

# FRONTIERS IN RESEARCH

## SCHOOL OF MEDICINE

### ■ Department of Biomedical Informatics

**Nicola J. Camp, Ph.D.**

Associate Professor

**PROJECT:** "Transferability of Tagging-SNPs across Disease Status: Colon Cancer and XRCC2"

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

**AMOUNT OF GRANT:** \$149,500 over 2 years

Several public resources exist to select tagging-SNPs (tSNPs) to design comprehensive genetic studies. However, current resources are based on neutral panels (individuals not ascertained for disease). This study will explore whether tSNPs from neutral panels are optimal for disease association studies. Simulation models and real data will be used to assess possible limitations of transferability of tSNPs across disease status and the consequences for association studies. The real data investigation will include sequencing and genotyping data on XRCC2 for multiple panels with differing colon cancer characteristics, and a subsequent meta genetic association analysis across several collaborating colon cancer resources.

### ■ Brain Institute

**Richard Dorsky, Ph.D.**

Assistant Professor of Neurobiology and Anatomy

**PROJECT:** "TCF Function in Spinal Cord Patterning"

**FUNDING AGENCY:** National Institute of Neurological Disorders and Stroke, National Institutes of Health

**AMOUNT OF GRANT:** \$800,000 over 4 years

In this project, researchers are studying the basic molecular mechanisms of spinal cord development and its implications in stem cells' ability to repair a damaged spinal cord. They are using zebrafish, which have a similarly structured but simpler spinal cord than humans. Because zebrafish lay eggs with translucent embryos, researchers can observe embryonic development and the effects of manipulation. By biochemically inactivating the gene *tcf3* in zebrafish embryos, Dorsky is gaining new insight into the vital role the gene plays in regulating other spinal cord genes.

### ■ Huntsman Cancer Institute (HCI)

**Stephen Lessnick, M.D., Ph.D.**

Assistant Professor, Division of Pediatric Hematology/Oncology, Department of Pediatrics; Adjunct Assistant Professor, Department of Oncological Sciences; HCI Investigator

**PROJECT:** "EWS/FLI and Its Targets in Ewing's Sarcoma Development"

**FUNDING AGENCY:** American Cancer Society

**AMOUNT OF GRANT:** \$714,000 over 4 years

Ewing's sarcoma is a highly malignant, solid tumor occurring in children and young adults. The disease's primary genetic abnormality is a chromosomal translocation that fuses two genes, *EWS* and *FLI*. The resulting oncoprotein, *EWS/FLI*, is a transcription factor that alters other gene levels. A thorough understanding of how *EWS/FLI* alters gene expression and the functions of the altered genes will assist researchers in identifying new treatment approaches to this illness.

### ■ Department of Obstetrics and Gynecology

**Ingrid Nygaard, M.D., M.S.**

Professor

**Peggy A. Norton, M.D.**

Associate Professor

**PROJECT:** "Pelvic Floor Disorders and Urinary Incontinence Treatment Networks"

## SELECTED NEW PROJECTS FUNDED BY MAJOR GRANTS AND AWARDS



**FUNDING AGENCY:** National Institute of Child Health and Human Development; National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health

**AMOUNT OF GRANTS:** \$2.3 million over 5 years

The University of Utah is one of five national sites awarded funding for two existing NIH-sponsored clinical networks in urogynecology. Both networks are multidisciplinary and include investigators from urogynecology, gastroenterology, radiology, and physical therapy among others. Studies focus on surgical and non-surgical treatments for pelvic organ prolapse and urinary and fecal incontinence in women.

### ■ Department of Oncological Sciences

**Susan E. Mango, Ph.D.**

Associate Professor

**PROJECT:** "Developmental Biology Training Program"

**AMOUNT OF GRANT:** \$604,317 over 5 years

The Developmental Biology Training Program brings together 48 faculty members with a wide range of research emphases from six departments (Neurobiology and Anatomy, Biology, Oncological Sciences, Biochemistry, Human Genetics, and Pathology) to support and train top students in developmental biology. The program also provides a focus for studies in developmental biology across campus. The National Institute for Child Health and Human Development funded the grant in 1995 under the directorship first of Mario R. Capecchi, Ph.D., then Carl Thummel, Ph.D., both professors in the Department of Human Genetics and Howard Hughes Medical Institute investigators. Mango will direct the program for the next award period, during which two postdoctoral and six pre-doctoral trainees per year will be funded.

### ■ Department of Orthopaedics

**Roy D. Bloebaum, Ph.D.**

Research Professor

**Kent N. Bachus, Ph.D.**

Research Associate Professor

**PROJECT:** "Development of Osseointegrated Implants for Soldier Amputees Following Orthopaedic Extremity Trauma"

**FUNDING AGENCY:** Peer-reviewed Medical Research Program

**AMOUNT OF GRANT:** \$2.9 million over 4 years

Limb loss is a significant problem worldwide. Until recently, amputees have had limited prosthetic options. Socket prostheses cause frequent problems including blisters, chaffing, and sores in as many as 62 percent of patients. Osseointegrated, percutaneous implants attach prosthetic limbs to amputees and provide increased mobility, activity levels, and performance. The research will work toward establishing foundations for safe and efficacious osseointegrated, percutaneous implants that allow for skeletal loading, the elimination of socket-related co-morbidities, and, possibly, the perception of physical sensation. The research should help to improve amputees' quality of life and clinical outcomes.

### ■ Division of Physical Medicine and Rehabilitation

**Stuart Willick, M.D.**

Associate Professor

**PROJECT:** "Implementation of a Long-term Paralympic Injury Surveillance System"

**FUNDING AGENCY:** International Paralympic Committee

Injury Surveillance Systems (ISS) can help identify patterns of injuries and changes in injury types over time. They provide researchers with the information to devise, implement, and test injury prevention measures. In 2002, the Paralympic ISS, used in the Salt Lake City Paralympics, provided insights into implementing injury prevention measures, which resulted in a documented decrease in targeted injury types in the 2006 Torino Paralympics. The project will continue in 2010 during the Vancouver Paralympics.

### ■ Department of Neurosurgery

**L. Eric Huang, M.D., Ph.D.**

Associate Professor of Neurosurgery; Adjunct Associate Professor of Oncological Sciences

**PROJECT:** "Exploring the Molecular Mechanisms of Hypoxic Response"

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

**AMOUNT OF GRANT:** \$304,000 over 2 years

This project investigates the mechanisms of hypoxic response and its relationship to tumor development. Researchers hope to gain a comprehensive understanding of how normal and cancer cells adapt to low oxygen (hypoxia) and/or ischemic conditions, and to develop new cancer treatment approaches. The work addresses fundamental mechanisms underlying the development and progression of human cancers, and has implications for developing novel treatments of ischemic diseases, such as heart attack and stroke.

## COLLEGE OF PHARMACY

### ■ Department of Medicinal Chemistry; Department of Neurobiology and Anatomy, School of Medicine

**Kuberan Balagurunathan, Ph.D.**

Assistant Professor of Medicinal Chemistry

**Chi-Bin Chien, Ph.D.**

Associate Professor of Neurobiology and Anatomy

**PROJECT:** "In Vivo Analysis of HSPG Structure and Function in Modulating Axon Guidance and Cell Signaling"

**FUNDING AGENCY:** International Human Frontier Science Program Organization

**AMOUNT OF GRANT:** \$525,000 over 3 years

Heparan sulfate proteoglycans are a class of proteins with sugar side chains critical for many

biological processes, including the growth of nerve fibers and cell-to-cell signaling. In this project, U researchers—in collaboration with Carl Neumann of the European Molecular Biology Laboratory and Lena Kjellen of Uppsala University—will study the function of heparin sulfate proteoglycans. Balagurunathan will develop new chemical compounds to inhibit sugar modifications; Chien will test the functions of these compounds in zebrafish embryos. The goal of HSFP is to promote cooperation among scientists with different backgrounds, from different continents, to solve biological problems. The grant is one of 20 worldwide that support 72 researchers.

### ■ Department of Pharmaceutics and Pharmaceutical Chemistry

**Yihua Bruce Yu, Ph.D.**

Assistant Professor

**PROJECT:** “Engineering Peptide-based Biomaterials”

**FUNDING AGENCY:** National Institutes of Health

**AMOUNT OF GRANT:** \$1,855,775 over 5 years (PECASE Award)

This project explores the engineering principles for peptide-based biomaterials. Researchers are working to construct biomaterials from artificially designed oligopeptides, which can be used as scaffolds in tissue engineering. The current focus is on the mechanical properties of the materials that have potential applications in drug delivery, tissue repair, and biosensing (see pg. 12).

### ■ Department of Pharmacotherapy

**Carl Asche, Ph.D., M.B.A.**

Research Associate Professor

**PROJECT:** “Healthcare Resource Utilization for Children with Acute Otitis Media Treated by Antibiotics (Omnicef and Augmentin) Following Pevnar Vaccination”

**FUNDING AGENCY:** Abbott

**AMOUNT OF GRANT:** \$219,059

This project will quantify the overall condition-specific costs of antibiotic treatment for patients with childhood acute otitis media following a Pevnar vaccination. The data will assist managed-care administrators in identifying the appropriate antibiotic for children with the condition who have already received a Pevnar vaccination.

## COLLEGE OF NURSING

### ■ William N. Dudley, Ph.D.

Research Professor; Director of Applied Statistics, Emma Eccles Jones Nursing Research Center

**PROJECT:** “Analysis of Individual Trajectories of Oral Mucositis”

**FUNDING AGENCY:** National Cancer Institute

**AMOUNT OF GRANT:** \$377,000 over 2 years

Oral mucositis (OM), inflammation of the oral mucosal tissue, is a common, often serious, side effect of high-dose chemotherapy, which affects as many as 400,000 patients annually. OM is typically accompanied by moderate to severe oral pain, which significantly impacts quality of life, as well as utilization of resources, administration of therapy, and cost of care. This project aims to apply statistical and graphical means to better understand the individual trajectories of OM. Researchers also plan to develop an OM visualization tool using the Information Visualization (InfoViz) technique, which synthesizes change across many variables. Collaborators include: Susan Beck, Ph.D., R.N., associate professor of nursing, and Jim Agutter, Ph.D., research assistant professor, College of Architecture + Planning, U of U; and researchers at the University of

Maryland, University of Connecticut, and Albert Einstein School of Medicine.

### ■ Jane Dyer, M.S., C.N.M., F.N.P., M.B.A.

Clinical Assistant Professor

**PROJECT:** “Utah’s Women’s Health and Midwifery Education for Six Western States”

**FUNDING AGENCY:** Advanced Nursing Education, U.S. Health Services Resources Administration

**AMOUNT OF GRANT:** \$820,084 over 3 years

This project will increase the number of nurses with advanced education through an enhanced Nurse Midwifery and Women’s Health Nurse Practitioner Graduate Program. It combines opportunities in the two specialties with focused recruitment of rural and minority students throughout the West; an emphasis on retention; and the integration of rural/diversity/cultural competency issues into the curriculum. The program will offer in-state tuition to students from largely rural, medically underserved areas in Alaska, Arizona, Idaho, Montana, Nevada, Utah, and Wyoming. These states have a shortage of providers, a higher incidence of women’s health issues, and limited access to care.

### ■ Ginette A. Pepper, R.N., Ph.D.

Professor and Associate Dean for Research and Ph.D. Program; Helen Bamberger Colby Presidential Endowed Chair in Gerontological Nursing

**PROJECT:** “Enhanced R.N. Credentials: Geriatric Care and Leadership”

**FUNDING AGENCY:** Health Services Resource Administration, U.S. Department of Health and Human Services

**AMOUNT OF GRANT:** \$511,648 over 3 years

This project will expand the Geriatric Nurse Leader career track by providing registered nurses with the opportunity to complete a baccalaureate degree or certificate for geriatric nursing in acute and long-term care settings. Additionally, researchers will develop a management certificate program within the interdisciplinary program. The project will enhance the education and performance of practical nurses, certified nursing assistants, and other providers of geriatric care. It also will improve access to and quality of culturally appropriate care for elderly adults related to medication safety, fall-injury prevention, end-of-life-care, pain management, and pressure ulcer prevention.

## COLLEGE OF HEALTH

### ■ Department of Communication Sciences and Disorders

**Sean M. Redmond, Ph.D., CCC-SLP**

Associate Professor

**PROJECT:** “Psycholinguistic and Socioemotional Profiling of SLI and ADHD”

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

**AMOUNT OF GRANT:** \$224,250 over 3 years

The co-occurrence of language impairments and attention deficits in children receiving therapeutic services is well documented, but the nature of the co-morbidity is poorly understood. This study is the first to directly compare the psycholinguistic and socioemotional profiles of children with Specific Language Impairment (SLI) and children with Attention-Deficit/Hyperactivity Disorder (ADHD). Researchers will investigate if unique behavioral phenotypes associated with these prevalent disorders could be used to develop protocols for differential diagnosis.

### ■ Department of Exercise and Sport Science

**J. David Symons, Ph.D.**

Associate Professor

**PROJECT:** “Exercise Training Increases Nitric Oxide Bioavailability”

**FUNDING AGENCY:** American Heart Association

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

The prevailing view that insulin resistance in skeletal muscle, adipose tissue, and liver is largely responsible for features of the insulin-resistance syndrome has expanded to include insulin resistance in other compartments, such as blood vessels. In this project, researchers will use genetic and diet-induced models of insulin resistance to determine the physiological characteristics of and molecular mechanisms responsible for impaired insulin-mediated signal transduction in the vasculature. They also will investigate whether dynamic exercise stimulates novel signaling pathways throughout the arterial wall that contribute to “correcting” vascular dysfunction and hypertension, which exist in conditions associated with impaired insulin-mediated signal transduction. Collaborators from the U medical school’s Division of Endocrinology, Metabolism, and Diabetes are E. Dale Abel, M.D., Ph.D., associate professor, and Donald A. McClain, M.D., Ph.D., professor.

### ■ Division of Foods and Nutrition

**Thunder Jalili, Ph.D.**

Associate Professor

**PROJECT:** “Cardiac Hypertrophy Due to Oxidative Stress in the Insulin-resistant Heart”

**FUNDING AGENCIES:** National Heart, Lung and Blood Institute; National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health

**AMOUNT OF GRANT:** \$150,000 over 3 years

Oxidative stress is one of the consequences of diabetes. Recent studies implicate oxidative stress in the pathogenesis of cardiovascular disease in diabetic individuals. This is significant, because the principal cause of diabetes morbidity and mortality is heart disease. In this project, researchers will test antioxidant treatments in a cardiac-deficient GLUT 4 mouse. The study should provide insight into the role of oxidative stress as a trigger for cardiac hypertrophy in the insulin-resistant heart and help determine if antioxidant treatment can prevent cardiac hypertrophy.

### ■ Division of Physical Therapy

**Paul C. Lastayo, Ph.D.**

Associate Professor

**PROJECT:** “A RENEW Intervention for Elderly Cancer Survivors”

**FUNDING AGENCY:** National Cancer Institute

**AMOUNT OF GRANT:** \$312,455 over 2 years

Cancer survivors—most of whom are 65 years and older—report persistent and chronic levels of fatigue, weakness, and limited mobility that last long after treatment. This study will test the effect of Resistance Exercise via Negative-Eccentric Work (RENEW) in a sample population of elderly cancer survivors versus a population receiving traditional care. This collaborative project with the College of Nursing will determine whether RENEW can mitigate fatigue and weakness, and improve muscle conditioning and functional mobility. Researchers also will explore elderly cancer survivors’ adherence and satisfaction with the novel exercise regime. ■