OSUCCC Summer Research Program

Program Description: The Summer Research Program provides summer research experiences to qualified undergraduate students. Participants in this program will complete a 15-week cancer research internship at The Ohio State University Comprehensive Cancer Center (OSUCCC) during the summer of 2018.

Program Dates: April 30, 2018 – August 10, 2018 in Columbus, Ohio

Program Eligibility: The undergraduate summer research internship program is intended for undergraduate students with a background in science and an interest in social science research. We invite applications from current undergraduate sophomores (rising junior), or juniors (rising senior). There is no minimum GPA requirement. Please note if you are graduating in May 2018, you are not eligible for the program.

A committee comprised of OSUCCC staff will review applications and determine internship recipients. The criteria for selection include the student’s undergraduate record, letter of recommendation, and applicant’s essay responses.

Required Application Documents:
1. Application along with essay questions
2. Current Resume
3. Recommendation letter from a faculty member at your university who can comment on the qualifications for this research position
4. Ranked list of the top three lab choices and a rationale for the lab selections

Selection Timeline:
- Application Open: Week of January 1, 2018
- Application Deadline: Friday, February 9, 2018
- Interviews: Mid February
- Students Notified of Selection: Late February 2018

Summer Research Experience:
- Obtain hands-on mentored research experience
- Professional Development
- Journal Club
- Experience in Community Based Participatory Research (CBPR) to better understand health disparities
- Become proficient in presenting scientific concepts to peers and mentors

Stipend: A stipend will be provided to all program participants.

Housing: Housing will be provided to all students at no cost.

Final Project: Each scholar will produce a final paper and deliver an oral presentation to CCHE staff, OSU and OSUCCC staff, faculty, and invited guests.

Contact Us: Toyin Adeyanju, MPH, Program Manager Olutoyin.adeyanju@osumc.edu or 614.293.6959
Center for Cancer Health Equity
2018 Summer Research Projects

Project 1:
Understanding how cancer cells overcome their internal stress and cope with drug-induced stress to guide the development of improved therapeutic strategies
Mentor: Matthew K. Summers, PhD

The loss of internal controls that limit and regulate cell growth is a hallmark of cancer cells. Although cancer cells tolerate certain levels of changes to their DNA they must retain the blueprints for building the machinery required for cell growth and survival. Thus, they must still duplicate and transmit their genomes from one generation to the next with minimal errors in order for the tumor to continue to grow. The checkpoints that monitor these processes are rarely defective in cancer cells and are often highly active due to the loss of other control mechanisms. By inducing additional stress and/or inhibiting these remaining checkpoints we can induce death in tumors. The goal of our research is to understand how cancer cells overcome their internal stress and cope with drug-induced stress to guide the development of improved therapeutic strategies. Our work focuses on the interplay between ubiquitin ligases and cellular checkpoints, ensure the fidelity of these essential processes. We currently have two main projects. In the first project, we are examining the role of the deubiquitinating enzyme USP37 in the regulation of replication and the cell cycle. The second project focuses on the regulation of chromosome segregation in mitosis. We utilize a multi-faceted approach to achieve our goals including; proteomic, cellular, microscopy, and biochemical based analyses. Potential projects include construction of cellular models for monitoring cell growth or to enhance proteomic studies, analysis of protein-protein interactions in a purified system, and live cell analysis of cellular response to drug-induced stress, among others.

Project 2:
Men’s Health Education Series
Mentor: Electra Paskett, PhD

This study aimed to increase awareness of the main health problems affecting men and increase awareness of and participation in healthy lifestyles. The program utilized community health educators to facilitate a series of three educational sessions focused on improving knowledge and behaviors related to the prevention and early detection of colon, lung and prostate cancers and clinical trials among African American, Appalachian, and Latino/Hispanic men. Potential research/analytic projects include:

- Race, education, or income differences in knowledge improvement as a result of the intervention
- Race, education, or income differences in behavior change/screening compliance
- Race, education, or income differences in self-assessment of health
- Change/willingness to participate in clinical trials
Project 3:  
Cardiovascular disease among cancer and non-cancer patients  
Mentor: Daniel Addison, MD

Exposure is the first step toward decision. I am a clinical investigator and practicing cardiologist with unique expertise in cardiovascular imaging and cardio-oncology. I joined the OSUCCC earlier this year following the completion of my NIH T-32 advanced cardiovascular imaging fellowship at MGH. But, as a medical student I gained important exposure to medical research through the mentorship of Dr. Henry Okafor, a Meharry-Vanderbilt cardiologist, in Nashville, TN, which propelled me to a career in academic cardiology. Currently, my research includes the assessment, evaluation, and identification of cardiovascular disease among cancer patients. I specifically seek to employ cardiovascular imaging techniques to understand the pathophysiologic mechanisms and potential targets of interventions for cardiovascular disease(s) among cancer survivors at-risk for cardiovascular events. To date, these efforts have focused on the interplay of cancer-treating radiotherapy and cardiovascular events, the early detection of anthracycline-associated cardiotoxicity, and the early detection and mechanisms of cancer immunotherapy-associated cardiovascular disease, for which, I was recently awarded an NCI K-12 Career Development Award. Within this I have several projects (cancer and non-cancer), in which I would be happy to mentor and train an undergraduate student interested in a potential medical research career. These projects, building on existing datasets include:

1) an evaluation of the association of the novel cancer immunotherapy, ibrutinib, with incident atherosclerotic cardiovascular disease (ASCVD) development,

2) an evaluation of the predictors of anthracycline-associated cardiotoxicity in breast cancer patients, and

3) an evaluation of the representation of women and minorities in contemporary cardiovascular clinical trials

From these projects and biweekly research meetings, my group and I would be excited to offer a student strong exposure to clinical research as well as potential guidance into a future academic career.
Project 4:
The Role of Access
Mentor: Karen Patricia Williams, PhD

Not being able to access cancer screening services can create barriers for women. Access to those services can be: a) having clinics that provide cancer screening services; b) having insurance or money to pay for the cancer screening services and/or; c) having transportation services. In this project we answer the question, how does access influence breast and cervical cancer screening? Using a secondary data set from a randomized controlled trial conducted in metro Detroit, we will work with a Detroit-based civil engineer to examine access points such as zips codes, transit mobility, finances and available clinics. Our sample population will be both non-adherent and adherent Black, Latina and Arab women. The student will understand one aspect of the complexity of health disparities and explore some options of what health equity would look like with the same population in the same living environment.

Project 5:
Role of Cancer-Associated Fibroblasts in Papillary Thyroid Cancer
Mentor: Drew Shirley, PhD

The Shirley laboratory broadly focuses on the role of cancer-associated fibroblasts in papillary thyroid cancer, focusing specifically on the functional effects of the serine-threonine kinase ILK in this cell type. For in vitro studies, we have been developing novel primary fibroblast cultures from resected thyroid nodule specimens, both murine and human. We have performed siRNA knockdown of ILK in these cells to show a functional role, and continue to perform these experiments. In future studies, we plan to perform co-culture and conditioned medium experiments with the fibroblasts and immortalized thyroid cancer cells. With the assistance of the pathology core we perform immunohistochemistry on thyroid cancer samples to assess for expression of ILK as well as markers for immune cell infiltrate and fibroblast activation. We perform cytokine/chemokine arrays to assess how ILK affects secretion of the factors. With the assistance of the genomics core at OSU we are investigating genetic signatures of thyroid cancer-associated fibroblasts. Finally, we plan to perform transgenic, fibroblast-specific knockout of ILK in a murine model of thyroid cancer to assess for effect on thyroid cancer progression. Additionally, Dr. Shirley has clinical projects assessing short and long term surgical outcomes after thyroid and parathyroid surgery. Students who enter our lab would learn skills in both basic and translational research and play an active role in data collection and analysis.
**Project 6:**

*MicroRNA drivers of TMPRSS2 Fusion Negative Prostate Cancer in African American Men*

**Mentor:** Moray J Campbell, PhD

African American men are significantly more likely to experience aggressive prostate cancer (PCa) and at a younger age than their European American (EA) counterparts. Therefore we have aimed to identify and understand the underlying biological drivers of AA PCa. Amongst EA men, certain gene fusions such as TMPRSS2:ERG are very common and being pursued as genomic biomarkers to define disease state and predict treatment responses in PCa. However the incidence of TMPRSS2:ERG is far lower in AA PCa patients and therefore we have focused on dissecting TMPRSS2:ERG fusion negative AA PCa. Specifically, we have focused on microRNA drivers of PCa in TMPRSS2:ERG fusion negative AA PCa.

We have analyzed microRNA expression in PCa tumors from several large groups of AA and EA PCa patients and identified a small cohort of microRNA that are uniquely altered in TMPRSS2 fusion negative PCa amongst AA men. Our current research has focused on understanding why these microRNA are uniquely regulated in AA PCa and applying genomic approaches to understand what are the downstream consequences in terms of altered gene networks and cell behavior. To undertake this research we use cell models of AA and EA PCa, as well as publically available data from PCa patients. Importantly, we combine cell-based experiments with bioinformatics and computational analyses to gain the fullest understanding of how altered microRNA regulation can act as cancer drivers in AA PCa. This research opportunity will focus on the actions of specific microRNA using cell-based analyses and introduce the basics of bioinformatics analyses.

**Project 7:**

*Rural Intervention for Screening Effectiveness (RISE)*

**Mentor:** Electra Paskett, PhD

Women living in rural areas are more likely to get cancer and less likely to have received recommended cancer screening tests that prevent or find cancer early. Additionally, the number of women who die from breast, colon, and cervical cancer are higher in Ohio and Indiana than the rest of the US. Researchers at The Ohio State University and Indiana University-Purdue University Indianapolis are working to reduce the cancer burden in rural areas and have developed a program to help rural women understand the need for cancer screening.

- **Purpose:** To compare two different ways to increase cancer screening participation for breast, cervical, and colorectal cancer, and determine which method is more effective.
- **Method:** Researchers will contact women in 32 rural counties across Northwest Ohio and Northeast Indiana by mail and then by telephone to invite them to join the study and to complete a baseline survey.

Potential research/analytic questions using baseline surveys include:

- Cancer screening behaviors among participants
- Factors associated with participants within and outside screening guidelines
**Project 8:**  
Community Initiative towards Improving Equity and Health Status (CITIES)  
Mentor: Electra Paskett, PhD

This study sought to better understand overall health of people living in Ohio and to see if what people do, how they feel, and where they live affect their health. Over a thousand participants, age 21 to 74, living in Ohio took part in the project. Potential research/analytic questions include:

- Examining participant screening behaviors
- Health information seeking behaviors
- Prevention actions
- Self-efficacy beliefs as a predictor of behavior

**Project 9:**  
Community Awareness Resources and Education (CARE II)  
Mentor: Electra Paskett, PhD

CARE II built upon results of CARE I and focused on the goal of understanding why cervical cancer (CC) incidence and mortality rates are higher in Appalachia Ohio and West Virginia. The goal was accomplished using 4 core principles: 1) the Social Determinants of Health Framework; 2) community-based participatory research; 3) multi-level framework (“from cells to society”); and 4) transdisciplinary team of researchers and community members. Four inter-related projects examined factors related to the high rates of CC from genetic to policy/access issues using a range of studies from observational to randomized designs. Project 1 recruited women to a case-control study to investigate multi-level (genetic, behavioral, and environmental) correlates of invasive CC. Project 2 interviewed women to examine smoking behaviors among their social networks and a smoking cessation intervention is using the influence of social networks. Project 3 recruited women to participate in a cohort study where women received the HPV vaccine and were followed for 12 months to assess the effect of stress (self-reported and biological) on the ability of the host immune system to mount an immunological response to HPV. In Project 4, a multi-level intervention (parents, providers, system-level) was tested in a group randomized trial in county health departments (HD) and local clinics to see if HPV vaccine rates increased among females aged 9-17 who use HDs and clinics randomized to receive the intervention program.

Potential research/analytic questions include:

- Examining measures of poverty
- Participant’s perceived perception of self in community