In the Spotlight

Jorge Castorena-Gonzalez, PhD

Cells in tissues around the body are constantly supplied with nutrients and metabolites transported by the blood. Cellular waste products accumulate in the interstitium and then are collected and transported back into the bloodstream by the lymphatic system. Deficiencies in the lymphatic system can result in the abnormal accumulation of fluid and protein leading to edema. In the USA, tens of millions of people are affected each year, both by edema per se and/or by diseases that have a lymphatic component, including congestive heart failure, obesity, and peripheral artery/venous disease. In many regions of the body, lymph transport must be accomplished against hydrostatic pressure gradients that arise from the imposition of gravitational loads. Consequently, efficient lymph propulsion relies critically on the intrinsic spontaneous contractions of lymphatic muscle cells, in conjunction with one-way lymphatic valves that prevent or retard lymph backflow. Dr. Castorena-Gonzalez’s main research project has focused on the study and understanding of some of the mechanisms behind lymphatic dysfunction. As the spontaneous, coordinated contraction of all lymphatic muscle cells within a pumping unit, or lymphangion, result from the rapid propagation of the electrical pacemaking signals along the lymphatic wall, Dr. Castorena-Gonzalez is particularly interested in understanding how cells communicate with each other through intercellular gap junction channels. Recent findings by Dr. Castorena-Gonzalez (in the lab of Dr. Michael J. Davis): 1) identified the gap junction protein Cx45 as the critical connexin isoform mediating the electrical communication between lymphatic smooth muscle cells and the entrainment of coordinated contraction waves; 2) showed that the major endothelial connexin isoforms are dispensable for the coordination and conduction of those contractions; and 3) revealed an apparent lack of coupling between the endothelial and smooth muscle layers, in contrast to the arteriolar wall.

Conduction of Spontaneous Contractions in Collecting Lymphatics

Cardiovascular Day will be Tuesday, February the 27st, 2018 at the Reynolds Alumni Center
**Funding**

*Erika Boerman, PhD*

My current grant focuses on the role of vascular dysfunction in Inflammatory Bowel Disease, or IBD.

We emphasize understanding the role perivascular nerves in IBD, particularly sensory nerves that release calcitonin gene-related peptide and substance P. These transmitters can communicate with smooth muscle and endothelial cells to alter blood flow and may interact with nearby immune cells to improve or exacerbate disease.

Initial studies focused on using pressure myography and electrical field stimulation to define functional changes in perivascular nerve function. Moving forward in the R00 phase of the grant, I will incorporate more advanced imaging of the vessels to look at protein expression and localization, calcium signaling, and changes in blood flow associated with IBD.

By understanding how signaling pathways within and between vascular cells change during IBD, I hope to uncover new and selective targets to treat vascular dysfunction and impaired intestinal blood flow, improving quality of life for IBD patients.

---

**Graduate Student Adam Veteto Awarded NIH F31 Predoctoral Fellowship**

Cardiovascular disease remains the greatest cause of mortality in those aged 65 and older. Intracellular Ca\(^{2+}\) triggers cardiac muscle cell contraction and cardiac systole. However, excessive intracellular Ca\(^{2+}\) impairs cardiac relaxation during diastole. Previous studies focused on age-associated impairments in Ca\(^{2+}\) removal processes and associated elevated diastolic Ca\(^{2+}\) and diastolic dysfunction. Aged hearts operate under increased filling pressures and volumes, resulting in increased longitudinal stretch of cardiac muscle cells. This grant investigates the contribution of the stretch-activated TRPV4 ion channel to excessive Ca\(^{2+}\) entry in the aged myocardium. The goal is to identify a new therapeutic target to improve cardiac function in aged individuals. Additionally, this National Research Service Award will support training in multiple advanced investigative techniques, thereby providing a foundation for future research efforts.

---

**Where are they now?**

*Dr. Mozow Zuidema, MD, PhD*

Dr. Mozow Zuidema was an MD/PhD student from the Fall of 2000-December 2007 and graduated with a PhD in Pharmacology from the Department of Medical Pharmacology and Physiology. Dr. Ronald Korthuis was her mentor, and her PhD thesis was titled *“Antecedent Hydrogen Sulfide Elicits an Anti-inflammatory Phenotype in Postischemic Murine Small Intestine”*. She went on to her Internal Medicine internship and residency at the University of Missouri, and since blending her studies was already a trend, she began a training program approved by the American Board of Internal Medicine, as a resident of the “Research Track” that incorporated postdoctoral research with Internal Medicine training and Cardiovascular Disease clinical fellowship. Her mentors during her research years were Dr. Cuihua Zhang and Dr. Michael Hill while she studied cardiac ischemia and reperfusion in the murine model. She focused on cytokine signaling while completing a cardiovascular clinical fellowship. When she finished her clinical cardiology fellowship, she began clinical work at the Harry S Truman Memorial Veteran’s Administration as a Staff Cardiologist. Her research background landed her a position on the Institutional Review Board and she enjoyed reviewing clinical trials proposed by University of Missouri or Harry S Truman VA scientists. Clinical trials were truly rewarding for her as her basic science background and clinical skills were finally truly blended. Her clinical skills were growing, and she was quickly promoted to Director of the Cardiovascular lab, overseeing echocardiography, cardiology clinics, and cardiology non-invasive diagnostic testing. Most recently Mozow has been recruited to and joined the Missouri Heart Center as a cardiologist, and is now affiliated with the private practice group, also seeing patients at Boone Hospital. She enjoys her clinical cardiology work, with special emphasis on cardiovascular imaging, structural heart disease and is on the transcatheter aortic valve intervention team. As the innovation and science of cardiology grows, she is excited to grow her clinical expertise in these cutting-edge advances. In addition to her clinical work, she working on initiating and developing research studies in the practive, and also in forming ties with industry and science to help promote and advance cardiovascular research. Surely her prior research training with the Department of Medical Pharmacology and Physiology has proved invaluable in training her to think analytically and evaluate science and medicine to bring cardiovascular innovation to the bedside.

---

Check out the **MPP Intranet website**

The site where you have quick access to helpful information, links and downloadable department forms using your pawprint.
January 23  Zhenguo Liu, MD, PhD, Chair and Professor, Division of Cardiovascular Medicine, Department of Medicine, University of Missouri

“Endothelial differentiation of bone marrow stem cells and potential mechanisms”

January 30  Mark Milanick, PhD, Professor, Department of Medial Pharmacology and Physiology, University of Missouri

“Walking the line vs. crossing the line: A discussion of fuzzy areas in the responsible conduct of research”

February 6  Kerry McDonald, PhD, Professor, Department of Medical Pharmacology and Physiology, University of Missouri

“Cardiac myofilaments: from health to heart disease”

February 13  Eileen Hasser, PhD, Professor, Department of Biomedical Sciences, University of Missouri

“Cardiorespiratory responses to hypoxia require a reciprocal hindbrain-forebrain pathway”

March 6  Susan C. Nagel, PhD, Associate Professor, Department of Obstetrics, Gynecology and Women’s Health, University of Missouri

“Developmental and reproductive effects of chemicals associated with unconventional oil and natural gas”

March 13  Grzegorz Sowa, PhD, Associate Professor, Department of Medical Pharmacology and Physiology, University of Missouri

“Role of caveolin-2 in cancer and beyond”

March 20  Kevin J. Cummings, PhD, Assistant Professor, Department of Biomedical Sciences, University of Missouri

“Cardiorespiratory features of infants prone to sudden death in sleep: the role of serotonergic dysfunction”

April 3  Doris Taylor, PhD (2018 JO Davis Student Selected Lecturer), Director, Regenerative Medicine Research, Director of the Center for Cell and Organ Biotechnology, Texas Heart Institute, Houston, TX

“Title to be announced”

April 10  Doug Bowles, PhD, Chair and Professor, Department of Biomedical Sciences, University of Missouri

“KCa3.1 in atherosclerosis: The REST of the story”

April 17  Aaron Ericsson, DVM, Assistant Research Professor, Department of Veterinary Pathobiology, University of Missouri

“Exoelectrogenic bacteria in the gut and redox-dependent lymphocyte recruitment”

May 1  Brandon Biesiadecki, PhD (host: Kerry McDonald, PhD), Associate Professor, Department of Physiology and Cell Biology, Ohio State University

“Tyrosine phosphorylation: A new player in heart function”

May 8  Cheryl Heesch, PhD, Professor, Department of Biomedical Sciences, University of Missouri

“The stimulus matters: Differential engagement of forebrain pathways for arterial chemoreflex neuroendocrine and sympathoexcitatory responses”
Recent Publications

Using a Thyroid Case Study and Error Plausibility to Introduce Basic Lab Skills. Samantha Browning, Margaret Urschler, Katherine Meidl, Brenda Peculis, and Mark Milanick. Bioscene Volume 43(2) December 2017 pp. 29-37.


Seminar/Symposia/Lecture Presentations

**Kerry McDonald**


Department of Physiology, University of Kentucky, “Cardiac myofilaments: from health to heart disease”, September 2017.

Grant information

NIH new RO1 deadline is February 5th.
Resubmission RO1 deadline is March 5th.

Upcoming Events

- **International Stroke Conference** (Jan 24 – 26, 2018), Las Angeles, CA.
- **Cardiovascular Day** Tuesday, February 27, 2018 at the Reynolds Alumni Center.
- **Biophysical Society Meeting** (Feb 17—21, 2018), San Francisco, CA.
- **Gordon Research Conferences** (Feb—July 2018).
- **Preconditioning in Biology and Medicine** (Apr 17—18, 2018), Amherst, MA.
- **Experimental Biology** (Apr 21—25, 2018), San Diego, CA.
- **ATVB/PVD 2018** (May 9—12, 2018), San Francisco, CA.
- **Lymphatic Education & Research Network Conferences**
- **Digestive Disease Week**, Washington, DC, June 2-5, 2018
- **Keystone Conferences** January—November 2018.
- **NAVBO**, Newport, RI, October 14—18, 2018.
- **European Society for Microcirculation**—SAVE the DATE for 2019, April 15—18.
Ron Korthuis, PhD, MPP Chair

1. What do you enjoy doing outside of work? Running, which I now have to do on an elliptical treadmill because of arthritis in my hips, and reading. I also love talking to and playing with my three grandsons (a fourth grandson is on the way!). Only one lives close by (in Ashland), so he gets really spoiled.

2. Favorite book? And why? I can’t think of a particular book that is my favorite, but I do have a long list of favorite authors — Ted Bell, Clive Cussler, Dean Koontz, Patricia Cornwell and Jo Nesbo rise to the top—from that list you can see that I prefer action/adventure/mystery novels, although I read some non-fiction too.

3. Favorite movie? I love movies and will watch just about any movie once, but anytime Sleepless in Seattle, We Were Soldiers, or Love Actually comes on, I’ll tune in. And every Christmas, I watch The Sound of Music, Home Alone 1 and Home Alone 2, The Family Stone, and A Christmas Story at least once. I should also list Planes, Trains, and Automobiles, Dumb and Dumber, National Lampoon’s Animal House and Vacation, Airplane!, and all the Monty Python movies, as I crack up now just as much as the first time I watched them.

4. If you could study something else, what would it be, and why? I’ve always had an interest in protecting the environment so it would be interesting to conduct research related to environmental engineering of fresh water bodies. Rivers, lakes and aquifers are drying up or becoming too polluted to use, climate change is altering weather patterns, causing water shortages in some areas and floods in others, while agriculture consumes more water than any other use but wastes much of that through inefficiencies. All of those factors has placed tremendous stress on fresh water supplies. I’d like to work on how to better manage and protect fresh water sources, because disputes over water rights and access to fresh water are emerging as major threats to human health and world security and in the not too distant future, will likely cause as many wars as conflicts over oil.

5. Did you ever have a nickname? How did it come about? In tenth grade, I broke a metatarsal in my foot playing volleyball in gym class and had to wear a wooden shoe for about 6 weeks while the bone healed. This shoe had thick leather straps that were shaped like horseshoes attached to the bottom, to provide some grip and to reduce the noise produced with each step. Even with that, walking on those linoleum tile floors at school produced loud clomping noises that sounded like a horse running down the hall. I was thus christened “the hoof” by my friends, a nickname which stayed with me through the rest of high school.

University of Missouri
Department of Medical Pharmacology & Physiology
1 Hospital Dr. Med Science Bldg. MA415 Columbia, MO 65212 (573) 882-4957