

Muscle Health Research Centre

Strategic Plan 2021-2026

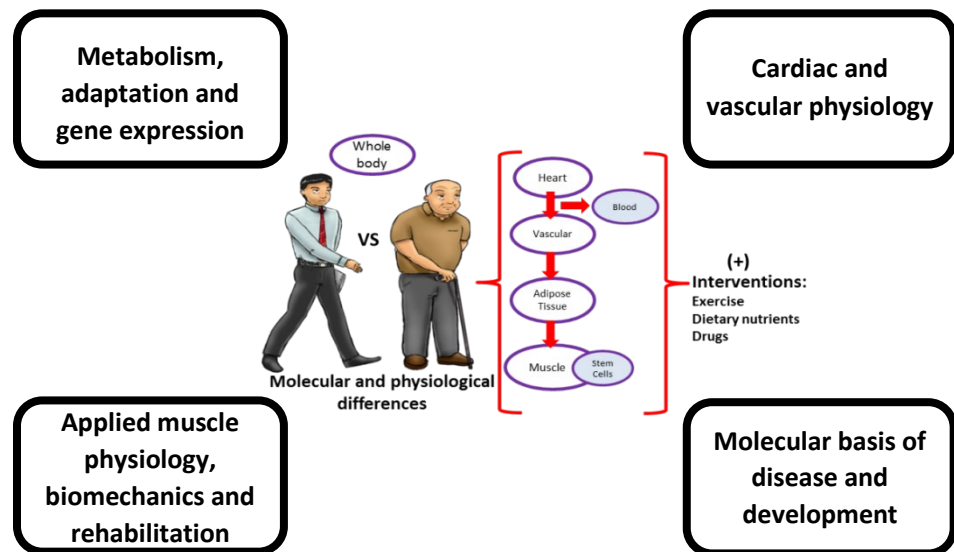
Introduction:

The Muscle Health Research Centre (MHRC), founded in 2009, is an Organized Research Unit (ORU) based in the Faculty of Health. It is presently composed of 24 regular, active faculty members, 6 adjunct faculty members, and more than 120 graduate trainees at the MSc, PhD and post-doctoral level. This currently represents the largest group of “muscle health” researchers in Canada, and is among the biggest in the world. MHRC faculty members have diverse training, with expertise in cell and molecular biology, organ physiology, metabolism and whole body function, yet are all focused, at one level or another, on muscle health.

Our research themes and the Challenge ahead:

Skeletal muscle, 40 per cent of a human's body mass, is a unique and large tissue that significantly contributes to an individual's metabolism, locomotion, and overall quality of life. Skeletal muscle health is vital for powering the movements of daily activities so that we can enjoy life and be gainfully employed, *Cardiac muscle* (the heart) circulates blood and nutrients to supply all tissues in the body, while *smooth muscle* controls blood flow distribution to muscle and all other vital organ systems. **These physiological functions are well known to decline with age, and when combined with a predominantly inactive population, lead to a high susceptibility to age-related metabolic conditions such as obesity and type 2 diabetes, and even cancer.** These conditions have *profound economic and quality of life implications* that affect millions of Canadians, but the underlying molecular causes of this synergy between aging and inactivity leading to disease processes remain largely unknown.

At the MHRC we have the research talent and exceptional capabilities that allow us to investigate these major age-related decrements in physiological functions, and we can investigate treatment solutions related to exercise, therapy, and nutrient interventions that intervene at various levels of organization (see diagram above). MHRC faculty members and their trainees use *multidisciplinary cellular, molecular and whole body approaches* to study muscle biology in the broadest terms, including muscle and heart development, disease, metabolism, blood supply, injury and regeneration, and adaptation to acute and chronic exercise. These studies allow for an understanding of the **integration of physiological systems** that determine metabolism, locomotion, heart health and quality of life.

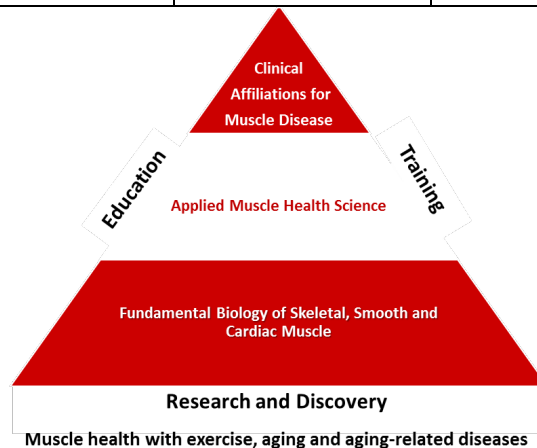


Alignment with Faculty of Health and York University Academic and Research Priorities:

The mission of York University is the pursuit, preservation, and dissemination of knowledge, with a promise to pursue excellence in research and teaching in pure, applied and professional fields. The UAP 2020-25 outlines six priorities and initiatives that guide strategic actions and initiatives. Among these, several priorities stand out as most relevant to the pursuits of the MHRC, including: **1) Knowledge for the Future: from Creation to Application, 2) 21st Century Learning: diversifying whom, what and how we teach, 3) Global Engagement, 4) Working in Partnership, and perhaps most of all 5) Living Well Together (promoting health in the Global Community).** Similar, but more focused priorities exist within the Faculty of Health (IRP 2019-20, Priority 2), to advance exploration, innovation and achievement in scholarship and research, in part by building on existing strengths to enhance current, and create new research partnerships from local to global levels, increasing the breadth of engagement in research, and climbing the national and international rankings for research intensity by enhancing undergraduate, graduate student and post-doctoral fellow education and training.

In view of the breadth of our research programs, spanning skeletal muscle, the heart and smooth muscle regulation of blood flow, work within the MHRC exemplifies interdisciplinarity, a hallmark and priority of the York Strategic Research Plan. In particular, research within the MHRC fully conforms with one of the top research priorities for York University in the area of “Healthy Individuals, Healthy Communities and Global Health”. Within the Faculty of Health, for example, aging research has been identified as a priority area with new academic programs, research collaborations and faculty hires. As described below, muscle health research in the field of *aging and aging-associated diseases* is a key component of the MHRC platform, thereby positioning York University as a potential “Centre of Excellence” in the field of muscle health research in Canada.

Vision	<i>To be Canada’s leader in exercise and muscle health research, training and education</i>				
Mission	To achieve this vision via high quality, individual and collaborative research programs, excellent teaching and training of highly qualified personnel in laboratory, technical and communication skills, and the dissemination of research findings to broader Communities via publications, seminars and social media platforms				
Strategic Priorities	Promoting excellence and innovation in muscle health research, in its broadest terms, including basic science, applied physiology and clinical affiliations (see image below)	Providing a collaborative research and enriched training environment with common useful infrastructure and resources	Ensuring high quality learning in the classroom and advanced technology laboratory training to produce HQP at all levels that have marketable technical and communication skills	Developing national and international visibility for the University, the Faculty of Health, the MHRC and its members via promotion of our basic and translational research	Incentivizing our trainees and faculty members to instill pride in membership, and to promote the MHRC as an important centre for muscle research and training



Opportunities to achieve our Vision:

Our research talents match well with societal trends that influence government and funding agency priorities, including shifting demographics, advances in technology, and a realization of the importance of physical activity in combatting diseases such as cancer, cardiovascular disease, obesity, type 2 diabetes and muscle wasting conditions. We have expertise in the following:

- Research covering the spectrum from genes, to organelles, to cells, organs and the whole body;
- Fundamental basic science and discovery, applied physiology, biomechanics and rehabilitation;
- Muscle and adipose tissue metabolism, fatigue and bioenergetics, gene expression and adaptation during exercise and development;
- Cardiac adaptations to exercise and disease;
- Stem cells, immune cells, endothelial cells and how they support muscle health or provoke pathophysiology;
- Nutritional interventions that support muscle health and adaptations to exercise

Despite the lack of a medical school environment, York University, the Faculty of Health and the MHRC are well-positioned within a surrounding hospital and health care sector in York region, as well as with the UHN. This represents an unprecedented opportunity to develop clinical collaborations with colleagues who would benefit from our strong, multidisciplinary expertise in muscle, cardiac and vascular health.

Given the relevance of our research for so many areas of human health and quality of life, MHRC members must seek opportunities to increase the visibility of our research through every means possible, including publications, websites, and social media outlets. In this way **the MHRC is poised to represent the “face” of the Faculty of Health in the area of muscle health**. We have research strength in this area, and our goal should be to **continue to build upon this**, where we already have a critical mass of scientists, with developing infrastructure and capacity in place.

From an educational perspective, the COVID-19 pandemic has accustomed online education platforms to otherwise unwilling participants. This represents an opportunity to capitalize on our breadth of course offerings in muscle health, exercise and disease, to promote the MHRC and to provide a revenue stream that help support the Centre financially.

We need to continue to develop relationships with industry, particularly those that are local and that have a home-grown interest in supporting our research and education in southern Ontario (eg. Aurora Scientific).

We should build upon the many past successes of MHAD as well as IBEC 2022 to promote sponsorship of our activities and develop research relationships with other academic units, as well as with industry and clinical partners, wherever possible.

Muscle Health Research Centre's 2021-26 Five Strategic Priorities

A. Excellence and innovation in muscle health research	B. Collaborative and enriched training environment	C. Training HQP to be innovators and educators for the current marketplace	D. National and international visibility	E. Incentivizing our MHRC faculty and trainees
<p>A1. Strive to publish in highly respected journals within our field</p> <p>A2. Interact with other MHRC faculty to develop multidisciplinary grant applications for research funds or infrastructure</p> <p>A3. Work to develop clinical partnerships. As a group, establish liaisons at each identified institution for future interactions; create a “network” of clinical scientists with common interests in broad aspects of muscle health</p> <p>A4. Advocate KHS and Biology hiring Committees to hire based on MHRC-specific needs that build research strength</p>	<p>B1. Promote interaction between graduate students and trainees; encourage membership in the MHRC Student Committee from each lab</p> <p>B2. Encourage the participation in group grant applications for common equipment</p> <p>B3. Invigorate the MHRC Student Colloquium series to promote cross education among labs</p> <p>B4. Make new infrastructure known and available to all MHRC colleagues</p>	<p>C1. Use advanced technology to train and support HQP at all levels, with EDI principles in mind</p> <p>C2. Develop micro-credentials that uniquely qualify our HQP; develop a Diploma in Muscle Health and Exercise</p> <p>C3. Provide opportunities for HQP beyond the bench and into classroom, clinic or collaborative environments</p> <p>C4. Teach HQP to communicate effectively using all media available</p> <p>C5. Partner with KMB and Innovation York and FGS for alternative career skills and training for graduate students</p> <p>C6. Continue having an MHRC-Sponsored “Career Day” every 2 years</p>	<p>D1. Acknowledge the MHRC (and FoH) in all publications and seminars</p> <p>D2. Continue expanding the MHRC Seminar series and MHAD</p> <p>D3. Use Twitter and Facebook, website development, CSEP affiliation for promotion and KT</p> <p>D4. Develop a “Muscle Health network” by affirming our current Adjunct members and expanding their numbers and roles</p> <p>D5. Visiting scientist program development</p> <p>D6. Participate in “Paper-of-the-Month” website and lay summary posting</p> <p>D7. Ensure that the KHS and FoH websites help to promote the MHRC (and other ORUs) as a selling feature to come to York</p> <p>D8. Develop possible MOUs with other Muscle Centres for exchange and collaboration, resource sharing</p> <p>D9. Work to enhance “Global Community Engagement”</p>	<p>E1. Establish a \$5000 per year Seed Grant for novel or clinical collaborations</p> <p>E2. Hire a Core facility manager</p> <p>E3. Develop 2 X \$1000 PhD Fellowships for those without external funding in 2nd year</p> <p>E4. Provide MHRC member Grant application mentorship for Tri-Council and Fellowship opportunities</p> <p>E5. Establish a research scholarship with industry and partnering with Mitacs</p> <p>E6. Generate revenue from MHAD for graduate student travel bursaries as well as presentation awards</p> <p>E7. Encourage the nomination of MHRC members for prestigious awards (external and internal)</p> <p>E8. Alter the MHRC Governance to encourage faculty participation on specific goal-oriented committees: <i>Industry, Education, Grant review, Local and International liaison, Core facility maintenance, Clinical partnerships</i></p>

Additional details on how these Priorities will be achieved (by Priority A, B, C, D, E).

- A. Promote the possibility of inter-lab lab meetings; attend student seminars and colloquia; seek out clinical partners through existing collaborations and current ties to hospitals; submit your grant for internal review to the MHRC grant review committee; speak to the Dean regarding input into the Faculty Complement Plan; organize research stream-specific workshops to help develop collaborative grant ideas; discuss what the MHRC needs are regarding future research hires (informatics, genomics, etc);
- B. Post-COVID, promote social gatherings among faculty and grad students at the start of each term; discuss common interests and infrastructure requirements for grant applications within your research sub-group; attend Colloquia; promote equipment sharing and add to the website list; expand the MHRC Student Committee to include representatives from every lab, if possible;
- C. Have lab meetings; take on UG Independent Study or thesis students; investigate alternative optional courses available on campus for alternative career skill development;
- D. Identify researchers in your field that you would like to have visit for 1 week; Continue with international MHAD speakers via Zoom; expand the Adjunct faculty list with expectations of participation for members;
- E. Formalize membership on MHRC Committee and develop the mandate and responsibilities more fully; appeal for research funds from the FoH for the yearly Seed Grant, expansion of PhD fellowships, funds for an external visiting scientist, and ask for central administration funds to support a Core Facility manager. Consider a scholarship for international graduate students; Some funds could be diverted from the Seminar program if Zoom Seminars are continued.

Metrics: How will we quantify our achievements going forward?

Although the External Reviewers strongly supported the existence of the MHRC as well as its added value to York University, they also expressed concern about the need for a more complete set of metrics to evaluate MHRC progress. Thus, we have developed a “Metrics” table that will be used annually to collect data (see Appendix C, below).

Note: This document drew inspiration from several sources, including the KHS Academic plan, the Faculty of Health Strategic Research Plan, the CVR Management Plan, the University Academic Plan (UAP 2020-2025), the MHRC Charter renewal document (2020), the MITO2i development Plan, the Faculty of Health IRP, and the discussion from MHRC Executive Committee meeting, held Mar. 11, 2021.

Appendices:

- A. MHRC Research Clusters
- B. MHRC Internal Committee membership
- C. MHRC Metrics Table for the Annual Report

Appendix A

MHRC Research Clusters for collaborations, grant applications, or lab meeting discussions

Metabolism Research Group		Cardiovascular Research Group		Applied Physiology Research Group		Molecular Basis of Disease Research Group	
Adegoke	Protein metabolism	Backx	Cardiac electrophysiology and exercise	Belcastro	Physical activity, muscle in children	Abdul-Sater	Immunology of exercise
Ceddia	Obesity and exercise	Biro	Angiogenesis in muscle	Drake	Spine biomechanics	Connor	Cancer and metabolism
Cheng	Muscle fatigue and calcium	Edgell	Cardiovascular physiology: sex differences	Gage	Mobility and arthritis with age	Josse	Exercise immune responses and nutrition
Hamadeh	Metabolism	Haas	Angiogenesis in muscle	Hynes	Neck injury, athletic therapy	McDermott	Molecular basis of muscle development
Hood	Mitochondria exercise and muscle	Roudier	Angiogenesis in muscle				
Kuk	Obesity and exercise	Sweeney	Autophagy and metabolism in the heart	This group could be expanded and re-named “Rehabilitation, Movement Disorder Applied Physiology group” if we merged with some members of the proposed ORU.			
Perry	Bioenergetics in muscle	Tsushima	Cardiac metabolism				
Riddell	Diabetes and exercise						
Scime	Muscle and adipose tissue stem cells						

Appendix B: MHRC Sub-Committee structure (May 2021)

Director: Dr. David A. Hood

Associate Director: TBD

Executive Committee: Dr. Peter Backx, Dr. Chris Perry, Dr. Rolando Ceddia, Dr. Michael Connor, Dr. David A. Hood, Dr. Michael Riddell, Mr. Matthew Triolo

MHRC Coordinator: Louise Solomon

All Committee membership below can be expanded; names currently inserted are tentative

Industry Partner Liaisons: Riddell, Perry, others in cooperation with Innovation York

Mandate: to help MHRC members link up with existing industry connections; to help identify new ones.

CSEP and Knowledge Translation Liaison: Perry, others

Mandate: to link with CSEP educational, promotional and funding support initiatives.

Graduate and UG education initiatives Committee: Connor, Belcastro, others

Mandate: to identify and develop a course framework for UG and Graduate micro-credentials that are tied to the MHRC and can add to student qualifications, and focus student education, as well as be revenue generating.

Clinical Partner Liaison: Edgell, Perry, Belcastro

Mandate: to help develop and advise on potential clinical relationships with hospitals

Social Media and website: MHRC Coordinator Louise Solomon, student member(s), Hood.

CIHR Internal Grant Review Committee: Hood, Backx, Abdul-Sater, Haas

Mandate: to provide feedback 1 month prior to the York deadline, advising on science and grantsmanship

NSERC Internal Grant Review Committee: Riddell, Hood, Perry, Drake

Mandate: to provide feedback 1 month prior to the York deadline, advising on science and grantsmanship

Local and International relationships Liaison: Perry, Hood, Ceddia, Birot, Roudier, Haas

Mandate: to develop local and international connections between the MHRC and colleagues, with an ultimate aim of forming a “Muscle Health Network” at the local and international level, mainly via social media platforms and communication.

Core Facility / Vivarium Maintenance Committee: Abdul-Sater, Backx, Hood

Mandate: To ensure cooperation in the maintenance of the facilities and to organize user fees and repair funds when necessary

Graduate Student Committee (8): Matt Triolo (Chair), Catherine Bellissimo, Sarah McGaugh, Shailee Jani, Simona Yakobov, Mayoorey Murugathasan, Daniel Daeira

Mandate: to consider student concerns and advise on programming (Seminar speakers, Career day); to help with MHAD and to promote student involvement from each member laboratory.

Adjunct Faculty Members (and affiliations) (6): Dr. Ira Jacobs (Toronto), Dr. Imogen Coe (Ryerson), Dr. Thomas Hawke (McMaster), Dr. Xavier Bigard (France), Dr. Robert Laham (Clinical Advisor, York), Dr. Shawn Wharton (Obesity Clinic), Dr. Sherry Grace (York).

Appendix C: MHRC Annual Report Metrics table

Reporting year: June 1, 2021-May 31, 2022

A version of this Metrics table will be used in April 2022 for the Annual Report

Please fill in all questions to fulfill our reporting and metrics gathering obligations

Part I: Numerical data

Questions	Response
1. Total # publications in referred journals [to be listed below]:	
2. # of publications in referred journals <i>with other MHRC members</i> :	
3. Total # of grants applied for:	
Identify the agencies and type of grant (eg. NSERC RTI, CIHR Project etc..)	
4. # of collaborative grants applied for <i>with at least 1 other MHRC member</i> :	
Identify the agencies and type of grant, along with MHRC collaborators:	
5. Total research dollars incoming to your lab this year:	
6. Total # of Trainees in your lab this year:	
# undergraduate volunteers, non-academic lab helpers:	
# undergraduate thesis or independent study students:	
# Msc students that you supervise:	
# PhD students that you supervise:	
# of PDFs that you supervise:	
# of technicians or other trainees that you supervise: (specify please):	
11. # of student supervisory committees you participate in (supervising MHRC-affiliated students, other than your own):	
12. # of Media or KT events you participated in this year:	
13. # of invited University Seminars given:	
14. # of talks at National or International Conferences:	
15. Please name any Awards received during this last year:	

Part II: Descriptive data: [Please expand the fields below with inserted text]

List the publications in refereed journals within the reporting year:
Follow your graduates: what are your graduates from this reporting year doing now? Industry, Research, Education? PDF?
Insert name, degree received and current position (be as specific as possible)
<i>Please Answer:</i> How do your CV accomplishments and research directions developed in the last year <i>link to</i> the MHRC? (eg. Trainee support? Infrastructure support via Core facility or vivarium? Collaboration with MHRC members or invited MHRC Seminar speakers? Grant mentorship? Other?)

MHRC-specific metrics
Reporting Year: 2021-2022

As compiled by the MHRC Director and Coordinator (Expand the field where necessary)

Questions	Response
1. # of MHRC Seminars held:	
2. Attendance at Seminars (specifics: # from Canada, USA, Europe, elsewhere) Insert: Seminar #, Month, Name of speaker, University, attendance numbers	
3. MHRC Website traffic per month:	
MHRC Twitter followers as of May 1 of the reporting year:	
4. Attendance at MHAD:	
5. Revenue from MHAD:	
6. # of prizes (and \$) awarded at MHAD;	
7. Attendance at Career Day [list Career Day speakers and source] Insert: Name of Speaker, Affiliation, attendance number	
8.	
# of MHRC internal grant reviews completed	
# of new Faculty members added to the MHRC	
9. Total # of MHRC Trainees, based on reporting from faculty members Undergraduate: MSc: PhD: Post-doctoral:	

MHRC Metrics information from the FoH Research Officer

(draft):

1.	# MHRC-affiliated applications submitted for external funding	
2.	% success rate	
3.	# of MHRC faculty members holding tri-council funding;	
4.	# of MHRC faculty holding external funding from any source;	
5.	\$ of infrastructure funding	

Version 1: May 2021
Updated: August 2022