University Cancer Research Fund
2014 Legislative Report

Annual Financial Report to the Joint Legislative Education Oversight Committee and the Office of the State Budget and Management

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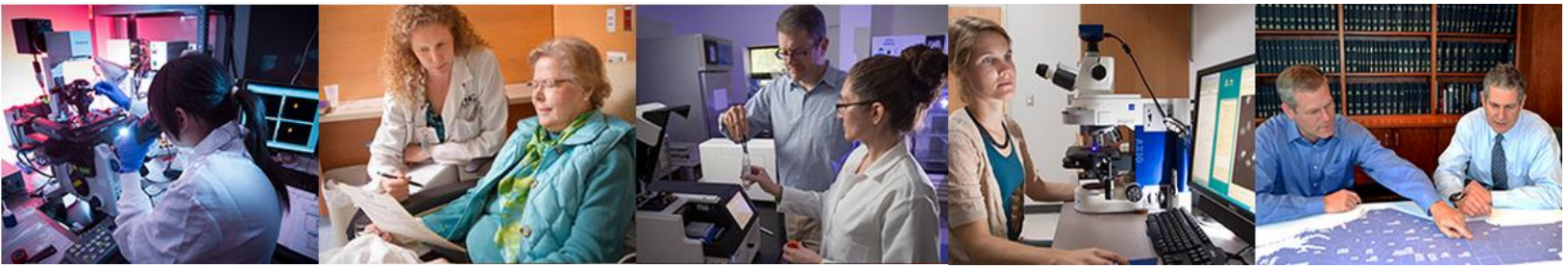
in accordance with G.S. 116-29.1



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MESSAGE FROM THE CHAIR

The General Assembly's continued support of the University Cancer Research Fund (UCRF) has helped make the University of North Carolina at Chapel Hill a national leader in the fight against cancer. This disease affects nearly 40 percent of North Carolinians during their lifetimes, and efforts to improve treatment and outcomes for cancer patients are critical to our state's public health.

Doing innovative medical and public health research and caring for the people of our state are integral to our University's mission. The UCRF has enabled us to make significant progress in both areas. We are now providing cancer care for thousands of North Carolinians all across our state through high-impact enrollment in clinical trials, the use of telemedicine, public outreach programs, and partnerships with local communities and organizations. And through outstanding faculty and infrastructure that the UCRF has supported, we are leading large-scale research efforts that aim to better pinpoint the origins of cancer, to develop more effective and personalized treatments for patients, and to help survivors lead healthier and longer lives.

As Chair of the Cancer Research Fund Committee, I am pleased to present our annual legislative report detailing the tremendous economic impacts the UCRF is having on our state, including:

- A growing economic benefit for North Carolina, with an impact of $332.8 million in this fiscal year for an economic return of over $6 dollars for every dollar invested;
- The hiring and retention of 176 outstanding cancer researchers at UNC;
- Continued increases in extramural research funding. This year, UNC received nearly $137 million in new research funding from outside North Carolina directly attributable to UCRF; and
- An increase in job creation, spinoff commercialization efforts and intellectual property.

Just as important as the economic impacts are the human ones. The UCRF has allowed us to recruit and retain outstanding faculty who are the main reason UNC has become a national leader in cancer care and research. We are recruiting the brightest and the best from around the United States and keeping world-class faulty in North Carolina. They are skilled researchers, public health specialists, caring doctors, and partners who collaborate across disciplines with the shared goal of eradicating cancer as our state's leading cause of death.

The progress we are making in cancer research and care would simply not be possible without the University Cancer Research Fund. Thank you again for your continued support.

Sincerely,

Carol L. Folt, PhD
Chancellor, University of North Carolina at Chapel Hill
Chair, Cancer Research Fund Committee

EXECUTIVE SUMMARY

The North Carolina General Assembly created the University Cancer Research Fund (UCRF) in 2007, the year that cancer became the state's leading cause of death. The UCRF is used exclusively to support cancer research through the University and the UNC Lineberger Comprehensive Cancer Center in an effort to defeat a disease that claims the lives of about 17,000 North Carolinians each year.

Initially supported by tobacco settlement funds, taxes on non-cigarette tobacco products such as snuff, and state appropriations, the Fund received $25 million in 2007 and $40 million in 2008 before reaching its fully authorized funding amount of $50 million in 2009. In 2013, the legislature consolidated all earmarked tobacco settlement funds into the General Fund, eliminating those monies as a source of UCRF support and thereby reducing its funding stream to $42 million annually.

To ensure that UCRF funds are invested responsibly, the legislature established the Cancer Research Fund Committee to provide continued oversight. In 2009, led by then-Chairman Erskine Bowles, former UNC President, the Committee adopted a Strategic Plan to target UCRF resources in areas where they can have the most impact. The successful plan, which is currently being updated in an ongoing effort to maintain accountability of UCRF investments, calls for funds to be invested in the following areas:

- Strategic research priorities in genetics, therapies, and outcomes;
- Selective opportunities that enable researchers to adapt to a rapidly changing field; and
- Clinical infrastructure such as technology, training, outreach and other core resources.

The Cancer Research Fund Committee has published regular reports on the Fund's activities since 2008. In 2011, the General Assembly mandated an annual financial report including UCRF's effects on the state's economy, details on expenditures of UCRF monies and outside funds leveraged by UCRF support, and other performance measures.

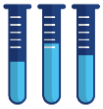
This is the fourth financial report submitted under the legislative requirement. It demonstrates that the University Cancer Research Fund continues to have significant economic benefits for the state of North Carolina.

WHAT IS THE UCRF?

The University Cancer Research Fund is a $42 million nation-leading investment to stimulate cancer research and reduce North Carolina's leading cause of death. The Fund builds upon the exceptional research base at UNC Lineberger Comprehensive Cancer Center, the state's public, NCI-designated comprehensive cancer center.

UCRF RESEARCH FOCUS AREAS

Understanding Cancer Genetics



Developing Novel Therapies

Optimizing Cancer Outcomes

Meet Chad Pecot, MD

UCRF was essential in the recruitment of Assistant Professor Chad Pecot, MD, a lung cancer specialist – and a cancer survivor himself – who is studying how to use nanoparticle-based drug delivery to target the metastatic process. Metastasis is the spread of cancer from one organ to another and this process is responsible for the majority of cancer deaths. Dr. Pecot, who worked at the MD Anderson Cancer Center before coming to UNC, is working on several types of nanoparticle-based treatments that will hopefully prevent or treat metastatic cancer.

UNC Lineberger members Ethan Basch, MD, and Stephanie Wheeler, PhD, MPH, served as **guest co-editors of 2014 North Carolina Medical Journal cancer-focused issue.**

From 2008 to 2014, the UCRF had the following economic impacts:

- UCRF funding and the addition of grants from outside North Carolina supported over 2,250 jobs.
- Had an overall economic impact that reached $332.8 million in FY 2013-2014 including $179.1 million in direct impact and $153.7 million in indirect and induced effects, and totaled $1.56 billion over the years since UCRF inception.
- Has leveraged $136.9 million in extramural funding this year directly linked to faculty who were recruited or retained by UCRF funds, or to the results of innovation grants, technology and infrastructure investments by UCRF.
- Has had an increased return on investment each year, exceeding a 6 to 1 return in FY 2013-2014.

In addition to these economic benefits for North Carolina, the UCRF's impact will continue to be felt in the years to come through the continuing advancement of cancer research, public health interventions and care. The UCRF supports the recruitment, retention and research of world-class faculty members who are leading our efforts to better understand, prevent, diagnose, and treat cancer. These faculty members, along with innovative technologies, infrastructure and other core resources, have helped UNC become a national leader in cancer research – a leadership position that would not be possible without the UCRF. Details of research highlights are featured in this report.

UNDERSTANDING CANCER GENETICS

1,300 patients are now enrolled in **UNCseq,** UNC's genetic sequencing protocol and clinical trial designed to create customized cancer treatment plans based on an individual patient's tumor.

Through critical investments in sequencing technology, other research tools and faculty support, the UCRF has helped make UNC a worldwide leader in cancer genetics. Our faculty members are leading collaborative efforts to catalog thousands of genetic identifiers that can affect the development and growth of cancer. UNC's pivotal role in **The Cancer Genome Atlas project** – a role made possible largely because of UCRF investments – has put our scientists at the forefront of key discoveries that could revolutionize the way cancers are classified, diagnosed and treated.

The UCRF has also helped create **UNCseq**, a clinical trial designed to create a cancer treatment plan based on an individual patient's tumor. More than 1,300 patients are now enrolled in UNCseq, UNC's genetic sequencing protocol and clinical trial designed to create customized cancer treatment plans based on an individual patient's tumor. This protocol, funded by the UCRF, is especially important for situations where standard therapeutic options are not effective or useful.

DEVELOPING NOVEL THERAPEUTICS

Much of our research focuses on how to improve treatment delivery methods in a way that **better targets tumor cells** while sparing normal tissues from toxic side effects. Our researchers are developing reprogrammed stem cells, nanoparticles and other vehicles for more precise drug delivery.

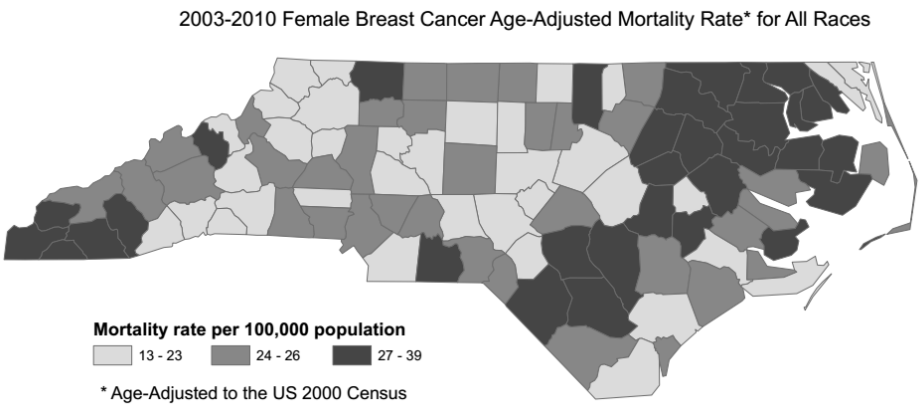
UNC also received a major grant this year to support research to develop better melanoma treatments, **centered on a discovery made at UNC**. And enrollment in clinical trials continues to grow, allowing more North Carolinians to have access to cutting-edge treatments as part of the testing process.

Federico Innocenti, MD, PhD, and his team are working to help identify patients who will benefit the most from angiogenesis inhibitors, a class of drugs commonly used in cancer therapy.

OPTIMIZING N.C. CANCER OUTCOMES

This priority focuses on improving our understanding of cancer in North Carolina through the use of data; community-based research interventions; and strong partnerships with doctors, hospitals and patients. The UCRF has been instrumental in building population-based data resources and funding projects that test ways to improve prevention and early detection in communities all across North Carolina.

A powerful resource supported by the UCRF is the Integrated Cancer Information and Surveillance System (ICISS), a UCRF-funded initiative **that links cancer data to support cancer research**. Metrics of cancer incidence, mortality, and burden in North Carolina are linked with data sources at an individual and aggregate level that describe health care, economic, medical claims, social, behavioral, and environmental patterns. ICISS generates powerful mapping, such as the one below showing the county-by-county distribution of breast cancer death rates. These analyses **enable the discovery of cancer risk factors** and tell us how and where to best intervene, prevent and treat cancer.



Deborah Manning, one of a record-breaking 3,000 breast cancer survivors participating in the UCRF-funded Carolina Breast Cancer Study

"The best knowledge we can provide as cancer survivors is what our lifestyles are like, what our habits are like, what our genetics are like, so maybe we can find some common thread that will link us all together and help find a cure."

The opening of **Marsico Hall** has supported collaborative UCRF research in genetics and immunotherapy.

Telemedicine activities supported by the UCRF connect oncologists across the state to confer with UNC physicians on complicated cancer cases.

CLINICAL EXCELLENCE AND INFRASTRUCTURE

The UCRF has enabled us to recruit and retain faculty with expertise and leadership in several key clinical areas. It has also helped establish research infrastructure that is widely used not just at UNC, but by provider practices and research institutions across the state. Our telemedicine network and virtual tumor boards have connected community doctors, nurses, staff and hospitals with oncology experts in Chapel Hill.

While the UCRF plays a tremendous role for ongoing research, infrastructure and community outreach, it must be noted that the State of North Carolina also made two significant capital investments in cancer care: **The N.C. Cancer Hospital**, which opened in 2009 and serves patients from all 100 counties, seeing more than 135,000 patients each year; **and Marsico Hall, a cutting-edge collaborative research facility** that opened in spring 2014 and that houses high-capacity technology and equipment to further accelerate our research capabilities. These investments from the state will work together to advance cancer care and research for patients in North Carolina and beyond.

The University Cancer Research Fund has been a landmark initiative for North Carolina. It is an investment whose gains – not only the positive economic impacts, but also the benefits for patients and public health in North Carolina – will keep growing as UNC continues to be a national leader in the fight against cancer.

Creating Jobs for North Carolinians: The UCRF has created biotech and pharmaceutical companies that are creating jobs for North Carolinians and making impactful advances in cancer treatment and prevention. Just a few of the 20 UCRF-supported startups are profiled below.

LIQUIDIA TECHNOLOGIES

- Biotechnology company located in Research Triangle Park employing over 60 people

G1 THERAPEUTICS

- UNC startup that raised $12.5 million in a Series A financing
- Opened a Phase I clinical trial for a drug that could reduce the toxicity of cancer treatments

COUNTER TOOLS
ADVANCING PLACE-BASED PUBLIC HEALTH

- Tobacco tracking software company currently being used in 7 states
- Offering two proprietary software tools – the Store Mapper© and the Store Audit Center©

ECONOMIC IMPACTS

To assess whether the UCRF is achieving its goal of stimulating the economy, UNC once again hired Tripp Umbach, a nationally respected consulting firm, to estimate the UCRF's economic impact for FY 2014. Tripp Umbach examined UCRF's immediate impact on state income growth and employment. The Fund's overall economic impact was estimated as the sum of its direct and indirect and induced economic impacts (see separate full report in Appendix). Direct impact resulted from two major sources: expenditures from the UCRF itself and expenditure of UCRF-attributable research funds awarded to UNC by federal, foundation, and other sources. The indirect and induced impact was calculated by applying standard multipliers to direct expenditures.

For FY 2014, UCRF's total allocation was $42.1 million. Using standard methodologies, Tripp Umbach estimated that in FY 2014 UCRF:

- Had an overall economic impact of $332.8 million. The total included $179.1 million in direct spending and $153.7 million in indirect and induced impact attributable to external grant funding;
- Generated well over $6 in economic impact for every UCRF dollar expended;
- Supported over 2,250 jobs, including the direct support of 983 jobs and an additional 1267 jobs through the increased extramural funding and the indirect and induced impacts of those direct jobs and the spending generated within North Carolina.
- Resulted in nearly $11.4 million in tax revenues to North Carolina.

Using slightly different methodology than used by Tripp Umbach in FY 2013 and FY 2014, prior economic impact analyses by SRA International and the UNC Center for Competitive Economies (Frank Hawkins Kenan Institute of Private Enterprise) found that between FY 2008 and FY 2012, UCRF's cumulative economic impact was $968.0 million over the Funds' first five years. The FY14 total brings the economic impact of UCRF over its entire seven year span to more than $1.56 billion.

FACULTY JOB CREATION AND RETENTION

Faculty drive the UCRF. They lead the teams that conduct the groundbreaking research to push the boundaries of our knowledge and advance cancer treatment, prevention and early detection. Faculty also hire staff, evaluate technology, earn research funding from outside North Carolina, and train students and fellows. UCRF has had a tremendous positive impact on cancer research faculty at UNC during the six years from 2007 - 2014:

- ***Recruitment:*** UCRF has supported the recruitment of 144 faculty in the College of Arts and Sciences, the Schools of Nursing, Public Health, Medicine, Pharmacy and Journalism and Mass Communication. These faculty members are developing a wide range of research programs in nanomedicine, quantitative biology, cancer genomics, health outcomes, health communications, multiple cancer types, and other areas critical to improving cancer prevention, diagnosis and treatment in our state.
- ***Retention:*** UCRF support has led to the retention of 32 faculty.

EXTRAMURAL FUNDING GROWTH

Virtually all extramural funds come to UNC from outside North Carolina and add to the state's economy. The UCRF Strategic Plan establishes extramural research funding – particularly competitive federal funding – as a key metric for UCRF success. According to this metric, UCRF funds are being invested very effectively. UCRF support is leveraging extramural research funds for North Carolina at a time when national funding levels are decreasing, keeping the state at the forefront of research nationally. Key trends include the following:

- FY 2014 funding from outside sources that is directly attributable to the UCRF totaled $136.9 million in annual total cost dollars.
    - This amount is based on a snapshot of active attributable extramural funding held by faculty in the first quarter of FY 2014-2015. The dollars represent one year of funding. A complete list of the awards is included in the Appendix.
    - The positive effects of faculty recruitment and retention, technology enhancement, and developmental projects have accumulated. The UCRF attributable extramural funding has risen from $5 million in FY08. By FY11, it was $69 million and in FY13 was $106 million. This year, UNC has seen a $30 million increase to over $136 million. Many of the currently active awards will continue for several more years, and we fully expect new awards to add to the total.
- Between 2007 and 2014, the overall extramural support for cancer-related research to UNC Lineberger increased from $163.6 million to $243 million; support from the National Cancer Institute grew from $48.5 million to $68.1 million.

INTELLECTUAL PROPERTY, INNOVATION, AND ENTREPRENEURSHIP

The UCRF focus on innovation has promoted entrepreneurship that has created jobs and spinoff companies. The UCRF, in collaboration with UNC's North Carolina Translational and Clinical Sciences Institute, is fostering an entrepreneurial mindset at UNC. UCRF supports specialized staff to maximize the development and licensing of university intellectual property. In the past seven years, 20 startup companies have been launched or expanded their scope with direct UCRF help. These new companies are attracting external grant support and venture capital investment, as well as creating private-sector jobs.

Featured UCRF Startup: EpiCypher

Many UCRF-supported faculty members have helped lead or support research endeavors that have translated into commercial opportunities. For example, Dr. Brian Strahl, PhD, was a scientific founder of EpiCypher, a bioscience company that develops new tools and technologies to support epigenetic and chromatin biology research worldwide. In June 2014, the company moved from Texas to the Research Triangle Park. Dr. Strahl's research continues to explore ways that histones, which are a class of proteins that regulate DNA, affect other enzymes and processes that influence cell growth and the development of disease.

RESEARCH IMPACTS

The UNC Lineberger Comprehensive Cancer Center holds an "exceptional" rating from the National Cancer Institute – a rating given to only a handful of the nation's 41 NCI-designated cancer centers. NCI specifically cited the University Cancer Research Fund as a significant reason UNC earned the institute's top rank.

To direct the most effective and responsible use of the state's investment, the Cancer Research Fund Committee adopted a Strategic Plan in 2009 when the UCRF reached its full funding amount of $50 million. The plan includes three primary tiers: Research Priorities, the Opportunity Fund, and Critical Infrastructure. This section of our report highlights noteworthy successes in each tier.

1) **Research Priorities:** Three targeted research priority areas where with focused investment in major scientific programs, disease-based initiatives, or cutting-edge research platforms, UNC could have substantial impact and become a world leader. The priority areas are as follows.

   - ***Understanding the Role of Genetics in Cancer Causation and Treatment*** – to discover the genes that predispose families to cancer and that predispose cancer patients to poor treatment outcomes – especially by looking for the various genetic mutations in specific cancer subtypes that lead to cancer therapy failure.

   - ***Developing Novel Therapeutics*** – to devise new therapies that are targeted to the specific vulnerabilities of treatment-resistant cancers, and to develop new ways of delivering treatments that reduce toxic side effects for patients. This research priority relates closely to the genetics initiative, and makes key observations that will be utilized in clinical applications as quickly as possible.

   - ***Optimizing NC Cancer Outcomes*** – to enhance the quality of oncology and survivor care, and to build population-based datasets that track the occurrence and treatment of cancer across North Carolina to support research designed to improve community prevention and early detection. The ultimate goal is to understand North Carolina's cancer problem at a level unprecedented in the nation and to design research interventions aimed at rectifying these problems at the practice, health system and community levels.

2) **Opportunity Fund:** Allows UCRF to remain nimble, seizing basic, population or clinical research or clinical opportunities as they arise and providing the top minds in the field with the resources they need. Examples include competitive, innovative pilot projects; seed funds to recruit top researchers; support of leading-edge technology and equipment for use by multiple faculty members; and the development of shared research resources.

3) **Critical Infrastructure Fund:** Provides critical resources for cancer research that are not readily obtainable by outside funding but upon which future progress relies. Investing in imaging, informatics and fundamental research technologies ultimately provides UNC scientists with the tools to change population and patient outcomes. This requires enhancement of multidisciplinary excellence in cancer care and the development of a statewide infrastructure to help bring leading-edge clinical research and applications into community practices.

Progress Toward UCRF Strategic Goals

TIER 1: RESEARCH PRIORITIES

Leading national effort to giving patients a greater voice in their care

Leveraging big data to improve quality and access of cancer care

Developing targeted therapeutics for brain cancer

Significant work and grants funded in melanoma

Led the largest ever genetic sequencing analysis to date

Enrolled over 1300 participants in UNCseq

TIER 2: OPPORTUNITY FUND

- Enrolling patients in a clinical trial testing a new x-ray screening system that could replace mammography
- Developing a program to take advantage of a person's immune system to fight cancer
- Awarding six Innovation Awards to support groundbreaking contributions to cancer research

TIER 3: INFRASTRUCTURE FUND

- Supporting collaborative clinical and imaging cancer research across the campus and the state
- Connecting with oncologists across the states via telemedicine
- Supporting the training of students as future cancer researchers

Changing the Face of Clinical Trials

UNC Lineberger secured three major grants from the National Cancer Institute (NCI) this year as part of a new NCI clinical trials research network designed to improve treatment for the more than 1.6 million Americans diagnosed with cancer annually. UNC is **one of only five** cancer centers in the nation to be awarded all three grants.

- UNC Lineberger will serve as one of 30 NCI **Lead Academic Partnership Sites** from across the country. As a LAPS, UNC Lineberger will provide NCI with scientific leadership in the development and implementation of clinical trials.
- UNC Lineberger also secured entry into an elite network focused on experimental clinical trials — the NCI's **Experimental Therapeutics Clinical Trials Network**. UNC Lineberger, along with two partner institutions, will conduct early phase NCI-sponsored cancer clinical trials to expedite the drug development process.
- We are one of only five institutions across the country funded to develop genomic tests for the clinical trials within the National Clinical Trials Network. Our group will be providing high-throughput RNA and DNA sequencing and regulatory assistance to partner institutions in the new network. As a **Network Group Integrated Translational Science Center**, UNC Lineberger will become one of the world's foremost centers for high volume, regulatory compliant clinical genetic sequencing.

RESEARCH PRIORITY 1: UNDERSTANDING THE ROLE OF GENETICS

One of the most rapidly changing fields of cancer research, cancer genetics involves the study of how a person's individual genetic makeup can affect the risk and development of disease. This is done by sequencing a patient or family member's normal DNA obtained from their blood. The other important aspect is examining the genetic changes that occur in a patient's tumor. This information can tell us how various types of enzymes, proteins and genetic mutations influence tumor growth. UCRF investments in new faculty as well as high-powered sequencing technologies, massive data resources, and other important analytical tools have helped make UNC a world leader in cancer genomics.

Reclassification of cancer could revolutionize diagnoses, treatments

As part of the Cancer Genome Atlas (TCGA) – a $40 million national research project in which UNC is a lead research institution – UNC researchers headed the largest, most diverse tumor sequencing project ever done. Taking National Institutes of Health cancer data representing 100 billion base pairs of DNA, UNC researchers worked with 10 other centers to analyze more than 3,500 tumors from 12 different tissue types, including breast, bladder and lung cancers. As the main TCGA site for RNA analysis, UNC sequenced over 50 trillion bases of RNA and was the principal site for analysis of all the data.

The bulk of traditional cancer research has identified cancer as not a single disease, but as many types and subtypes, with a tumor defined by the tissue – breast, lung, colon, and so on – in which it originated. Under this approach, treatments were tailored to which tissue was affected; however, questions have always existed about the effectiveness of this approach because some treatments work, and fail for others, even when a single tissue type is involved.

Instead, UNC's analysis of TCGA data found that cancers are more likely to be genetically similar based on the type of cell in which the cancer originated, compared to the type of tissue in which it originated. For instance, researchers found that in several cancer sites, multiple distinct cancer types exist. Additionally, some tumor types appear in more than one tissue type.

"In some cases, the cells in the tissue from which the tumor originates are the same. But in other cases, the tissue in which the cancer originates is made up of multiple types of cells that can each give rise to tumors," said Katherine Hoadley, Ph.D., a UCRF recruit and UNC assistant professor in genetics and lead author of the massive TCGA analysis recently published. "Understanding the cell in which the cancer originates appears to be very important in determining the subtype of a tumor and, in turn, how that tumor behaves and how it should be treated."

For example, UNC research had shown that breast cancer actually consists of four previously known subtypes; luminal A, luminal B, HER2-enriched and basal-like. The TCGA's analysis found that the basal-like breast cancers actually looks more like ovarian cancer and cancers of a squamous-cell type origin, rather than other cancers that arise in the breast. Bladder cancers were also found to be very diverse, possibly representing at least three different disease types that also showed differences in patient survival.

The study, published online in the scientific journal *Cell* in August 2014, found that one in 10 cancers would be re-classified under this new approach, said Chuck Perou, PhD, professor in genetics and pathology, a UNC Lineberger member and senior author of the paper. The TCGA project will help doctors more accurately diagnose cancer and help biotech and pharmaceutical companies develop more targeted drug therapies. This type of analysis will allow researchers to focus more on the creation of treatments targeting larger groups of cancers with genomic similarities instead of to a single tissue-based tumor type, the current way that drugs are developed.

UNC researchers steer project to sequence rare kidney cancer

UNC scientists led another critical TCGA project that has revealed new insights into the unique genetic changes that contribute to a rare form of kidney cancer. The study – a comprehensive integrated analysis of the molecular and genetic features of chromophobe renal cell carcinoma, a rare form of kidney cancer that affects roughly 2,000 new patients each year – was published in the journal *Cancer Cell***.**

So far, all the treatments for this type of cancer have been based on the biology of the more common kidney cancer type, but this new analysis of 66 tumor samples revealed significant genetic mutations that show chromophobe cancer to be genetically different from more common kidney cancers.

UNC Lineberger member and associate professor Kimryn Rathmell, MD, PhD**,** co-chaired the project, and in all there were 27 UNC authors who contributed to this manuscript. UNC played several roles in the study: In addition to working on the data analysis itself, UNC served as the RNA analysis site as well as a tissue source site contributing samples for the study.

The analysis found frequent mutations in the TP53 and PTEN genes as well as a whole or partial loss of chromosomes necessary for DNA packaging and replication. These are two major discoveries that could change the ways that physicians treat this type of cancer, pointing to future therapies that target the unique biology of the tumor.

“We found virtually no similarities between these cancers. They appear to originate from different segments of the kidney nephron, have completely distinct genetic patterns, and differ in methylation profiles,” said Dr. Rathmell.

UNCSeq reaches patients statewide through clinical trials

UNC has turned the UCRF-developed genomics capabilities towards North Carolina patients. More than 1,300 patients are now enrolled in UNCseq, UNC’s genetic sequencing protocol and clinical trial designed to create customized cancer treatment plans based on an individual patient’s tumor. This protocol, funded by the UCRF, is especially important for situations where standard therapeutic options are not effective or useful.

Under UNCseq, researchers analyze tumor samples obtained from a biopsy or surgery, using next-generation sequencing to identify the molecular or genetic changes that may influence outcomes or choice of therapy. Once sequencing is complete, the study calls for a molecular tumor board, which is run similarly to a cancer multidisciplinary conference. Clinical information about the study patients and sample reports from the genomic data are presented and discussed, and variants that need to be confirmed in the clinical lab are identified. If researchers find and validate a molecular alteration that can be treated with a drug targeted to that change, UNC oncologists will provide this information to the

patient and his or her doctor so that they can discuss this treatment option. Normal DNA from a patient's blood is also sequenced so that we can accurately determine if the changes in the tumor are truly mutations. This information can also help determine if the patient and their family have a gene that would predispose them to specific cancers.

The UNCseq clinical trial is open to patients with all cancer types, and its ultimate aim is to provide every patient with tumor analyses that will allow their doctors to prescribe targeted and efficient therapies on an individualized basis.

RESEARCH PRIORITY 2: DEVELOPING NOVEL THERAPIES

As we improve our understanding of how cancer develops and grows, we can work toward new ways of treating this disease more effectively. Roughly one third of U.S. cancer patients will die with advanced disease that is resistant to treatment, and it can take more than 10 years for a new drug to go through the comprehensive testing required for widespread patient use. The UCRF has been critical in helping UNC researchers further their work to develop and test new therapies and drug delivery methods, protecting normal cells and doing less harm to patients.

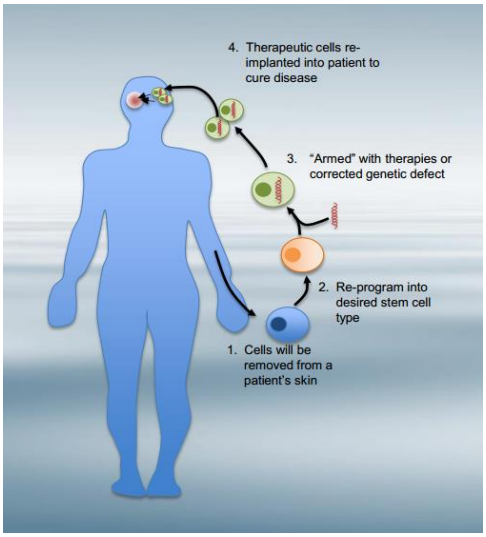
Major grant award to support research on melanoma target discovered at UNC

A team of scientists from UNC Lineberger, the University of Colorado and the Hebrew University of Jerusalem received a $1 million grant this year for research aimed at improving the treatment of melanoma, the most aggressive type of skin cancer. At the center of the research is a type of regulatory protein called MerTK, a new target for melanoma cancer which was originally discovered in the lab of UNC Cancer Care Director Shelley Earp, MD.

Earp and Stephen Frye, PhD, director of the Center for Integrative Chemical Biology and Drug Discovery at the UNC Eshelman School of Pharmacy who has synthesized a series of molecules that inhibit MerTK activity, are leading the UNC research team. Additional collaborators are Rotem Karni, PhD, and Tal Burstyn-Cohen, PhD, both of the Hebrew University of Jerusalem; and S. Gail Eckhardt, MD, and Douglas Graham, MD, PhD, of the University of Colorado Anschutz Medical Campus. Dr. Graham was a UNC medical student working with Dr. Earp when MerTK was first discovered and they have continued to collaborate on this project for over a decade. The team which included melanoma surgeon Dr. David Ollila, medical oncologist Dr. Stergios Moschos, and pathologist Ryan Miller found that MerTK is elevated in metastatic melanoma. They have also shown that the team's prototype drug could slow the growth of melanoma cells – both alone and even more effectively in combination with some of the newly approved melanoma drugs.

Developing targeted stem cell therapeutics for brain cancer

Safe and effective drug delivery to treat brain disorders is a major medical challenge due to the brain's structure and complexity. UNC Lineberger member and UCRF recruit Shawn Hingtgen, PhD, assistant professor at the Eshelman School of Pharmacy, is working to develop innovative and precisely targeted drug delivery methods to treat glioblastoma (GBM), a very aggressive brain cancer.



Previous research has found that using neural stem cells (NSCs) to treat brain disorders is more effective than traditional delivery methods because NSCs can better target tumor sites and be used for continuous long-term drug delivery to those sites. Hingtgen's current work aims to further advance NSC-

based therapy for glioblastoma by using cellular reprogramming technology. He hopes to develop and evaluate a novel type of NSC by deriving stem cells starting with a patient's own fibroblasts. He could then use these induced NSCs as vehicles for GBM treatment of the same patient without fear of rejection. Eventually, his team including neurosurgeon Dr. Matt Ewend hopes to be able to biopsy a patient's skin, convert those cells to stem cells, add therapies to those cells, and then reimplant them for treatment. The goal is to create a model for the use of personalized patient-specific NSCs to treat aggressive GBMs.

RESEARCH PRIORITY 3: OUTCOMES

The UCRF is an integral part of our work to improve the outcomes for cancer patients in North Carolina. It has enabled us to build unprecedented data sources that can give researchers a comprehensive look at cancer incidences in our state, including how patient outcomes can vary by geographic, economic and other differences. UNC has also taken a leadership role in designing national standards that integrate the voice of patients into the evaluation of care. These patient-reported outcomes will provide a new standard for both care and approval of new cancer therapies. Additionally, support from the UCRF is also helping to test different intervention strategies that reduce cancer risk factors and enhance a patient's ability to access screenings, treatments, and other information that could affect their decisions about cancer care.

Patient-reported outcomes critical to improving cancer care

Interdisciplinary collaborators in the UNC School of Medicine and the UNC Gillings School of Global Public Health are helping to create national guidelines for patient-reported outcomes in cancer care.

UNC's Pediatric PRO Research Network is working to design and validate a questionnaire for children and adolescents to self-report symptomatic adverse events they are experiencing while undergoing cancer treatment. The ultimate goal is to enhance the validity and precision of adverse event reporting in oncology trials and to improve the healthcare for children with cancer by directly including their voice.

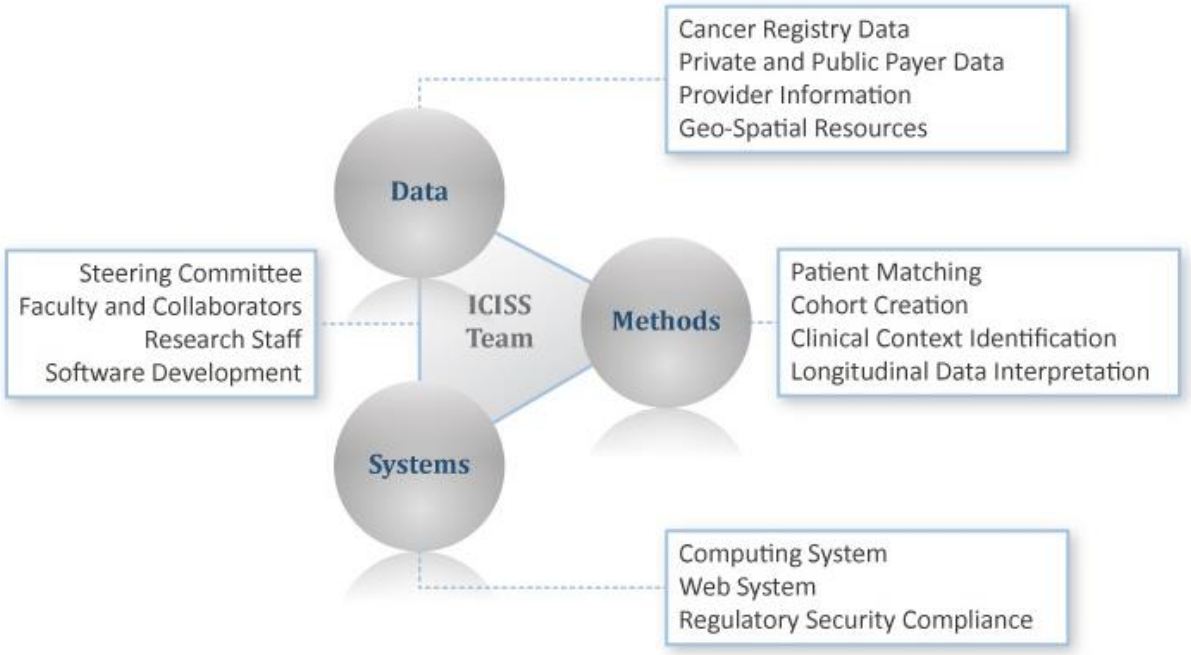
Several key UNC researchers are playing a role in this effort. Dr. Ethan Basch, MD, MSc, was recruited here last year from Memorial-Sloan Kettering with support from the UCRF. He now serves as Director of Cancer Outcomes Research at UNC. His research expertise includes patient-reported outcomes and developing ways to better evaluate patient symptoms and adverse events. Dr. Basch, who leads the National Cancer Institute's Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE) initiative to develop a standardized patient reporting system, has spearheaded efforts to create standardized patient reporting tools for clinical use. By gathering and using patient feedback during cancer treatment, doctors can better understand what their patients are feeling both physically and emotionally, leading to improved quality of care.

Building on Basch's initiative for adult patient reports, another UCRF recruit Dr. Bryce Reeve, PhD, UNC Lineberger member and associate professor of health policy and management at UNC's Gillings School of Global Public Health, has focused on patient-centered reporting for pediatric patients. He has

received a five-year, $2.5 million grant from the NCI to design and evaluate a self-report measure of adverse events experienced by children receiving cancer treatment.

Big data, analytics serve as powerful research tools

Funding from the UCRF has enabled UNC to build a powerful, data-rich research tool that will give researchers an unprecedented view of the cost and quality of cancer care in North Carolina. The Integrated Cancer Information and Surveillance System (ICISS), a system funded in part by UCRF and composed of North Carolina data, links multiple population, clinical and other data sources. It contains all North Carolina's cancer cases and links to health claims data for 5.5 million people insured by Medicare, Medicaid, State Employees' Health Insurance, and Blue Cross/Blue Shield of North Carolina – covering about 85 percent of North Carolina's population of cancer patients. No similar integrated population-based cancer informatics system exists at the state or national levels in the nation. ICISS could become a model for rational cancer planning in the United States and beyond.



"North Carolina is very unique in the existence of ICISS, a resource that links Medicare, Medicaid, private insurance claims and the cancer registry. North Carolina is ahead of every other state in terms of the methods that it has employed and the technology that it has developed," said UCRF recruit and ICISS faculty director Anne-Marie Meyer, PhD.

ICISS will be used in many ways. It can evaluate the cost and geographic distribution of cancer care modalities. It is also being used to measure outcomes of cancer control activities, especially among vulnerable subgroups and communities that have been traditionally under-represented. Researchers at other academic centers in North Carolina also can access the data to inform their studies. ICISS allows scientists to consider what kinds of cancer treatments are most effective, which parts of the state need more access to cutting-edge cancer care, what kinds of environmental and economic factors may affect prognosis, and other important questions. ICISS-related research will improve scientists' understanding of cancer in North Carolina and provide a pathway to improve cancer outcomes for patients.

Health-e-NC reaches communities across North Carolina

Health-e-NC, which stands for "Health for Everyone in North Carolina," is a statewide effort funded by UCRF to improve cancer outcomes. With cancer being the state's leading cause of death, this initiative

uses community partnerships to test intervention strategies for prevention, detection, diagnosis, treatment and survivorship – and then sharing the most effective strategies statewide. Reducing cancer risk factors like tobacco use and obesity, increasing cancer screenings and referrals, and helping people make more informed decisions about prevention and treatment options are among the objectives of Health-e-NC.

One new Health-e-NC intervention targets the health and wellness of child-care workers who older and entering the age of cancer susceptibility in North Carolina by helping them improve their physical activity and healthy eating. Lineberger members Laura Linnan and Dianne Ward, professors in the UNC Gillings School of Global Public Health, will oversee the Care2BWell initiative, which will work with personnel at 104 childcare centers across the state and is funded by a $3.4 million, five-year grant from the National Institute of Health.

Childcare workers have received very little research attention in the past, despite earning low wages and making up 1.2 million jobs in the United States. By increasing physical activity and improving healthy eating habits, workers will be put at a decreased risk for many chronic diseases related to obesity.

Healthier childcare workers are in a better position to provide excellent care for the children they work with – and serve as role models for healthy behaviors for the children in their care. “We believe they will feel great physically and mentally,” Linnan said. “And as a result, we expect they will model these healthy behaviors for the children in their care.”

Weight loss program helps reduce cancer risks

Obesity – a widespread problem in North Carolina – has been linked to risk of several cancers and to decreased survival rates. But many effective weight-loss programs involve intensive face-to-face treatments, meaning that they are costly and not widely accessible to the general population. Health-e-NC’s LoseNowNC initiative tested a different approach that researchers hoped would be more adaptable in communities across the state: monthly face-to-face treatment in much larger groups (approximately 200 or more), coupled with an Internet program between sessions. This more cost-effective approach was tested in Kannapolis, NC.

The project has found that a low-intensity weight loss program could be successfully delivered in a community-based setting and result in overall weight losses over time. While the Internet program is now being used in a larger physician-referred weight loss study, participants in LoseNowNC can already testify to its initial success.

Third phase of breast cancer study focusing on access to care, other barriers to treatment

The largest population-based study of breast cancer ever in North Carolina and one of the largest in the world, the Carolina Breast Cancer Study (CBCS) has recently enrolled 3,000 more patients and aims to improve understanding of breast cancer, especially disparities in the risk of developing cancer and the timely access to health services.

The CBCS Phases I and II were launched in 1993 and included participants from 44 of North Carolina’s 100 counties. Phase III funded in large part by UCRF has just completed accrual of 3,000 women and is now in the five-year follow-up phase. Phase III focuses specifically on how treatment decisions, access to care, and financial or geographic barriers impact breast cancer outcomes. CBCS is also a leader in

assessing whether these outcomes are affected by genetic breast cancer subtypes. The study is one of the largest ever done investigating whether subtypes of breast cancer are associated with different risk factor and prognosis profiles.

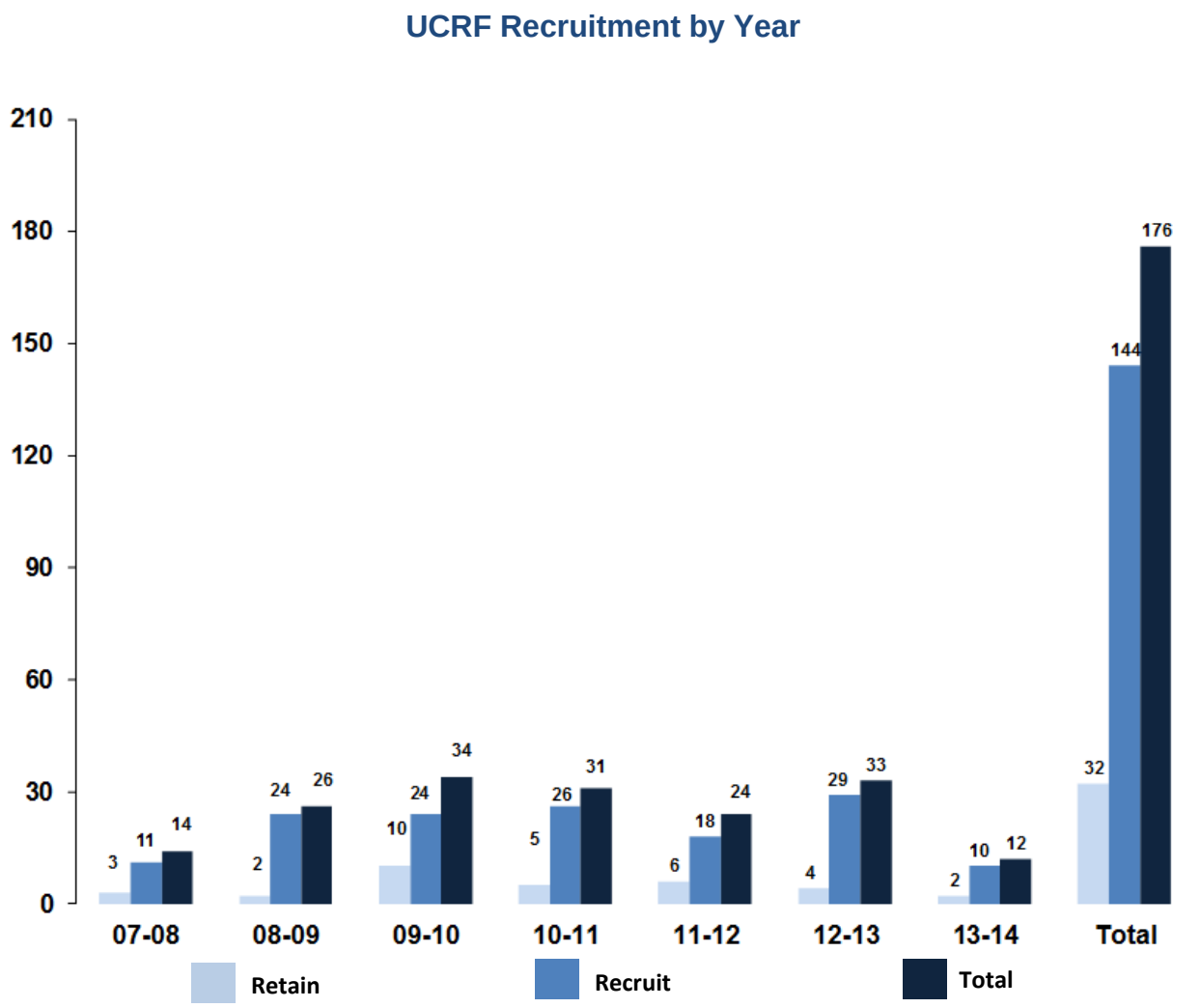
“CBCS participants are the real heroes; they will be contributing to changing our understanding of breast cancer therapy for their sisters and daughters,” said Mary Beth Bell, MPH, who manages the study.

OPPORTUNITY FUND

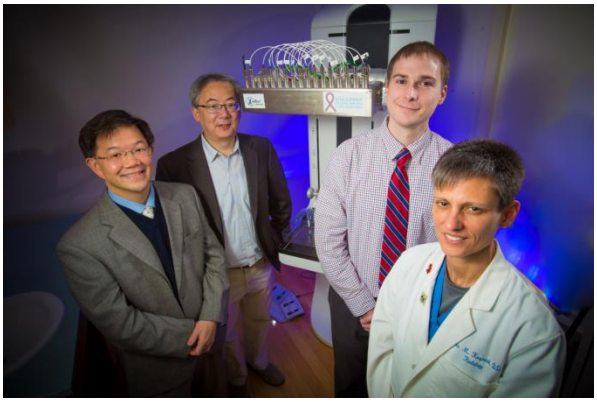
Because cancer research is an evolving field, the purpose of the Opportunity Fund is to allow us to seize research and clinical opportunities as they arise. The UCRF enables us to fund competitive and innovative pilot projects, support cutting-edge technology and shared research resources, and provide seed money to recruit and retain the top minds in the field.

Building capacity in cancer research

While the Strategic Plan concentrates UCRF resources on three Tier 1 Research Priorities, cancer research is a continually changing field – and new opportunities for strategically important research regularly develop outside the Tier 1 priorities. Recruiting and retaining outstanding faculty is critical to our efforts to fight cancer, and the UCRF has successfully helped UNC recruit and retain researchers in order to build capacity in key areas of study. Since the UCRF was established, we have recruited 146 and retained 33 outstanding key leaders.



Breast tomosynthesis trial enrolls patients across NC



Clinical trials are under way to test a new x-ray imaging system that could improve the early detection of breast cancer. This technology, X-ray digital breast tomosynthesis (DBT), produces better imaging than traditional mammography, but current DBT models require long scanning times that can lead to blurred pictures, patient discomfort and other problems. In UNC clinical trials, UNC Lineberger member Dr. Otto Zhou, PhD, is now testing the next-generation DBT scanner he developed at UNC. The world's first prototype relies on a multipixel X-ray technology to increase the imaging speed, reduce the size and cost of the equipment, and potentially reduce radiation doses while improving image quality. Zhou's DBT device is based on early UCRF-funded innovative work at UNC using carbon nanotubes (CNT) as an X-ray source. The trial is being conducted by UCRF recruit and research radiologist Yueh Lee, MD, PhD.

UCRF Innovation Awards recognize collaborative projects, leverage external funds

Designed to promote the next generation of cancer research, the UCRF Innovation Awards support innovation, collaboration and cancer-focused science at UNC. Awards can range up to $100,000 a year for two years funding for individuals and up to $200,000 per year for teams, and all UNC faculty and UNC Lineberger Comprehensive Cancer Center members are eligible to apply. These awards have stimulated research across the public health, clinical and basic science spectrum and provide data with which to seek new external funding. From 2007 to 2014, the UCRF conducted **10** rounds of competition for the Innovation Awards and received **529** applications. Rigorous peer reviews led to **87** awards, a funding rate of about one in six, for a total of $14.45 million.

This spring, six UNC researchers won Innovation Awards for their groundbreaking contributions to cancer research. Award-winning projects from the Spring 2014 round include research on the impacts of electronic cigarettes, a largely unregulated product that is so new to the market that there is little medical research on its effects on consumers; a project aiming to use "suicide genes" to yield a new, less toxic cell-based therapy for acute leukemia; and a mouse-model sequencing study focusing on the therapeutic efficacy of a DNA damaging agent called temozolomide (TMZ) in therapy for low-grade brain tumors.

UNC researcher leads study of electronic cigarettes, authors policy statement

A leading UNC scientist has authored a policy statement calling for continued monitoring of the health effects of electronic cigarettes, with special attention given to youth and adolescents. Dr. Kurt Ribisl, PhD, professor of health behavior at the UNC Gillings School of Global Public Health and leader of the Cancer Prevention and Control Program at UNC Lineberger, was awarded a five-year grant of nearly $20 million from the U.S. Food and Drug Administration (FDA) and National Institute of Health (NIH) to research tobacco communication and prevention strategies. Ribisl, along with colleagues from other universities participating in the study, caution that use of e-cigarettes could be a problem at the population level. For example, e-cigarettes could fuel and promote nicotine addiction, especially in children, and acceptance of the devices has the potential to renormalize smoking behavior.

INFRASTRUCTURE

Marsico Hall opens, builds collaborative research capacity

In April 2014, the doors of Marsico Hall opened – and so did the doors to cutting-edge technologies that are available for research in only a few other places in the world. Funded by the General Assembly in 2009, the new facility is located next to the Lineberger building and near the hospital, bringing the physical and chemical sciences much closer to the cancer center and promoting multidisciplinary collaboration toward key research objectives.

Researchers now have access to three floors of imaging technology equipment that will allow us to make significant strides in cancer imaging, drug development and other areas. More than half the building is occupied by Lineberger members. The facility's imaging component will substantially enhance translational research by bringing all small animal imaging modalities together for early pre-clinical work that helps researchers know which drugs to advance to human trials. The facility will also provide some of the country's most modern imaging tools for human trials including MRI/PET and CT/PET scanners, a 7TMRI, a cyclotron, and radiochemistry facilities.

Outreach and telehealth expands UNC tumor expertise

UCRF has also been critical in the launch and success of UNC Lineberger's telehealth program. Using the infrastructure supported by UCRF funds, healthcare providers connect across North Carolina in real time to discuss best practices for patient care and cutting-edge research.

Since 2012, UNC Lineberger has hosted over 65 lectures that have been broadcast to over 3,800 participants across the state. Topics in the last year ranged from "Parenting with Cancer" to "Which Patients to Refer for Stem Cell Transplantation and When." On average, each lecture reaches 62 medical professionals – nurses, doctors, and clinic managers – and cover an average of 12 sites across the state. Offering continuing education credits for RNs, MDs, NPs, radiation technologists and others also allows UNC to support the professional development of North Carolina's health care workforce.

Affiliated physicians and hospitals have the resources to videoconference with a team of UNC experts from a wide variety of specialties, meeting to discuss treatment plans for patients during weekly Multidisciplinary Oncology Tumor Boards. Physician-to-patient consultations also are provided via telemedicine in selected specialties that are lacking in rural communities. Additionally, telemedicine allows the Comprehensive Cancer Support Program to provide mental health support for cancer patients, and enables the Clinical Genetics Program to offer genetics counseling to patients.

BUDGET AND EXPENDITURE INFORMATION

UCRF Funding

The 2007 law that established the University Cancer Research Fund stated that North Carolina should provide a minimum of $50 million annually for cancer research under UNC Hospitals, the UNC Lineberger Cancer Center, or both. The Fund initially received $25 million in 2007 and $40 million in 2008 before reaching its fully authorized funding amount of $50 million in 2009. The UCRF was initially funded by three sources of support: tobacco settlement funds, taxes on other (non-cigarette) tobacco products such as snuff, and state appropriations. In the 2013-2014 budget, the General Assembly eliminated tobacco settlement funds as a source of support, which resulted in a 16 percent reduction to the UCRF, but kept the tax proceeds and state appropriations funding streams intact. State-appropriated funding in FY2014 was anticipated to be $42 million. The actual proceeds from the tax on other tobacco products (OTP) exceeded projections by 0.3%, leading to a total funding of $42,089,447.

FY 13-14 Anticipated and Actual Fund Revenue	$ Amount *
Anticipated	
State Appropriation	16,020,000
Projected OTP Tax Receipts	25,980,000
Total	42,000,000
Actual	
State Appropriation	16,020,000
Actual OTP Tax Receipts	26,069,447
Total	42,089,447
Unanticipated OTP Tax Receipts	**89,447**

*** Rounded to the nearest dollar**

FUND BALANCE

The actual revenue and carryover from FY13 established a budget of $42,173,167. FY14 expenditures totaled $42,173,298, leaving a balance of -$131.

FY 13-14 Budget and Expenditures	Amount $
Budget	
Revenue	42,089,447
Carryover from FY13	83,720
Total	**42,173,167**
Expenditures	**42,173,298**
Balance	**(131)**

*** Rounded to the nearest dollar**

Restrictions on the Use of UCRF Monies

The General Assembly created the University Cancer Research Fund as part of the 2007 budget. G.S. 116-29.1 established the Fund as a special revenue fund in the Office of the President of the University of North Carolina. The law also established the Cancer Research Fund Committee as an oversight measure to provide accountability, and explicitly stated that allocations from the fund "shall be made in the discretion of the Cancer Research Fund Committee and shall be used only for the purpose of cancer research under UNC Hospitals, the Lineberger Comprehensive Cancer Center, or both."

As the Cancer Research Fund Committee, led by its Chairman, then-UNC President Erskine Bowles, developed the UCRF Strategic Plan in 2009, each potential use of UCRF resources was evaluated according to the following questions:

- Will it address North Carolina's needs in terms of the goal of reducing the cancer burden in the state?
- Can we be world class at it? (Does it build on existing strengths, and is there an opportunity to lead?)
- Is there a strong economic model/justification for UCRF investment?

Based on these questions, the Committee developed a clear set of rules to guide how UCRF funds would be most responsibly and effectively spent. The Committee determined that UCRF funds should focus major resources on a limited set of opportunities to have the greatest impact; fund initiatives where UNC has the opportunity to establish a leadership position; be self-sustaining and provide leverage for additional extramural funding; build fundamental cancer-related research capabilities that benefit UNC research programs; and enhance North Carolina's economy by creating jobs, intellectual property, and startup companies.

To maximize the effectiveness of the state's cancer investment and to ensure wise and responsible use of the funding, the Strategic Plan imposed additional restrictions on the use of these funds, instructing that UCRF funds *should not*:

- Invest broadly in an effort to make incremental improvements everywhere;
- Provide funding that would limit future flexibility;
- Undermine faculty innovation and competitiveness by eliminating the need for extramural grant funding;
- Substitute for existing university or health system funding or new philanthropy;
- Make expenditures based upon institutional or other needs outside cancer research; or
- Negatively impact other research on campus, for example by appropriating shared research infrastructure or resources.

Expenditures of State Funds related to UCRF

As mandated by G.S. 116-29.1(g), the table below provides a summary accounting of expenditures of state funding related to the University Cancer Research Fund. Further details regarding these expenditures are included as appendices to this report.

More than half the funding from UCRF has been used to recruit world-class researchers to North Carolina. Only 1.2 percent of the FY14 UCRF budget is used for ongoing administrative expenses.

Strategic Plan Categories	**YTD Actual**
Tier 1: Research Priorities	
Understanding Genetics	7,061,583
Developing Novel Therapies	6,002,428
Optimizing Outcomes	6,363,508
Tier 2: Opportunity Fund	8,040,614
Tier 3: Critical Infrastructure	
Clinical Excellence – Research & Outreach	7,104,732
Research & Tech Development and Training	7,600,433
Total	**42,173,298**

CONCLUSION

The University Cancer Research Fund continues to spark groundbreaking, innovative research that will enhance cancer prevention, treatment, and outcomes. It promotes collaborations with other universities, with the private sector, and with communities all across North Carolina in keeping with UNC's mission of public service. The UCRF is leveraging unprecedented amounts of outside funding, and is creating jobs and commercialization opportunities that will benefit our economy and the health of cancer patients. UCRF's total economic impact shows a 6-to-1 return on investment.

The economic and health impacts of the UCRF have been, and will continue to be, impactful for our state in so many ways. We are thankful for the General Assembly's ongoing support of this investment and we continue to utilize these funds responsibly, strategically and effectively. The University Cancer Research Fund has been a truly remarkable investment in cancer care that will have a lasting impact both in and beyond North Carolina – and is a critical tool in our work to defeat our state's most fatal disease.

University Cancer Research Fund
2014 Legislative Report

Appendix

1. Establishing Legislation
2. Cancer Research Fund Committee
3. FY 13-14 Expenditures
4. UCRF Strategic Plan
5. Economic Impact Analysis
6. List of Active Extramural Awards

Establishing Legislation

§ 116-29.1. University Cancer Research Fund
(as modified by SL 2013-360)

(a) Fund. – The University Cancer Research Fund is established as a special revenue fund in the Office of the President of The University of North Carolina. Allocations from the fund shall be made in the discretion of the Cancer Research Fund Committee and shall be used only for the purpose of cancer research under UNC Hospitals, the Lineberger Comprehensive Cancer Center, or both.

(b) Effective July 1 of each calendar year, the funds remitted to the University Cancer Research Fund by the Secretary of Revenue from the tax on tobacco products other than cigarettes pursuant to G.S. 105-113.40A is appropriated for this purpose are appropriated for this purpose.

(c) Cancer Research Fund Committee. – The Cancer Research Fund Committee shall consist of five ex officio members and two appointed members. The five ex officio members shall consist of the following: (i) one member shall be the Chancellor of the University of North Carolina at Chapel Hill, (ii) one member shall be the Director of the Lineberger Comprehensive Cancer Center, (iii) one member shall be the Dean of the School of Medicine at The University of North Carolina, (iv) one member shall be the Dean of the School of Pharmacy at The University of North Carolina, and (v) one member shall be the Dean of the School of Public Health at The University of North Carolina. The remaining two members shall be appointed by a majority vote of the standing members of the Committee and shall be selected from persons holding a leadership position in a nationally prominent cancer program.

If any of the specified positions cease to exist, then the successor position shall be deemed to be substituted in the place of the former one, and the person holding the successor position shall become an ex officio member of the Committee.

(d) Chair. – The chair shall be the Chancellor of the University of North Carolina at Chapel Hill.

(e) Quorum. – A majority of the members shall constitute a quorum for the transaction of business.

(f) Meetings. – The Committee shall meet at least once in each quarter and may hold special meetings at any time and place at the call of the chair or upon the written request of at least a majority of its members. (2007-323, s. 6.23(b); 2009-451, s. 27A.5(e); 2010-31, s. 9.12.)

(g) Report. – By November 1 of each year, the Cancer Research Fund Committee shall provide to the Joint Legislative Education Oversight Committee and to the Office of State Budget and Management an annual financial report which shall include the following components:

(1) Accounting of expenditures of State funds related to strategic initiatives, development of infrastructure, and ongoing administrative functions.

(2) Accounting of expenditures of extramural funds related to strategic initiatives, development of infrastructure, and ongoing administrative functions.

(3) Measures of impact to the State's economy in the creation of jobs, intellectual property, and start-up companies.

(4) Other performance measures directly related to the investment of State funds.

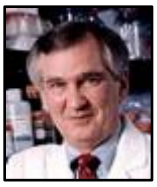
(5) Accounting of any fund balances retained by the Fund, along with information about any restrictions on the use of these funds.

Cancer Research Fund Committee

Cancer Research Fund Committee

The legislatively established Cancer Research Fund Committee, chaired by Carol Folt, Chancellor of the University of North Carolina at Chapel Hill, oversees the University Cancer Research Fund. The seven-member committee includes five ex-officio members designated by the legislation who elect two at-large members. The at-large members are to be leaders at nationally prominent cancer programs. Currently, the two are Drs. Edward Benz (President and CEO, Dana Farber Cancer Institute) and John Mendelsohn (President Emeritus, MD Anderson Cancer Center).

Carol Folt, PhD, Chair
Chancellor
The University of North Carolina at Chapel Hill



Edward J. Benz, MD
President and Chief Executive Officer
Dana Farber Cancer Institute

Robert Blouin, PharmD
Dean
Eshelman School of Pharmacy
The University of North Carolina at Chapel Hill

Ned Sharpless, MD
Director
UNC Lineberger Comprehensive Cancer Center
The University of North Carolina at Chapel Hill

John Mendelsohn, MD
President Emeritus
The University of Texas M. D. Anderson Cancer Center

Barbara K. Rimer, DrPH
Dean
Gillings School of Global Public Health
The University of North Carolina at Chapel Hill

William L. Roper, MD, MPH
Dean, UNC School of Medicine
Vice Chancellor for Medical Affairs
CEO, UNC Health Care

FY 13-14
Expenditures

UCRF Fiscal Year 2014

Strategy	Sum of Annual Budget	Sum of Year to Date Actual	Sum of Cash Balance
Tier 1: Research Priorities			
Understanding Genetics	$6,700,000	$7,061,583	-$361,583
Developing Novel Therapies	$6,625,000	$6,002,427	$622,573
Optimizing Outcomes	$6,350,000	$6,363,508	-$13,508
**Tier 2: Opportunity Fund ** **	$7,973,167	$8,040,614	-$67,447
Tier 3: Critical Infrastructure			
Clinical Excellence - Research & Outreach	$7,400,000	$7,104,732	$295,268
Research & Tech Development and Training	$7,125,000	$7,600,433	-$475,433
Total	**$42,173,167**	**$42,173,298**	**-$131**

Expenditures for Fiscal Year 2014 - Cash Balance as of June 30th		
Obj Name	**Sum of Year to Date Actual**	**% of Expense to Total Expenditure**
Faculty Salaries	$12,431,200.70	29.48%
EPA Student Salaries	$2,703,567.16	6.41%
Staff Salaries	$6,275,367.55	14.88%
Other staff	$547,256.92	1.30%
Benefits	$5,321,621.94	12.62%
HCS Contracted Serv	$649,977.00	1.54%
Faculty/Non Faculty Benefits		
Phy Benefits	$207,203.21	0.49%
Other Staff Benefits	$122,843.42	0.29%
Transit Tax	$56,452.52	0.13%
Consultants/Contracted Service	$414,285.05	0.98%
Employee Education	$10,204.00	0.02%
Repairs and Maint	$332,864.32	0.79%
Other Current Services	$3,653,543.01	8.66%
Supplies, Utilities, Other	$3,343,194.46	7.93%
Travel	$351,842.13	0.83%
Freight and Exp	$44,870.71	0.11%
Maintenance Contracts	$1,068,643.07	2.53%
Advertising	$25,191.80	0.06%
Meetings & Amentites	$25,002.56	0.06%
Transfer Computer Science		
Printing and Binding	$27,398.48	0.06%
Communication	$109,287.61	0.26%
Contracted Serv		
Computer Services	$42,186.60	0.10%
Rental/Lease Facilities	$536,395.07	1.27%
Other Fixed Charges	$34,225.20	0.08%
Rental Equipment	$47,231.03	0.11%
Equipment	$3,026,303.30	7.18%
Study Subjects & Exp	$20,577.23	0.05%
Employee on Loan		
Insurance	$19.50	0.00%
Student Support	$668,117.91	1.58%
#N/A		
Utilities	$76,424.45	0.18%
HCS Residents		
HIPAA Deduct		
Grand Total	$42,173,297.91	100.00%

UCRF Funding by Strategy and Expense				
Stategy	**Obj Name**	**Annual Budget**	**Current Month**	**Year to Date Actual**
Tier 1: Research Priorities Understanding Genetics	Budget			
	Faculty Salaries			1,815,829.09
	EPA Student Salaries			215,749.40
	Staff Salaries			1,242,450.28
	Other staff			139,312.84
	Benefits			896,389.89
	HCS Contracted Serv			
	Faculty/Non Faculty Benefits			
	Phy Benefits			12,555.52
	Other Staff Benefits			20,509.94
	Transit Tax			8,867.47
	Consultants/Contracted Services			2,972.59
	Employee Education			2,680.00
	Repairs and Maint			6,330.94
	Other Current Services			805,297.41
	Supplies, Utilities, Other			466,100.45
	Travel			45,531.99
	Freight and Exp			3,236.22
	Maintenance Contracts			375,873.50
	Advertising			
	Meetings & Amentites			
	Transfer Computer Science			
	Printing and Binding			500.00
	Communication			5,656.41
	Contracted Serv			
	Computer Services			14,825.88
	Rental/Lease Facilities			243,603.47
	Other Fixed Charges			24,389.39
	Equipment			573,369.55
	Insurance			19.50
	Equipment Rental			158.99
	Student Support			62,948.28
	#N/A			
	Utilities			76,424.45
Understanding Genetics Total		0.00	0.00	7,061,583.45
Developing Novel Therapies	Budget			
	Faculty Salaries			1,837,615.79
	EPA Student Salaries			417,461.90
	Staff Salaries			367,505.93
	Other staff			66,913.00
	Benefits			643,297.19
	Faculty/Non Faculty Benefits			
	Phy Benefits			
	Other Staff Benefits			14,569.55
	Transit Tax			6,964.49
	Consultants/Contracted Services			59,595.23
	Employee Education			196.00
	Repairs and Maint			15,012.38
	Other Current Services			1,022,907.63
	Supplies, Utilities, Other			771,174.12
	Travel			26,066.18
	Freight and Exp			8,587.28
	Maintenance Contracts			240,290.85
	Advertising			
	Meetings & Amentites			52.00
	Transfer Computer Science			
	Printing and Binding			
	Communication			1,564.58
	Computer Services			80.00
	Rental/Lease Facilities			22,990.00
	Other Fixed Charges			
	Rental Equipment			
	Equipment			430,286.30
	Employee on Loan			
	Insurance			
	Student Support			49,296.46

UCRF Funding by Strategy and Expense				
Stategy	**Obj Name**	**Annual Budget**	**Current Month**	**Year to Date Actual**
	#N/A			
	HIPAA Deduct			
Developing Novel Therapies Total		0.00	0.00	6,002,426.86
Optimizing Outcomes	Budget			
	Faculty Salaries			2,482,163.08
	EPA Student Salaries			240,362.26
	Staff Salaries			1,273,489.95
	Other staff			73,101.32
	Benefits			1,080,067.46
	Faculty/Non Faculty Benefits			
	Phy Benefits			8,012.54
	Other Staff Benefits			22,086.76
	Transit Tax			10,525.35
	Consultants/Contracted Services			85,353.41
	Employee Education			2,397.00
	Repairs and Maint			28,098.87
	Other Current Services			329,687.75
	Supplies, Utilities, Other			154,138.23
	Travel			96,876.03
	Freight and Exp			879.26
	Maintenance Contracts			40,994.00
	Advertising			
	Meetings & Amentites			1,269.00
	Printing and Binding			4,993.78
	Communication			52,722.01
	Contracted Serv			
	Computer Services			1,751.74
	Rental/Lease Facilities			252,277.89
	Other Fixed Charges			225.00
	Equipment			5,237.12
	Study Subjects & Exp			16,392.70
	Student Support			100,405.63
	Equip rental			
	HCS Residents			
Optimizing Outcomes Total		0.00	0.00	6,363,508.14
Tier 2: Opportunity Fund	Budget			
	Faculty Salaries			1,136,758.18
	EPA Student Salaries			806,484.60
	Staff Salaries			488,173.79
	Other staff			124,005.28
	Benefits			566,811.47
	Faculty/Non Faculty Benefits			
	Phy Benefits			17,924.53
	Other Staff Benefits			14,120.07
	Transit Tax			6,583.80
	Consultants/Contracted Services			(3,723.79)
	Employee Education			4,961.00
	Repairs and Maint			219,671.73
	Other Current Services			642,557.12
	Supplies, Utilities, Other			1,610,844.13
	Travel			67,863.96
	Freight and Exp			23,539.99
	Maintenance Contracts			218,832.50
	Advertising			
	Meetings & Amentites			181.74
	Printing and Binding			15,642.94
	Communication			15,834.75
	Computer Services			17,568.98
	Other Fixed Charges			25.06
	Rental Equipment			47,072.04
	Equipment			1,900,532.00
	Insurance			
	Study Subjects & Exp			1,300.00
	Student Support			97,048.31
	Utilities			
Tier 2: Opportunity Fund Total		0.00	0.00	8,040,614.18

UCRF Funding by Strategy and Expense				
Stategy	**Obj Name**	**Annual Budget**	**Current Month**	**Year to Date Actual**
Tier 3: Critical Infrastructure				
Clinical Excellence - Research & Outreach	Budget		0.00	0.00
	Faculty Salaries			3,684,634.29
	EPA Student Salaries			78,523.03
	Staff Salaries			716,288.36
	Other staff			29,799.85
	Benefits			991,551.45
	HCS Contracted Serv			649,977.00
	Faculty/Non Faculty Benefits			
	Phy Benefits			166,636.70
	Other Staff Benefits			24,268.45
	Transit Tax			11,478.55
	Consultants/Contracted Services			108,185.47
	Employee Education			
	Repairs and Maint			1,385.04
	Other Current Services			421,177.77
	Supplies, Utilities, Other			55,009.21
	Travel			32,739.31
	Freight and Exp			7,188.22
	Maintenance Contracts			70,316.22
	Advertising			187.00
	Meetings & Amentites			17.00
	Printing and Binding			2,605.66
	Communication			31,747.61
	Contracted Serv			
	Computer Services			7,880.00
	Rental/Lease Facilities			12,051.60
	Other Fixed Charges			166.08
	Equipment			
	Insurance			
	Study Subjects & Exp			150.00
	Employee on Loan			
	Student Support			768.00
	Rental Equipment			
	HCS Residents			
Clinical Excellence - Research & Outreach Total		0.00	0.00	7,104,731.87
Research & Tech Development and Training	Budget			
	Faculty Salaries			1,474,200.27
	EPA Student Salaries			944,985.97
	Staff Salaries			2,187,459.24
	Other staff			114,124.63
	Benefits			1,143,504.48
	HCS Contracted Serv			
	Faculty/Non Faculty Benefits			
	Phy Benefits			2,073.92
	Other Staff Benefits			27,288.65
	Transit Tax			12,032.86
	Consultants/Contracted Services			161,902.14
	Employee Education			(30.00)
	Repairs and Maint			62,365.36
	Other Current Services			431,915.33
	Supplies, Utilities, Other			285,928.32
	Travel			82,764.66
	Freight and Exp			1,439.74
	Maintenance Contracts			122,336.00
	Advertising			25,004.80
	Meetings & Amentites			23,482.82
	Transfer Computer Science			
	Printing and Binding			3,656.10
	Communication			1,762.25
	Contracted Serv			
	Computer Services			80.00
	Rental/Lease Facilities			5,472.11
	Other Fixed Charges			9,419.67
	Equipment			116,878.33
	Insurance			

UCRF Funding by Strategy and Expense				
Stategy	**Obj Name**	**Annual Budget**	**Current Month**	**Year to Date Actual**
	Utilities			
	Study Subjects & Exp			2,734.53
	Employee on Loan			
	Student Support			357,651.23
	#N/A			
Research & Tech Development and Training Total		0.00	0.00	7,600,433.41
Grand Total		0.00	0.00	42,173,297.91

UCRF
Strategic Plan

The following Strategic Plan, created in 2009, has guided the University Cancer Research Fund for the last five years. The Plan is currently being refreshed with an expected completion date of spring 2015.

UCRF Strategic Plan

Background and Context

Introduction

Cancer has overtaken heart disease as the leading cause of death in North Carolina. An estimated 40 percent of North Carolinians will develop cancer during their lifetimes. Approximately 46,416 North Carolinians are projected to receive a cancer diagnosis in 2009 with 18,277 projected cancer deaths this year. These numbers will increase as the population ages unless cancer prevention, early detection, and therapeutic research intervene. And as with other diseases, the impact of cancer falls disproportionately on disadvantaged communities. For example, African-Americans in North Carolina experience higher cancer incidence and mortality rates compared with other groups.

This growing challenge motivated the state legislature to fund the NC Cancer Hospital and, in August 2007, to create the University Cancer Research Fund (UCRF) "only for the purpose of cancer research under UNC Hospitals, the Lineberger Comprehensive Cancer Center, or both." With up to $50 million of funding per year from the Tobacco Trust Fund, an increased tax on smokeless tobacco products, and general revenue, the UCRF provides a unique opportunity to develop leading national (and international) cancer research and innovation while improving cancer outcomes for the people of North Carolina.

> "The UCRF's mission is to ensure that future generations of North Carolinians will develop cancer less often and live longer and better when they do. Research creates new knowledge, turns that knowledge into innovative treatment, screening, and prevention, and then assures delivery of innovations across the state – that research is the key unlocking the doors to a new and better future. The UCRF is helping make that research possible." (UCRF 2007-2008 Annual Report)

Strategic planning process overview

In order to most effectively realize the vision of improving cancer outcomes in North Carolina and to maximize the return on the State's investment, UNC and its Lineberger Comprehensive Cancer Center (UNC Lineberger) sought to develop a UCRF strategic plan, with a focus on clear goals with measurable outcomes and metrics of success. To that end, the strategic planning firm AltshulerGray was hired to lead the planning process and SRA International was retained to develop an evaluation plan.

AltshulerGray consultants worked with the UNC Lineberger Program Planning Committee (PPC) to establish a two-phase process that included a range of university stakeholders as well as outside experts. The initial phase included interviews with 50 internal and external stakeholders, a survey of 243 UNC faculty members, and six listening sessions conducted by UNC leaders to gather feedback from communities across the state, in addition to regular meetings of the PPC and reports to the UNC Oversight Committee, chaired by Dean and Health System CEO Bill Roper, and the governance committee by the UCRF statute, the Cancer Research Fund Committee, chaired by President Erskine Bowles. This outreach and extensive faculty input built consensus around a vision, guiding principles, and a framework to help determine initial research strategies. The result was the definition of a three-tier investment strategy for UCRF funds, comprised of *Research Priorities*, an *Opportunity Fund*, and *Critical Infrastructure*, described in greater detail below.

Initial faculty feedback and subsequent discussions led to the identification of a list of potential research priorities. These opportunities were evaluated according to three criteria:

- Will it address the needs of North Carolina, in terms of the goal of reducing the cancer burden in the state?
- Can we be world class at it? (Does it build on existing strengths, and is there an opportunity to lead?)
- Is there a strong economic model/justification for UCRF investment?

As a result of extensive analysis and faculty feedback, including a faculty-wide survey, three interconnected thematic research priorities were identified as the initial key strategic focus areas:

> ***Understanding Genetics and its Role in Cancer Causation and Treatment,***
> ***Developing New Cancer Treatments,*** and
> ***Optimizing NC Cancer Outcomes.***

These three areas were the top priority areas identified in the faculty survey.

In the second phase of strategic planning, three "theme teams" comprised of 5-7 faculty were charged with creating strategic and investment plans for each prioritized research area. In addition to laying out a vision of what would be possible with focused investment, the teams were asked to delineate the rationale for investment (i.e., why should this be done now, and why at UNC), current strengths and gaps at UNC, a potential funding model (e.g., how UCRF investment would be expected to generate increased funding from other sources, such as federal funding), and an implementation and launch plan. External experts from leading centers across the U.S. are being brought in to review the plans and provide constructive feedback to the proposals.

At the same time, faculty groups were convened to evaluate opportunities for disease-focused UCRF investment. 51 faculty members served on 12 disease teams. Each team produced a report outlining the opportunities and resource needs for its specific disease area and highlighting how research in these areas could best leverage investments in the three prioritized research initiatives. The theme teams used this disease team input to further refine their own plans. Critical needs identified by the disease teams to bolster clinical excellence and outreach – essential for conducting UNC and state-wide clinical cancer research – were considered as part of the planning for UCRF critical infrastructure investment.

Guiding principles and philosophy

Based on the stakeholder interviews in the first phase of strategic planning, the PPC developed guiding principles for investment:

- The UCRF should fund breakthrough innovation and excellence in cancer research, propelling UNC to national and international leadership
- UCRF research should focus on areas of great concern to the citizens of North Carolina
- UCRF research should have a real and tangible impact on the health of the state of North Carolina and beyond

Following from these guiding principles, a clear set of ground rules was established for determining how UCRF funds would be best spent. Specifically, it was agreed that UCRF funds *should*:

- Focus major resources on a limited set of opportunities in order to have the greatest impact
- Fund initiatives where UNC has the opportunity to establish a leadership position
- Be catalytic, self-sustaining, and provide leverage for additional funding from extramural sources
- Build fundamental cancer-related research capabilities that benefit UNC research programs
- Enhance North Carolina's economy by creating jobs, intellectual property, and start-up companies.

At the same time, it was agreed that UCRF funds *should not*:

- Invest diffusely in an attempt to make incremental improvements everywhere
- Provide in perpetuity funding that would limit future flexibility
- Undermine faculty innovation and competitiveness by eliminating the need for extramural grant funding
- Substitute for existing university or health system funding or new philanthropy
- Make expenditures based upon institutional or other needs outside cancer research.
- Negatively impact other research on campus, for example by appropriating shared research infrastructure or resources

Strategy Overview

The UCRF strategic plan is comprised of three tiers: Research Priorities, Opportunity Fund and Critical Infrastructure Fund.

The term ***Research Priorities*** refers to a limited number of initiatives, where with focused investment in major scientific programs, disease-based initiatives, or cutting-edge research platforms, UNC could have a substantial impact and achieve recognition as a world leader.

The initial UCRF research priorities are:

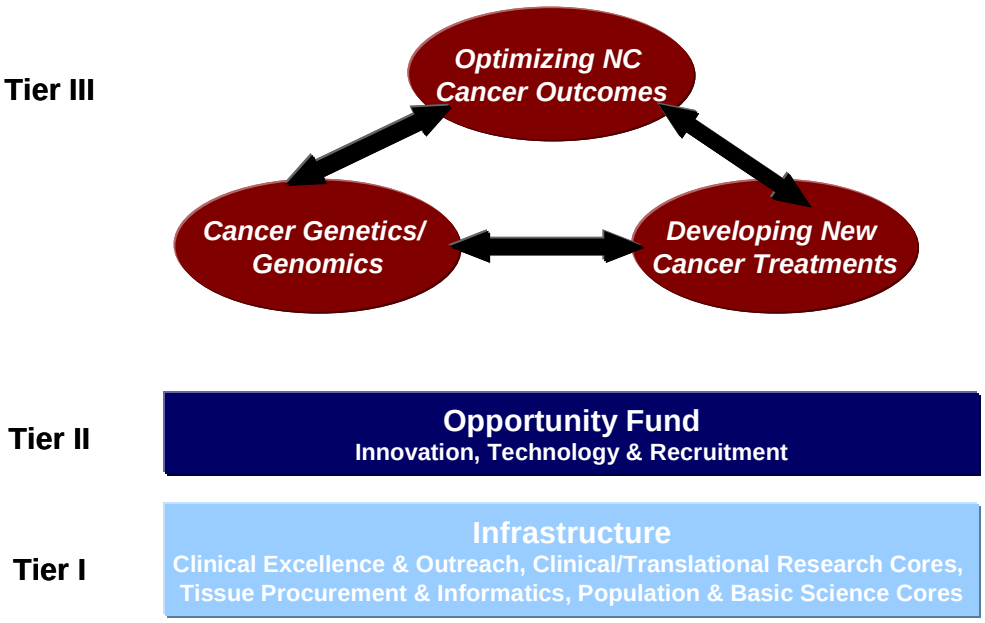
- Understanding Genetics and its Role in Cancer Causation and Treatment
- Developing New Cancer Treatments, and
- Optimizing NC Cancer Outcomes.

The first two will interrelate, making fundamental observations that will, as quickly as possible, be turned into clinical applications. The third will seek to understand North Carolina's cancer problem at a level unprecedented in the United States, and design research interventions to rectify these problems at the community, health system, and practice level.

The ***Opportunity Fund*** will ensure that the UCRF will remain nimble, allowing the opportunistic pursuit of programs, projects and capability development that cannot be foreseen in a strategic plan and would expand the capacity of the major initiatives.

Finally, the ***Critical Infrastructure Fund*** will enable these major initiatives by providing critical resources for cancer research that are not readily obtainable by extramural funding but upon which future progress relies. (See figure below).

UCRF Strategic Plan Structure



Further detail on each of these strategic investment areas is provided in the next section.

Research priorities

Supporting high-priority research is at the core of the UCRF strategic plan, as reflected in the guiding principles described above. In considering which areas to identify as initial research priorities, the PPC and UNC leadership assessed the relative merits of selecting specific cancer types or broader research themes. Understanding that basic and clinical discoveries often cut across multiple diseases, it was concluded that the UCRF would have the greatest impact if structured around addressing a set of critical research questions that could catalyze breakthroughs in all cancer types while extending the reach of UCRF investment beyond the fund itself (e.g. through resource acquisition and development available to all UNC). Nevertheless, disease-specific UCRF investment is seen as critical, and will occur within the initiatives, as well as via the Opportunity Fund and the clinical excellence infrastructure investment. Creating individual clinical/translational research efforts led by visible clinician-scientists will be central to the national recognition to which UNC, with the help of UCRF, aspires.

A broad review of UNC strengths and key opportunities led to the selection of *Understanding Genetics and its Role in Cancer Causation and Treatment*, *Developing New Cancer Treatments,* and *Optimizing NC Cancer Outcomes* as the three initial research priorities. These three research themes span the basic, clinical, and public health research spectrum, but in a focused manner that will add critical knowledge – from improving our understanding of the underlying causes and progression of cancer, to developing novel therapies based on this new understanding, to optimizing the dissemination and delivery of state-of-the-art care to the citizens of North Carolina. An overview of each thematic initiative is provided below.

Understanding Genetics and its Role in Cancer Causation and Treatment

Goal: To discover the genes that predispose families to cancer, and cancer patients to poor treatment outcomes. To investigate the mutant genes in specific cancer subtypes that lead to cancer therapy failure.

Why do certain cancers run in some families and not others? Why do patients respond to treatment differently? The answer to these questions lies in the genes we inherit from our parents. And cancer itself is caused by the mutation of these inherited genes. Although tremendous progress has been made in our understanding of genetics over the past two decades culminating in the sequencing of the entire human genome, these advances have not been sufficiently focused on the practical matter of human health and have yet to enter the clinical arena and tangibly improve the care of patients. Integrating basic research with clinical care will enable us to detect earlier and more curable forms of cancer and to develop more effective, highly targeted therapies. With significant expertise across the genetic spectrum enhanced by extraordinary support from UCRF, UNC is well positioned to realize the promise of the "Genetic Revolution".

The UCRF Cancer Genetics initiative will seek to track down inherited differences to determine whom to target for early detection, prevention and specific therapies, and will identify the derangements in individuals' tumors in order to individualize therapy. The initiative will pursue these goals by integrating and expanding existing strengths at UNC in genetic and molecular analysis from basic science through clinical application, and enabling integrated, high-throughput analyses. This vision will be realized through strategic recruitment of faculty in emerging fields, farsighted investment in cutting-edge technology, enhanced organizational capability for integrative analysis, and a focus on cancers that are especially amenable to this approach. This collaborative and multi-disciplinary strategy will incorporate disparate disciplines into a unified effort with the ultimate goal of improving our ability to prevent, detect, and treat cancer in North Carolina and beyond. This strategy will also provide fundamental knowledge upon which the next initiative will base its attempt to create new therapies.

Developing New Cancer Treatments

Goal: To devise novel therapies targeted to the specific vulnerabilities of treatment resistant cancers. To develop new ways of delivering therapeutic agents to reduce toxic side effects for all patients.

Of the 1.5 million people who will get cancer next year, fully 500,000 will die with untreatable forms of cancer. Some who receive curative treatment will have to live with debilitating side effects. Clearly, today's armamentarium is insufficient to deal with many forms of advanced cancer. In addition, our therapies need to be based on biologic principles rendering them more effective and less toxic. Tremendous progress in our understanding of cancer has set the stage for new methods. However, it is true that many elegant basic cancer research observations never prove of value in the clinic. For example, although nearly 50,000 papers have been published on p53, a protein that is known to be involved in preventing cancer, our understanding of how to exploit this molecule for therapeutic endpoints remains virtually nil. For a novel discovery to benefit an actual human cancer patient, the new understanding must provide a "druggable" approach to therapy – the overriding challenge with regard to curing cancer.

The UCRF New Cancer Treatments initiative will seek to devise novel therapies targeted to the specific vulnerabilities of cancers, to prevent the emergence of resistant cancer cells and to eliminate the small proportion of cancer initiating cells which appear to prevent cancer cure by evading therapy and repopulating tumor sites. To reduce the toxicity of existing and novel therapies, research will also focus on new ways of delivering those drugs. In doing so, it will become the model for academic drug discovery and delivery research in cancer, providing an outlet for UNC investigators to test innovative ideas in drug development, which will improve delivery and efficacy of cancer therapies. Through a framework of collaboration and significant financial support for new therapeutic ideas, this initiative will 1) find and convincingly validate new targets for cancer therapies, 2) develop small molecule compounds to modulate identified targets, and 3) provide better delivery and formulation of promising therapeutics.

As a result of these efforts, patients at our hospital will initially benefit from a larger portfolio of novel clinical trials involving agents that underwent some portion of pre-clinical development at UNC. In the longer term, we expect to see this initiative bring new start-up companies to the region that will employ North Carolinians, attract venture and federal funding, and eventually lead to discoveries with the potential to treat, ameliorate, and possibly even cure cancer.

Optimizing NC Cancer Outcomes

Goal: To use the state of North Carolina as a laboratory tracking the occurrence and treatment of cancer through data systems and large population- and hospital-based studies. To use these data to initiate research aimed at improving community prevention, early detection in the population, and the quality of oncology and survivor care.

There is a strong evidence base of prevention, early detection, and quality-of-care precepts that, if applied uniformly, would improve cancer outcomes and reduce the burden of cancer in North Carolina. But while advances in medical care and treatment have had a notable impact on improving cancer outcomes in some areas, there remain enormous challenges in closing the gap between what is known to work to reduce cancer burden and what actually takes place. In addition, the application of prevention and quality care are not uniform across our state or among its constituent populations.

As an additional opportunity for this UCRF initiative, the nation is about to undergo health care reform, and many are concerned about the potential "rationing" of critical cancer care services. Thus, the time is especially ripe to answer the questions: What works in cancer prevention and early detection? How do we make it cost effective? Do cancer risk factors and outcomes vary across our state? How do we ensure that lower socioeconomic populations receive the best preventive and cancer care services? And how do we get doctors and health departments to adopt evidence-based practices?

The UCRF Optimizing Cancer Outcomes initiative will seek to optimize cancer outcomes in North Carolina by conducting innovative research to understand how best to deliver preventative and early detection services and high quality care in populations. Working in settings that range from rural communities to physician practices to local governments, researchers from UNC's nation-leading Schools of Public Health and Medicine will systematically design, test, disseminate, implement, and evaluate methods to identify and modify cancer risk factors to ensure that all North Carolinians have an opportunity to lower their cancer risk, get appropriate treatment and to improve the quality and length of life for cancer survivors. Findings and practices found to be effective will be disseminated and implemented across the state.

UCRF funds will make this work possible by enabling 1) the creation of a unique, comprehensive cancer information data system that tracks cancer patients, cancer services, and cancer treatment outcomes at a level of detail unprecedented in the United States; 2) the accrual of a 10,000 cancer patient cohort at UNC Hospitals to investigate many questions related to cancer outcomes among cancer survivors including response to therapy, 3) nation-leading research in population health disparities that lead to different cancer risk profiles and poorer outcomes among African Americans and lower socioeconomic status North Carolinians; and 4) research into cost effective methods to increase adoption of evidence-based cancer prevention, early-detection, and quality of care practices by individuals, communities, health systems, and providers. Since no such fully integrated and interactive system exists in the United States as envisioned here, North Carolina will be able to assume a true leadership position in this critical area.

Opportunity Fund

Goal: To promote innovation broadly by funding novel approaches and taking advantage of emerging technologies. To sponsor recruitments that bring new directions to the research initiatives and contribute to the overall UCRF mission.

The UCRF is committed to ongoing innovation and renewal. Recognizing that science is dynamic and that a research-focused strategic plan must be nimble, the UCRF will designate funds to support emerging opportunities outside the initial three identified research priorities. This Opportunity Fund will consist of three main components: a competitive peer-reviewed innovative pilot projects program; a competitive peer-reviewed technology and equipment acquisition program; and support for high-profile faculty with significant potential to enhance the UCRF's mission.

Innovative Pilot Projects

This competitive peer-reviewed effort continues the successful Innovation Award program ongoing during the UCRF's first two years. Projects funded by the Innovation Awards have and will continue to produce data that allow researchers to obtain external funding to expand their research. Opportunity Fund pilot projects will complement those funded by the three research priority initiatives, diversify the UCRF's portfolio of innovative cancer research, and build research funding and excellence at UNC. Moreover, the Opportunity Fund pilot projects will provide an antidote to the current extramural peer-reviewed funding systems, which has been criticized for its conservative investment in incremental, rather than innovative, research.

Innovative Technology and Equipment

Being at the technologic-forefront increasingly distinguishes leading research universities from the rest and provides a competitive advantage in research funding. Leading-edge techniques enable leading-edge research and discovery. The Opportunity Fund technology and equipment program will support the acquisition of novel, leading-edge technology and equipment for the use by multiple faculty members and the development of shared research resources. As with the Innovation Awards, this program will be competitive and rigorously peer-reviewed.

High-Impact Faculty Recruitment

UNC has the opportunity to attract faculty with significant potential for a positive effect on the UCRF mission – but who do not fit neatly into one of the three research priorities. This third portion of the

Opportunity Fund will support the opportunistic recruitment of promising or established faculty. For example, the vast majority of our patients who die do so from metastatic cancer. The mutant genes driving metastasis will be the purview of the Cancer Genetics initiative and the drugging of targets promoting metastasis will be an outstanding aim for the New Cancer Treatments initiative. The Opportunity Fund will seed the recruitment of scientists in epithelial motility, metastasis genes, cell signaling systems biology, etc. and would enable the major research initiatives as well as the disease-specific programs. Opportunity Fund recruits over the next five years will include fundamental, translational, and population scientists. Prominent academic clinicians would be a high priority. They will propel UNC to national leadership in a particular clinical care specialty while helping to anchor a research program in that specialty.

Critical Infrastructure Fund

Goal: To expand the clinical care and research excellence of our faculty and provide all UNC researchers with the core resources necessary for clinical and translational cancer research. To initiate and maintain an outreach program beyond UNC for performing clinical care and quality of care research. To develop core resources in imaging, informatics, and fundamental research that will serve all faculty members. To plan and implement the UCRF research effort including its cancer research educational mission.

Innovative cancer research builds upon and is promoted by a strong, underlying infrastructure. External funding (NIH, etc) to enhance this infrastructure is lacking, despite acknowledgement that a healthy and proactively advanced research infrastructure is critical to innovative research and necessary to compete successfully for external research funding. To complement the three research priority initiatives and the Opportunity Fund, the UCRF will establish a Critical Infrastructure Fund. Initially, this Fund will focus on four critical underlying research infrastructure components: clinical excellence and outreach, informatics, imaging, and key existing shared research resources and services. Investing in this critical infrastructure will enable and enhance not only UNC's cancer research; it will also strengthen the infrastructure and effectiveness of the campus's entire research enterprise.

Clinical Excellence and Outreach

Maintaining a strong foundation of quality cancer care and outreach at UNC Chapel Hill is critical for enabling leading-edge clinical research and its successful translation into community practice. The new NC Cancer Hospital provides an ideal setting for pioneering clinical research. The Critical Infrastructure Fund will help UNC recruit oncologists to expand the patient base for enhanced clinical and translational research. In addition, the NC Cancer Hospital, combined with UCRF Infrastructure support, will provide the videoconferencing/telemedicine hub that links UNC with cancer centers and oncologists across the state. These links and other services will increase physician collaboration, both promoting research and patient care quality, while increasing statewide access to UNC clinical trials.

Informatics

Modern research methods, such as high-throughput sequencing and other genomics approaches, generate vast pools of data. Informatics is the alchemy transforms that base information into knowledge. Informatics takes raw output from across the research spectrum and creates well-characterized, well-managed data from across the spectrum of research that can be powerfully linked together and then mined and analyzed. Although fundamental to innovative science and the UCRF's research priorities, informatics, particularly bio-and clinical informatics, is in short supply at UNC and at most research institutions. The Critical Infrastructure Fund will support development of informatics at UNC by recruiting faculty scientists who can push the envelope of this emerging field.

Imaging

In the years ahead, imaging will drive many vital advances in cancer research, diagnosis and treatment. By providing researchers and clinicians with the ability to literally see in real-time the cancer tumor inside the patient (or animal, in the case of research), powerful new imaging technologies offer significant promise of diagnosing cancer earlier than previously possible and of more closely monitoring response to treatment (whether experimental, or in the clinic). UNC is extremely well-positioned to lead in

developing and applying these new imaging capabilities via its Biomedical Research Imaging Center and the under-construction Imaging Research Building. Supported by a forward-looking investment from the State of NC, the Imaging Research Building will be the largest research facility on campus. The UCRF will leverage this investment by the state and others by supporting purchase of key equipment and the recruitment of leading faculty and staff. The Imaging Research building will also have designated space for expanding the Developing New Cancer Therapies/Initiative both for drug development and nanomedicine as well as additional wet lab cancer research space.

Other Resources and Services

UCRF Critical Infrastructure funds will also help develop and expand other key research core facilities (such as tissue procurement and proteomics), clinical trials infrastructure, trainee support for the next generation of researchers, and research administration (including clinical trial contracting, clinical research administration, and other research administration). These resources will directly benefit the three research priorities, but will also have a broader impact -- benefiting all UNC researchers as well as partners outside of the university.

Taken together, the three-tiered UCRF investment strategy ensures that UNC maintains a strong focus on a few key areas where it can leverage existing strengths, achieve breakthrough results in cancer research, *and* make a tangible impact on cancer outcomes in North Carolina and beyond.

Investment Plan

In the first two years of the UCRF, while a long-term strategic and investment plan was being developed, funds were directed towards building or expanding clinical excellence to prepare for the opening of the North Carolina Cancer Hospital; critical research infrastructure; basic, population and clinical science faculty; the technological base for topnotch genetic and animal models cancer research; and a state-wide outreach program for both clinical and public health research. Key faculty recruitments and retention in areas of UNC strength were accomplished in the first two years. Many of these initial investments were prescient, laying important groundwork for what have now been identified as UCRF strategic priorities. The investment plan presented in this document begins in year 3 of the UCRF, with a fully-funded budget of $50 million per year, but builds on the critical investments of the first two years.

For the next five years the Strategic Plan would, on average, allocate $8 million yearly to the three initiatives (Cancer Genetics, New Cancer Treatments and Optimizing Cancer Outcomes). These initiatives will benefit, as will all UNC cancer research, from the $16-17 million yearly Critical Infrastructure investments in clinical excellence faculty recruitment, clinical and translational research core resources, and imaging and informatics. A $9-10 million Opportunity Fund will drive innovation, technology development and translational research opportunities that initially fall outside the research themes. The interrelatedness of cancer biology and discovery, and their translation from model systems to human applicability make it highly likely that research initiatives will also benefit from these recruitments and investments in innovation.

To accomplish the aims of UCRF in each of its three-tiered components, faculty must seek extramural funding to expand the overall capacity of UNC cancer research. The objective is for the UCRF investment to produce funding replacing existing expenditures, thereby freeing up UCRF funds for re-investments. Cancer research is a dynamic process and UCRF investments, if used correctly, will be catalytic in not only expanding the size of UNC's overall cancer research effort but also its accomplishments and reputation.

Organization and Implementation

The Cancer Research Committee—Erskine Bowles, Chair

The legislation creating the UCRF specified that allocations be made at the discretion of a Cancer Research Committee that would consist of five ex officio members and two appointed members. The five ex officio members are the President of The University of North Carolina, the Director of the Lineberger Comprehensive Cancer Center, and the Deans of the School of Medicine, School of Pharmacy, and School of Public Health. The remaining two members shall be selected from persons holding a leadership position in a nationally prominent cancer program. This group elected Ed Benz, President of Dana Farber Cancer Institute, and John Mendelsohn, President of MD Anderson. The Cancer Research Committee meets at least quarterly. The committee has been operating for two years and during its quarterly meetings has made decisions initiating many aspects of the research initiatives and critical infrastructure. They have received interim reports from the strategic planning process and will ultimately be responsible for approving and implementing the plan.

The Oversight Committee—William Roper, Chair

An Oversight Committee chaired by Dr. Roper, Dean of the UNC School of Medicine, CEO of the UNC Health Care System, and Vice Chancellor for Medical Affairs, provides ongoing monitoring of the UCRF. This committee includes leaders from throughout the Health Affairs Schools and the College of Arts and Sciences and is scheduled to meet quarterly to: monitor progress; provide advice on within year budget alterations; approve the award of innovation, program development, and research initiative pilot and project funding. They will also assess that expenditures and recruitments are congruent with the precepts of UCRF and the Cancer Research Committee.

UNC Lineberger Senior Leadership and Research Initiative Committees

The day-to-day management, planning, and coordination for the UCRF will be the responsibility of the UNC Lineberger senior leadership in frequent consultation with the Office of the Dean of the School of Medicine. The long-standing senior leadership team consisting of the director and associate directors for clinical research, basic science, population science, and outreach will be expanded to include the leaders of the three UCRF research initiatives. These will be considered to be at the associate director level. Each of the initiatives will be led by a committee that will consist of a rotating membership comprised of faculty members and senior scientists with specific expertise. Broad faculty input will come to the Cancer Center senior leadership through the program planning committee and the initiative leadership committees.

Other members of the senior leadership team will assume responsibility for the Opportunity Fund and Critical Infrastructure components of the UCRF. The full senior leadership will meet on a weekly basis to discuss activities and make decisions that affect the entire UNC Lineberger. Thus, UCRF leaders will be made aware of, and will participate in decision-making regarding, issues that extend beyond the UCRF. At the same time, a subcommittee of the senior leadership comprised of UCRF leaders may choose to meet to address UCRF-specific issues as they arise.

Each initiative committee will also be advised by a set of leaders in their relevant fields from top cancer centers across the United States. These advisors will meet with the committees at least yearly to review plans and observe the progress of each thematic area. These advisors will also be invited to join the UNC Lineberger Board of Scientific Advisors.

The UNC Lineberger senior leadership, in consultation with the School of Medicine Dean's Office, will develop and revise plans and propose detailed budgets for upcoming fiscal years. Those plans and budgets will be presented to the UCRF Oversight Committee, chaired by Dean William Roper, and if approved by that committee, presented to the Cancer Research Fund Committee, chaired by UNC President Erskine Bowles.

Ensuring Success

Defining success and measuring progress

While it will be years before the full effect of North Carolina's visionary investment in cancer research will be fully evident, it will be possible, and indeed, essential, to track progress and to adjust the strategy as needed. Specifically, it will be important to assess in an ongoing way whether UCRF funds are being spent most wisely and are being clearly directed towards improving the health of North Carolinians.

Is the UCRF being invested to generate the greatest possible return?

While it is impossible to predict where research will lead and what finding will emerge, it is possible to evaluate whether funds are being invested in such a way as to maximize their return. That is the purpose of this strategic plan – to focus UCRF funds on their best use -- however, the plan may need to be modified over time.

As described above, the UNC Lineberger Board of Scientific Advisors will be asked to evaluate the scientific progress associated with UCRF investment. As part of this evaluation, they will be asked explicitly to assess whether the funds are being used most effectively.

In addition to this qualitative review, there are other, more quantitative ways of measuring whether UCRF funds are being most effectively spent. One key metric is the growth in extramural funding, and in particular, in federal research funding. If UCRF funds are spent wisely, UNC researchers will be able to compete more successfully for additional research support. An increase in federal grants will serve as an important validation of the quality and value of UCRF investments. It will also satisfy a critical goal for the UCRF articulated during the planning process – to be catalytic, self-sustaining, and provide leverage for additional funding from extramural sources.

Estimating precise increases in extramural funding levels is difficult, as the federal research budget in the last decade has been extremely variable, doubling over the first five years and remaining flat over the most recent five years. However, with substantial resources from UCRF, a good strategic plan, and continued recruitment of outstanding faculty, UNC should significantly increase its funding relative to other major public and private universities. UNC currently ranks in the top 15 nationally in funding from the National Cancer Institute with $44 million (total annual costs). Over the next seven years, we should aspire to move into the top five among cancer centers, as assessed by a combination of funding, high-impact publications, and peer assessment. Space for new recruitment is a major constraint and the BRIC building will come open in four years, thus the use of the seven year timeframe. The combination of UCRF and new space would be needed to achieve this aspiration. With respect to overall funding from federal, foundation, and private sources, which now totals ~$700 million to UNC at Chapel Hill, it's reasonable to assume that the $50 million UCRF should at least generate a 4:1 stimulation, thus adding $200 million to the university's overall funding.

Will the UCRF directly impact the health of NC citizens?

It will take a long time before efforts can be measured as improvement in health at the state level or beyond, but important interim steps can, should, and will be tracked. In some cases, there will be clear and tangible benefits in the short term.

For example, the Optimizing NC Outcomes initiative includes activities designed to test the impact of interventions in defined communities across North Carolina, with a focus on counties that disproportionately contribute to the cancer burden in the state. If successful, these communities will see a direct benefit, and the findings will be disseminated more broadly across NC. Investments designed to bolster the level of cancer clinical care at UNC will have an immediate impact on the care of cancer patients, while providing the necessary conditions for cutting edge clinical research. The number of

patients engaged in clinical trials, and thus able to benefit from important new therapies, will thus be an important metric to be tracked. Finally, the development of novel therapeutics can take years, but ultimately are expected to have widespread impact. Interim steps include the development of promising drug candidates for pre-clinical and clinical testing.

An outside, independent evaluation will be conducted based on this strategic plan. A process to identify the organization that will conduct the evaluation is underway.

Contingencies that could hinder progress

Space constraints

One major potential risk in achieving UCRF goals is the current lack of adequate research space to carry out the strategic plan. This space constraint will be alleviated to some extent when two new buildings, the Imaging Research Building and the Genome Sciences Building, come on line in four years. However, the recruitment of both junior and particularly senior faculty requires more space than is currently available. This will either delay some of the major components of the plan, or interim solutions must be found. There is the potential to rent some space offsite for core facility development and expansion. In order to recruit the high-quality faculty necessary to achieve the objectives of the plan, they will need to be offered laboratory space on the Chapel Hill campus. One potential is to use some UCRF funds for renovation of campus space, for example, in the Mary Ellen Jones building, or for short-term utilization of other space being constructed on the campus, for example, the new Dental Research building. If for any reason sufficient space is not made available, this will curtail UNC's ability to recruit new faculty and to carry out the specific activities described in this strategic plan.

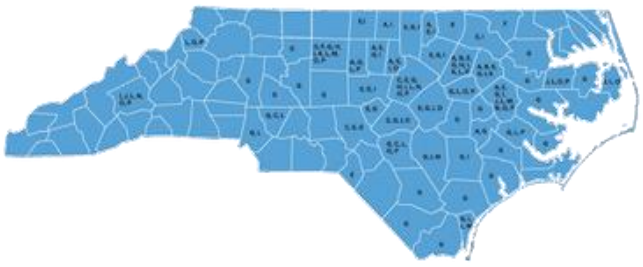
Ongoing evaluation and refinement of the strategic plan

While the strategic plan lays out a roadmap and expected budgetary priorities for future years, it is expected that specific opportunities and needs will require modifying these plans over time. As described above, the UNC Lineberger Executive Committee, advised by the UNC Lineberger Board of Scientific Advisors, will regularly review progress and will adjust the plans accordingly. As well, in the fourth year of the five-year strategic plan period, UCRF leadership will undertake a thoroughgoing review of UCRF performance to date, as well as an assessment of emerging opportunities in cancer research, as part of developing a new five-year strategic plan.

Economic Impact Analysis

The Economic Impact of University Cancer Research Fund

Current economic, employment, government revenue, and generated research funds which assist with the recruiting and retaining of local research talent due to the UCRF at University of North Carolina Lineberger Comprehensive Cancer Center



October 2014

TrippUmbach
Research • Strategy • Impact

University Cancer Research Fund

Contents

Executive Summary

In 2007, the state leaders of North Carolina developed a fund to invest in cancer research in the state. Cancer is one of the leading causes of death in North Carolina, and the fund was developed to demonstrate a commitment to the health of the state residents. Although cancer mortality rates have been decreasing, incident rates of cancer have been increasing over the past decade.[1] The state is investing in this fund, ensuring that future generations of North Carolinians will develop cancer less often, and live longer and better when they do.

The initial investment in 2007 to the University Cancer Research Fund (UCRF) of $25 million has grown to $42 million for FY 2013-2014. This investment has translated into innovative research to detect, treat, and prevent cancer and has given an opportunity for UNC to become home to one of the nation's leading public comprehensive cancer centers. This also allows the state an even greater ability to continue its tradition of care for all North Carolinians. It is an investment in making the best care in the world available in North Carolina; and it is difficult to think of a better investment than one for the future health of the state.

People and place are the keys to the UCRF's success. UCRF is about investing in people – promising researchers with the best ideas for cancer research and master clinicians who know how to bring those findings to patients and others. UNC Chapel Hill and its UNC Lineberger Comprehensive Cancer Center have a culture of collaboration – both across the University and with partners beyond the University's walls – that is essential to promote discovery and then turn those discoveries into new ways to treat, find, and prevent cancer. Outside of the obvious impacts this National Cancer Institute-designated Comprehensive Cancer Center provides to North Carolina, there are additional impacts that the UCRF provides to the state through the dollars that directly and indirectly impact the state economy and job numbers.

The aim of this report is to illustrate in detail the positive economic impact that UCRF dollars have on North Carolina's biomedical sector in 2014; it is important to note that these impacts have been **annual** since the Fund's inception. Through expanding the state economy, creating jobs, generating tax revenue, encouraging scientific collaboration, and leveraging federal research funds, these dollars have provided a significant benefit to the State of North Carolina.

[1] Cancer in North Carolina 2013 Report. North Carolina State Center for Health Statistics.

Key Findings

- ✓ **Expanding the state economy.** UCRF generated nearly $332.8 million in total economic impact in North Carolina in 2014. This includes direct spending of more than $179.1 million within the state, much of which is a result of the generation of greater than $136.9 million from national grants due to research activities. The ripple effect of in-state spending accounts for nearly $153.7 million additional dollars, representing downstream spending by employees, vendors, and contractors. This is just the impact of the current year (2014).

- ✓ **Future Impact.** Tripp Umbach estimates that through the commercialization of the discoveries made from this research, the impact by 2024 will be dramatically larger.

- ✓ **Creating jobs.** In 2014, UCRF directly supported employment of more than 983 jobs in North Carolina. The indirect and induced impacts of those direct jobs, along with the increased extramural funding and spending generated within North Carolina, supported an additional 1,267 jobs. This means the total employment impact of this fund is more than 2,250 jobs throughout North Carolina.

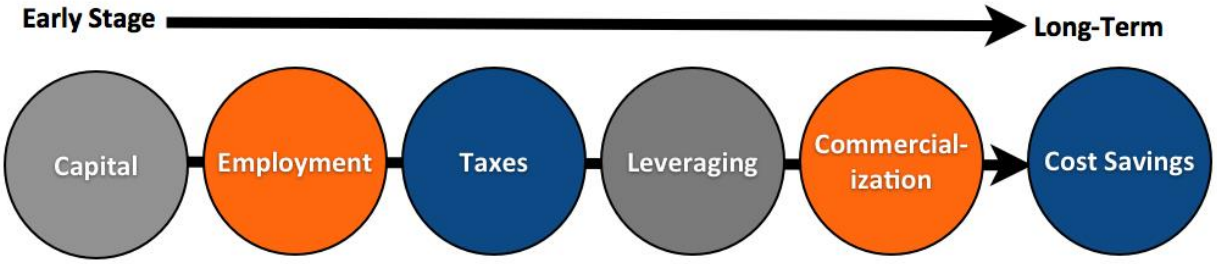
- ✓ **Generating tax revenue.** Tripp Umbach estimates that UCRF provided nearly $11.45 million in local and state tax revenue in 2014 and nearly $24.5 million in federal revenue.

- ✓ **Encouraging scientific collaboration and leveraging federal research funds.** These funds have encouraged recipient institutions to collaborate, as well as to apply for and win, highly competitive federal grants. Recipients of these state research funds have leveraged federal research funds which have amounted to nearly $137 million in research grants in 2014 alone. This would not have been possible without the UCRF funding.

Impacts of UCRF in 2014

Any discussion of the economic impact of these state funds must be predicated on an understanding that research investments, by their nature, have a multitude of impacts on a state's economy, both in the present and in the future. Short-term impacts include capital and non-capital investment, employment growth supported by the funds, and new federal medical research funding leveraged by North Carolina's funds that expand the state's economy. Longer term impacts include a strengthened ability to compete nationally for funding and to attract world-class scientists; the economic and employment advances that will be achieved when medical research and innovation are translated into commercial products and services; and health care cost-savings to the state as a result of innovation (see Figure 1):

Figure 1: Research Return on Investment Timeline



Early-Stage Economic Impact of Funding

UCRF dollars invested in research in 2014 have resulted in an expansion of the state's economy by nearly $332.8 million. Tripp Umbach's economic impact analysis indicates that even in the early stage (2007-2011), program investments in capital and human resources have returned greater than three dollars to the state's economy for every one dollar invested. In 2014, this amount has risen to more than seven dollars for every dollar invested. Spending attributable to the fund can be divided into two parts: direct and indirect/ induced impacts.

The direct impacts of program funding include institutional expenditures for capital improvements, goods and services, as well as the spending by researchers, research staff, subcontractors, and visitors who come to these institutions for conferences and meetings. The indirect impacts of these funds result from the direct, first-round expenditures, which are received as income by businesses and individuals in the state and re-circulate through the economy in successive rounds of re-spending. The end result is a multiplied economic impact that is a linear result of the state's investment in research.

Early-Stage Impact of UCRF Dollars on Employment

Tripp Umbach estimates that in 2014, UCRF dollars for health care research have created and sustained 2,250 high-paying research-related jobs throughout the state of North Carolina. The economic expansion created by the funds allocated to the UCRF has, in turn, brought about demand for additional employment in the state's economy.

Early- and Later-Stage State Tax Impacts

Tripp Umbach estimates that funds provided in 2014 have resulted in nearly $11.5 million in tax revenues to the state of North Carolina. In-state spending by the recipient organizations and spending in the state by out-of-state parties have a significant impact on state tax revenue. Taxes created as a result of spending in the state's economy, and generation of fresh dollars from outside of the state, are expected to grow as early-stage research is commercialized.

Impacts Associated with Leveraged Federal Medical Research Funds

The North Carolina academic medical industry and growing life sciences industry have been measurably enhanced by these state funds. This federal medical research funding helps fuel clinical enterprises. According to the Association of American Medical Colleges, North Carolina's academic medical industry is among the top 10 nationally in total annual economic impact[2].

These funds from UCRF have encouraged researchers at the recipient organization to collaborate to apply for and win highly competitive federal grants. These funds have enabled recipients of UCRF dollars to leverage at least $137 million in federal health research funding in 2014 alone.

Health Care Cost-Savings

While this study does not include detailed economic impact models that calculate the potential cost-savings attributable to research activities, a growing body of literature provides some potential insights. Breakthrough research by Silverstein et al. (1995) documented $69 billion in annual economic savings resulted from NIH-supported research. The return on investment calculated by Silverstein was seven dollars in health care cost-savings for every dollar invested in NIH-sponsored research[3].

[2] In 2012, North Carolina ranked 10th in Academic Medical Impact of AAMC members and COTH hospitals.
[3] Cost-Savings Resulting from NIH Research Support, NIH Publication No. 93. Silverstein, H.H. Garrison and S.J. Heinig, 1995.

Research That Makes a Difference

UCRF supports the prevention and quality of cancer care throughout North Carolina. The following features represent just a handful of projects touching the lives of North Carolinians.

Connecting with physicians across the state

UNC physicians connect via telemedicine with oncologists and other physicians across the state on a regular basis. UNC faculty regularly hold virtual "tumor boards" — an in-depth review of a particular patient's case with a team of doctors — to review cancer cases across the state. Clinicians in the Comprehensive Cancer Support Program are also using the technology to connect with patients directly, offering virtual counseling sessions or simply to answer patient questions.

Preventing lung cancer though primary care networks

Cigarette smoking remains the leading cause of preventable death in the U.S. Working through the UNC Practice Network, UNC researchers partnered with providers in one clinic to increase their expertise in pharmacotherapy and behavioral interventions, enabling them to better support their patients struggling to quit smoking. At the end of the first year of this ongoing project, researchers found a significant increase in the documentation of counseling, cessation medications discussed or prescribed, and the number of referrals to QuitlineNC.

Assessing risk factors for cancer

Researchers are using CHART (Carolina Health Assessment & Resource Tool), an online resource tool developed at UNC that assesses and modifies behavioral risk factors for cancer. Study participants answer module-based questions on such health behaviors as physical activity, nutrition, and tobacco use, and then immediately receive personalized, evidence-based and theory-guided feedback. CHART is available online and via mobile devices and can be used in a wide variety of interventions and research to improve cancer outcomes.

Understanding survivorship through health data

Researchers continue the enrollment of patients in the UNC Health Registry/Cancer Survivorship Cohort to support cancer survivorship research. The goal of the Registry is to better understand the causes of cancer and other diseases that affect many North Carolinians. Researchers now have access to the data of more than 5,000 study participants and are leveraging these data to secure external research funding.

Helping North Carolinians LOSE NOW

Twenty percent of cancer is caused by being overweight as well as by obesity. Regular, face-to face weight loss interventions, while effective, are expensive. UNC researchers have developed an effective weight loss intervention, LoseNowNC, which couples large-group interventions with web-based support delivered on mobile devices. The intervention encourages and monitors ongoing progress for individuals trying to lose weight. The effort has shown promising results, with significant weight changes in two research groups over time.

Understanding barriers to colon cancer screening in underserved communities

Although colon cancer screening rates have increased in recent years, screening is underutilized in vulnerable populations. Using state cancer registry-linked insurance claims data, UNC researchers identified underserved areas in North Carolina with relatively low colon cancer screening rates and high colon cancer mortality. Seeking feedback from eligible individuals from across the state, researchers are studying the barriers to screening for this population and using this understanding to develop better screening strategies for underserved North Carolina communities.

Appendix A: Definition of Terms

Study Year

Fiscal Year 2014

Total Impact

The total impact of an organization is a compilation of the direct impact, the indirect impact, and the induced impact generated in the economy because of the organization.

Direct Impact

Direct impact includes all direct effects the organization has on the regional area due to the organizational operations. These items include direct employees, organizational spending, employee spending, as well as spending by patients and visitors to the organization.

Indirect Impact

The indirect impact includes the impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value added. The impacts are calculated by applying direct effects to the Type I Multipliers.

Induced Impact

The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added. IMPLAN's default multiplier recognizes that labor income (employee compensation and proprietor income components of value added) is not leakage to the regional economy. This money is re-circulated through the household spending patterns causing further local economic activity.

Multiplier Effect

The multiplier effect is the additional economic impact created as a result of the organization's direct economic impact. Local companies that provide goods and services to an organization increase their purchasing by creating a multiplier.

Appendix B: Tripp Umbach Qualifications

Tripp Umbach is the national leader in providing economic impact analysis to leading health care organizations and academic health centers. The firm has completed more than 100 economic impact studies over the past 10 years for clients such as the Mayo Clinic Rochester, The Cleveland Clinic, University of Florida Shands HealthCare, and the Ohio State University Medical Center. In addition to work on multiple occasions for the six allopathic medical schools and academic medical centers in Pennsylvania, Tripp Umbach has completed statewide studies for multiple institutions in Ohio, Virginia, South Carolina, Wisconsin, and Minnesota.

The Association of American Medical Colleges (AAMC) relies on Tripp Umbach to complete a study of all U.S. medical schools and teaching hospital affiliates. Tripp Umbach has completed five such studies for AAMC since 1995.

Tripp Umbach has also completed economic impact studies for cancer centers such as the CURE Funding for PA Cancer Alliance, The Wistar Institute, University of North Carolina's Cancer Hospital, Ohio State University's James Cancer Center and Solove Research Center, Ohio State University's Comprehensive Cancer Center, Penn State Milton S. Hershey Medical Center's Cancer Institute, Mayo Clinic/Allegheny General Hospital Cancer Services planning, UPMC Hillman Cancer Center feasibility and economic impact projections study, University of Pennsylvania projected economic impact of the Cancer Center as a component of the Civic Center project, and University of Florida Shands Healthcare economic impact projections.

For more information, please contact Tripp Umbach at www.trippumbach.com

Appendix C: Methodology

In order to fully quantify the impact of the funding of UCRF to the operations of UNC Lineberger Comprehensive Cancer Center within the various geographical areas throughout this study, it was necessary for Tripp Umbach to establish a study methodology. It was critically important that the methodology used would deliver a comprehensive, yet conservative, estimate of the operations' impact, based on information compiled using uniform and consistent techniques. In addition, the study team sought to develop a reproducible methodology, ensuring that subsequent studies could build upon the information and knowledge gained through this effort.

Tripp Umbach determined that the use of the IMPLAN Pro economic impact model software was most appropriate for this analysis. The IMPLAN econometric model operates by estimating the direct impact, indirect impacts, and induced impacts of specific economic activity. Direct economic impacts, are those attributable to the initial economic activity. For example, an operation with 10 full-time employees creates 10 direct jobs. Indirect economic impacts are those economic activities undertaken by vendors and suppliers within the supply chain of the direct activity because of the initial economic activity. For example, suppliers of goods, materials, and services used in the direct activities produce indirect economic impacts. Induced economic impacts result from the spending of wages paid to employees in local industries involved in direct and indirect activities. Tripp Umbach selected the IMPLAN model due to its frequent use in economic impact, in addition to its development independent of local influences.

Tripp Umbach collected employment information concerning the economic activity of UCRF's funding on operations themselves and followed up in-person to make certain the data was the most current available.

In this report, the impact was measured using IMPLAN datasets. The IMPLAN data files include information for 528 different industries (generally three- or four-digit SIC code breakdown) and 21 different economic variables. IMPLAN sources their employment data from ES202 employment security data supplemented by county business patterns and REIS data. Employment data utilized in the analysis includes full-time and part-time positions.

It should be noted that, at the time of performing the UCRF assessment, the most recent IMPLAN data files for the state of North Carolina were for 2012. While the data is not current, it is unlikely that the fundamental economic structure of North Carolina's economic fabric has changed to an extent that would invalidate the analysis. IMPLAN data and accounts closely follow the accounting conventions used in the "Input/ Output Study of the U.S. Economy" by

the U.S. Bureau of Economic Analysis and the rectangular format recommended by the United Nations.

By deriving the direct and actual employment numbers from IMPLAN for each county, Tripp Umbach was able to conduct input/output modeling to analyze the current impact of the industry in each county. Tripp Umbach supplied additional information as required to supplement the data supplied by UNC Lineberger Comprehensive Cancer Center.

List of Active Extramural Awards

List of Active Extramural Awards

UCRF	Current PI	Sponsor	Number	Begin Date	End Date	Title	Annual Total Cost $
Theme Invest (HTS)	Aikat, Jayashree	National Science Foundation	OCI-1245783	12/01/12	11/30/14	CC-NIE Network Infrastructure: Enabling Data-Driven Research	499,529
Innovation Award	Allbritton, Nancy	National Cancer Institute	5-R01-CA139599-05	03/01/09	01/31/15	Multiplexed Measurement of Kinase Activity in Single Cancer Cells	505,646
Retention	Allbritton, Nancy	National Cancer Institute	1-RO1-CA177993-01	08/01/14	07/31/19	Single-Cell Measurement of Lipid Signaling in Colorectal Cancer	725,260
Innovation Award	Allbritton, Nancy	National Inst. of Health	5-R01-EB011763-04	04/01/10	01/31/15	Protectides: A Tool for Drug Target Assays in Myeloma NCE	565,311
Retention	Allbritton, Nancy	National Inst. of Health	5-R01-EB012549-03	02/01/11	01/31/15	Arrays for Cloning Growth Suppressed Cells	451,651
Retention	Allbritton, Nancy	National Inst. of Health	1-RO1-EY02556-01	08/01/14	07/31/19	Generation of a Gene-Targeted Human iPS Cell Library for Macular Degeneration	613,957
Retention	Allbritton, Nancy	National Inst. of Health	1-F32-CA186748-01	08/01/14	07/31/17	Peptide Reporters for Estimation of BCR-Abl Kinase Activity in ALL Patient Cells	57,269
Retention	Allbritton, Nancy	National Inst. of Health	Not Assigned	09/01/14	08/31/16	Single Cell Analysis of Intratumoral Heterogeneity in Parathyroid Neoplasia - Subcontract with Duke University	43,301
Recruitment	Amelio, Antonio	National Cancer Institute	4-ROO-CA157954-03	09/22/14	08/31/17	Convergence of CREB and MYC Pathways in Oncogenesis	241,531
Recruitment	Anders, Carey	Bristol-Myers Squibb	CA191-011-042	06/19/12	06/18/15	A Phase 2 Study of BMS-754807 Combined with Letrozole or BMS-754807 Alone in Hormone Receptor-Positive Breast Cancer Subjects with Acquired Resistance to Non-Steroidal Aromatase Inhibitors	2,396
Theme Investment (MP1U)	Anders, Carey	National Cancer Institute	5-K23-CA157728-03	09/01/11	08/31/16	PARP Inhibition to Treat Triple-Negative Breast Cancer Brain Metastases	173,089
Recruitment	Armistead, Paul	National Inst. of Health	5-K08-HL113594-03	05/01/12	02/28/15	Leukemia Stem cell Antigen Discovery Using Advanced Genomic and Proteomic Methods	132,088
Recruitment	Asokan, Aravind	National Inst. of Health	2-R01-HL089221-06	01/01/14	12/31/18	Determinants of AAV Tropism	347,447
Retention	Ataga, Kenneth	National Inst. of Health	1-RO1-HL11569-01	01/01/12	12/31/16	Endothelial Dysfunction in the Pathogenesis of Sickle Cell Nephropathy	450,546
Retention	Ataga, Kenneth	National Inst. of Health	5-UO1-HL117659-02	08/15/13	05/31/18	Targeted Anticoagulant Therapy for Sickle Cell Disease	1,452,063
Theme Investment (CC)	Aylor, David	National Inst. of Health	1-K99-ES021535-03	06/01/12	05/31/14	Epigenetics, environmental exposure, and reproduction in the Collaborative Cross	87,921
Innovation Award	Bae-Jump, Victoria	Department of Defense	W81XWH-12-1-0426	09/25/12	09/24/14	Pre-clinical and Clinical Investigation of the Impact of Obesity on Ovarian Cancer Pathogenesis	342,939
Innovation Award	Bae-Jump, Victoria	Department of Defense	W81XWH-13-1-0164	06/01/13	05/31/15	Obesity Exposure Across the Lifespan on Ovarian Cancer Pathogenesis	189,027
Innovation Award	Bae-Jump, Victoria	National Cancer Institute	5-K23-CA143154-04	09/01/10	08/31/15	Metformin as a Novel Chemotherapeutic Strategy for the Treatment of Endometrial Cancer	170,873
Theme Investment (CC)	Baric, Ralph	National Inst. of Health	5-U19-AI100625-03	08/05/12	07/31/17	Systems Immunogenetics of Biodefense Pathogens in the Collaborative Cross	4,030,980
Theme Investment (CC)	Baric, Ralph	National Inst. of Health	5-RO1-AI085524-05	06/09/10	05/31/15	Broad Spectrum Neutralizing Human Abs Against SARS and Related Zoonotic Coronavi -Subcontract with Dana Farber Cancer Institute	262,237
Theme Investment (CC)	Baric, Ralph	National Inst. of Health	1-U19-AI107810-01	07/01/13	06/30/18	Characterization of Novel Genes Encoded by RNA and DNA Viruses - Project 1	710,839
Theme Investment (CC)	Baric, Ralph	National Inst. of Health	1-U19-AI107810-01	07/01/13	06/30/18	Characterization of Novel Genes Encoded by RNA and DNA Viruses - Core A	196,909
Recruitment	Baron, John	National Cancer Institute	5-R01-CA098286-12	12/01/02	07/31/17	Colorectal Chemoprevention with Calcium and Vitamin D	2,430,107
Recruitment	Baron, John	National Cancer Institute	5-R01-CA059005-18	09/30/93	07/31/15	Aspirin/Folate Prevention of Large Bowel Polyps	485,122

List of Active Extramural Awards

Recruitment	Baron, John	National Cancer Institute	5-R01-CA12217-11	10/01/10	07/31/15	Chemoprevention of Arsenic Induced Skin Cancer - Subcontract with University of Chicago	40,434
Recruitment	Baron, John	National Cancer Institute	5-U01-CA086400-05	07/01/10	06/30/15	Early Detection Research Network (EDRN) - Subcontract with University of Michigan	113,174
Recruitment	Baron, John	National Cancer Institute	5-U01-CA0864011-14	07/01/11	06/30/16	Early Detection Research Network (EDRN) - Subcontract with University of Michigan	415,125
Recruitment	Baron, John	National Cancer Institute	3-RO1-CA098286-12S1	09/01/13	08/31/15	A Pilot Metabolomic Study of the Effects of vitamin D and Calcium Supplementation - Supplement	163,305
Recruitment	Baron, John	National Inst. of Health	5-R01-ES019876-04	08/16/10	03/31/15	Methods of Pathway Modeling with Application to Folate - Subcontract with University of Southern California	19,674
Recruitment	Baron, John	National Inst. of Health	5-RO1-ES019876-04S1	04/01/13	03/31/15	Methods of Pathway Modeling with Application to Folate - Subcontract with University of Southern California	7,969
Recruitment	Basch, Ethan	Department of Defense	W81XWH 11-1-0639	09/30/12	09/29/15	Development of Pain End Point Models for Use in Prostate Cancer Clinical Trials and Drug Approval	581,379
Recruitment	Basch, Ethan	National Cancer Institute	261201000063C-1-0-1	09/28/10	09/29/15	Patient Reported Outcomes Version of the Common Terminology - CTCAE Contract	1,259,398
Recruitment	Basch, Ethan	National Cancer Institute	5-R01-CA154537-02	01/01/13	05/31/17	Assessing PROMIS and Other Simple Patient Reported Measures for Cancer Research - Subcontract with Mayo Clinic	85,000
Recruitment	Basch, Ethan	National Inst. of Health	5-U24-NR-014637-02	09/28/10	06/30/18	Refinement and Expansion of the Palliative Cooperative Group - Subcontract with Duke University	110,620
Retention	Bateman, Ted	National Inst. of Health	5-R01-AR059221-04	04/01/11	03/31/16	Radiation-Induced Osteoporosis in Women with Cancer: Mechanisms and Prevention	297,143
Recruitment	Batrakova, Elena	National Inst. of Health	7-R01-NS057748-05	09/29/08	06/30/14	Inflammatory Cells for Transport of Therapeutic Polypeptides Across the BBB	293,266
Innovation Award	Bautch, Victoria	National Inst. of Health	1-RO1-HL116719-02	07/15/13	05/31/17	Centrosome Mis-Regulation and Blood Vessel Function	372,400
Innovation Award	Bautch, Victoria	National Inst. of Health	1-F32-HL113296-02	07/01/13	06/30/15	Centrosome Over-Duplication and Blood Vessel Function	55,094
Recruitment	Bensen, Jeannette	Department of Defense	PO#41749/12-2029	09/30/11	09/29/14	Vitamin D and Related Genes, Race and Prostate Cancer - Subcontract with University of South Carolina	16,754
Recruitment	Bensen, Jeannette	Department of Defense	12084021/98040295	07/01/12	06/30/15	Genetic Variations in Mitochondria and Prostate Cancer Aggressiveness and Progression in Caucasian and African American Men - Subcontract with University of Texas MD Anderson Cancer Center	32,424
Recruitment/Theme Investment	Berg, Jonathan	National Inst. of Health	1-U01-HG007437-01	09/23/13	07/31/17	A Knowledge Base for Clinically Relevant Genes and Variants	1,400,000
Recruitment	Branca, Rosa	National Cancer Institute	5-R01CA142842-04	04/01/10	01/31/15	Sensitive and Specific Molecular Imaging of Pulmonary Nodules - Subcontract with Duke University	288,793
Recruitment	Branca, Rosa	National Inst. of Health	7-R2-1DK090758-03	09/20/10	08/31/14	Novel Magenetic Resonance Approach to Detect Bat Distribution and Temperature	156,976
Recruitment	Brookhart, Maurice	AMGEN Inc.	2011561720	12/16/11	12/31/15	Methodological Issues in Drug Utilization Research	244,960
Recruitment	Brookhart, Maurice	AMGEN Inc.	138938-7100060173	01/01/12	12/31/14	Patterns of Anemia Management in United States Hemodialysis Population	250,898
Recruitment	Brookhart, Maurice	AMGEN Inc.	7100116225/138938	07/01/13	12/31/14	Patterns of Use of Cinacalcet Among Patients with End-Stage Renal Disease	249,468
Recruitment	Brookhart, Maurice	AMGEN Inc.	7100137320/138938	11/15/13	11/15/14	Exploratory Study of Methods to Examine Cinacalcet Persistence and Long Terms Outcomes	59,033
Recruitment	Brookhart, Maurice	AMGEN Inc.	7200635956	11/15/13	06/15/15	Cinacalcet Persistence and Long Terms Outcomes	249,233
Recruitment	Brookhart, Maurice	AMGEN Inc.	7100163382/2011561720	07/01/14	07/01/16	The Effect of Persistent Cinacalcet Use on Biochemical Control in Patients REceiving Hemodialysis	249,720
Recruitment	Brookhart, Maurice	AMGEN Inc.	7100161394	06/01/14	12/31/15	Estimation of Short-term Fracture Risk using Machine-learning Methods	249,531

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Recruitment	Brookhart, Maurice	National Inst. of Health	5-R01-AG042845-03	08/01/12	07/31/15	A Retrospective Cohort Study of the Safety of Testosterone Therapy in Older Men	215,460
Recruitment	Brookhart, Maurice	National Inst. of Health	1-R21-HD080214-01A1	12/01/13	11/30/14	Patterns of use Comparative Effectiveness, and Safety of Rotavirus Vaccines	228,000
Recruitment	Brookhart, Maurice (Raghunathan, Karthik)	Agency for Healthcare Research and Quality	2013 APSF/ASA	01/01/14	12/31/14	Comparative Safety of Different Types of IV Fluids for Resuscitation in the OR and ICU: An Applied Pharmacoepidemiologic Approach -Subcontract with Duke University	22,378
Innovation Award	Burridge, Keith	National Inst. of Health	5-R01-GM029860-32	04/01/81	08/31/15	Cell Adhesion and the Regulation of Rho GTPases	409,684
Recruitment	Busby-Whitehead, Jan	Donald W Reynolds Foundation	Not Assigned	01/01/11	12/31/14	Next Steps in Physicians' Training in Geriatrics	250,001
Recruitment	Busby-Whitehead, Jan	National Inst. of Health	5-T35-AG038047-04	05/01/10	04/30/15	UNC-CH Summer Research Training in Aging for Medical Students	56,661
Recruitment	Caron, Kathleen	Ferring Pharmaceuticals	Not Assigned	12/01/13	12/31/14	Analysis of Am Cardiovascular Effects in Ramp Mouse Models	21,519
Recruitment	Caron, Kathleen	National Inst. of Health	5-R01-HD060860-05	04/01/09	03/31/15	Adrenomedullin Signaling At the Maternal-Fetal Interface	275,366
Recruitment	Caron, Kathleen	National Inst. of Health	1-R01-DK099156-01	09/01/13	07/31/17	Causes and Consequences of Digestive Tract Lymphangiectasia	325,570
Recruitment	Carpenter, William	National Cancer Institute	5-U54-CA153602-04	09/01/10	08/31/15	Carolina Community Network Center to Reduce Cancer Health Disparities (CCNII) - Research Program - Pilot Research Project	82,039
Recruitment	Chavala, Sai	National Inst. of Health	5K08EY021171-02	03/01/12	02/28/16	Regulation of Adult Ciliary Body Progenitor Cells for Cell Replacement Therapy	0
Recruitment	Chavala, Sai	National Inst. of Health	5-K08-EY021171-02	03/01/11	02/28/16	Regulation of Adult Ciliary Body Progenitor Cells for Cell Replacement Therapy	236,392
Recruitment	Chavala, Sai	National Inst. of Health	5-K08-EY021171-03	03/01/11	02/28/16	Regulation of Adult Ciliary Body Progenitor Cells for Cell Replacement Therapy	236,392
Recruitment	Chen, Ronald	Accuray, Inc.	Not Assigned	06/01/12	05/31/15	Comparative Effectiveness of Management Options for Localized Prostate Cancer Parallel Study to Include Patients Treated with Cyberknife Radiation Therapy	100,000
Recruitment	Chen, Ronald	Agency for Healthcare Research and Quality	1-RO1-HS022713-01A1	07/01/14	06/30/19	NC Process: A Stakeholder-Driven, Population-Based Prospective Cohort Study	249,958
Theme Investment (Proteomics)	Chen, Xian	W. M. Keck Foundation	Not Assigned	01/01/13	12/31/16	New Tools for Characterization of the Protein Methylome and the Histone Code	250,000
Recruitment	Chera, Bhishamjit	Eli Lilly	CCCWFU-60107	02/14/12	02/14/15	Phase I/II Trial of Combined Re-irradiation With Pemetrexed And Erlotinib Followed by Maintenance Erlotinib For Recurrent And Second Primary Squamous Cell...	9,500
Recruitment/Innovation Award	Coghill, James	National Inst. of Health	5-K08-HL111205-03	04/01/12	03/31/16	Targeting CC-Chemokine Receptor 7 for the Prevention of Graft-versus-Host Disease	132,327
Theme Invest (HTS)	Crews, Stephen	National Inst. of Health	5-R01-NS075079-04	06/01/11	05/31/16	Molecular Genetics of Midline Glial Development	320,513
Theme Investment (HTS, CC)	Crowley, James (Jim)	National Inst. of Health	1-K01-MH094406-03	04/01/12	03/31/16	Systems Genetics of Fluoxetine-Induced Neurogenesis and Antidepressant Response	156,686
Retention	Damania, Blossom	Leukemia & Lymphoma Society	0740-14	01/01/14	12/31/15	Novel Technology for Targeting and Understanding NHL Biology	400,000
Retention	Damania, Blossom	National Cancer Institute	5-P01-CA019014-35	07/01/11	06/30/16	Herpesviral Oncogenesis, Latency and Reactivation - Project 3	249,862
Retention	Damania, Blossom	National Cancer Institute	2-RO1-CA096500-12	09/01/13	08/31/18	Role of KSHV Viral Proteins in Signaling and Pathogenesis	272,674
Retention	Damania, Blossom	National Inst. of Health	5-R01-DE018281-08	06/01/12	05/31/17	Innate Immunity and KSHV	365,968
Retention	Damania, Blossom	National Inst. of Health	5-R01-DE023946-02	09/17/13	07/31/18	Targeting the Epigenome of Gammaherpesviruses in Oral Disease - Supplement	378,255

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Retention	Damania, Blossom	National Inst. of Health	1-U19-AI109965-01	03/01/14	02/28/19	nnDiscovery of New Innate Immune Pathways in Viral Recognition - Project 3 Innate Recognition of Human Herpesviruses	437,760
Retention	Damania, Blossom	National Inst. of Health	1-U19-AI107810-01	07/01/13	06/30/18	Characterization of Novel Genes Encoded by RNA and DNA Viruses - Project 3	351,841
Theme Invest (HTS)	Dangl, Jeff	Gordon and Berry Moore Foundation	3030	09/01/11	08/31/16	Understanding Plant Immune System Function in Complex Microbial Environments	333,333
Theme Invest (HTS)	Dangl, Jeff	National Science Foundation	IOS-0929410	09/01/09	08/31/14	Arabidopsis 2010: Mechanisms of NB-LRR Disease Resistance Protein Function	457,446
Retention	Dayton, Paul	Department of Defense	W81XWH-12-1-0303	08/01/12	07/31/15	Piezoelectric Composite Micromachined Multi-Frequency Transducers for High-Resolution, High-Contrast Ultrasound Imaging for Improved Prostate Cancer Assessment	502,375
Retention	Dayton, Paul	National Cancer Institute	5-RO1-CA170665-03	07/01/12	06/30/16	Micro-Tumor Detection by Quantifying Tumor-Induced Vascular Abnormalities (PQ-13)	442,375
Retention	Dayton, Paul	National Cancer Institute	3-RO1-CA170665-03S1	09/01/12	06/30/15	Pilot Clinical Study of Acoustic Angiography for Improving Ultrasound Sensitivity - Supplement	196,588
Retention	Dayton, Paul	National Cancer Institute	5-R24-CA165621-02	12/01/12	11/30/14	SBIR-Quantitative Ultrasound Analysis of Vascular Morphology for Cancer Assess - Subcontract with Kitware Inc	52,629
Retention	Dayton, Paul	National Inst. of Health	5-R01-EB015508-04	08/01/12	05/31/16	Dual-Frequency Intravascular Arrays for Functional Imaging of Atherosclerosis - Subcontract with North Carolina State University	107,708
Retention	Dayton, Paul	National Science Foundation	NSF 13-547	01/01/14	12/31/14	A Benchtop Ultrasound Scanner for Rapid tomographic Imaging of Preclinical Disease Models - Subcontract with SonoVol, LLC	50,951
Theme Investment (CC)	de Villena, Fernando	National Inst. of Health	1-P50-GM076468	04/01/06	03/31/11	Genome Dynamics: Evolution, Organization and Function	483,925
Theme Investment (CC)	de Villena, Fernando	National Inst. of Health	5-P50-HG006582-05	09/30/09	08/31/14	An Interdisciplinary Program for Systems Genomics of Complex Behaviors	802,132
Theme Investment (CC)	de Villena, Fernando	National Inst. of Health	5-R01-HD065024-04	05/01/10	04/30/15	Collaborative Cross: A Systems Genetics Approach to the Study of Male Infertility	318,130
Theme Investment (CC)	de Villena, Fernando	National Inst. of Health	5-P50-GM076468-09	07/01/12	06/30/15	Genome Dynamics: Evolution, Organization and Function - Subcontract with Jackson Lab	261,707
Theme Investment (CC)	de Villena, Fernando	National Inst. of Health	5-P50-HG006582-05	07/01/13	04/30/16	An Interdisciplinary Program for Systems Genomics of Complex Behaviors	568,864
Theme Investment (CC)	de Villena, Fernando	National Inst. of Health	1-F30-MH103925-01A1	09/08/14	09/07/18	Effects of Advanced Paternal Age on Germine Genome Stability	33,035
Theme Investment (CC)	de Villena, Fernando	Neogen Corp	Neogen Corp	05/01/12	05/31/13	Content Selection for a New Mouse Genotyping Array	75,000
Innovation Award	Deshmukh, Mohanish	National Inst. of Health	1-R01-GM105612-02	04/01/13	03/31/17	Mechanism by Which Human ES Cells Prime Bax at the Golgi for Rapid Apoptosis	286,900
Retention	DeSimone, Joseph	Defense Threat Reduction Agency	HDTRA1-13-1-0045	09/05/13	09/04/16	PRINT Butyrylcholinesterase (BuChE) Delivery	4,781,156
Retention	DeSimone, Joseph	Department of Defense	313-0474	09/30/13	09/29/16	Preventing Morbidity and Mortality with Novel Preventative Therapy for Recurrent Urinary Tract Infections - Subcontract with Duke University	108,272
Retention	DeSimone, Joseph	EIPI Systems, Inc	Not Assigned	11/20/13	11/19/14	Research Agreement with EIPI Systems, Inc.	299,160
Retention	DeSimone, Joseph	Liquidia Technologies	Not Assigned	09/01/05	08/31/15	Research Agreement between UNC and Liquidia in the area of PFPE, Lithography, Microfluidics, Nanostudies and Membrane Studies	436,014
Retention	DeSimone, Joseph	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence	2,058,365
Retention	DeSimone, Joseph	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence- Project 1	495,739

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Retention	DeSimone, Joseph	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence- Core 4	260,969
Retention	DeSimone, Joseph	National Inst. of Health	1-U19-AI109784-01	07/01/14	06/30/19	Novel Nanoparticle Platform for the Delivery of Vaccines and Adjuvants - Project 1	742,387
Retention	DeSimone, Joseph (Holder, Place)	Liquidia Technologies	G-5441-2	07/01/11	06/30/15	Molecular Mosquitocides: Development of an Innovative and Robust, Platform-based Approach for Sustainable Insecticidal Control of Anopheline Mosquitoes - Subcontract with Colorado State University	99,165
Retention	Dittmer, Dirk	Emmes Corporation	Not Assigned	09/01/12	08/31/15	Laboratory Site Agreement Between The Emmes Corporation and The University of North Carolina at Chapel Hill -Laboratory	63,559
Retention	Dittmer, Dirk	Emmes Corporation	PO 1568 G NA643	09/01/11	08/03/15	Clinical Site Agreement	1,000
Retention	Dittmer, Dirk	National Cancer Institute	1 U01 CA121947-04	01/01/13	08/31/14	AIDS Malignancy Clinical Trials Consortium Study (Subcontract with UCLA)	17,999
Retention	Dittmer, Dirk	National Cancer Institute	2-P01-CA019014-35	07/01/11	06/30/16	Herpesviral Oncogenesis, Latency and Reactivation - Project 4	249,734
Retention	Dittmer, Dirk	National Cancer Institute	2-P01-CA019014-35	07/01/11	06/30/16	Herpesviral Oncogenesis, Latency and Reactivation - Core B	224,961
Retention	Dittmer, Dirk	National Cancer Institute	5-R01-CA109232-10	08/01/04	04/30/15	Regulation of the KSHV Latent Promoter	227,369
Retention	Dittmer, Dirk	National Cancer Institute	3-R01-CA109232-08S1	08/01/12	04/30/15	Regulation of the KSHV Latent Promoter - Supplement	63,276
Retention	Dittmer, Dirk	National Cancer Institute	5-R01-CA163217-03	08/01/11	07/31/16	Targeted Therapies for HIV-Associated Kaposi Sarcoma and Lymphoma	287,409
Retention	Dittmer, Dirk	National Cancer Institute	5-R21-CA177315-02	08/01/13	07/31/15	Pathobiology and Clinical Profile of HIV-Associated Cancers in India and the West	211,037
Retention	Dittmer, Dirk	National Cancer Institute	1-R21-CA180097-02	09/01/13	08/31/15	(PQD2) Why is Endemic Burkitt Lymphoma Curable with Single Agent Chemotherapy?	192,409
Retention	Dittmer, Dirk	National Inst. of Health	2-R01-DE018304-06	09/15/13	08/31/18	ART Modulation of Viral Pathogenesis in Oral Epithelia	364,837
Retention	Dittmer, Dirk	National Inst. of Health	1-U19-AI107810-01	07/01/13	06/30/18	Characterization of Novel Genes Encoded by RNA and DNA Viruses - Core C	193,537
Retention	Dittmer, Dirk	National Inst. of Health	2-UM1-AI068636-01	01/01/14	11/30/14	AIDS Clinical Trial Group (ACTG) - OHARA Laboratory Support - Subcontract with Brigham and Women's Hospital	352,727
Recruitment	Doerschuk, Claire	National Inst. of Health	5-R01-HL114388-03	06/01/12	03/31/17	RHO-Mediated Signaling in Lung Endothelial Cells Induced by Neutrophil Adhesion	607,168
Recruitment	Doerschuk, Claire	National Inst. of Health	5-T32-HL007106-38	07/01/75	03/31/17	Multidisciplinary Research Training in Pulmonary Diseases	421,918
Recruitment	Doerschuk, Claire	National Inst. of Health	1-K12-HL119998-01	09/01/13	05/31/18	Application of Omics in Lung Disease	123,320
Recruitment	Doerschuk, Claire	National Inst. of Health	1-P50-HL120100-02	09/19/13	08/31/18	The Impact of Tobacco Exposure on the Lungs Innate Defense System	805,530
Retention	Dokholyan, Nikolay	National Inst. of Health	5-R01-GM080742-8	04/01/07	03/31/16	Protein Misfolding and Aggregation	279,122
Retention	Dokholyan, Nikolay	National Inst. of Health	5-R01-AI102732-03	07/01/12	06/30/16	Immunogen Design to Target Carbohydrate-Occluded Epitopes on the HIV Envelope	503,164
Recruitment	Dudley, Andrew	American Cancer Society	RSG-14-038-01-CSM	07/01/14	06/30/18	Mechanisms of Tumor Escape from Anti-Angiogenic Therapy	198,000
Recruitment	Dudley, Andrew	National Cancer Institute	1-R01-CA177875-01A1	09/01/14	08/31/19	Mechanisms of Tumor Escape from Anti-Angiogenic Therapy	312,777
Recruitment	Dusetzina, Stacie	American Cancer Society	RSGI-14-030-01-CPHPS	07/01/14	06/30/16	Impact of Parity Legislation on Use and Costs of Oral Cancer Medications	239,947
Theme Investment (CBCS,HTS)	Earp, Henry	Susan G. Komen Foundation	OGUNC1202	05/01/12	04/30/15	Carolina Breast Cancer Study: PHASE III	247,267
Recruitment	Emanuele, Michael	V Foundation	Not Assigned	10/01/13	09/30/15	Identification of Ubiquitin Signaling Networks as Novel Avenues for Therapeutic Intervention	99,149
Recruitment	Engel, Lawrence	National Inst. of Health	5-R01-ES020874-02	09/01/11	08/31/16	Effects of the Deepwater Horizon Disaster:the Coast Guard Responder Cohort - Subcontract with Uniformed Services University	22,384

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Retention	Evans, James	National Inst. of Health	5-U01-HG006487-03	12/01/11	11/30/15	NC GENES: NC Clinical Genomic Evaluation by NextGen Exome Sequencing	2,329,283
Recruitment	Foster, Matthew	Celator Pharmaceuticals, Inc	CLTR0301-301*-CPX-351	10/04/13	10/31/15	Phase III, Multicenter, Randomized, Trial of CPX-351 (Cytarabine: Daunorubicin) Liposome Injection versus Cytarabine and Daunorubicin in Patients 60-75 Years of age with Untreated High Risk (Secondary) AML.	6,795
Recruitment	Foster, Matthew	Celgene Corporation	LCCC 1111	05/31/12	05/30/15	An Open-Label Dose-Finding Study of Lenalidomide as Reinduction/Consolidation Followed by Lenalidomide Maintenance Therapy for Adults Over 60 Years of Age with AML in Partial or Complete Response Following Induction Therapy	107,033
Recruitment	Foster, Matthew	ICON Clinical Research	B1931022	06/26/13	06/25/16	An Open-label Randomized Phase 3 Study of Inotuzumab Ozogamicin Compared to a Defined Investigator's Choice in Adult Patients with Relapsed or Refractory CD22-Positive Acute Lymphoblastic Leukemia (ALL)	0
Recruitment	Foster, Matthew	Rex Healthcare	CAMN107AUS12T	05/13/13	12/13/14	Pilot Study to Assess Telemonitoring of Gleevec (imatinib mesylate) or Tasigna (nilotinib) Therapy	3,350
Recruitment	Fry, Rebecca	National Inst. of Health	5-R01-ES019315-04	09/20/10	05/31/15	In Utero Exposure to Arsenic, Links to Epigenetic Alterations and Disease	363,075
Recruitment	Fry, Rebecca	National Inst. of Health	3-R01-ES019315-04S2	09/20/10	05/31/15	In Utero Exposure to Arsenic, Links to Epigenetic Alterations and Disease - Supplement	153,816
Recruitment	Frye, Stephen	National Inst. of Health	5-R01-GM100919-03	05/01/12	01/31/16	Discovery of Chemical Probes for Methyl-Lysine Readers	281,200
Recruitment	Garcia-Martinez, Jose	American Foundation for AIDS Research	108684-55-RKMT	10/01/13	09/30/15	Mechanisms of Oral HIV transmission in Breast Milk	75,000
Recruitment	Garcia-Martinez, Jose	National Inst. of Health	1-F32-AI100775-02	05/01/12	04/30/15	Mechanisms of Cell-Associated HIV Transmission in Humanized Mice	52,190
Recruitment	Garcia-Martinez, Jose	National Inst. of Health	5-R01-AI096138-04	07/01/11	06/30/15	Next Generation Pre-exposure Prophylaxis	705,599
Recruitment	Garcia-Martinez, Jose	National Inst. of Health	5-R01-AI073146-07	08/01/13	07/31/18	Prevention of HIV Acquisition by Long-Acting Antiretroviral PrEP	633,949
Recruitment	Garcia-Martinez, Jose	National Inst. of Health	1-R01-AI111899-01	04/01/14	03/31/19	Plug & Purge: In Vivo Targeting of Active HIV Reserviors that Persist Despite ART	586,548
Recruitment	Garcia-Martinez, Jose	National Inst. of Health	5-RO1-AI097012-03	09/01/13	08/31/16	Mode of Action of a Net Tat HIV-1 Inhibitor - Subcontract with Scripps Institute, University of California at San Diego	161,200
Recruitment/Innovation Award	Gershon, Timothy	American Cancer Society	207069	01/01/12	12/13/14	Glycolytic Metabolism as a Novel Therapeutic Target in Medulloblastoma	165,000
Recruitment/Innovation Award	Gershon, Timothy	National Inst. of Health	5-K08-NS077978-02	04/01/13	03/31/16	Aerobic Glycolysis Regulates Apoptosis in Neurogenesis and Medulloblastoma	176,618
Recruitment	Gershon, Timothy	St. Baldrick's Foundation	Not Assigned	07/01/14	06/30/16	Exploiting Bcl-xl Dependence to Improve medulloblastoma Therapy	75,000
Recruitment	Godley, Paul	National Cancer Institute	5-U54-CA153602-04	09/01/10	08/31/15	Carolina Community Network Center to Reduce Cancer Health Disparities (CCNII)	758,720
Innovation Award	Goldstein, Robert	National Inst. of Health	5-R01-GM083071-06	06/01/08	08/31/16	C. Elegans Gastrulation: A Model for Understanding Apical Construction Mechanisms	287,919
Theme Investment/Retention	Graves, Lee	National Cancer Institute	5-U54-CA156733-04	09/01/10	08/31/15	NCCU-LCCC Partnership in Cancer Research - Full Project 4	103,094

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Recruitment	Grilley-Olson, Juneko	Bayer	BAY 80-6946	10/13/11	10/12/14	A Phase 1 Study of BAY 80-6946 (Phosphatidylinositol-3 Kinase Inhibitor) in Combination With Gemcitabine (Treatment A) or Cisplatin Plus Gemcitabine (Treatment B) in Subjects With Advanced Solid Malignancy	5,120
Recruitment	Grilley-Olson, Juneko	GlaxoSmithKline	P3K113794	12/22/10	12/21/14	A Phase I Open-Label, Dose Escalation Study to Investigate the Safety, Pharmacokinetics, Pharmacodynamics, and Clinical Activity of GSK2126458 and GSK 1120212 Combination Therapy in Subjects with Advanced Solid Tumors	83,055
Recruitment	Grilley-Olson, Juneko	GlaxoSmithKline	FGF117360	10/02/13	10/01/16	Multi-arm, Non-randomized, Open-label Phase IB Study to Evaluate GSK3052230 in Combination with Paclitaxel and Carboplatin, or Docetaxel or as Single Agent in Subjects with Solid Malignancies and Derugulated FGF Pathway Signaling	14,888
Recruitment	Grilley-Olson, Juneko	Kyowa Hakko Kirin Pharma	CEP-37250-KHK-2804-001	01/26/12	01/25/15	Two-Part, Open-Label, Multi-Center Phase 1 Study of Monoclonal Antibody CEP-37250/KHK2804 in Subjects with Advanced Solid Tumors	15,943
Recruitment	Grilley-Olson, Juneko	Morphotek, Inc	MORab-004-203-STS	07/26/13	07/26/15	A Study of the Safety and Efficacy of the Combination of Gemcitabine and Docetaxel with MORab-004 in Metastatic Soft Tissue Sarcoma	8,850
Recruitment	Grilley-Olson, Juneko	Novartis Pharmaceutical Corporation	CBKM120ZUS40	01/07/14	12/31/17	Modular Phase II Study to Link Targeted Therapy to Patients with Pathway Activated Tumors: Module 1 - BKM120 for Patients with PI3K-activated Tumors	1,121
Recruitment	Grilley-Olson, Juneko	Peregrine Pharmaceutical	LCCC 1030	02/18/11	02/17/15	A Phase I Study of Bavituximab plus Carboplatin and Pemetrexed in Untreated Locally Advanced or Metastatic Non-squamous NSLC	63,185
Recruitment	Gupton, Stephanie	National Inst. of Health	1-R01-GM108970-01	01/01/14	12/31/18	TRIM9 Coordinates Membrane Trafficking and Cytoskeletal Dynamics	287,252
Retention	Hahn, Klaus	Arthritis Foundation	5536	10/01/11	09/30/14	Spatio-temporal Dynamics of Rho Family Signaling in Leukocyte TEM	50,000
Retention	Hahn, Klaus	National Inst. of Health	5-R01-GM090317-04	09/01/09	08/31/14	Quantitative Imaging of Signaling Networks-Subcontract with Harvard	432,323
Retention	Hahn, Klaus	National Inst. of Health	1-P01-GM103723-01	12/01/12	11/30/17	Spatio-temporal Dynamics of GEF-GTPase Networks	1,125,220
Retention	Hahn, Klaus	National Inst. of Health	5-UO1-GM094663-05	07/01/13	06/30/15	Assembly, Dynamics and Evolution of Cell-Cell and Cell Matrix Adhesions - Subcontract with Sanford Burham Medical Research Institute	135,165
Retention	Hayes, David	Eli Lilly	14E-MC-JXBA	05/21/10	05/20/15	(IMCL-CP01-0861) Phase 2 Study to Evaluate the Pharmacokinetics and Drug-Drug Interaction of Cetuximab and Cisplatin in Patients with Recurrent or Metastatic Carcinoma of the Head and Neck	3,343
Retention	Hayes, David	GeneCentric	Not Assigned	01/01/12	12/31/14	Validation of Lung Observations	31,959
Retention	Hayes, David	GeneCentric	Not Assigned	03/01/14	12/31/15	Velo3 Genecentric Agreement	158,346
Retention	Hayes, David	Genentech Inc.	GO28076	11/15/12	11/14/14	A Phase II, Open-Label, Randomized Study of MEHD7954A Versus Cetuximab in Patients with Recurrent/Metastic Squamous Cell Carcinoma of the Head and Neck Who Have Progressed During or Following Platinum-Based Chemotherapy	15,126
Retention	Hayes, David	National Cancer Institute	1-U10-CA181009-01	03/01/14	02/28/19	Network Group Integrated Translational Science Centers Application	700,000
Retention	Hayes, David	Pharmaceutical Research Assoc	VRXP-A202	12/18/13	12/19/16	A Randomized, Double-Blind, Placebo-Controlled Study of Chemotherapy Plus Cetuximab i n Combination with VTX-2337 in Patients with Recurrent or Metastatic SCCHN	16,848

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Recruitment	Hayes, Liza	Mary Kay Ash Charitable Foundation	062-13	07/01/13	06/30/15	Reversing Carcinogenic Effect of Obesity on Basal-like Breast Cancer	100,000
Recruitment	Hayes, Liza	National Cancer Institute	5-R21-CA180134-02	08/07/13	07/31/15	(PQA2) Reversing Carcinogenic Effect of Obesity on Basal-like Breast Cancer	154,570
Theme Invest (HTS)	Henderson, Gail	National Inst. of Health	5-P50-HG004488-07	09/27/07	05/31/18	Center for Genomics and Society	1,189,388
Innovation Award	Huang, Leaf	National Cancer Institute	5-R01-CA149363-05	04/01/10	03/31/15	Novel Nanoparticles for siRNA Delivery	285,192
Innovation Award	Huang, Leaf	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence- Project 2	243,701
Innovation Award	Huang, Leaf	National Inst. of Health	1-R01-DK100664-01	09/10/13	08/31/18	Hepatic Non-Viral Gene Therapy	330,600
Recruitment	Hursting, Stephen D.	The Breast Cancer Research Fund	Not Assigned	10/01/14	09/30/15	High Dose Omega-3 Gatty Acids and Weight Loss for Breast Cancer Prevention: The Role of Epigenetic Reprogramming	249,355
Retention	Ibrahim, Joseph	AMGEN Inc.	Not Assigned	07/31/08	12/31/14	Supported Research Agreement - Amgen, Inc.	164,474
Retention	Ibrahim, Joseph	AMGEN Inc.	PO 7200322732	07/31/08	12/31/14	Supported Research Agreement	105,000
Retention	Ibrahim, Joseph	AMGEN Inc.	PO#7200322732	01/01/14	12/31/14	Amgen Amendment #4	250,000
Retention	Ibrahim, Joseph	Eli Lilly	Not Assigned	09/19/11	03/31/15	Eli Lilly Master Agreement	65,789
Retention	Ibrahim, Joseph	Merck & Co.	Not Assigned	07/01/09	02/28/17	Methods for Interim Analysis with Incomplete Adjudication of Events	475,401
Retention	Ibrahim, Joseph	National Cancer Institute	5-T32-CA106209-09	05/01/04	06/30/16	Biostatistics for Research in Genomics and Cancer	133,574
Retention	Ibrahim, Joseph	National Inst. of Health	5-R01-GM070335-14	03/01/96	08/31/15	Bayesian Approaches to Model Selection for Survival Data	316,928
Recruitment	Innocenti, Federico	Alliance for Clinical Trials	Not Assigned	10/01/13	09/30/14	Alliance for Clinical Trials in Oncology 40503 Genotyping	13,640
Recruitment	Innocenti, Federico	National Cancer Institute	5-K07-CA140390-06	09/23/09	08/31/14	Genome-Wide Molecular Epidemiology of Treatment Outcome and Cancer Risk	130,043
Recruitment	Innocenti, Federico	National Cancer Institute	1-R21-CA178550-01A1	04/01/14	03/31/16	A New Model for Discovering Genetic Determinants of Angiogenesis and the Effect of Angiogenesis Inhibitors	165,300
Recruitment	Jamieson, Katarzyna	Astellas Pharma, Inc	0113-CL-1004	09/11/13	10/03/16	A Randomized, Double-Blind, Placebo-Controlled, Phase III Trial to Evaluate the Protective Efficacy and Safety of a Therapeutic Vaccine. ASP0113, in Cytomegalovirus (CMV)-Seropositive Recipients Undergoing Allogenic, Hematopoietic Cell Transplant (HCT)	13,000
Recruitment	Jamieson, Katarzyna	GlaxoSmithKline	Zoster-039	08/13/13	07/13/16	A Phase III, Randomized, Observer-blind, Placebo-controlled, Multicenter Study to Assess the Safety and Immunogenicity of GSK Biologicals' Herpes Zoster HZ/su Candidate Vaccine when Administered Intramuscularly on a Two Dose Schedule to Adults Aged 18 Yea	16,552
Recruitment	Jobin, Christian	National Inst. of Health	5-R01-DK073338-06	04/01/07	03/31/17	Role of Bacteria in Colitis-Associated Colon Cancer	343,474
Theme Investment (CBCS,HTS)	Johnson, Gary	Department of Defense	W81XWH-12-1-0129	09/30/12	09/29/14	Targeted Therapy for MAP3K1 and MAP2K4 Mutant Estrogen Receptor Positive Breast Cancer	236,501
Theme Investment (CBCS, HTS)/Innovation Award	Johnson, Gary	National Cancer Institute	2-P50-CA058223-20	09/01/12	08/31/17	SPORE in Breast Cancer - Project 5	204,986
Theme Investment (CBCS,HTS)	Johnson, Gary	National Inst. of Health	5-R01-GM068820-11	08/01/03	07/31/16	Function of Cerebral Cavernous Malformation Proteins	494,372
Theme Investment (CBCS,HTS)	Johnson, Gary	National Inst. of Health	5-R01-GM101141-03	04/15/12	01/31/16	Kinome Reprogramming in Response to Targeted Kinase Inhibitors	277,181

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Theme Investment (Proteomics, HTS)	Johnson, Gary	National Inst. of Health	1-UO1-MH104999-01	08/01/14	07/31/17	Activation and Regulation of the Understudied Kinome Using MIB/MS Technology	399,282
Theme Investment (CBCS, HTS, MP1U)/Innovation	Johnson, Gary	Susan G. Komen Foundation	IIR12225201	01/01/13	12/31/16	Whole Kinome Profiling and Remodeling in HER2+ Breast Cancer	244,838
Theme Invest (HTS)	Jones, Corbin	N.C. Biotechnology Center	2013-MRG-1110	07/01/13	06/30/15	Developing REA (Repetitive Element Assembler) Algorithm for Assembling Repetitive and Hyper-Variable Geneomic Regions	390,777
Theme Invest (HTS)	Juliano, Jonathan	National Inst. of Health	5-R01-AI089819-03	06/01/10	05/31/15	Within Host Selection of P. falciparum Variants by Artemisinin Combination Therapy	329,671
Recruitment	Kabanov, Alexander	National Cancer Institute	5-U01-CA151806-05	09/20/10	07/31/15	High Capacity Nanocarriers for Cancer Chemotherapeutics	375,556
Recruitment	Kabanov, Alexander	National Inst. of Health	5-R01-NS051334-09	04/01/05	03/31/15	Polypeptide Modification for Enhanced Brain Delivery	340,541
Recruitment	Kasow, Kim	National Childhood Cancer Foundation	CTN 0601	03/01/10	02/28/16	CTN 0601 Unrelated Donor Hematopoietic Cell Transplantation for Children with Severe Sickle Cell Disease Using a Reduced Intensity Conditioning Regime	7,537
Recruitment	Kasow, Kim	National Inst. of Health	TCRN-NMD-0901	08/01/09	07/31/14	TCRN-NMD-0901 Unrelated Donor Hematopoietic Cell Transplantation for Children with Severe Thalassemia Using a Reduced Intensity Conditioning Regimen (The URTH Trial) - Subcontract with New England Research Institutes	4,000
Recruitment	Kasow, Kim	National Marrow Donor Program	16664	11/22/11	11/21/14	09-MRD The Role of Minimal Residual Disease Testing before and after Hematopoietic Cell Transplantation for Pediatric Acute Myeloid Leukemia	1,000
Opportunity Fund Invest Ret	Keku, Temitope	National Cancer Institute	5-R01-CA136887-05	05/01/09	02/28/15	Intestinal Microbiota, Diet and Risk of Colorectal Adenomas	145,965
Retention	Key, Nigel	Baxter Healthcare	Not Assigned	10/14/11	10/13/14	An Observational Study of Postoperative Deep Venous Thrombosis (DVT) in Hemophilics Undergoing Major Orthopedic Surgery	75,313
Retention	Key, Nigel	Hemostasis and Thrombosis Research Society	Not Assigned	07/01/12	06/30/15	Exploratory study to assess the potential contribution of tissue factor and microparticles to disease pathogenesis and the activated state of coagulation in inflammatory bowel disease	81,000
Retention	Key, Nigel	McMaster University	Not Assigned	05/07/09	10/31/14	DODS - D-dimer Optimal Duration Study	5,600
Retention	Key, Nigel	National Inst. of Health	5-T32-HL007149-37	07/01/12	06/30/17	Research Fellowships in Hematology/Oncology	338,588
Retention	Key, Nigel	National Inst. of Health	5-U01-HL072355-10	09/30/02	08/31/14	Clinical Trials in Transfusion Medicine and Hemostasis	159,688
Retention	Key, Nigel	National Inst. of Health	5-K12-HL087097-08	05/01/14	04/30/15	Duke/UNC clinical hematology and Transfusion Research Career Development Program K12 - Subcontract with Duke Univeristy Medical Cener	25,175
Innovation Award	Kim, William	Damon Runyon-Walter Winchell Foundation	46C-09	07/01/12	06/30/14	Defining Synthetic Lethal Targets of mTOR Inhibition in Renal Cell Carcinoma	300,000
Theme Invest (HTS)	Knowles, Michael R.	Natl Heart, Lung, & Blood Inst	5-R01-HL68890-11A1	09/01/06	06/30/15	Gene Modifiers in CF Lung Disease	768,095
Retention	Kosorok, Michael	National Inst. of Health	5-P01-CA142538-05	04/01/10	03/31/15	Statistical Methods for Cancer Clinical Trials - Project 4	196,429
Recruitment	Laederach, Alain	National Inst. of Health	5-R01-HL111527-03	01/01/12	12/31/16	Non-Coding RNA Structure Change in Chronic Obstructive Pulmonary Disease	360,052
Recruitment	Laederach, Alain	National Inst. of Health	5-R01-GM101237-03	05/01/14	04/30/15	Structural and Functional Consequences of Disease SNPS on the Transcriptome	273,639

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Recruitment	Lai, Samuel	David and Lucile Packard Foundation	2013-39274	10/15/13	10/14/18	Harnessing Antibody-mucin Interactions	174,999
Recruitment	Lai, Samuel	National Science Foundation	DMR-1151477	04/15/12	03/31/17	Synthetic Nanoprobes Reveal Novel Biophysical Immune Protective Mechanism of Mucus	79,999
Recruitment	Lai, Samuel	PhRMA Foundation	Not Assigned	02/01/13	01/31/15	Engineering Immune-inert for Lymphatic Drug Delivery	20,000
Innovation Award	Lawrence, David	National Cancer Institute	5-R01-CA140173-05	05/01/09	02/28/15	Signaling Network Dynamics in Metastatic Prostate Cancer	386,344
Recruitment	Lee, Carrie	GlaxoSmithKline	BRA116598/LCCC 1128	01/07/13	01/06/16	Open Label Phase 11 Trial of the BRAF Inhibitor (Dabrafenib) and the MEK Inhibitor (Trametininb) in Unresectable Stage 111 and Stage IV BRAF Mutant Melanoma; Correlation of Resistance with the Kinome and Functional Mutations	146,616
Recruitment	Lee, Carrie	Millennium Pharmaceuticals, Inc.	C15010	06/20/13	06/19/16	A Phase 1b, Open-Label, Dose Escalation, Multi-arm Study of MLN4924 Plus Docetaxel, Gemcitabine, or Combination of Carboplatin and Paclitaxel in Patients with Solid Tumors	161,210
Recruitment	Lee, Carrie	Quintiles, Inc	GP28363	12/11/13	12/10/16	A Phase Ib Study of the Safety and Pharmacology of MPDL3280A Administered iwth Cobimetinib in Patients with Locally Advanced or Metastic Solid Tumors	25,213
Recruitment	Lemon, Stanley	Merck & Co.	40420	02/10/12	02/09/15	Antiviral Mechanisms and Emergence of Resistance to HCV Protease Inhibitors	193,422
Recruitment	Lemon, Stanley	Merck & Co.	Not Assigned	04/01/13	03/31/15	High-Fidelity Primer ID Sequencing of NS5A-Coding RNA in Patient Samples	126,682
Recruitment	Lemon, Stanley	National Cancer Institute	5-R01-CA164029-03	05/01/12	03/31/17	Murine Model of HCV-Associated Human Liver Cancer	456,574
Recruitment	Lemon, Stanley	National Inst. of Health	1-R01-AI095690-04	04/01/11	03/31/16	Micro-RNA 122 and Chronic Hepatitis C	346,286
Recruitment	Lemon, Stanley	National Inst. of Health	5-R01-AI103083-03	09/01/12	08/31/17	Membrane Hijacking: Biogenesis and Fate of Enveloped Hepatovirus	380,000
Recruitment	Lemon, Stanley	National Inst. of Health	1-U19-AI109965-01	03/01/14	02/28/19	Discovery of New Innate Immune Pathways in Viral Recognition - Project 2 - Novel Pathogen Recognition Pathways and Control of Hepatitis A Virus	429,700
Retention	Lieb, Jason	National Inst. of Health	1-R01-HG006787-01	04/23/12	02/28/15	Highly Parallel Functional Characterization of Human Regulatory Elements	446,265
Theme Investment/Retention	Linnan, Laura	Centers for Disease Control	2-R49-CE002479-01	08/01/14	07/31/19	UNC Injury Prevention Research Center	408,961
Retention	Linnan, Laura	Kate B. Reynolds Health Care Trust	Not Assigned	07/01/14	03/31/15	Workplace Wellness Plan for McDowell County - Subcontract with McDowell County	27,500
Theme Investment/Retention	Linnan, Laura	National Cancer Institute	5-U54-CA156733-04	09/01/10	08/31/15	NCCU-LCCC Partnership in Cancer Research - Full Project 3	113,777
Retention	Lund, Pauline	National Inst. of Health	5-RO1-DK40247-22	05/01/89	06/30/15	Intestinal Adaptation: Role of Hormones and Growth Factors	335,352
Retention	Lund, Pauline	National Inst. of Health	1-R01-AG041198-03	08/01/12	06/30/17	Aging Intestinal Stem Cells and Insulin/IGF System	309,337
Theme Investment (CC)	Magnuson, Terry	National Inst. of Health	5-U42-RR014817-15	09/30/99	02/28/15	A Carolina Center to Characterize and Maintain Mutant Mice	1,429,301
Theme Investment (CC)	Magnuson, Terry	National Inst. of Health	3-U42-010924-15S1	07/01/14	02/28/15	Using CRISPR/Cas9 to Develop Improved Mouse Models of Influenza A Virus Disease - Supplement	233,280
Recruitment	Major, Michael	American Cancer Society	RSG-14-068-01-TBE	07/01/14	06/30/18	Mechanisms Controlling KEAP1 Function in Cancer	178,572
Recruitment	Major, Michael	National Cancer Institute	1-R21-CA178760-01A1	09/01/14	08/31/16	Mass Spectrometry-Coupled Hypermorphic Functional Genomics	226,920
Recruitment	Major, Michael	National Inst. of Health	1-DP20-OD007149-04	09/01/10	06/30/15	Exploitation of Near-Haploid Human Cells for Functional Gene Discovery	400,636

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Recruitment	Major, Michael	Sarcoma Foundation of America	Not Assigned	06/01/14	05/31/15	Kinase Activity Profiling in Soft Tissue Sarcoma	50,000
Recruitment/Theme Investment	Major, Michael	V Foundation	Not Assigned	12/01/14	11/30/17	Team Science Approach for Defining the Activation State and Dynamic Reprogramming of the Kinime in Aerodigestive Cancer	200,000
Recruitment	Marks, Lawrence	National Inst. of Health	5-U58-DP003414-03	09/30/11	09/29/14	Improving Access and Utilization of Support Services in Young Breast Cancer Survivors	305,772
Theme Invest (HTS)	Matera, Arnold	National Inst. of Health	5-R01-GM053034-18	05/01/96	04/30/15	Biogenesis of Small Ribonucleoproteins	394,430
Theme Invest (HTS)	Matera, Arnold	National Inst. of Health	5-R01-NS041617-11-12	08/01/01	07/31/14	Coilin, Cajal Bodies and Spinal Muscular Atrophy	292,392
Recruitment	McRee, Autumn	GlaxoSmithKline	MEK1168833	04/30/13	04/29/16	An Open-Label, Three-Part,Phase 1/11 Study to Investigate the Safety, Pharmacokinetics, Pharmacodynamics, and Clinical Activity of the MEK Inhibitor GSK1120212, BRAF Inhibitor GSK2118436 and the Anti-EGFR Antibody Panitumumab in Combinationin Subjects wit	18,219
Recruitment	McRee, Autumn	Novartis Pharmaceutical Corporation	LCCC 1036	05/01/12	12/31/14	A Phase I Study of BKM120 with mFOLFOX6 in Patients with Advanced Solid Tumors with Expansion Cohorts in KRAS Wild Type Metastatic Colorectal and Metastatic Pancreatic Cancers	18,048
Recruitment	Miao, Edward	National Inst. of Health	5-R01-AI097518-03	02/01/14	01/31/15	Inflammasome Response to Bacterial Infection	421,239
Retention	Miller, Christopher	Merck & Co.	Not Assigned	08/01/13	12/09/14	Gene Expression Analysis in Vorinostat-Treated GBM by RNAseq	181,882
Retention	Miller, Christopher	National Cancer Institute	5-P30-CA016086-38	12/01/10	11/30/15	Cancer Center Core Support Grant- Translational Pathology Core	259,186
Retention	Miller, Christopher	National Cancer Institute	5-P01-CA151135-04	08/01/11	07/31/16	Epidemiology of Breast Cancer Subtypes in African-American Women: a Consortium, Core C: Biospecimen - Subcontract with Roswell Park Cancer Institute	303,495
Recruitment	Milowsky, Matthew	BIND Biosciences, Inc	BIND-014-004	06/06/13	06/05/16	An Open Label, Multicenter, Phase 2 Study to Determine the Safety and Efficacy of BIND-014-(Docetaxel nanoparticles for Injectable Suspension), Administered to Patients with Metastatic Castration-Resistant Prostate Cancer	26,500
Recruitment	Milowsky, Matthew	Dendreon Corporation	N10-1	06/20/12	06/19/15	A Randomized, Phase 2, Open-label Study Evaluating DN24-02 as Adjuvant Therapy in Subjects with High Risk HER2+ Urothelial Carcinoma	5,476
Recruitment	Milowsky, Matthew	Exelixis	XL184-306	08/28/12	08/27/17	XL184-306 A Phase 3, Randomized, Double-blind, Controlled Trial of Cabozantinib (XL184) vs. Mitoxantrone Plus Prednisone in Men with Previously Treated Symptomatic Castration-resistant Prostate Cancer	876
Recruitment	Milowsky, Matthew	Sloan-Kettering Institute for Cancer Research	MSKCC-12-071	01/01/13	01/02/16	Phase II Study of Neoadjuvant Dose Dense Gemcitabine and Cisplatin (DD GC) In Patients with Muscle-Invasive Bladder Cancer	6,000
Recruitment	Milowsky, Matthew	Sloan-Kettering Institute for Cancer Research	C11-092	05/20/13	05/19/16	A Phase 2, Randomized, 3-Arm Study of Abiraterone Acetate Alone, Abiratreone Acetate Plus Degarelix, a GnRH Antagonist, and Degarelix Alone for Patients with Prostate Cancer with a Rising PSA or Rising PSA and Nodal Disease Following Definitive Radical	10,253
Recruitment	Milowsky, Matthew	Sloan-Kettering Institute for Cancer Research	MSK13-074	11/11/13	10/31/16	Randomized Phase II Trial of Paclitaxel, Ifosfamide, nd Cisplatin (TIP) vs. Bleomycin, Etooposide nd Cisplatin (BEP) for Patients with Previously Untreated Intermediate - and Poor - Risk Germ Cell Tumors.	13,500
Theme Investment (CBCS,HTS)	Mohlke, Karen	National Inst. of Health	5-R01-DK072193-09	09/01/05	05/31/15	Targeted Genetic Analysis of T2D and Quantitative Traits	607,411

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Theme Invest (HTS)	Mohlke, Karen	National Inst. of Health	5-R01-DK093757-04	09/05/11	07/31/16	Genetic Epidemiology of Rare and Regulatory Variants for Metabolic Traits	586,255
Recruitment	Moody, Cary	American Cancer Society	RSG-13-229-01-MPC	07/01/13	06/30/17	The Role of ATM Signaling in the Life Cycle of Human Papillomaviruses	167,651
Recruitment	Moody, Cary	National Cancer Institute	1-R01-CA181581-01A1	07/01/14	06/30/19	Regulation of Human Papillomavirus Replication by the DNA Damage Response	315,400
Recruitment	Moorman, Nathaniel	National Inst. of Health	5-R01-AI103311-02	12/01/12	11/30/17	The Role of Host and Viral Translation Factors During HCMV Infection	340,430
Recruitment	Moschos, Stergios	Merck & Co.	MK-8353-001	11/29/12	11/28/15	A Phase I Study to Evaluate the Safety, Tolerability and Efficacy of SCH 900353 in Subjects with Advanced Solid Tumors (SCH 900353/ P06203)	38,462
Recruitment	Moschos, Stergios	Merck & Co.	MK-3475-002-29	02/15/13	02/14/16	Randomized, Phase II Study of MK-3475 Versus Chemotherapy in Patients with Advanced Melanoma	201,441
Recruitment	Moschos, Stergios (Sharpless, Norman)	National Cancer Institute	3-P30-CA016086-38S3	09/01/14	08/31/16	Cancer Center Core Support Grant - Team Leadership Award (CCITLA) - Supplement	11,838
Recruitment	Muss , Hyman	Kay Yow Cancer Foundation	Not Assigned	03/01/14	02/28/18	Impact of Physical Activity on Biomarkers of Aging and Body Composition Among Breast Cancer Survivors Age 65 and Older	249,978
Recruitment	Muss , Hyman	National Inst. of Health	5-RO1-AG037037-01A1	08/15/11	07/31/15	Clinical and Biological Predictors of Chemotherapy Toxicity in Older Adults with Cancer - Subcontract with City of Hope	21,942
Recruitment	Muss , Hyman	National Inst. of Health	1-ROO1-AG037037-03	10/24/13	10/23/14	Tolerability of the Combination of Lapatinib and Trastuzumab in Adults Age 60 or Older with HER2+ Positive Metastatic Breast Cancer - Subcontract with City of Hope	34,500
Recruitment	Muss , Hyman	The Breast Cancer Research Fund	Not Assigned	10/01/10	09/30/15	P16INK4a Gene Expression of Chemotherapy Toxicity and Age	250,000
Recruitment	Nicholson, Wanda	National Inst. of Health	2-R21-DK09518-02	04/01/13	03/31/15	A Transgenerational e-Intervention for Gestational Diabetics and Thier Offspring	222,000
Recruitment	Nicholson, Wanda	National Inst. of Health	1-R21-DK095189-02	04/01/13	03/31/15	A Transgenerational E-Intervention for Gestational Diabetics and Their Offspring	190,000
Recruitment	Noar, Seth (Ammerman, Alice)	Blue Cross Blue Shield of North Carolina Found	UNC-HDHP-1012-1113	12/01/12	04/30/15	BCBS Healthy School Meal Pilot-Social Marketing and Evaluation Plan- Supplement	99,584
Theme Investment (CBCS,HTS)	Olshan, Andrew	National Cancer Institute	5-PO1-CA151135-04	08/01/11	07/31/16	Epidemiology of Breast Cancer Subtypes in African-American Women: a Consortium, Core A: Administration - Subcontract with Roswell Park Cancer Institute	32,317
Theme Investment (CBCS,HTS)	Olshan, Andrew	National Cancer Institute	5-P01-CA151135-04	08/01/11	07/31/16	Epidemiology of Breast Cancer Subtypes in African-American Women: a Consortium, Core B: CBPR - Subcontract with Roswell Park Cancer Institute	272,625
Recruitment	Park, Steven	GlaxoSmithKline	OMB112517	05/06/10	05/05/15	A Phase III, Open Label, Randomized, Multicenter Trial of Ofatumumab Maintenance Treatment versus No Further Treatment in Subjects with Relapsed Chronic Lymphocytic Leukemia (CLL) who have Responded to Induction Therapy	7,120
Recruitment	Park, Steven	GlaxoSmithKline	OMB110928	02/13/12	02/12/15	Ofatumumab versus Rituximab Salvage Chemoimmunotherapy followed by ASCT in Relapsed or Refractory DLBCL	8,719
Recruitment	Park, Steven	Millennium Pharmaceuticals, Inc.	C14011	09/14/11	09/13/14	A Multicenter, Phase 1-2 Study of MLN8237, an Oral Aurora A Kinase Inhibitor, in Patients With Relapsed or Refractory Aggressive B-Cell Lymphoma Treated With Rituximab and Vincristine	41,909
Recruitment	Park, Steven	Seattle Genetics	LCCC 1115	04/26/12	04/25/15	A Pilot Feasibility Trial of Induction Chemotherapy with ABVD Followed by Brentuximab Vedotin (SGN-35) Consolidation in Patients with Previously Untreated Non-bulky Stage I or II Hodkin Lymphoma (HL)	258,307

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Theme Invest (HTS)	Perou, Charles	National Cancer Institute	5-U24-CA143848-05	09/29/09	07/31/15	Gene Expression Patterns in Human Tumors Identified Using Transcript Sequencing	3,777,583
Theme Invest (HTS)	Perou, Charles	National Cancer Institute	5-RO1-CA148761-05	03/17/10	12/31/14	Therapeutic Targeting of Breast Cancer Tumor Initiating Cells - Subcontract with Baylor College of Medicine	184,112
Theme Investment (CBCS,HTS)	Perou, Charles	National Cancer Institute	2-P50-CA058223-20	09/01/12	08/31/17	SPORE in Breast Cancer - Project 3	402,792
Theme Investment (CBCS,HTS)	Perou, Charles	National Cancer Institute	2-P50-CA058223-20	09/01/12	08/31/17	SPORE in Breast Cancer - Core B: Genomics & Data Analysis	203,483
Theme Invest (HTS)	Perou, Charles	The Breast Cancer Research Fund	Not Assigned	10/01/08	09/30/14	Molecular Therapeutics for Luminal Tumor Subtypes	240,000
Theme Invest (HTS)	Philpot, Benjamin	National Inst. of Health	5-RO1-MH093372-03	12/01/11	11/30/16	Epigenetic Regulation of Ube3a as a Treatment for Angelman Syndrom	607,649
Theme Investment (CC)	Pomp, Daniel (Zeisel, Steven)	National Inst. of Health	5-P30-DK056350-14	04/01/06	03/31/16	UNC Clinical Nutrition Obesity Research Center	1,123,498
Theme Invest (HTS)	Powell, Cynthia	National Inst. of Health	1-U19-HD077632-01	09/05/13	08/31/18	NC NEXUS, North Carolina Newborn Exome Sequencing for Universal Screening	1,151,384
Recruitment	Powell, Wizdom	National Inst. of Health	1-K01-DA032611-01A1	07/01/14	06/30/19	Neighborhoods, daily stress, affect regulation, & Black male substance useNeighborhoods, Daily Stress, Affect Regulation, & Black Male Substance Use	155,294
Theme Invest (HTS)	Prins, Jan	National Inst. of Health	1-R01-HG006272-01A1	07/01/12	06/30/15	Unlocking Transcript Diversity via Differential Analyses of Splice Graphs	425,000
Recruitment	Purvis, Jeremy	National Inst. of Health	3-ROO-GM120372-02S1	09/01/12	08/31/16	Dynamics of Cellular Senescence in Single Human Cells	248,330
Retention	Raab-Traub, Nancy	National Cancer Institute	5-P01-CA019014-35	07/01/11	06/30/16	Herpesviral Oncogenesis, Latency and Reactivation	1,722,119
Retention	Ramsey, John (Mike)	Defense Threat Reduction Agency	W911NF-12-1-0539	09/10/12	12/09/14	Micro Ion Trap Mass Spectrometer	2,549,963
Retention	Ramsey, John (Mike)	Department of Defense	HR0011-12-2-0001	05/06/13	11/05/16	Reconfigurable Multi Element Diagnostic ReMEDx	2,326,749
Retention	Ramsey, John (Mike)	National Inst. of Health	5-R01-GM066018-11	07/01/03	07/31/14	Single Cell Electroportation - Subcontract with University of Pittsburg	64,707
Retention	Ramsey, John (Mike)	National Inst. of Health	5-R01-HG007407-02	09/01/13	08/31/17	Nanofluidic Platforms for High Resolution Mapping of Genomic DNA	496,651
Theme Invest (HTS)	Randell, Scott H.	National Inst. of Health	5-UO1-HL111018-02	01/01/12	12/31/16	An Integrated Approach to Airway Epithelial Repair and Regeneration	646,359
Recruitment	Reeder-Hayes, Katherine	Dana Farber Cancer Institute	TBCRC 012	04/03/13	04/02/16	ABCDE: A Randomized Trial of Becacizumab and Metronomic Chemotherapy Versus Observation in the Post-preoperative Setting	143,500
Recruitment	Reeve, Bryce	Alex's Lemonade Stand Foundation	Not Assigned	01/01/14	12/31/15	Evaluation of the Literacy Demand and racial/Ethnic Influences for Self-Reported Symptomatic Adverse Events during Childhood Cancer Therapy - Subcontract with Palmetto Health	13,755
Recruitment	Reeve, Bryce	National Cancer Institute	1-R01-CA160104-04	09/09/11	07/03/16	Health-Related Quality of Life Values for Cancer Survivors: Enhancing the Application of PROMIS Measures for Comparative Effectiveness - Subcontract with H. Lee Moffitt Cancer Center and Research Institute	45,009
Recruitment	Reeve, Bryce	National Cancer Institute	5-RO1-CA174453-03	09/01/12	07/31/15	PROMIS Validation in Prospective Population-Based Prostate Cancer Research Study	271,719
Recruitment	Reeve, Bryce	National Cancer Institute	1-R01-CA175759-02	04/01/13	03/31/18	Creating and Validating Child Adverse Event Reporting in Oncology Trials	623,121
Recruitment	Reeve, Bryce	National Cancer Institute	3-RO1-CA175759-02S1	09/01/14	03/31/17	Creating and Validating Child Adverse Event Reporting in Oncology Trials - Supplement	48,511
Recruitment	Reeve, Bryce	National Cancer Institute	5-RO1-CA174453-03	08/01/14	07/31/15	PROMIS Valildation in Prospective Population-based Prostate Cancer Research Study - Supplement	150,000

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Recruitment	Reeve, Bryce	National Inst. of Health	RX 4442-007-UNCCH	07/01/14	06/30/15	Validation of PROMIS in Diverse Cancer Populations - Supplement - Subcontract with Georgetown University	26,975
Recruitment	Reeve, Bryce	Patient-Centered Outcomes Research Institute	1-312-0214129/888-11-16-	10/01/13	11/30/16	Measuring Patient-Centered Communication for Colorectal Cancer Care and Research - Subcontract with Research Triangle Institute (RTI International)	125,055
Recruitment	Rini, Christine	National Inst. of Health	1-P60-AR064166-01	07/19/13	06/30/18	Clarifying Critical Processes Linking Partner Support to Insufficiently Active	279,769
Recruitment	Robinson, Whitney	National Cancer Institute	1-KO1-CA172717-03	09/01/12	08/31/17	Racial Disparities in Cancer Outcomes: Quantifying Modifiable Mechanisms	126,374
Recruitment	Rosenstein, Donald	Lance Armstrong Foundation	Not Assigned	01/01/08	12/31/14	NC STRONG Center for Healthy Survivorships: Lineberger Lance Armstrong Center of Excellence and Community Partnerships	220,000
Recruitment	Rosenstein, Donald	Susan G. Komen Foundation	Not Assigned	04/01/14	03/31/15	TLC-UNC: Transforming Lymphedema Care for Underserved North Carolinians	50,000
Recruitment	Roth, Bryan	National Inst. of Health	5-U19-MH082441-08	09/28/07	04/30/14	Functional Selectivity: A Novel Approach for CNS Drug Discovery	1,527,521
Theme Investment (CC)	Rusyn, Ivan	National Inst. of Health	1-R01-ES023195-02	08/26/13	05/31/17	Genes, Genomes and Genotoxicity: In Vivo Epigenetic Toxicology of 1,3-Butadiene	542,413
Recruitment	Sanoff, Hanna	Bayer	LCCC 1029	12/06/10	08/31/15	Randomized Phase II Study of Regorafenib in Combination with FOLFIRI (Irinotecan, r-Fluoracil, and Leucovorin) versus Placebo in Combination with FOLFIRI as Second Line Therapy in Patients with KRAS or BRAF Mutant Metastatic Colorectal Cancer	1,173,255
Recruitment	Sanoff, Hanna	Jennerex	JX594-CR019	09/12/12	09/12/15	A Phase 1/2a Dose-escalation Study of JX-594 Administered by Multiple Intravenous Infusions Followed by Intratumoral Boosts Alone and in Combination with Irinotecan in Patients with Metastatic Refractory Colorectal Carcinoma	17,171
Recruitment	Sanoff, Hanna	National Cancer Institute	7-KO7-CA160722-03	09/01/12	08/31/16	Use and Comparative Effectiveness of Innovative Therapies for Hepatoellular Carcinoma	170,100
Retention	Schoenfisch, Mark	National Inst. of Health	1-R21-AI097539-01A1	07/01/12	06/30/14	Temporal Analysis Of Nitric Oxide As Potential Sepsis Biomarker	182,741
Retention	Serody, Jonathan	GlaxoSmithKline	Zoster 001/006/015	07/31/10	03/31/15	Zoster 001. Zoster 006. Zoster 015 Plasma and PBMC Processing	40,416
Retention	Serody, Jonathan	National Cancer Institute	5-R01-CA166794-03	04/01/12	03/31/17	Th1/Th17 Macrophage Interactions in Cutaneous GVHD	300,062
Retention	Serody, Jonathan	National Inst. of Health	1-R01-HL115761-02	06/01/12	05/31/16	Targeting CCR7 for the Prevention/Treatment of GvHD	352,240
Recruitment	Sethupathy, Praveen	National Inst. of Health	4-R00-DK091318-02	07/01/12	06/30/15	Discovery of Micro-RNA Regulatory Modules Conrolling Human Pancreatic Islet Function	248,575
Retention	Shaheen, Nicholas	American Society for Gastrointestinal Endoscopy	2012 ASGE	09/01/12	08/30/15	Stratifying Risk in Barrett's Esophagus: Towards Biomarker-Based Patient Management	315,000
Retention	Shaheen, Nicholas	BARRX	Not Assigned	03/03/06	07/01/16	Ablation of Intestinal Metaplasia Containing Dysplasia (AIM Dysplasia Trial) Multi-Center, Randomized, Sham-Controlled Trial	41,109
Retention	Shaheen, Nicholas	CSA Medical, Inc	Not Assigned	03/21/13	03/31/19	A #003 truFreeze Spray Cryotherapy Patient Registry	76,160
Retention	Shaheen, Nicholas	CSA Medical, Inc	Not Assigned	12/14/12	12/13/15	Prevalence of Dysplasia of the Gastric Cardia	98,000
Retention	Shaheen, Nicholas	CSA Medical, Inc	Not Assigned	03/15/13	03/14/15	A Dose-Optimization Study for the Initial Treatment of Dysplastic Barrett's Esophagus with TruFreeze Spray Cryotherapy ("Dose" Trial)	126,595
Recruitment	Shaheen, Nicholas	Diagnovus	Not Assigned	10/01/13	09/30/14	Diagnovus Biomarker Research Project	37,867
Retention	Shaheen, Nicholas	National Cancer Institute	5-U54-CA156733-04	09/01/10	08/31/15	NCCU-LCCC Partnership in Cancer Research - Full Project 1	159,522
Recruitment	Shaheen, Nicholas	National Cancer Institute	RS506502	09/01/11	08/31/16	Barrett's Esophagus Translational Research Network (BETRNet)	38,162

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Retention	Shaheen, Nicholas	National Inst. of Health	5-T35-DK007386-33	05/01/80	02/29/16	Short Term Research Training	184,149
Retention	Shaheen, Nicholas	National Inst. of Health	RES0504795	07/01/10	06/30/15	Familial Barrett's Esophagus- Subcontract with Case Western Reserve University	43,808
Retention	Shaheen, Nicholas	National Inst. of Health	1-K24-DK100548-01	09/17/13	08/31/18	Non-Endoscopic Surveillance for Barrett's Esophagus Following Ablative Therapy	177,185
Theme Investment (MP1U)	Sharpless, Norman	National Cancer Institute	5-UO1-CA141576-05	09/01/09	08/31/14	LKB1 Tumor Suppressor and Human Cancer - Subcontract from the University of Texas Southwestern Medical Center	192,961
Theme Investment (MP1U)	Sharpless, Norman	National Cancer Institute	5-R01-CA163896-03	04/01/12	03/31/17	In vivo Murine Models of Metastasis for Therapeutic Testing	388,202
Theme Investment (MP1U)	Sharpless, Norman	National Cancer Institute	1-RO1-CA185353-01	06/01/14	06/30/18	(PQD5) Predicting Anti-Cancer Efficacy Through Tumor Profiling	405,890
Recruitment	Shen, Dinggang	National Cancer Institute	5-R01-CA140413-05	07/06/10	12/31/14	Online Collection of Patient-Specific Information for Daily Prostate Segmentation	325,070
Recruitment	Shen, Dinggang	National Inst. of Health	5-R01-EB006733-05	09/30/09	08/31/16	Development and Dissemination of Robust Brain MRI Measurement Tools	555,137
Recruitment	Shen, Dinggang	National Inst. of Health	5-R01-EB009634-02	09/01/11	08/31/15	Fast, Robust Analysis of Large Population Data	340,000
Recruitment	Shen, Dinggang	National Inst. of Health	5-R01-EB008374-04	07/15/09	08/31/14	Continued Development of 4-Dimensional Image Warping and Registration Software	320,080
Recruitment	Shen, Dinggang	National Inst. of Health	5-R01-AG041721-03	08/01/12	05/31/15	Quantifying Brain Abnormality By Multimodality Neuroimage Analysis	398,036
Recruitment	Shen, Dinggang	National Inst. of Health	1-RO1-CA140413-03	09/01/12	08/31/15	Quantifying Brain Abnormality by Multimodality Neuroimage Analysis	413,404
Recruitment	Shen, Dinggang	National Inst. of Health	1-R01-MH100217-02	08/26/13	07/31/17	Infant Brain Measurement and Super-Resolution Atlas Contruction	506,315
Recruitment	Shen, Dinggang	National Science Foundation	OCI-1127413	09/01/11	08/31/14	SDCI NET: Development of an Ultra-high Speed End-to-end Transport Stack based on the Packet Design Paradigm.	798,496
Recruitment	Smith, Jennifer S	GlaxoSmithKline	Not Assigned	05/01/13	10/31/14	Multi-site HPV Vaccine Acceptability Study	526,003
Recruitment	Smith, Jennifer S	Merck & Co.	Not Asigned	08/01/12	07/31/14	Opportunities and challenges associated with administering adolescent and adult vaccinations within pharmacies	126,046
Recruitment	Smith, Jennifer S	National Cancer Institute	5-RO1-CA142983-05	07/01/10	06/30/15	Disparities in Cervical Cancer Precursors and Deregulation of Imprinted Regulation - Subcontract with Duke University	14,001
Theme Investment/Retention	Smith, Jennifer S	National Cancer Institute	5-U54-CA156733-04	09/01/10	08/31/15	NCCU-LCCC Partnership in Cancer Research - Pilot Project 1	98,888
Recruitment	Smith, Jennifer S	National Cancer Institute	1-U54-CA156733-04	09/01/10	08/31/15	NCCU-LCCC Partnership in Cancer Research - Pilot Project 2	9,789
Recruitment	Smith, Jennifer S	Trovagene, Inc	14-1248	10/15/13	12/19/14	Detection of HPV Infection in Urine Samples	46,000
Recruitment	Song, Paula	Robert Wood Johnson Foundation	60038386	01/01/15	03/14/15	Accountable Care Organizations: Testing Their Impact - Subcontract with Ohio State University	40,565
Theme Investment (CC)	Sparling, P. Frederick	National Inst. of Health	5-U54-AI057157-10	03/01/12	02/01/13	SERCEB Administration Supplement Request to Support Inbreeding and Genotyping of the CC	241,570
Retention	Stinchcombe, Thomas	Bristol-Myers Squibb	CA209-063	03/11/13	03/10/16	A Single-Arm Phase 2 Study of BMS-936558 in Subjects with Advanced or Metastatic Squamous Cell Non-Small Cell Lung Cancer Who Have Received at Least Two Prior Systemic Regimens	158,885
Retention	Stinchcombe, Thomas	Genentech Inc.	LCCC 0825/ AVF4499s	09/18/09	09/17/14	A Multicenter Phase II Trial of Carboplatin, Pemetrexed, and Bevacizumab Followed by Pemetrexed and Bevacizumab Maintenance Therapy in Patients with a Light...	28,112
Retention	Stinchcombe, Thomas	Genentech Inc.	RC1126	05/16/12	05/16/15	A Randomized Phase II Trial of Erlotinib Alone or In Combination with Bevacizumab in Patients With Non-Small Cell Lung Cancer and Activating Epidermal Growth Factor Receptor Mutations - subcontract from Mayo Clinic	10,731

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Retention	Stinchcombe, Thomas	GlaxoSmithKline	LCCC0921	03/18/10	06/01/15	A Non-Randomized, Multi-Center Open Label Phase II Study of Pazopanib and Pemetrexed or Pazopanib Alone in Stage IIIB/IV Non-Squamous Non-Small Cell Lung Cancer After Progression on First Line Therapy Containing Bevacizumab	46,000
Retention	Stinchcombe, Thomas	National Inst. of Health	1-R21-AG042894-01A1	08/01/13	07/31/15	Translational Meta-analysis for Elderly Lung Cancer Patients - Subcontract with Duke University	8,008
Retention	Stinchcombe, Thomas	PPD Pharmaco	OAM4971G	11/12/12	11/11/15	OAM4971g A Radnomized, Phase III, Multicenter, Double-Blind, Placebo-Controlled Study Evaluating the Efficacy and Safety of Metmab in Combination with Tarceva (Erlotinib) in Patients with Met Diagnostic Positive Non-Small Cell Lung Cancer (NSCLC)	25,400
Theme Investment (ICISS)	Stuermer, Til	National Inst. of Health	2-R01-AG023178-10	12/01/03	03/31/15	Propensity Scores and Preventive Drug Use in the Elderly	320,367
Theme Investment (ICISS)	Stuermer, Til	Patient-Centered Outcomes Research Institute	Not Assigned	10/31/12	12/31/14	Methods to Increase Validity of Comparative Effectiveness Research in the Elderly	673,395
Retention	Styblo, Miroslav	National Inst. of Health	1-R21-ES023690-01A1	07/01/14	06/30/16	The Role of Diet in Diabetes Associated with Arsenic Exposure	223,555
Innovation Award	Su, Lishan	National Inst. of Health	5-R01-AI095097-03	12/01/11	11/30/16	HIV Co-Infection and HCV-induced Liver Fibrosis in vivo	333,000
Theme Invest (HTS)	Sullivan, Patrick	National Inst. of Health	3-U01-MH094421-03	05/01/12	03/31/16	1/4 Psychiatric GWAS Consortium: Genomic Follow-up Next-Gen Sequencing & Genotypi	369,774
Theme Investment (CBCS,HTS)	Sullivan, Patrick	National Inst. of Health	5-R21-MH097173-02	04/01/12	03/31/15	Biomarkers of Olanzapine-induced Weight Gain in Mice	11,100
Theme Invest (HTS)	Swanstrom, Ronald	National Inst. of Health	5-R37-AI044667-15	04/01/10	03/31/15	Biological Properties of HIV-1 V3 Evolutionary Variants	324,285
Theme Invest (HTS)	Swanstrom, Ronald	National Inst. of Health	5-R21-AI108539-02	08/01/13	07/31/15	Development of Novel Methods to Exploit Next Gen Sequencing for HIV	190,000
Theme Investment (CC)	Tarantino, Lisa	National Inst. of Health	1-RO1-MH100241-01	04/19/13	03/31/18	Role of Maternal diet and Allelic Imbalance in Behavior	602,068
Innovation Award	Thomas, Nancy	National Cancer Institute	5-R01-CA112243-10	05/13/05	01/31/15	Melanoma RAS/BRAF Mutation: Heterogeneity-Risk Prognosis	479,355
Theme Investment (CBCS,HTS)	Thorne, Leigh B.	National Cancer Institute	2-P50-CA058223-20	09/01/12	08/31/17	SPORE in Breast Cancer - Core A: Tissue Procurement	77,907
Retention	Ting, Jenny	Multiple Sclerosis Society	RG1785G9/2	09/30/11	09/29/15	The Roles of New Innate Immune Mediators in Neuroinflammation	175,596
Retention	Ting, Jenny	Multiple Sclerosis Society	CA10068	04/01/14	03/31/19	Preclinical Therapeutic Development for Multiple Sclerosis	181,500
Retention	Ting, Jenny	National Cancer Institute	5-RO1-CA156330-04	05/01/11	03/31/16	Colitis, Colon Cancer and the NLR Family	319,871
Retention	Ting, Jenny	National Inst. of Health	5-U19-AI067798-10	08/01/10	07/31/15	Inflammation and Radiation-Induced Lung Injury - Subcontract with Duke University	247,925
Retention	Ting, Jenny	National Inst. of Health	4-R37-AI029564-22	04/01/13	03/31/18	Plexin-A1: Regulation by CIITA and Immunologic Function	384,729
Retention	Ting, Jenny	National Inst. of Health	1-U19-AI109784-01	07/01/14	06/30/19	Novel Nanoparticle Platform for the Delivery of Vaccines and Adjuvants - Project 2	733,519
Retention	Ting, Jenny	National Inst. of Health	1-U19-AI109784-01	07/01/14	06/30/19	Novel Nanoparticle Platform for the Delivery of Vaccines and Adjuvants - Core A	200,688
Retention	Ting, Jenny	National Inst. of Health	1-U19-AI109965-01	03/01/14	02/28/19	Discovery of New Innate Immune Pathways in Viral Recognition - Project 1 Novel Nucleic Acid Sensing NLRs and Innate Immunity to Viruses	431,387
Retention	Ting, Jenny	National Inst. of Health	1-U19-AI109965-01	03/01/14	02/28/19	Discovery of New Innate Immune Pathways in Viral Recognition - Core A - Administrative Core	192,244
Retention	Ting, Jenny	National Inst. of Health	1-U19-AI109965-01	08/01/14	07/31/19	Discovery of New Innate Immune Pathways in Viral Recognition - Supplement	707,959

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Retention	Ting, Jenny	National Inst. of Health	1-U19-AI109965-01	08/15/14	08/14/15	Discovery of New Innate Immune Pathways in Viral Recognition - Supplement 2	300,000
Retention	Ting, Jenny	National Inst. of Health	5-T32-AI07273-30	07/01/84	08/31/15	Basic Immune Mechanisms Training Grant	322,534
Recruitment	Troester, Melissa	National Cancer Institute	5-PO1-CA151135-04	08/01/11	07/31/16	Epidemiology of Breast Cancer Subtypes in African-American Women: a Consortium, Project 1 - Subcontract with Roswell Park Cancer Institute	188,236
Recruitment	Troester, Melissa	National Cancer Institute	5-P01-CA151135-04	08/01/11	07/31/16	Epidemiology of Breast Cancer Subtypes in African-American Women: a Consortium, Project 2 - Subcontract with Roswell Park Cancer Institute	13,449
Recruitment	Troester, Melissa	National Cancer Institute	2-P50-CA058223-20	09/01/12	08/31/17	SPORE in Breast Cancer - Project 1	204,755
Recruitment	Troester, Melissa	National Cancer Institute	1-U54-CA156733-04	09/01/10	08/31/15	NCCU-LCCC Partnership in Cancer Research - Pilot Project 4	58,636
Recruitment	Troester, Melissa	National Cancer Institute	1-U01-CA179715-01A1	06/01/14	05/31/19	Biology of Race and Progression Associated Breast Tumor Gene Expression	313,159
Recruitment	Troester, Melissa	National Inst. of Health	5-U01-ES019472-04	08/17/10	05/31/15	Pregnancy, Obesogenic Environments, and Basal-like Breast Cancer	402,581
Recruitment	Troester, Melissa	National Inst. of Health	1-R21-CA175783-01	09/01/13	08/31/15	HGF Signaling in African-American and Basal-like Breast Cancer - Subcontract with North Carolina Central University (NCCU)	63,390
Recruitment	Valdar, William	National Inst. of Health	1-RO1-GM104125-02	09/01/12	08/31/17	Statistical Modeling of Complex Traits in Genetic Reference Super-Populations	241,086
Recruitment	Valdar, William	National Inst. of Health	5-RO1-DK088975-05	07/01/10	06/30/15	Genome-wide Fine-mapping of Metabolic Traits in Heterogeneous Stock Rats - Subcontract with the Medical College of Wisconsin	29,483
Recruitment	Vaziri, Cyrus	National Inst. of Health	5-R01-ES009558-17	08/01/98	04/30/17	A Novel Carcinogen-Induced Cell Cycle Checkpoint	326,340
Recruitment	Vaziri, Cyrus	National Inst. of Health	1-R01-GM105883-01A1	01/01/14	11/30/16	Targeting the TLS DNA Damage Tolerance Pathway for Cancer Therapy	286,392
Retention	Wallen, Eric	EDAP Technomed	G050103 EDAP TMS SA	10/16/08	12/31/17	ADAP Ablatherm Integrated Imaging High Intensity Focused Untrasound (HIFU) Indicated for Treatment of Low Risk, Localized Prostate Cancer	177,281
Recruitment	Wan, Yisong	Multiple Sclerosis Society	Not Assigned	10/01/12	09/30/15	Therapeutic Effect of Dihydro-Artemisinin on MS Through Suppressing Immune Response	185,752
Recruitment	Wan, Yisong	National Inst. of Health	1-R01-AI097392-03	05/01/12	04/30/17	The Roles of Gata3 in Controlling Treg Function	353,389
Recruitment	Wang, Gang	Amer Society of Hematology	Not Assigned	07/01/14	06/30/16	Epigenetic Therapy of Hematopoietic Malignancies: Novel Approaches for Global and Tissue-Specific Inhibition of EZH2 and Related EZH1 Enzymes	75,000
Recruitment	Wang, Gang	Concern Foundation	Not Assigned	07/01/14	06/30/15	The Role of KDM5 Histone Lysine Demethylases in Leukemia and Lymphoma	60,000
Recruitment	Wang, Gang	Gabrielle's Angel Foundation for Cancer research	84	05/01/14	04/30/17	Novel Approaches to Target prc2 Enzymatic Complexes for the Treatment of Hematopoietic Malignancies	75,000
Recruitment	Wang, Gang	Kimmel Foundation	SKF-14-053	07/01/14	06/30/16	Deciphering the Role of Histone Demethylation Among Hematopoietic Malignancies	100,009
Recruitment	Wang, Gang	National Cancer Institute	5-R00-CA151683-06	09/01/12	08/31/15	Cancer Epigenetics: Understanding Histone Methylation in Leukemia Stem Cells	241,530
Recruitment	Wang, Zhuang	Cerulean Pharma, Inc	LCCC1315	12/06/13	12/05/17	Phase Ib/II Study of Neoadjuvant Chemoradiotherapy with CRLX-101 and Capecitabine for Locally Advanced Rectal Cancer	33,166
Recruitment	Wang, Zhuang	National Cancer Institute	5-R01-CA178748-02	08/15/13	05/31/18	Nanoparticle Formulations of DNA Repair Inhibitors to Improve Chemoradiotherapy	302,717
Recruitment	Wang, Zhuang	National Cancer Institute	1-R21-CA182322-02	09/19/13	08/31/16	Development of 3D Organ-Specific Models of Colorectal Cancer Metastasis	188,617

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Recruitment	Weiss, Jared	Acceleron Pharma, Inc	A041-03	03/27/12	03/26/15	An Open-label Phase 2 Study of ACE-041 in Patients with Recurrent or Metastatic Squamous Cell Carcinoma of the Head and Neck	57,801
Recruitment	Weiss, Jared	Celgene Corporation	LCCC 1103/ABX 270	09/08/11	09/07/14	A Phase II Study of Carboplatin, Nab-Paclitaxel and Cetuximab for Induction Chemotherapy for Locally Advanced Squamous Cell Carcinoma of the Head and Neck	3,507
Recruitment	Weiss, Jared	Celgene Corporation	LCCC 1210	08/29/12	08/29/15	AX-NSCL-PI-0069 Second Line Treatment with Nab-Paclitaxel for the Elderly Patient with Advanced Lung Cancer which has Progressed on at least 1 Prior RegimenA	119,993
Recruitment	Weiss, Jared	GlaxoSmithKline	LCCC 1125	06/26/12	06/25/15	Multimodality Risk Adapted Therapy Including Carboplatin/Paclitaxel/Lapatinib as Induction for Squamous Cell Carcinoma of the Head and Neck Amenable to Transoral Surgical Approaches	164,789
Recruitment	Weiss, Jared	OSI Pharmaceuticals	LCCC 1123	05/15/12	05/14/15	Phase II Study of Stereotactic Radiosurgery or Other Local Ablation Followed by Erlotinib for Patients with EGFR Mutation Who Have Previously Progressed on an EGFR-TKI	25,000
Recruitment	Weiss, Jared	Synta Pharmaceuticals	9090-14	05/29/13	05/26/16	A Randomized, Phase 3 Study of Ganetespib in Combination with Docetaxel Versus Docetaxel Alone i nPatients with Advanced Non-Small-Cell Lung Adenocarcinoma	14,080
Recruitment	Wen, Haitao	National Inst. of Health	5-K01-DK098307-02	04/01/13	03/31/16	The Role and Mechanism of NLRX1-Mediated Cell Stress Response in Insulin Resistance	150,036
Recruitment	Wheeler, Stephanie	American Cancer Society	MRSG-13-157-01-CPPB	01/01/14	12/31/18	Improving Endocrine Therapy Utilization in Racially Diverse Populations	145,722
Recruitment	Whitehurst, Angelique	American Association of Cancer Research	SU2C-AACR-IRG1211	05/01/11	04/30/14	Framing Therapeutic Opportunities in Tumor-Activated Gametogenic Programs	742,500
Recruitment	Whitehurst, Angelique	National Cancer Institute	5-R01-CA154699-01-03	12/01/10	11/30/15	Mechanistic Elaboration of Fragility in the Cancer Cell Mitotic Spindle	284,245
Theme Invest (HTS)	Wilhelmsen, Kirk	National Inst. of Health	5-R01-DA030976-05	09/30/10	05/31/15	Deep Sequencing Studies for Cannabis and Stimulant Dependence	3,178,807
Recruitment	Williams, David	National Cancer Institute	5-RO1-CA039687-27	07/01/13	12/31/14	Human Folylpolyglutamate Synthetase and Cancer Therapeutics - Subcontract with Virginia Commonwealth University (VCU)	4,064
Recruitment	Williams, David	National Inst. of Health	PD302900-SC-105276	07/01/13	05/31/15	Dissection of the Structural Basis of MEIG1 in Assembling Sperm Flagella - Subcontract with Virginia Commonwealth University (VCU)	10,614
Recruitment	Williams, David	National Inst. of Health	5-RO1-GM098264-04	05/01/12	04/30/17	Structural and Functional Diversity of teh Methyl-Binding Domain Protein Family	284,726
Recruitment	Wong, Terence	American College of Radiology	1138	09/01/13	02/28/15	ACRIN Committee Chair Subaward Agreement	17,411
Recruitment	Wood, Jr, William	National Cancer Institute	5-U54-CA163438-05	05/01/12	08/31/14	Fluorescence Conjugated Antibodies and Flow Cytometry Analysis: Project 2 - Subcontract with Fred Hutchinson Cancer Research Center	3,364
Recruitment	Woods, Michael	Cepheid	Not Assigned	07/11/13	04/04/16	Evalution of Xpert Bladder Assay for Detection and Monitoring of Recurrence for Bladder Cancer	17,263
Recruitment	Woods, Michael	National Cancer Institute	7-RO1-CA155388-03	08/01/12	04/30/15	Open vs Robot-Assisted Radical Cystectomy: A Randomized Trial - Subcontract with the University of Miami	35,600
Recruitment	Woods, Michael	Ockham Development Group	RAD-IFN-CS-002	01/18/13	01/17/17	A Phase II, Randomized, Open Label, Parallel Arm Study to Evaluate the Safety and Efficacy of rAd-IFN/Syn3 Following Intravesical Administration in Subjects with High Grade, BCG Refractory or Relapsed Non-Muscle Invasive Bladder Cancer (NMI	96,712

List of Active Extramural Awards

Recruitment	Wu, Jing	Brain Tumor Trials Collaborative	BTTC11-02	09/04/12	09/03/14	Phase I/II Adaptive Randomized Trial of Bevacizumab Versus Bevacizumab Plus Vorinostat in Adults with Recurrent Glioblastoma - Contract with MD Anderson Cancer	2,800
Recruitment	Wu, Jing	Collaborative Medical Research	BTTC11-01	03/14/12	03/14/15	Randomized, Double-Blind , Placebo-Controlled Trial of Lacosamide for Seizure Prophylaxis in Patients with Malignant Gliomas - Subcontract with Universaity of Texas MD Anderson Cancer Center	6,000
Recruitment	Wu, Jing	Collaborative Medical Research	BTTC09-01	07/31/13	07/31/16	A Phase I-II Trial Everolimus and Sorafenib in Patients wtih Recurrent High-Grade Gilomas - MD Anderson Subcontract	5,000
Recruitment	Wu, Jing	MD Anderson Cancer Center	CERN 08-02	11/01/12	10/31/15	A Phase 11 Study of Dose-Dense Temozolomide adn Lapatinib for Recurrent Low-Grade and Anaplastic Supratentorial, Infratentorial and Spinal Cord Ependymoma	2,000
Innovation Award	Xiong, Yue	National Cancer Institute	5-R01-CA163834-03	03/01/12	02/28/17	Mechanisms of Metabolic Gene Mutations in Cancer	297,887
Recruitment	Yang, Yang	National Inst. of Health	5-K01-AG036745-05	08/01/10	07/31/15	Sex Differences in Health and Longevity: A Social and Biodemographic Approach	120,339
Recruitment	Yang, Yang	National Inst. of Health	Not Assigned	09/01/13	08/31/17	Veterans and Substance Use Over the Life Course - Subcontract with University of Colorado Denver	77,474
Innovation Award	Yeh, Jen Jen	Lustgarten Foundation	Not Assigned	05/01/13	04/30/16	Rational Identification of Combination Strategies for BKM120 Therapy	313,967
Innovation Award	Yeh, Jen Jen	National Cancer Institute	5-R01-CA140424-05	04/08/10	01/31/15	Targeting Ras-Ral GEF-Ral Effector Signaling for Pancreatic Cancer Treatment	288,951
Recruitment	Zamboni , William	Eli Lilly	Not Assigned	10/18/13	10/17/14	A High Throughput Screening Platform to Evaluate the Interactions Between Nanoparticle and Non-Nanoparticle Agents and the Mononuclear Phaga	150,000
Recruitment	Zamboni , William	Merrimack Pharmaceuticals	Not Assigned	04/23/14	04/22/17	Non-GLP Development of Analytical Methods for MM-310-Encapsulated and Released Drug	69,371
Recruitment	Zamboni , William	NanoVector, Inc	Not Assigned	09/28/12	09/27/14	SBIR-NanoVector Phase II: Multifunctional Therapeutics using Engineered Plant Virus Nanoparticles	190,000
Recruitment	Zamboni , William	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence- Core 1	121,103
Recruitment	Zamboni , William	National Cancer Institute	5-P30-CA016086-38	12/01/10	11/30/15	Cancer Center Core Support Grant- Analytical Chemistry and Pharmacology	220,478
Recruitment	Zamboni , William	SciDose LLC	Not Assigned	09/15/10	09/14/16	Pharmacology Studies of Curcumin-Succinate-PEG400 Conjugate compared with Curcumin in In Vivo Systems and in the Pa03C Human Pancreatic Cancer Orthotopic	247,299
Recruitment	Zeidner, Joshua	Leukemia & Lymphoma Society		07/01/14	06/30/17	Targeting Regulatory T Cells During Lymphocyte Recovery in Newly Diagnosed AML	65,000
Recruitment	Zhang, Qi	March of Dimes	5-FY12-561	02/01/13	01/31/15	The role of RNA conformational dynamics in the Biogenesis of mi$-1, an Essential MicroRNA in Cardiovascular Development and Disease	75,000
Recruitment	Zhang, Qing	National Cancer Institute	4-ROO-CA160351-04	02/01/13	06/30/16	Role of the EgIN2 Target FOXO3a in Breast Cancer	249,000
Recruitment	Zhang, Qing	Sidney Kimmel Fdn. for Cancer Research	Not Assigned	07/01/14	06/30/16	Determining the Regulation of Progesterone Receptor (PR) by EgIN2 in Tamoxifen Resistant Breast Cancer	100,000
Retention	Zhang, Yanping	National Cancer Institute	5-R01-CA127770-06	07/01/08	05/31/15	In Vivo Function of Mdm2 E3 Ubiquitin Ligase	278,702
Retention	Zhang, Yanping	National Cancer Institute	5-R01-CA100302-11	08/01/03	04/30/15	In Vivo Function of the r-Protein-Mdm2-p53 Pathway	291,299
Retention	Zhang, Yanping	National Cancer Institute	5-R01-CA167637-03	09/01/12	06/30/17	The Role of the Mdm2-MdmX Interaction in p53 Regulation	284,999
Retention	Zhang, Yanping	National Cancer Institute	5-R01-CA155235-03	07/01/12	04/30/17	Mitochondrial p32 Regulation of the Mdm2-p32 Tumor Suppression Signaling and Apoptotic Cell Death	297,887

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Opportunity Fund Invest Ret	Zhou, Otto	Carestream Health, Inc	Not Assigned	05/01/12	04/30/15	Portable Tomosynthesis System Using Carbon Nanotube X-Ray Source Array	238,000
Retention	Zhou, Otto	Carestream Health, Inc	Not Assigned	05/01/14	04/30/15	Portable Tomosynthesis System Using Carbon Nanotube X-Ray Source Array	238,030
Retention	Zhou, Otto	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence- Project 4	317,167
Retention	Zhou, Otto	National Cancer Institute	5-U54-CA151652-05	09/01/10	07/31/15	Carolina Center of Cancer Nanotechnology Excellence- Project 5	198,218
Recruitment	Zhou, Otto	National Cancer Institute	1-R21-CA185741-01	04/01/14	03/31/16	Low-dose and High-resolution Tomosynthesis for Lung Cancer Screening	193,821
Retention	Zhou, Otto	National Inst. of Health	HHSN261201300029C	02/06/14	02/05/16	Carbon Nanotube Based Multibeam Field Emission X-Ray Tube for Stationary Digital Chest Tomosynthesis - Subcontract with XinRay Systems	197,164
Theme Investment (CC)	Zou, Fei	National Inst. of Health	5-R01-GM074175-07	07/01/11	08/31/14	Robust Methods for Complex Trait Association Mapping with Collaborative Cross	214,945
Theme Investment (Drug)	Zylka, Mark	National Inst. of Health	5-R01-NS067688-05	09/25/09	02/28/15	Harnessing Ectonucleotidases to Treat Chronic Pain	708,206
TOTAL							**136,949,711**