Cancer Biology

Subhash Chauhan, PhD

The primary research interest of Dr. Chauhan's lab is to identify and characterize the diagnostic and therapeutic targets for gynecological malignancies. The main focus is to elucidate the regulatory mechanisms of cell-cell adhesion and anti-adhesion molecules that cause cancers. Our research is also aimed for the identification and characterization of biomarkers that aberrantly express or localize in cancer cells of reproductive tract in order to develop newer tools for early disease diagnosis.

Kristi Egland, PhD

Early and personalized diagnosis for breast cancer patients is crucial for optimizing treatments leading to long-term survival. Cancers can elicit an immune response which includes production of autoantibodies against tumor-associated antigens (TAA). Because anti-TAA antibodies reflect and amplify the cellular changes associated with tumorigenesis, detection of anti-TAA antibodies in the sera of breast cancer patients may provide a non-invasive mechanism for the early detection of breast cancer. Our laboratory has established a strategy to recognize breast cancer patients' antibodies. The long-term goal of Dr. Egland's laboratory is to develop a blood test for breast cancer based on detecting a patient's antibodies generated against cancer proteins.

Meena Jaggi, PhD

The primary focus of Dr. Jaggi's research is to identify and evaluate the functional significance of cell-cell adhesion molecules known as cadherins and catenins in cancer progression. In-depth knowledge of molecular mechanisms involved in signal transduction of human cancers is critical for the development of biomarker for early detection of cancer and rationalized structure-based drug designing.

John Lee, MD

Dr. Lee's lab goal is to improve cure rates for the treatment of Head and Neck cancer. His lab uses a variety of basic science approaches to better understand mechanisms of invasion and mechanisms of immune related clearance of head and neck cancer. He works to translate these findings into the clinic by using a mouse model of head and neck cancer that they have developed. He also works to develop new therapies by the initiation of clinical trials for the patients that he treats with cancer.

Keith Miskimmins, PhD

Our laboratory examines the molecular mechanisms that regulate proliferation and survival of cancer cells. One goal of our experiments is to determine the mechanisms that control expression of the tumor suppressor p27. Expression of this protein correlates with prognosis and we are characterizing the mechanisms that influence this process and how they vary in breast cancer cells. We have also found that certain metabolism-modulating compounds are able to selectively promote cell cycle arrest and cell death of cancer cells and are examining the molecular pathways that mediate these effects and characterizing the effects of the compounds in preclinical mouse models of cancer.

William C. Spanos, MD

A subset of head and neck cancer is caused by human papillomavirus (HPV). We found that an immune response is required for the clearance of HPV positive cancer in mice during treatment with chemotherapy and radiation. My lab is currently focused on determining the components of the immune system important for this tumor clearance. In addition, we are investigating several ways of augmenting the immune response to HPV positive cancer.

Cardiovascular Health

William Harris, PhD
The Omega-3 Research Lab at the Cardiovascular Health Research Center focuses on the analysis of blood (RBCs and plasma) omega-3 fatty acid levels. This test is currently being used in major national epidemiological research studies to learn more about the health benefits of the omega-3 fatty acids contained in fish oils. We are interested in more fully characterizing this test through the use of thin layer chromatography, gas chromatography and GC-mass spectroscopy. We are looking for a student with a strong interest and background in chemistry to work on this project.

Qiangrong Liang, MD, PhD
Research in my laboratory is devoted to understanding the molecular events and intracellular signaling mechanisms that underlie heart failure, a clinical syndrome that occurs in virtually all cardiovascular diseases and is one of the major causes of mortality in human population. Using an approach that combines cell culture system and genetic altered animal models, we are currently exploring mechanisms of myocardial protection by caloric restriction; investigating why diabetic patients and animals are predisposed to heart failure; and, investigating mechanisms of heart failure induced by the anti-cancer drug doxorubicin.

Tim O'Connell, PhD
Dr. O'Connell's lab goal is to understand the role of adrenergic receptors in the pathogenesis of heart failure. His lab is studying the physiologic role of alpha-1-adrenergic receptors in preventing heart failure using transgenic mouse models as well as the basic biochemical and biophysical aspects of alpha-1-adrenergic signaling in cardiac myocytes.

Greg Shearer, PhD
Atherosclerosis is a vascular disease that leads to the formation of plaques which clog the vessels and impede normal blood flow tissues. It is a leading cause of heart attacks and strokes. Two factors play key roles in the progression of atherosclerosis: inflammation and lipids. The developing plaque is largely comprised of cholesterol deposited by low-density lipoproteins (LDL), however inflammation is what initiates and propagates plaque formation. Two non-LDL lipid-bearing lipoproteins that mediate inflammation are VLDL and HDL. HDL, transport cholesterol away from plaques act as anti-inflammatory agents; VLDL, the primary triglyceride transporting lipoprotein, can induce inflammation and endothelial dysfunction. Our research is directed at understanding the relationship between lipoproteins and blood vessel disease by studying the inflammatory components of lipoproteins and how they impact the endothelium.

Health Disparities

Amy Elliot, PhD
Compelling data now suggest that maternal drinking during pregnancy, sudden infant death syndrome (SIDS), and stillbirth may be inter-related in important ways. The Safe Passage Research Network is conducting community-based pilot studies to investigate the role of prenatal alcohol exposure in the risk for SIDS and stillbirth, as well as other adverse pregnancy outcomes, including Fetal Alcohol Syndrome. In addition to mothers and infants from both urban and rural communities in the Northern Plains, the research effort also targets women from two areas plagued by high rates of perinatal mortality and prenatal alcohol exposure: American Indians in the Northern Plains and Cape Coloured (mixed race ethnicity) in South Africa.

DenYelle Kenyon, PhD

Dr. Kenyon engages in social/behavioral research using quantitative and qualitative research methods to examine various adolescent health and development issues. Students would have the opportunity to be involved in several ongoing projects, which include adolescent reproductive health, American Indian ethnic identity and mental health, obesity prevention, and parent-adolescent relationships during the transition to adulthood. Students interested in adolescent health/development and health disparities are encouraged to apply.

The Sanford Project

Zhiguang Guo, MD, PhD

At the clinical onset of type 1 diabetes (T1D), human patients still have some functional beta cell mass remaining. If we could control autoimmunity against beta cells, T1D may be cured by increasing the remaining β cell mass to restore normoglycemia. The goal of current research in my laboratory is to evaluate and develop therapeutic approaches to treating T1D by ameliorating autoimmunity and promoting beta cell regeneration.

Alexei Savanov, MD

The development of human type 1 diabetes (T1D) involves autoimmune destruction of insulin-producing β-cells of the pancreatic islets. This destruction is done by T cells. In order to kill β-cells, T cells first should travel from the bloodstream into these pancreatic islets. This process of activated lymphocytes migration from the bloodstream into the underlying target tissue is called homing. Homing takes place in the small blood vessels called capillaries. Homing of diabetogenic T cells into pancreatic islets consists of several steps of interaction between a migrating T cell and cells comprising the capillary wall – endothelial cells. Our studies explore novel approaches impeding the homing of diabetogenic T cells.

Daqing Yang, PhD

Ataxia-telangiectasia (A-T) is an autosomal recessive childhood disorder characterized by cerebellar ataxia and oculocutaneous telangiectasias. Patients with A-T also have high incidences of type 2 diabetes mellitus. A-T patients who have type 2 diabetes exhibit symptoms of insulin resistance and glucose intolerance. The gene mutated in this disease, *ATM* (A-T, mutated), regulates glucose uptake in response to insulin in muscle cells. Our goal is to study the mechanisms underlying defective glucose uptake and insulin secretion observed in A-T patients and A-T mice and to search for a cure for both type 2 and type 1 diabetes.

Sanford Children's Health

David Pearce, PhD

Neuronal Ceroid Lipofuscinoses is caused by autosomal recessive inheritance of mutations in the genes CLN1-10. Juvenile Neuronal Ceroid Lipofuscinosis (Batten Disease) is the most common neurodegenerative disease of childhood resulting from mutations in CLN3. This devastating disease results in loss of vision around 5 years of age, followed by slow decline in cognitive and motor function and a progressively increased frequency of seizures. Batten disease is universally fatal. The Pearce lab uses cell biology, biochemistry, molecular genetics, and neuroscience to investigate the underlying pathological mechanisms of Batten disease.

Peter Vitiello, PhD

The Vitiello lab investigates growth, injury, and repair in the developing lung. Premature infants exposed to supplemental oxygen (hyperoxia) often develop Bronchopulmonary Dysplasia (BPD), a form of chronic lung disease characterized by impaired alveolar growth. To investigate the molecular basis of BPD, we utilize multiple approaches including tissue culture, animal models, and biochemical methods.

The overall goal of our research is to apply biochemical, molecular, cellular, and system biology approaches to understand signals which regulate normal lung development and how environmental stresses, such as hyperoxia, affect these signals and alter the human condition.

Jill Weimer, PhD

The research objective of the Weimer lab is to understand novel mechanisms controlling the development of the cerebral cortex, with an emphasis on events regulating neural stem cell proliferation and neuronal differentiation. Disruption in various aspects of neuronal proliferation and placement have been shown to contribute to an array of neurodevelopmental migration defects, including leptomeningial heterotopias, subcortical band heterotopias, and periventricular heterotopias. These defects can lead to severe mental retardation, developmental delays and moderate to severe epileptic seizures and are thought to contribute to developmental disorders such as Lissencephalies, Autism, and Schizophrenia.