

University Cancer Research Fund

Annual Report 2009-2010

UCRF Strategic Plan Emphasizes Impact on North Carolina

The Cancer Research Fund Committee approved the University Cancer Research Fund Strategic Plan in November 2009. The planning process began in May 2008 and included listening sessions across campus, interviews with 50 key stakeholders, a survey of more than 200 UNC faculty and multiple meetings with the UNC Lineberger Program Planning Committee and other faculty groups.

The wide range of input resulted in a remarkable consensus: that the visionary investment being made to fight cancer in North Carolina is an opportunity to make a difference in people's lives. Despite the formal nature of the strategic planning document, making a difference for the people of our state is part of the plan's three guiding principles:

- 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.

Accordingly, the plan focuses significant resources on a limited set of research initiatives to maximize impact, with an emphasis on projects and programs that can be self-sustaining. In addition to focusing on initiatives with the most potential for making an impact on the health

of North Carolinians, these projects should provide leverage for additional funding from outside sources, build cancer-related research capabilities that benefit programs across UNC, or both simultaneously. Finally, UCRF investments should also benefit people in North Carolina by creating jobs, intellectual property and start-up companies.

Three Research Initiatives

Based on these principles, broad input, and extensive analysis, three interconnected priorities were identified as strategic research initiatives:

- Understanding Genetics and its Role in Cancer Causation and Treatment,
- Developing New Cancer Treatments, and
- Optimizing North Carolina's Cancer Outcomes.

The goal of UCRF funding for understanding genetics and its role in cancer causation and treatment is to discover the genes that predispose families to cancer and cancer patients to poor treatment outcomes — particularly by looking for the mutant genes in specific cancer subtypes that lead to cancer therapy failure.

UCRF will invest in devising new therapies targeted to the specific vulnerabilities of treatment-resistant cancers. Furthermore, this goal will focus on developing new ways of delivering therapeutic agents to reduce toxic side effects for all patients.

To optimize North Carolina cancer outcomes, UCRF research will use population-based methods to track the occurrence and treatment of cancer across our state. Data will come from large population and hospital-based studies and will be used to initiate research aimed at improving community prevention and early detection of cancer and to enhance the quality of oncology and survivor care across the state.

Opportunity Fund

Outstanding cancer research requires the ability to take advantage of opportunities as they arise and provide the top minds in the field with the resources they need to succeed. Therefore, the strategic plan charges the UCRF Opportunity Fund with the goal of promoting innovation by:

- Funding competitive, peer-reviewed innovative pilot projects (building on the successful Innovation Award program piloted during UCRF's first two years);
- Supporting the acquisition of novel, leading-edge technology and equipment for use by multiple faculty members and the development of shared research resources through a competitive, rigorous peer-reviewed process;
- Providing seed funds for the recruitment of top-notch faculty investigators whose work enables the key research initiatives, disease-specific programs and outstanding clinical research.

Critical Infrastructure Fund

The UCRF Strategic Plan recognizes that outstanding clinical cancer research requires an equally strong clinical program that can reach out across the state to share expertise and promote research opportunities. To accomplish this objective, UNC must build the multidisciplinary excellence not only to serve the growing demand for cancer care in North Carolina, but also to do research and share knowledge across the spectrum of cancer care. Recruiting faculty with the ability to collaborate with physicians across the state in clinical care and research through telephone and telemedicine consultation, as well as providing continuing education opportunities, is at the center of this mission.

Therefore, the goal of the Critical Infrastructure Fund is to expand the faculty excellence in clinical care and research and provide all UNC researchers with the core resources — including imaging, informatics and fundamental research techniques — necessary for clinical and translational cancer research. The Strategic Plan includes development of a statewide clinical research infrastructure, providing a conduit for leading-edge clinical research and its successful translation into community practice. The N.C. Cancer Hospital, combined with UCRF infrastructure support, also provides the videoconferencing/telemedicine hub that links UNC with cancer centers and oncologists across the state to increase physician collaboration and statewide access to UNC clinical trials.

Evaluating Impact — From the Population to the Patient

As UCRF moves forward, we are gathering data and designing an evaluation plan to measure the impact and return on investment for the fund. This process will recognize that there are many ways we can measure how we are doing with facts, figures, public health metrics, dollars and cents. Yet, in a real way, some of UCRF's impact will be very difficult to measure. How do we put a number on the patient in Wilson who doesn't have to travel several times a week to get treatment because her doctors are working with experts at UNC? Or the family that benefits from genetic discoveries and takes steps to protect family members from cancer through customized screenings? It is difficult to put a number on the benefits to babies whose mothers quit smoking or the community that benefits from an oncology workforce study — these are all ways that UCRF is helping North Carolinians be healthier. Our evaluation program will try to capture as many of these benefits as it can — but it won't tell the story of each person who is touched through UCRF's remarkable reach.

Cancer Genetics

Some of the most important breakthroughs in treating cancer have come through genetic analysis. For example, women with breast cancer are now precisely diagnosed and treated — thanks to breakthroughs made here in North Carolina — because we can pinpoint which of five different diseases they may have. Cancer genetics is moving us toward personalized medicine, where we can use analysis of the patient's genome to spot those who may have more toxicity and side effects from certain therapies than other patients, or who may not respond to certain therapies because of their genetic makeup. These and other personalized medicine approaches made possible by breakthroughs in the genetics field are leading to increased survival rates and bringing hope to hundreds of patients and families each year.

The more we know about the genetics of cancer, the more we can do for each patient.

UNC Helps Build Road Map for Cures

In September, 2009 The University of North Carolina at Chapel Hill was selected one of only 12 centers created as part of an unprecedented large-scale, collaborative effort by the National Cancer Institute (NCI) and the National Human Genome Research Institute (NHGRI) to systematically characterize the genomic changes that occur in cancer. UNC is part of an elite group that includes Harvard University, University of Texas M. D. Anderson Cancer Center, Memorial Sloan-Kettering, UCLA and Johns Hopkins University.

The Cancer Genome Atlas Grant (TCGA) is a five-year award, expected to bring as much as \$20 million to UNC, putting scientists from UNC Lineberger Comprehensive Cancer Center across the UNC campus at the center of a major push to provide a deeper, more systematic understanding of the mechanisms responsible for the uncontrolled growth of cancer cells and their spread throughout the body.

The genomic information generated by the project will fuel rapid advances in cancer research including new ways to categorize tumors, new therapeutic targets, and methods that allow clinical trials to focus on patients who are most likely to respond to specific treatments. UCRF technology investments were a key to UNC's competitive application for federal funds. "Cancer genetics has been a key area for University Cancer Research Fund investment, allowing us to diversify the technologic base needed for this project. This phase of The Cancer Genome Atlas will yield many new cancer discoveries that may change the face of clinical cancer care in the near future," said Shelton Earp, MD, Director of UNC Lineberger Comprehensive Cancer Center.

The UNC project team is headed by Charles Perou, PhD, and Neil Hayes, MD, MPH, and includes a broad multidisciplinary team that reflects the tremendous complexity and depth of the data collected, and the desire to extract as many biological insights out of this data as possible. Team members hail from seven different departments across UNC-Chapel Hill including Genetics (Derek Chiang, PhD, and Piotr Mieczkowski, PhD), Medicine (Hayes), Biology (Jason Lieb, PhD, and Corbin Jones, PhD), Pathology (Perou and Michael Topal, PhD), Statistics (Steve Marron, PhD, Yufeng Liu, PhD, and Andrew Nobel, PhD), and Biostatistics (Wei Sun, PhD, and Fred Wright, PhD).

Discovery of Brain Cancer Types Key to Better Treatments

The Cancer Genome Atlas Grant project yielded a major finding in January 2010, as research by D. Neil Hayes, MD, MPH, provided the cover story for the journal *Cancer Cell*.

Research made possible by UCRF suggested that the most common form of malignant brain cancer in adults, glioblastoma multiforme (GBM), is probably not a single disease but a set of diseases, each with a distinct underlying molecular disease process.

According to Hayes, who treats cancer patients in addition to performing laboratory research, the findings were quite striking, implying that there are distinct types of GBM and that each one is associated with a specific molecular process. This finding has potential significance for treatment, since determining the cells of origin of GBM is critical for establishing effective treatment regimens. Hayes' group also found that response to aggressive chemotherapy and radiation differed by subtype.

Taken together, the findings represent an important step towards more rational therapies for these devastating tumors.

Building a Better Mouse

Laboratory research has always been limited in terms of what conclusions scientists can safely extrapolate to the human population as a whole. That's because laboratory animals don't have the genetic diversity that humans do. This slows down testing of new cancer treatment.

Now, thanks in part to funding from UCRF, those barriers are being brought down by tiny creatures — with very special genes. While the DNA of typical laboratory mice contains only about 30 percent of the diversity of the entire mouse genome, the Collaborative Cross, a project aimed at mirroring the diversity of human genetics in the laboratory mouse population, is producing a mouse population that encompasses 90 percent of the diversity of the mouse genome — a level equivalent to the natural genetic variation in humans. The result for scientists is a fast track to understanding and testing new treatment and prevention approaches.

The project is being led by Fernando Pardo Manuel de Villena, PhD, in the UNC Department of Genetics and UNC Lineberger, David Threadgill, PhD, a geneticist at North Carolina State University and member of UNC Lineberger, and Gary Churchill, PhD, at The Jackson Laboratory. The mice are housed and 'curated' at UNC-Chapel Hill.

"Just as a museum curator is responsible for the heritage of art in their facility, we are responsible for the heritage of the mice in the Collaborative Cross," says Terry Magnuson, PhD, Chair of Genetics at UNC-Chapel Hill. "It's a big responsibility. As scientists use this resource to find ways to prevent and treat the genetic changes that cause cancer, the diversity of our lab experiments should be much easier to translate to humans."

New Treatments

UCRF-Supported Team to Boost NCI Cancer Drug Discovery

UNC offers dozens of clinical trials — but it's the patients that are lost while new drugs are waiting to be discovered that drives scientists at the new North Carolina Chemical Biology Center.

A team of scientists at UNC-Chapel Hill, N.C. Central University and the Hamner Institutes for Health Sciences have come together under a National Cancer Institute initiative to form the North Carolina Chemical Biology Center — one of five national comprehensive chemical biology screening centers.

The NCI's goal is to create a cancer drug pipeline that takes potential treatments from the lab to patients through the clinical trials process.

According to project leader, Stephen Frye, PhD, "What this consortium means to cancer patients is a collaboratively focused national effort to accelerate the identification of new anti-cancer drugs. Already, targeted therapies for cancer, such as Herceptin, have proved that developing effective therapies is possible if focused on the right drug for the right biological target in the right patient."

He added, "Our goal is to find those 'right' molecules and move them in an effective way through screening, testing, developing drug delivery systems, and, ultimately, designing a clinical trial to be carried out in the right patient."



Neil Hayes, MD, and Scott Randell, PhD, discuss UNC's participation in the National Institutes of Health (NIH) Cancer Genome Atlas Project.

Research that Makes a Difference (continued)

Frye, former worldwide head of discovery medicinal chemistry at GlaxoSmithKline, was recruited to UNC with support from UCRF to head the Center for Integrative Chemical Biology and Drug Discovery at UNC-Chapel Hill.

Big Hope on the Nanoscale

Nanotechnology sparks the imagination of science fiction writers, but Joe DeSimone, PhD, and his collaborators are showing big results for medical research that are the real thing.

DeSimone's national prominence has led to job offers from two leading private universities. UNC and UCRF came together to create the retention package that kept him in Chapel Hill and launched an expanded Nanomedicine program that shows great potential.

One of his most recent achievements is an NIH Pioneer Award, which will be used to develop new methods for delivering promising biological therapeutics — peptides, proteins, antibodies, antibody fragments and nucleic acids (siRNA, miRNA, shRNA replicons, DNA plasmids) — to specific locations in the body in a safe and effective fashion. Such methods and therapies could be used to treat many different diseases, including cancer.

The research builds on DeSimone's existing work, including his invention of techniques for mass-producing "custom made" micro- and nanoparticles tailored to have specific sizes, shapes and surface properties. That technology, known as PRINT (Particle Replication in Non-wetting Templates), is exclusively licensed to Liquidia Technologies, a UNC spin-off company based in Research Triangle Park. The team hopes to launch a Phase I clinical trial later this year.

In 2008, DeSimone won the Lemelson-MIT Prize, known as the "Oscar for Inventors."

DeSimone is the Chancellor's Eminent Professor of Chemistry in UNC's College of Arts and Sciences and the William R. Kenan Jr. Distinguished Professor of Chemical Engineering at North Carolina State University.

He is also a member of the UNC Lineberger Comprehensive Cancer Center and the pharmacology department in the School of Medicine; founding director of the UNC Institute for Advanced Materials, Nanoscience and Technology, and the UNC Institute for Nanomedicine; and co-principal investigator of the Carolina Center of Cancer Nanotechnology Excellence.

Innovation Award Boosts Personalized Medicine

A disagreement between Nancy Allbritton, MD, PhD, and David Lawrence, PhD, over which cancer — breast or prostate — should take the higher priority in their collaborative research — meant that they applied for grants to do both. Thanks to a UCRF Innovation Award, their persuasive data yielded two NIH grants totaling almost \$5 million over five years.



Nancy Allbritton, MD, PhD and David Lawrence, PhD

Innovation Awards, which are designed to test new concepts and help researchers get outside funding, are also part of the UCRF Opportunity Fund. Allbritton and Lawrence, both professors of chemistry, grabbed the opportunity and got results. Their project created a simple blood test to tell a patient whether they have cancer (or whether it has returned) and which combination of cancer drugs will work. The ultimate goal is a test that helps patients know in six hours — rather than six months — whether a particular drug regimen will be effective. The pair is developing a tool to do just that for leukemia in the lab. The

additional NIH funding is allowing them to expand the technology into breast cancer and prostate cancer.

The team is collaborating with UNC Lineberger faculty members Channing Der, PhD, Jen Jen Yeh, MD, Peter Voorhees, MD, and Young Whang, MD, PhD, on the NIH projects.

Optimizing N.C. Cancer Outcomes

Pattern Recognition: Better Cancer Care in N.C.

Bryan Weiner, PhD, associate professor of Health Policy and Management at the Gillings School of Global Public Health is leading a project aimed at understanding when, whether and how best practices in cancer treatment are actually implemented in communities across North Carolina. The team received more than \$282,000 in federal stimulus funding to carry out the research.

"The potential for understanding the quality of care and how and why treatment outcomes vary is huge," says Weiner, "but getting to insights requires complex coordination of data from different sources and different platforms."

His colleague, Bill Carpenter, is leading efforts to link cancer registry data with Medicare claims data, while optimizing data security and privacy.

"What we are trying to do is create a resource where content experts can access the data and ask questions like, 'Why do people in Wilson have different outcomes from people in Statesville who have the same diagnosis?'"

UCRF funding will help Carpenter and Weiner expand the data linkages across the state to better understand how to improve the health of North Carolina's citizens.

Survivorship Study Finds Strength in Numbers

Jeannette Bensen, PhD, is excited about the potential of 10,000. That's how many participants her team hopes to enroll in the UNC Health Registry and Cancer Survivorship Cohort — a comprehensive database of information and biological specimens. This valuable resource will help many researchers, including cancer epidemiologists like Bensen, answer important questions about factors that influence a patient's ability to get to health care, their pattern and quality of care, as well as methods to improve cancer treatment and minimize side effects. Other important questions will focus on how well cancer patients fare after treatment including factors that affect their quality of life and how we might best address some of these factors through community and state survivorship programs and services.

Bensen, who has been retained as a UNC faculty member with help from UCRF, says the project will soon begin to recruit participants aged 18 and older with a North Carolina address who speak English or Spanish. Before they begin treatment, patients will complete a questionnaire and donate a small amount of blood. The participants' medical record and questionnaire data along with blood samples and tumor tissues from surgery will be available to researchers for investigation. Each year patients will be phoned and asked to provide an update on their health since their last contact with the Registry. Participating patients also have the opportunity to be invited to participate in other studies.

"Our goal is to recruit a large group of cancer patients," says Bensen, "so that we can find the important patterns and the factors that we can change to improve health and quality of life for people in North Carolina with a specific focus on understanding factors that influence racial, ethnic and socio-economic differences in cancer care and outcome. This is a comprehensive and unique resource that will help us learn so much more about cancer; how to improve health care access, delivery and treatment in North Carolina as well as how to improve the quality of life of cancer patients, family members and their caregivers.

For more information, see the registry's website at unhealthregistry.org.

The University Cancer Research Fund

Screening, Educating, Support

■ Community Wellness & Cancer Prevention (CWCP)

North Carolina's high rates of obesity and smoking are important — and potentially reversible — factors contributing to our state's high cancer rates. Both problems are associated with socioeconomic status and are more prevalent among ethnic minorities. CWCP works with four Kate B. Reynolds Charitable Trust grantees to develop and implement evidence-based approaches designed to increase physical activity and reduce obesity and smoking rates. We help evaluate these programs to determine what really works — and how programs that work might be improved or implemented more broadly in the future. The four grantees that partner with UNC's CWCP program are the Cabarrus Health Alliance (Cabarrus, Mecklenburg and Rowan counties), the Cape Fear Valley Health System (Cumberland, Harnett, Robeson, Sampson and Bladen counties), First Health of the Carolinas (Hoke, Montgomery, Moore, Scotland and Richmond counties) and the YWCA of the Greater Triangle (Wake and Johnston counties).

● Barbershop Physical Activity Pilot

One of the fundamental premises in public health is to meet people where they are. This pilot project meets African American men in barbershops — community-based locations that can be centers for social and peer interaction. One of the key contributing factors to high cancer rates among African American men is lack of physical activity. Increasing physical activity is often a matter of awareness and measurement. This project uses accelerometers — instruments that help people assess how fast they are moving — to increase physical activity among African American men in Alamance, Durham, Edgecombe, Lenoir, Nash, Orange, Person, Pitt and Vance counties. The results of this pilot project will be used to prepare a proposal to the National Cancer Institute.

★ HPV/Cervical Cancer Social Marketing Campaign

In 2006 the U.S. Food and Drug Administration approved a 100 percent effective vaccine for the human papillomavirus (HPV). The virus is responsible for most cases of cervical cancer and has increasingly been implicated in other cancers, such as those of the head and neck. At the same time, barriers exist to getting the vaccine, including awareness, understanding of cost and whether the vaccine cost is covered by insurance, parental concerns and other perceptions. Research shows that many of these barriers can be overcome through the use of social marketing campaigns. UNC Lineberger is collaborating with the South Central Partnership for Public Health to design a social marketing campaign and serve on the campaign advisory committee to increase the utilization of the HPV vaccine in the partnership's 13-county service region including Anson, Bladen, Cumberland, Harnett, Hoke, Lee, Montgomery, Moore, Randolph, Richmond, Robeson, Sampson and Scotland counties.

● Improving Colorectal Cancer Screenings

Research shows that many individuals avoid cancer screening tests because of concerns about cost and the potential medical bills if they are found to have cancer. In Guilford County, UNC Lineberger works with a wide range of community partners to implement current guidelines for colorectal cancer screening and build a sustainable system of follow-up diagnostic and treatment care for uninsured individuals.

🌸 Jeanne Hopkins Lucas Carolina Breast Cancer Study

African American women in North Carolina die more often from breast cancer — and there is no simple answer as to why. Building on ground-breaking work done at UNC, the Jeanne Hopkins Lucas Study is conducting a comprehensive, population-based study that includes epidemiologic, biologic and clinical data to help understand the factors that contribute to this disparity. The study is ongoing in 44 counties across the state and is named for General Assembly member Jeanne Hopkins Lucas, the first African American woman to serve in the state senate. Senator Lucas died of breast cancer in 2007.

🌟 NC Speed Outreach Network

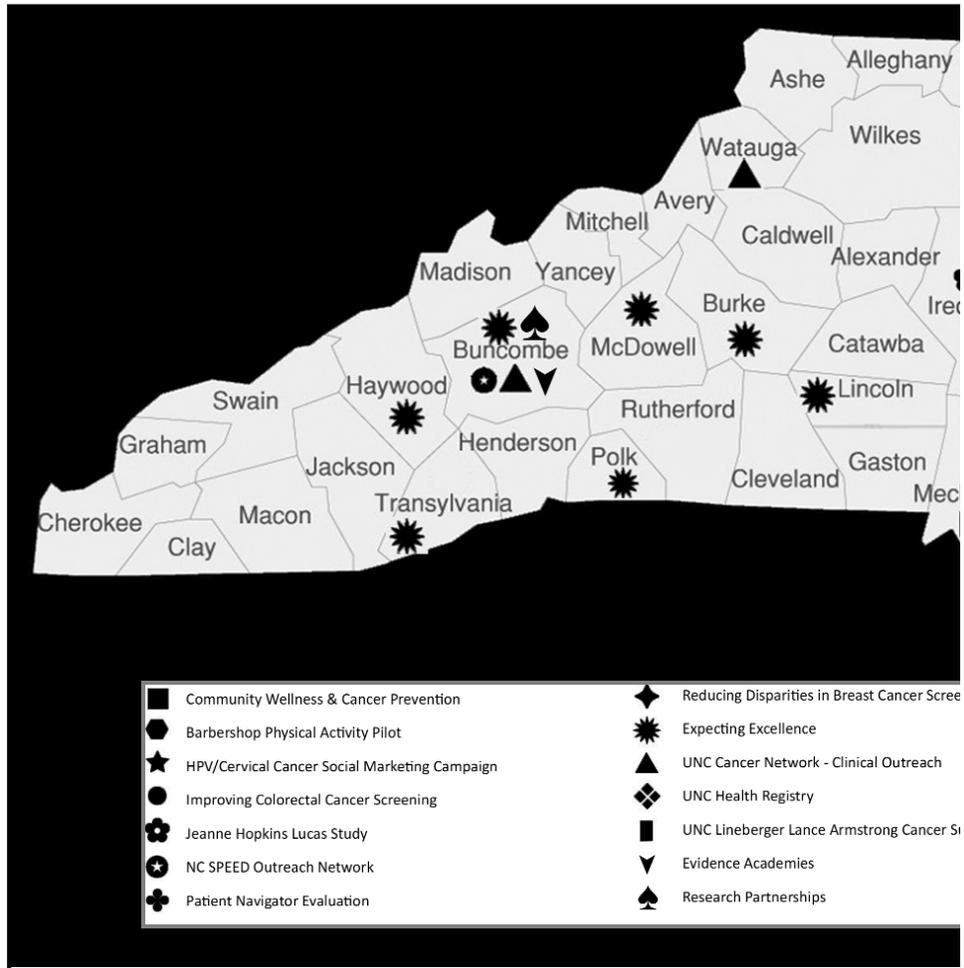
How can we better prevent cancer across North Carolina? How do we work with our communities to increase screening rates and early diagnosis? Will a program that works in Wilmington work in Asheville? To find out the answers to these questions, we are establishing a statewide network to facilitate and improve the quality of cancer prevention and control research across the state of North Carolina. Research associates in Asheville, Greenville, and Wilmington work with UNC Lineberger faculty as they establish linkages and serve as facilitators for research undertaken by UNC and other researchers in North Carolina communities and health systems.

🌿 Patient Navigator Education

The health care system can be confusing and intimidating — even more so when you're facing a cancer diagnosis for yourself or a loved one. Ensuring that records are transferred, specialist appointments are made in the right order and a coherent, individualized treatment plan is the goal of all cancer care at UNC Lineberger. To help make this a reality for patients across the state, we are working with hospital systems in Dare and Pitt counties to evaluate the impact of patient navigators on the receipt of timely, appropriate care for cancer patients. A new program is being initiated in Buncombe County in partnership with Mission Hospital. The results of this evaluation can inform local health care systems across North Carolina.

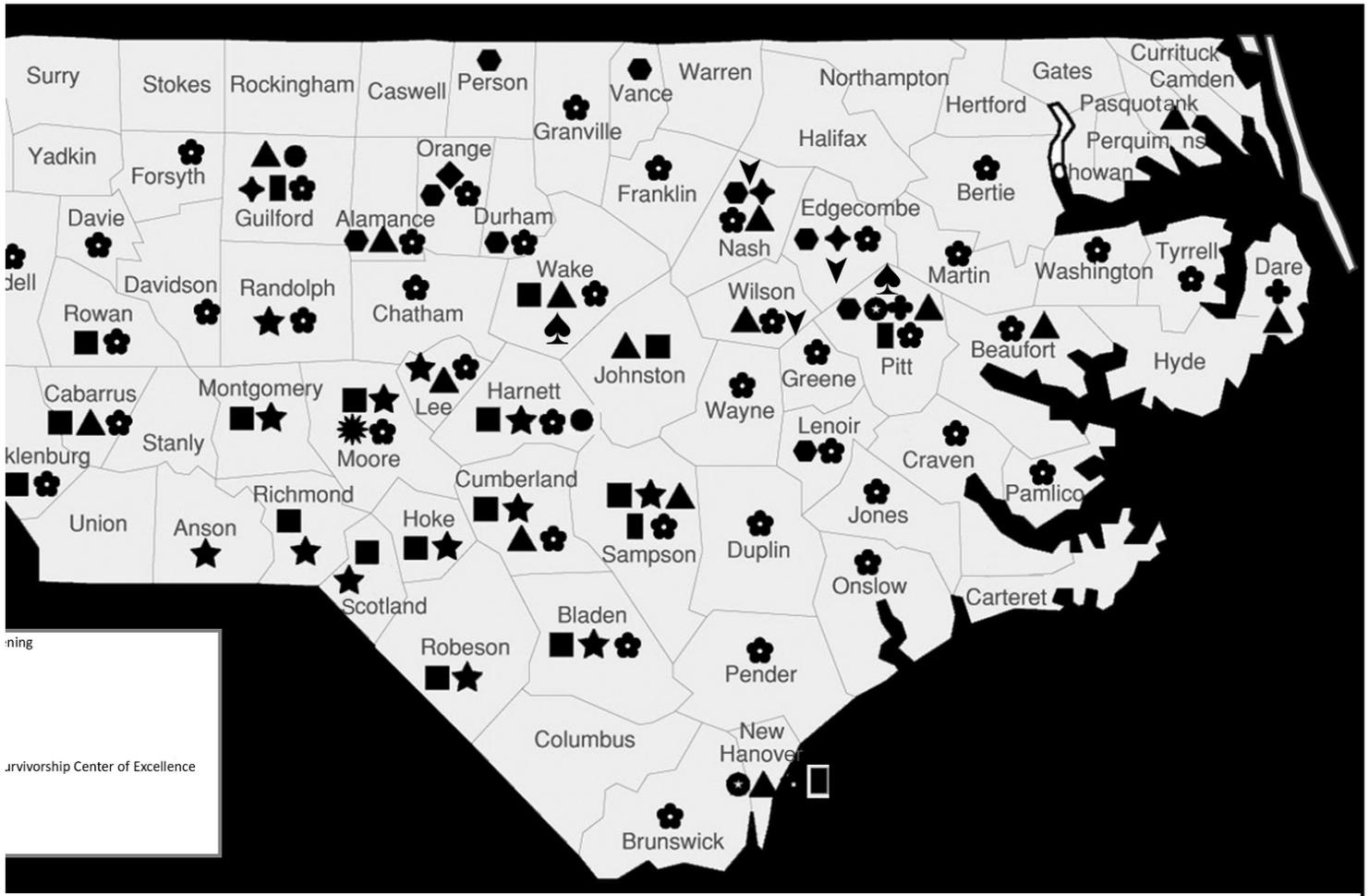
◆ Reducing Disparities in Breast Cancer Screening

Why do some racial, ethnic and socioeconomic groups face disparities in the incidence of cancer and cancer outcomes? Why are some groups less likely to be screened than others? As partners in the Southeastern U.S. Collaborative Center of Excellence for the Elimination of Disparities, UCRF is helping UNC researchers and public health professionals to assist with activities in Nash and Edgecombe Counties designed to eliminate racial disparities in breast cancer screening rates. We provide technical assistance to a similar program in Guilford County. Findings may provide important direction to similar programs across the state.



5: Reaching Out to North Carolinians

Reporting, Treating, Surviving



✱ Expecting Excellence

High smoking rates among pregnant women and women with small children not only increase their cancer rates, but also threaten their children's physical and cognitive development and long-term health outcomes. To complement the You Quit 2 Quit initiative in public prenatal settings, the Expecting Excellence project is being launched to improve the use of evidence-based smoking cessation treatment strategies in private obstetrical practices across North Carolina. A pilot project is being launched in Buncombe County.

▲ UNC Cancer Network — Clinical Outreach

The UNC Lineberger and the NC Cancer Hospital are bringing the expertise of UNC's academic medical center to doctors and patients across the state through a clinical outreach network across that will include telemedicine, physician collaboration and clinical trials access. Partnering with local doctors can help patients receive the best care possible in their home communities — where they have social support and established relationships with their health care providers. Current and in development sites stretch from the mountains to the coast and include Asheville, Concord, Greensboro, Burlington, Fayetteville, Raleigh, Rocky Mount, Wilson, Greenville, Dare County, Elizabeth City and Wilmington.

◆ UNC Cancer Survivorship Cohort

A recent report by the Institute of Medicine, part of the National Academies, notes that many cancer patients are “lost in transition” from treatment to survivorship. Primary care physicians and other health care providers are seeking more information about the consequences of cancer and want more explicit guidance from oncologists. A need for best practices in caring for patients with a history of cancer contributes to wide variation in care. The UNC Cancer Survivorship Cohort will enroll, monitor and collect biologic and clinical treatment information on consenting patients at UNC Health Care clinics. UCRF will initiate the enrollment of 10,000 patients into the UNC Cancer Survivorship Cohort. The data collected will help researchers determine methods for improving cancer outcomes and quality and length of life after treatment.

■ UNC Lineberger Lance Armstrong Cancer Survivorship Center of Excellence

As cancer survivorship rates increase across the United States, survivors face new challenges. How do they put the experience of cancer and cancer treatment behind them and move on with their lives? How do they deal with possible lingering physical limitations or psychological challenges. How do they work with their health care providers to ensure that they are getting the best ongoing treatment and screenings? These questions and more are being addressed, thanks to our work. The UNC Lineberger Comprehensive Cancer Center is one of eight Lance Armstrong Cancer Survivorship Centers of Excellence nationwide. We are expanding these survivorship efforts across the state with outreach sites in Greensboro, Newton Grove, Greenville and Wilmington.

▼ Regional Evidence Academies

Two regional evidence academies are being held in Western North Carolina (colorectal cancer) and Eastern North Carolina (breast cancer) to disseminate evidence-based guidelines and findings from new research. The evidence academies will stimulate new research partnerships between academic and community settings.

♠ Research Partnerships

Research Partnerships have been undertaken with N.C. State University, UNC-Asheville and East Carolina University. Projects include the study of mechanisms behind and treatment for human and canine lymphoma and pancreatic cancer.

Building a Better Future for N.C. Cancer Patients

Technology Helps Make N.C. "Virtually" Smaller

"It is always preferable for cancer patients to be cared for close to home," says Thomas Shea, MD, UNC Lineberger Comprehensive Cancer Center's Associate Director for Outreach.

As director of UNC's Bone Marrow Transplant Program, Shea sees firsthand the toll on patients and families who come from far away for complex medical procedures. That's why he's excited that the UCRF investment in telemedicine has extended the reach of UNC's experts to 17 sites located in 12 communities across the state (see the map on pages 4 and 5 for details).

Each week, the gastrointestinal cancer and head and neck cancer tumor boards — meetings where a team of experts from a wide variety of cancer specialties meet to discuss treatment plans and clinical trial options for their patients — take place via videoconference. Currently, physicians at Wilson Medical Center, Rex Hospital in Raleigh and at Wakefield, Rex at Smithfield, Moses Cone and New Hanover Hospital are participating in these meetings as their patient cases warrant and to gain ongoing medical education in a virtual environment that is almost like being in the same room!

Research conferences between East Carolina University and UNC are taking place on a bi-monthly basis, and the system is used to facilitate the distribution of Lunch and Learn lectures to multiple sites.

Finally, some patients are able to "see" specialists via the conferencing system under two pilot projects. The Comprehensive Cancer Support Program has begun providing psychological support for cancer patients via the network. In addition, the Clinical Genetics Program is providing genetics counseling via the network. Patients don't have to travel to get specialized services.

Shea says, "We're looking to ensure that all North Carolina's physicians and patients have access to the newest knowledge about how to treat cancer without having to travel long distances. We have a big state, but technology can help make it a little smaller."

More Hope: Closer to Home

Providing more choices and more access to clinical trials for cancer patients is one key to optimizing cancer outcomes in North Carolina. The UNC Cancer Network is UNC Lineberger's outreach program. This network of community-based hematologist/oncologists will collaborate to test new treatments that will lead the way for better outcomes in the future, while also allowing more North Carolinians to participate in these trials in their own communities.

UNC serves as an educational and research resource from which novel Phase II trials evolve and are tested. This network will complement the NCI-funded Cooperative Group system.

UNC Cancer Network Clinical Trials are administered by the UNC Lineberger Comprehensive Cancer Center Clinical Protocol Office. Members of this emerging network are indicated on the UCRF Map on pages 4 and 5.

Navigating Cancer Diagnosis, Treatment & Survivorship

Clinical partnerships are another important way that UNC physicians are extending the reach of UCRF across the state. UNC has had longstanding

partnerships with East Carolina University School of Medicine in the area of cancer research and treatment. Two nurse navigators at ECU help patients coordinate their diagnosis and treatment as part of a study to measure how these facilitators improve cancer treatment planning and outcomes for patients.

The Zimmer Cancer Center at New Hanover Hospital in Wilmington is a site for the UNC Lineberger Cancer Survivorship Program, Carolina Well. A dedicated counselor helps patients move from treatment to survivorship and find a 'new normal' through health care planning, support groups and other best practices. This program has been developed as part of the Lance Armstrong Foundation's Center of Excellence and with support from the V Foundation for Cancer Research.

Physicians at Wilson Medical Center regularly collaborate with doctors at UNC by participating in UNC tumor boards and hosting educational presentations, such as one on lung cancer recently provided by UNC faculty.

In Dare County, work continues with nurse navigators facilitating oncology treatment at Outer Banks Hospital and in collaboration with the County of Dare's Department of Public Health. Two UNC "Lunch and Learn" conferences each month provide the most current information for health care providers and patients in Dare County and second opinions are provided by UNC physicians when appropriate.

Finally, a new partnership signed this year with Mission Hospital in Asheville is putting oncology nurse navigators in western North Carolina, where they will work to assess communities' needs for screening and prevention of lung cancer, an important priority in a region where more adults use tobacco.

Through UNC's newly enhanced telemedicine capabilities, doctors in Mission's facilities will be able to collaborate in real-time conferences with UNC in ways that focus on creating individualized treatment plans for patients - no matter where they are initially seen. Additionally, patients at Mission's facilities will have access to research trials that will provide new treatments developed at UNC Lineberger without having to travel to Chapel Hill.

Keeping N.C. Patients, Doctors, Providers on the Leading Edge

The second annual Dare County Symposium: Coping with Cancer held in Kitty Hawk at the end of April, 2010 with speakers from UNC and the National Institutes of Health provided information for health care providers, patients and caregivers on the psychological and social aspects of cancer. This conference also presented advice and best practices in supporting cancer patients.

UNC collaborated with Mission Hospital in Asheville to sponsor the 2010 William J. Smith Memorial Oncology Conference. Held in Asheville in May, the conference focused on the latest developments in breast cancer, providing top expertise from UNC for physicians, nurses and other health care professionals.

Finally, the UCRF telemedicine investment will soon allow providers across North Carolina to watch UNC oncology education presentations such as grand rounds and seminars.

UCRF Makes Opportunities Real

New Funding, New Knowledge, New Hope

With Federal research budgets flat over the last few years, competition for grants is fierce. In this environment, UNC has increased NIH funding by more than 15 percent between 2005 and 2008 — a period when peer institutions lost ground. UNC's cancer research community accounted for \$220 million in extramural support last year, including more than \$40 million in multi-year research funding from the federal stimulus program.

Just two years after the first 18 UCRF Innovation Awards — totaling \$2.4 million — were launched, the initial research projects have yielded 16 extramural research grants totaling \$13.1 million, including major grants from the National Cancer Institute, National Institutes of Health, National Science Foundation, Department of Defense and the American Cancer Society. Thirteen additional grant applications are currently under review.

This initial set of Innovation Awards has also yielded two patents, contributed to a start-up company, produced 12 new research collaborations inside and outside of UNC-Chapel Hill and resulted in multiple peer-reviewed publications in top-tier journals.

UCRF has positioned UNC's cancer experts to achieve significant research growth and garner national and international leadership in many fields of cancer research. In addition to the \$13.1 million in competitive funding directly to UCRF Innovation Award projects, other grants are competitive through UCRF funding of leading-edge equipment. For example, the \$20 million-plus Cancer Genome Atlas Project relies on state-of-the-art sequencing equipment.

Nancy Thomas, MD, is leading a group that brought in \$287,000 to study subtypes of the deadly skin cancer, melanoma. Thanks to equipment purchased with UCRF support, her grant was highly competitive and her team is moving quickly to define different types of the disease — a crucial first step toward tailoring the most effective treatments for each patient.

Puppies, Pedigrees and Pinpointing Lymphomas

What do a college of veterinary medicine and a cancer treatment and research center have in common? The answer may be as plain as the nose on your dog's face. Researchers from NCSU College of Veterinary Medicine and UNC Lineberger are combining their expertise to pinpoint the cause of — and improve treatments for — non-Hodgkin lymphoma in human and canine patients. The project is supported by UCRF.

The dog is an excellent model to study human cancer, particularly lymphoma. The disease is biologically similar in human and canine

patients, but is much easier to narrow down problematic areas in a dog's genome because the genetic variation among dogs of the same breed is so much lower than genetic variation in humans. These factors, coupled with the publication of the human and canine genomes, make the dog the perfect candidate for this collaborative research.

UNC Lineberger's Kristy Richards, MD, PhD, a geneticist and clinical oncologist is collaborating with NCSU's Steven Suter, VMD, PhD, DACVIM, professor of clinical sciences, and Matthew Breen, PhD, professor of genomics, along with statistics professor Alison Motsinger-Reif, PhD and Dahlia Nielsen, PhD.



Kristy Richards, MD

Why Smokers Start — Why They Quit

UNC-Chapel Hill genetics faculty members and UNC Lineberger members Helena Furberg, PhD, and Patrick Sullivan, MD, used data from existing genome-wide association studies to identify genetic variants associated with key smoking behaviors that have a significant impact on health. The project was carried out as part of the national Tobacco and Genetics Consortium (TAG) and with the support of a UCRF Innovation Award.

Using data from multiple large studies that compare the complete DNA of people with a disease or condition to the DNA of those who do not have the disease or condition, the team analyzed data to determine whether genetic variants affect if people start to smoke, the number of cigarettes smoked per day, the age when people begin to smoke and whether people are able to quit.

"We hope that this work will allow researchers from multiple disciplines to develop a better understanding of the genetics of addiction and how drug-gene interactions could be used to create and tailor therapies to improve the rates of smoking cessation," said Furberg.

These genome-wide association studies (GWAS) find the genes involved in a disease and may help prevent, diagnose, and treat the disease. Because smoking behavior is associated with many diseases, such as heart disease and cancer, the researchers were able to assemble more data to test the links between genetic variants and smoking than any one study could provide alone.

Faculty Recruitment

More than 50 top experts have been recruited to UNC with the help of UCRF.
The following faculty members have been recruited in 2009-2010

Cancer Genetics

Piotr Mieczkowski, PhD
Department of Genetics
Previously at Duke University
Genetics, Collaborative Cross

Developing New Treatments

Mischa Machius, PhD
Department of Pharmacology
Previously at University of Texas Southwestern
Structural Biology

Michael Miley, PhD
Department of Pharmacology
Director, Biomolecular Crystallography Core Facility

Andrew Wang, MD
Department of Radiation Oncology
Previously at Harvard University
Radiation Oncology and Nanotechnology Research

Optimizing Cancer Outcomes

Paul Brown, PhD
Department of Health Policy and Management
Previously at University of Auckland (New Zealand)
Health Economics, Comparative Effectiveness and Health Services
Research

Linda Cameron, PhD
Department of Psychology
Previously at University of Auckland (New Zealand)
Health Psychology (stress, coping and illness, risk perception),
Environmental Psychology

William Carpenter, PhD, MHA
Department of Health Policy and Management
Cancer Care Quality and Outcomes, Cancer Prevention and Control,
Clinical Research Trials, Organization Design and Behavior, Diffusion of
Innovations, Translating Research into Practice

Bryce Reeve, PhD
Department of Health Policy and Management
Previously at the National Cancer Institute
Cancer Quality of Life, Patient Reported Outcomes

Chris Rini, PhD
Department of Health Behavior and Health Education
Previously at Mt. Sinai School of Medicine (New York)
Cancer Survivorship

Whitney Robinson, PhD
Department of Epidemiology
Previously at the University of Michigan
Cancer Disparities, Obesity and Cancer

Stephanie Wheeler, PhD
Department of Health Policy and Management
Health Services Research including Cost-Effectiveness in Evidence-Based
Medicine, Comparative Effectiveness, Health Disparities

Yang Yang, PhD
Department of Sociology
Previously at the University of Chicago
Population Assessment of Cancer

Opportunity Fund

Stanley M. Lemon, MD
Department of Microbiology and Immunology and
Department of Medicine
Previously at University of Texas Medical Branch at Galveston
Cancer Virology, Hepatitis and Liver Cancer

Ben Major, PhD
Department of Cell and Developmental Biology
Previously at University of Washington
Cell Signaling in Pancreatic Cancer, Adenocarcinoma

Cary Moody, PhD
Department of Microbiology and Immunology
Previously at Northwestern University
Human papillomavirus Biology and Carcinogenesis

Nat Moorman, PhD
Department of Microbiology and Immunology
Previously at Princeton University
Cytomegalovirus Pathogenesis and Signaling

Critical Infrastructure

Juneko Grilley-Olson, MD
Department of Medicine
Phase I Cancer Clinical Trials

Steven Park, MD
Department of Medicine
Previously at University of Washington/Fred Hutchison Cancer Center
Lymphoma, Translational Research

Phillip Roehrs, MD
Department of Pediatrics
Previously at the University of Cincinnati, Cincinnati Children's Hospital
Leukemia, Translational Research

Dinggang Shen, PhD
Department of Radiology
Director, BRIC Imaging Analysis Core
Previously at University of Pennsylvania
Biomedical Image Analysis

Karyn Stizenberg, MD
Department of Surgery and Gillings School of Global Public Health
Previously at Fox Chase Cancer Center
Surgical Oncology, Health Services Research

Jared Weiss, MD
Department of Medicine
Previously at the University of Pennsylvania
Head and Neck Cancer, Lung Cancer, Clinical Trials

William Wood, MD
Department of Medicine
Hematologic Malignancies, Bone Marrow Transplantation

Jing Wu, MD
Departments of Neurology and Neurosurgery
Previously at the University of Texas M.D. Anderson Cancer Center
Neuro-oncology

