# JOHNS HOPKINS

# CONQUEST 2017

## *A Report on the Maryland Cigarette Restitution Fund*

Johns Hopkins has been fortunate to benefit from Cigarette Restitution Funds (CRF) for more than 15 years.

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 remained constant.

Johns Hopkins experts provide the care for more than 13 percent of all Marylanders with cancer. More than half of the patients we treat live in our state, and cancer discoveries, including breakthrough advances in cancer genetics, immunotherapy and public health, positively impact virtually every cancer patient. Our success is reflected in our doctors, and the CRF has been an important partner in this progress, providing vital funding that helps us attract and launch the careers of some of the brightest young cancer clinicians and scientists.

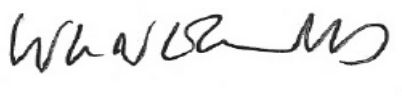
Strides made in Maryland have far exceeded national progress and continue to get better. Maryland cancer death rates—once the highest of any state in the nation—are now ranked 34th, and we have narrowed the gap in cancer death disparities between African-American and white Marylanders by more than 60 percent since we began our CRF partnership in 2001.

The goals of the CRF to reduce cancer death rates in Maryland through public health initiatives and research and our commitment to them are engrained in everything we do. They are integrated into our clinics and our laboratories, leveraging federal funding and private donations to augment and expand the reach and the benefit of the CRF. As we work to improve cancer prevention, detection and treatment, CRF support ensures that Maryland citizens are represented. State-centered projects reveal unmet needs brought to light by the unique demographics of Maryland.

At Johns Hopkins, we are using our CRF support to help remove barriers and improve cancer care for African-Americans and other minorities. Maryland has an African-American population of 31 percent, compared to a national average of 14 percent. More than 15 years ago, we showed the rest of the country how tobacco settlement funds could and should be used to make progress against cancer, earning commendation from the U.S. Congress. Our state's demographics uniquely position us to advance the understanding of the causes of differences in cancer outcomes among races and the changes needed to overcome them, once again creating model for the rest of the country to follow.

CRF support has helped us attract and hire talented clinicians and researchers interested in population science and disparities research, including four new African-American faculty members. It has fostered collaborations across universities and throughout Johns Hopkins and is at the foundation of our health disparities initiatives.

The following pages highlight these projects and accomplishments. We thank you for your commitment to the CRF and look forward to a continued partnership as we work together to improve the health of Maryland citizens.



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

John D. Groopman, Ph.D.
*Anna M. Baetjer Professor of Environmental Health Sciences*
Bloomberg School of Public Health

## A HISTORY OF

# Combatting Cancer in Maryland

### 1989

The Baltimore Sun reported that Maryland ranked highest among all states in cancer death rates (1983-1987).

### 1990

Newly elected Maryland Governor Schaeffer met with Johns Hopkins Oncology Center Director Albert Owens and University of Maryland cancer center director and the state Secretary of Health to secure the first Maryland Cancer Control Plan, appoint the Maryland Cancer Council and expand the Baltimore cancer registry statewide.

### 1998

State Attorneys General from 46 states, including Maryland, sued American cigarette manufacturers and won $53 billion in penalties to be divided among the states as reimbursement for the huge costs of smoking related diseases like cancer. The award was known as the Master Settlement Agreement.

### 2001-2009

A dozen CRF-based research discoveries and technologies were patented or licensed to outside companies.

### 2001

Johns Hopkins received its first CRF grants: $2.25 million for research and a $1.2 million public health grant for community-based cancer prevention, education and screening.

### 2000

Maryland passed legislation to use its portion of the award to establish the Cigarette Restitution Fund. This legislation included payouts to tobacco farmers, mandated appropriations to the Tobacco Use Prevention and Cessation Program, and the Cancer Prevention, Education, Screening, and Treatment Program and public health and research grants to Johns Hopkins and the University of Maryland.

### 2010

Outreach made via a variety of outlets to more than 1.2 million Marylanders about cancer screening; nearly 7,000 educated directly about cancer screening

### 2011

The CRF Public Health Grant was discontinued, but the Kimmel Cancer Center partnered with the Baltimore City Health Department to ensure cancer education and screening continued for underserved Baltimore citizens.

### 2012

Maryland began to lose ground against breast cancer, coinciding with cuts in CRF support. Death rate rankings climbed from 8th to 5th nationally.

### 2016

Maryland cancer death rates dropped to 34th, below the national average and rates declined among all citizens. Cancer death rates among African-Americans in Maryland were lower than the national average and significantly lower than adjoining states.

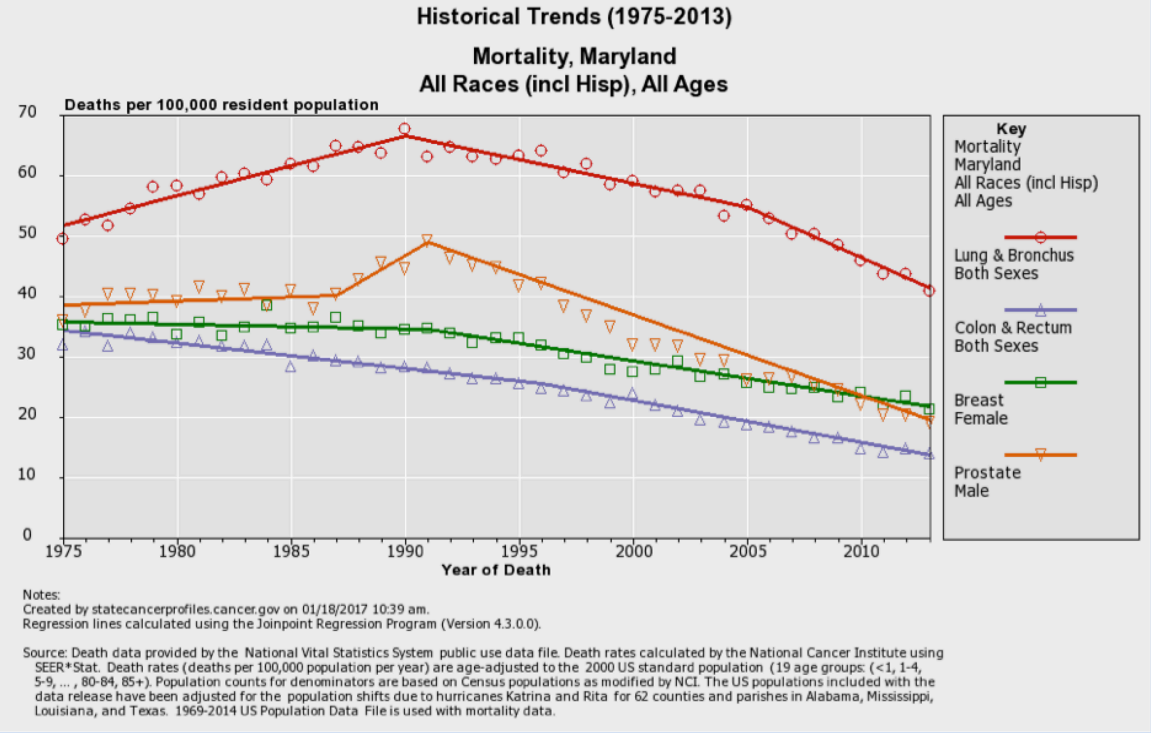
### 2015

Research by CRF grant recipients was reported in 394 journal publications.

### 2001-2014

The work of the CRF coincided with a marked and continuous decline in Maryland cancer deaths. Rates fell from first in 1989 to 14th in 2001, 19th in 2005, 23rd in 2007 and 30th in 2014. Rates fell more rapidly than the national average and continue to decline in six of the seven CRF targeted cancers. Tobacco remains the nation's most significant health risk factor, but in Maryland, smoking declined more quickly and further than most other states and earned the 10th best ranking.

# MORE WORK TO DO BUT FAVORABLE TRENDS CONTINUE IN MARYLAND




## Notable Numbers:

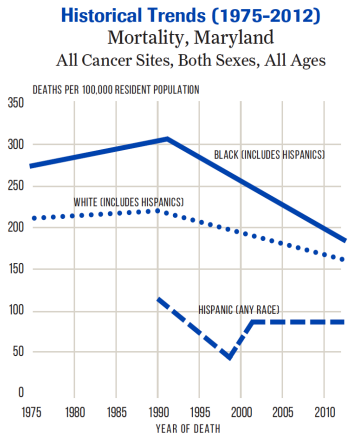
- Approximately **62 percent** of Kimmel Cancer Center patients are from Maryland. *(Percentage of patients by region: Baltimore City 29%, Baltimore metro area 19%, Montgomery County and Western Maryland 14%, Eastern Shore 12%, Southern Maryland and Prince Georges County 11%)*
- Maryland ranks **33rd** in cancer incidence among all states and Washington, D.C.
- Maryland ranks **34th** among states and Washington, D.C., for cancer deaths (2015 death rates).
- More than **13 percent** of Maryland cancers are diagnosed at the Kimmel Cancer Center.
- All CRF-targeted cancers, except for melanoma skin cancer, have declined by **2 percent to 4 percent** per year.
- Cancer deaths overall in Maryland have declined by **2 percent** annually.

# *KIMMEL IN THE COMMUNITY*

## *Leveraging CRF Programs and Goals to Reduce Cancer Disparities*

### Notable Numbers:

The gap in cancer death rates between African-American and white Marylanders has narrowed by **60 percent** since 2001, a number that far exceeds the national average.




The number of minority patients from Maryland treated at the Kimmel Cancer Center has increased from 985 in 2010 to **1,231** in 2015.

Prostate cancer death rates among African-Americans in Maryland have declined by **20 percent**, and race disparities in death rates have also narrowed by **20 percent**.

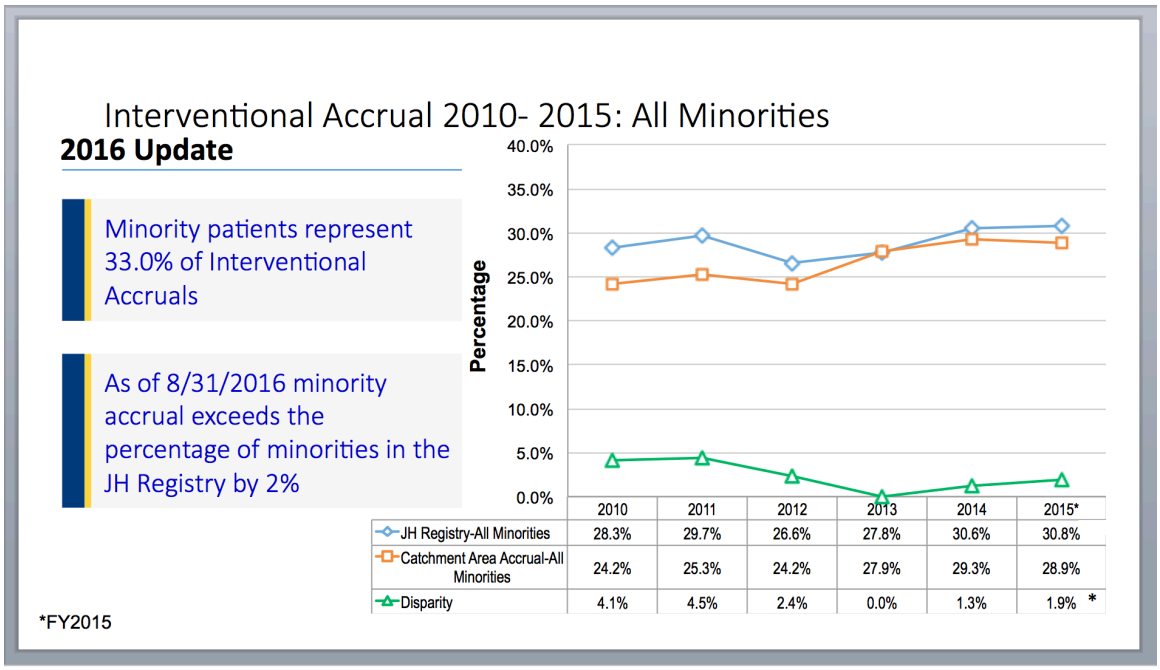
### Diversity and Inclusion Program

Dina Lansey, M.S.N., R.N., Assistant Director for Diversity and Inclusion, focuses on increasing the participation of women and minorities in cancer clinical trials. Accomplishments include:

- Mandatory cultural competency training for all clinical faculty and staff.
- Ongoing study prescreens patients and matches them to available clinical trials.
- A new database with required participation by all clinical trials teams makes it possible to track reasons patients decline clinical trials.
- Clinical trials education video series hopkinsclinicaltrials.org
- Clinical trials brochure and decision tool is in process. Currently being reviewed by the Johns Hopkins Kimmel Cancer Center Community Advisory Group.
- Transportation pilot study attempts to remove the cost and availability of transportation as a barrier to participating in a clinical trial by providing free parking or transportation to Baltimore City residents participating in cancer clinical trials.

Power in Choices

- **Participation by minorities and women in clinical trials is increasing and disparities are decreasing. Minority patient accrual is 29.4 percent, nearly matching the 30 percent of minorities in the Johns Hopkins cancer registry. Women represent 43 percent of clinical trials participants. African-American patients represent 23 percent of the Johns Hopkins registry and 22.4 percent of participants in clinical trials.**




## Center to Reduce Cancer Disparities

**Smoking Cessation:** Smoking remains the most preventable cause of cancer. James Zabora, Sc.D., received CRF support to begin a pilot smoking cessation effort to help families living in Latrobe Homes, a public housing development in East Baltimore that is home to 20,000 residents, to quit smoking.

**Community Advisory Group:** Two groups—one in Baltimore City and one in Prince Georges County—offers critical input and perspective to guide our experts as they plan for and provide community-based participatory education and research among minority and underserved populations in Maryland.

**Cervical Cancer Campaign:** A prevention campaign was developed to eliminate cervical cancer incidence and death disparities through HPV vaccination. The program initially focuses on African-American preteens and teens in Baltimore City and Prince Georges County but could be expanded statewide. HPV is the cause of almost all cervical cancers and is the cause of an increasing incidence of head and neck cancers.

### Day at the Market

An award-winning program is held twice a month at Northeast Market in East Baltimore to bring nurses and other clinicians, safety experts and others to offer tips on cancer prevention, screening, detection, treatment and healthy living. The Kimmel

Cancer Center-supported program received recognition from the Maryland Department of Health and Mental Hygiene and the Maryland Cancer Collaborative.

## EMPaCT

Johns Hopkins is one of five universities selected to participate in Enhancing Minority Participation in Clinical Trials (EMPaCT), funded by the National Institute on Minority Health and Health Disparities. Jennifer Wenzel, Ph.D., is collaborating with diversity and inclusion expert Dina Lansey, M.S.N., and patient navigator Lisa Sheridan to improve cancer experiences for minority patients and care partners and to address existing disparities in health outcomes.

## Removing Barriers as a Form of Personalized Cancer Medicine

Lung cancer expert Joy Feliciano recently joined the Kimmel Cancer Center faculty. Dr. Feliciano has a specific clinical interest in reducing barriers to treatment for minorities and the underserved. Among these groups, she says, many are diagnosed with the most advanced stages of lung cancer and resist treatment for economic reasons. Dr. Feliciano is committed to a new approach to personalized care—collaborating with colleagues at Johns Hopkins and other Maryland institutions to address ways to improve early detection of lung cancer, smoking cessation and to begin to address things like cost of transportation to appointments, drug affordability and other economic factors that deter many Marylanders from seeking and continuing treatment for lung cancer. “Sitting with patients, talking with them and making sure they don’t fall through the cracks is just as important as identifying the treatment that will work best for them,” says Dr. Feliciano.

## Merck Grant Supports Care for the Underserved

The Merck Foundation provided a $2 million grant to establish the Johns Hopkins Cancer Care Alliance. It represents a partnership among the Johns Hopkins Kimmel Cancer Center, Johns Hopkins Center to Reduce Cancer Disparities and the Johns Hopkins Clinical Research Network to improve health outcomes and reduce and eliminate racial and ethnic health disparities. The Alliance includes several CRF investigators and is led by Michael Carducci, M.D., Debra Roter, Dr. PH., Jim Zabora, Sc.D., Kim Peairs, M.D., Ahmed Hassoon, M.D., Roland Thorpe, Ph.D., Janice Bowie, Ph.D., and Jennifer Wenzel, Ph.D. Their goals are to:

- Improve patient access to healthcare and engage them in the process.
- Improve coordination of care with services such as patient navigation.
- Expand community advisory groups to build relationships with organizations and individuals with varied skills from diverse racial, cultural and ethnic backgrounds.

# LEVERAGING LEADERSHIP

**National Cancer Moonshot:** Kimmel Cancer Center Deputy Director and international cancer immunotherapy expert Elizabeth Jaffee, M.D., was named co-chair of the Vice President’s Cancer

Moonshot Initiative Blue Ribbon Panel and chair of the National Cancer Advisory Board. Dr. Jaffee, an Associate Director of the new Bloomberg~Kimmel Institute for Cancer Immunotherapy, also serves as co-chair of the Moonshot initiative's Immunology Working Group. Dr. Jaffee is charged with helping to set the direction for the Cancer Moonshot and recently announced recommendations at a White House press briefing for making 10 years' worth of progress against cancer in five years.

**Controlling Cancer in Maryland:** Elizabeth Platz, Sc.D., Co-Director of the Kimmel Cancer Center Cancer Prevention and Control Program, Chairs the Maryland Cancer Collaborative, the volunteer group that prioritizes and implements Maryland's Comprehensive Cancer Control Plan. Platz, Kimmel Cancer Center Director William Nelson, M.D., Ph.D., and many Johns Hopkins experts contribute to the Plan. Among Dr. Platz's research focus at Johns Hopkins is uncovering explanations for the notably higher rate of prostate cancer in African-American men compared to white men.

**Managing Big Data for Individualized Care:** Nilanjan Chatterjee, Ph.D., Bloomberg Distinguished Professor in Biostatistics, was jointly recruited by the School of Public Health and Kimmel Cancer Center to develop methods that translate huge data sets into precision prevention and treatment of cancer. New technologies used by cancer researchers generate millions—even billions—of data points. Dr. Chatterjee is developing methods that make it possible to combine and analyze disparate data from multiple studies to create cancer risk prediction models and to develop and guide individualized treatment approaches and public health interventions.

CRF investigator Andrew Feinberg, M.D., M.P.H, Bloomberg Distinguished Professor and director of the Center for Epigenetics is leading a collaboration between The Johns Hopkins University and Texas A&M University to learn at a fundamental level how genes and environmental factors interact to cause human disease. The project is supported by a $5.3 million National Institutes of Health grant.

Gregg Semenza, M.D., Ph.D., a CRF-supported investigator whose discoveries on how cells respond to low oxygen levels could result in treatments for illnesses ranging from cancer to diabetes, was awarded the 2016 Albert Lasker Basic Medical Research Award.

**Immunotherapy Institute:** Cancer survivor Governor Larry Hogan was among the speakers last spring at the launching of the Bloomberg~Kimmel Institute for Cancer Immunotherapy at Johns Hopkins. The new Institute builds upon pioneering cancer immunotherapy progress at Johns Hopkins to speed the delivery of these promising new treatments to patients.

## CRF IN ACTION

*CRF investigators co-authored **255 journal publications** in FY16. Since 2011, CRF investigators have published 2,142 journal articles.*

### Published CRF-Supported Research 2016/2017:

#### Hysterectomy-Corrected Cervical Cancer Mortality Rates Reveal a Larger Racial Disparity in the United States

*Cancer*, March 2017
Investigators: Anna L. Beavis, Patti E. Gravitt and Anne F. Rositch
**Key Finding:** Including women who underwent hysterectomy, revealed that cervical cancer mortality rates are underestimated, particularly in black women. The highest rates are seen in the oldest black women, and public health efforts should focus on appropriate screening and adequate treatment in this population.

#### Prevalence of chemopreventive agent use among hospitalized women at high risk for breast cancer: a cross-sectional study

*BMJ* (the British Medical Journal), November 2016
Investigators: Waseem Khaliq, Danijela Jelovac and Scott M Wright
**Key Finding:** Many hospitalized women are at high risk for breast cancer, but the researchers could not identify even a single woman who was using chemoprevention for risk reduction. Current chemoprevention guidelines may be falling short in their dissemination and implementation. Since women at high risk for breast cancer may only interface with the healthcare system at select points, all healthcare providers must be willing and able to do risk assessment. For those identified to be at high risk, providers must then either engage in chemopreventive counseling or refer patients to providers who are more comfortable working with patients on this critical decision.

#### A Novel Urine Test to Predict High-Risk Cervical Cancer

*Cancer Prevention Research*, November 2016
Investigators: Rafael Guerrero-Preston, Blanca Valle, Anne Jedlicka, Nitesh Turaga,

Oluwasina Folawiyo, Francesca Pirini, Fahcina Lawson, Angelo Vergura, Maartje Noorhuis, Amanda Dziedzic, Gabriela Perez, Marisa Renehan, Carolina Guerrero-Diaz, Bruce Trock, Liliana Florea and David Sidransky
**Key Finding:** Johns Hopkins Medicine specialists report they have developed a urine test for the likely emergence of cervical cancer that is highly accurate compared to other tests based on genetic markers derived directly from cervical tissue. The new urine test, they say, is different because it analyzes not only multiple sources of human cellular DNA altered by precancerous changes, but also DNA from HPV that is sexually transmitted and causes virtually all cases of the disease.

FY17 Awards
(November 4, 2016)
$2,154,653

| **Grants:** | **All** | **New** | **MFR*** |
|---|---|---|---|
| Translational Research | 14 | 9 | 18 |
| Faculty Recruitment | 5 | 3 | 3 |
| Faculty Retention | 3 | 1 | 1 |
| TOTAL | 22 | 13 | 22 |

**Alexander Baras, M.D., Ph.D.:** *Leveraging clinical somatic mutation profiling of malignancies with modern electronic health records to better characterize etiologic, prognostic, and therapeutic associations.* **CONTINUED**

**Robert Blum, M.D., Ph.D., M.P.H.:** *Study of colorectal cancer screening among the underserved in Baltimore (SCRUB).* **CONTINUED**

**W. Nathaniel Brennen, Ph.D.:** *Tumor infiltrating mesenchymal stem cells as a function of the patient's immune response: Potential as a marker of prostate cancer aggressiveness in the African American population.* **CONTINUED**

**Robert Casero, Ph.D.:** *Role of spermine oxidase-generated H2O2, DNA damage and epigenetic changes in inflammation/infection-associated carcinogenesis.* **CONTINUED**

**Geetanjali Chandar, M.D., M.P.H.,** and **Heidi E. Hutton, Ph.D.:** *Development, cultural adaptation and piloting of an avatar delivered smoking cessation intervention for low-income smokers in Baltimore City.* **NEW**

**Young Bong Choi, Ph.D.:***Virus-like particle vaccination to control HHV-8/KSHV and prevent related cancers.* **NEW**

**Gypsyamber D'Souza, Ph.D., M.P.H.:** *E-cigarette use among young adults in East Baltimore: a pilot tobacco cessation intervention.* **NEW**

**Jed W. Fahey, Sc.D.:** *Defining Pharmacokinetic Requirements for Synergy between Breast Cancer Therapeutic Drugs and phytochemicals*. **NEW**

**Jonathan Golub, Ph.D., M.P.H.:** *COach2Quit: a novel mHealth smoking cessation application for cancer patients*. **NEW**

**Christine Hann, M.D., Ph.D.:** *Optimizing Bcl-2 inhibitor therapy for small cell lung cancer.* **NEW**

**Ahmed Hassoon, M.D., M.P.H., P.M.P.:** *Novel Individualized Technology Intervention for Behavioral Change Among Cancer Survivors Among a High Risk Group: Artificial Intelligent Solutions to Increase Physical Activity*. **NEW**

**Ahmet Hoke, M.D., Ph.D.:** *Discovery Mobilization: Pre-clinical development of a novel ethoxyquin analogue for chemotherapy induced peripheral neuropathy.* **NEW**

**Sushant Kachhap, Ph.D.:** *A novel link between NDRG1 and mTOR: Developing a rational therapy to target NDRG1-deficient metastatic prostate cancer.* **NEW**

**Marikki Laiho, M.D., Ph.D.:** *Discovery Mobilization: Development of a clinical led molecule for RNA polymerase I inhibition.* **NEW**

**Dina Lansey, M.S.N., E.N., O.C.N.:** *Enhancing Clinical Trial Participation: Assistance for Parking and Transportation for Patients Participating in Therapeutic Oncology Trials.* **CONTINUED**

**Dina Lansey, M.S.N., E.N., O.C.N.,** and **Ahmed Hassoon, M.D., M.P.H., P.M.P:** *Piloting an EMR based eligibility for clinical trials screening.* **NEW**

**Craig Pollack, M.D., M.H.S.:** *Implementing an individualized risk prediction tool for men with prostate cancer in the JH Active surveillance program.* **NEW**

**Anne Rositch, Ph.D.:** *Understanding the role of screening in cervical cancer incidence and disparities in Maryland*. **CONTINUED**

**Ana M. Rule, Ph.D.:** *Electronic Cigarettes as a Pathway of Exposure to Toxic and Carcinogenic Metals.* **CONTINUED**

**Anju Singh, Ph.D.,** and **Stephane Lajoie, Ph.D.:** *Baltimore ambient particulate matter reprograms the immune system to facilitate tumor escape and progression.* **CONTINUED**

**Jessica Yeh, Ph.D.,** and **Lawrence Appel, M.D.:** *Metformin Treatment or Lifestyle Intervention to Improve Health in Overweight/Obese Cancer Survivors.* **CONTINUED**

**James Zabora, Sc.D.:** *The East Baltimore Household-Based Smoking Cessation Program.* **NEW**

## *From Research to Revenue*

## *Personal Genome Diagnostics*


**2008:** CRF researchers Victor Velculescu and Luis Diaz launched the Maryland biotech start-up Personal Genome Diagnostics translating research into commercial cancer tests.
**2010:** Earned $2.8 million seed investment to launch the Maryland biotech start-up Personal Genome Diagnostics (PGDx) to translate their genetic research into commercially available cancer tests.
**2014:** PGDx expanded to 25 employees and a new, larger facility.
**2015:** New Enterprise Associates invests $214 million in PGDx. Company now employees 63 people, with more new hires anticipated.
**2016:** Velculescu and Diaz receive EY Entrepreneurs of the Year Maryland Award.

## REMEMBERING A CANCER PIONEER

Albert H. Owens, Jr., a cancer pioneer and the first director of the Johns Hopkins Kimmel Cancer Center died on January 13, 2017, at age 90. Dr. Owens served as president of the Johns Hopkins Hospital from 1987 to 1988, decreeing the hospital smoke-free. He left the presidency to return to his position as director of the Johns Hopkins Oncology Center, as the cancer center was known then, to oversee its expansion at a time when Maryland ranked the highest in cancer death rates among all states in the U.S. Dr. Owens worked with former Governor William Donald Schaefer to develop the Maryland Cancer Control Plan, Maryland Cancer Commission, a collaboration between the state government, academic institutions and communities to develop strategies to better understand and combat Maryland's high cancer rates, including a statewide cancer registry. In pushing for the registry, Dr. Owens said, "We need to know something about where the people live, work, their environmental exposures, their family histories—did they actually get the treatment prescribed, did they do well or didn't they do well."