UNMC

Mary and Dick Holland Regenerative Medicine

2017 Annual Report

Regenerative Medicine at UNMC

The Holland Regenerative Medicine Program was established at the UNMC to bring many areas of science and medicine together to provide those in Nebraska and surrounding areas more advanced therapies and treatments that can enhance their quality of life beyond what we are currently capable of providing. Researchers hope to develop strategies to grow bone and muscle tissue for amputees or new heart tissue for those who suffer from heart disease.

"A necessary component for the success of the Regenerative Medicine Program is clinical translation. It's a delicate balance that requires a multidisciplinary approach" states Nora Sarvetnick, Ph.D., professor in the transplant section of the UNMC Department of Surgery and Director of the Regenerative Medicine Program. Without the help of involved/collaborative clinicians here at UNMC we cannot bring our current research into the clinic. We would like to encourage those interested in Regenerative Medicine to contact us with their thoughts and suggestions. Our goal is to foster collaborations between scientists and clinicians to drive new, innovative techniques that are currently absent in the field.

Dr. Sarvetnick has been working with the Regenerative Medicine Advisory Committee and Faculty to establish directions for the Regenerative Medicine Program as well as recruit potential candidates to fill available faculty positions. "We hope to grow the field of Regenerative Medicine at UNMC, but also give both junior and senior investigators the chance to participate in research and therapy development."

The Regenerative Medicine Program seeks to establish approaches that generate new therapies for disease. The types of activities undertaken utilize:

- Cellular Therapies, involving both adult and embryonic stem cells
- Translational Research leading to clinical trials
- Restoration with synthetic and cellular components
- Collaboration with Bioengineering Facility at UNL
- Stem Cell Differentiation
- Biotech collaborations
- Induced Pluripotent Stem Cells

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Mary and Dick Holland **Regenerative Medicine**

2017 Annual Report

Letter from the Director

Dear Friends,

It is a privilege to serve as the Director of the Holland Regenerative Medicine Program at the University of Nebraska Medical Center. I write to you in this annual report to share some of the program's successes and our vision for the coming year.

The past year has seen some interesting challenges and also some great successes. The Holland Regenerative Medicine Program continues to become locally significant, but also global in scope and impact. Among our most distinctive and important characteristics is that we are unusually collaborative with numerous program activities, including, weekly seminars, research update talks, incoming speakers, annual retreats, and symposia, which foster a sense of community and provide a foundation for our shared research interests. This last year has seen some fantastic visiting and local speakers in particular, who continue to inspire further collaborative efforts and research directions.

Our mission has always been focused on bringing together forward thinking scientists and clinicians who are committed to understanding the basic science behind tissue engineering and development. By translating these concepts we seek to pioneer regenerative therapies that can be taken into the clinic. The last year has seen the introduction of five new regenerative medicine initiatives, which are being given seed funding from the program to foster collaborations and development of these novel research areas. We look forward to further evolving and adding new faculty, initiatives, and collaborations in the coming year with the introduction of new faculty who focus on exciting up-and-coming research, such as organ-on-a-chip technology.

In the next year we are also looking at expanding our resources for graduate students. Our program is uniquely broad and yet intimate. Our more than 40 faculty over the University of Nebraska campuses investigate a diverse range of problems from basic mechanisms in cell biology to translational applications of stem cell biology. We have the infrastructure to maintain a close-knit and supportive learning environment and plan to make this a larger part of our mission. In order to achieve this, in part, we are developing two regenerative medicine courses to be included in the new UNMC umbrella degree granting program, the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS).

We are also excited to announce the successful launch of our new Bioprinting core. The Bioprinting Core provides access to advanced imaging technologies enabling precise placement of cells, biomaterials, and biomolecules for regenerative medicine-related research. 3D bioprinting technology has emerged as a versatile and powerful tool for fabricating 3D tissue and organ analogs and I look forward to seeing where this technology and research can take us.

Support continues to be a valuable tool of which we are profoundly thankful. We look forward to continuing to share our research with yourselves and the scientific and educational communities.

Regards
Nora Sarvetnick, PhD, Director of Regenerative Medicine

Dedication to Richard Holland

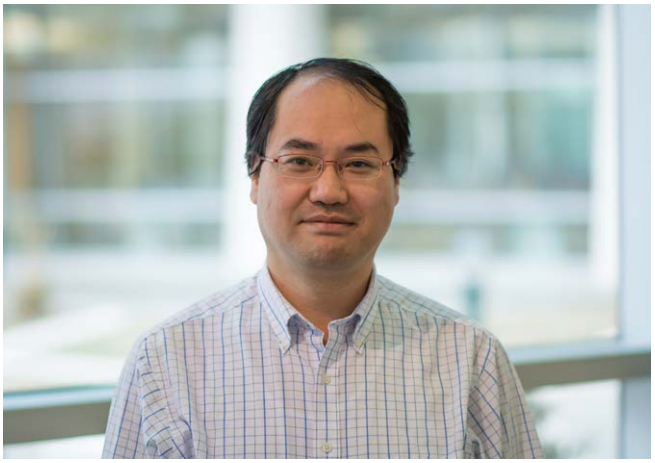
On August 11th 2016, one of our biggest and longest standing supporters, Richard 'Dick' Holland, died following a short illness at the age of 95.

His gifts allowed for the creation of the Mary and Dick Holland Regenerative Medicine Program and words cannot express how much his ongoing support has meant to the success of the program. He always expressed great interest not only in the activities of the program, but the well-being of its members.

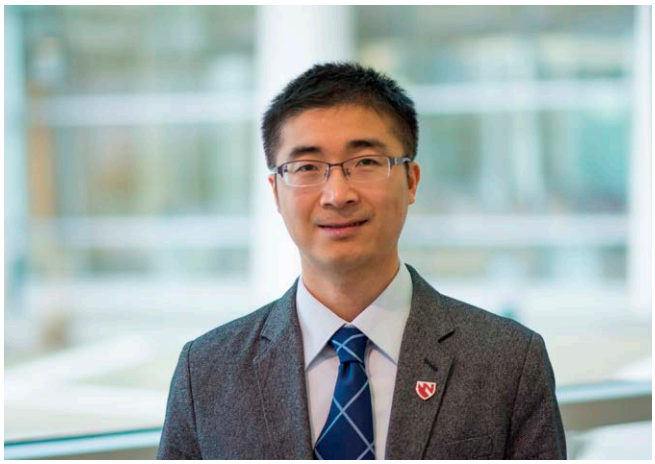
He was a champion for science and progress and will be greatly missed. Our condolences go out to his family and friends.

Key Faculty

Nora Sarvetnick, Ph.D., *Professor*



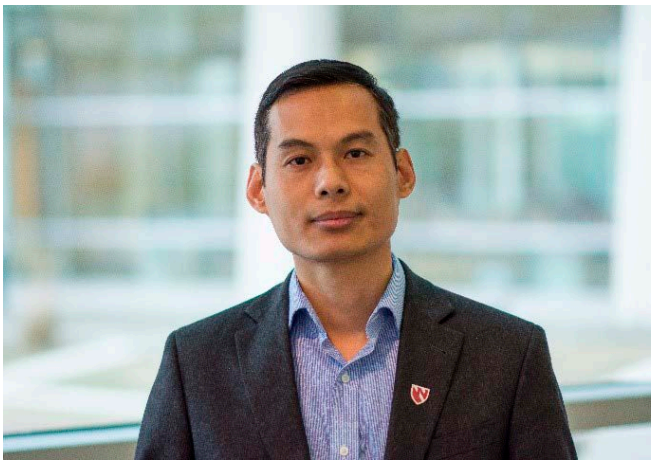
Sung-Ho Huh, Ph.D., *Assistant Professor*



Bin Duan, Ph.D., *Assistant Professor*

Haitao Wen, Ph.D., *Assistant Professor*

Andrew Dudley, Ph.D., *Associate Professor*



Jingwei Xie, Ph.D., *Assistant Professor*

Faculty

University of Nebraska Medical Center

Iqbal Ahmad, Ph.D., *Professor, Ophthalmology & Visual Sciences*

Hamid Band, M.D., Ph.D., *Professor, Eppley Institute*

Vimla Band, Ph.D., *Professor, Genetics, Cell Biology & Anatomy*

Hesham Basma, Ph.D., *Instructor, Internal Medicine, Cardiology*

Surinder Batra, Ph.D., *Professor, Biochemistry & Molecular Biology*

B.TimothyBaxter, M.D., *Professor, Surgery*

Jennifer Black, Ph.D., *Professor, Eppley Institute*

Brian Boerner, M.D., *Assistant Professor, Internal Medicine*

Shannon Buckley, Ph.D., *Assistant Professor, Genetics, Cell Biology & Anatomy*

Keely Buesing, M.D., F.A.C.S., *Assistant Professor, Surgery*

Mark Carlson, M.D., *Professor, Surgery*

Howard Fox, M.D., Ph.D., *Professor, Pharmacology & Experimental Neuroscience*

Hani Haider, Ph.D., *Professor, Orthopaedic Surgery*

James Hammel, M.D., *Assistant Professor, Surgery*

Peng Jiang, Ph.D., *Assistant Professor, Munroe-Meyer Institute*

Peter Kador, Ph.D., *Professor, Pharmaceutical Sciences*

Anne Kessinger, M.D., *Professor, Internal Medicine, Oncology*

Brian Lowes, M.D., Ph.D., *Professor, Internal Medicine, Cardiology*

David Mercer, M.D., Ph.D., *Professor, Surgery*

Ted Mikuls, M.D., *Professor, Internal Medicine, Rheumatology*

Ali Nawshad, Ph.D., *Associate Professor, Dentistry*

Tara Gries Nordgren, Ph.D., *Instructor, Internal Medicine - Pulmonary*

Jeffrey Payne, D.D.S., *Professor, Dentistry*

Iraklis Pipinos, M.D., Ph.D., *Professor, Surgery*

Ruben Quiros, M.D., *Professor, Pediatrics Gastroenterology*

Richard Reinhardt, D.D.S., Ph.D., *Professor, Dentistry*

Angie Rizzino, Ph.D., *Professor, Eppley Institute*

Graham Sharp, Ph.D., *Professor, Genetics, Cell Biology & Anatomy*

Rakesh Singh, Ph.D., *Professor, Pathology and Microbiology*

Geoffrey Thiele, Ph.D., *Professor, Internal Medicine*

Dong Wang, Ph.D., *Professor, Pharmaceutical Sciences*

Wanfen Xiong, Ph.D., *Associate Professor, Surgery*

Jialin Zheng, M.D., Ph.D., *Professor, Pharmacology & Experimental Neuroscience*

University of Nebraska – Lincoln

Nicole Iverson, Ph.D., *Assistant Professor, Biological Systems Engineering*

Srivatsan Kidambi, Ph.D., *Assistant Professor, Chemical & Biomolecular Engineering*

Yuguo Lei, Ph.D., *Assistant Professor, Chemical & Biomolecular Engineering*

Jung Yul Lim, Ph.D., *Associate Professor, Mechanical & Materials Engineering*

Angela Pannier, Ph.D., *Associate Professor, Biological Systems Engineering*

William Velander, Ph.D., *Professor, Chemical & Biomolecular Engineering*

Rebecca Wachs, Ph.D., *Assistant Professor, Biological Systems Engineering*

Timothy Wei, Ph.D., *Professor, Mechanical & Materials Engineering*

University of Nebraska at Omaha

Mukul Mukherjee, Ph.D., *Assistant Professor, Biomechanics*

Sara Myers, Ph.D., *Associate Professor, Biomechanics*

Nicholas Stergiou, Ph.D., *Professor , Biomechanics*

Kota Takahashi, Ph.D., *Assistant Professor, Biomechanics*

Jenna Yentes, Ph.D., *Assistant Professor, Biomechanics*

Administration Staff

Jenni Irving, Ph.D., *Administrative Project Associate*

Heather Jensen Smith, Ph.D., *Research Coordinator*

Neha Woods, Ph.D., *Research Administration Specialist*

Focus: Mission and Values

Mission

Driven by the needs of patients who seek treatment for their incurable diseases, The University of Nebraska Medical Center has established the regenerative medicine program. Our mission is focused on bringing together forward thinking scientists and clinicians who are committed to understanding the basic science behind tissue engineering and development. By translating these concepts we seek to pioneer regenerative therapies that can be taken into the clinic, spreading hope throughout the Nebraskan community and around the world.

Vision

Envision a world with no donor organ shortage, where patients with diabetes are cured, damaged hearts are repaired, and gastrointestinal birth defects are corrected. Regenerative medicine may make these dreams a reality. The potential outcomes of Regenerative medicine are endless.

Our vision will see that the research and therapies stemming from this project can be taken directly into the clinic to treat those patients who may have no other hope. Therapies being developed today will offer a faster, more complete recovery with significantly fewer side effects or risk of complications.

Focus

Regenerative medicine brings together several different disciplines of science including bioengineering, biology, chemistry, computer science, genetics, medicine, robotics, and many other fields. The regenerative medicine program is focused on uniting these areas as one force to battle disease head on. We look forward to the outcomes this project will create both for patients and UNMC as a center of scientific and clinical excellence.

Goals 2015-2016

- Write a collaborative bioengineering T32 with UNL and UNO
- Develop a bioprinting facility
- Hold two brainstorming sessions that lead to collaborative projects
- Hold an Annual Regenerative Medicine Symposium

Progress

The last year has been a productive and busy one for the Regenerative Medicine Program. We aimed to build our program by establishing new collaborations and facilities, starting work towards a training program for graduate students in translational and regenerative medicine, and holding bigger more integrative events such as the second Regenerative Medicine Symposium.

We have been largely successful in these ventures. In the past year, six new collaborative projects were started with faculty from UNMC, UNL, and the VAMC. These include:

- SOX2 levels determine the quality of pluripotent stem cells; PI: Angie Rizzino
- Regenerative approaches for glaucomatous neuropathy; PI: Iqbal Ahmad
- Small intestine tissue engineering collaborative; PI: Jingwei Xie
- Genetic dissection of the role of CBL; PI: Vimla Band
- Mechanisms of cartilage growth; PI: Andrew Dudley
- Cartilage tissue engineering project; PI: Bin Duan

Additionally we acquired the Bioprinter for the establishment of the Bioprinting Facility, which is headed up by Bin Duan. We successfully obtained an NRI grant for expenses and also hired a technologist specifically for the facility. Collaborations have been started with the Biomechanics Department at UNO, UNL faculty and Children's Hospital and UNMC staff and faculty are already benefitting from the facility.

In May 2016 we submitted a collaborative bioengineering T32 grant with Howard Fox as PI. This grant is a collaborative venture with UNO and UNL faculty to provide translational opportunities for graduate students related to regenerative medicine. The grant was reviewed in November and received favourable reviews but requires revision. We will be working on resubmission, using the opportunity to incorporate newer faculty and to design a regenerative medicine course as part of the in the Interdisciplinary Graduate Training Program in Biomedical Sciences umbrella.

The second annual Regenerative Medicine Symposium was held in April 2016 at Mahoney State Park and was very successful. One hundred and ten people attended including faculty, staff, students, postdoctoral fellows and members of the public. Thirty posters were presented by students, postdoctoral fellows and collaborators and the annual report for the previous year was published and distributed. We hope to continue this venture in 2017.

The Regenerative Medicine Program has a major focus on cutting-edge research. The Summer Regenerative Medicine Research Program represents a chance for science and engineering undergraduate and/or graduate students to work in the specialty areas of regenerative medicine. These summer opportunities for students allow them to become members of research teams and discover first-hand the spectrum of research activities occurring in the field of regenerative medicine. This year we have had students in many of our labs in the Durham Research Center II.

Goals 2016-2017

- Continue developing a bioengineering training grant
- Develop a regenerative medicine course
- Develop a regenerative medicine conference
- Hire new faculty
- Establish external advisory board
- Hold Annual Regenerative Medicine Symposium

We are actively looking for new faculty members to increase the capabilities and research interests of the Regenerative Medicine Program. Specifically, at this time, we are looking for faculty with expertise in the Biomimetic Microsystems platform. We seek faculty applicants to join our interdisciplinary team of biologists and engineers with expertise in the development of these novel "organ-on-a-chip" microsystems technologies. Organ-on-a-chip is a tissue system used to test stem cell therapies and in drug testing. It is a microfluidic cell culture device created with microchip manufacturing methods that contains continuously perfused chambers inhabited by living cells arranged to simulate tissue- and organ-level physiology.

In 2017 we will be instituting a Fall Regenerative Medicine Annual Meeting. This will be aimed at the newer faculty, giving them the opportunity to invite peers, potential collaborators, and reviewers to review their research and present their own.

Research Successes 2016-2017

Study Shows Avenue for Treating Brain Injuries

by John Keenan, UNMC public relations | May 26, 2016

Peng Jiang, Ph.D., assistant professor in the division of Developmental Neuroscience at the Munroe-Meyer Institute, has had a manuscript published in the journal Cell Reports. The study documents the efforts of Dr. Jiang and his co-authors to identify a new treatment for white matter injury in the brain.

While most people are familiar with the term "gray matter," white matter is an important part of brain function. White matter mainly contains nerve fibers and a substance called myelin, which wraps around nerve fibers to facilitate transmission of nerve impulses. The well-known examples of myelin-loss disorders include multiple sclerosis and neonatal hypoxic ischemic brain injury, which is a leading cause of cerebral palsy.

"Our brain has a very limited regenerative capacity. So in these cells, damage is permanent," Dr. Jiang said. "But we are developing a new strategy to promote myelin regeneration."

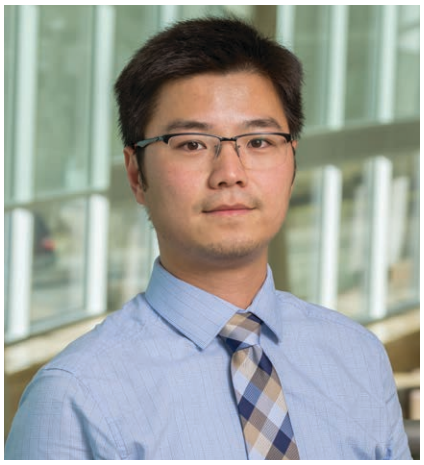
Dr. Jiang's study shows that a type of star-shaped brain cell called astrocytes, which can be derived by human-induced pluripotent stem cells (hiPSCs), can act on oligodendrocytes, the myelin-producing cells, to promote their proliferation. This is a process called oligodendrogenesis and results in the generation of new myelin, suggesting that white-matter injuries can possibly be healed.

The "stem cells" Dr. Jiang is using for the work are generated from the skin cells of patients. "Stem cells provide new hope to treat this disease, because stem cells are capable of differentiating into brain cells, and we can use these cells to replace the damaged cells and rebuild the myelin."

In early cell culture studies, Dr. Jiang's work compared the effects of hiPSC-derived immature and mature astrocytes on oligodendrocytes, and found that much better than the mature astrocytes, the immature astrocytes promoted proliferation and the maturation of oligodendrocytes, which promote myelination.

"Normally, there are very few maturing oligodendrocytes in the culture," he said. "After we add the immature astrocytes, a large number of proliferating and maturating oligodendrocytes show up."

With animal models of white matter damage, they observed that animals who had received the immature astrocyte transplant showed a higher density of myelin and better learning and memory recovery in tests conducted for the study, compared to the control group of animals without transplanted immature astrocytes.



Peng Jiang, Ph.D., *Assistant Professor, Developmental Neuroscience, Munroe-Meyer Institute*

Going forward, Dr. Jiang and his team want to apply this new strategy to different diseases.

"Now we're testing a neonatal hypoxic ischemic injury model, and we're also interested in other myelin-loss disorders such as multiple sclerosis and white matter stroke," he said. "We are also hopeful that this strategy can be applied to other neurodegenerative disorders that involve white matter injury."

Research Successes 2016-2017

Jason MacTaggart, M.D.,
Associate Professor, Surgery

UNMC will Lead Endovascular Training Course

by Tessa Bowen, The National Strategic Research Institute | November 10, 2016

The National Strategic Research Institute (NSRI) at the University of Nebraska recently received a contract funding research for the U.S. Army Medical Research and Materiel Command (USAMRMC).

The NSRI, a University Affiliated Research Center (UARC), is one of 13 established UARCs across the nation, delivering relevant and timely research solutions directly impacting Department of Defense (DoD) operations and national security.

The USAMRMC research contract requests a team from UNMC to further improve a DoD training course designed for medical professionals on an endovascular surgical procedure to control severe bleeding.

The procedure involves passing a balloon catheter from a peripheral artery in the thigh up into the aorta, the largest blood vessel in the body deep in the chest and abdomen. Upon inflation of the balloon intra-abdominal bleeding can be temporarily controlled, maintaining blood flow to the heart and brain until the patient can receive definitive repair of the injury.

"Hemorrhage is a leading cause of potentially preventable death in civilian and military trauma victims," said Jason MacTaggart, M.D., associate professor, UNMC Department of Surgery. "Control of hemorrhage in the chest and abdomen has traditionally been done only through surgery, with large incisions, in hospital settings. Recently, significant experience has been gained with new, minimally invasive endovascular techniques that allow for rapid control of bleeding with far less physical insult to the patient than standard surgical methods. Most importantly, many of these endovascular techniques have the potential to be applied outside the hospital, in harsh environments such as battlefields, rural and wilderness settings.

"Currently the endovascular skills to perform these hemorrhage control techniques are possessed primarily by vascular surgeons, radiologists, and other cardiovascular interventionalists," he said. "However, these providers are not typically on the front lines caring for critically injured, unstable patients in hemorrhagic shock. The goals of the work under this contract are to help disseminate the knowledge and technical skills to perform aortic balloon occlusion to frontline trauma providers, and to study the optimal methods of teaching and practicing the technique.

"The curriculum we are developing at UNMC will help to better prepare trauma providers to save lives, whether on the battlefield or potentially in response to a Weapons of Mass Destruction (WMD) event."

Duy Ha presents his research at the moderated poster session at the American Heart Association meeting in Nashville.

Study finds better option for PAD patients

by Darcy Spitz, American Heart Association, and Tom O'Connor, UNMC public relations | May 11, 2016

A UNMC M.D., Ph.D. student was the lead author of a study which found that restoring blood flow to the legs of patients with peripheral artery disease (PAD) may stop the progression of scarring in their leg muscles.

Results of the preliminary research were presented on May 5 at the American Heart Association's Arteriosclerosis, Thrombosis and Vascular Biology/ Peripheral Vascular Disease 2016 Scientific Sessions in Nashville, Tenn.

PAD causes pain and fatigue while walking due to poor blood circulation in arteries that supply blood to the limbs. The decreased blood flow can lead to substantial scarring and damage in leg muscles. There are currently no available treatments once the scarring has occurred. Supervised exercise therapy and revascularization procedures (which reopen or bypass blockages in the blood vessels) may help PAD patients walk further and longer, but it is not known if these treatments affect the scarring process.

Duy Ha, a doctoral candidate in cellular and integrative physiology, was the lead author on the study. Co-authors on the study from UNMC included George Casale, Ph.D., associate professor, surgery-general surgery, and Iraklis Pipinos, M.D., professor, surgery-general surgery.

The study is funded by the National Heart Lung and Blood Institute, National Institute of Aging, and the Charles and Mary Heider Fund for Excellence in Vascular Surgery. The VA Nebraska and Western Iowa Health Care System provided additional support.

"Duy Ha has been an outstanding and highly productive graduate student," said Irving Zucker, Ph.D., professor and chair of the UNMC Department of Cellular and Integrative Physiology. "His research was a blend of clinical and basic science and shows the value of clinical and basic science departments co-mentoring graduate students."

Ha won travel awards from the Society for Vascular Surgery and the Atherosclerosis Thrombosis and Vascular Biology Council of the American Heart Association to allow him to share this work at the conference. He was one of only six researchers who were selected to give a moderated poster presentation in which he gave an oral presentation on the poster in front of a crowd of researchers.

Research Successes 2016-2017

Keely Buesing, M.D.,
Assistant Professor, Surgery, UNMC

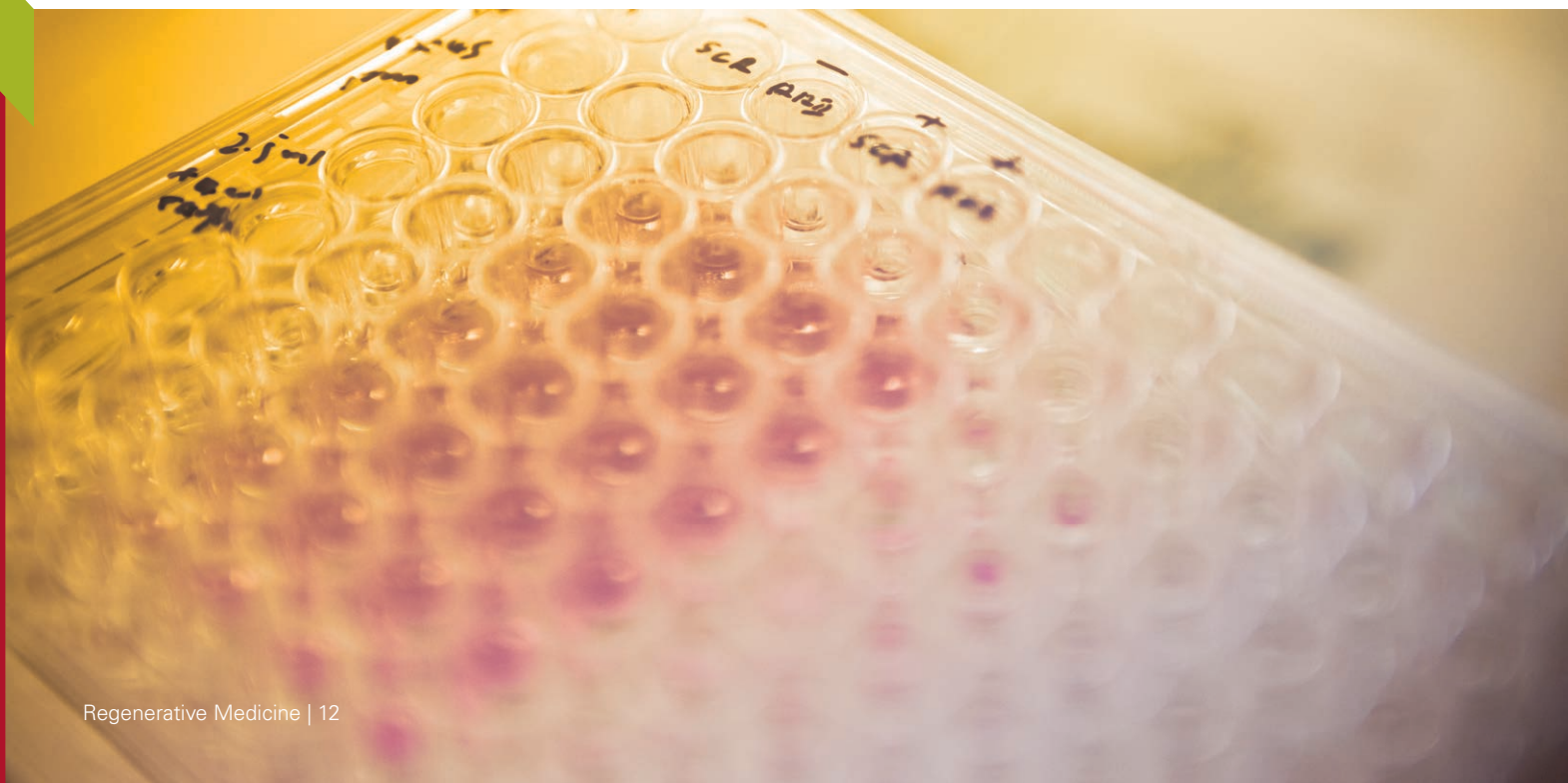
New UNMC Partnership

Regenerative Medicine Program collaborators, Keely Buesing M.D., assistant professor of Surgery at UNMC, and Benjamin Terry, Ph.D., assistant professor of mechanical and material engineering at UNL, will be part of a partnership on a new contract. The Office of the Air Force Surgeon General has awarded a contract, valued at $1.3 million, to the National Strategic Research Institute (NSRI) at the University of Nebraska, and UNMC will be a collaborator in the project.

The aim of the contract is to advance the new medical treatment process using microbubble oxygenation, an emerging technology to provide oxygen to patients whose lungs cannot function efficiently due to trauma. Microbubble technology provides rapid oxygen delivery and could provide the levels of blood oxygen needed to survive during emergency patient transport from remote environments far from hospitals.

Mark Borden, Ph.D., associate professor of mechanical engineering at the University of Colorado Boulder and inventor of the oxygen microbubbles, will create a process and system capable of large scale manufacturing. Benjamin Terry, Ph.D., assistant professor of mechanical and materials engineering at the University of Nebraska-Lincoln (UNL) will design and develop a medical device that delivers the oxygen microbubbles to patients. Keely Buesing, M.D., assistant professor of surgery at UNMC, will develop injury models for testing the new technique.

Drs. Terry and Borden invented the new way of administering oxygen to patients who cannot breathe.



Development Successes 2016-2017

New Grants Spotlight

Andrew Dudley, Ph.D.

Associate Professor, Genetics, Cell Biology & Anatomy

Received an NIH R01, 07/01/2016 – 06/30/2021

Title: Cell Biological Mechanisms that Regulate Development of Cartilage Architecture

Our bones grow longer and we grow taller because of specialized cartilage near the ends of our bones known as growth plate cartilage. Although the signaling molecules (hormones and growth factors) that regulate growth have been known for many years, therapeutic interventions are available for only a small number of growth disorders. The goal of our research is to understand how these signaling molecules act on cells in cartilage to promote growth. Unlike most tissues that grow by increasing the number of cells, cartilage grows primarily via depositing a highly structured matrix composed of specific proteins and sugars. The structure of this matrix, in turn, depends on the rotation of pairs of cells to form columns aligned with the direction of growth. Previously we showed that rotation occurs when cells exert force on their environment through cell adhesion and activation of motor proteins. The funded research will determine how signaling molecules regulate cell adhesion and motor protein activity to control the forces that promote column formation. The information obtained from these studies will provide new tools to engineer cartilage that displays appropriate growth and mechanical properties to replace defective tissue in the treatment of growth disorders.

Haitao Wen, Ph.D.

Assistant Professor, Pathology and Microbiology

Received an LB606 Stem Cell Grant

Title: O-GLcNAc Signaling in Intestinal Stem Cell Mediated Epithelial Regeneration

Dr. Haitao Wen has been awarded a Stem Cell Project Award by the Nebraska Stem Cell Research Advisory Committee for his project entitled "O-GLcNAc Signaling in Intestinal Stem Cell Mediated Epithelial Regeneration." His proposal will investigate the role of a novel post-translational modification of O-Linked N-Acetylglucosamine addition to serine/threonine residues – on STAT3 – to counter activating effects of phosphorylation of STAT3 during intestinal stem cell regeneration using a sepsis model.

Received NIH R01

Title: Immunometabolism in Microbial Sepsis

Dramatic increase in glucose metabolism occurs in immune cells during microbial sepsis. This Proposal aims to study the role and mechanism of two glucose metabolism pathways, the pentose phosphate pathway and the hexosamine biosynthesis pathway, in the innate immune function during microbial sepsis. Understanding the consequence of immunometabolic changes in septic inflammation will be instrumental for the generation of new strategies targeting the prevention and/or treatment of this complex syndrome.

Development Successes 2016-2017

New Grants Spotlight cont.

Wanfen Xiong, M.D., Ph.D.
Associate Professor, Surgery

Received NIH R01

Title: Role of Early SMC Phenotypic Switch in the Aortic Pathology of Marfan Syndrome

Thoracic aortic aneurysm and dissection (TAAD) are the most deadly manifestation of the inherited connective tissue disorder, Marfan syndrome (MFS). MFS is caused by mutations in the fibrillin-1 gene (FBN-1). Although the molecular and cellular mechanisms driving TAAD remain unclear, transforming growth factor-beta (TGF-ß) has become a major target. However, the most recent data from the largest randomized clinical trial showed that targeting TGF-ß signaling by losartan was not effective in controlling aortic dilatation. We hypothesize: 1) TAAD in MFS results primarily from KLF4 down-regulation and abnormal aortic SMC phenotypic switching from ED14 to PD14 in the mouse; 2) Similar SMC phenotypic changes occur normally in humans over a longer time span; 3) that increasing KLF4 levels during early aortic development will attenuate morphologic changes and prevent aneurysm formation in MFS. Our long-term goal is to identify the role of premature differentiation of aortic SMCs in MFS, to further understand the pathogenesis of other syndromic causes of thoracic aneurysms, and eventually to develop rational therapeutic strategies to prevent and treat TAA.

Nora Sarvetnick, Ph.D.
Professor, Surgery

Received NIH U01

Title: Uncovering Pathogenic Anti-bacterial Defense Mechanisms to Identify Novel Targets for Prevention of T1D

While contemporary research has shown Type 1 diabetes (T1D) is associated with intestinal dysbacteriosis and leakage, it is not known whether these factors cause the disease. Establishing a *causative link* between the onset and progression of T1D and dysbacteriosis is critical for developing effective prevention strategies. *The overarching hypothesis of this application is that T1D is preceded by pancreatic bacterial exposure, which promotes an anti-bacterial response, pancreatic inflammation, insulitis, and autoimmunity.* This hypothesis was formulated based on our preliminary data demonstrating: 1) heightened anti-bacterial responses in juvenile T1D; 2) pathologic responses by islets to bacteria overrepresented in the T1D microbiome; 3) pancreatic inflammation and insulitis in a mouse model of experimental leakage of bacteria into the pancreas; and 4) blockade of the anti-bacterial response protects islets from insulitis. In aim 1 we will determine whether human T1D development is preceded by a cellular and humoral anti-bacterial response and establish an association with the duodenal microbiome. In aim 2 we will ascertain whether pancreatic exposure to bacteria leads to immune activation, insulitis, and hyperglycemia. To accomplish this task, we have established a novel mouse animal of intestinal dysbiosis and leakage to test therapeutic interventions.

Jingwei Xie, Ph.D.
Assistant Professor, Surgery

Received NIH R01

Title: Nanofiber-based Delivery of Combined Immune-modulating Compounds to Minimize Infection and Enhance Wound Healing

Surgical site infections (SSIs) within 30 days of an operation contribute substantially to surgical morbidity and mortality each year. The majority of these infections involve antibiotic-resistant ESKAPE pathogens. These bacteria thrive in healthcare settings and traditional antibiotics cannot kill them as they are either multi-drug or extremely drug resistant. The increasing frequency of these pathogens underscores the priority for developing novel approaches to supplement the current antimicrobial regimens used in the prevention of surgical site and wound infections. To address this research priority, we seek to develop technologies that prevent infections associated with SSIs or traumatic injuries by local sustained co-delivery of vitamin D3 and other immune-boosting compounds for endogenous antimicrobial peptide induction. We expect successful completion of this proposed study to lay the foundation for developing therapeutic anti-infective wound dressings with a new mechanism of action that could greatly speed healing, reduce rates of SSIs in patients post-surgery and possibly decrease development of antibiotic resistance.

Development Successes 2016-2017

Faculty / Staff Awards

New Investigator Award

New Investigator Awards go to outstanding UNMC scientists who in the past year have secured their first independent funding from the National Institutes of Health, the Department of Defense or other national sources. New Investigators also had to demonstrate scholarly activity such as publishing their research and/or presenting their findings at national conventions.

Research Leadership Award

The Research Leadership Award is intended to honor scientists previously recognized as Distinguished Scientists who have a longstanding research funding history, and also serve as research leaders and mentors on campus.

Sung-Ho Huh, Ph.D., *Assistant Professor, Munroe-Meyer Institute*

Wanfen Xiong, M.D. Ph.D., *Assistant Professor, Surgery*

B. Timothy Baxter, M.D., *Professor, Surgery*

Nicole Iverson, Ph.D., *Assistant Professor, Biological Systems Engineering, UNL*

UNL Parents Association for Contributions to Students Award

The awards, presented during a Jan. 29 ceremony, are earned through nominations made from parents of UNL students. Presented annually, the honors provide positive feedback to faculty and staff about their work with students. They also encourage good student and faculty relationships and provide recognition in an area often overlooked in the formal rewards system.

New Additions

Postdoctoral Fellows

Jehan Alam, Ph.D. – Sarvetnick Lab
Prathapan Ayyappan, Ph.D. – Sarvetnick Lab
Michael Ebeid, Ph.D. – Huh Lab
Lina Fu, Ph.D. – Xie Lab
B.Sunil Kumar, Ph.D. – Xie Lab
Oluwatobi Ogun, M.D. – Buesing Lab
Shaohua Wu, Ph.D. – Duan Lab
Erin Wuebben, Ph.D. – Rizzino Lab

PhDs

Sophie Walsh – Iverson Lab

Spotlight: Distinguished Visitors

Adrian Gombart, Ph.D.

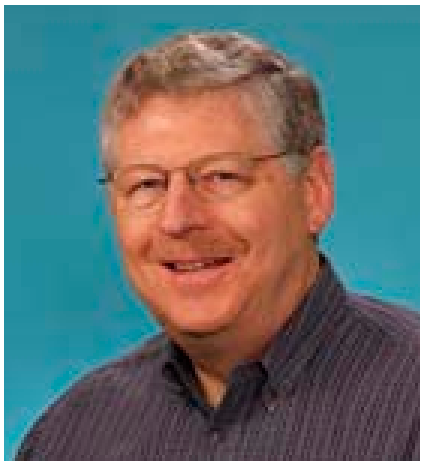
May 2016

Principal Investigator at the Linus Pauling Institute and Associate Professor in the Department of Biochemistry and Biophysics at Oregon State University. Dr. Gombart presented on his research on "Nutritional Regulation of Cathelicidin Antimicrobial Peptide Gene Expression."

Song Li, Ph.D.

September, 2016

Chancellor Professor and Department Head in the Department of Bioengineering at the University of California. Dr. Li presented on his research on the "Mechanobiology of Cell Reprogramming."



David Ornitz, M.D., Ph.D.

December, 2016

Alumni Endowed Professor in the Department of Developmental Biology at Washington University in St. Louis. Dr. Ornitz presented on his research on "Fibroblast Growth Factors: Critical Regulators of Osteogenic and Chondrogenic Growth Programs."

Seminar Series

Each year we invite specialists to present, from within UNMC and from universities nationwide, to increase our knowledge of the field and encourage collaboration and networking. Speakers can give an overview of their research, or if they would like to go over any Aims/Research Strategy for an upcoming grant proposal or any reviews received that is welcomed as well. Our director, Nora Sarvetnick, provides a supportive audience to provide feedback on grant submissions and/or summary statements.

During 2016 we were fortunate enough to host the following speakers:

Nicholas Stergiou, Ph.D.
Harnessing Movement Variability to Treat and Prevent Motor Related Disorders

Andrew Dudley, Ph.D.
Perspectives on Cartilage Engineering

Jason Johanning, M.D.
Frail Explorations: Research, QI, Implementation

Brian Lindegaard Pedersen, M.D. Ph.D.
Muscle Function in Patients with PAD and Diabetes Type 2 – Implications in Treatment

Shane Farritor, Ph.D.
Miniature Surgical Robotics Research at the University of Nebraska

Aaron Mohs, Ph.D.
Nanoparticle Formulations of near Infrared Dyes for Image-guided Surgery

Peng Jiang, Ph.D.
Pluripotent Stem Cells for Regenerative Medicine and Disease Modeling

Matthew Zimmerman, Ph.D.
Role of Redox Signaling Antioxidants in the Brain in the Pathogenesis of Hypertension

David Oupicky, Ph.D.
Development of Pharmacologically Active Polymers

John Ikonomidis, M.D. Ph.D.
The Role of Membrane Type I Matrix Matalloproteinase and Cellular Phenotype Change in the Pathogenesis of Thoracic Aortic Aneurysm

Alberto Figueroa, Ph.D.
Surgical Planning in Congenital Heart Disease using Computational Techniques: Procedure Optimization and Clinical Validation

Aimin Peng, Ph.D.
Phosphatase 1 Nuclear Targeting Subunit in Cell Cycle Regulation and DNA Repair

Hernan Hernandez, M.D.
Improved Physician Ergonomics and Reduced Radiation Exposure with the use the Attachable Radiation Reduction Extension Support Sheath (ARRESS) for Endovascular Procedures

Carrie Vyhlidal, Ph.D.
Drug Metabolism and Precision Medicine: Lessons from CYP3A Enzymes

Santhi Gorantla, Ph.D.
Humanized Mice for Regenerative Medicine

Jenny Wang, Ph.D.
LGR5 Suppresses Colon Cancer Metastasis

Melanie Simpson, Ph.D.
Targeting Steroid Elimination in Prostate Cancer

Jennifer Keshwani, Ph.D.
Biomedical Engineering as a Vehicle for Science Literacy

Aleem Siddique, M.B.B.S.
Developing a Database, Tissue Bank and Other Projects

Nick Woods, Ph.D.
Domainomics Reveals Novel Role of CTDP1 in ICL Repair

Kishor Bhakat, Ph.D.
Regulatory Functions of APE1 Acetylation in Cancer

Bernadette McCrory, Ph.D.
Protecting Healthcare Workers using Human Factors Engineering

Bin Duan, Ph.D.
3D Bioprinting for Tissue Engineering Applications

HelenMari Merritt-Genore, D.O.
No Heparin, No Problem? Re-exploring Anticoagulation on ECMO

Mark Carlson, M.D.
Disease Modeling With Pigs

Tara Nordgren, Ph.D.
Activation and Regulation of Lung-resident Mesenchymal Stem/ Stromal Cells by Organic Dusts

Mukul Mukherjee, Ph.D.
The Effects of Sensory Stimulation on Learning Gait Coordination in Health and After Stroke

Shree Singh, Ph.D.
Lipolysis Pathway Regulates Survival of Normal and Transformed Stem Cells

David Ornitz, M.D., Ph.D.
Fibroblast Growth Factors: Critical Regulators of Osteogenic and Chondrogenic Growth Programs

Yu Shrike Zhang, Ph.D.
Integrated Multi-Organ-on-a-Chip Platform

The audience is a mix of Ph.D. students, post docs, technologists, clinicians, and faculty.
If you are interested in coming to speak or have someone you would like to invite to speak, please contact us.

Opportunities

Conferences, Meetings, and Workshops

MAY

International Society for Cell Therapy Annual Meeting
May 3-6, 2017
London, United Kingdom

Musculoskeletal Regenerative Medicine and Biology: From Development to Regeneration
May 4-6, 2017
Washington University in St. Louis, St. Louis, Missouri

World Advanced Therapies & Regenerative Medicine Congress
May 17-19, 2017
London, United Kingdom

Advances in Stem Cells and Regenerative Medicine, EMBL Meeting
May 23-26, 2017
Heidelberg, Germany

JUNE

Bioprocessing of Advanced Tissue Repair & Regeneration, Gordon Research Conferences
June 4-9, 2017
New London, New Hampshire

CSHL Mouse Development, Stem Cells, & Cancer featuring 35th Anniversary Symposium
June 7-26, 2017
Cold Spring Harbor, New York

ISSCR Annual Meeting 2017
June 14-17, 2017
Boston, Massachusetts

18th Congress of ISDB
June 18-22, 2017
Singapore

Developmental Biology, Gordon Research Conferences
June 25-30, 2017
South Hadley, Massachusetts

JULY

4th Annual Congress on Drug Discovery & Designing
July 3-5, 2017
Bangkok, Thailand

AUGUST

6th International Conference on Tissue Engineering and Regenerative Medicine
August 23-24, 2017
San Francisco, California

CSHL Stem Cell Biology
September 25-29, 2017
Cold Spring Harbor, New York

SEPTEMBER

9th Annual Conference on Stem Cell and Regenerative Medicine
Sep 25-26, 2017
Berlin, Germany

OCTOBER

7th International Conference on Tissue Engineering & Regenerative Medicine
October 2-4, 2017
Barcelona, Spain

10th World Congress on Stem Cell and Biobanking
October 23-24, 2017
Osaka, Japan

Appendix A: New Active Grants

Hamid Band

26-6236-0102-002
University of Nebraska – Lincoln
04/15/2016 – 04/30/2018
Targeting CBL-family Ubiquitin ligases to reverse diet-induced obesity and insulin resistance

Surinder Batra

0047829(127913-1)
University of Pittsburgh
05/17/2016 – 03/31/2017
Validation of Biomarkers for Early Diagnosis and Risk Prediction of Pancreatic Neoplasms

Shannon Buckley

Stem Cell 2016-02 NE-DHHS – LB606
07/01/2016 – 06/30/2017
Role of E3 ubiquitin ligase, FBX08, in maintaining and inducing pluripotency

Andrew Dudley

1 R01 AR070242-01 NIH NIAMS
06/20/2016 – 05/31/2021
Cell biological mechanisms that regulate development of cartilage architecture

NE. Bankers Assoc. Equipment Grants
09/01/2016 – 08/31/2017
PELCO easiGlow dual chamber glow discharge system

Howard Fox

1 R01 DA 043164-01 NIH
09/15/2016 – 08/31/2021
The brain as a SIV reservoir under suppressive cART potention by drugs of abuse

11845 Michael J. Fox Foundation
08/01/2016 – 07/31/2017
Effect of elevated partin on brain mitochondrial bioenergetics and proteome dynamics

Sung-Ho Huh

5 R00 DC 012825-04 NIH NIDCD
01/01/2017 – 12/31/2018
Mechanisms regulating cochlear development

Nicole Iverson

UNL's Research Council Faculty Seed Grant

Alexey Kamenskiy

W81XWH-16-2-0034 U.S.Army
09/30/2016 – 09/29/2019
Rapid acute endovascular management of non-compressible truncal and junctional haemorrhage and long-term analysis of stent-grant durability in young military trauma populations

Abbott Vascular Solutions, Inc.
10/03/2016 – 02/28/2017
Work order 3: Evaluate supera pro devices for overall performance and ease of use, with focus on deployment accuracy in diseased arteries

Jul Yul Lim

26-1123—0144-001 UNL, Layman New Directions Awards
06/01/2016-05/31/2017
Promoting Cardiomyogenesis by Mechanical Stretching

Jason MacTaggart

TO-0061-00 National Strategic Research Institute
08/10/2016 – 08/09/2017
Endovascular skills for trauma and resuscitative surgery (ESTARS) curriculum analysis and development of strategic transition plan (TO 0061)

David F. Mercer

Ted-C14-006 NPS Pharmaceuticals, Inc.
08/01/2016 – 07/31/2018
A 24-week double-blind, safety, efficacy, and pharmacodynamics study investigating two doses of teduglutide in pediatric subjects 17 years of age with short bowel syndrome who are dependent on parenteral support

Ted Mikuls

University of Alabama – Birmingham
12/06/2016 – 05/31/2017
Novel methods for ascertainment of gout flares – A pilot Study (GoutPRO)

Angie Rizzino

2017-53 NE DHHS LB506
07/01/2016 – 06/30/2017
Roles of SOX2-High tumor cells in pancreatic ductal adenocarcinoma

Nora Sarvetnick

2-SRA-2016-288-S-B JDRF
09/01/2016 – 08/31/2018
Anti-bacterial factors as biomarkers for predicting T1D in at-risk population

Rakesh Singh

1 R41 TR001902-01A1
Actorius Pharmaceuticals, LLC
09/15/2016 – 08/31/2017
Development of Chol-DsiRNA polyplexes to improve the treatment of breast cancer

Geoffrey Thiele

Bristol-Myers Squibb Company
12/19/2016 – 12/18/2017
Malondialehyde-acetaldehyde (MAA) antibodies in abatacept treatment response in rheumatoid arthritis (RA)

Dong Wang

1 R01 AI 119090-01A1 NIH NIAID
05/26/2016 – 04/30/2021
Nanomedicine development for systemic lupus erythematosus

Haitao Wen

32675-Y3 NE DHHS – LB606
07/01/2016 – 06/30/2017
O-GlcNAc signalling in intestinal stem cell-mediated epithelial regeneration LB606

Wanfen Xiong

5 R01 HL1 30623-02 NIH NHLBI
01/01/2016 – 12/31/2019
Role of early SMC phenotypic switch in the aortic pathology of Marfan syndrome

Jialin Zheng

1 R01 NS097195-01 NIH NINDS
09/30/2016 – 05/31/2020
Glutaminase and its neurotoxic link to HAND

Appendix B: Publications

Iqbal Ahmad

Teotia, P., Chopra, D. A., Dravid, S. M., Van Hook, M. J., Qiu, F., Morrison, J., ... & Ahmad, I. (2016). Generation of functional human retinal ganglion cells with target specificity from pluripotent stem cells by chemically defined recapitulation of developmental mechanism. STEM CELLS.

Xia, X., & Ahmad, I. (2016). Unlocking the neurogenic potential of mammalian Müller Glia. International Journal of Stem Cells.

Hamid Band

Griffin, N. I., Sharma, G., Zhao, X., Mirza, S., Srivastava, S., Dave, B. J., ... & Band, V. (2016). ADA3 regulates normal and tumor mammary epithelial cell proliferation through c-MYC. Breast Cancer Research, 18(1), 113.

Cypher, L. R., Bielecki, T. A., Huang, L., An, W., Iseka, F., Tom, E., ... & Band, H. (2016). Corrigendum to CSF-1 receptor signalling is governed by pre-requisite EHD1 mediated receptor display on the macrophage cell surface [Cell Signalling 2016 Sep.; 28 (9): 1325-35]. Cellular Signalling, 28(12), 1933.

An, W., Mohapatra, B. C., Zutshi, N., Bielecki, T. A., Goez, B. T., Luan, H., ... & Band, H. (2016). VAV1-Cre mediated hematopoietic deletion of CBL and CBL-B leads to JMML-like aggressive early-neonatal myeloproliferative disease. Oncotarget.

Mohibi, S., Srivastava, S., Bele, A., Mirza, S., Band, H., & Band, V. (2016). Acetylation of mammalian ADA3 is required for its functional roles in histone acetylation and cell proliferation. Molecular and Cellular Biology, MCB-00342.

Goetz, B., An, W., Mohapatra, B., Zutshi, N., Iseka, F., Storck, M. D., ... & Band, H. (2016). A novel CBL-Bflox/flox mouse model allows tissue-selective fully conditional CBL/CBL-B double-knockout: CD4-Cre mediated CBL/CBL-B deletion occurs in both T-cells and hematopoietic stem cells. Oncotarget.

Cypher, L. R., Bielecki, T. A., Huang, L., An, W., Iseka, F., Tom, E., ... & Band, H. (2016). CSF-1 receptor signalling is governed by pre-requisite EHD1 mediated receptor display on the macrophage cell surface. Cellular Signalling.

Shukla, A., Rai, K., Shukla, V., Chaturvedi, N. K., Bociek, R. G., Pirruccello, S. J., ... & Joshi, S. S. (2016). Sprouty 2: a novel attenuator of B-cell receptor and MAPK-Erk signaling in CLL. Blood, 127(19), 2310-2321.

Vimla Band

Griffin, N. I., Sharma, G., Zhao, X., Mirza, S., Srivastava, S., Dave, B. J., ... & Band, V. (2016). ADA3 regulates normal and tumor mammary epithelial cell proliferation through c-MYC. Breast Cancer Research, 18(1), 113.

Ahmad, D. A., Negm, O. H., Alabdullah, M. L., Mirza, S., Hamed, M. R., Band, V., ... & Rakha, E. A. (2016). Clinicopathological and prognostic significance of mitogen-activated protein kinases (MAPK) in breast cancers. Breast Cancer Research and Treatment, 159(3), 457-467.

Cypher, L. R., Bielecki, T. A., Huang, L., An, W., Iseka, F., Tom, E., ... & Band, H. (2016). Corrigendum to CSF-1 receptor signalling is governed by pre-requisite EHD1 mediated receptor display on the macrophage cell surface [Cell Signalling 2016 Sep.; 28 (9): 1325-35]. Cellular signalling, 28(12), 1933.

An, W., Mohapatra, B. C., Zutshi, N., Bielecki, T. A., Goez, B. T., Luan, H., ... & Band, H. (2016). VAV1-Cre mediated hematopoietic deletion of CBL and CBL-B leads to JMML-like aggressive early-neonatal myeloproliferative disease. Oncotarget.

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Goetz, B., An, W., Mohapatra, B., Zutshi, N., Iseka, F., Storck, M. D., ... & Band, H. (2016). A novel CBL-Bflox/flox mouse model allows tissue-selective fully conditional CBL/CBL-B double-knockout: CD4-Cre mediated CBL/CBL-B deletion occurs in both T-cells and hematopoietic stem cells. Oncotarget.

Cypher, L. R., Bielecki, T. A., Huang, L., An, W., Iseka, F., Tom, E., ... & Band, H. (2016). CSF-1 receptor signalling is governed by pre-requisite EHD1 mediated receptor display on the macrophage cell surface. Cellular Signalling.

Hesham Basma

Dhar, K., Moulton, A. M., Rome, E., Qiu, F., Kittrell, J., Raichlin, E., ... & Anderson, D. R. (2016). Targeted myocardial gene expression in failing hearts by RNA sequencing. Journal of Translational Medicine, 14(1), 327.

Surinder Batra

Kumar, S., Cruz, E., Joshi, S., Patel, A., Jahan, R., Batra, S. K., & Jain, M. (2016). Genetic variants of mucins: unexplored conundrum. Carcinogenesis, bgw120.

Ingersoll, M. A., Miller, D. R., Martinez, O., Wakefield, C. B., Hsieh, K. C., Simha, M. V., ... & Lin, M. F. (2016). Statin derivatives as therapeutic agents for castration-resistant prostate cancer. Cancer Letters, 383(1), 94-105.

Krishn, S. R., Kaur, S., Sheinin, Y. M., Smith, L. M., Gautam, S. K., Patel, A., ... & Roy, H. K. (2016). Mucins and associated O-glycans based immunoprofile for stratification of colorectal polyps: clinical implication for improved colon surveillance. Oncotarget.

Hiraki, T., Yamada, S., Higashi, M., Hatanaka, K., Yokoyama, S., Kitazono, I., ... & Tanimoto, A. (2016). Immunohistochemical expression of mucin antigens in gallbladder adenocarcinoma: MUC1-positive and MUC2-negative expression Is associated with vessel invasion and shortened survival. Histology and Histopathology, 11824.

Pai, P., Rachagani, S., Dhawan, P., Sheinin, Y. M., Macha, M. A., Qazi, A. K., ... & Batra, S. K. (2016). MUC4 is negatively regulated through the Wnt/β-catenin pathway via the Notch effector Hath1 in colorectal cancer. Genes & Cancer, 7(5-6), 154.

Yokoyama, S., Higashi, M., Kitamoto, S., Oeldorf, M., Knippschild, U., Kornmann, M., ... & Kitazono, I. (2016). Aberrant methylation of MUC1 and MUC4 promoters are potential prognostic biomarkers for pancreatic ductal adenocarcinomas. Oncotarget.

Wang, Y., Kumar, S., Rachagani, S., Sajja, B. R., Xie, Y., Hang, Y., ... & Oupický, D. (2016). Polyplex-mediated inhibition of chemokine receptor CXCR4 and chromatin-remodeling enzyme NCOA3 impedes pancreatic cancer progression and metastasis. Biomaterials, 101, 108-120.

Suklabaidya, S., Das, B., Ali, S. A., Jain, S., Swaminathan, S., Mohanty, A. K., ... & Senapati, S. (2016). Characterization and use of HapT1-derived homologous tumors as a preclinical model to evaluate therapeutic efficacy of drugs against pancreatic tumor desmoplasia. Oncotarget.

Chugh, S., Meza, J., Sheinin, Y. M., Ponnusamy, M. P., & Batra, S. K. (2016). Loss of N-acetylgalactosaminyltransferase 3 in poorly differentiated pancreatic cancer: augmented aggressiveness and aberrant ErbB family glycosylation. British Journal of Cancer.

Joshi, S., Cruz, E., Rachagani, S., Guha, S., Brand, R. E., Ponnusamy, M. P., ... & Batra, S. K. (2016). Bile acids-mediated overexpression of MUC4 via FAK-dependent c-Jun activation in pancreatic cancer. Molecular Oncology.

Kanteti, R., Batra, S. K., Lennon, F. E., & Salgia, R. (2016). FAK and paxillin, two potential targets in pancreatic cancer. Oncotarget.

Krishn, S. R., Kaur, S., Smith, L. M., Johansson, S. L., Jain, M., Patel, A., ... & Lo, W. C. (2016). Mucins and associated glycan signatures in colon adenoma–carcinoma sequence: Prospective pathological implication (s) for early diagnosis of colon cancer. Cancer Letters, 374(2), 304-314.

B.Timothy Baxter

Gupta, P. K., Ramanan, B., Grossman, L., Gupta, H., Fang, X., MacTaggart, J. N., ... & Pipinos, I. I. (2016). Outcomes of aortic surgery for abdominal aortic graft infections. Vascular and Endovascular Surgery, 50(4), 256-260.

Baxter, B. T., Matsumura, J., Curci, J., McBride, R., Blackwelder, W. C., Liu, X., ... & N-TA3CT Investigators. (2016). Non-invasive treatment of abdominal aortic aneurysm clinical trial (N-TA 3 CT): Design of a Phase IIb, placebo-controlled, double-blind, randomized clinical trial of doxycycline for the reduction of growth of small abdominal aortic aneurysm. Contemporary Clinical Trials, 48, 91-98.

Mark Carlson

Hall, D. E., Arya, S., Schmid, K. K., Blaser, C., Carlson, M. A., Bailey, T. L., ... & Johanning, J. Development and initial validation of the risk analysis index for measuring frailty in surgical populations. JAMA Surgery.

Guenther, T. M., Coker, T. J., Chen, S. I., & Carlson, M. A. (2016). Military medicine interest groups in US medical schools. Military Medicine, 181(11), e1449.

Jiang, J., Li, Z., Wang, H., Wang, Y., Carlson, M. A., Teusink, M. J., ... & Xie, J. (2016). Expanded 3D nanofiber scaffolds: cell penetration, neovascularization, and host response. Advanced Healthcare Materials.

Bin Duan

Duan, B. (2016). State-of-the-art review of 3D bioprinting for cardiovascular tissue engineering. Annals of Biomedical Engineering, 1-15.

Howard Fox

Hu, G., Yang, L., Cai, Y., Niu, F., Mezzacappa, F., Callen, S., ... & Buch, S. (2016). Emerging roles of extracellular vesicles in neurodegenerative disorders: focus on HIV-associated neurological complications. Cell Death & Disease, 7(11), e2481.

Joseph, J., Cinque, P., Colosi, D., Dravid, A., Ene, L., Fox, H., ... & Mukerji, S. S. (2016). Highlights of the Global HIV-1 CSF Escape Consortium Meeting, 9 June 2016, Bethesda, MD, USA. Journal of Virus Eradication, 2(4), 243.

Stauch, K. L., Villeneuve, L. M., Purnell, P. R., Pandey, S., Guda, C., & Fox, H. S. (2016). SWATH-MS proteome profiling data comparison of DJ-1, Parkin, and PINK1 knockout rat striatal mitochondria. Data in Brief, 9, 589-593.

Stauch, K. L., Villeneuve, L. M., Purnell, P. R., Ottemann, B. M., Emanuel, K., & Fox, H. S. (2016). Loss of Pink1 modulates synaptic mitochondrial bioenergetics in the rat striatum prior to motor symptoms: concomitant complex I respiratory defects and increased complex II-mediated respiration. PROTEOMICS-Clinical Applications.

Harrison, E. B., Hochfelder, C. G., Lamberty, B. G., Meays, B. M., Morsey, B. M., Kelso, M. L., ... & Yelamanchili, S. V. (2016). Traumatic brain injury increases levels of miR-21 in extracellular vesicles: implications for neuroinflammation. FEBS Open Bio.

Ivanisevic, J., Stauch, K. L., Petrascheck, M., Benton, H. P., Epstein, A. A., Fang, M., ... & Boska, M. D. (2016). Metabolic drift in the aging brain. Aging, 8(5), 1-000.

Hani Haider

Haider, H., Weisenburger, J. N., & Garvin, K. L. (2016). Simultaneous measurement of friction and wear in hip simulators. Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine, 230(5), 373-388.

Urish, K. L., DeMuth, P. W., Kwan, B. W., Craft, D. W., Ma, D., Haider, H., ... & Davis III, C. M. (2016). Antibiotic-tolerant staphylococcus aureus biofilm persists on arthroplasty materials. Clinical Orthopaedics and Related Research®, 1-8.

James Hammel

Varghese, J., Kutty, S., Abdullah, I., Hall, S., Shostrom, V., & Hammel, J. M. (2016). Preoperative and intraoperative predictive factors of immediate extubation after neonatal cardiac surgery. The Annals of Thoracic Surgery, 102(5), 1588-1595.

Nicole Iverson

Iverson, N. M., Bisker, G., Farias, E., Ivanov, V., Ahn, J., Wogan, G. N., & Strano, M. S. (2016). Quantitative tissue spectroscopy of near infrared fluorescent nanosensor implants. Journal of Biomedical Nanotechnology, 12(5), 1035-1047.

Peng Jiang

Chen, C., Kim, W. Y., & Jiang, P. (2016). Humanized neuronal chimeric mouse brain generated by neonatally engrafted human iPSC-derived primitive neural progenitor cells. JCI insight, 1(19).

Jiang, P., & Deng, W. (2016). Regenerating white matter using human iPSC-derived immature astroglia. Neurogenesis, 3(1), e1224453.

Jiang, P., Chen, C., Liu, X. B., Pleasure, D. E., Liu, Y., & Deng, W. (2016). Human ipsc-derived immature astroglia promote oligodendrogenesis by increasing TIMP-1 secretion. Cell Reports, 15(6), 1303-1315.

Peter Kador

Kador, P. F., Wyman, M., & Oates, P. J. (2016). Aldose reductase, ocular diabetic complications and the development of topical Kinostat®. Progress in retinal and eye research.

Alexey Kamenskiy

Desyatova, A., MacTaggart, J., Poulson, W., Deegan, P., Lomneth, C., Sandip, A., & Kamenskiy, A. (2016). The choice of a constitutive formulation for modeling limb flexion-induced deformations and stresses in the human femoropopliteal arteries of different ages. Biomechanics and Modeling in Mechanobiology, 1-11.

Kamenskiy, A., Seas, A., Deegan, P., Poulson, W., Anttila, E., Sim, S., ... & MacTaggart, J. (2016). Constitutive description of human femoropopliteal artery aging. Biomechanics and Modeling in Mechanobiology, 1-12.

MacTaggart, J. N., Poulson, W. E., Akhter, M., Seas, A., Thorson, K., Phillips, N. Y., ... & Kamenskiy, A. V. (2016). Morphometric roadmaps to improve accurate device delivery for fluoroscopy-free resuscitative endovascular balloon occlusion of the aorta. Journal of Trauma and Acute Care Surgery, 80(6), 941-946.

Anne Kessinger

Huerter, M. M., Meza, J. L., Copur, M. S., Tolentino, A., Marr, A. S., Ketcham, M., ... & Radniecki, S. E. (2016). Weekly vinorelbine and paclitaxel in older patients with advanced non-small cell lung cancer: A phase II Fred and Pamela Buffet Cancer Center Clinical Trials Network study. Journal of Geriatric Oncology.

Ganti, A. K., Shostrom, V., Alorabi, M., Zhen, W. K., Marr, A. S., Trujillo, K., ... & Kessinger, A. (2015). Early stage non–small-cell lung cancer in octogenarian and older patients: A SEER database analysis. Clinical lung cancer.

Srivatsan Kidambi

Li, Q., Lin, H., Wang, O., Qiu, X., Kidambi, S., Deleyrolle, L. P., ... & Lei, Y. (2016). Scalable production of glioblastoma tumor-initiating cells in 3 dimension thermoreversible hydrogels. Scientific Reports, 6.

Tsigkas, N., Kidambi, S., Tawakol, A., & Chatzizisis, Y. S. (2016). Drug-loaded particles: "Trojan horses" in the therapy of atherosclerosis. Atherosclerosis, 251, 528-530.

Hayward, S. L., Wilson, C. L., & Kidambi, S. (2016). Hyaluronic acid-conjugated liposome nanoparticles for targeted delivery to CD44 overexpressing glioblastoma cells. Oncotarget, 7(23), 34158-34171.

Yuguo Lei

Li, Q., Lin, H., Wang, O., Qiu, X., Kidambi, S., Deleyrolle, L. P., ... & Lei, Y. (2016). Scalable production of glioblastoma tumor-initiating cells in 3 dimension thermoreversible hydrogels. Scientific Reports, 6.

Jung Yul Lim

Bouzid, T., Sinitskii, A., & Lim, J. Y. (2016). Graphene platform for neural regenerative medicine. Neural Regeneration Research, 11(6), 894.

Andalib, M. N., Dzenis, Y., Donahue, H. J., & Lim, J. Y. (2016). Biomimetic substrate control of cellular mechanotransduction. Biomaterials Research, 20(1), 1.

Appendix B: Publications

Andalib, M. N., Lee, J. S., Ha, L., Dzenis, Y., & Lim, J. Y. (2016). Focal adhesion kinase regulation in stem cell alignment and spreading on nanofibers. Biochemical and biophysical research communications, 473(4), 920-925.

Brian Lowes

Dhar, K., Moulton, A. M., Rome, E., Qiu, F., Kittrell, J., Raichlin, E., ... & Anderson, D. R. (2016). Targeted myocardial gene expression in failing hearts by RNA sequencing. Journal of Translational Medicine, 14(1), 327.

Kupzyk, K. A., Seo, Y., Yates, B., Pozehl, B., Norman, J., & Lowes, B. (2016). Use of the late-life function and disability instrument for measuring physical functioning in patients with heart failure. Journal of Nursing Measurement, 24(2), 323-336.

Nayar, P., Yu, F., Chandak, A., Kan, G. L., Lowes, B., & Apenteng, B. A. (2016). Risk factors for in-hospital mortality in heart failure patients: does rurality, payer or admission source matter? The Journal of Rural Health.

Raichlin, E., Baibhav, B., Lowes, B. D., Zolty, R., Lyden, E. R., Vongooru, H. R., ... & Um, J. Y. (2016). Outcomes in patients with severe preexisting renal dysfunction after continuous-flow left ventricular assist device implantation. ASAIO Journal, 62(3), 261-267.

Jason MacTaggart

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Geoffrey Thiele

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Appendix C: Staff and Student Recognition

Staff

Jenni Irving, Ph.D.
Administrative Project Associate, Regenerative Medicine

Jenni graduated with her Ph.D. in Medical History from Macquarie University in Sydney, Australia and both a Certificate and Advanced Certificate in Medical Writing and Editing from the University of Chicago. She also completed the 2016 Foundations for Success Series and the 2016-2017 Management Series.

Students

Taylor Laughlin, M.S.

Taylor graduated with a Masters from Angela Pannier's lab in August 2016. She was offered and accepted a position after graduation as a process engineer at Desmet Ballestra North America in Atlanta.

Krishna Sarma, B.S.

Krishna Sarma received first place in the Department of Genetics, Cell Biology and Anatomy for his oral presentation at the MSBRF conference in March 2016. He also received first place in the Department for his poster presentation at the American Physician Scientist Association Regional Meeting in November 2016.

Erin Wuebben, Ph.D.

Erin Wuebben graduated from Angie Rizzino's laboratory with a Ph.D. in November 2016. She has now joined the Rizzino lab as a Postdoctoral Fellow.

Contact

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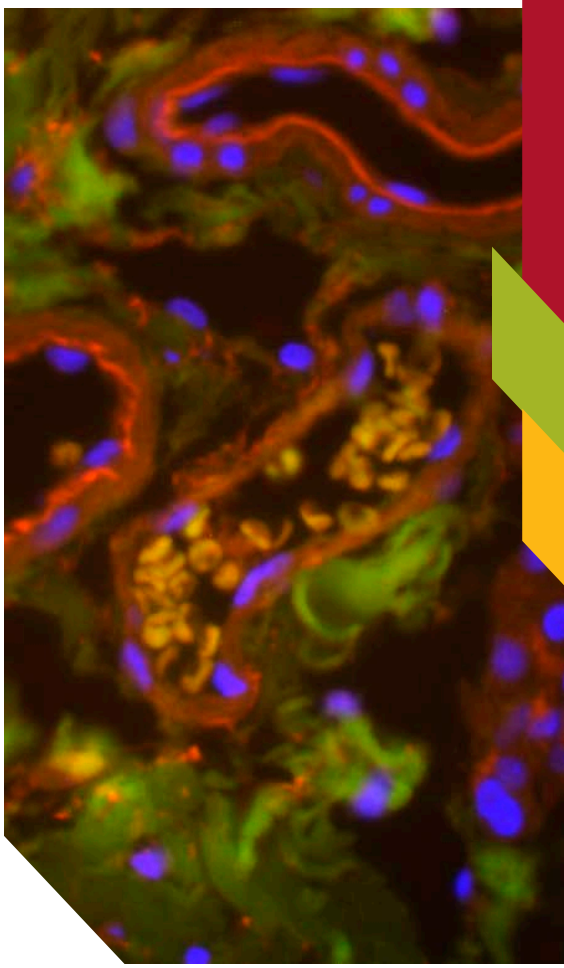

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