depth, in order to introduce more effective mechanisms for improving clinical outcomes and thereby alter or redefine existing standards of care. CDI translational-science model is driven by a combination of incentive-based systems that have improved patient outcomes as a key metric. It is agile and dynamic to rapidly address novel challenges. The principal outcome is disease intervention and/or prevention, often resulting in a change in standard-of-care, which may involve development of a marketable drug, vaccine or diagnostic.





The CDI is led by a group of entrepreneurial scientists committed to translate scientific insights into treatments for some of the world's most challenging diseases. They have created a new paradigm and the required infrastructure to enhance productivity, spark innovation, and accelerate the timeline from discovery at the bench to treatment at the bedside. The CDI's robust research program directly informs and benefits from enhanced partnerships with some of the country's most respected health care and research institutions, including Hackensack Meridian Health's own extensive network and resources.

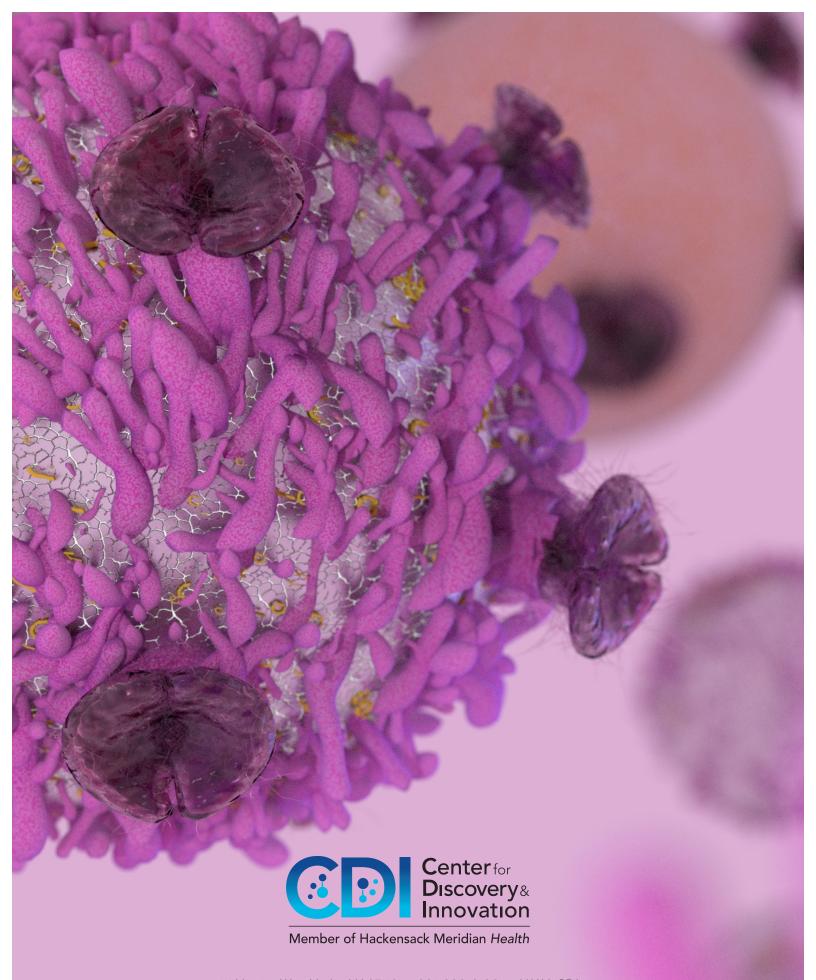












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