The lymphatic system is akin to the garbage truck that picks up the bag of trash every morning, if it stopped working eventually the trash would pile up and your neighborhood would no longer be the nice subdivision but a landfill. When the lymphatic system is disrupted tissues swell with fluid and macromolecules, and if this is maintained the tissue will begin to lose its identity and function due to aberrant activation of fibrosis and adipogenesis. Whereas the blood vasculature relies on the force generated by the heart, the lymphatic system is open ended in the tissue space and requires extrinsic and intrinsic forces to propel fluid and macromolecules through the networks of vessels and nodes to ultimately return to the blood stream. Extrinsic forces are from tissue compression such as from skeletal muscles contracting and raising interstitial pressures to help promote lymph flow. This would be like your neighbors pushing the full garbage truck down the street, and hopefully you don’t live on the bottom of the hill. Fortunately, the lymphatic vessels have their own innate contractile function to provide an intrinsic force to propel the fluid and macromolecules just as each garbage truck may have a working electric engine. The lymphatic vessel contractions are regulated by an array of ion channels opening and closing in each lymphatic muscle cell within the network until a critical membrane potential is reached to fire a slow-wave like action potential. These APs last on the order of a little over a second and allow large influx of calcium into the cell by voltage gated calcium channels that ultimately activate the contractile machinery. We are using a combination of physiological techniques such as isobaric myography, single/dual microelectrode membrane potential recordings, patch clamp, calcium recordings, and a host of transgenic mice to determine the critical ion channels involved in the regulation of the lymphatic slow wave like action potential frequency, amplitude and duration. We have recently confirmed the importance of the calcium activated chloride channel TMEM16a in providing a basal depolarizing stimulus that in part regulates the frequency and duration of the action potential although ejection fraction is maintained. My personal research interest has taken me past the outer cell membrane and into the regulation of spontaneous calcium release events from the sarcoplasmic reticulum that appear to drive the activity of many membrane channels in addition to the role for calcium induced calcium release in regulating the contraction amplitude. Hopefully, the mechanisms we uncover will provide the foundation for future doctors to be able to fix and/or tweak your lymphatic function like the engine mechanic working on your car down the street.

Inflammatory bowel disease (IBD) greatly decreases quality of life for patients, and the incidence of IBD is increasing worldwide. Further, IBD is comorbid with cardiovascular disease, a leading cause of death. Dr. Erika Boerman, in collaboration with Dr. Steven Segal and Dr. Gwendalyn Randolph (Washington University) received a K99/R00 award to investigate the role of perivascular sensory nerves in the pathogenesis of IBD. Perivascular sensory nerves surrounding mesenteric arteries play a key role in opposing sympathetic vasoconstriction and producing vasodilation to regulate blood flow to the intestines. Blood flow and arterial vasodilation are impaired in inflammatory bowel disease through mechanisms that are poorly understood, and the neurotransmitters released from sensory nerves, calcitonin gene-related peptide and substance P are implicated in the pathogenesis of the disease. This research investigates the nature of impaired perivascular sensory nerve function in IBD with the central hypothesis that altered sensory neurotransmitter function, release and downstream signaling in smooth muscle and endothelial cells of mesenteric arteries leads to impaired blood flow to the intestine during IBD. The ultimate goal of the project is to manipulate these pathways in order to improve vascular function, blood flow and quality of life in IBD patients.
Remaining SEMINAR SCHEDULE  
Tuesdays 12:00 – 1:00 pm; MA217 Acuff Auditorium

May 2  
Demetra D. Christou, PhD (JO Davis Student Select Lecturer), Assistant Professor, Director, Integrative Cardiovascular Physiology Laboratory, Department of Applied Physiology & Kinesiology, University of Florida

“Acute and Chronic effects of exercise on cardiovascular function in aging”

May 9  
Kristy Red-Horse, PhD (Host: Mike Hill, PhD), Assistant Professor, Department of Biology, Stanford University School of Medicine

“Growth and patterning of coronary arteries during mammalian heart development”

Upcoming Events

- **ATVB/PVD 2017**, Minneapolis, MN, May 4-6, 2017
- **Digestive Disease Week**, Chicago, IL, May 5-9, 2017
- **European Society for Microcirculation**, Geneva, Switzerland, May 29—June 1, 2017
- **Lymphatic Forum**, Chicago, IL, June 8-10, 2017
- **AHA Basic Cardiovascular Science Meeting**, Portland, OR, July 10-14, 2017
- **Gordon Research Conferences:**
  - **Mitochondria, Metabolism and the Heart**, Santa Fe, NM, May 8-12, 2017
  - **Angiogenesis and Vascular Disease**, Santa Fe, NM, May 8-12, 2017
- **Keystone Conferences:**
  - **Keystone Conferences**:
  - **Mitochondria, Metabolism and the Heart, Santa Fe, NM, May 8-12, 2017**
  - **Angiogenesis and Vascular Disease, Santa Fe, NM, May 8-12, 2017**

Recent Publications


Seminar/Symposia/Lecture Presentations

**TC Hwang**

An organizer of the *European Cystic Fibrosis Basic Science Conference*, and Co-Chair Symposium, “CFTR Structure,” and gave a symposium talk, “Functional Integrity of CFTR in the Cell Membrane: Role of ATP binding in Site 1,” Algarve, Portugal, March 29-April 1, 2017.

**Luis Polo-Parada**

Magisterial lecture: “Lo Bueno, lo Malo y lo Feo, para la detección de cancer (The good, the bad and the ugly in cancer cell detection),” III *Congreso Multidisciplinario Ciencias Aplicadas en Latinoamerica*, Habana, Cuba, December 6-9, 2016.

**Luis Martinez-Lemus**


**Gerald Meininger**

Co-Chair Symposium and Poster Judge at British Microcirculation Society and UK Adhesion Society focus on the Many Facets of Inflammation, University of Birmingham, April 3-4, 2017.
Where are they now?

Josh Scallan

The majority of my predoctoral and postdoctoral training took place in the Medical Pharmacology and Physiology department at the University of Missouri. As an undergraduate student in Louisiana, I took the opportunity to work under Dr. Ron Korthuis in a summer internship at LSU-MC and that experience remains a major reason that I decided to pursue a career in science. While at Mizzou, I trained under Drs. Virginia Huxley and Mike Davis, but with the caveat that I would be able to explore my own research interests, the permeability of lymphatic vessels.

I cannot thank Ron, Ginger, Mike, as well as the MPP department at MU enough for supporting my dream of having an independent career, but also for allowing me the intellectual freedom to investigate my own hypotheses and research directions. Thanks to this rare and supportive environment, I was able to successfully compete for an NIH grant that ultimately helped me to obtain a faculty position at a competitively ranked medical school.

As an Assistant Professor in the Molecular Pharmacology and Physiology department at the University of South Florida, I have set up my own independent laboratory focused on investigating the genetic regulation of lymphatic vessel permeability. Additionally, I am actively involved in mentoring my very own graduate student and have taught medical physiology courses to Masters students in a premedical program. In the Fall semester, I will teach medical students for the first time. Through these activities I am learning that the MPP department taught me not only how to conduct rigorous science, but also how to be a good mentor to trainees and students.

During the time I was in the process of searching for a faculty position, my wife and I had a daughter in Missouri. She is now 2.5 yrs old and is a big part of our life outside the lab. While I enjoyed growing scientifically in Missouri, and seeing snow for the first time, I can attest to the fact that I enjoy Tampa much more during the winter months (you can even catch bass in December here!).

Best wishes to everyone in the MPP department at MU!

CONGRATULATIONS

Steve Segal was invited to join the Faculty1000Prime in the Muscle and Connective Tissue section, Physiology Faculty. Dr. Segal joins Dr. Virginia Huxley, who was initially appointed in the Integrative Physiology section in 2010, to this prestigious body of highly accomplished scientists.

Luis A. Martinez–Lemus was appointed to serve as a Standing Member in the Cardiovascular–B sub-committee of the Office of Research and Development within the US Department of Veterans Affairs to review grant applications submitted to the Merit Review Award Program.

Congratulations to Kim To for her Successful Dissertation Defense

Congratulations to Samantha DeStefano, a Master’s Degree student in TC Hwang’s lab, who was awarded a traineeship from the Cystic Fibrosis Foundation.

Han-I Yeh was awarded a travel grant to attend the European Cystic Fibrosis Basic Science Conference March 29-April 1, 2017 to present her abstract which scored in the top 10 among 130 abstracts.

Several in the department are applying for NIH R01’s this round.

The NIH deadline for the R01 is June 5th.

OSPA needs complete application 5 business days before sponsor due date.

Thank you to everyone who participated in the MPP bowling competition! It was a lot of fun!

Plan to join us in June for a new adventure!

Do you have what it takes to Break Out?

Break Out CoMo

Check out the newly launched Medical Pharmacology & Physiology website.

If you need to update your profile, fill out this form https://communications.muhealth.org/faculty-profile-information/


**Who’s Who**

**Kerry McDonald** has been a Principle Investigator in our department for 20 years. He says if he could choose a different profession he would be a football coach. He said it was his first love having played it from 5th grade all the way through 4 years of college. He says it is the ultimate “team” game and he craves “the challenge of getting everyone to work together for a common goal.”

Of all the super powers to choose from, Kerry would love to have wisdom because he says, “I constantly wish that I could say the right thing at the right time.”

His favorite movie is **Hoop Dreams**. He said he was mesmerized by the characters’ focus through all the obstacles that they had to overcome, all to pursue their athletic dreams.

A few things you may not have known about Kerry is that he spent a lot of time in the Emergency Room growing up. He enjoys reading biographies on American historical figures. And Spring time to him is for turkey hunting.

**Murry’s Restaurant** is his favorite. He has had good food, service and experiences consistently for 20 years. He says you can’t go wrong with, “Green pepper rings, salad with house peppercorn dressing, whatever their entrée special is, and gooey butter cake and coffee for dessert.”

**Who’s Who 2**

**Chuck Norton** has been a PostDoc in Steve Segal’s lab for 2 years. He says that if he could choose a different profession he would like to run a microbrewery. He says, “It combines chemistry and science with the production of a tasty end product.”

When asked if he could choose to have any super power, he would choose **telekinesis** so he could always grab a beer without interrupting what he was doing.

His favorite movie is **StarGate from 1994** because it combines two of his favorite interests, science fiction and mythology.

Which leads to something unique about him that you probably didn’t know. He is an avid science fiction/fantasy reader. He says he has a collection of about 2,000 books!

His all-time favorite restaurant is **Sadie’s Mexican Restaurant** in Albuquerque, NM. He says they have the best salsa and enchiladas!