JOHNS HOPKINS MEDICINE | THE SIDNEY KIMMEL COMPREHENSIVE CANCER CENTER

TURNING RESEARCH INTO RESULTS

Prevention and Health Promotion Administration

CONQUEST 2024

A Report on the Maryland Cigarette Restitution Fund

February 2024

We are excited to again share with you how the Maryland Cigarette Restitution Fund (CRF) has helped the citizens of our state. As you will read in this issue of Conquest, the state of Maryland and Johns Hopkins have a long and meaningful history of collaboration. This hard work has resulted in monumental progress—including going from leading the country in cancer death rates a few decades ago to now ranking 34th in the nation; the support to recruit the best and brightest young cancer researchers and doctors; and the transfer of technology to serve the public good. We are making unprecedented progress. Yet, we truly believe that the best is yet to come.

After decades of research, we have seen extraordinary progress (See The Next Cancer Front, page 2). Our investigators have enlisted the full power of the immune system against cancer. New molecular technologies are making the dream of simple blood tests to detect and monitor almost every type of cancer a reality. The ability to prevent cancer is being realized. Disparities, where improvements in cancer outcomes lag behind for minorities and the underserved, are being erased. We are solving the cancer problem.

Yes, there is work that remains to be done, but we truly believe a brighter future is on the horizon. The full Johns Hopkins enterprise—five schools and 35 departments—is invested with us in overcoming cancer. Those things we imagined 50 years ago when our Cancer Center opened its doors are today helping patients. As we celebrate what we've accomplished, we renew our mission to conquer cancer. With a continued partnership through the CRF, we are certain there is nothing we cannot accomplish for the people of Maryland.

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

John D. Groopman, Ph.D.
Edyth H. Schoenrich Professor of Preventive Medicine and Associate Director of Population Sciences

MARYLAND AND JOHNS HOPKINS: A HISTORY OF COLLABORATION

In 1998, 52 state and territory attorneys general, including Maryland's, signed the Master Settlement Agreement with the four largest U.S. tobacco companies to settle dozens of lawsuits brought to recover billions of dollars in health care costs associated with treating smoking-related illnesses. We worked with then-Gov. Parris N. Glendening and the General Assembly to establish the Maryland Cigarette Restitution Fund (CRF).

Maryland was unique, named by the U.S. Congress as a national model. As most states engaged in lengthy battles over how to use the funds, Maryland got to work, investing its settlement funds to fight cancer—particularly seven CRF-targeted cancers: breast, cervical, colorectal, lung, melanoma, oral and prostate cancers, with a specific focus toward minority and underserved populations. Johns Hopkins investigators leveraged their grants, earning research funding and other support more than 10 times the CRF investment. To date, the CRF has funded 166 grants at Johns Hopkins to fund research and to recruit and retain scientists and clinicians.

Even before the CRF, however, Johns Hopkins leadership and faculty members were working with state officials. In 1985, the Johns Hopkins Cancer Prevention and Control program was established, and a collaboration with the state began that continues today. Over the years, our experts have held leadership positions on the Maryland State Council on Cancer Control. In 1989, we worked with then-Gov. William Donald Schaefer to form the Maryland Cancer Consortium, and in 1991, the first Maryland Cancer Control Plan. Today, the plan is administered by the Maryland Cancer Collaborative, a statewide coalition of volunteers, which continues to include many Johns Hopkins faculty members.

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. Dr. 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.

CRF SUPPORT IS TURNING RESEARCH INTO RESULTS

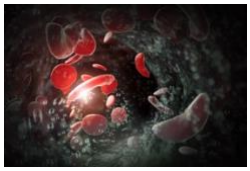
The Next Cancer Front: "An extraordinary wave of progress against cancer has occurred in the U.S. over the past three decades. From its peak in 1991, cancer mortality has declined by more than a third. Smoking cessation, HPV vaccination, improved cancer screening and better cancer treatments are poised to push cancer deaths even lower," wrote **William Nelson, M.D., Ph.D.**, Kimmel Cancer Center Director and Johns Hopkins CRF co-leader, in *Cancer Today*. He suggests using the same discoveries that led to this progress to improve cancer survivorship. Molecular genetic tools are already

being used in precision (individualized) cancer medicine to guide which types of therapies will benefit a patient, including which patients will need more intensive therapies to hold their cancers at bay, and on the other hand, those who can be spared these intensive therapies and their complications. This type of progress is already being made in breast cancer, Dr. Nelson says, but adds that it is the tip of the iceberg. "Hopefully, as we cut cancer mortality in half over the next 25 years, we will do so using these types of molecular tests to provide equally dramatic improvements in cancer survivorship."

Immunotherapy: This cancer treatment, which harnesses the power of the immune system to destroy cancers and hold them at bay, has revolutionized the treatment of lung cancer and melanoma skin cancer. More than 15% of patients are benefiting from new drugs called checkpoint inhibitors, which reignite the immune response shut down by cancer cells. New research is aimed at expanding the benefit by learning why these powerful therapies work so well in some patients but not others.

Cancer Tests: Johns Hopkins Kimmel Cancer Center researchers developed tests that detect the remnants of dying cancer cells in the blood and in body fluids. Two of these tests—PapGene, which tests cervical fluid for molecular evidence of ovarian and endometrial cancers, and DELFI, which detects unique patterns in DNA fragments shed from multiple types of cancer—were developed by CRF-supported researchers. The technologies have led to the launch of companies and have earned Maryland some prominence in the biotech industry.

Cancer Treatment Cures Sickle Cell Disease: A Johns Hopkins-led national, multicenter clinical trial of low-dose haploidentical (half-matched) bone marrow transplant to treat severe sickle cell disease found the treatment to be safe and curative for adults with serious sickle cell-related health complications. Half-matched bone marrow transplant with post-transplant cyclophosphamide was developed through more than a half-century of translational team science at the Johns Hopkins Kimmel Cancer Center. In this type of bone marrow transplant, the donated bone marrow comes from a half-matched donor, such as a patient's parent, sibling or child. Other relatives, including a nephew, niece, aunt or uncle, are also often suitable donors. As a result, essentially every patient is able to find a donor. Sickle cell disease affects about 100,000 Americans, primarily African Americans, and 20 million people worldwide. It is a painful blood disorder in which red blood cells are shaped like crescents instead of discs and clog blood vessels.



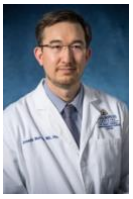
Cancer Risks in Maryland's Soil: In research led by Johns Hopkins CRF co-leader **John Groopman, Ph.D.**, measurements have been taken of carcinogens in the soil throughout Maryland. Dr. Groopman, who helped link aflatoxins, a fungus found in soil, to liver cancer, evaluates the risk and makes recommendations for mitigation when carcinogens are found. He notes that carcinogens are stable in the environment and that it's when they enter the body that they become active. Environmental carcinogens can be a significant cancer risk factor, says Dr. Groopman, pointing to the 87% of liver cancers that are caused by just three carcinogenic exposures—aflatoxin, albumin, and hepatitis C. He is exploring whether predictors of other cancers, such as breast

cancer and lung cancer, can be developed based on exposures to carcinogens in our state, and he is developing cancer prevention strategies to identify these exposures and intervene.

Listen to these podcasts of Dr. Groopman and Kimmel Center Director Dr. William Nelson discussing cancer prevention and control: bit.ly/3tZzDSO and bit.ly/4b3it7y.

Smoking Among Low-Income Marylanders: Smoking remains a leading cause of cancer. Although smoking rates overall in Maryland are low, at 11.1%, there are certain low-income areas where smoking rates approach 30% to 40%, says **Kassandra Alcaraz, Ph.D.** She received CRF support to study the connection between where someone lives and socializes and smoking among socio-economically disadvantaged populations. Her studies find that many in difficult economic situations are motivated to quit smoking, but they are unaware of how to get help, and they have less social support. For example, they are more likely to live in communities and households where smoking is common. She is collaborating with another CRF investigator, **Panagis Galiatsatos, M.D., M.H.S.**, who directs the Johns Hopkins Tobacco Treatment Clinic, and **Alejandra Ellison-Barnes, M.D., M.P.H.**, to develop ways to help this population quit, including addressing factors such as stress and anxiety and other mood disorders that stop them from quitting, and improving knowledge about and use of the Maryland Tobacco Quit-line. Dr. Alacaraz says they are working with 50 partners throughout Maryland to reach as many people as possible, and will share what they learn with the Kimmel Cancer Center Community Outreach and Engagement team, so that effective strategies can be deployed more broadly throughout Maryland.

Who Do We Serve and How Do We Serve Better: In one of the most extensive analyses ever of comprehensive cancer center patients, CRF-supported researcher **Michael Dejardins, Ph.D., M.A**., looked at every patient who came to the Kimmel Cancer Center from 2010-2019. His goal was to define the Center's catchment area and to evaluate how catchment areas influence early-stage versus late-stage diagnosis. Although the Cancer Center serves patients from all over the country and the world, Dr. Dejardins' survey revealed that two-thirds of patients are from Maryland with a considerable and growing number of patients coming from Pennsylvania and Northern Virginia. His findings also revealed that the Center serves a large population of patients enrolled in Medicaid or who have no health insurance, and these patients tend to be diagnosed at late stages. Based on this analysis, Dr. Dejardins recommends interventions to ensure better access to routine care and earlier screening for patients with Medicaid or no insurance.



Lung Cancer Signature: New CRF-supported research by **Joseph Murray, M.D., Ph.D.**, revealed patterns of gene alterations that could help inform lung cancer risk and guide treatment. Lung cancer has the second highest number of mutations of all cancers. Mutational signatures of the cancer can now be gathered through blood tests called liquid biopsy, which collect the DNA of dying cancer cells. The mutational signatures reflect exposures, such as smoking and radon, and include toxins specific to Maryland. The signatures are used to predict which patients may benefit from treatments such as immunotherapy and targeted therapies. In addition, since they include genetic alterations people are born with, Dr. Murray says they could help close disparities by pointing researchers toward inherited mutations that could increase cancer risk factors among underrepresented

populations. To advance this research, Dr. Murray has started the Thoracic Cancer Data Commons, which includes data provided by more than 21,000 patients with lung cancer, esophageal cancer, mesothelioma, and other thoracic cancers. He is taking a deep dive into the data to identify specific features and characteristics of a patient's clinical course that can lead to better treatments and survival.

Listen to Dr. Murray's podcast: bit.ly/4b7bmLx.

Improving Breast Cancer Treatment: Jenna Canzoniero, M.D., M.S., is a leader of the Kimmel Cancer Center precision (individualized) medicine initiative for the Women's Malignancies Program. She is using liquid biopsy—the study and measurement of tumor DNA circulating in the bloodstream—to improve the treatment of metastatic breast cancer. With CRF support, she will continue a clinical study called IMAGE, Individualized Molecular Analyses Guide Efforts. The first IMAGE study compared tissue DNA to liquid biopsy DNA in 20 patients with triple-negative breast cancer to see if liquid biopsy provided a more complete genetic profile of metastatic cancers than tissue biopsy, which is typically limited to sampling one metastatic site. The second study builds on these findings and expands the study to 200 patients, reflecting the diversity of our patient population by ensuring that 25% of patients are African American and reflect all breast cancer types. The research will also include a new artificial intelligence (AI) component developed by the research team that tells them, with certainty, if a mutation is from cancer cells.

ENGAGE Patients in Genetic Advances: New technologies, such as artificial intelligence (AI), are being used by CRF-supported researcher **Kala Visvanathan, M.B.B.S., M.H.S.**, to improve access to high-quality genetic education and appropriate referral to genetic experts when needed. A study called ENGAGE, Evaluation of Novel Approach to Genetic Testing and Education in cancer patients, tests a tool developed by Dr. Visvanathan and team in collaboration with Optra Health, Inc., to determine if it enhances the patient experience, provides education, and helps providers.

Reducing Cancer Deaths by 2035: CRF investigator **Anna Beavis, M.D., M.P.H.**, estimates that 34% of adult cancer deaths could be prevented by 2035 if socioeconomic disparities were eliminated. She is implementing social needs screening programs to identify unmet social needs, such as lack of food and transportation. Health equity can be obtained, she says, through programs that target these unmet needs. "We won't know if we don't ask," she says, and recalls a patient who, through a conversation at her appointment, revealed that she did not have food. The clinical team was able to provide two bags of groceries for the patient that day.

More on Reducing Cancer Deaths: Listen to this podcast with Kimmel Cancer Center Director **William Nelson, M.D., Ph.D.**, and **Otis Brawley, M.D.**, Associate Director of Community Outreach and Engagement discussing work to reduce cancer deaths and next steps in cancer prevention and screening: bit.ly/3S8lKd2.

JOHNS HOPKINS CRF AND KIMMEL IN THE COMMUNITY

Community Health Education: Last year, the Kimmel Cancer Center Community Outreach and Engagement Program's Clinical Health Educators launched a community health education program, providing live webinars and in-person sessions to educate communities about healthy living, ways to reduce cancer risk, and cancer screenings. The program was launched with a series of sessions offered to the more than 900,000 Johns Hopkins Community Physicians (JHCP) patients through its network of community practices that extend to 40 locations throughout Maryland and Washington, D.C., allowing our Clinical Health Educators to reach more underserved communities. Since then, they hosted 77 events and reached more than 2500 citizens with presentations on breast, colorectal, cervical, lung, prostate, and skin cancer awareness, general cancer awareness, cancer risk reduction, cancer screening, HPV awareness and vaccination, the dangers of vaping and smoking and help to quit, and nutrition and exercise.


Clinical Health Educators, from left: Theron Scott, Asst. Director Community Education, Oliva Sandford, and Tiffini McGronan

Inclusion of Women and Minorities in Clinical Trials: Under the leadership of **Dina Lansey, M.S.N.**, Assistant Director for Clinical Research and Population Sciences, the Kimmel Cancer Center now has ways to measure and understand why many African Americans, women, elderly, underserved patient groups, and Baltimore City residents have chosen not to participate in clinical trials. Johns Hopkins became the first institution to use its electronic medical records to support conversations about clinical trials. To better understand trial accrual among patients from Maryland, she prescreened and matched patients to clinical trials and used a database to track reasons patients with clinical trials available to them did not enroll. She used the information to help guide the development of ways to remove barriers that kept patients from treatments that could help them. The system also documented that clinical trials were discussed with patients and communicated names of interested patients to study teams. Her action plan also included collaborating with investigators as studies were designed to identify barriers to participation from the onset and to develop targeted interventions aimed at those most in need. The results have

been promising. The number of women and minorities enrolling in clinical trials increased and disparity gaps decreased.

A Nationwide Plan: The National Cancer Plan is a framework that, through the National Cancer Institute, promotes collaboration among all of society to end cancer. Kimmel Cancer Center Deputy Director, **Elizabeth Jaffee, M.D.**, is Chair of the President's Cancer Panel, which advises the President on the National Cancer Program. The Panel is charged with monitoring progress toward the goals of the National Cancer Plan, which provides a framework for collaboration to realize the Cancer Moonshot goal of reducing cancer death rates in the U.S. by at least 50% by 2047. The goals Dr. Jaffee and the Panel put forward are: **prevent cancer, detect cancers early, develop effective treatments, eliminate inequity, deliver optimal care, engage every person, maximize data, and optimize a diverse cancer care and research workforce.** The Kimmel Cancer Center was selected as the national model for reporting progress to the public.

Cancer in the News: Kimmel Cancer Center researcher **Cynthia Zahnow, Ph.D.**, discusses her research related to alcohol use and increased risk of breast cancer in this CBS News report. cbsn.ws/3SpF2vW.

LEVERAGING CRF SUPPORT

Johns Hopkins Technology Ventures Supports CRF Research: This year marks the 10th anniversary of Johns Hopkins Technology Ventures (JHTV), which is aimed at maximizing the impact of The Johns Hopkins University's research through commercialization of discoveries in technologies, products, and services. JHTV has overseen 1,900 technologies available for licensing, helped with 150 startup companies—including technologies and startups by CRF investigators—developed corporate partnerships leading to more than 30 active research collaborations, and helped fund raise $4 billion in venture capital.

Among these startups was Personal Genome Diagnostics (PGDx), a Baltimore-based cancer genomics company started in 2010 by **Victor Velculescu, M.D., Ph.D.**, and fellow CRF investigator **Luis Diaz, Jr., M.D.**, (now head of the Division of Solid Tumor Oncology at Memorial Sloan Kettering Cancer Institute). The company, which was acquired by Labcorp, made genomic profiling of cancer available to patients and oncologists at the local level. In 2021, PGDx received U.S. Food and Drug Administration clearance for its diagnostic kit, called *PGDx elio tissue complete*, which analyzes tumors with a panel of more than 500 genes. Plans to grow PGDx's Baltimore presence is part of Labcorp's long-term plans. Thrive, a biotech start-up launched in 2019 by the

researchers who developed a multicancer screening test, called CancerSEEK, was acquired by Exact Sciences. Quest Diagnostics has now licensed the technology to monitor people with cancer for signs of recurrence or progression.

For this and other research, Dr. Velculescu was elected to the National Academy of Inventors. He was selected for "demonstrating a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on the quality of life, economic development, and welfare of society."

2024 AWARDS

FY24 Awards
$2,134,600

Grants:	All	New	FY Target
Translational Research	16	11	16
Faculty Recruitment	5	2	8
Faculty Retention	3	2	0
TOTAL	24	15	24

Kassandra Alcaraz, Ph.D., M.P.H.: *Leveraging Social Determinants of Health in EMR Data for Targeted Cancer Health Equity Intervention* **FACULTY RECRUITMENT, CONTINUATION**

Kassandra Alcaraz, Ph.D., M.P.H. and Frank Curriero, Ph.D.: *Developing an online dashboard to inform evidence-based cancer prevention and control in the SKCCC* **TRANSLATIONAL RESEARCH, NEW**

Rebkha Atnafou, M.A.: *Applying Narrative Theory to Raise Community Awareness and Support to Promote Healthy Behaviors and Cancer Screening in Baltimore* **TRANSLATIONAL RESEARCH, CONTINUATION**

Anna Beavis, M.D., M.P.H.: *Scaling a Social Needs Screening Program to Decrease CancerCare Disparities: Next Step to Optimize Implementation* **TRANSLATIONAL RESEARCH, CONTINUATION**

Otis Brawley, M.D.: *Reduction of the cancer burden in the SKCCC catchment area through disparities elimination* **FACULTY RETENTION, CONTINUATION**

Jenna V. Canzoniero, M.D., M.S.: *Utility of Circulating Tumor DNA to Inform Treatment of Patients with Metastatic Breast Cancer* **FACULTY RECRUITMENT, CONTINUATION**

2024 AWARDS CONTINUED

Jeanne Clark, M.D., M.P.H. and Heidi Hutton, Ph.D.: *Feasibility, Acceptability and Piloting of a Virtual Counselor Tobacco Cessation Intervention with Community Health Worker Linkage to Lung Cancer Screening* **TRANSLATIONAL RESEARCH, NEW**

Avonne Connor, Ph.D.: *Disparities in Healthcare Utilization and Access by Length of Cancer Survivorship among Female Cancer Survivors in Maryland* **FACULTY RETENTION, 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**

Sudipto Ganguly, Ph.D.: *Targeting immuno-regulatory dendritic cells to improve outcomes in PD-1-refractory melanoma* **FACULTY RETENTION, NEW**

Joel Gittelson, Ph.D.: *Digital strategies to Improve Health Food Access and Reduce Risk for Cancer in Baltimore City* **TRANSLATIONAL RESEARCH, NEW**

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, NEW**

Christine Hann, M.D., Ph.D.: *TNIK as a novel therapeutic target to overcome therapy resistance in small cell lung cancer* **TRANSLATIONAL RESEARCH, CONTINUATION**

Moonjung Jung, M.D., M.S.: *Genetic Determinants of Alcohol-induced Cancers among Korean Americans Living in MD* **FACULTY RECRUITMENT, NEW**

Alison Klein, Ph.D.: *Assessment of SKCCC catchment area for cancer patients over time, demographic, or tumor characteristic: Hopkins Center for Community Cancer Control* **TRANSLATIONAL RESEARCH, CONTINUATION**

Elyse Lasser, Dr.PH.: *Cancer Diagnosis Insight across the 5 regions of Maryland: Utilizing Digital Data sources* **TRANSLATIONAL RESEARCH, NEW**

Mady, Leila, Ph.D.: *Understanding Tobacco Use and Spending as a Modifiable Risk Factor for Financial Toxicity in Lung and Head and Neck Cancers* **TRANSLATIONAL RESEARCH, NEW**

Joseph C. Murray, M.D., Ph.D.: *Revealing Mutational Signatures that Modify Lung Cancer Risk and Treatment* **FACULTY RECRUITMENT, CONTINUATION**

2024 AWARDS CONTINUED

Sheetal Parida, Ph.D.: *Modulation of Gut Microbiota to Reverse Obese State Associated Therapy Resistance in Hormone Receptor Positive Breast Cancer* **TRANSLATIONAL RESEARCH, NEW**

Ana Rule, Ph.D.: *Exposure to Metals from Electronic Cigarette Use* **TRANSLATIONAL RESEARCH, NEW**

Tracy Murray Stewart, Ph.D.: *Cancer-specific roles of HDAC10-mediated polyamine deacetylation.* **FACULTY RECRUITMENT, NEW**

Ravi Varadhan, Ph.D.: *Evaluating the Real-World Comparative Effectiveness of Proton Beam Therapy versus Conventional Photon Radiation in Frail Older Adults* **TRANSLATIONAL RESEARCH, NEW**

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

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