KYLE STEVEN MARTIN, PH.D.

kyle.s.martin@gmail.com http://ksm362.github.io

EDUCATION

Ph.D. *University of Virginia*, Department of Biomedical Engineering, Charlottesville, VA 2015
Dissertation: "Agent-based modeling of skeletal muscle adaptation"
Advisers: Shayn Peirce-Cottler and Silvia Salinas Blemker

B.S. *Drexel University*, Department of Biomedical Engineering, Philadelphia, PA 2009

AWARDS

Whitaker International Scholarship, *Karolinska Institutet* 2017
Wenner-Gren Fellowship, awarded but declined, *Karolinska Institutet* 2017
Cardiovascular Research Postdoctoral Training Grant, NIH 4T32HL007284-39, *University of Virginia* 2016
Image-Based Biomedical Modeling (IBBM) fellowship, *Scientific Computing and Imaging Institute* 2014
American Society of Biomechanics President's award, *World Congress of Biomechanics* 2014
Tomorrow's Professor Today, *University of Virginia* 2013
SEAS Graduate Teaching Fellowship, *University of Virginia* 2013
Cardiovascular Research Graduate Student Training Grant, NIH 5T32HL007284, *University of Virginia* 2010
Double-Hoo Scholarship, *University of Virginia* 2010

RESEARCH

Positions

Project Coordinator, **Carl Johan Sundberg lab**, *Karolinska Institutet, Sweden* 2021 – present

I am organizing a collaborative study between the Karolinska Institutet and Oura, a wearable biometric device company. The study consists of volunteers performing low to medium intensity activities (computer work, jogging, cycling) while wearing an Oura ring. I recruited and trained a team of student assistants that help with participant intake, organization, and data collection. I also manage the six-figure budget intended for equipment acquisition, salaries, and other running costs.

Post-Doctoral Researcher, **Jorge Ruas lab**, *Karolinska Institutet, Sweden* 2017 – 2021

In Jorge's lab, I was interested in the communication between adipocytes and sensory neurons. Their local communication is both understudied and could have an impact on metabolic disorders. Through the use of microfluidic devices, RNAseq, and traditional cell culture methods, I investigated how sensory neurons regulate adipocyte function (metabolism, adipokine production, etc).

Post-Doctoral Researcher, **George Christ Lab**, *University of Virginia* 2016 – 2017

Severe muscle injuries, such as volumetric muscle loss, involves the disruption of many biological systems that work congruently to function (muscle, nervous system, vasculature, etc.). My projects focused on exploring the hypotheses generated from my computational models created during my graduate studies as well as understanding the vasculature and nervous system in muscle before and after volumetric injury.

Graduate Student, **Labs of Silvia Blemker and Shayn Peirce-Cottler**, *University of Virginia* 2009 – 2015

I developed a novel tissue level agent-based model of skeletal muscle and used the model to simulate muscle adaptation. My model was able to explore disuse-induced muscle atrophy as well as probe how muscles recovery and adapt after injury (contusion/crush/laceration). The model was able to 1) elucidate the importance of inflammatory cell recruitment timing (neutrophils, pro or anti-inflammatory macrophages) during muscle regeneration and 2) provides insight into optimum timing/duration of therapeutics during muscle recovery.

RESEARCH

Journal Publications

KS Martin*, AF Kahrl*, B Ivanov, MA Johnson. “Use it and bruise it: copulation rates are associated with muscle inflammation across anole lizard species” *Journal of Zoology*, 2021 (* authors contributed equally)

KM Virgilio, B Jones, E Miller, E Ghajar-Rahimi, **KS Martin**, SM Peirce, SS Blemker. “Computational models provide insight into in vivo studies and reveal the complex role of fibrosis in mdx muscle regeneration” *Annals of Biomedical Engineering*, 2020

KS Martin*, M Azzolini*, J Ruas. “The Kynurenine Connection: How exercise shifts muscle tryptophan metabolism and affects energy homeostasis, the immune system, and the brain.” *American Journal of Physiology - Cell Physiology,* 2020 (* authors contributed equally)

KM Virgilio, **KS Martin**, SM Peirce, SS Blemker. “Agent-based model illustrates the role of the micro-environment in regeneration in healthy and mdx skeletal muscle” *Journal of Applied Physiology*, 2018

JA Call, J Donet, **KS Martin**, … Z Yan. “Muscle-derived extracellular superoxide dismutase inhibits endothelial activation and protects against multiple organ dysfunction syndrome in mice” *Free Rad Bio & Med*, 2017

CC Henry, **KS Martin**, BB Ward, GG Handsfield SM Peirce, SS Blemker. “Spatial and age-related changes in the microstructure of dystrophic and healthy diaphragms” *PloS one*, 2017

KS Martin, CD Kegelman, KM Virgilio, JA Passipieri, GJ Christ, SS Blemker, SM Peirce. “In silico and in vivo experiments reveal M-CSF injections accelerate regeneration following muscle laceration” *Annals of Biomedical engineering,* 2017

KS Martin, KM Virgilio, SM Peirce, SS Blemker. “Computational modeling of muscle regeneration and adaptation to advance muscle tissue regeneration strategies” *Cells, Tissues, Organs,* November 2016

KS Martin, SS Blemker, SM Peirce. “Agent-based computational model investigates muscle-specific responses to disuse-induced atrophy” *Journal of Applied Physiology,* 2015

- *Featured in the editorial:* An, Gary. *Journal of Applied Physiology,* 2015

KM Virgilio, **KS Martin**, SM Peirce, SS Blemker. “Multiscale models of skeletal muscle reveal the complex effects of muscular dystrophy on tissue mechanics and damage susceptibility” *Interface Focus*, 2015

JA Call, KH Chain, **KS Martin**, VA Lira, M Okutsu, M Zhang, Z Yan. “Enhanced skeletal muscle expression of EcSOD mitigates streptozotocin-induced diabetic cardiomyopathy by reducing oxidative stress and aberrant cell signaling” *Circulation: Heart Failure*, 2014

M Okutsu, JA Call, VA Lira, M Zhang, JA Donet, BA French, **KS Martin**, SM Peirce, CM Rembold, BH Annex, Z Yan. “Extracellular Superoxide Dismutase Ameliorates Skeletal Muscle Abnormalities, Cachexia and Exercise Intolerance in Mice with Congestive Heart Failure” *Circulation: Heart Failure*, 2014

AO Awojoodu, ME Ogle, LS Sefcik, DT Bowers, **KS Martin**, KL Brayman, KR Lynch, SM Peirce, E Botchwey. “Sphingosine 1-phosphate receptor 3 regulates recruitment of anti-inflammatory monocytes to microvessels during implant arteriogenesis” *Proceedings of the National Academy of Sciences*, 2014

AM Guendel*, **KS Martin***, J Cutts, PL Foley, AM Bailey, F Mac Gabhann, TR Cardinal, SM Peirce. "Murine Spinotrapezius Model to Assess the Impact of Arteriolar Ligation on Microvascular Function and Remodeling" *Journal of Visualized Experiments*, 2013 (* authors contributed equally)

Presentations

KS Martin, AF Kahrl, BM Ivanov, MA Johnson. “Copulation rates in anole lizards are correlated with muscle damage” The Society for Integrative and Comparative Biology Annual Meeting. Jan 2018, San Francisco, CA

KS Martin, KM Virgilio, SM Peirce, SS Blemker. “Agent-based model of inflammation and regeneration following contraction-induced muscle injury” ASB Annual Meeting. Aug 2015, Columbus, OH

KS Martin "Agent based modeling of skeletal muscle atrophy and inflammation" University of Kentucky, Center for Muscle Biology Forum. May 2015, Lexington, KY

KS Martin. "Vascular adaptations in response to exercise" University of Virginia Graduate Biomedical Engineering Society symposium. Sept 2012, Charlottesville, VA

Selected Posters

KS Martin, H Wu, F Lallemend, J Ruas. "Exploring Adipocyte and Sensory Neuron Crosstalk" Biomedical Engineering Society Annual Meeting. Oct 2019, Philadelphia, PA

KS Martin, J Ruas. "Role of kynurenine metabolites in adipose and sensory nerve crosstalk" 9th SRP Diabetes-EndoMet-MetEndo retreat. May 2019, Stockholm, Sweden

KS Martin, KM Virgilio, JA Passipieri, C Kegelman, G Christ, SM Peirce, SS Blemker. "Computational Model-Driven Design of a Pharmacological Intervention During Muscle Regeneration" Biomedical Engineering Society Annual Meeting. Oct 2016, Minneapolis, MN

KS Martin, KM Virgilio, JA Passipieri, C Kegelman, G Christ, SM Peirce, SS Blemker. "Guiding muscle injury experiments using an agent based computational model" Adv. in Skeletal Muscle Bio. Jan 2016, Gainesville, FL

KM Virgilio, **KS Martin**, SM Peirce, SS Blemker. "Multiscale computational models recapitulate progression of fibrosis in dystrophic muscle" Advances in Skeletal Muscle Biology. Jan 2016, Gainesville, FL

KM Virgilio, **KS Martin**, SM Peirce, SS Blemker. "Multiscale models predict how accumulated microtears lead to acute muscle injury. Aug 2015, Columbus, OH

KS Martin, SS Blemker, SM Peirce. "Agent-based model of skeletal muscle tissue predicts immobilization-induced remodeling" World Congress of Biomechanics. July 2014, Boston, MA

TEACHING

Guest Lecturer

Graduate Physiology I (2644HT2021), *Karolinska Institutet* 2021
Taught students a detailed overview on the digestive and cardiovascular systems (3 lectures)

Graduate Physiology I (BME 6101), *University of Virginia* 2020
Gave a broad lecture on how sleep, diet, and exercise influence learning

Advanced Physiology (HL2018), *Karolinska Institutet* 2018
Ran a circulation and respiration lab for undergraduates

Human Physiology (BME2102), *University of Virginia* 2016 - 2017
Assisted in syllabus design, coursework, grading, and teaching (4 lectures per year)

Engineering Physiology (BME6101), *University of Virginia* 2013 - 2015
Administered and graded the oral final exam

Systems Bioengineering Modeling and Experimentation (BME 4550), *University of Virginia* 2014
Developed and delivered 3 lectures on performing sensitivity analysis and model construction.

Computational principles of Biomedical engineering (BME 6440), *University of Virginia* 2014
Taught graduate students various optimization techniques (3 lectures)

Motion Biomechanics (BME 4280/6280), *University of Virginia* 2014
Lectured on skeletal muscle adaptation to stimulation and disease (1 lecture)

Co-Instructor

Biomedical Engineering: Design and Discovery (BME2000), *University of Virginia* 2013
Created the syllabus, lectured 1/3rd of the course, co-wrote and graded both the midterm and final exams

Teaching Assistant

Biomedical Engineering: Senior Design (BME4063/4064), *University of Virginia* 2011 - 2012

Student Mentoring

Graciana de Azambuja *Utilizing microfluidics to explore sensory nerve signaling* 2021
Madeleine McDonald *Reproducibility in creating skeletal muscle constructs* 2017
Katherine Crump and John Hanckel *Modelling muscle atrophy during space flight* 2017
Catherine Henry *Investigation of non-uniform sarcomere lengths in the mouse diaphragm* 2013 - 2016
Chris Kegelman and Ruba Shalhoub *Sarcomere adaptations during muscle-tendon transfer* 2015
Bridget Ward *Microscale muscle analysis of healthy and dystrophic diaphragm* 2013
Brennan Torstrick *Induction of murine spinotrapezius ischemia via cauterization* 2011 - 2012
Julie Kokinos *Diaphragm Modeling in Duchenne Muscular Dystrophy* 2012
Ross Gordon *Immunogenic response to PCL-PEO nanoparticles* 2010
Grace Stuntz *Creation of a novel aortic flow system* 2010
Scott Schubert *Effects of combination drug treatment on smooth muscle cells* 2010
Caryn Just *Evaluation of thin films vs electrospun mats for intraluminal use* 2010

Posters

KS Martin "Works in Progress: Development of a need-based BME design course focused on current NICU challenges" ASEE 121st annual conference, June 2014, Indianapolis, IN

Non-academic teaching

Socialdansutskottet (Swedish Swing Society), *Stockholm, Sweden* 2017 - 2020
Taught blues dancing to all levels of students

SwingCville, *Charlottesville, Virginia* 2011 - 2017
Taught swing and blues to all levels of students

PROFESSIONAL SERVICE AND OUTREACH

Stockholm BiotechBuilder's annual event, *Stockholm*, Project Leader 2021
Working with a committee to organize a networking event for Stockholm's life sciences community

DataClassroom, *Charlottesville*, Client Relations Managers 2021
Assisted communication between educators and the Ed Tech company DataClassroom

BMES Teaching Panel, *University of Virginia*, Co-Organizer and Moderator 2014
Planned a teaching focused panel for undergraduates, graduates, and post docs

Day in the Life, *Zion Union Baptist Church,* Volunteer Tutor 2014 - 2015
Tutored K – 12 students in all subjects

Life Sciences Day, *University of Virginia,* Volunteer Teacher 2014 - 2015
Led science demo (cell culturing) for 3-5th grade students

Mini-Med Laboratory Night Best Practices, *University of Virginia,* Volunteer Teacher 2011 - 2013
Educated participants in a community program about current medical research

Affiliations

Biomedical Engineering Society 2014 - Present
American Society for Engineering Education 2014 - Present
Society for Integrative and Comparative Biology 2017 - Present