Meharry Cancer Summer Undergraduate Research Program
Mentor Project Descriptions/Research Project Areas

A. Basic/Translational Research

Zhengbang Chen, Ph.D.
The research in Dr. Zhengbang Chen’s laboratory focuses on dysregulated signaling pathways in prostate cancer. His group has published several important discoveries on SKP2, androgen receptor (AR), ARF and MET essential oncogenic signaling in prostate cancer. Students in his laboratory will use cultured cells and animal models to explore molecular signaling pathways that influence prostate cancer growth and progression.

Salil Das, D.Sc.
The research in Dr. Das’ laboratory focuses on molecular mechanisms of pulmonary diseases, including acute respiratory distress syndrome (ARDS), chronic obstructive pulmonary disease (COPD), emphysema, lung injury, lung fibrosis and lung cancer induced by direct and environmental smoke and mustard gas, a chemical warfare agent. His group also studies the role of environment and diet, and molecular mechanisms associated with the pathology of breast cancer. Students working within the Das laboratory will use animal models and cell lines to study molecular mechanisms associated with environmental causes of breast and lung cancer.

Jamaine Davis, Ph.D.
The Davis laboratory uses an interdisciplinary approach (biochemistry/biophysics, bioinformatics, cell and structural biology) to elucidate mechanisms of genomic maintenance and regulation in breast cancer. Their challenge is to understand how genomic and proteomic variations affect health, disease and drug response. To address this, the lab seeks to define how dysregulated protein-protein interaction networks obtained from bioinformatics (patient data) influence disease. They also model these observations in cell systems to determine the best course of therapy for breast cancer patients. Students working with Dr. Davis and his team will use in vitro models of breast cancer to study the structure and function of proteins involved in DNA damage repair.

Sakina Eltom, D.V.M, Ph.D.
The research in Dr. Eltom’s laboratory overlaps molecular aspects of environmental toxicology and chemical carcinogenesis. One area of research explores molecular mechanisms involved in the signaling pathways of the aryl hydrocarbon receptor (AhR) in breast cancer. The second area of research involves the examination of the differential role of environmental chemicals on the etiology of breast cancer in pre-menopausal African American and Caucasian women. The overall objective of this study is to identify biological factors contributing to the ethnic variation in breast cancer and provide mechanistic data on the possible differential role of environmental chemicals on the biology of
breast cancer. Students working within the Eltom laboratory will use cell lines to study the biology of AhR and the effects of environmental chemicals on breast cancer.

**Dana Marshall, Ph.D.**

Dr. Dana Marshall’s research focuses on identifying factors that contribute to the disparity in mortality between African-American males and their Caucasian counterparts. Her work includes the acquisition of clinical and demographic information from individuals treated for oral cancer at Nashville General Hospital at Meharry and in the Meharry Oncology Clinics. Patient tissues are evaluated molecularly for HPV as well as for other molecular clues predictive of outcome. She also works with cell lines, characterizing the role of Alpha2-HS glycoprotein (AHSG) in enhancing metastatic properties of oral squamous cell carcinoma cells while also characterizing isoforms of human AHSG using mass spectrometry.

**Robert Matusik, Ph.D.**

Dr. Robert Matusik’s laboratory has been engaged in studies of various aspects of molecular genetics and transgenic mouse models of prostate cancer. His laboratory discovered that the androgen regulated probasin promoter directs prostate-specific gene expression in the mouse and has been involved in developing numerous mouse models for prostatic disease. Their work has also identified the protein Forkhead Box A1 (FoxA1) as an important androgen receptor (AR) co-regulator and shown that the NF-kappaB pathway plays a major role to induce AR full length and AR variants during prostate cancer failure of hormonal therapy. Students working in Dr. Matusik’s laboratory will use cell lines and animal models to explore regulation of the AR signaling pathway in prostate cancers.

**Amosy M’Koma, M.D., Ph.D.**

Dr. Amosy M’Koma is a physician scientist who has been recognized for his expertise in inflammatory bowel disease (IBD) diagnostics, and in the improvement of diagnostic assessments of disease activity and surgical management of ulcerative colitis (UC) and familial adenomatous polyposis (FAP). His laboratory conducts translation research that seeks to establish the link between IBD and colorectal cancer. Students in Dr. M’Koma’s laboratory will use data from MALDI-mass spectrometry, proteomics, bioinformatics and recombinant single-chain antibody development to identify changes in protein expression in colon cancers.

**Aramandla Ramesh, Ph.D.** The laboratory of Dr. Aramandla Ramesh uses *in vivo* (rats and mice) and *in vitro* (sub-cellular preparations and cell cultures) models to elucidate how chemical metabolism drives toxicity and carcinogenesis. Students working in Dr. Ramesh’s laboratory will use rodent models and cell lines to examine the ability of one group of environmental toxicants, polycyclic aromatic hydrocarbons (PAHs), to influence the development of colon cancer.
Ann Richmond, Ph.D.
The laboratory of Dr. Ann Richmond investigates the intracellular signals that are important in the tumor microenvironment and in the premetastatic niche to reduce the establishment of metastatic lesions. They have worked for several years to investigate the role of inflammatory mediators in cancer progression and mechanisms for controlling the negative impact of inflammatory mediators using basic cancer biology principals that can be translated to the clinic. Students working in Dr. Richmond’s laboratory will be able to use cell lines, animal models, and in vitro and in vivo imaging techniques to characterize the mechanism by which small molecular inhibitors regulate growth and progression of melanomas and other types of cancer.

Amos Sakwe, Ph.D.
Dr. Sakwe’s research focuses on the molecular basis of cancer progression, metastasis and chemoresistance. His laboratory uses molecular and cell biology, and biochemical techniques as well as animal models of breast cancer to study the role of calcium binding and calcium activated proteins in breast cancer progression and metastasis. The laboratory is also interested in drug discovery techniques to identify drugs that attenuate the progression of breast cancer. Students working in the Sawke laboratory will use human cell lines and other in vitro models to study breast cancer progression and metastasis.

Anil Shanker, Ph.D.
The central focus of Dr. Anil Shanker’s laboratory is to understand the molecular mechanisms of intratumoral functional cross-talk between T lymphocytes and natural killer (NK) cells. They are also invested in dissecting the mechanisms of immunomodulation by the proteasome inhibitor bortezomib, Notch ligands, and neurotransmitters in adoptive T cell/NK cell transfer settings in an effort to optimize lymphocyte effector function for cancer therapy. His laboratory is also interested in identifying common functional immune signatures and specifying Notch and lymphocyte repertoires in racial and ethnic minorities that could correlate with strong anti-tumor responses. Students working in Dr. Shanker’s laboratory will use in vitro and in vivo models of cancer to explore these different aspects of cancer immunology.

Deok-Soo Son, D.V.M., Ph.D.
The laboratory of Dr. Son examines the role of proinflammatory chemokines on the progression of ovarian cancer and the link between obesity and breast cancer. Students working in this laboratory will have an opportunity to study chemokine networks in models of human ovarian cancer in order to determine which chemokines can be used as biomarkers and therapeutic targets. In a second project, the Son lab has identified a proinflammatory chemokine profile linking obesity and breast cancer. Students working on this project will perform
experiments designed to define the roles of obesity-promoted proinflammatory chemokines on the progression of breast cancer.

LaMonica Stewart, Ph.D.
Dr. Stewart’s laboratory studies signaling pathways activated by the peroxisome proliferator activated receptor (PPARγ). Her laboratory also studies interactions between the androgen receptor signaling pathway and PPARγ in human prostate cancer cells. Students working in Dr. Stewart’s laboratory will use human prostate cancer cell lines to explore how PPARγ agonists and the anti-diabetic drug metformin regulate prostate cancer growth and progression.

B. Clinical/Community-Based Research

Phillip Lammers, M.D., M.S.C.I.
Dr. Lammers is an active translational researcher with ongoing projects with collaborators in research labs at both Vanderbilt University and Meharry Medical College. He is exploring in tandem the possible genomic differences and inequalities in access to vital genetic testing between African-Americans and Caucasians to explain disparities in outcomes of patients with breast cancer. In addition to his interest in clinical disparity research, Dr. Lammers is investigating the role of the fetuin-A and circulating exosomes in breast cancer through bench research with collaborators at Meharry. Students working with Dr. Lammers will perform studies with a clinical oncology focus.

Maureen Sanderson, M.P.H., R.D., Ph.D.
Dr. Maureen Sanderson has a background in cancer epidemiology, with specific training and expertise in breast cancer, prostate cancer, human papillomavirus (HPV) related cancers, lung cancer, and cancer survivorship. Much of her research has been conducted as community based participatory research. Students who work with Dr. Sanderson will design, conduct, and interpret epidemiologic studies that focus on the causes of and means of preventing cancer.

Flora Ukoli, M.D., M.P.H.
The research of Dr. Flora Ukoli focuses on developing culturally appropriate prostate cancer education interventions particularly for low-income and low-education populations that will improve the level of knowledge about prostate cancer and positively impact attitude to early detection. A second area of interest is to investigate dietary exposures that might contribute in some way to the high prostate cancer risk and burden observed in African-Americans. Students working with Dr. Ukoli will have the opportunity to perform community-based participatory research and epidemiological studies to determine the effect of diet and gene-environment interactions on prostate cancer risk.