Inside

Race for PACE
The VDL was crowned most creative while raising money for a fantastic cause.

Zooming into the Cell Culture Lab
PhD candidate Jennifer Williams discusses her creative and innovative way of remotely preparing trainees for the cell culture lab.
Welcome!

This last year has certainly reinforced for me how much “little things” matter, both in life, and in the lab. As we continue on this global pandemic journey, while I am very impressed by all of the activities and achievements of the members of the Vascular Dynamics Lab, I am most grateful for all of the “little things” they have done to bring our team together. In virtual lab meetings, lab members have been busy giving high fives, thumbs up, clapping and badges. During presentations, lab members are praising their colleagues for their slide designs, fonts, and colour schemes in addition to constructive feedback on the scientific content. In emails, chats and meetings, peers are celebrating each others achievements and life events, both big and small, ranging from finally getting a haircut to winning an award. I have seen our lab members recognizing that sometimes the nicest thing you can do for someone is say hello when they join the meeting and smile at them even when you are exhausted from all the screen time. Of course, the science we undertake matters and in this newsletter you will see the progress our lab has made in the last 6 months, but the people matter even more. I am so proud of how everyone has worked to pay attention to the “little things” that build lasting relationships and communities.

Dr. Maureen MacDonald
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We are thankful to be able to connect remotely during this time.

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Dani Joshi
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Rachael Moorhouse
Thesis Student

Christina Pizzola
Thesis Student

Jessica Han
Placement Student

Hope Harnack
Placement Student

Arad Hashemi
Placement Student

Jenna Stone
Placement Student

Current VDL Members

Staff

Graduate Students

Undergraduate Students
McMaster Race for PACE

This May, members from the VDL had the pleasure of participating in the virtual Race for PACE in support of the McMaster physical Activity Centre of Excellence. The Race for PACE was held in place of the Walk of Life, a national event run in partnership with the Cardiac Health Foundation of Canada that sadly closed its doors after 55 years last September. Throughout the pandemic, the team at PACE worked hard to continue promoting health and well-being through physical activity in the community of over 500 older adults and folks living with chronic disease or disability. Individuals gathered in teams to donate and participate in the virtual race to accumulate minutes of physical activity and raise funds for the PACE. The event was promoted via social media and the hashtag #RaceforPACE. We are thrilled to report that the race had over 160 participants, 204 donations, 40 teams, 26,445 minutes of movement, and over $30,000 raised in support of the PACE! The team from the VDL was crowned “Most Creative” and we look forward to participating in the event next year! Thank you to everyone involved with organizing and participating in this wonderful event.

By: VDL MSc Student and RA Connor Droog
Committed to EDI: The VDL Book Club

As part of the ongoing Equity, Diversity, and Inclusion (EDI) initiatives within the VDL and across the McMaster community, the VDL has committed to hosting book club meetings, selecting literature specifically aimed at creating informed discussions around EDI in science. The first book club meeting was held in February, and the topic was The Immortal Life of Henrietta Lacks, by Rebecca Skloot. This book outlines the story of Henrietta Lacks, and deals with the intersection of ethics, race, and medicine. The next two books to be read and discussed by the group are “Small Great Things” by Jodi Picoult, and “Invisible Women: Data Bias in a World Designed for Men” by Caroline Criado Perez. We look forward to maintaining our commitment to creating space and open spaces for discussion around EDI in science, and anyone interested in participating in the next meetings is encouraged to reach out the vdl@mcmaster.ca.

By: VDL MSc Student and RA Connor Droog
The VDL Adventures: Research During a Provincial Lockdown

In the fall of 2020, PhD students Jem Cheng and Sydney Valentino, along with their thesis students Christina Pizzola and Dani Joshi, found themselves in a rare situation. They’d both been gearing up to get projects up and running and had ethics approved, participants tentatively recruited, and resources prepared. All there was left to do was to count down the days to the end of the provincial lockdown. Well, three lockdowns and 7 months later, it was clear that COVID-19 wasn’t going to let them back in the lab quite so easily, which is how, in January 2021, they both decided to pivot entirely and abandon all in-person elements in favour of a fully virtual data collection.

In March 2021, with Hamilton taking the full brunt of the pandemic, the VDL persisted in getting some data collection done. With some unique research questions, creative study design, and thoughtful planning, the UberHEATS (Jem and Christina) and CRASH (Sydney and Dani) studies were born. The UberHEATS study aimed to examine the feasibility of a 4-week at-home heat therapy intervention as well as the effect of heat therapy on estimated cardiorespiratory fitness. It was lovingly called UberHEATS because of all the heat therapy kit deliveries Jem had to make to various households in the McMaster/Hamilton area. The CRASH study investigated the effect of baseline fitness on the relationship between heart rate and perceived exertion responses during stair climbing-based high intensity interval training (HIIT). The Cardiorespiratory Responses in Athletes completing Stair-climbing HIIT (CRASH) study adapted from recruiting athletes to active adults. It was impressive that many of the study participants had managed to stay very fit regardless of the lack of access to gym facilities. The study participants weren’t the only ones that defied the odds against the pandemic restrictions.
Research always has its challenges, but not being able to be in the same room as your participants challenged the team to develop key organizational skills and tech savviness. In the planning process, Dani and Christina developed a protocol for the virtual or Zoom version of the modified Canadian aerobic fitness test (mCAFT), an element that their studies shared. Research placement students Arad Hashemi and Hope Harnack also played key roles in refining said protocol and supporting data collection. Although we couldn’t connect in person, in some ways we got to know our study participants even better, not only making trips to and from their houses to deliver “study care packages” but also maintaining constant communication with them to ensure all aspects of the study were completed correctly. Thanks to our participants, who graciously agreed to spend yet another hour or two on Zoom with us to complete their testing “visits” (despite the “Zoom fatigue” they probably already had!), our thesis students were able to have a full research experience.

Overall, data collection in the virtual space taught us a lot about our ability to come up with creative solutions when limitations are in place. The VDL virtual study teams made the best of the resources to work within the COVID-19 restrictions. Our main takeaways from the CRASH and UberHEATS studies are that stair climbing exercise and foot bath heating are both feasible and able to be independently performed in a non-laboratory setting. Jem and Sydney both hope to be able to build on these practical findings in their PhD research.

By: VDL PhD Candidate’s Jem Cheng and Sydney Valentino
During the COVID-19 pandemic, I’ve had the opportunity to pivot my previous human research to run experiments in a cell model, working with Dr. Gianni Parise and his graduate students, Michael Kamal and Mai Wageh at McMaster. With the pandemic restricting access to labs for our undergraduate students, I’ve been hosting virtual sessions over Zoom in the lab to show students lab procedures and also how research happens – all the excitement of new results and challenges of running experiments.

The origin of this idea came from when I started Zooming students into the lab via my computer in January and shared my challenge with not being able to bring the students with me through the lab as I conducted experiments. In chatting with Dr. MacDonald, she suggested that I set-up a harness to take the students with me through the lab, based on a Tik Tok she saw of a woman who makes ice cream cakes using a harness in Ancaster. Now, students join me on Zoom through a harnessed phone and ask and answer questions through a Bluetooth headset. We run sessions almost daily as I go through various cell culture procedures, including growing up the cells, treating them with various hormone conditions, running Western blots for protein analysis, and probing with immunofluorescent probes to look at intracellular metabolites. I also record the sessions for students who couldn't join in and for developing of training videos.

I initially ran the sessions for undergraduate students in the VDL, but the opportunity has now grown to include students from other programs who are interested in seeing what research looks like – the virtual medium makes it very accessible for students to drop-in. My hope from this experience is that students who would have otherwise not had an opportunity this term to see the inner-workings of a research lab, have had the chance to see and be a part of this experience and hopefully are excited and prepared for doing hands-on research in the near future!

By: VDL PhD Candidate Jennifer Williams
Heat therapy: less is not more, but it might be enough

In May, my first PhD project called the HEAT study (Heating Effects on the Arterial Tree) was published in the Journal of Applied Physiology’s Highlighted Topic on the Physiology of Thermal Therapy.

Interest in heat therapy as a health-promoting intervention is growing, but current methods of participation are limited to hot tubs, saunas, or spas, which aren't equitable options for the general population. For this study, we were interested in comparing the acute vascular function responses to ankle- and knee-level heating to determine whether these cheaper, more feasible, and less intense protocols would serve as sufficient stimuli to change specific metrics of cardiovascular health that we assessed. While both conditions improved upper limb endothelial function and lower limb arterial stiffness, only knee-level heating was also able to elicit positive changes in upper limb microvascular function and plasma heat shock protein-72 concentrations, demonstrating that it is more effective than the ankle condition across more outcome measures. It's important that we develop the evidence base for local protocols if we hope for heat therapy to be adopted by the broader community. For my next project, I’m looking forward to determining whether these acute effects will persist in a chronic time frame, as well as how the cardiovascular adaptations to local heating will hold up when compared to exercise.

If you're interested in learning more about the HEAT study, you can read the full paper at this link: https://journals.physiology.org/doi/abs/10.1152/japplphysiol.00630.2020 or check out the citation at the end of this newsletter.

By: VDL PhD Candidate Jem Cheng
Undergraduate Student Thesis Presentations

Dani Joshi

In my thesis, I explored the effect of estimated cardiorespiratory fitness on the relationship between heart rate and ratings of perceived exertion (RPE) during high intensity interval stair climbing in a completely virtual data collection. We found that heart rate is a significant contributor to the variance in RPE but that estimated cardiorespiratory fitness does not contribute to the variance in RPE during this stair climbing exercise. These results demonstrate that individuals with different levels of cardiorespiratory fitness have similar perceptual responses to a given exercise intensity. Overall, our findings are indicative that perceptually-guided exercise prescriptions may be applicable to individuals of various baseline fitness levels.

VDL Experience

I am so grateful to have been able to complete a thesis project in the VDL. My experience has helped me gain a greater appreciation for the research process and the associated challenges and triumphs. Throughout my thesis, I have been able to broaden my knowledge of equipment-free alternatives, such as ratings of perceived exertion and stair climbing exercise, and how these can be used in interventions targeting cardiovascular health and cardiorespiratory fitness. I would like to extend my gratitude to the VDL for this opportunity and to all lab members for being so welcoming and supportive.

Estimated VO2peak did not significantly contribute to either of the models.
Undergraduate Student Thesis Presentations

Rachael Moorhouse

Coming from the department of Biology, I had the amazing opportunity to complete my senior undergraduate thesis in the VDL. In our study, we were examining the acute effects of emergency contraceptive use on vascular function. Emergency contraceptive pills consist of a 1.5 mg dose of a progestin called levonorgestrel (LNG). This study was two-pronged, so we explored the effects of LNG on the nitric oxide pathway in vitro and will be conducting the human arm of the study this coming summer. In our cell work, we found what appears to be an upregulation of eNOS at lower LNG doses compared to higher doses. We are excited to continue this research and explore LNG’s impact on vascular function further.

VDL Experience

I have had an amazing time in the VDL both as a volunteer and as a thesis student. I have gained so many skills as a researcher and have seen how valuable it is when a lab works as a team. All members of the VDL have been incredibly supportive and their knowledgeable input on projects, presentations and papers has been invaluable. The atmosphere in the lab fosters curiosity and makes me excited for a future in science! I am looking forward to continuing with this project, building my research skills, and spending more time (virtually for now) with everyone at the VDL.
Undergraduate Student Thesis Presentations

Christina Pizzola

Our pilot study was on the effects of 4 weeks of local lower limb heating therapy on cardiorespiratory fitness in young, healthy, recreationally active males and females. From this study, we found that cardiorespiratory fitness, measured at home with the mCAFT, improved over four weeks in both the control group and heat therapy group, which may have been due to a small sample size and the study being performed remotely. We are hopeful that this summer we will be able to continue with our full study and analyze the effects of heat therapy in comparison to and combined with exercise training on different outcome measures.

VO2peak improved in both groups

* Difference from training week 0
Placements Student 3-Minute Thesis Presentations

Jessica Han

Throughout this past semester, I have had the opportunity of joining the Vascular Dynamics Lab as a 3RP3 student. Although the idea of a virtual placement was daunting, with the support from my graduate supervisor Jennifer Williams, I have been able to develop new skills and gain insight into the realm of cardiovascular research. Given the online learning environment, I was encouraged to explore a variety of opportunities in order to discover my interests. As a result, I attended different journal clubs, assisted with data analysis, and even got to participate in a remote exercise study!

One of my primary goals as a placement student was to improve my presentation skills. Thankfully, the 3-minute presentation gave me the opportunity to do so, while simultaneously allowing me to learn about an area of cardiovascular research that I was interested in. Given that older women are often understudied, I chose to explore the effects of aerobic exercise on endothelial function in early and late postmenopausal women, and the potential role of estrogen in eliciting the benefits of exercise on the endothelium. Overall, I am grateful for my time in the VDL as I have been able to improve my critical thinking skills while working under the supervision of knowledgeable mentors.

Young at Heart?

![Diagram of ultrasound probe, cuff, and endothelial cells.](Santos-Parker, Strahler, Vorwald, Pierce, & Seals, 2016)

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*Santos-Parker, Strahler, Vorwald, Pierce, & Seals, 2016*
Having my first research experience in an online setting was unconventional to say the least, however, the experiences and skills I have gained throughout my 3RP3 placement in the VDL are extremely valuable. Working with my graduate supervisor, Connor Droog, and other members of the VDL, I had the opportunity to participate in journal clubs, complete research article critiques, observe data collection sessions, and take part in weekly lab meetings. Throughout my placement, I developed stronger critical analysis and communication skills, and gained a much greater understanding of research as a whole, and vascular dynamics specifically. For my 3MT presentation, I presented a study by Schreuder et. al (2014) regarding the benefits of life-long exercise on insulin sensitivity, CV fitness, CVD risk, and vascular function for individuals with T2DM. The study found that those with T2DM who exercised 2.5 hours or more each week for at least 10 years, exhibited similar values in each of these parameters to healthy, sedentary controls. The results suggest that life-long exercise can offset the increased CVD risk and abnormal vascular function caused by T2DM. For my research proposal, the impairments in exercise and endothelial function with T2DM and greater risk of CVD in women with T2DM led me to explore the sex differences in the vascular response to exercise training in this clinical population.
Placement Student 3-Minute Thesis Presentations

Arad Hashemi

My name is Arad Hashemi and I completed my Kinesiology 3RP3 research practicum with guidance from Jem Cheng, my graduate student supervisor. My primary task was to write a brief literature review and research proposal exploring the extent of endothelial dysfunction and recovery in adults affected by SARS-CoV-2 (the virus responsible for the Covid-19 pandemic). Additionally, I presented a three-minute thesis highlighting one of the central articles from my literature review and I assisted with administering mCAFT tests for a study on artery function responses to heat therapy and exercise training study (HEATEX).
Shear stress is a mechanism that we often discuss in the Vascular Dynamics Laboratory as it relates to endothelial function. High shear stress caused by increased blood flow, promotes endothelial survival by causing the release of substances such as nitric oxide, which will promote vasodilation - highlighting one of the many incredible abilities of the body to respond to stressors. Shear stress in endothelial cells can serve as a metaphor for the experiences that myself, and all of the hard-working members of the VDL have encountered during this pandemic. Even in light of this ever-changing online environment, this amazing team has been able to continuously adapt, providing me with a remarkable experience as a 3RP3 student. This past semester I have engaged in cell work, participated in stimulating discussions about a variety of topics in vascular research, and assisted in artery analysis... all from my bedroom! One of the highlights of my experience in the VDL was the Three-Minute Thesis (3MT) presentation that I gave, which involved summarizing a research article examining the effects of oral contraceptive pill use on cardiorespiratory fitness (VO2max). Effectively conveying research findings to both academic and non-academic audiences is vital to research literacy, and I thoroughly enjoyed this opportunity to contribute to research communication. I am eternally grateful for the skills that working in this laboratory has provided me with, and I look forward to continuing as a member of the VDL in the 2021-2022 academic year as a Thesis student, where I will further investigate the effects of oral contraceptive pill use on both endothelial function and VO2max. I am especially grateful for my incredible graduate supervisor Jennifer Williams, and Dr. Maureen MacDonald for this invaluable opportunity and their continued support this past semester.
Clubhouse Discussion on Sleep Deprivation and Endothelial Function

A Clubhouse chat room on sleep deprivation and endothelial function was hosted by Brady Holmer (PhD Candidate; University of Florida) and Joshua Cherubini (MSc student; McMaster University) on Tuesday April 6th. Clubhouse is a mobile application where participants engage in audio chats and discussions and listen to live conversations in virtual chat rooms. Brady and Joshua focused their discussion on two recent articles: The first being a systematic review from Brady and his co-authors entitled, Effects of sleep deprivation on endothelial function in adult humans: a systematic review, and the second article being a review from the VDL, Sleep deprivation and endothelial function: Reconciling seminal evidence with recent perspectives. Several guests attended the chat room to provide comments and ask questions, which made for a very interesting conversation. Keep an eye on Twitter for more Clubhouse discussions in the future!

By: VDL MSc Student Josh Cherubini
Vascular Dynamics Lab Newsletter

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Recent Publications


Stacey Priest

I am fortunate for the opportunity I had to spend ~4 years in the VDL. My first experience in the lab was in 2014 where I was as an undergraduate thesis student in the final year of my undergraduate studies at McMaster. I then continued on to complete my MSc thesis in the lab, which focused on the effect of sex, menstrual cycle phase, and monophasic oral contraceptive pill use on arterial stiffness in young adults. The time I spent in the VDL helped me to grow both personally and professionally, and I have taken the skills I developed into other positions.

Following my time in the VDL, I have worked in a couple of different research roles including as a Research Assistant from September 2018 – October 2019. In this position, I worked with Dr. Michelle Kho and the CYCLE research team based out of St. Joseph’s, Hamilton, where I was involved with an international multicentre randomized controlled trial focused on critical care rehabilitation.

Since November 2019, I have been working at EVERSANA where I joined as a Research Associate and have recently started a new role as Associate Project Manager this past January. At EVERSANA, I am part of the Value & Evidence team, which focuses on assisting pharmaceutical, medical device and digital medicine clients demonstrate and communicate value to key stakeholders at every phase of a product lifecycle. During my time at EVERSANA, I have been involved with several Canadian and global projects spanning a variety of disease spaces including chronic kidney disease, community acquired pneumonia, multiple myeloma, and schizophrenia. Thus far, I have gained some new knowledge through completing health economic models and value communications, but I have also used previous knowledge that I developed during my MSc such as scientific writing and conducting literature reviews. I have really enjoyed my time at EVERSANA so far. It can be challenging work at times but also very rewarding, and I am always learning.

I will always be thankful for my time in the VDL, not only for introducing me to some wonderful people and for some of my favourite memories, but also for the skills I learned that have assisted me with my career path thus far, such as analytical and critical thinking, juggling several tasks at once, and for instilling in me a passion for research.
VDL Member Updates

Mason Kadem joined us as a new graduate student in the Vascular Dynamics laboratory after he completed his MSc Neuroscience training in the Schulich School of Medicine and Dentistry and the Brain and Mind institute at Western University (London, ON), in the areas of autonomic control, cognitive load and multi-modality imaging; and has collaborated on projects related to blood flow control in health and disease populations. In his current doctoral work (PhD Biomedical Engineering) at McMaster University, under the co-supervision of Dr. Zahra Motamed (Mechanical Engineering) and Dr. Maureen MacDonald, he will apply machine learning approaches to surgical interventions, contributing to the advancement of cardiovascular clones for personalized interventions.

Good news and accomplishments from current and past VDL members!

♥ VDL PhD candidate Jennifer Williams was awarded the MSU Teaching Assistant of the year award

♥ VDL PhD candidate Sydney Valentino received an OGS Scholarship

♥ VDL undergraduate thesis student Christina Pizzola was accepted into the McMaster University Master of Public Health Program

♥ VDL undergraduate thesis student Rachael Moorhouse was accepted into the McMaster University accelerated nursing program

♥ Former VDL undergraduate student Josie Jakubowski was accepted into medical school at both Queens and Western

♥ Former VDL undergraduate student Zaryan Masood received a CGS-M NSERC scholarship

♥ Former VDL undergraduate student Jessica Morris was accepted into medical school at both Queens and Calgary
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.

Thank you for reading!