



Prevention and Health Promotion Administration CONQUEST 2025

A Report on the Maryland Cigarette Restitution Fund

January 2025

As we approach the 25th anniversary of the Maryland Cigarette Restitution Fund (CRF), we mark the great progress that has been made for the citizens of Maryland. It is not an exaggeration to say that it has helped transform the health of our state. Maryland, which once had the highest cancer rates in the nation, now has among the lowest rates in the nation.

In this issue of Conquest, we will revisit some of the historical advances already achieved and the progress on the horizon made possible through the Maryland CRF. We are cognizant of the lives that have been saved because of these advances. We honor Maryland's elected officials who decided in 2000 to use the CRF to address the state's cancer burden, and we are grateful to the Governors and State legislators over the 25 years that followed who remained committed to this mission.

The Maryland CRF is a source of pride for our state. It is the model for how communities, government and academic centers can work together effectively to reduce cancer incidence and improve patient outcomes and the overall health of citizens. Throughout this enduring partnership, the Johns Hopkins commitment to improving the health of all Marylanders, particularly minorities and the underserved, has persisted.

We acknowledge the challenges of managing Maryland's complex budget and appreciate that, despite economic challenges throughout these 25 years, commitment to the CRF has remained constant. As we mark the history-making decision by Maryland elected officials in making our state a national leader in the use of Cigarette Restitution Funds, we look forward to a continued partnership in our fight against cancer.

Whallem

William G. Nelson, M.D., Ph.D. Marion I. Knott Professor and Director Johns Hopkins Kimmel Cancer Center John D. Groopman, Ph.D.

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25 YEARS OF TURNING CRF RESEARCH INTO RESULTS

History of the Maryland CRF: In 1998, Maryland joined 46 other states in a class action lawsuit against America's cigarette manufacturers. States were seeking reimbursement for the huge costs associated with cancer and other smoking related diseases. The states prevailed and split a \$53 billion settlement, known as the Master Settlement Agreement.

Maryland became the national model when, in 2001, its elected officials opted to use a considerable portion of its award to fight cancer by establishing the Maryland Cigarette Restitution Fund (CRF) to fund cancer research and other projects aimed at reducing the state's cancer burden.

Maryland got to work, investing its settlement funds to fight cancer, and Johns Hopkins investigators leveraged their grants, earning research funding and other support more than ten times the CRF investment.

2000 - 2025:

- → 7 Cancers Targeted: breast, cervical, colorectal, lung, melanoma, oral and prostate
- → Maryland's ranking among the states and DC is now better than half the states and DC in melanoma (41st), oral (39th), lung (36th), colorectal (30th), and cervical (29th), and all cancers (31st)
- → A specific focus on minority and underserved populations
- → 448 grants totaling \$43.7 million funded
- → More than 5,500 journal articles published
- → 107 faculty recruited and retained
- → Johns Hopkins investigators leveraged their grants, earning research funding and other support more than 10 times the CRF investment. These included 20 Maryland Cancer Moonshot grants totaling \$1.7 million

JOHNS HOPKINS CRF AND KIMMEL IN THE COMMUNITY



"The Kimmel Cancer Center has 300 faculty members from 35 Johns Hopkins departments and five schools. We are bringing the right people together with a focus on cancer intervention and control. We interact most closely with the Maryland Department of Health. There is no relationship anywhere in the country that is as tight as the one we have. With this interaction, we can explore needs, such as cancer screening, and act for the citizens of our

state. You just don't see these kinds of discussions in other states, The CRF is the framework for

this unique collaboration. Working together through the CRF, we are able to bring in new talent, address the cancer problems specific to Maryland, and build industry in the state." --William Nelson, M.D., Kimmel Cancer Center Director and Johns Hopkins CRF co-principal investigator

In the Community: The goal of the CRF is to get all of the expertise and knowledge we have assembled to community providers, say Johns Hopkins CRF co-principal investigators **William Nelson, M.D., Ph.D.**, and **John Groopman, Ph.D.**, Johns Hopkins CRF-supported experts are working with community providers to develop cancer screening best practices, including expanding screening colonoscopy and broadening stool screening capabilities, which were developed at the Kimmel Cancer Center with the aid of CRF support.



Healthy Eating to Reduce Cancer Risk: Joel Gittelsohn, Ph.D., is studying digital strategies to improve healthy food access and to reduce cancer risk for African Americans and Native Americans who live in Baltimore City. He is working with a mobile app, called BUD, to push for stores to stock healthier foods. The app connects small retailers to local suppliers, utilizing the power of collective purchasing. Gittelsohn is expanding the reach, using BUDConnect, a consumer app connecting the stores to customers and FRESH, Focus on Restaurant

Engagement to Strengthen Health, to encourage healthy menu options in low income areas. A simulation model will assess the impact of these programs.



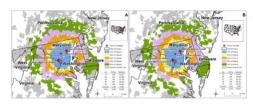
Understanding Needs: A collaboration between the Johns Hopkins Kimmel Cancer Center and Bloomberg School of Public Health is aimed at developing web-based dashboard tools specific to Maryland. Developed by **Kassandra Alcaraz, Ph.D., M.D.**, and **Frank Curriero, Ph.D.**, the dashboard transforms data about cancer risks and rates in Maryland from numerical to graphical. Cancer statistics, health behaviors, screening rates, sociodemographics, and social

determinants of health are being captured for the dashboard to better understand the cancer burden in our state and target outreach and intervention where needed.



The Connection Between Mental Health and Smoking: Panagis Galiatsatos, M.D., M.H.S., started a smoking cessation collaboration with a psychiatric clinic in Maryland. Those with a mental health diagnoses are twice as likely to smoke as those without mental health issues. As a result,

the leading cause of death among this patient population is lung cancer and a lung condition known as COPD. Patients from the clinic come to Galiatsatos' Tobacco Treatment Clinic for tailored clinical care and support groups. To date, there has been 78 participants, with 82% attending three or more sessions and receiving care, and 34 of 42 participants remaining smoking-free for at least six weeks. Those eligible for lung cancer screening—64 participants—completed the screening. Galiatsatos is planning to expand the outreach in 2025.



This figure shows the main catchment area for people diagnosed with cancer at the Johns Hopkins Kimm Cancer Center from 2010-2014 (A) and 2015-2019 (B). This area expanded in size in 2015-2019, adding 18 additional Zip codes. There also was an increase in patients traveling from southern Pennsylvania and the Eastern Shore of Maryland. Credit: Michael Desjardins

Proximity to a Cancer Center Contributes to Cancer Stage at Diagnosis: Location, race and insurance status play a significant part in the odds of a patient being diagnosed with early-stage or late-stage cancer, according to a detailed medical records analysis of more than 94,000 patients with cancer by researchers Michael Desjardins, Ph.D., Frank Curriero, Ph.D., and William Nelson, M.D., Ph.D. Patients who lived farther

away from a facility designated a comprehensive cancer center (CCC) by the National Cancer Institute (NCI) and who received only a diagnosis or only treatment at the center had higher than average odds of a late-stage diagnosis, as did non-Hispanic Black patients and patients with Medicaid or no insurance, regardless of their location, the researchers report. This CRF-supported research highlights that significant barriers to cancer screening and treatment remain to be addressed for people living far from a comprehensive cancer center and for disadvantaged populations.

"Moving forward, we need to ask patients why they choose a particular cancer center for a diagnosis or a treatment," says Desjardins. "Maybe they can't afford the treatment at a certain location, or maybe they are seeking a specific late-stage cancer treatment. There are a lot of nuances we have to try to understand by combining spatial data sets with qualitative surveys."



Expanding Cancer Screening: In a collaboration with the Maryland and Baltimore Health Departments, **Allison Klein, Ph.D.**, is studying groups at high risk for cancer to uncover predispositions. Beginning in Baltimore City in the HIV-positive community, Klein is working to add cancer screening to the care offered. Focus groups are helping identify other at risk groups who could benefit from cancer screening.



A Statewide Plan: Elizabeth Platz, Sc.D., co-leader of the Kimmel Cancer Center Cancer Prevention and Control Program and a CRF-supported investigator, is a steering committee member and former chair of the Maryland Cancer Collaborative. Platz and Otis Brawley, M.D.,

Director of Community Outreach and Engagement, and also a CRF-supported investigator, contributed to the 2021-2025 Maryland Comprehensive Control Plan.



Access to HPV Vaccines on College Campuses: About half of adolescents aged 13 to 17 in United States are not fully vaccinated against human papillomavirus (HPV). As they age into young adulthood, colleges may be key to improving HPV vaccination access and participation. In collaboration with the Maryland Cancer Collaborative and Maryland

Department of Health, a study led by CRF investigator **Norma Kanarek, Ph.D., M.P.H.**, and leading HPV expert **Gypsyamber D'Souza, Ph.D., M.P.H.**, showed that college campuses are central to raising the HPV vaccination rate among young adults. Twenty Maryland colleges participated in the study. Ten colleges offered HPV vaccines, covering 39% of Maryland college students. Colleges that over HPV vaccines, provided them to all interested students at no out-of-pocket cost.



Non-Hormonal Treatment for Recurrent Prostate Cancer: A new clinical study by **Cathy Handy Marshall, MD., Ph.D.**, found that the anti-cancer drug olaparib may be effective in treating biochemically recurrent prostate cancer without accompanying hormone therapy for men who have mutations in genes, such as BRCA2. The study focused on men experiencing signs of cancer recurrence after

surgical removal of the prostate, measured by a high level of the protein prostate-specific antigen (PSA). Following treatment with olaparib, 13 participants, including all 11 who had BRCA2 mutations, had a decrease in PSA of at least 50% — a sign that their cancers were receding.



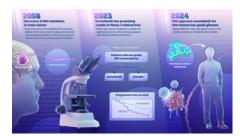
Drug Reprograms Immune Cells: CRF-support research by Jelani Zarif, Ph.D., explored a drug called DON, developed at Johns Hopkins, in laboratory models of prostate and bladder cancers. The drug is called a prodrug because it only becomes activated in tumors. The drug blocks glutamine, which helps feed cancer cells. Zarif says using DON to keep immune cells in tumors from accessing glutamine shifts the balance of immune cells to an immune-stimulating type that help shrink tumors. Zarif showed that the drug blocked glutamine in prostate and bladder tumors in laboratory models and reprogrammed immune-suppressing immune cells, called

macrophages, into immune-boosting immune cells. He is now planning to launch a clinical trial of the drug in patients with treatment-resistant prostate and bladder cancers. Read the news release at https://bit.ly/3C0kHrI.



Common Culprit Found to Drive Prostate Cancer: By tracking the changes in prostate cancer cells over time, Kimmel Cancer Center researchers found that activation of the MYC gene — a well-known cancer-causing gene — sets off a cascade of events that leads to both initiation and progression of the disease. The CRF-supported study, led by Srinivasan Yegnasubramanian, M.D., Ph.D., identifies the MYC gene as a common denominator across prostate cancers. The

researchers found that initial MYC activation attracts immune cells to the tumor but later helps hide the tumor from immune cells. This discovery is the first step toward identifying potential therapeutic targets along the pathway. Read the news release at https://bit.ly/40nZH7J.



FDA Brain Cancer Drug Approval Based on Johns Hopkins Discovery: A new drug for treatment of a type of brain cancer, called IDH-mutant low-grade glioma, was approved Aug. 6 by the U.S. Food and Drug Administration (FDA). The promising new drug stems from a 2008 genetic discovery made at the in the lab of CRF-supported investigator Bert Vogelstein, M.D. The drug,

called vorasidenib, is a targeted cancer therapy that works by inhibiting the activity of a mutated gene called IDH, slowing the growth of the cancer. The gene was identified by Vogelstein and team in 2008 when they became the first to map the genetic blueprint for brain cancer. The

researchers found that the IDH gene—which had never been suspected to be involved in any tumor type—was frequently mutated in a subset of brain cancers.

"The history of medicine shows that when a disease is understood, it eventually becomes manageable. It may not be immediately evident, but in time, as in this case, such discoveries result in better treatment for patients," said Vogelstein of the two decade-spanning research.

Maryland Cancer Moonshot

Drug Prompts Immune Response in Pancreatic Cancer: Nilofer Azad, M.D., and Marina Baretti, M.D., led a clinical trial

of a two-drug combination—an epigenetic drug that reactivates silenced tumor suppressor genes and an immunotherapy that re-ignites the immune response to cancer—in patients with the most common type of pancreatic cancer. The Maryland Cancer Moonshot-supported research resulted in some patients experiencing deep tumor shrinkage. The team is now exploring other drug combinations, testing different types of immunotherapies.

Lymph Node-Like Structure Triggers Cancer Demise: In this Maryland Cancer Moonshot-supported research, **Mark Yarchoan, M.D.**, described a lymph-node like structure seen in liver tumors after presurgical immunotherapy. He found that patients that have more of these structures are less likely to have a cancer recurrence after surgery. Their next step is to see if they can induce formation of the structures in patients who do not develop them on their own.

Treatment Resistant Melanoma in Men: Age-related changes in the fibroblasts, cells that create the skin's structure, contribute to the development of aggressive, treatment-resistant melanoma in males, according to Maryland Cancer Moonshot-supported research in mice led by **Ashani Weeraratna, Ph.D.** Weeraratna and her team are now studying how age- and sex-related changes in immune system cells surrounding melanoma cells affect how well the tumors respond to immune cell-boosting therapies increasingly used to treat melanoma.

Age-Related Changes that Support Pancreatic Cancer Growth: Research by **Daniel Zabransky, M.D., Ph.D.**, in collaboration with **Ashani Weeraratna, Ph.D.**, found that older people may be at greater risk of developing pancreatic cancer and have poorer prognoses because of age-related changes in cells in the pancreas, called fibroblasts. The Maryland Cancer Moonshot-supported research points out—for the first time in pancreatic cancer—that there are aging-specific signals in tumors that may need to be modulated to realize the potential of current and future treatments for this deadly disease.

TURNING RESEARCH INTO REVENUE FOR MARYLAND A SNAPSHOT OF THE CRF MODEL IN ACTION

"Johns Hopkins has turned Baltimore into quite a liquid biopsy biotech hub."—Megan Molteni, reporter for Wired

Kimmel Cancer Center research led to the Maryland-based biotech startups Personal Genome Diagnostics (PGDx) and PapGene, Inc. Victor Velculescu, M.D., Ph.D., a PGDx founder, received CRF support, launching pioneering discoveries and leveraging these discoveries to earn revenue for Maryland, as detailed here:

In 2004, Victor Velculescu, M.D., Ph.D., moved to Maryland from California and launched his research career at Johns Hopkins with a faculty recruitment grant from the CRF. He joined the research team whose pioneering discoveries deciphered the genetic causes of cancer.

These discoveries brought millions more in research funding to Maryland and led to Velculescu earning a \$2.8 million seed investment to launch the Maryland biotech start-up PGDx to produce and market the cancer tests. He conducted business with hundreds of companies to purchase equipment and supplies, and these companies set up offices in Maryland because of business opportunities with Johns Hopkins. PGDx flourished, moving to a larger facility in Baltimore City and expanding its staff.

This success led Labcorp to acquire PGDx, making genomic profiling of cancer available to patients and oncologists at the local level. Plans to grow PGDx's Baltimore presence remains part of long-term plans, and New Enterprise Associates invested \$214 million in the company. The investment allowed the company to expand to 63 employees, with more new hires anticipated. PGDx also received U.S. Food and Drug Administration clearance for its diagnostic kit, called *PGDx elio tissue complete*, which analyzes tumors, using a panel of more than 500 genes.

With his research success and continued CRF support, Velculescu also started, and later expanded, his own laboratory, research that resulted in a pioneering new test, called DELFI, that can detect cancer DNA through simple blood tests, known as liquid biopsy.



DELFI can detect cancer early by finding DNA fragments unique to cancer cells circulating in the blood. Velculescu explains that healthy cells package DNA like a well-organized suitcase in which different regions of the genome are carefully placed in various compartments. By contrast, cancer cells are more like disorganized suitcases, with items from across the genome thrown in haphazardly. Finding these fragments in the blood indicates the presence of cancer.

(left) Maryland State Senator Cory McCray visited Velculescu's lab on Jan. 3 to see how the DELFI test is made and interpreted.

IMAGINING THE FUTURE



"As we look back at the progress made with CRF research over the past 25 years, we can see that the return on investment has been extraordinary. We are reminded that our state went from the worst cancer rates in the U.S. to 34th. With ongoing support, our researchers can address emerging issues, so when we look back in another 15 to 25 years, we'll see the fruit of these endeavors. CRF support allows us to imagine the future."

John Groopman, Ph.D., Johns Hopkins CRF co-principal investigator

Looking to the Future:

- In addition to screening, primary prevention of cancer in all Marylanders through lifestyle changes portends fewer cancers ever developing. With increased avoidance of tobacco smoke, alcohol, obesity, and sedentariness, cancer incidence and mortality would lessen.
- A greater focus on prostate cancer and breast cancer, where rates have been slower to improve, due to less curable cancer subtypes that are more prevalent among African Americans, represented to greater extent in the state's population.
- Increase use of low-dose CT scan screening among former smokers may convey lifesaving benefits. As our knowledge of cancer epidemiology accumulates, additional population subgroups at higher risk will come to light and be the focus of attention

Rise of Machines, Discovery and Design in the Age of AI: Data science, or methods for discovering structure and patterns in data, was the focus of the 2024 Research Matters Conference. The conference brings together CRF-supported investigators from the University of Maryland and Johns Hopkins to collaborate on new opportunities for cancer discovery. Topics included:

- Using data science and AI to intercept pancreatic cancer early
- Using large language models to incorporate the medical documentation in electronic medical records to advance cancer therapies, such as immunotherapy and personalized cancer vaccines
- Making imaging lower dose, faster, and higher quality
- Image reconstruction into 3D or 4D
- Better assessment of gene mutations to determine those that promote cancer and/or change cancer drug sensitivity
- Stratifying and categorizing patients to improve treatment and outcomes

2025 AWARDS

FY25 Awards \$2,176,000

Grants:	All	New	FY Target
Translational Research	19	11	16
Faculty Recruitment	6	4	10
Faculty Retention	3	3	0
TOTAL	28	18	26

Kassandra Alcaraz, Ph.D., M.P.H. and Frank Curriero, Ph.D.: *Understanding and Addressing Adverse Social Determinants of Health to Reduce Cancer-related Disparities in Maryland Communities* **FACULTY RETENTION, NEW**

Rebkha Atnafou, M.A.: Identifying Barriers and Promoters to Colorectal Cancer Screening for Black Immigrants and Refugees in the Metropolitan Baltimore and Prince George's County: A Qualitative Study **TRANSLATIONAL RESEARCH, NEW**

Jeanne Clark, M.D., M.P.H. and Heidi Hutton, Ph.D.: Feasibility and RCT Pilot of an Avatar-Delivered Computerized Intervention for Tobacco Cessation with Community Health Worker Linkage to Lung Cancer Screening In Baltimore City **TRANSLATIONAL RESEARCH, CONTINUATION**

Jenell S. Coleman, M.D., M.P.H.: Identifying Determinants of Postpartum HPV Vaccination Uptake: A Qualitative and Quantitative Approach **FACULTY RECRUITMENT, NEW**

Avonne Connor, Ph.D., M.P.H.: Disparities in the Association between Obesity and Cancer-Related Pain Among Female Cancer Survivors in Maryland **TRANSLATIONAL RESEARCH, NEW**

Dulce Cruz-Oliver, M.D.: Enhancing Self-Efficacy and Lowering Anxiety Through a Telenovela Intervention for Caregivers of African American and Hispanic Hospice Cancer Patients: Pilot Trial **TRANSLATIONAL RESEARCH, NEW**

Michael Dejardins, Ph.D.: Spatial Science Approaches to Evaluate Patient Utilization of SKCCC's Clinical Trials before and during the COVID-19 Era **TRANSLATIONAL RESEARCH, NEW**

2025 AWARDS CONTINUED

Atul Deshpande, Ph.D., M.S.: A Machine Learning Framework for Delineating Spatial Cell-Cell Interactions Predictive of Cabozantinib/Nivolumab Therapy Response in Real and Virtual Hepatocellular Carcinoma Tumors **FACULTY RECRUITMENT, CONTINUATION**

Roy Elias, M.D.: Disentangling Ancestry-Influenced Gene Expression in Prostate Cancer Using a Multi-Omic Deep Exploratory Non-Negative Matrix Factorization Framework **TRANSLATIONAL RESEARCH, NEW**

Panagis Galiatsatos, M.D.: Tobacco Free Community: Expanding Efforts for Smoking Cessation and Lung Cancer Screenings in Populations With Psychiatric and Mental Health Co-Morbidities **TRANSLATIONAL RESEARCH, CONTINUATION**

Joel Gittelsohn, Ph.D.: Developing an Agent-Based Model to Inform Programs and Policies Aimed at Improving Healthy Food Access and Reducing Cancer Risk In Baltimore City **TRANSLATIONAL RESEARCH, CONTINUATION**

John Groopman, Ph.D.: Global Discovery and Profiling Changes of Human Albumin Modifications by Pan-Protein Adductomics: Initial Application to Inflammation Derived Adducts Related to Bariatric Surgery **TRANSLATIONAL RESEARCH, CONTINUATION**

Peng Huang, Ph.D. and Hari Easwaren, Ph.D.: Al-guided Indeterminate Pulmonary Nodules Clinical Decision System TRANSLATIONAL RESEARCH, NEW Jacky Jennings, Ph.D.: PRO BEAD Shared Resources TRANSLATIONAL RESEARCH, CONTINUATION

Burles Johnson, III, M.D.: *Identification of Tumor Targets Using Optimized Preclinical Bladder Cancer Models* **FACULTY RETENTION, NEW**

Miranda R. Jones, Ph.D.: Unraveling Connections: Social Determinants of Health and Their Impact on Smoking Behaviors among Adults with and without a History of Cancer TRANSLATIONAL RESEARCH, NEW

Alison Klein, Ph.D. and Zachariah Foda, M.D.: *Pilot Study of Targeted Community-Based Colorectal Cancer Screening Tailored to Low-Uptake Communities in Baltimore City and Western Maryland* **TRANSLATIONAL RESEARCH, NEW**

Kirsten Koehler, Ph.D., Lesliam Quiros-Alcala, Ph.D., M.Sc., Ana Rule, Ph.D.: *Environmental Exposures and Cancer Mortality Among Maryland Adults* **TRANSLATIONAL RESEARCH, CONTINUATION**

2025 AWARDS CONTINUED

Leila J. Mady, Ph.D., M.P.H.: Understanding Demographic and Social Determinants of Health on Tobacco Dependence and Financial Toxicity in Lung and Head and Neck Cancers **FACULTY RECRUITMENT, CONTINUATION**

Hailey Miller, Ph.D., R.N.: A Community-Driven, Nurse-Led Dietary Intervention For Adults With Overweight or Obesity **TRANSLATIONAL RESEARCH, NEW**

Aliyah Pabani, M.D., M.P.H.: Improving Access for Expert Management of Immunotherapy-Related Adverse Events **FACULTY RECRUITMENT, NEW**

Chintan Pandya, Ph.D., M.P.H., M.B.B.S.: Examining Disparities in Access and Outcomes of Immune-Based Cancer Treatments: A Comparative Analysis of Patients Covered by Medicaid vs. Private Insurance Using Johns Hopkins Electronic Health Records and Claims Data **TRANSLATIONAL RESEARCH, NEW**

Jenni Yeong-Shin Sheng, M.D.: Gut microbiome, Adverse effects, and Markers through Metabolic Reprogramming (GAMMER) Study **FACULTY RETENTION, NEW**

Dimitri N. Sidropoulos, Ph.D.: Tracking Lymphocyte Dynamics Across Tumors, Lymph Nodes and Periphery To Optimize Cancer Vaccine Strategies **FACULTY RECRUITMENT, NEW**

Kala Visvanathan, M.D, M.H.S.: Improving Breast Cancer Disparities in Maryland by Addressing Breastfeeding Adults **TRANSLATIONAL RESEARCH, CONTINUATION**

Govind Warrier, M.D., M.P.H.: Innovating Inclusion: Implementing a Digital Patient Navigation Platform to Improve Access to Expert Melanoma Care and Clinical Trials **FACULTY RECRUITMENT, NEW**

H. Catherine Wilbur, M.D.: Characterization of the molecular landscape of sarcoma to inform cancer risk and treatment **FACULTY RECRUITMENT, NEW**

Jessica Yeh, Ph.D.: Scaling up Behavioral Weight Loss Opportunities for Cancer Survivors in Maryland with Overweight or Obesity **TRANSLATIONAL RESEARCH, CONTINUATION**