

JOHNS HOPKINS CONQUEST

AN UPDATE FROM THE SIDNEY KIMMEL COMPREHENSIVE CANCER
CENTER ON ITS MARYLAND CIGARETTE RESTITUTION FUNDS
2012

A NOTE FROM THE DIRECTOR

Continued Progress Hinges on the Return to Full CRF Funding

At Johns Hopkins we are transforming cancer medicine away from a model in which we see patients for the first when they begin experiencing symptoms to one that will detect, manage, and many times eradicate cancers before patients even know they have them. As the leaders in uncovering the cellular causes of cancer, we are uniquely positioned to make these revolutionary advances.

The CRF has been a partner in this progress. The commitment of our elected officials to reducing Maryland's cancer burden is evident. It is witnessed in the tremendous gains we have made in taking Maryland from the nation's leader in cancer deaths to 20th. Progress in eliminating cancer disparities also is being made. Through the previously supported CRF Public Health Grant and now through our own initiatives and collaborations with state and local health departments, citizens who had never before been screened for cancer have received oral exams, prostate exams and colonoscopies. For many of these people, it was also a connection to improving primary health care, and they received—for the first time ever—information and guidance on smoking cessation, had their blood pressure taken, and more. Clearly our cancer outreach activities were having added benefits. We were not only addressing the cancer risks of Maryland's most vulnerable citizens, but improving their overall health as well. A better understanding and progress in health screening, environmental risks factors and behaviors, and cancer discovery, all advanced through CRF support, are improving the health of our citizens, and making our state a model for how to address and impact serious health issues.

At Johns Hopkins, we remain committed to reducing Maryland's cancer burden through science and medicine, but we are mindful that this progress is fragile and cannot be maintained without the same commitment from the state. Already we have seen Maryland begin to lose ground in breast cancer, with our death rates climbing from 8th to 5th nationally. It is a reminder that we must remain vigilant, and so we look forward to returning to a fully funded CRF cancer research grant.

William G. Nelson, M.D., Ph.D.

Marion I. Knott Professor and Director

The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkin

NUMBERS THAT MATTER

- Pilot projects have resulted in **\$300 million** in CRF investigator-initiated projects.
- For every CRF research dollar spent, **\$10** more came back to the state through business contracts and other economic development.
- CRF-supported research led to **15** discoveries of scientific tools or clinical applications.
- Translational research grants, **166** in all, advanced cancer care and addressed racial disparities.
- Start up companies in Baltimore, **2** leveraging CRF Funds (Cureveda and Personal Genome Diagnostics) supported the business of science in Maryland, created jobs, and launched new opportunities.
- Since the inception of the Maryland Cigarette Restitution Fund, Maryland's cancer death rates have dramatically declined. In 2001, it ranked **16th** in the nation, today Maryland ranks **20th**.
- Prostate cancer death rates among African Americans have declined by more than **16 percent**. Race disparities in death rates have narrowed by more than **20 percent**.
- Cancer death disparities between African Americans and Caucasians have declined by **50 percent** and Maryland's disparity rates are falling more rapidly than the national average.

CRF SCIENCE AND INNOVATION

The CRF has played an important role in spring boarding some of the most significant cancer discoveries of this decade. Seed funding from the CRF has provided faculty support to seasoned investigators and helped jump-start the careers of young faculty, bringing some of the country's most talented and sought after investigators to Maryland. **CRF research support for new innovative ideas at their inception has provided a critical bridge that has led to millions more in grants, expanded technology, and most importantly, made a difference in patient care.**

CANCER GENOME SEQUENCING AND PERSONALIZED CANCER MEDICINE:

The CRF supported the purchase of a next generation sequencing machine for funded investigator **Victor Velculescu, M.D., Ph.D.**, a member of the laboratory that used this equipment to decipher the genetic landscape of cancer and map the genome of more cancers than any other research institution. The research team made these pioneering advances with fewer investigators and less funding than other major research institutions performing similar work. These Kimmel Cancer Center discoveries have opened the door to personalized cancer medicine and broadened collaborations throughout Johns Hopkins with computer scientists and engineers now leading the world in developing the bioinformatics that will analyze and apply this genomic data to cancer care (See story Data Pipeline story). **Intellectual property generated at Johns Hopkins has fueled new biotechnology start-up companies in Maryland, including Velculescu's Personal Genome Diagnostics.** Scientists who seek to be a part of these breakthroughs advances are drawn to Maryland through Johns Hopkins.

Consider this: *World class computer scientist Rachel Karchin came to Johns Hopkins from the University of California Santa Cruz, where the human genome was assembled in 2000, for the opportunity to work with Velculescu and team and join the Johns Hopkins Institute for Computational Medicine. Karchin's lab employs four Ph.D. students and one postdoctoral fellow. She says, "Every one of us relocated to Baltimore because of Johns Hopkins."*

A SMALL INVESTMENT MULTIPLIES

Shyam Biswal, Ph.D., received CRF support to construct a cigarette exposure facility that utilizes **mouse models to study smoke-induced lung cancer and identify protein biomarkers that could be useful in the early detection of lung cancer, the leading cancer killer.** Through this work, he identified the Nrf2 gene and Keap1 gene and found that Nrf2 alters how lungs respond to cigarette smoke and later found that it works in concert with Keap1 to cause treatment resistance. Biswal collaborated with University of Maryland investigator Geoffrey Gurnin to identify drugs that could target Nrf2 in lung cancer prevention trials.

Consider this: *The early CRF support that led to these initial findings resulted in additional grants from NIH and Flight Attendants Medical Research Institute (FAMRI) to continue the work. Other investigators requiring a mouse model for carcinogen exposure for their research are using Biswal's unique mouse model and equipment. The FAMRI grant allowed him to purchase additional equipment to accommodate the increased demand for his facility. **His laboratory now employs 20 people and his invention has led to the biotechnology start-up company Cureveda, and the business plan for another start-up company is under way.***

UNCHARTED CLINICAL DISCOVERY

Epigenetics, the study of acquired defects in genes that occur without mutating them, was a little understood field in cancer research when **Stephen Baylin, M.D.**, and **James Herman, M.D.**, received CRF funding to study the role these alterations play in silencing tumor suppressor genes. Their work which focused on abnormal methylation, a normal chemical process in cells that goes awry to initiate cancer, has made Johns Hopkins the international leader in epigenetics. **Their research has resulted in some of the first uses of epigenetic abnormalities as cancer biomarkers for diagnosis and predictors of response to treatment.** Clinical trials of some of the first epigenetic-targeted therapies have begun.

Consider this: *This early work led to additional funding from Stand Up to Cancer that allowed the team to conduct innovative clinical trials in lung cancer. A small subset of patients like Jerry Morton, a retired firefighter diagnosed with a lethal form of lung cancer that had spread throughout his lungs and to his liver saw his tumors melt away. Moreover, this type of targeted therapy works directly against cancer cells without harming normal cells, so the treatment has virtually no side effects. As the trials continue and the therapy is directed to those patients with the specific epigenetic characteristics targeted by the drugs, the number of patients who will benefit should dramatically increase. Clinical trials have recently been expanded to breast cancer.*

MISSED OPPORTUNITIES?

FEWER RESEARCHERS, LESS RESEARCH:

All academic cancer centers compete for the best and brightest young faculty. They are, after all, at the center of continued progress against cancer. The start of their careers is a difficult challenge for any new investigator, as they must compete for grants against more seasoned investigators with established bodies of work. Since 2001, CRF support has helped Johns Hopkins recruit 38 talented young investigators to the fight against cancer. In 2011, significant cuts meant just one faculty member could be recruited.

Johns Hopkins is the undisputed leader in translational research—research aimed at improving patient care. Before the significant cuts to the research grant, the CRF supported an average of 11 research projects per year. **With the research grant now slashed to \$393,000, just five new translational research grants were made this year and continued funding for existing CRF investigators with promising findings can no longer be provided.**

2011/2012 CRF-SUPPORTED INVESTIGATORS

- **Jessica Yeh, Ph.D.**, is studying **racial disparities in cancer** survival and investigating whether diabetes contributes.

- **Norma Kanarek, Ph.D.**, is researching the time to first surgery among newly diagnosed, early stage **lung cancer** patients being treated at the Kimmel Cancer Center.
- **Corinne Joshi, Ph.D.**, is researching population issues in **prostate cancer** and **colon cancer**.
- **Claire Snyder, Ph.D.**, is providing expertise-enhanced **access to cancer data** to facilitate research into cancer services.

FACULTY RECRUIT



Craig Pollack, M.D., focuses his research on **cancer disparities, organization of cancer care, and social determinants of health**. His CRF research funding is focused on physician interventions to improve **prostate cancer screening**.

COMMUNITY OUTREACH

Despite the discontinuation of the CRF Public Health Grant at Johns Hopkins, we remain committed to caring for the underserved and reducing the cancer burden among African Americans and other minorities in our state.

Under the direction and leadership of CRF investigator **Jean Ford, M.D.**, the Kimmel Cancer Center launched the **Johns Hopkins Center to Reduce Cancer Disparities**. This initiative includes additional funding made possible through the CRF investment:

- **The Community Networks Program**, which uses the framework established through the CRF to address cancer disparities through community-based participatory education, training, and research among racial/ethnic minorities and underserved populations.
- A collaboration with the South Atlantic Division of the **American Cancer Society** was started to expand outreach activities in African-American and Latin American communities in the Baltimore region.
- **The National Outreach Network**, a collaborative program with the NCI provides outreach and education to underserved communities. The Kimmel Cancer Center has a community health educator that serves as a liaison between our Cancer Center and the community to provide culturally tailored information about cancer.

- **Health Disparities Conference** was held in January and included participants from other Maryland Universities, including Morgan State University and the University of Maryland, local and state health departments, and the American Cancer Society. Topics addressed included Maryland-relevant strategies to eliminate cancer disparities, ways to measure disparities, research opportunities, mapping health inequalities, and the economic burden of health inequalities.
- **Community Research Programs** include **COACH** (an evaluation of Coaches of Older Adults for Cancer Care and Healthy Behaviors) and **EMPaCT** (Enhancing Minority Participation in Clinical Trials), to research and understand the reasons African Americans diagnosed with cancer do not participate in clinical trials; reduce barriers that prevent minorities from enrolling in clinical trials; and make cancer clinical trials more available to minority patients.
- **Cancer screening** continues to be provided to Maryland's underserved populations through Johns Hopkins Priority Partners, a Medicaid managed care organization and Johns Hopkins Community Physicians. In addition, physicians from our gastrointestinal program collaborate with representatives from the Baltimore City Health Department to provide colonoscopies to uninsured Baltimore residents, and the Johns Hopkins Kimmel Cancer Center conducts annual oral cancer screenings.

JOHNS HOPKINS MOVES MARYLAND FORWARD

INNOVATIVE POPULATION-BASED RESEARCH THAT SAVES LIVES AND MONEY

Johns Hopkins experts are proving that it is possible to provide quality medical care without driving up costs. Priority Partners is a Johns Hopkins managed care organization serving Baltimore's Medicaid and Medicare populations. A disproportionate number of patients were suffering with end stage kidney disease. Johns Hopkins clinicians intervened with individualized risk assessments and treatment plans, including providing free medications. As a result, the need for kidney dialysis was essentially eliminated among its membership, dramatically improving the health and quality of life of members, and slashing costs by nearly 50 percent.

Now there is a new opportunity to use Johns Hopkins pioneering discoveries in cancer genetics to improve the health of Marylanders. Unneeded colonoscopies expose patients to unnecessary risks and cost about \$100 million per year, experts say. It is estimated that nearly 35 percent of Marylanders who have a colonoscopy will have another one in two years negative for cancer. Colonoscopies are done too frequently because the quality

varies so greatly throughout the state. Lack of confidence in results leads to over screening, and this over screening translates into avoidable risks to patients and financial burden to the healthcare system. The CRF supported the Kimmel Cancer Center team that deciphered the genetic blueprints for cancer. Using their findings, they developed a simple stool test that detects colon cancer DNA that is shed in the stool. Researchers are seeking grant funding to study the use of the test as a complement to colonoscopy. If the test was used in the years subsequent to a negative colonoscopy to confirm the validity of colonoscopy results, it could greatly reduce the numbers of unnecessary colonoscopies and many cut millions of dollars in costs.

JOHNS HOPKINS BRINGS THE WORLD'S LARGEST DATA PIPELINE FOR MARYLAND

Personalized cancer medicine is only possible if clinicians can rapidly access and interpret the data collected on the cellular characteristics of each patient's cancer. Johns Hopkins Kimmel Cancer Center researchers led the world in deciphering the genetic and epigenetic blueprints of cancer, and now Johns Hopkins is also leading the world in developing the technology that makes sense of the volumes of data generated by these groundbreaking discoveries. Computer scientists and engineers from the Johns Hopkins School of Medicine, Whiting School of Engineering, and Department of Physics and Astronomy are collaborating with Cancer Center investigators so that doctors can quickly sift through the huge amounts of data to make clinical decisions.

Recognizing the importance of this work, the National Science Foundation has awarded a \$1.2 million grant to create one of the world's fastest and most advanced scientific computer networks at Johns Hopkins. It will be capable of transferring data equivalent to 80 million file cabinets filled with text in and out of Johns Hopkins every day. It will be built on the University's Homewood campus and supported by the regional Mid-Atlantic Crossroads research and engineering network at the University of Maryland, College Park.

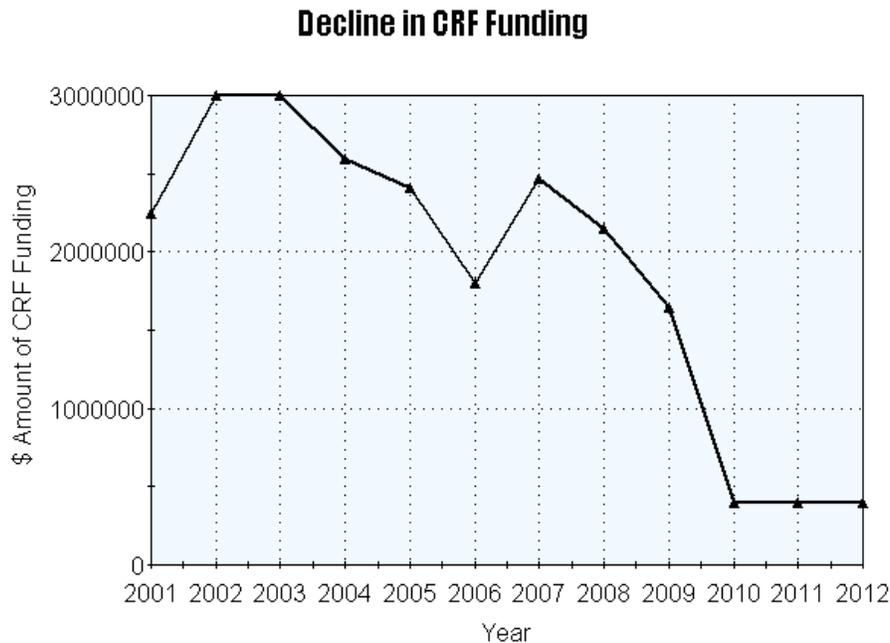
The network will allow for the transfer and analysis of the kind of complex and massive datasets being produced today in medical research, genomics, and astrophysics, and other scientific fields, according to experts. This network will be one of the nation's first public 100 gigabit per second Internet connections and will allow scientists to move data sets thousands of times bigger than was previously thought possible. This new technology will be a boon for cancer research where demand is high for efficient ways to handle and capture very large amounts of data to be shared across institutions and among many researchers.

This project will attract scientists to Maryland from around the world, exponentially expand research opportunities and capabilities, and create additional non-medical jobs through the installation of fiber optic cables needed to upgrade connectivity throughout Maryland.

WHERE ARE CIGARETTE RESTITUTION FUNDS GOING?

When the Governor and General Assembly established the Maryland Cigarette Restitution Fund in 2000, the state's elected officials recognized the number of potential uses for this money. While other states were criticized for using their funds to cover budget shortfalls, Maryland was held as a national model, even receiving Congressional recognition, for applying its funds to impact the effects of cigarette smoking and cancer on the citizens of Maryland.

Despite the proven success of the CRF research grant at Johns Hopkins—launching breakthrough discoveries and bringing millions more back to the state of Maryland than have been spent—support continues to decline. Imagine the missed opportunities in scientific advances and economic gains these lost dollars represent.



**REFLECT UPON THE SUCCESS OF CRF-SUPPORTED RESEARCH.
THINK OF THE MISSED OPPORTUNITIES CAUSED BY CUTS TO CRF
RESEARCH.**

CONSIDER HOW MUCH MORE WE COULD ACCOMPLISH FOR MARYLAND.

MAKE PLANS TO RETURN THE CRF TO FULL FUNDING.