

# FRONTIERS IN RESEARCH

## SELECTED NEW PROJECTS FUNDED BY MAJOR GRANTS AND AWARDS



### SCHOOL OF MEDICINE

#### ■ Department of Anesthesiology

**Kathleen Light, Ph.D.**

Research Professor

**PROJECT:** "Novel Ion Channel-based Biomarkers in CFS"

**FUNDING AGENCY:** Chronic Fatigue and Immune Dysfunction Syndrome Association of America, Inc.

**AMOUNT OF GRANT:** \$100,000 over 18 months

Exercise leads to increased mRNA for sensory, adrenergic, and immune receptors. The goal of this project is to determine if these changes in mRNA can be used as an objective biomarker in leukocytes to distinguish patients with Chronic Fatigue Syndrome (CFS) from normal subjects and patients with other forms of fatigue. Findings from this work could form the basis for a blood test that could help diagnose CFS and distinguish it from fatigue caused by other conditions. In addition, Light's work may help direct treatment strategies and aid in understanding the mechanisms that cause clinical fatigue and CFS.

#### ■ Department of Biomedical Informatics

**John F. Hurdle, M.D., Ph.D.**

Associate Professor

**PROJECT:** "POET: Consolidated, Comprehensive Clinical Text Preprocessing"

**FUNDING AGENCY:** National Library of Medicine, National Institutes of Health

**AMOUNT OF GRANT:** \$375,000 over 2 years

Modern health-care systems rely increasingly on electronic medical records to store and process clinical data about patients. By far, the vast majority of clinical information in these systems is stored as electronic notes, typed or dictated by clinicians of all professional backgrounds. If these clinical narratives could be mined by intelligent programs, a tremendous new resource in improving patient care and safety could be opened. But a major roadblock is that the clinical notes themselves are often ungrammatical and contain misspellings and abbreviations. Programs called natural language processing systems could mine these texts, if they were written in proper English. The purpose of POET (Parseable Output Extracted from Text) is to preprocess raw clinical notes into a form more closely resembling regular language, so that the power of natural language processing systems can be harnessed to improve patient care.

#### ■ Huntsman Cancer Institute (HCI)

**Brandon Bentz, M.D.**

Investigator; Assistant Professor, Surgery, Division of Otolaryngology-Head and Neck Surgery

**PROJECT:** "Oxidation of Carotenoids and Cancer Risk"

**FUNDING AGENCY:** Elsa U. Pardee Foundation

**AMOUNT OF GRANT:** \$140,000 over 2 years

Carotenoids, such as beta-carotene, have been explored as a dietary supplement to prevent cancer. Yet several studies have shown that carotenoids actually increase cancer risk when given to smokers. This project will determine whether oxidative breakdown of beta-carotene can produce pro-carcinogenic metabolites.

#### ■ Department of Family and Preventive Medicine

**Joseph Stanford, M.D., M.S.P.H.**

Associate Professor

**PROJECT:** "Effectiveness, Intention, and Behavior in Creighton Model Natural Family Planning Use"

**FUNDING AGENCY:** Office of Population Affairs, U.S. Department of Health and Human Services

**AMOUNT OF GRANT:** \$900,000 over 3 years

Despite decades of studies in natural family planning (NFP), limited data exist to compare NFP methods with other methods of family planning. In addition, there are conceptual shortcomings with standard measures for intended and unintended pregnancy. In this prospective study, Stanford will compare conventional measures of family planning effectiveness with objective measures of intention and behavior. He will study users of the Creighton Model of NFP, which teaches women (and couples) how to track ovulation and the fertility cycle for the purposes of avoiding pregnancy, achieving pregnancy, or managing gynecologic health. Results will contribute to greater understanding of the effectiveness of NFP methods by health professionals and increased utilization of NFP by couples.

#### ■ Department of Internal Medicine

**E. Dale Abel, M.D., Ph.D.**

Professor of Internal Medicine and Biochemistry; Chief, Division of Endocrinology, Metabolism, and Diabetes

**PROJECT:** "Treating Diabetic Cardiomyopathy by Modulating Myocardial GLUT4 Expression"

**FUNDING AGENCY:** American Diabetes Association

**AMOUNT OF GRANT:** \$300,000 over 3 years

The project will determine if modulating glucose uptake in the hearts of diabetics will promote or prevent progressive cardiac dysfunction. Abel's previous work showed how insulin controls mitochondrial function in the heart and that a high-fat diet can lead to major abnormalities in how the heart metabolizes glucose and fatty acids. In this study, Abel will determine if maintenance of the myocardial glucose transporter GLUT4 will preserve cardiac function and energetics in the

context of diabetes and obesity/insulin resistance. Abel also has a related project, "Molecular Pathogenesis of Diabetic Cardiomyopathy."

#### ■ Department of Neurobiology and Anatomy

**A. Gordon Smith, M.D.**

Associate Professor

**PROJECT:** "Peripheral Neuropathy in Metabolic Syndrome and Diabetes"

**FUNDING AGENCY:** American Diabetes Association; National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health

**AMOUNT OF GRANTS:** \$558,780; \$1.99 million, respectively

Smith has two major projects dealing with peripheral neuropathy in diabetes and its precursor, metabolic syndrome. Peripheral neuropathy is a disorder of the longest nerves in the body that results in numbness, pain, and weakness in the feet and hands. Neuropathy occurs when nerve fibers die quicker than the body can regenerate them. The most common cause of peripheral neuropathy is diabetes. Obesity, high cholesterol, and high blood pressure may facilitate neuropathy, although the mechanisms are unknown. Smith's projects will examine nerve regeneration using skin biopsies and various measures of nerve function. He also will study whether better diet and exercise will improve nerve regeneration. Both studies will help further understanding of the mechanisms causing neuropathy and may influence clinical testing for and treatment of the disorder.

#### ■ Department of Oncological Sciences

**Bradley Cairns, Ph.D.**

Professor; Huntsman Cancer Institute (HCI) Investigator; Investigator, Howard Hughes Medical Institute

**David Jones, Ph.D.**

Professor; Senior Director, Early Translational Research, HCI

**PROJECT:** "A Center for Zebrafish Chromatin and Epigenetics"

**FUNDING AGENCY:** National Institute of Child Health and Human Development, National Institutes of Health

**AMOUNT OF GRANT:** \$1.5 million over 5 years

Epigenetics is the study of heritable changes in gene expression. One of the reasons that diseases such as cancer may be heritable is that people in affected families have a defect in how they package or mark their genes, rather than a mutation in the DNA or the gene itself. This defect can have the same effect as a DNA mutation, silencing the gene's function. Zebrafish offer an excellent model system to discover how genes are properly packaged and marked, and how defects can lead to disease or cancer. In addition to compiling biological information regarding packaging and marking of genes in development and cancer, Cairns and Jones will create a large database for researchers in epigenetics to compare data.

#### ■ Department of Ophthalmology and Visual Sciences

**Balamurali K. Ambati, M.D., Ph.D.**

Associate Professor; Director of Corneal Research

**PROJECT:** "Novel Anti-angiogenics for Eye Disease"

**FUNDING AGENCY:** Research to Prevent Blindness

**AMOUNT OF GRANT:** \$60,000 over 4 years

A long-standing mystery in the visual sciences

has been: what keeps the cornea free of blood vessels? Ambati's research group has identified the protein sVEGFR-1 as the prime mediator of this essential requirement for clear vision. His team has developed novel inhibitors targeting the key mediator of angiogenesis by sequestering the molecule within cells. Ambati will continue to study angiogenesis in the cornea and develop novel intracellular approaches to fight blood vessel formation: a key process in corneal injury, macular degeneration, diabetic retinopathy, and cancer.

#### ■ Department of Radiology

##### **Dan J. Kadmas, Ph.D.**

Associate Professor

**PROJECT:** "Multi-tracer PET Tumor Imaging"

**FUNDING AGENCY:** National Cancer Institute, National Institutes of Health

**AMOUNT OF GRANT:** \$1.44 million over 4 years

Unlike MRI or X-ray, which image body structures, positron emission tomography (PET) images functional processes, using "tracers": drugs or compounds labeled with a radioactive atom that are designed to follow specific body processes. Kadmas has developed new processing algorithms for dynamic PET imaging techniques, which enable multiple tracers to be used simultaneously. This allows for characterization of tumor metabolism, blood flow, rate of proliferation, and other growth factors, all at the same time. This new imaging tool will be tested in patients with primary brain tumors, providing new information on tumor status and aggressiveness to help determine the most effective therapy for each patient.

#### ■ Department of Surgery

##### **Richard R. Orlandi, M.D.**

Associate Professor, Division of Otolaryngology-Head and Neck Surgery

**PROJECT:** "Development of an Animal Model for Wound Healing in Sinus Surgery"

**FUNDING AGENCY:** Head and Neck Surgery Foundation, American Academy of Otolaryngology

**AMOUNT OF GRANT:** \$25,000 over 1 year

Sinus surgery is often complicated by scarring and inflammation following the procedure. A principal barrier in understanding normal wound healing processes in the sinus lining has been an acceptable animal model. Orlandi will use a recently developed mouse model of chronic allergic sinus and nasal inflammation to study chronically inflamed sinus lining wound healing. Successful refinement of such a model will lead to understanding of healing processes in chronically inflamed sinus mucosa as well as improve surgical and post-surgical practices in sinus surgery.

### COLLEGE OF PHARMACY

#### ■ Department of Pharmaceutics and Pharmaceutical Chemistry

##### **Sung Wan Kim, Ph.D.**

Distinguished Professor

**PROJECT:** "RGD-Polymer Targeting Plasmid to Angiogenic Endothelium"

**FUNDING AGENCY:** National Cancer Institute, National Institutes of Health

**AMOUNT OF GRANT:** \$1.18 million over 5 years

Discovery and use of potent but nontoxic polymeric carriers is the key to unlocking the potential of non-viral gene delivery. This project will synthesize and characterize a new form of polymer that will be nontoxic and enhance delivery of siRNA. In addition, a water-soluble carrier will be designed. Extensive studies will be performed with these polymers complexed with siRNA. Inhibition of tumor growth will be tested in prostate and breast adenocarcinoma models. Findings from Kim's research may lead to the design of siRNA delivery systems for treating cancers.

#### ■ Department of Pharmacology and Toxicology

##### **Andrea Bild, Ph.D.**

Associate Professor

**PROJECT:** "Epigenetic Changes and Phenotype-specific Therapeutic Strategies in Breast Cancer"

**FUNDING AGENCY:** National Institute of General Medical Sciences; National Institute of Environmental Health Sciences, National Institutes of Health

**AMOUNT OF GRANT:** \$1.5 million over 4 years

This grant provides a genome-wide analysis of epigenetic pathways and their specific deregulation in breast cancer molecular phenotypes. Bild's project aims to define which specific phenotypes of breast cancer certain drugs should target. Results will provide preclinical evidence for the initiation of a human trial that would employ a more focused approach to the use of small molecule inhibitors of epigenetic processes. This proposal should demonstrate how tumor biology and systems-wide genomic signatures can be translated into strategies for personalized cancer treatment.

### COLLEGE OF NURSING

#### ■ Michael Caserta, Ph.D.

Professor; Practicum Coordinator, Gerontology Interdisciplinary Program

**PROJECT:** "Dual-process Intervention for Bereaved Spouses"

**FUNDING AGENCY:** National Institute on Aging, National Institutes of Health

**AMOUNT OF GRANT:** \$2.2 million over 5 years

The primary purpose of this project is to study a new and innovative dual-process bereavement intervention. Some 330 individuals aged 50 and above, whose spouses or partners have died within the past two to six months, will meet in 14 weekly group sessions led by professional facilitators. Participants will receive support and be taught skills to aid in meeting the daily challenges of widowed life. This dual-site project involves participants from Salt Lake City and San Francisco.

#### ■ Margaret Clayton, Ph.D., R.N., F.N.P.-C.S.

Assistant Professor

#### ■ Lee Ellington, Ph.D.

Associate Professor

**PROJECT:** "Hospice Nurse-Caregiver Communication"

**FUNDING AGENCY:** Division of Cancer Control and Population Sciences, HCl

**AMOUNT OF GRANT:** \$31,920 over 1 year

With health-care increasingly moving into the home, a growing number of spouse/partner caregivers are seeking help from home hospice

services for end-of-life cancer care. Effective communication between the hospice RN case manager and caregiver has the potential to enhance symptom management for the patient and reduce caregiver burden and distress, although little systematic research has been conducted on the topic. This project will examine communication processes between hospice RN case managers and caregivers of advanced cancer patients during 30 home-based hospice visits. Findings will determine the feasibility of recruitment, audiotaping, and communication-coding protocols, and will provide initial descriptive data about hospice cancer visits. Results will provide preliminary data for a larger project. Other College of Nursing investigators are: Pat Berry, Ph.D., A.P.R.N., B.C.-P.C.M., assistant professor of nursing and associate director of education and practice for the U of U Hartford Center of Geriatric Nursing Excellence; Kathi Mooney, Ph.D., R.N., A.O.C.N., professor of nursing and holder of the Louis S. Peery, M.D., and Janet B. Peery Presidential Endowed Chair in Nursing Research; and Bob Wong, Ph.D., research assistant professor of nursing.

### COLLEGE OF HEALTH

#### ■ Department of Communication Sciences and Disorders

##### **Bomjun Kwon, Ph.D.**

Assistant Professor

**PROJECT:** "Perceptual Effects of Mixed Channel Configurations in Cochlear Implants"

**FUNDING AGENCY:** National Institute on Deafness and Other Communication Disorders, National Institutes of Health

**AMOUNT OF GRANT:** \$451,500 over 3 years

More than 100,000 individuals worldwide have benefited from cochlear implants: devices that restore hearing and sensation in deaf individuals by means of direct electrical stimulation to the auditory nerve through an electrode array. This project investigates perceptual effects of various types of electrode configurations for stimulation—such as monopolar or bipolar—and their interactions, which will be tested in both speech and non-speech stimulus contexts. Outcomes will enrich the knowledge of perceptual mechanisms through cochlear implants and guide directions for future clinical applications.

#### ■ Division of Nutrition

##### **Wayne Askew, Ph.D.**

Professor; Division Director

**PROJECT:** "The Effects of Bison Meat Consumption on Blood Lipids and Biomarkers of Cardiovascular Risk, Phase II"

**FUNDING AGENCY:** National Bison Foundation

**AMOUNT OF GRANT:** \$41,330 over 1 year

This clinical trial is a continuation of previous work by Askew, which compared the effect of two red meat sources on cardiovascular risk. In this project, researchers will compare the influence of meals containing bison—a low-fat meat—and beef—a higher fat meat product—on flow-mediated vasodilation and biomarkers of inflammation. Co-investigator is Russ Richardson, Ph.D., professor of exercise and sport science, College of Health, and professor of geriatrics in the School of Medicine. Graduate students working on the project are Sujata Anantharman, Danielle Bennett, and Jason Mihalopoulos. ▣