

**Muscle Health Research Centre (MHRC)  
Annual Report  
2022-2023**

1. **Contact Information:** Include the following:

<b>Name of Director</b>	Dr. David Hood
<b>Telephone number</b>	66640/ 77832
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<b>Administrative contact</b>	Adam Charnaw
<b>ORU website</b>	<a href="https://www.yorku.ca/mhrc/">https://www.yorku.ca/mhrc/</a>

2. **Original and Current Charter Dates:** July 1, 2008, re-chartered in 2014 and 2021.

3. **Mandate**

The MHRC is an organized research unit within the Faculty of Health dedicated to Biomedical Sciences, and more specifically to the study of “muscle”, including skeletal, cardiac and vascular muscles, in its broadest terms. Its mandate is to provide a centralized and focused research emphasis on the importance of “muscle health” for the overall well-being of Canadians. The MHRC consists of a strong cohort of well-funded and highly productive scholars (including two Canada Research Chairs and two York Research Chairs) and graduate students from the Faculty of Health and the Faculty of Science. The revised vision statement of the MHRC incorporated following the re-Chartering exercise in 2021 is *“to be Canada’s leader in exercise and muscle health research, training and education”*. We are achieving this through 1) innovative research, 2) the education of qualified trainees, and 3) the translation of our findings for the benefit of all Canadians. In 2021 we spent considerable time analyzing and revising the vision and mandate of the MHRC for the purpose of the re-Chartering exercise, and this is reflected in our progress and goals for the future.

4. **2022-2023 Outstanding Centre-specific Accomplishments**

The MHRC continues to hold its educational activities every year, consistent with the goal of uniting faculty and trainees in the areas of muscle, heart and vascular health, with collaboration and interaction in mind. Our programs provide a platform that continues to increase the visibility of York University, and the MHRC, in Canada and around the world. Our accomplishments are listed in Appendix 1, including the funding obtained, awards received and most significant publications in peer-reviewed journals. This appendix contains an abbreviated version of the vast list of accomplishments of our faculty members (a complete list, termed “Complete Contributions”, is provided on the MHRC website). It is clear from this Appendix that the MHRC is fulfilling its mandate in promoting muscle / heart / vascular research for the health and well-being of Canadians. We continue to be successful at obtaining NSERC, CIHR, and CFI funding, and at publishing and translating our findings.

**Funding proposals:** Several collaborations exist among MHRC faculty members, and many are in place with researchers at other institutions. The MHRC funded a Collaborative Research Grant (CRG) for research initiatives for Drs. Adegoke and Haas in 2022. The MHRC submitted a new CFI application entitled “Fundamental Molecular Bioenergetics (FMB) Lab” in 2022 to bring in needed infrastructure in this research area.

**Educational events organized:** We normally hold 3 types of events throughout the year:

These include **Colloquia**, featuring internal speakers discussing their work in an informal interactive research presentation. Normally this involves 3 graduate students who present their research, or it highlights the work of new faculty members. No Colloquia were held in 2022-23.

We had a very successful **Seminar Series**, in which external speakers from other Universities are invited to present their work and to interact with faculty members and graduate students. This year we had 9 speakers in total, from across the USA and Canada. Their names and affiliations are listed in the Table below (Visitors). These Seminars were held using Zoom, and they were very well attended. Indeed, this method has the advantage of allowing us to “bring in” speakers from around the globe at very little cost, while providing our MHRC trainees and faculty members exposure to extremely high-level science.

The Annual **Muscle Health Awareness Day (MHAD13)** was also very well attended. It was held as a “pre-Conference” for the **International Biochemistry of Exercise Conference (IBEC 2022)** which was held May 25-28, 2022 at the Marriott Eaton Centre in downtown Toronto. This major international conference was in development for 5 years, after the MHRC won the bid to hold the Conference with a presentation in Beijing in 2018. It was the most successful IBEC in its >50 year history, with 65 international speakers, >400 participants and >210 trainee posters. Eight (8) Graduate Student awards were presented as well, valued at \$250 each. This event significantly promoted York University, the Faculty of Health and the MHRC further onto the world stage in the field of exercise biochemistry, and was a major accomplishment. Here is the website: <https://event-wizard.com/IBEC22/0/welcome/>.

**Knowledge Mobilization / Outreach:** All MHRC faculty members are involved in promoting knowledge mobilization of their research via the MHRC website, and MHRC social media outlets (Twitter and Facebook). Newly published papers-of-the-month are summarized in easy-to-read language for public dissemination. In addition, many members have had their work featured in Y-file, and some members spend considerable time promoting muscle health, metabolism and diabetes education to the public. Several MHRC members have had media interviews in the past year to promote muscle health in their field.

**Membership:** Our faculty membership increased by one additional new member: Dr. Devin Phillips has joined the group as a new Assistant Professor in Kinesiology and Health Science. We look forward to Dr. Phillips’ expertise in human respiratory and cardiovascular physiology, with an additional focus on respiratory muscle function.

**Mentorship:** MHRC faculty members are extremely active in the training and development of graduate students, undergraduate students, and post-doctoral fellows. One of the reasons that MHRC members are so successful individually with NSERC is that we are very active in the training of Highly Qualified Personnel (HQP), a major criterion for success with NSERC. MHRC faculty members directly mentored >130 trainees over the past year;

**Continuing Education:** We developed a **Graduate Diploma** in "Muscle Health and Exercise" to increased graduate enrollments from within and outside; feedback has already been received, and the plan is to move forward with this by Fall 2024, if possible. We also developed 3 different UG **Concentrations** (now in consideration in KINE) focusing on our strengths in "Muscle Health", "Cardiovascular Health" and "Metabolic Health" (and Exercise) to further fortify our 4th year class enrollments in these areas, and provide micro-credentials to students.

**Other leadership activities:** The MHRC sponsored four \$1000 MHRC Student Fellowships directed against the Graduate Student’s fees. This Fellowship is for MSc students and PhD

students in second year who do not have Tri-Council external funding sources. We also made the decision to actively participate in the Vaughan-McKenzie Health collaboration / initiative, in the **Musculoskeletal Health Pillar**. This is currently in progress and development.

We developed a **Collaborative Research Grant (CRG)** that can be applied for by Active MHRC Faculty members who want to initiate a new collaboration and start a new project. One grant was offered in 2022 valued at \$5000.

Our **MHRC Strategic Plan 2021-2026** has been finalized and posted on the website along with other administrative documents.

(<https://mhrc.info.yorku.ca/administration/>).

We generated MHRC sub-Committees for internal **tri-Council grant reviews**, prior to submission (for NSERC, CIHR and Foundations); this will have a major impact on our already satisfactory success rates in this area.

**Industry partners:** The MHRC has developed relationships with industry on several fronts, including Aurora Scientific, a manufacturing company for muscle testing equipment (Hood), Zucara Therapeutics (Riddell), Stealth Biotechnologies and F2C Nutrition (Perry), both drug development companies.

**Student-based activities:** The MHRC continues to significantly involve our graduate student and post-doctoral trainees in our activities. The **MHRC Student Committee** provides input into our programming and direction, particularly with regard to student interests in the MHRC Seminars and the Muscle Health Awareness Day program. Every year we have a student-invited Seminar speakers. The Committee organized an **MHRC Career Day** on April 22, 2022, featuring 5 PhD graduated speakers who now hold positions outside of academia. Their advice on future careers was very well received by the live audience of trainees, and the next planned Career Day will be held in April 2024.

## 5. **Challenges and Areas for Improvement**

We have two major challenges, and both are related to funding:

a) Funding for large scale collaborative initiatives related to 1) student training and 2) infrastructure. CREATE and CFI applications have been written in the past but have not yet been successful. We have submitted a new CFI grant for infrastructure related to Bioenergetics (please see above). In the meantime, we continue to use the NSERC RTI application process to acquire new equipment to support our MHRC Core Facility.

b) Funding of the MHRC itself, either through donor contributions, industry support, or Continuing Education initiatives. Continuing Education using on-line courses is currently in development, and the curriculum is set. The pursuit of donors is in the hands of the Faculty of Health Development Office.

## 6. **Charter Goals** – What progress has been made toward the goals of the ORU's current charter?

- Created an **MHRC Strategic Plan 2021-2026** in 2021;
- Created MHRC sub-Committees for internal **tri-Council grant reviews**, prior to submission (for NSERC, CIHR and Foundations);
- Developed a **Graduate Diploma** in "Muscle Health and Exercise" to increased graduate enrollments from within and outside;

- Developed 3 different UG **Concentrations** (now in consideration in KINE) focusing on our strengths in "Muscle Health", "Cardiovascular Health" and "Metabolic Health" (and Exercise) to further fortify our 4th year class enrollments in these areas, and provide micro-credentials to students;
- Expanded our Muscle Health Awareness Day (**MHAD, 13th Annual**) to an international audience as a Pre-conference for IBEC 2022. This took place on May 24, 2022;
- Participated in the Vaughan-McKenzie Health collaboration / initiative, in the **Musculoskeletal Health Pillar**.
- We have altered our Governance, by instituting internal sub-Committees to deal with MHRC-related issues (please see the **SP 2021-2026**), including the addition of a new position of "MHRC Associate Director".

7. **Charter Challenges** – What are the challenges your ORU has faced in making progress towards the goals stated in your charter?

- The challenge for all of us is financial constraint, fitting priorities that are important into a fixed budget. Fundraising initiatives with a focus on "Muscle Health" in its broadest terms would help alleviate these constraints.

8. **Financial Position<sup>1</sup>:**

The "Financial Position" is attached as Appendix 4.

9. **Graduate Diplomas and Non-Degree Activities**

See the Certificate description above in Continuing Education

10. **Space Utilization** - Provide a list of current space usage data as appropriate to your ORU in the charts and space provided in Appendix 3.

11. **Objectives for Upcoming Year**

We will continue to pursue our educational, training and research objectives as described above, to fulfill our Vision statement and our Strategic Plan Objectives.

(a) **FUNDING PROPOSALS:** anticipated for submission by **April 30, 2024** by active members of the ORU

Funding Proposal	Funder	Value	Type (grant, contract, other)	Role of ORU
1. FMB Lab (submitted in 2022, anticipated outcome June 2023)	CFI	\$2.5M	Infrastructure	Critical
2. NSERC RTI	NSERC	\$150,000	Infrastructure	Critical
3. NSERC Discovery	NSERC	Usually up to \$100k/yr	Operating	Helpful
4. CIHR Operating	CIHR	\$100-200k/yr	Operating	Helpful

(b) **PLANNED EVENTS:** List conferences, workshops, exhibits or other events to be hosted or organized by **April 30, 2024**, and target audience(s).

	<b>Events (Workshop, Exhibit, Conference, Other)</b>	<b>Target Audience(s)</b>
1.	MHAD14 (May 19 2023)	Scientists and Trainees from Ont-Que-NY-Mlch
2.	MHRC Seminars (every 2 weeks in F/W 2023-24)	Scientists and trainees from North America via Zoom

(c) **PLANNED ACTIVITIES:** List knowledge mobilization/engagement/outreach/technology transfer activities planned

	<b>Activities (Knowledge Mobilization, Engagement, Outreach, Technology Transfer, Other)</b>
1.	MHRC Seminar Series
2.	MHAD14
3.	Paper of the Month (website Research article by Faculty member)

(d) All specific **visitors** invited or anticipated (visiting faculty or other)– please list

	<b>Visitor</b>	<b>University</b>	<b>Purpose</b>
1.	Dr. Steven Segal	Missouri	MHRC Seminar Series
2.	Dr. Brian Glancy	NIH, Bethesda	MHRC Seminar Series
3.	Dr. Scott Trappe	Ball State	MHRC Seminar Series
4.	Dr. Mark Haykowsky	Alberta	MHRC Seminar Series
5.	Dr. Nadine Wiper- Bergeron	Ottawa	MHRC Seminar Series
6.	Dr. Walter Herzog	Calgary	MHRC Seminar Series
7.	Dr. Glen Foster	UBC Okanagan	MHRC Seminar Series
8.	Dr. Kevin Murach	Arkansas	MHRC Seminar Series
9.	Dr. Lauren Sparks	Florida	MHRC Seminar Series

## APPENDIX 1 – Active Members and Governance

### Active Membership

<b>Active Member Name</b>	<b>Faculty</b>	<b>Department</b>
1. Abdul- Sater, Ali	Faculty of Health	KHS
2. Adegoke, Olasunkanmi	Faculty of Health	KHS
3. Backx, Peter	Faculty of Science	Biology
4. Belcastro, Angelo	Faculty of Health	KHS
5. Birot, Olivier	Faculty of Health	KHS
6. Ceddia, Rolando	Faculty of Health	KHS
7. Cheng, Arthur	Faculty of Health	KHS
8. Connor, Michael	Faculty of Health	KHS
9. Drake, Janessa	Faculty of Health	KHS

10.Edgell, Heather	Faculty of Health	KHS
11.Gage, William	Faculty of Health	KHS
12.Haas, Tara	Faculty of Health	KHS
13.Hamadeh, Mazen	Faculty of Health	KHS
14.Hood, David	Faculty of Health	KHS
15.Hynes, Loriann	Faculty of Health	KHS
16.Josse, Andrea	Faculty of Health	KHS
17.Kuk, Jennifer	Faculty of Health	KHS
18.McDermott, John	Faculty of Science	Biology
19.Perry, Christopher	Faculty of Health	KHS
20. Phillips, Devin	Faculty of Health	KHS
21.Riddell, Michael	Faculty of Health	KHS
22.Roudier, Emilie	Faculty of Health	KHS
23.Scime, Anthony	Faculty of Health	KHS
24.Sweeney, Gary	Faculty of Science	Biology
25.Tsushima, Robert	Faculty of Science	Biology

### Other Members

Other Member Name	Faculty	Department	Membership category
1.Biggard, Xavier	Medical Director	Union Cycliste Internationale (UCL)	Adjunct
2.Coe, Imogen	Faculty of Science	Toronto Metropolitan University	Adjunct
3.Grace, Sherry	Faculty of Health	York University	Adjunct
4.Hawke, Thomas	Medicine	McMaster University	Adjunct
5.Jacobs, Ira	Faculty of Physical Education	University of Toronto	Adjunct
6.Laham, Robert	Physician	York Lanes Appletree Medical Centre	Adjunct
7.Wharton, Sean	Physician	Wharton Medical Clinic	Adjunct

### Appendix 1: Members Contributions between May 1, 2022- April 30, 2023

#### Olasunkanmi Adegoke:

Adegoke, Huang, Y., Fu, X., & Mora, S. (2022). Editorial: Nutrition in the Regulation of Muscle Development and Repair. *Frontiers in Physiology*, 13, 853007–853007. <https://doi.org/10.3389/fphys.2022.853007>

#### Peter Backx:

1. Teng, Gu, L., Di Paola, M., Lakin, R., Williams, Z. J., Au, A., Chen, W., Callaghan, N., Zadeh, F. H., Zhou, Y.-Q., Fatah, M., Chatterjee, D., Jourdan, L. J., Liu, J., Simmons, C. A., Kislinger, T., Yip, C. M., Backx, P. H., Gourdie, R. G., ... Gramolini, A. O. (2022).

Tmem65 is critical for the structure and function of the intercalated discs in mouse hearts. *Nature Communications*, 13(1), 6166–6166. <https://doi.org/10.1038/s41467-022-33303-y>

2. Li, Tan, W., Zheng, S., Pyle, W. G., Zhu, C., Chen, H., Kang, L., Wu, J., Zou, Y., Backx, P. H., & Yang, F. H. (2022). Differential mRNA Expression and Circular RNA-Based Competitive Endogenous RNA Networks in the Three Stages of Heart Failure in Transverse Aortic Constriction Mice. *Frontiers in Physiology*, 13, 777284–777284. <https://doi.org/10.3389/fphys.2022.777284>
3. Kim, Oh, Y., Liu, J., Dababneh, S., Xia, Y., Kim, R. Y., Kim, D.-K., Ban, K., Husain, M., Hui, C.-C., & Backx, P. H. (2022). Irx5 and transient outward K<sup>+</sup> currents contribute to transmural contractile heterogeneities in the mouse ventricle. *American Journal of Physiology. Heart and Circulatory Physiology*, 322(5), H725–H741. <https://doi.org/10.1152/ajpheart.00572.2021>
4. Li, Tan, W., Zheng, S., Zhang, J., Zhu, C., Cai, C., Chen, H., Yang, C., Kang, L., Pan, Z., Pyle, W. G., Backx, P. H., Zou, Y., & Yang, F. H. (2022). Cardioprotective Effects of n-3 Polyunsaturated Fatty Acids: Orchestration of mRNA Expression, Protein Phosphorylation, and Lipid Metabolism in Pressure Overload Hearts. *Frontiers in Cardiovascular Medicine*, 8, 788270–788270. <https://doi.org/10.3389/fcvm.2021.788270>
5. Lakin, Liu, X., CHEN, W., DEBI, R., Yakobov, S., Polidovitch, N., & Backx, P. (2022). Abstract 15442: Pharmacological and Atrial Cardiomyocyte-Specific Inhibition of Tumor Necrosis Factor Protects Against Adverse Atrial Remodeling and Valvular Atrial Fibrillation an a Mouse Model of Aortic Regurgitation. *Circulation (New York, N.Y.)*, 146(S\_1), A15442–. [https://doi.org/10.1161/circ.146.suppl\\_1.15442](https://doi.org/10.1161/circ.146.suppl_1.15442)

#### **Angelo Belcastro:**

Moghaddaszadeh, Taqvi, U., Lee, C., Lee, E., & Belcastro, A. (2022). Stable physical activity tracking during children’s guided active play. *Frontiers in Sports and Active Living*, 4, 881664–881664. <https://doi.org/10.3389/fspor.2022.881664>

#### **Olivier Birot:**

Lemieux, Roudier, E., & Birot, O. (2022). Angiostatic freeze or angiogenic move? Acute cold stress prevents angiokine secretion from murine myotubes but primes primary endothelial cells for greater migratory capacity. *Frontiers in Physiology*, 13, 975652–975652. <https://doi.org/10.3389/fphys.2022.975652>

#### **Arthur Cheng:**

1. **Cheng, A.J.**, von Walden, F., Lanner, J.T. (2023). Orail as a potential “fits-all approach” therapeutic target for the treatment of DMD. *Journal of General Physiology*. <https://doi.org/10.1085/jgp.202213224>.
2. Delfinis, L.J., Bellissimo, C.A., Gandhi, S., DiBenedetto, S.N., Garibotti, M.C., Thuan, A.K., Tsitkanou, S., Rosa-Caldwell, M.E., Rahman, F.A., **Cheng, A.J.**, Wiggs, M.P., Schlattner, U., Quadriatero, J., Green, N.P., Perry C.G.R. (2022). Muscle weakness precedes atrophy during cancer cachexia and is linked to muscle-specific mitochondrial stress. *JCI Insight*. <https://10.1172/jci.insight.155.147>.
3. Gineste, C., Youhanna, S., Vorrink, S.U., Henriksson, S., Hernandez, A., **Cheng, A.J.**, Chaillou, T., Buttgerit, A., Schneidreit, D., Friedrich, O., Hultenby, K., Bruton, J.D., Ivarsson, N., Sandblad, L. Lauschke, V.M., Westerblad, H. (2023). Collagenase-mediated cell dissociation alters gene expression patterns and causes loss of mitochondrial Ca<sup>2+</sup> control in skeletal muscle fibers. *iScience*.
4. Vainshtein, A., Slavin, M.B., **Cheng, A.J.**, Memme, J.M., Oliveira, A.N., Perry, C.G., Abdul-Sater, A.A., Belcastro, A.N., Riddell, M.C., Triolo, M., Haas, T.L., Roudier, E., Hood, D.A. Scientific Meeting report: International Biochemistry of Exercise 2022. *Journal of Applied Physiology*
5. Olsson, K., **Cheng, A.J.**, Al-Ameri, M., Tardiff, N., Melin, M., Rooyackers, O., Lanner, J.T., Westerblad, H., Gustafsson, T., Bruton, J.D., Rullman, E. (2022). Sphingomyelinase activity promotes atrophy and attenuates force in human muscle fibres and is elevated in heart failure patients. *Journal of Cachexia, Sarcopenia and Muscle*. <https://doi.org/10.1002/jcsm.13029>

**Rolando Ceddia:**

1. Jani, Da Eira, D., & Ceddia, R. B. (2023). Insulin-resistant female rat skeletal muscles display diacylglycerol-mediated protein kinase C activation and inflammation without ceramide accumulation. *The Journal of Physiology*. <https://doi.org/10.1113/JP284324>
2. Da Eira, Jani, S., & Ceddia, R. B. (2023). An obesogenic diet impairs uncoupled substrate oxidation and promotes whitening of the brown adipose tissue in rats. *The Journal of Physiology*, 601(1), 69–82. <https://doi.org/10.1113/JP283721>
3. Jani, Da Eira, D., Stefanovic, M., & Ceddia, R. B. (2022). The ketogenic diet prevents steatosis and insulin resistance by reducing lipogenesis, diacylglycerol accumulation and protein kinase C activity in male rat liver. *The Journal of Physiology*, 600(18), 4137–4151. <https://doi.org/10.1113/JP283552>

4. Da Eira, Jani, S., Stefanovic, M., & Ceddia, R. B. (2023). Obesogenic versus ketogenic diets in the regulation of the renin–angiotensin system in rat white and brown adipose tissues. *Nutrition (Burbank, Los Angeles County, Calif.)*, *105*, 111862–111862. <https://doi.org/10.1016/j.nut.2022.111862>
5. Effting, Thirupathi, A., Müller, A. P., Pereira, B. C., Sepa-Kishi, D. M., Marqueze, L. F. B., Vasconcellos, F. T. F., Nesi, R. T., Pereira, T. C. B., Kist, L. W., Bogo, M. R., Ceddia, R. B., & Pinho, R. A. (2022). Resistance Exercise Training Improves Metabolic and Inflammatory Control in Adipose and Muscle Tissues in Mice Fed a High-Fat Diet. *Nutrients*, *14*(11), 2179–. <https://doi.org/10.3390/nu14112179>

### Heather Edgell:

#### Peer-Reviewed Publications:

1. \*Barranca C, \*Pereira T, and **Edgell H** (2023) Oral contraceptive use and menstrual cycle influence acute cerebrovascular response to standing. *Autonomic Neuroscience: Basic and Clinical* 244: 103054
2. \*Pereira TJ, \*Wasef S, \*Ivry I, \*Assadpour E, \*Adeyinka BO, and **Edgell H** (2022) Menstrual cycle and oral contraceptives influence cerebrovascular dynamics during hypercapnia. *Physiol Rep* 10(13); e15373

#### Funding

1. Catalyzing Interdisciplinary Research Clusters (2022; Co-applicant) - \$175,000/year for 3 years – Translating Brain Signals Across Scales, Species, Sex, and Lifespan
2. Minor Research Grant (2022; Principal applicant) - \$3,000 - Association of cognitive function with vascular and autonomic function in Type 2 Diabetes.
3. Heart and Stroke Foundation of Canada (2022; Co-applicant) – Precision cardiovascular disease profiling and risk prediction in cancer survivors (PROGRESS): A prospective cohort study. - \$207,900

### William Gage:

1. Di Bacco, & Gage, W. H. (2023). Evaluation of a smartphone accelerometer system for measuring nonlinear dynamics during treadmill walking: Concurrent validity and test-retest reliability. *Journal of Biomechanics*, *151*, 111527–. <https://doi.org/10.1016/j.jbiomech.2023.111527>
2. Verniba, Di Bacco, V. E., & Gage, W. H. (2023). Neuromuscular organization during balance-correcting responses induced with platform-translation and upper body cable-pull perturbation methods. *Heliyon*, *9*(4), e14856–e14856. <https://doi.org/10.1016/j.heliyon.2023.e14856>

3. Di Bacco, Kiriella, J. B., & Gage, W. H. (2022). The Influence of the Relative Timing between Pole and Heel Strike on Lower Limb Loading among Young and Older Naïve Pole Walkers. *Translational Sports Medicine*, 2022, 1–10. <https://doi.org/10.1155/2022/3938075>

#### **Tara Haas:**

##### **Funding Received –**

**CIHR 5 yr project grant as PI– July 2022;** \$780,000 total funding; co-applicants: Thomas Gustafsson and Anthony Scimè

**NSERC Research Tools and Instruments grant: “Apparatus for the isolation of specific primary cells from tissue”** (150,000) PI: Anthony Scime; co-applicants: T.L. Haas, E. Roudier

**Catalyzing Interdisciplinary Research Clusters initiative (VPRI);** \$200,000 /2 years *PIs: Alex Czekanski and Peter Backx; Co-applicants: Tara Haas, John McDermott, Terry Sachlos, Moren Levesque, Roxanne Mykitiuk, Giuseppina D’Agostino*

##### **Peer-reviewed Journal Articles-**

Rudnicki, M.\*#, A. Pislaru\*, Rezvan, O., Rullman, E., Fawzy, A., Nwadozi, E., Roudier, E., Gustafsson, T. and T.L. Haas#. Transcriptomic profiling reveals sex-specific molecular signatures of adipose endothelial cells under obesogenic conditions. (\*co-first author; # co-corresponding authors) *iScience* Dec 2022 26(1):105811. doi: 10.1016/j.isci.2022.105811.

##### **Book chapter**

Rudnicki, M., A. Pislaru and T.L. Haas. Chapter 9: **Capillary diversity: endothelial cell specializations to meet tissue metabolic needs**”; pp99-110 *In* The Vasculome, Ed. Zorina Galis, Elsevier, June 2022 ISBN: 9780128225462

#### **David Hood:**

1. Vainshtein A., M.B. Slavin, A.J. Cheng, J.M. Memme, A.N. Oliveira, C.G.R. Perry, A.A. Abdul-Sater, A.N. Belcastro, M.C. Riddell, M. Triolo, T.L. Haas, E. Roudier, and D.A. Hood. Scientific meeting report: International Biochemistry of Exercise 2022. *J Appl Physiol* (1985). 133:1381-1393. doi: 10.1152/jappphysiol.00475.2022.
2. Slavin M.B., R. Kumari, and D.A. Hood. ATF5 is a regulator of exercise-induced mitochondrial quality control in skeletal muscle. *Mol Metab.* Dec;66:101623. doi: 10.1016/j.molmet.2022.101623, 2022.

3. Triolo, M. D. Bhattacharya and D. A. Hood. Denervation induces mitochondrial decline but exacerbates lysosome dysfunction in middle-aged mice. *Aging*. 14(22):8900-8913, 2022.
4. Triolo, M., A.N. Oliveira, R. Kumari and D.A. Hood. The influence of age, sex and exercise on autophagy, mitophagy and lysosome biogenesis in skeletal muscle. *Skelet. Muscle* 12(1):13. doi: 10.1186/s13395-022-00296-7, 2022.
5. Slavin, M.B., J.M. Memme, A.N. Oliveira, N. Moradi and D.A. Hood. [Regulatory networks coordinating mitochondrial quality control in skeletal muscle](#). *Am J Physiol Cell Physiol*. 322: C913-C926. doi: 10.1152/ajpcell.00065.2022.

#### **Loriann Hynes:**

1. Migotto, Gill, S., Sem, M., Macpherson, A. K., & Hynes, L. M. (2022). Sex-related differences in sternocleidomastoid muscle morphology in healthy young adults: A cross-sectional magnetic resonance imaging measurement study. *Musculoskeletal Science & Practice*, 61, 102590–102590. <https://doi.org/10.1016/j.msksp.2022.102590>
2. Smeha, Kalkat, R., Sergio, L. E., & Hynes, L. M. (2022). Sex-related differences in visuomotor skill recovery following concussion in working-aged adults. *BMC Sports Science, Medicine & Rehabilitation*, 14(1), 72–72. <https://doi.org/10.1186/s13102-022-00466-6>
3. King, & Hynes, L. (2022). An Action Research Approach to Designing the Athletic Therapy Interactive Concussion Educational Tool. *International Journal of Technology, Knowledge and Society*, 18(2), 19–34. <https://doi.org/10.18848/1832-3669/CGP/v18i02/19-34>
4. Hurtubise, Gorbet, D. J., Hynes, L., Macpherson, A. K., & Sergio, L. E. (2023). Cortical and cerebellar structural correlates of cognitive-motor integration performance in females with and without persistent concussion symptoms. *Brain Injury*, 37(5), 397–411. <https://doi.org/10.1080/02699052.2022.2158231>

#### **Andrea Josse:**

1. February 2023, awarded as Principal Investigator: CFI-JELF Infrastructure Grant (ORF portion). TITLE: Novel Targets of Whole-food Dairy Products for Human Musculoskeletal and Cardiometabolic Health. Awarded: \$125,000 (ORF portion of \$340,639 CAD total cost) \*Federal CFI portion awarded in February 2022.
2. Kurgan N, Skelly LE, Ludwa IA, Klentrou P, Josse AR. Twelve weeks of a diet and exercise intervention reduces fat mass and alters the acute bone response to exercise in adolescent females with overweight/obesity. *Front Physiol*. 2023 Jan 4;13:1049604.
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- diet quality and eating patterns in female adolescents with overweight/obesity. *Children* (Basel). 2022 Nov 6;9(11):1703.
4. Frascetti EC, Skelly LE, Abdul-Sater AA, Josse AR. The Acute Effects of Milk Consumption on Systemic Inflammation after Combined Resistance and Plyometric Exercise in Young Adult Females. *Nutrients*. 2022 Oct 28;14(21):4532.
  5. March 2023, Josse AR. Webinar (online), sponsored by Osteoporosis Canada, in partnership with: ThinkBeef.ca. “Protein and Exercise for Bone Health”. Target audience: dietitians, health professionals, lay people. March 16, 2023.

### **Jennifer Kuk:**

1. Samouda H, Lee S, Arslanian S, Han M, **Kuk JL**. Anthropometric Equations to Predict Visceral Adipose Tissue in European and American Youth. (*J Pediatr*. 2023 Feb;253:33-39.e3. doi: 10.1016/j.jpeds.2022.09.009. Epub 2022 Sep 14. PMID: 36115621).
2. **Kuk JL**, Kamran Samani E, Wharton S: Association between Weight Loss History and Weight Loss Achieved in Clinical Obesity Management: Retrospective chart review (Obesity (Silver Spring). 2022 Oct;30(10):2071-2078. doi: 10.1002/oby.23530. PMID: 36150211)
3. Pooni R, Edgell H, Tamim H, **Kuk JL**. The association of objectively and subjectively measured physical activity and sedentary time with prediabetes and type 2 diabetes in adults: A cross-sectional study in Framingham Heart Study cohorts (*Appl Physiol Nutr Metab*. 2022 Oct 1;47(10):1023-1030. doi: 10.1139/apnm-2022-0232. Epub 2022 Jul 25. PMID: 35878413)

### **John McDermott:**

1. Miyake, & McDermott, J. C. (2023). Re-organization of nucleolar architecture in myogenic differentiation. *Journal of Cell Science*, 136(4). <https://doi.org/10.1242/jcs.260496>
2. Tripathi, Miyake, T., Kelebeev, J., & McDermott, J. C. (2022). TAZ exhibits phase separation properties and interacts with Smad7 and  $\beta$ -catenin to repress skeletal myogenesis. *Journal of Cell Science*, 135(1). <https://doi.org/10.1242/jcs.259097>
3. O’Murchadha, Egan, A. M., Cahill, K., Flynn, C., O’Flynn, D., O’Neill, J., Sreenan, S., & McDermott, J. H. (2023). Utility of screening for silent myocardial ischaemia in diabetes with an annual electrocardiogram. *Diabetic Medicine*, 40(3), e14983–n/a. <https://doi.org/10.1111/dme.14983>

### **Devin Phillips:**

1. Neder, Phillips, D. B., O’Donnell, D. E., & Dempsey, J. A. (2022). Excess ventilation and exertional dyspnoea in heart failure and pulmonary hypertension. *The European Respiratory Journal*, 60(5), 2200144–. <https://doi.org/10.1183/13993003.00144-2022>
2. James, Phillips, D. B., Vincent, S. G., Abdallah, S. J., Donovan, A. A., de-Torres, J. P., Neder, J. A., Smith, B. M., Jensen, D., & O’Donnell, D. E. (2022). Exertional dyspnoea in patients with

mild-to-severe chronic obstructive pulmonary disease: neuromechanical mechanisms. *The Journal of Physiology*, 600(18), 4227–4245. <https://doi.org/10.1113/JP283252>

3. Milne, James, M. D., Smyth, R. M., Vincent, S. G., Singh, N., D’Arsigny, C. L., de-Torres, J. P., de Wit, K., Johri, A., Neder, J. A., O’Donnell, D. E., & Phillips, D. B. (2023). Neurophysiological mechanisms of exertional dyspnea in post-pulmonary embolism syndrome. *Journal of Applied Physiology* (1985), 134(3), 667–677. <https://doi.org/10.1152/jappphysiol.00677.2022>
4. Phillips, James, M. D., O’Donnell, C. D., Vincent, S. G., Webb, K. A., de-Torres, J. P., Neder, J. A., & O’Donnell, D. E. (2022). Physiological predictors of morbidity and mortality in COPD: the relative importance of reduced inspiratory capacity and inspiratory muscle strength. *Journal of Applied Physiology* (1985), 133(3), 679–688. <https://doi.org/10.1152/jappphysiol.00352.2022>
5. Smyth, Neder, J. A., James, M. D., Vincent, S. G., Milne, K. M., Marillier, M., de-Torres, J. P., Moran-Mendoza, O., O’Donnell, D. E., & Phillips, D. B. (2023). Physiological underpinnings of exertional dyspnoea in mild fibrosing interstitial lung disease. *Respiratory Physiology & Neurobiology*, 312, 104041–104041. <https://doi.org/10.1016/j.resp.2023.104041>

### Christopher Perry:

1. Funding: Received \$148,250 from MITACS entitled ‘Mitochondrial-targeted therapies to improve Duchenne muscular dystrophy outcomes (Principal Applicant)
2. Funding: Received \$875-925 from CIHR project grant entitled ‘Targeting vascular and skeletal muscle health to improve the quality of life in males and females with Type 1 Diabetes (Co-Investigator; Principal Applicant, Thomas Hawke, McMaster University)
3. Peer-Reviewed Publication: **Bellissimo CA, Delfinis LJ, Hughes MC, Turnbull PC, Gandhi S, DiBenedetto SN**, Rahman FA, **Tadi P, Amaral C, Dehghani A**, Cobley JN, Quadrilatero J, Schlattner U, Perry CGR. Mitochondrial creatine sensitivity is lost in the D2.mdx model of Duchenne muscular dystrophy and rescued by the mitochondrial-enhancing compound Olesoxime. *Am J Physiol Cell Physiol*, 2023 Jan 23, In Press. PMID: 36689672
4. Peer-Reviewed Publication: **Delfinis LJ, Bellissimo CA, Gandhi S, DiBenedetto SN, Garibotti MC, Thuhan AK**, Tsitkanou S, Rosa-Caldwell ME, Rahman FA, Cheng AJ, Wiggs MP, Schlattner U, Quadrilatero J, Greene NP, Perry CGR. Muscle weakness precedes atrophy during cancer cachexia and is linked to muscle-specific mitochondrial stress. *JCI Insight*, 2022 Dec 22; 7(24):e155147. PMID: 36346680
  - Editor’s Pick: <https://insight.jci.org/this-month/2023/1>
5. Invited presentation: Unexpected adaptative responses in mitochondria and muscle force during cancer cachexia’

- School of Kinesiology, The University of British Columbia, Vancouver, BC, CANADA (scheduled March 30<sup>th</sup>, 2023)

**Michael Riddell:**

1. Riddell MC, Li Z, Gal RL, Calhoun P, Jacobs PG, Clements MA, Martin CK, Doyle Iii FJ, Patton SR, Castle JR, Gillingham MB, Beck RW, Rickels MR; T1DEXI Study Group. Examining the Acute Glycemic Effects of Different Types of Structured Exercise Sessions in Type 1 Diabetes in a Real-World Setting: The Type 1 Diabetes and Exercise Initiative (T1DEXI). *Diabetes Care*. 2023 Apr 1;46(4):704-713. doi: 10.2337/dc22-1721. PMID: 36795053.
2. Hoffman EG, D'Souza NC, Aiken J, Atherley S, Liggins R, Riddell MC. Effects of somatostatin receptor type 2 antagonism during insulin-induced hypoglycaemia in male rats with prediabetes. *Diabetes Obes Metab*. 2023 Feb 3. doi: 10.1111/dom.15002. Epub ahead of print. PMID: 36734462.
3. Aronson R, Riddell MC, Conoscenti V, Junaidi MK. Effect of Mini-Dose Ready-to-Use Liquid Glucagon on Preventing Exercise-Associated Hypoglycemia in Adults With Type 1 Diabetes. *Diabetes Care*. 2023 Apr 1;46(4):765-772. doi: 10.2337/dc22-1145. PMID: 36689626.
4. Adolfsson P, Taplin CE, Zaharieva DP, Pemberton J, Davis EA, Riddell MC, McGavock J, Moser O, Szadkowska A, Lopez P, Santiprabhob J, Frattolin E, Griffiths G, DiMeglio LA. ISPAD Clinical Practice Consensus Guidelines 2022: Exercise in children and adolescents with diabetes. *Pediatr Diabetes*. 2022 Dec;23(8):1341-1372. Doi: 10.1111/pedi.13452. PMID: 36537529.
5. Riddell MC, Peters AL. Exercise in adults with type 1 diabetes mellitus. *Nat Rev Endocrinol*. 2023 Feb;19(2):98-111. doi: 10.1038/s41574-022-00756-6. Epub 2022 Oct 31. PMID: 36316391.

**Gary Sweeney:**

1. Sung HK, Lam NH, Murugathasan M, Anwar S, Botelho R, Sater AA & Sweeney G. Autophagy deficiency exacerbates iron overload induced reactive oxygen species production and apoptotic cell death in skeletal muscle cells. *Cell Death & Disease* 2023 Apr 7;14(4):252
2. Reboucas P, Fillebeen C, Botta A, Cleverdon R, Steele AP, Richard V, Zahedi RP, Borchers CH, Burelle Y, Hawke TJ, Pantopoulos K, & Sweeney G. Discovery-Based Proteomics Identify Skeletal Muscle Mitochondrial Alterations as an Early Metabolic Defect in a Mouse Model of  $\beta$ -Thalassemia. *International Journal of Molecular Sciences* (2023) 24(5):4402
3. Sung HK, Mitchell P, Gross S, Marette A & Sweeney G. ALY688 elicits adiponectin-mimetic signaling and improves insulin action in skeletal muscle cells. *American Journal of Physiology (Cell)* (2022) 322(2):C151-C163
4. Jahng JWS, Alsaadi RM, Rengasamy P, Song E, Hipolito VEB, Sung HK, Botelho RJ, Russell, RC & Sweeney G. Iron overload inhibits late stage autophagy flux leading to insulin resistance. *EMBO Reports* (2019) 20(10):e47911
5. Song E, Ramos SV, Huang X, Liu Y, Botta A, Sung HK, Turnbull PC, Wheeler MB, Berger T, Wilson DJ, Perry CGR, Mak TW, Sweeney G. Holo-lipocalin-2-derived siderophores increase mitochondrial ROS and impair oxidative phosphorylation in rat cardiomyocytes. *Proc Natl Acad Sci U S A*. 2018 115(7):1576-1581

**Governance:**

<b>Executive Committee</b>	
<b>Meeting Date(s):</b> via Email or Zoom, as needed	
<b>Member</b>	<b>Affiliation</b>
1. Dr. David Hood	Director, MHRC, Faculty Member, KHS
2. Dr. Christopher Perry	Faculty Member, KHS
3. Dr. Janessa Drake	Faculty Member, KHS
4. Dr. Rolando Ceddia	Faculty Member, KHS
5. Dr. Michael Connor	Faculty Member, KHS
6. Dr. Peter Backx	Faculty Member, Biology
7. Mr. Daniel Da Eira	PhD Student, Representative

**APPENDIX 2** – Additional **Centre-specific** accomplishments. (Information cited above).

**APPENDIX 3**

(a) **Office Space** – fill out the table below indicating the utilization of office space within your ORU.

Room #	Name of Occupant	Occupant Affiliation <sup>1</sup>	Type of Workspace <sup>2</sup>	Length and Frequency of Occupancy <sup>3</sup>	Notes <sup>4</sup>
332 Farq	Adam Charnaw	Coordinator	Office	2.5 days/week	
333 Farq	Dr. David Hood	Director	Office	5d/week	

(b) **Shared Space/Equipment** – fill out the table below indicating the utilization of shared space and equipment within your ORU.

Room # <sup>5</sup>	Type of Space/Equipment <sup>6</sup>	Access <sup>7</sup>	Length and Frequency of Occupancy <sup>8</sup>	Notes <sup>9</sup>
043 Farquharson	Lab, vivarium	MHRC Members, key	Unspecified key access 5/d week	Shared space agreement in place
320 Farquharson	Core facility, large shared equipment lab	MHRC Members, key	Unspecified key access 5/d week	Shared space agreement in place
322 Farquharson	Exercise and biopsy lab	MHRC Members, key	Unspecified key access 5/d week	Shared space agreement in place
330 Farquharson	Meeting Room	MHRC Members, key	Unspecified key access 5/d week	Shared space agreement in place

<sup>5</sup> If no room number, indicate where it is located.

<sup>6</sup> Choose the type of space: meeting room, cubicle, reception, open space, resource centre, supply room, storage, coat closet, kitchen, photocopier room, break room, lab, etc.

<sup>7</sup> Choose type of access: open access, key badge, key, etc.

<sup>8</sup> Choose unspecified or list a *realistic* period (starting and ending) regarding how often this room gets used (e.g. 4 days a week, 3 days a week, etc.)

<sup>9</sup> Explain if there is an agreement in place and how this room is being utilized.

**Cumulative Financial Statement**

**Intructions:** Operating cost centre, present information for each 200 cost centre. Do not combine cost centre financial data, duplicate the template to present data for another cost centre as necessary. **Ensure project names are listed on all worksheets.** The bottom line must be aligned with the statement of operations from e-reports (i.e. Total Rev-Total Exp; Cfdw and Balance).

**NOTE:** provide necessary explanation for the worksheets in the notes & comments section of the appropriate worksheet. Include comments to explain any committed expenditures or expected revenues that appear in the reporting of the accounts, along with all supporting documentation, so that the worksheet provides a complete picture of the ORU's financial position.

**ORU: Muscle Health Research Centre**

**Cost Centre: 200- 157001**

Account Description	2020-21 Actuals	2021-22 Actuals	2022-23 Actuals	Comments	3 Year Rolling Budget			Additional Comments
					2023-24	2024-25	2025-26	
<b>Revenue:</b>								
Base Allocation from Central								
VPRI support (CR, stipend, operating)								
Faculty support	\$53,654.56	\$65,000.00	\$80,000.00	\$65,000 FoH commitment + 1 year only top up of \$15,000	\$ 65,000.00	\$ 65,000.00	\$ 65,000.00	
Endowment Revenue								
Indirect Costs (Overhead)								
Support from Grants and Contracts								
Other Internal Revenue	\$4,200.00	\$650.00	\$5,500.00	Internal MHAD Support	\$ 2,500.00	\$ 2,500.00	\$ 2,500.00	
Other External Revenue	\$300.00		\$4,400.00	External MHAD Support	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	
<b>TOTAL REVENUE</b>	<b>\$58,154.56</b>	<b>\$65,650.00</b>	<b>\$89,900.00</b>		<b>\$68,500.00</b>	<b>\$68,500.00</b>	<b>\$68,500.00</b>	
<b>Expenses:</b>								
Total Faculty Admin. Sal & Ben	\$7,930.44	\$7,930.44	\$8,171.44	Directors Stipend	\$ 8,090.00	\$ 8,171.00	\$ 8,252.00	
Total Research Staff Sal & Ben	\$1,600.00	\$1,931.06		Honoraria	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	
Total Support Staff Sal & Ben	\$39,685.93	\$28,615.27	\$40,932.76	Coordinators salary	\$ 40,888.00	\$ 41,297.00	\$ 41,709.00	
Total Other Salaries & Ben				MHRC Graduate Student Awards	\$ 4,000.00	\$ 4,000.00	\$ 4,000.00	
Total Equipment			\$2,097.74	MHRC lab equipment maintenance	\$ 9,000.00	\$ 9,000.00	\$ 9,000.00	
Total Other Expense	\$3,631.63	\$22,265.77	\$9,104.16	MHRC Faculty Collaborative Research Grant	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	
Total Travel & Hospitality	\$5,306.56		\$1,727.49	MHAD hospitality (catering and supplies)	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	
Total Supplies			\$5,650.86	MHRC Lab equipment and expenses	\$ 6,000.00	\$ 6,000.00	\$ 6,000.00	
Total Telephone & Power								
<b>TOTAL EXPENSES</b>	<b>\$58,154.56</b>	<b>\$60,742.54</b>	<b>\$67,684.45</b>		<b>\$75,978.00</b>	<b>\$76,468.00</b>	<b>\$76,961.00</b>	
Total Revenue Less Total Expenses	\$0.00	\$4,907.46	\$22,215.55		-\$7,478.00	-\$7,968.00	-\$8,461.00	

**Cumulative Financial Statement**

Carryforward from Previous Year	\$0.00	\$0.00	\$4,907.46		\$ 27,123.01	\$ 19,645.01	\$ 11,677.01	
Balance (cwfd to next year)	\$0.00	\$4,907.46	\$27,123.01	Includes MHAD14 sponsors	\$19,645.01	\$11,677.01	\$3,216.01	
<b>Notes:</b>								
Actuals must match bottom line in ereports - that is TR-TE, Cwfd and Balance must be the same as in ereports								
A separate spreadsheet for each cost centre (no roll up).								