WELCOME

In the Vascular Dynamics Lab (VDL) we focus on examining the complex interactions of mechanical, neural and humoral factors in peripheral arteries in response to both acute and chronic changes in physical activity. Alterations in blood vessel structure and function play essential roles in the responses of the cardiovascular system to physiological stresses by influencing a number of factors.

For example, we know that chronic changes in an individual's activity level can alter the vascular wall thickness, and mechanical properties (elasticity and compliance) and vascular responses to stress (capacity and rate of vasodilation or vasoconstriction). Little, however, is known about the discrete stimulus response characteristics of the mechanisms governing changes in vascular structure and function.

Our contributions to date have included development and refinement of methodology for measurement of arterial compliance and endothelial function in humans and determining the impact of chronic activity (resistance, isometric, endurance and sprint interval training) or inactivity (immobilization) on arterial structure and function.

Our studies have yielded some important insights related to the possible labile nature and mechanistic measurement-dependence of some arterial adaptations. As such we conduct research in both healthy young populations and populations with elevated cardiovascular risk factors such as those with hypertension, coronary artery disease, congenital heart disease, cerebral palsy and spinal cord injury.

This newsletter will highlight what is going on in our lab! We hope you enjoy it!

Dr. Maureen MacDonald  
Principal Investigator

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Current Lab Members

Staff

Todd Prior
Lab Manager

Dr. Emily Dunford
Postdoctoral Fellow

Dam Nguyen
Computer Specialist

Stacey Priest
Research Assistant

Graduate Students

Nicole Proudfoot
PhD Candidate

Ninette Shenouda
PhD Candidate

Jem Cheng
PhD Student

Sydney Valentino
MSc Student
Current Lab Members

Graduate Students (cont’d)

Joey Bacauanu  
MSc Student

Vanessa Rizzuto  
MSc Student

Jessie Ma  
MSc Student

Undergraduate Students

Megan Bittner  
Thesis Student

Jessica Morris  
Thesis Student

Alessia Roman  
Placement Student

Jessica Sadri-Gerrior  
Placement Student
**Stair Climbing Outcomes in cardiac Rehabilitation Exercise Study**

*By: Emily Dunford*

The **Stair Climbing Outcomes in cardiac Rehabilitation Exercise (SCORE)** study will investigate whether completion of a stair climbing-based HIIT program improves fitness, increases perception of health and wellness, enhances cardiac rehabilitation adherence and induces positive changes in key markers of cardiovascular (flow-mediated dilation and left ventricular twist) and muscle health. While stair climbing-based HIIT has the potential to be an effective exercise strategy in cardiac rehabilitation that can easily transition to an at-home program, the translation of this time-efficient, laboratory-based interval protocol to a “real world” setting remains largely unexplored in individuals completing cardiac rehabilitation. Information gained from this study will be valuable in the development and refinement of cardiac rehabilitation programs that are effective in reducing CVD risk and increasing long-term exercise participation. Stair climbing-based HIIT may be more engaging to patients which could increase exercise enjoyment, overall adherence, quality of life, post-operative survival rates, and reduce the associated health care costs.

Lab members involved with the SCORE study include Dr. Emily Dunford, Sydney Valentino, Jessica Morris and Jessica Sadri-Gerrior.

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**Total Vascular Reactivity of the Brachial Artery Study**

*By: Vanessa Rizzuto*

This study aims to assess low flow mediated constriction (L-FMC) and total vascular reactivity (TVR) in a diverse population of individuals to determine the repeatability of L-FMC and TVR. As well, we aim to further examine the relationship between L-FMC and shear stress and how the relationship between flow mediated dilation, L-FMC and TVR changes across the lifespan and is influenced by cardiovascular disease risk and cardiovascular disease.

Vanessa Rizzuto is the VDL member that will be involved with this upcoming study.
ASPEN
Alterations in Shear Pattern and ENdothelial Function Study
By: Jem Cheng

Shear stress against the arterial wall is a critical stimulus for inducing arterial adaptation, but there is conflict as to the regulatory effect of the direction or pattern of this variable on endothelial function. In the ASPEN study, various interventions were applied (i.e., heat stress, handgrip exercise, cuff compressions) to the forearm of humans to examine whether or not changes in blood flow pattern altered the acute endothelial function response, assessed by flow-mediated dilation.

Current lab members that were involved with the ASPEN study include Jem Cheng and Joey Bacauanu.

RAM
Repeatability of Arterial Measures Study
By: Stacey Priest

The RAM study is currently wrapping up! Data collection and analysis are both complete, and manuscripts are being prepared for submission. RAM investigated the effects of sex hormones on measures of vascular structure and function in young healthy adults. Specifically, we examined the influence of biological sex, menstrual cycle phase, and monophasic oral contraceptive pill use on arterial stiffness measured using carotid artery distensibility and carotid-femoral pulse wave velocity, and endothelial function measuring using a flow-mediated dilation test. Both measures are predictors of cardiovascular disease risk.

Current VDL members that were involved with the RAM study include Ninette Shenouda, Stacey Priest, Vanessa Rizzuto and Megan Bittner.
**Collaborations**

**Stroke Rehabilitation Research Team: MacStroke Canada**

By: Jennifer Crozier

The Stroke Rehabilitation Research team, MacStroke Canada, is excited to partner with the Vascular Dynamics Lab to examine interventions aimed at improving cardiovascular health and function in individuals post-stroke. Our upcoming research study is a 4-year CIHR project grant examining changes in arterial stiffness following 16 weeks of high-intensity interval training, compared to 16 weeks of moderate-intensity-intensity continuous training in people living in the community with stroke. We are grateful for the collaboration with the Vascular Dynamics lab as we set forth this great research study and aim to improve the health and lives of people living with stroke.

**CONGRATULATIONS!**

Congratulations to Dr. Ada Tang and PhD student Jennifer Crozier for recently being awarded research funding from Canadian Institute of Health Research (CIHR) for their project “Exercise intensity matters: a window of opportunity to promote neuro-recovery and cardiovascular health in stroke”.

**Child Health and Exercise Medicine Program**

Since 2010, the Child Health and Exercise Medicine Program (CHEMP) has collaborated with the VDL for multiple studies including the Health Outcomes and Physical activity in Preschoolers (HOPP) study. This study followed 400 boys and girls (ages 3-5) for three years and assessed their physical activity and health. The HOPP study is completed and the follow-up study, the School-age Kids’ health from early Investment in Physical activity (SKIP) study is currently in progress. The SKIP study is following the same cohort of children for three more years when they are school-aged.

In the VDL, all the vascular data including the arterial stiffness and flow-mediated dilation data is collected and analyzed. The goal of these collaborative studies is to be able to understand the impact of the investment in physical activity during the early years on vascular structure and function during later stages of childhood.

Current VDL members involved with the SKIP study include Nicole Proudfoot, Joey Bacauanu, Megan Bittner and Alessia Roman.
I am a fourth year Doctoral candidate in the School of Rehabilitation Science. My supervisor is Dr. Jan Willem Gorter, MD, PhD, Director of CanChild, Centre for Childhood Disability Research. I collaborate with Dr. Maureen MacDonald and the Vascular Dynamics Lab to assess non-traditional risk factors of cardiovascular disease (CVD) in adolescents and adults with cerebral palsy. Cerebral palsy (CP) is defined as a permanent disorder, resulting in limitations of movement and activity, which is attributed to non-progressive disturbances to the developing fetal or infant brain. The prevalence of CP ranges from 1.5 to greater than 4 per 1000 live births.

It is well documented in the general population that physical activity has positive benefits to cardiovascular and overall health. However, children, adolescents, and adults with CP engage in significantly less physical activity than the general population. Therefore, it is possible that individuals with CP may be at risk for CVD and at an earlier age than the general population.

Currently I am conducting longitudinal research to investigate the change in cardiovascular structure and function in individuals with CP over a 3-year period. Results from this seminal research have the opportunity to inform intervention studies and, perhaps more importantly, the management of CVD risk in individuals with CP.

I was first invited by Dr. MacDonald to spend 2 months in the VDL during May and June 2016 to conduct a study as part of my PhD, which investigates using Ratings of Perceived Exertion (RPE) to prescribe and regulate exercise intensity during upper body exercise. This came about as a result of the strong working relationship between Dr. MacDonald and my supervisor, Prof Vicky Goosey-Tolfrey, Director of the Peter Harrison Centre for Disability Sport (PHC) at Loughborough University, UK.

During my time at McMaster I conducted a study investigating whether a maximal exercise test based on RPE can be used to measure peak oxygen uptake in people reliant on manual wheelchair propulsion. The findings were extremely promising and hope to be published later this year. This experience has led to an ongoing collaboration in the area of RPE and spinal cord injury, with further projects both planned, and ongoing.

It was a fantastic experience to be able to see the great work that goes on in the VDL, and I hope that the links developed with the PHC can continue to flourish.
Ontario Exercise Physiology (OEP) Conference
January 26-28, 2018
Barrie, Ontario

OEP is an annual conference designed for kinesiology/exercise physiology graduate and undergraduate students from across Ontario to present their research proposals and/or study findings. It also provides young scientists the opportunity to network with both their peers and colleagues and receive feedback about their research. This year, OEP was held in Barrie, Ontario and hosted by the University of Guelph. OEP 2018 had the most attendees and student presenters than any previous OEP conference in history. As you can see in the figure below, McMaster had the largest number of attendees compared to all other institutions! The VDL had several members present at this year’s meeting. Please see page 9 for more exciting details about the OEP 2018 experience as told from the perspectives of two VDL members.
Ontario Exercise Physiology (OEP)
By: Megan Bittner and Jessica Morris

At the end of January, the Vascular Dynamics Lab was fortunate to attend the Ontario Exercise Physiology (OEP) conference in Barrie. The annual OEP conference is a unique and engaging experience that allows students to congregate and present their research in the field of exercise physiology. Largely composed of graduate and undergraduate student presentations, OEP gave young researchers like ourselves the chance to contribute and learn about current research and recent advances in our field. Having the opportunity to present was an incredible experience for professional development and also allowed us to respond to questions and receive feedback from experts in our field of research.

As the weekend progressed, the friendly atmosphere welcomed questions from other undergraduate students in the audience in addition to graduate students and faculty members. Another aspect of the presentation sessions that we enjoyed was the mandatory standing ovation that followed each presenter - sitting is the new smoking after all! The student-focused environment facilitated great opportunities to meet prominent faculty members from the exercise physiology community and discuss their work. Learning about the different topics of study and investigating potential opportunities for graduate studies provided valuable insight to the field of academia.

We also thoroughly enjoyed the off-site social where we enjoyed skating on Lake Simcoe, making maple syrup taffy, and watching fireworks. Overall the weekend was an incredible experience that we both really enjoyed and are very grateful to have attended!
On March 10th, I had the opportunity to attend and present my Master’s thesis proposal at the Current Research in Engineering Science & Technology (CREST) 2018 conference organized by the McMaster Women in Science and Engineering (WISE) group. CREST is designed to be an interdisciplinary celebration, not only for women in science and engineering, but also highlights the exciting research being conducted at McMaster University in the Science, Technology, Engineering and Mathematics (STEM) fields. I often find attending scientific conferences and related talks highly valuable as an opportunity to engage in scientific discussion and network with fellow students, faculty and industry professionals alike. With just 30% of the world’s top researcher’s being female, I am proud to be a graduate student in science, representing the Vascular Dynamics Lab in the Department of Kinesiology. I am also extremely humbled to attend an institution that values equal opportunities for men, women and persons who identify as non-binary.

Proceeds from this year’s CREST conference are donated to the Organization for Women in Science in the Developing World which is the first international forum to unite distinguished women scientists from the developing and developed worlds with the objective of strengthening their role in scientific and technological leadership positions. The development of new ideas, solutions to problems and knowledge translation have no inherent race or gender divide. Anyone with a passion for research and development can participate in scientific research, but if there is a lack of opportunity to teach essential scientific skills and foster education in STEM fields in both the developing and developed worlds, all levels of our society miss out on the potential to advance scientific discovery and prosperity. My experience at CREST 2018 inspired me to continue my work in the field of science and I am grateful for the opportunity.
Conferences

Okanagan Cardiovascular and Respiratory Symposium
March 15-17, 2018
Okanagan, British Columbia
By: Dr. Maureen MacDonald

The 3rd Okanagan Cardiovascular and Respiratory Symposium was hosted by the Centre for Heart, Lung and Vascular Health of the University of British Columbia (Okanagan) at the Silver Star Ski Resort, British Columbia, Canada on March 15-17th 2018. The Okanagan Cardiovascular and Respiratory Symposium is a small conference, held biennially, with a primary focus on student development in integrative human cardiac, respiratory and vascular physiology but also with time for skiing and socializing.

Maureen MacDonald attended the conference for the first time this year and arrived early in the week with her son Glen and 2 of his friends so they would have time for skiing before the conference program began. Later in the week lab members Jem Cheng, Emily Dunford, Joey Bacauanu, Vanessa Rizzuto, Sydney Valentino and lab alumnus Jason Au arrived.

The conference provided an excellent opportunity for interactions with leaders in the field and student trainees. On Friday morning Maureen chaired and delivered a talk “What happens to your arteries after a day of skiing- exercise induced vascular adaptation” in the Vascular Physiology scientific session and Emily presented her work “Day to day variations in sleep (continued on page 12)
duration do not influence indices of cardiovascular health in young, healthy men, naturally cycling women or women using oral contraceptive pills.”

In addition to the scientific sessions, lab members had a great chance to enjoy skiing, snowshoeing and the beautiful scenery and catch up with former lab members, Dr. Mark Rakobowchuk (Thomson Rivers University) and Dr. Kyra Pyke (Queens University). Thanks to conference organizers Professors Phillip Ainslie and Neil Eves.

VDL members enjoying the beautiful snow show trails in Okanagan, BC (from left to right): Dr. Emily Dunford, Joey Bacauanu, Sydney Valentino, Dr. Jason Au, Jem Cheng, Vanessa Rizzuto.
The Annual Bertha Rosenstadt National Undergraduate Research Conference in Kinesiology and Physical Education
March 23, 2018
Toronto, Ontario
By: Adrienne Tearle

Adrienne Tearle, Undergraduate Thesis Course Coordinator for McMaster Kinesiology

The Bertha Rosenstadt National Undergraduate Research Conference in Kinesiology and Physical Education is an annual event hosted at the University of Toronto each Spring. Undergraduate students from across the country have the opportunity to present literature reviews, critiques, term papers and findings from research projects. This is a multidisciplinary conference that includes topics from exercise physiology, biomechanics, sports medicine, motor learning and control, exercise and sport psychology, philosophy, history and sociology of sport.

Students give a 10-minute presentation to peers and faculty and awards of recognition are given to the best presentation in each area. In addition to providing students with a setting to present their research, the conference provides a valuable networking opportunity as students and faculty from universities nation wide are in attendance. McMaster Kinesiology is always strongly represented at the conference and our students have taken home major awards in recent years.

VDL undergraduate thesis students, Megan Bittner and Jessica Morris at the Annual Bertha Rosenstadt National Undergraduate Research Conference in Kinesiology and Physical Education at the University of Toronto. Megan and Jessica both delivered oral presentations at the conference about their respective research projects.
YWCA Hamilton Women of Distinction Awards
March 8, 2018
Hamilton, ON
By: Stacey Priest

The YWCA Women of Distinction Awards are held annually and recognize outstanding women in the community. Women can be nominated in several categories including Young Women of Distinction, Arts | Culture | Design, Business Leadership | Entrepreneurship, Community Leadership, Education Mentorship, Outstanding Workplace, Health, Science | Technology | Trades, and Lifetime Achievement. This event has been taking place for over 40 years and proceeds from the event support YWCA programs and services.

This year, our supervisor and mentor, Dr. Maureen MacDonald was nominated in the Education Mentorship category.

We are very thankful to Dr. MacDonald who invited members of our lab to attend this wonderful event. The event featured a networking dinner followed by the awards ceremony. It was so nice to be able to support our mentor, as well as all other inspiring women who were nominated this year.

Congratulations to Dr. MacDonald for her Women of Distinction Award nomination!
Congratulations to Jessica Sadri Gerrior who has been awarded an NSERC Undergraduate Student Research Award (USRA) for summer 2018! Jessica will be continuing her work with the SCORE study and examining the impact of both high intensity stair-climbing exercise training and traditional cardiac rehabilitation exercise on low flow mediated constriction (L-FMC).

CONGRATULATIONS!

Undergraduate thesis students, Megan Bittner and Jessica Morris presented their final senior thesis presentations on April 10, 2018 at the Kinesiology Undergraduate Research Symposium.

Megan’s talk was titled, “The impact of age and aerobic fitness on heart rate recovery in children.” Megan will be continuing her studies and pursuing an accelerated Bachelor of Science in Nursing degree at the University of Toronto.

Jessica’s talk was titled, “Relationship between rate of perceived exertion and heart rate within a cardiac rehabilitation population completing a stair climbing based high intensity interval training intervention.” Jessica is interested in economics and global health and hopes to pursue a career in healthcare.

Congratulations to both Megan and Jessica for achieving this milestone!
CONGRATS AND FAREWELL TO DR. NINETTE SHEN OUD A!


Congratulations Dr. Shenouda!

Ninette has accepted a Postdoctoral Fellow position at the University of Delaware in the Department of Kinesiology and Applied Physiology under the mentorship of Dr. David Edwards. We wish Ninette the best of luck as she starts this new and exciting adventure!
Congratulations to former VDL PhD student, Dr. Katharine Currie who recently accepted a faculty position at Michigan State University in the Department of Kinesiology.

Former PhD student, Dr. Jason Au is currently working as a Postdoctoral Fellow in the Department of Electrical and Computer Engineering at the University of Waterloo in the Laboratory on Innovative Technology in Medical Ultrasound (LITMUS) supervised by Dr. Alfred Yu. His current research is focused on the applications of high frame rate ultrasound imaging.

Former undergraduate thesis student, Nicole Amatruda has been accepted to teacher’s college at the University of Toronto and will begin her studies in September 2018. Congratulations Nicole!

CALL FOR VDL ALUMNI UPDATES!

We would love to hear from VDL alumni! Please inform us if you have any news that you would like to share with us so that we can include it in future VDL newsletters to update other readers. We are looking forward to hearing from and learning all the exciting endeavours of VDL alumni.

Please contact vdl@mcmaster.ca with any updates, comments, or inquiries.