Seed Grants for New Ideas in Cancer Research

2017 ANNUAL REPORT

UNC LINEBERGER

For UNC Lineberger physicians and scientists, seed grants not only yield early results, but also help develop the ideas that grow into large, federally funded projects aimed at transformative breakthroughs in patient care.

Over the past few decades, we have made remarkable progress toward finding a cure, but solving a problem as intractable as cancer will require a willingness to take on risks and the kind of big-picture thinking that fuels medical breakthroughs. The Seed Grant Program at UNC Lineberger Comprehensive Cancer Center gives talented researchers the opportunity to find answers to some of cancer's biggest challenges and develop promising new concepts for basic cancer research, clinical care, prevention, early detection and survivorship. An increasingly competitive funding environment has magnified the need for and impact of investments in this type of innovative research.

Funded by private support and state funds, seed grants have helped UNC become a top 10 institution for research funding.

A Catalyst for Great Ideas

The United States is a global leader in biomedical research, but our leadership depends on federal investment, primarily through the National Institutes of Health (NIH) and the National Cancer Institute (NCI). However, federal funding is in jeopardy. While the number of applicants for NCI grants has increased by 30 percent since 1998, the number of awards has remained the same. Fewer than one in seven researchers who apply for a research grant from the NCI will receive one—a historic low.

In making funding decisions, the NIH and NCI evaluate the significance of the research, approach and level of innovation. These criteria, coupled with the competitive award process, favor applicants who can show experience and preliminary data. Being able to discuss studies, data or experience pertinent to the application greatly improves the proposed project's likelihood of success, especially for young cancer investigators.

Seed grants give UNC Lineberger scientists an advantage in this competitive landscape. For the past 28 years, the program has maintained a steadfast focus on three guiding priorities:

- Accelerating cancer research by funding promising, novel ideas with no other source of funding;
- Providing venture capital to gather vital preliminary data to help secure major external funding for program implementation, human trials and further research; and
- Ensuring young, bright cancer researchers have the opportunity to establish a history of success, keeping them engaged and building a future in cancer research.

Private Support Fuels Progress

We are grateful to the many generous donors who share UNC Lineberger's commitment to investing in early-stage research. Since the inception of the Seed Grant Program in 1986, donors have contributed more than $7 million and supported over 300 seed grants. UNC Lineberger currently has 42 permanently endowed, named seed grant funds:

Dr. and Mrs. Gerald Arney Fund for Liver Cancer Research
Elizabeth Dalton Averett Seed Grant for New Ideas in Breast Cancer Research
Barnhill Family Seed Grant Fund for Cancer Research
Helen Kalogridis Baucom Memorial Fund for Breast Cancer Research
Bell Family Endowment for New Ideas in Cancer Research
Emily Bright Seed Grant Fund for New Ideas in Ovarian Cancer Research
Rebecca L. Calderon Endowment Fund for New Ideas in Lung Cancer Research
Calvo and Rivera Endowed Seed Grant Fund for GI and Thoracic Oncology Research
James Edwin Clement and Louise Johnson Clement Seed Grant for Cancer Research
Elizabeth Winter Cohen Endowment Fund for New Ideas in Cancer Research
Lovick Pierce Corn Endowment Fund for New Ideas in Cancer Research
Edward K. Crawford Cancer Research Fund
Goldman Family Fund for Innovative Lung Cancer Research
Clarence A. Griffin Jr. Seed Grant for New Ideas in Prostate Cancer Research
Alice and John Harney Fund for New Ideas in Cancer Research
Lanier Swann Hodgson Kidney Cancer Research Fund
Laura T. Jensen & John V. Hyer Endowment Fund for Cancer Research
Carolyn Christoph Johnston Endowment Fund for Ovarian Cancer Research
Christina B. Jones Endowment Fund for Gastrointestinal Cancer Research
C. H. Jack & Joyce E. Keller Endowment Fund for Breast Cancer Research
Owen G. Kenan Pancreatic Cancer Research Fund
Susan Hoke Lambeth Endowment Fund for New Ideas in Ovarian Cancer Research
Kenneth and Frances Lee and Family Seed Grant for Melanoma Research
James W. and Kay J. Mann Fund for Thoracic Oncology Research
Neil Maddux Miller Endowment Fund for Breast Cancer Research
Bryan and Rebecca Morris Endowed Seed Grant for Cancer Research
Annie G. Muenzner Endowment Fund for New Ideas in Cancer Research
Patrick F. and Carolyn B. Nash Seed Grant Endowment Fund
Marian Nottingham Rice Seed Grant
Palmer Family Fund for Innovative Cancer Research
Brian L. & Suzanne P. Pecheles Seed Grant Endowment for Cancer Research
Allen W. Post, Jr. Prostate Cancer Research Fund
Linda T. Postema Endowment Fund for New Ideas in Lung Cancer
River Landing Golf Association for Ladies Fund for Breast Cancer Research
Murphy and Nancy Sample Endowment Fund for Pancreatic Cancer Research
Sol and Pearl Schechter Family Seed Grant for Innovative Cancer Research
Nancy W. Stegman for New Ideas in Cancer Research Fund
Barbara Snipes Tate Endowment Fund
Dianne M. Toal Endowment Fund for Cancer Research
Gail Whisenant Towne Endowment Fund
White Seed Grant Fund
Wren Foundation Fund for Pediatric Oncology Research

Making early investments in research that will pay dividends now – and later

Bob Barnhill believes in the power of venture funding. As the chairman and chief executive officer of Barnhill Contracting Company in Rocky Mount, North Carolina, and as a supporter of UNC Lineberger Comprehensive Cancer Center, he understands the value of making investments in early-stage ideas and emerging enterprises that show promise to be both successful and stand the test of time.

It is this entrepreneurial philosophy that motivates Bob and his wife, Penny, to be longstanding participants in UNC Lineberger's Seed Grant Program. In 2007, they created the Barnhill Family Seed Grant Fund for Cancer Research, and established The Barnhill Fund for Advances in Cellular Immunotherapy in 2016.

"We like to invest in things that we think will make a difference and offer a benefit for a long period of time," said Barnhill, who, together with Penny, is a member of the cancer center's Board of Visitors. "We have a lot of confidence that these grants will provide support that will allow the researcher to achieve some early success, and that success will lead to federal funding."

The Barnhill's latest round of support will help underwrite one of the most promising of UNC Lineberger's "big bets" against cancer: a clinical research program that uses a patient's own immune cells to target and direct an attack against their cancer.

The cancer center launched its Cellular Immunotherapy Program in 2015 with the recruitment of Gianpietro Dotti, MD, and Barbara Savoldo, MD, PhD, from the Cell and Gene Therapy Program at the Baylor College of Medicine. These two investigators have more than a decade of research experience in the use of adoptive cell therapy for the treatment of patients with cancer with a particular focus on the design and implementation of chimeric antigen receptor (CAR) modified T cells.

Today, UNC Lineberger is one of only six academic medical centers nationally with the scientific, technical and clinical capabilities to develop and deliver CAR-T immunotherapy. As of early 2018, nearly two dozen patients from North Carolina and across the United States have participated in three CAR-T clinical trials for lymphoma and leukemia at the cancer center. Thanks in part to private support, including the Barnhill Fund for Advances in Cellular Immunotherapy, UNC Lineberger researchers intend to open other trials that target multiple myeloma, ovarian cancer and glioblastoma.

In addition to working on new potential CAR-T therapies for hard-to-treat cancers, UNC Lineberger researchers are focused on making the treatments safer. While CAR-T cell therapies have produced remarkable results in patients with acute lymphoblastic leukemia, there can be potentially lethal side effects to these treatments. Savoldo is developing a "safety switch" that can deactivate the CAR-T cells in case a patient experiences toxic side effects.

Earlier this year, Savoldo and her team initiated a clinical trial for a CAR-T cell treatment for acute lymphoblastic leukemia

with a built-in-safety switch. This switch can halt the expansion of infused T cells, and thereby reduce potentially lethal side effects, such as cytokine release syndrome. In addition, researchers believe this approach could help leukemia patients regenerate their immune system after it has been depleted by treatment.

"The question that we want to investigate is: Can we, at one point, eliminate the residual T-cells that are no longer needed because the malignancy is gone so we can allow normal B-cells to reconstitute?" Savoldo said.

Seed grant funding from UNC Lineberger helped launched the laboratory studies that demonstrated that the safety switch could eliminate CAR-T cells, and in a manner that clinicians could control. Building on

those results, Savoldo secured a three-year, $600,000 award from the Leukemia & Lymphoma Society to help bring the technology into clinical trials.

Barnhill is confident that his family's investment in the Seed Grant Program will pay dividends now and in the future. "UNC Lineberger is a special place," said Barnhill, who lives in Tarboro. "The researchers, the doctors and the leadership are exceptional. They truly are on the leading edge of cancer treatment and their research efforts will keep them on the forefront. We're very fortunate to have this kind of health care in North Carolina."

'A WHOLE NEW LEASE ON LIFE'

T-cell therapies have shown very encouraging results in early clinical trials against some advanced, hard-to-treat types of leukemia and lymphomas. Ian Dale of Cary, North Carolina (pictured above with his wife Laura), was diagnosed in January 2016 with anaplastic large cell lymphoma and told he would live four to six months without treatment. He underwent chemotherapy and radiation, but the cancer spread to his liver and spleen. He enrolled in a UNC Lineberger clinical trial for cellular immunotherapy treatment; the cancer went into remission. "I have a whole new lease on life. I'm here when I probably wouldn't be. I actually had a scan and was given the all clear. I'm officially a survivor."

2016-2017 Seed Grant Awards

UNC Lineberger awards seed grants in three funding tiers across three research program areas:

- Clinical/Translational, which supports early-stage research that can translate basic science discovery into clinical applications
- Basic Science, which supports research to identify cancer-driving mechanisms in cells and potential drug targets
- Population Science, which supports innovative research in cancer prevention, early detection, health promotion, epidemiology and survivorship

AWARD RECIPIENTS

Wendy Brewster, MD, PhD - $39,733
Exploring the urban-rural paradox of cancer care in North Carolina (Population Science)

Jennifer Brondon, MD, MS - $49,785
Mapping child and adolescent self-reported symptom data to clinician-reported adverse event grading to improve pediatric oncology care and research (Clinical/Translational)

Yuri Fedoriw, MD - $50,000
Whole exome sequencing of HIV-associated diffuse large B-cell lymphomas from Malawi (Clinical/Translational)

Jodie Fleming, PhD - $50,000
Determining the relationship of CRYBB2 and its pseudogene in promoting breast cancer disparities and patient outcome (Basic Science)

Caterina Gallippi, PhD - $50,000
ARFI, VisR, and DDAI Ultrasound for improving discrimination of malignant and unresponsive breast cancer (Clincical/Translational)

Katherine Hoadley, PhD - $49,629
Development of an intrinsic classification signature specific to basal-like breast cancer (Clinical/Translational)

Jennifer Lund, PhD - $49,990
Generalizing colorectal cancer trial results to real world populations: A pilot study (Population Science)

Jesse Raab, PhD - $49,560
SWI/SNF mediated genome regulation in SChLAP1-dependent prostate cancer (Basic Science)

Jennifer Smith, PhD, MPH - $49,572
Concomitant conventional treatment and traditional, complementary, and alternative medicine (TCAM) use by cancer patients in Malawi (Population Science)

Andrew Smitherman, MD - $48,746
Patterns of cancer care and clinical trial enrollment among adolescents and young adults (AYAs) in North Carolina (Clinical/Translational)

Hong Yuan, PhD - $49,992
Imaging tumor hypoxia in brain metastasis: a step closer towards personalized therapy on brain metastasis (Basic Science)

Award Abstracts

Wendy Brewster, MD, PhD, member, UNC Lineberger and professor, UNC School of Medicine Department of Obstetrics & Gynecology

Exploring the urban-rural paradox of cancer care in North Carolina
(Population Science)

Studies have shown that cancer patients living farther away from their health care treatment facilities are more likely to be diagnosed later, less likley to receive treatment within recommended guidelines, and are more likely to have worse quality of life and survival.

However, recent studies in North Carolina have revealed conflicting findings for patients who live in urban versus rural areas. One previous study found that Medicare-insured breast cancer patients living farther from treatment in rural areas were more likely to receive radiotherapy treatment than those who lived closer. In comparison, patients living in urban areas were less likely to receive treatment if they lived farther away.

UNC Lineberger researchers are planning a study to tease out this mystery. Led by UNC Lineberger member, Wendy Brewster, researchers are launching an effort to understand this urban-rural paradox by studying cancer patients of all insurance types. They will assess the differential effect of distance to care between urban and rural areas among women diagnosed with cervical cancer from 2003 to 2015 using data from the North Carolina Central Cancer Registry (NCCCR) linked to public and private health insurance claims.

If they continue to find paradoxical findings, researchers believe large health care systems should reconsider whether current interventions such as tele-oncology are the most effective method for addressing treatment disparities among cancer patients. The specific mechanisms that make distance a barrier to care may need to be considered separately when examining cancer patients residing in urban versus rural areas.

Jennifer Brondon, MD, MS, pediatric hematology-oncology fellow, UNC School of Medicine Division of Pediatric Hematology/Oncology

Mapping child and adolescent self-reported symptom data to clinician-reported adverse event grading to improve pediatric oncology care and research (Clincical/Translational)

To ensure safety in clinical trials, the side effects of cancer treatment are required to be reported during clinical trials for new treatments. For children, studies have shown that many doctors under-report the side effects they experience from cancer treatment, compared to what children report themselves. Researchers at UNC Lineberger are designing a survey to allow children and teens to report their own symptoms to address this issue. The effort will be important for a more accurate reporting of “adverse events,” or side effects, from treatment during clinical trials. Since adverse events in clinical trials for oncology are reported using the adult grading system, researchers will have to translate the child/adolescent

responses to the adult grading system. This will involve 10 senior pediatric oncology physicians, and another group of 180 pediatric oncologists. The results will allow clinicians to interpret the self-report data from children, potentially improving the impact of drugs that go to regulators, patients, and their families.

Yuri Fedoriw, MD, associate professor of Pathology and Laboratory Medicine, Director of Hematopathology

Whole exome sequencing of HIV-associated diffuse large B-cell lymphomas from Malawi (Clinical/Translational)

Infection with HIV has been shown to increase the odds of contracting lymphoma by 70 times, according to the Lymphoma Association. In sub-Saharan Africa, where HIV infection levels are high, researchers are seeing increasing incidence of this cancer type. However, classification of lymphoma linked to HIV is not complete. UNC Lineberger researchers are working to better understand and classify this type of cancer, believing if they are able to understand the physical characteristics of the cancer linked to the virus, their work could drive prevention and treatment strategies worldwide for HIV-linked lymphoma.

UNC Lineberger researchers will sequence the genetic code from samples of a particular type of HIV-linked lymphoma – diffuse large B-cell lymphoma, which is the most common type of lymphoma in the world. They will capture samples using tissue and blood samples from the KCH Lymphoma Study in Lilongwe, Malawi, where an existing effort is underway to study and treat cancers in sub-Saharan Africa known as the Malawi Cancer Consortium. Researchers have collected lymphoma samples from 59 HIV-positive lymphoma patients. Of the HIV-linked diffuse large B-cell lymphoma patients, 36 have undergone whole transcriptome sequencing. By sequencing these samples, researchers plan to identify gene mutations common in HIV-associated diffuse large B-cell lymphoma in order to better understand this disease, and to possibly improve treatment and prevention.

Jodie Fleming, PhD, assistant professor at the North Carolina Central University Department of Biological and Biomedical Sciences, member of UNC Lineberger and N.C. State's Center for Human Health and the Environment

Determining the relationship of CRYBB2 and its pseudogene in promoting breast cancer disparities and patient outcome (Basic Science)

African American women have higher breast cancer mortality rates compared to other races. That has been found to be true even for African-American women with luminal A breast cancer, which is considered to have a "good prognosis."

To better understand this disparity, researchers are looking into the function of one particular gene, CRYBB2, which is expressed differently in women of different races to investigate whether this gene may be contributing to poor outcomes in breast cancer. High expression of this gene has been linked with poor outcomes in breast, colorectal, endometrial, and prostate cancers in African-Americans.

Researchers are planning to do studies to define the biological consequences of high levels of CRYBB2, building off of findings they have already made to help define the function of this gene. Some of the biological effects of high expression of this gene that they have already discovered include alteration of intracellular-Ca2+, IL6, and EGFR/Her2/Her3 levels. In addition, they are interested in whether this gene is controlled or regulated by a "pseudogene," which is a similar, but non-functional, gene. Pseudo-genes can regulate parental genes by generating antisense regulator transcripts or noncoding RNAs.

The studies will utilize RNA in situ hybridization in BrCa biopsies, genetic manipulation of BrCa cells, and in vitro assays to define the unique roles of CRYBB2/CRYBB2P1. The findings could help explain differences in patient outcomes. And lastly, they plan to study the effects of CRYBB2-mediated alterations in EGFR/Her2/Her3, Ca2+, and IL6 to identify physiological changes in BrCa cells upon CRYBB2/CRYBB2P1 deregulation.

Caterina Gallippi, PhD, associate professor, NC State/UNC Joint Department of Biomedical Engineering

ARFI, VisR, and DDAI Ultrasound for improving discrimination of malignant and unresponsive breast cancer (Clincical/Translational)

Screening for breast cancer is beneficial when it averts progression of disease to metastasis or death. However, patients can experience negative side effects and unnecessary medical expenses from false positive screening results, or when tumors that will not respond to chemotherapy are treated anyway. To address this need, UNC Lineberger researchers are working to develop new cancer detection tools that are highly sensitive and specific.

Specifically, they are working on ultrasound-based imaging technologies that measure the mechanical properties of breast tissue, such as stiffness, elasticity, viscosity, and anisotropy.
Caterina Gallippi, PhD, is planning to use novel, noninvasive ultrasound technologies under development in her laboratory: Acoustic Radiation Force Impulse imaging for interrogating tissue stiffness, Viscoelastic Response ultrasound for assessing tissue elasticity and viscosity, and Dynamic Displacement Anisotropy Imaging for measuring tissue anisotropy. Already, these technologies have been demonstrated clinical utility in delineating atherosclerosis, muscular dystrophy, and renal dysfunction. However, their plan to use these tools for breast imaging is a new focus for this highly qualified research team. Their first step will be to study the diagnostic relevance of ultrasound-derived metrics for the different features of stiffness, elasticity, viscosity and anisotropy.

Katherine Hoadley, PhD, PhD, assistant professor, UNC School of Medicine Department of Genetics

Development of an intrinsic classification signature specific to basal-like breast cancer (Clinical/Translational)

UNC Lineberger researchers are looking to improve the classification of an aggressive set of breast cancers that are known as “basal-like” by studying tumor genetics. In the clinic, the term “triple-negative breast cancer” is often used as a surrogate term for this breast cancer subtype. The term comes from the lack of surface receptors on this breast cancer type -- most basal-like breast cancers typically lack expression of an estrogen receptor, a progesterone receptor and do not have amplified HER2. And while these characteristics apply to many breast cancers of this type, this classification does not apply to all basal-like breast cancers.

Analysis with 11 other tumor types from a multi-institutional cancer genetics project called The Cancer Genome Atlas showed that the basal-like breast cancer, and not necessarily triple negative breast cancers, are distinct from other breast cancers. This suggests they represent a separate disease within the breast. Attempts to develop a basal-like specific subtype classification have used variably expressed genes and often led to subtypes that are based on non-tumor features such as the stroma or immune cells. While these features play important roles in the tumor pathogenesis, they may be masking important tumor-intrinsic features that could help to further classify basal-like breast cancer and potentially identify new therapeutic targets.

Here, UNC Lineberger researchers propose to use multiple samplings of basal-like breast cancers to identify genes that are “intrinsic” to the tumor. These genes have low variance between repeated measurements of the same tumor and high variance across tumors from different patients. This approach was highly successful in identifying the robust classifications of the PAM50 and now within the context of basal-like subset will help to further classify this subset in a robust manner.

Jennifer L. Lund, PhD, UNC Lineberger member and assistant professor of epidemiology, UNC Gillings School of Global Public Health

Generalizing colorectal cancer trial results to real world populations: A pilot study (Population Science)

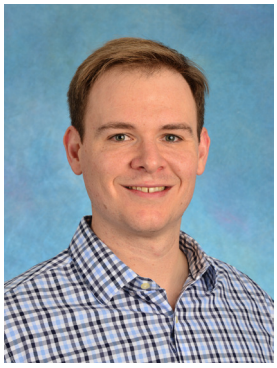
Patients who participate in clinical trials testing new cancer treatments do not often represent the full population of patients who will ultimately receive the treatment. Under-representation of patient subgroups in trials is problematic for health care providers because they need to know how treatments will effect different groups in order to offer personalized, patient-level treatment guidance. In addition, the findings of clinical trials need to be generalizable to the population for health policy reasons.

To assess and generalize findings from trials to target populations, a method called “model-based standardization” has emerged as a promising approach. This method essentially estimates the effects

on subgroups using clinical trials data, and weighs these effects according to their distribution in a target population.

Researchers have applied this approach to cardiovascular prevention and HIV trials, but not to cancer treatment trials. This proposed developmental pilot grant will use data from clinical trials, a population-based cancer registry, and Medicare claims to assess and apply model-based standardization for generalization of two colorectal cancer trials to target populations of patients treated in routine care.

The researchers' work in colorectal cancer will provide a framework for broader application to treatment trials from other cancer sites and generate preliminary data to support a larger grant application. This will tailor the model-based standardization approach to enhance its relevance for the cancer trials setting.



Jesse Raab, PhD, assistant professor, UNC School of Medicine Department of Genetics

SWI/SNF mediated genome regulation in SChLAP1-dependent prostate cancer (Basic Science)

Understanding the mechanism by which localized prostate cancer becomes metastatic, or spreads in the body, is necessary to the development of new prostate cancer therapies. UNC Lineberger researchers are planning to launch a study of a specific, notoriously detrimental gene to see if they can understand how it can drive invasive and aggressive forms of this disease.

Currently, scientists know that expression of the gene SChLAP1 can transform regular prostate cells into invasive cells, and is required for tumor formation in some models. They know that this gene codes for a long-non-coding segment of RNA that has been shown to cause problems in the cell when it is present. Because this non-coding RNA has been shown to deplete another molecule in the cell called the SWI/SNF complex core subunit SNF5, some researchers believe that SNF5 is a tumor suppressor in prostate cancer. The complexities of this molecule have created difficulties for scientists in confirming this running hypothesis. One of the issues is that this complex is not actually a single entity; instead, it can be assembled into a combination molecule to create hundreds or thousands of biochemically distinct complexes. So far, it remains unknown how the functional interplay of these many other forms of SWI/SNF function in prostate cancer progression.

UNC Lineberger researchers plan to try to define the precise mechanism by which SChLAP1 expression alters the state of the DNA to drive prostate cancer. They offer an alternative hypothesis to the running belief of the role of the SNF complex. They believe that distinct forms of SWI/SNF are required to alter chromatin in SChLAP1-expressing tumors. Completion of this study will definitively determine how SWI/SNF functions in prostate cancer, identify the molecular basis of SChLAP1 function, and will provide the foundation for future studies to identify novel therapeutic targets and epigenetic regulators of prostate cancer.

Jennifer Smith, PhD, MPH, UNC Lineberger member and professor, UNC Gillings School of Public Health Department of Epidemiology

Concomitant conventional treatment and traditional, complementary, and alternative medicine (TCAM) use by cancer patients in Malawi (Population Science)

The world's least developed countries experience the majority of the global burden of cancer. While access to conventional treatment such as surgery, chemotherapy, and radiation is expanding
to address this, these countries also have a high prevalence of the use of traditional, complementary and alternative medical practices, such as using herbal remedies that could be causing issues such as delays in clinical cancer diagnosis, or safety concerns due to herb/drug interactions. There are limited published data on alternative treatment use among cancer patients in sub-Saharan Africa, and no such data from Malawi.

Researchers at UNC Lineberger are planning to implement a survey of the use of conventional and alternative medicine in adult cancer patients who come to the Kamuzu Central Hospital in Lilongwe, Malawi, and to conduct focus groups of cancer patients.

Primarily, their goal will be to measure the frequency of the use of alternative medicine among adult cancer patients undergoing conventional cancer treatment. Secondarily, they will measure the frequency of delayed clinical cancer diagnosis due to seeking alternative treatment for symptoms.

Andrew Smitherman, MD, MSc, Medical Director of UNC Lineberger's Adolescent and Young Adult Program

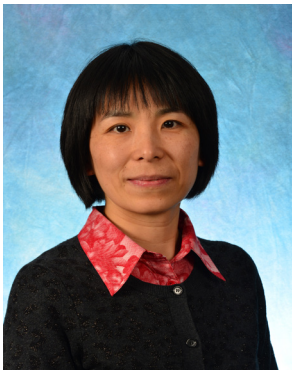
Patterns of cancer care and clinical trial enrollment among adolescents and young adults (AYAs) in North Carolina (Clinical/Translational)

Improvements in treatment have led to increased survival for many patients with cancer. However, adolescents and young adults have experienced lower improvements in survival rates than children and older adults. Evidence suggests that lower rates of participation in research studies among this group contribute to worse outcomes.

UNC Lineberger is uniquely situated to understand the patterns of adolescent and young adult cancer care, and the factors associated with research study participation. That's because of the UNC Lineberger Cancer Information & Population Health Resource, or CIPHR. By combining information from the North Carolina Central Cancer Registry with health insurance claims data, CIPHR provides a reliable way to identify adolescent and young adult patients in North Carolina and to obtain information regarding their treatment. Pairing data from CIPHR with research study enrollment data from the National Cancer Institute will generate a very accurate estimate of adolescent and young adult research study enrollment will be obtained.

UNC Lineberger researchers' objectives for this study are to describe the patterns of cancer care for adolescent and young adult patients in North Carolina and to determine if the likelihood of research study participation is affected by the type of medical center at which cancer treatment is received. They will be able to identify the location of cancer diagnosis and to track patients through treatment while exploring the factors that influence this process. With a better understanding of the relationship between adolescent and young adult cancer care and research study participation, they will identify barriers that currently prevent access to studies and optimal patient care.

Hong Yuan, PhD, UNC Lineberger member and associate professor, UNC School of Medicine Department of Radiology



Imaging tumor hypoxia in brain metastasis: a step closer towards personalized therapy on brain metastasis (Basic Science)

Tumors that have spread to the brain are a serious clinical problem, and rates of death are high in these patients. Innovative multi-disciplinary approaches are needed for more effective diagnosis and treatment. Researchers at UNC Lineberger are planning to target one feature of brain metastases that has been shown to have a significant detrimental impact on the effectiveness of radiation and chemotherapy: tumor hypoxia.

Hypoxia, or low levels of oxygen delivery, has been shown to have an impact on radiation and chemotherapy effectiveness due to hypoxia-induced resistance. Researchers plan to tackle this problem by developing imaging strategies that they believe can improve radiosurgery for tumors that have spread to the brain.

They are planning to establish a system of PET imaging with a "hypoxia probe" in preclinical models of brain metastases, and to characterize the features of hypoxia in various brain metastases models. Their aims are two-fold: to evaluate the newly developed hypoxia PET imaging marker called "18F-HX4" in laboratory model of breast cancer brain metastases, and to characterize the hypoxia and vascular features in breast and lung cancer brain metastases using hypoxia PET/MR imaging.

Researchers say they will be the first to study the hypoxia in brain metastases using imaging. They believe their findings could help to pave the way towards personalized, image-guided therapy in patients with brain metastases.

Seed Grant Award Process

The Seed Grant Program is administered by senior cancer center leaders who review and critique applications. At least two peer scientific experts evaluate and score each proposal, a NIH-style study section evaluates the top-scoring proposals, and a scientific advisory board identifies top priorities for funding.

Seed grants are significant—and highly competitive—awards for our faculty researchers. Each year, we receive far more promising proposals than we are able to fund.

In 2015, with input from UNC Lineberger faculty and internal and external advisors, we revised the existing program to add two tiers of awards that are larger in scope than those previously offered. The "regular" seed grants became Tier 1 Pilot Grants ($50,000); to these were added Tier 2 Stimulus Grants ($100,000-$200,000) and Tier 3 Multi-Project Grants (up to $400,000). We also added targeted request for applications to the mix, to stimulate proposals in new, high-priority areas.

With award recipients from a wide variety of departments and disciplines, the Seed Grant Program reflects one of UNC Lineberger's greatest strengths—multidisciplinary depth. UNC Lineberger is the largest research entity at the University of North Carolina, with approximately 300 scientists from 40 departments, including all five health affairs schools (medicine, public health, dentistry, nursing and pharmacy) as well as the College of Arts and Sciences. The Seed Grant Program encourages collaboration across campus as our faculty members work to combat cancer from all directions.

If you would like to learn more about the Seed Grant Program, please contact the UNC Lineberger Office of Development and Communications at lcccgiving@unc.edu or (919) 966-5905.

UNC Lineberger Comprehensive Cancer Center brings together some of the most exceptional physicians and scientists in the country to investigate and improve the prevention, early detection and treatment of cancer.

One of only 49 NCI-designated comprehensive cancer centers in the nation, UNC Lineberger works to understand the causes of cancer at the genetic and environmental levels, conduct groundbreaking laboratory research and translate findings into pioneering and innovative clinical trials.

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