Charter Application Template
For Organized Research Units

Office of the Vice-President Research & Innovation

Please see the accompanying Guide for instructions on completing this template.

Application for ORU Charter 2013-14

1. ORU Name: **Muscle Health Research Centre (MHRC)**

2. Plain Language Abstract (75 words):

The MHRC consists of well-funded and highly productive scholars and graduate students from the Faculties of Health and Science. Our members perform leading edge research on muscle growth, development, metabolism, disease and adaptation to exercise. The vision statement of the MHRC is *"to be Canada's leading research centre for the study of muscle health and disease"*. We will achieve this through 1) innovative research, 2) the education of qualified trainees, and 3) the translation of our findings for the benefit of all Canadians.

3. Category (check one):

   ☐ Institutional

   ☐ X Faculty Based

4. Principal Applicant and Institutional Sponsors:

	Name	Title & Affiliation	Signature
Principal Applicant	David Hood	Professor, Canada Research Chair	
Department Chair/Unit Head	Angelo Belcastro	Chair, Kinesiology and Health Science	
Sponsoring (lead) Faculty	Health	Dean Harvey Skinner	
Participating Faculty 1	Science	Dean Don Hastie	
Participating Faculty 2			

5. Co-applicant(s), if any (add rows if needed):

Name	Title & Affiliation	Signature
None		

*add rows as needed

6. Executive Committee

Current members (name/title/affiliation)	Proposed members (name/title/affiliation)
Rolando Ceddia, Assoc. Prof., KHS	None
Olivier Birot, Assoc. Prof., KHS	
Robert Tsushima, Assoc. Prof., Assoc. Dean Science, Biology	
Michael Connor, Assoc. Prof. KHS	
Sobia Iqbal, PhD student, KHS	

*add rows as needed

7. Board

Current members (if applicable) (name/title/affiliation)	Suggested members (name/title/affiliation)
No Board currently.	Dr. Harvey Skinner, Dean, Faculty of Health (Chair) Dr. Robert Hache, VPRI (Vice-Chair) Dr. Don Hastie, Dean, Faculty of Science Shirley Freek, Office of Advancement, York University

8. Advisory Committee

Current members (if applicable) (name/title/affiliation	Proposed members (name/title/affiliation
No Advisory Committee currently	We will seek members from the Muscular Dystrophy Association, the Canadian Society for Exercise Physiology, CanFit Pro (Fitness Certification Organization), Quaker Oats (nutrition-performance based company), Goodlife Fitness, and the Canadian Centre for Physical Activity and Aging (Western University), the Faculty of Health Learning and Leadership Network (Tania Xerri) to help us with Continuing Education initiatives and the Faculty of Health Senior Development Officer (Janet Vukovic)

9. Proposed Membership:

We propose the following new members, with the idea of increasing our support for clinically-based studies, spreading the influence of the MHRC across southern Ontario, and promoting interaction among Universities. This is in line with York University Senate Guidelines, which suggest that ORUs should "develop extensive relationships within the region", and "actively engage in knowledge transfer and knowledge mobilization activities".

Name	**Affiliation**	**Role**	**Comments**
Assistant Professor in Cardiovascular Physiology	KAHS	Full Member	New hire being advertised in 2013-14
CRC Tier I or II Chair in Cardiovascular Biology	Biology	Full Member	New hire being advertised in 2013-14
Dr. Robert Laham	Physician, York Lanes Appletree Medical Centre	Adjunct Member	Medical advisor, consultant on clinical research studies
Dr. Sean Wharton	Physician	Adjunct Member	Medical advisor, consultant on clinical research studies
Faculty members from Universities across southern Ontario not yet represented as Adjunct members of the MHRC	Queen's, Western, Waterloo, Wilfrid Laurier, Laurentian, Brock, Ottawa, Guelph, Windsor	Adjunct Members	Contacts within each University to maintain communication among "Muscle Health" researchers

Our current membership consists of 15 Active members at York University, and 4 Adjunct members from other Universities. All York members are active in the events sponsored by the MHRC in the sense that they contribute to fulfilling the mandate of the MHRC by attending, promoting and participating in all MHRC programming. The list of current members is provided in the Table below:

Faculty Member	**Rank**	**Research Area**
School of Kinesiology and Health Science		
Hood, David, A.	Professor, Canada Research Chair, Director of the Muscle Health Research Center	Molecular basis of Mitochondrial Biogenesis in health and disease
Adegoke, Olasunkanmi	Associate Professor	Protein and amino acid nutrition and metabolism
Belcastro, Angelo	Professor, Chair, School of Kinesiology and Health Science	Muscle injury and damage in health and disease
Birot, Olivier	Associate Professor	Vascular plasticity in striated muscle (angiogenesis vs. capillary regression)
Ceddia, Rolando	Associate Professor	Glucose and fat metabolism in muscle and adipose tissue
Connor, Michael	Associate Professor	Muscle Development and Cancer

Gage, William	Associate Professor	Biomechanics of postural control and of joint stability
Haas, Tara	Associate Professor	Angiogenesis in Muscle
Hamadeh, Mazen	Associate Professor	Human Nutrition and Exercise Physiology, Diabetes and ALS
Kuk, Jennifer L.	Assistant Professor	Obesity, CVD, Type 2 diabetes and exercise interventions
Perry, Christopher G.	Assistant Professor	Redox Metabolism, Skeletal Muscle, Diet and Exercise
Riddell, Michael	Associate Professor, KAHS Graduate Program Director	Exercise Physiology, Stress and Diabetes Metabolism
Scime, Anthony	Assistant Professor	Stem Cell Biology; Muscle Regeneration; Adipose Differentiation
Department of Biology		
McDermott, John	Professor	Muscle Development
Tsushima, Robert	Associate Professor, Associate Dean of Science	Cardiac Muscle Physiology and Disease
Adjunct faculty		
Cafarelli, Enzo (Emeritus)	Professor Emeritus	Neuromuscular Physiology
Coe, Imogen	Professor, Dean, Faculty of Science, Ryerson University	Cardiac Muscle Biochemistry
Hawke, Thomas	Associate Professor , Kinesiology, McMaster University	Muscle Development and Regeneration
Jacobs, Ira	Dean, Faculty of Physical Education, University of Toronto	Muscle Metabolism, Applied Physiology and Pharmacology

10. Describe the ORU's progress toward fulfilling its mandate or meeting charter expectations during its current term (for existing ORUs only; 5 pages max).

10.

Introduction: The MHRC's first full year of operation was in 2009-10. The MHRC was modeled after the Copenhagen Muscle Research Centre, which was established in Denmark many years ago, and was the only other "Muscle Research Centre" in the world. Since that time, we have been striving to achieve National and International recognition. Our vision statement is ***"to be Canada's leading research centre for the study of muscle health and disease".*** As such, we are building around a specific focus, and serving as a synergistic hub for convergent programmatic activities. We will fulfill this vision through:

1) Our innovative research, high quality publications and the excellence of our grant funding acquisitions to help support our research and our graduate students;

2) Our programming initiatives, including invited Seminar speakers and Muscle Health Symposia, as well as student and faculty Colloquia. This provides a rich training environment for undergraduate and graduate students, as well as postdoctoral fellows;

3) The continued growth of our membership base, to include additional York University faculty members, as well as Adjunct faculty members and students from other institutions. This helps to develop extensive research relationships within the region, as well as nationally;

4) Educational outreach to Canadians via Continuing Education programs (see below), as promoted through our website and other social media networks.

These objectives are entirely consistent with the Senate Guidelines and Policies regarding the expectations for ORU activity at York University. Progress in these areas is documented below:

Publications and funding: A review of our most recent Annual Report will reveal that the MHRC is fulfilling its mandate in promoting muscle research for the health and well-being of Canadians. We are very successful at obtaining NSERC, CIHR, Heart and Stroke Foundation and Canadian Diabetes Association research funding. Some highlights of this funding include:

1) The acquisition of two CIHR grants valued at more than $1.1M over the next 5 years to study the regulation of gene expression in cardiac and skeletal muscle cells (McDermott);

2) A new 5 year CIHR grant ($580k) for the study of mitochondria in aging muscle (Hood);

3) New NSERC Discovery grants awarded to both Perry and Scime

4) CFI infrastructure funding award to Scime ($342k).

5) Heart and Stroke Foundation funding for the study of Race/ethnicity and the perception of Diabetes and cardiovascular disease risk factors (Kuk).

6) NIH grant for the development of an artificial pancreas (Riddell).

7) NSERC Research Tools and Instruments grants awarded to Haas and Birot for a "Multi-modal plate reader";

8) NSERC Research Tools and Instrument grant for an "Ultracentrifuge and Rotors" (Hood). This latter award, amounting to $143,000, will substantially ease the burden on the one existing system on the York campus, for the benefit of all MHRC members.

9) Funding from Panacea Global, a cancer screening company, in the form of equipment and resources for the development of a cancer screening service lab, which will foster research collaboration and provide income to support the MHRC.

We have also submitted an internal Notice of Intent for a Canada Foundation for Innovation (CFI) grant amounting to more than $1.5M. The purpose of this collaborative, group application is to provide infrastructure funding for the development of a centralized, novel, multi-disciplinary Core Research Facility devoted to the study of skeletal muscle. It is expected that this facility will serve as a catalyst for the growth of important collaborative research projects on muscle metabolism, development, disease and adaptation among members of the MHRC, and will help to situate the MHRC as an internationally renowned research facility, serving to attract both Canadian and international collaborators, and high quality trainees. The funds will be used, in part, for the renovation of the current animal care facility (i.e. rodent vivarium), as well as the re-organization of research laboratories for the incorporation of common infrastructure (i.e. core equipment). The facilities will be used for muscle physiological, biochemical and molecular biology assessments in cells, animals and humans. A clinical research unit will also be included for the acquisition and assessment of human blood and muscle samples.

Over the last year alone, our members published more than 80 articles as book chapters or in top-ranked physiology, biochemistry and molecular biology journals, including the Journal of Biological Chemistry (Hood), American Journal of Physiology (Ceddia), FASEB Journal (Birot), Canadian Journal of Physiology and Pharmacology (Belcastro), PLoS One (Adegoke, Haas, Hamadeh), Obesity (Kuk), Molecular and Cellular Biology (McDermott), Diabetes (Perry), Applied Physiology, Nutrition and metabolism (Adegoke), Journal of Molecular and Cellular Cardiology (Tsushima) and the Canadian Journal of Diabetes (Riddell), to name a few. Several of these journals are classified as "Open Access". MHRC graduate students are generally listed as first authors on these publications. Our most compelling and newsworthy publications are featured monthly on the MHRC website as the "Papers-of-the-Month", and are summarized in lay language to achieve a broader understanding of the significance for the health of Canadians.

Programming: The MHRC continues to expand its activities every year, consistent with the goal of uniting muscle health researchers and graduate students, and of providing a platform which will serve to increase the visibility of York University, and the MHRC, in Canada and around the world. Since 2009, we have featured 17 speakers from York University, and have invited 48 scientists from external institutions to speak within the events described below (see the list of Speakers in the Appendix).

We typically feature 3 types of educational events:

1) Colloquia, featuring internal speakers (faculty and/or graduate students) who discuss their work in an informal, interactive research presentation. This type of function helps us to interact amongst ourselves, and it fosters research collaboration. Attendance at the Colloquia usually averages about 50 graduate students and faculty members.

2) Seminars, in which external speakers from other Universities are invited to present their work, and to interact with faculty members and graduate students. Each seminar day consists of a) a meeting between the guest scientist and graduate students to discuss science in general, career options and a specific research paper chosen by the speaker, b) meetings with other interested MHRC faculty members, c) lunch with faculty members, and d) the research Seminar itself. Attendance at Seminars can range from 25-40 people.

3) The Annual Muscle Health Awareness Day (MHAD). This research day represents the highlight event of the year for our research centre. We have held four MHADs thus far, and it grows progressively every year. Typically 9-10 external speakers are invited, 40-50 posters are presented by graduate students, and most recently (MHAD4, 2013) the total registration was 120-130 people. All speakers present high level talks about their research. In addition, there are sufficient breaks throughout the day to permit interactions among graduate students and faculty members at the poster sessions. In 2013, we were able to attract some corporate sponsorship for the event, for the first time. The ratio of external-to-internal attendees has progressively increased, indicating more regional awareness of the event. By all metrics, MHAD has been extremely successful, and we will continue to develop this event on a yearly basis.

Continuing Education: For the first time this year, the MHRC will offer Continuing Education programs in Neuromuscular Physiology, Exercise and Sports Physiology, and Review of Muscle

Physiology, specifically targeted toward Massage Therapy professionals. The goal of this is to spread our knowledge of muscle health to the community at large, and for the generation of revenue to support the activities of the MHRC. We intend to expand this initiative (see below).

Membership: The MHRC has a critical mass of 15 Full, and 4 Adjunct faculty members. We anticipate further growth with two new hires that are currently being advertised. One advertisement is for a Cardiovascular Physiologist in the School of Kinesiology and Health Science. The other is directed toward hiring a Tier I or Tier II Canada Research Chair in Cardiovascular Biology in the Department of Biology. In addition, we currently have more than 100 trainee (PDFs, PhD, MSc and undergraduate students) members of the MHRC, mostly from within York University, but also from Universities throughout southern Ontario. This student membership is vital for our success as an organization. Students are eligible for the MHRC Student fellowship, and they participate in program decision-making through the Graduate Student Committee. Our intent is to continue to grow student involvement and participation within the MHRC (see below).

Our membership represents a unique strength of scientists in the area compared to anywhere else in Canada, indeed in North America. We will be the largest group of muscle health researchers spanning the spectrum of investigation from cells, to animal models, to human studies - the largest translational research facility for muscle health in Canada, with relevance to multiple muscle-related disorders. There is no comparable institution in the country.

11. Charter Proposal

(a) Describe the most promising research opportunities for the ORU over the term of the proposed charter. 5 pages max; see Guide for additional instructions on content)

Nature, themes and timeliness of the research undertaken within the MHRC: The MHRC is an Organized Research Unit with faculty members and their graduate students who study skeletal muscle, its blood supply, and its relationship to other important organs such as the heart and adipose tissue (fat), in health, in aging, and in disease (e.g. cancer, diabetes, neuromuscular disease, obesity). This research focus is both timely, and vitally important given our increasingly "aging" demographic, as well as our preponderant society characterized by physical inactivity, overweight/obesity and metabolic diseases such as Type 2 Diabetes. These are processes and conditions which largely affect skeletal muscle, denoted by atrophy and metabolic dysfunction. Of great interest to our research group is the fact that much of this dysfunction can be reversed or attenuated by appropriately styled programs of physical activity. Research within the MHRC delves deeply into mechanistic comparisons between health, disease, aging and the effects of exercise. Our research approaches are multi-disciplinary, involving the study of muscle at all levels of organization: from molecules and cells, to organ function and to whole body metabolism. The experimental models that are routinely employed include the use of muscle and fat cells in culture, along with animal and human subjects.

The necessity and added value of the MHRC: The MHRC and its programs offer an invaluable educational experience for its faculty members and students. In its absence, there would be no Seminar series, no student interactions with guest scientists, no Colloquia or

Symposia, no Graduate Student committee to organize events, and no Muscle Health Awareness Day, an immensely popular event which is the highlight of our yearly calendar. This educational program encourages and fosters interaction among all of our members, promoting discussion and collaboration. The MHRC is the only mechanism available to help focus and align the common interests of our 15 faculty members and their students, thereby facilitating collaboration amongst ourselves. In addition, faculty members commonly use our connections within the MHRC to share grant funding applications for internal review. This serves as an informal mentorship program which is vital for the success funding of junior faculty members.

From a research perspective, the MHRC provides a focus for initiating collaborative discussions. As its visibility and reputation increase, it serves as clear point of entry for scientists exterior to the University to connect with muscle health researchers. In addition, our developing MHRC Core Facility will house common resources and equipment to be shared among all members. We have the space allocation for this Facility, and we are now preparing to deploy it as we await approval of potential CFI funding. Although this initiative is in its infancy, we believe that the added-value of this Core Facility, combined with the educational programming provided by the MHRC, is large and immeasurable.

How the MHRC complements existing institutional strengths: York University is a large comprehensive institution which is constantly striving to increase its research intensity. The MHRC is an important component of achieving this goal at York, because the MHRC has an extremely strong culture of research intensity. All of our researchers are well-funded, they promote and support graduate student education, and they publish their work. In addition, the MHRC is the only Organized Research Unit within the University which is devoted to the Biomedical Sciences at the cellular and molecular level. Its existence puts York University "on the map" in this area, promotes its visibility, and is a model of research excellence for the entire institution.

Alignment with the University Strategic Research Plan: 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 skeletal muscle health. In view of the breadth of our research programs, research within the MHRC exemplifies interdisciplinarity, a hallmark and priority of the York Strategic Research Plan. Our research is also nicely aligned with the themes of "Advancing fundamental discovery and critical knowledge" and "Exploring the frontiers of Science and Technology" – recognized strengths in the Strategic Research Plan. In particular, work 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. Muscle health research in the field of aging and aging-associated metabolic diseases is a key component of the MHRC research platform, thereby making York University a centre of excellence in the field of muscle health research.

Anticipated external funding to finance its activities: We have been fortunate until now to have been financially supported by the Faculties of Health and Science since our inception. We

are now actively seeking to support ourselves and become self-sufficient via a variety of mechanisms:

1) The development of Continuing Education programs for various groups, including Message Therapy professionals, Nurses, and Fitness Assessment and Counseling. In the future we will also offer physiology courses for Kinesiology graduates who seek to maintain accreditation with the Ontario College of Kinesiologists.
2) Collaboration with industry on several fronts. One of these is with Panacea Global, a cancer screening company with research interests that complement several of our members. We will supply the space, and Panacea will donate the supplies, equipment, and serum samples for analysis. We will provide a diagnostic service and receive income based on a fee per sample basis. This is a model that could be expanded to other areas if proven successful. Another company is OmniActive Health Technologies Canada, a Natural Health Product company with an interest in muscle health and obesity. They are seeking to evaluate the beneficial effects of their nutritional supplements on muscle strength, endurance and protein synthesis. These are analyses that we routinely perform, and income would be on a contract basis.
3) Continuous interaction with our Development office within the University to promote outreach and the visibility of the MHRC among members of the public, in an effort to seek interested financial contributions from potential benefactors. In seeking this, we appreciate that our research messages must be relevant to all Canadians, and easily marketable. We are working on the further development of our MHRC website, our Facebook page, Webinars and blogs on "Muscle Health", and the dissemination of our findings via publications.
4) Attraction of more industry sponsorship and augmentation of the registration fee for our yearly Muscle Health Awareness Day.

Collaborative grants: There are a number of possible collaborative grant opportunities that exist which the MHRC would qualify for. These include funding from 1) the NSERC-CIHR Collaborative Health Research Program (CHRP), 2) CIHR Catalyst grants, and 3) CREATE grants. We will seek funding from the CHRP in the Spring (2014), and we routinely submit internal Notices of Intent to apply for Research Tools and Instruments (RTI) funding from NSERC for shared equipment.

Knowledge mobilization: In addition to our increasing use of social media (see above), all MHRC faculty members are involved in promoting knowledge mobilization of their research via the MHRC website. Newly published papers-of-the-month are summarized in easy to read language for public dissemination. Many members have had their work featured in Y-file, and some members spend considerable time promoting muscle health, metabolism, obesity and diabetes education to the public. Several MHRC members have had media interviews in the past year to promote muscle health in their specific areas. We maintain an up-to-date website, and have student volunteers who monitor and maintain the Facebook page.

Training environment for students and PDFs: MHRC faculty members are extremely active in the training and development of graduate students. We directly trained and mentored 57 MSc and PhD students, 56 undergraduate students, and 4 post-doctoral fellows over the past year alone. Exposure to MHRC research Seminars and Colloquia provides the opportunity to realize

the potential for cross-training among research groups, to appreciate the work of others within, or outside the MHRC, to share equipment and facilities, and to collaborate. The visibility of the MHRC also provides the exposure needed for industry collaboration, and this opens the opportunity to apply for Mitacs funding, an initiative which we have begun to actively explore. Mitacs provides matching funds with industry to support graduate student stipend and partial research costs. At least one application has been submitted thus far.

Should the MHRC continue to be Faculty Based, or Institutional?
Our Faculty members are largely based within the School of Kinesiology and Health Science (13) with some in the Faculty of Science (2). This does not appear to represent enough Faculty diversity to warrant becoming an Institutionally-based ORU. The faculty of Health has provided most of the resources required for our success to this point, and is eager to continue supporting our activities. By the same token, MHRC members are content to remain closely affiliated administratively with the Faculty of Health.

How will the MHRC achieve greater National or International prominence? Our researchers will continue to publish at the high rate at which they are accustomed, and we will promote our activities electronically and via social media. We will also continue to invite outside speakers and guests to Seminars and to the Annual Muscle Health Awareness Day. Many of our faculty members are regularly invited to speak at international Symposia, Conferences and Seminars where we promote the activities of the MHRC. For example, Riddell was recently invited to Brazil, and Hood was invited to Korea to give lectures in our specialty areas. These are great opportunities to promote the science and scholarship of our MHRC. Hood will give seminars at the Universities of Florida, East Carolina, Missouri and Rochester, and Chair a Symposium at the Experimental Biology meeting in San Diego within the next 6 months, providing just one example of the number of opportunities that we have to promote MHRC-driven scientific achievements. Perry has active collaborations with members of the Karolinska Institute in Stockholm, Sweden, and such interactions naturally increase the prominence of the MHRC. We are full participants in a number of national organizations, such as the Canadian Society for Exercise Physiology, the American Physiological Society and the Canadian Nutrition Society, and when we attend those meetings with our students, we advertise and promote the reputation of the MHRC. Thus, we are very pro-active in the dissemination of our research findings and activities, and we increase the visibility of York University in the process.

(b) Describe any other benefits of the ORU and its activities that have not been fully captured by the information in 10(a) above (optional - up to 1 page)

None

(c) Define the expectations, projected deliverables, and evaluation metrics for the proposed charter period. (2 pages max)

We have an ambitious plan for growth over the next 5 years:

a) **Finances:** We will aggressively pursue industry liaisons to forge research collaboration and service agreements. We will also develop more Continuing Education programs for health professionals to improve our community outreach and for revenue purposes. Interactions with the Advancement Office will increase as we seek potential donors who are interested in our research and its potential relevance to the health of Canadians. These initiatives are a top priority as we seek to become self-sufficient financially;
b) **Knowledge mobilization:** Central to the acquisition of funding is an improvement in our "message" to Canadians, who we are, what our mission is, and what we do. We will endeavor to improve this with the guidance of the Knowledge Mobilization unit and the faculty of Health Communications experts at York;
c) **Programming:** Once greater financial stability is achieved, we aspire to grow our educational programs further, to include 1) more seminars per year, 2) an expansion of the Muscle Health Awareness Day, and 3) increased community-based interactions to help spread the muscle health message to the public;
d) **Student Fellowships and Faculty Awards:** Depending on the finances available, we hope to increase the amount of funding contributions to deserving MSc and PhD students. These fellowships are directly applied to student tuition fees, and this is greatly appreciated by graduate students at all levels. In addition, we would like to increase our yearly allocation of MHRC Faculty Research Grant to help the research programs of our productive faculty members;
e) **Collaborative group grants:** We currently have a CFI internal Notice of Intent submitted for an MHRC Core Facility. A number of other group grant initiatives are available, including the Collaborative Health Research Program (CHRP), Catalyst Grants (CIHR), NSERC Research Tools and Instruments (RTI) grants, and CREATE grants. The CHRP grants are also attainable at our current stage of unit development, and we will pursue this in the Spring, 2014. CREATE grants require more industry partners and collaborators, a process which will require more time to develop.
f) **MHRC student-based activities:** We will continue to improve the involvement of our student members. As a start, we have created an MHRC Student Committee to provide input into our programming and direction, particularly with regard to student interests. In particular, the mandate of this Committee is to provide more student input regarding MHRC Seminars and the Muscle Health Awareness Day program. Our students now manage the MHRC Facebook page, and we have a student-invited Seminar speaker for the first time this year. We are developing a Career Workshop for those interested in the industrial, hospital, college or pharmaceutical sectors. We are also sponsoring our first MHRC Student Colloquium, in which graduate students will present their work orally and respond to questions;
g) We will consider developing an **MHRC Summer School / Workshop** related to teaching the skills of cellular, animal and human muscle research to visiting students. This could serve to spread the word about the MHRC more nationally and internationally, and provide some income for the Centre;
h) The MHRC will try to promote more **collaborations** between laboratories both within, and outside of York University;
i) An ambition within the next 5 years is to develop a "Muscle Health Network" among like-minded researchers in southern Ontario, upstate New York and northern Michigan. This geographical area is densely populated with "muscle health" researchers, and it has

enormous potential for interaction, collaboration and the advancement of science. The long term goal would be the development of a **Research Centre of Excellence** in Muscle Health. As a first step, we will seek more involvement from our adjunct MHRC Faculty members at Ryerson University, the University of Toronto and McMaster University, and find ways to expand our membership to other universities with incentives for participation.

12. Directorship

The Director is **Dr. David Hood**, appointed for a second 5 year term (2013-2018)

Appendices:

A List of Invited Speakers and their research topics since 2009.

B Sponsoring and Participating Faculty Letters of Support **(to be attached).**

C 5 Year budget **(attached).**

D This is our first review process. The last 2 Annual Reports are **attached**.

List of MHRC Colloquia Speakers

	Speaker Name	University	Topic
1	Dr. Tara Haas	York	Angiogenesis, muscle
2	Dr. Rolando Ceddia	York	Obesity, muscle
3	Dr. William Gage	York	Biomechanics, gait
4	Dr. Imogen Coe	York	Cardiac transporters
5	Dr. Robert Tsushima	York	Ischemia, cardiac tissue
6	Dr. Mazen Hamadeh	York	ALS, Nutrition
7	Ms. Mandeep Gaidhu	York	Obesity, muscle
8	Dr. Jennifer Rose	York	Cardiac transporters
9	Dr. Michael Connor	York	Cancer, cytokines
10	Mr. Keir Menzies	York	Mitochondria, muscle
11	Dr. Angelo Belcastro	York	Protein degradation, exercise
12	Dr. Michael Riddell	York	Diabetes, muscle, glucocorticoids
13	Dr. Christopher Perry	York	Insulin sensitivity, redox signaling
14	Dr. Anthony Scime	York	Stem Cells
15	Dr. John McDermott	York	Muscle differentiation
16	Dr. Ola Adegoke	York	Muscle protein synthesis
17	Dr. Olivier Birot	York	Muscle angiogenesis

List of MHRC External Seminar Speakers

	Speaker Name	University / Affiliation	Topic
1	Dr. Bengt Saltin	Copenhagen Muscle Research Centre, University of Copenhagen	Exercise, fatigue, glycogen
2	Dr. Vicki Baracos	Alberta	Cancer cachexia
3	Dr. Patrick Seale	Pennsylvania, USA	Brown/beige fat
4	Dr. Jason Fish	Toronto	Angiogenesis, muscle
5	Dr. Sabah Hussain	McGill	Autophagy, muscle
6	Dr. Ilona Skerjanc	Ottawa	Cardiomyogenesis
7	Dr. Guillaume Grenier	Sherbrooke	Muscle trauma
8	Dr. Marius Locke	Toronto	NFkB, Muscle
9	Dr. Sandra Peters	Brock	PLIN, PKA, muscle
10	Dr. Scott Heximer	Toronto	Cardiac muscle
11	Dr. Gianni Parise	McMaster	Satellite cells, muscle
12	Dr. Ingrid Tein	Hospital for Sick Children	Mitochondrial disease
13	Dr. Graham Holloway	Guelph	Fatty Acids, Muscle
14	Dr. Greg Wells	Toronto	Exercise performance
15	Dr. Anthony Gramolini	Toronto	Sarcoplasmic reticulum function
16	Dr. James Rush	Waterloo	Hypertension, muscle
17	Dr. Kyra Pyke	Queen's	Muscle, blood flow
18	Dr. Celine Boudreau	Laurentian	Cytoskeletal proteins in muscle
19	Dr. Russ Tupling	Waterloo	Sarcolipin, muscle
20	Dr. Peter Tiidus	Wilfred Laurier	Hormones, muscle
21	Dr. David Malkin	Toronto	Rhabdomyosarcoma muscle
22	Dr. Simon Lees	Laurentian	Satellite cells, muscle
23	Dr. Greg Steinberg	McMaster	AMPK, muscle
24	Dr. Mark Tarnopolsky	McMaster	Mitochondrial disease, exercise
25	Dr. Tom Hawke	McMaster	Satellite cells, muscular dystrophy
26	Dr. Greg Cartee	Michigan, USA	Insulin sensitivity, muscle
27	Dr. Jack Goodman	Toronto	Cardiac adaptations to exercise
28	Dr. Coral Murrant	Guelph	Angiogenesis
29	Dr. Maureen MacDonald	McMaster	Blood flow in muscle
30	Dr. Tami Martino	Guelph	Circadian rhythms and the heart
31	Dr. Joe Quadrilatero	Waterloo	Apoptosis, muscle
32	Dr. Eldad Zacksenhaus	Toronto	Myogenesis
33	Dr. David Wright	Guelph	Adipose tissue, muscle
34	Dr. Ian Scott	Hospital for Sick Children	Muscle development
35	Dr. Robert Dirksen	Rochester, USA	Calcium, muscle
36	Dr. John Grande	Hospital for Sick Children	Neuromuscular junction
37	Dr. Jeffrey Horowitz	Michigan, USA	Metabolism, exercise
38	Dr. Bernard Jasmin	Ottawa	Muscular dystrophy
39	Dr. Jayne Kalmar	Wilfrid Laurier	Neurological, muscle
40	Dr. Geoff Pickering	Western	Angiogenesis, muscle
41	Dr. Lawrence Spriet	Guelph	Mitochondria, muscle
42	Dr. Michael Tschakovsky	Queen’s	Muscle blood flow regulation
43	Dr. Rene Vandenboom	Brock	Myosin light chain phosporylation
44	Dr. David Williamson	Buffalo, USA	Cell cycle in muscle
45	Dr. James Carson	South Carolina, USA	Cancer cachexia
46	Dr. Daniel Kane	St. Francis Xavier	Mitochondria, muscle
47	Ms. Marion Pauly	Montpellier, France	Muscle autophagy
48	Dr. Michael Rudnicki	Ottawa Hospital Research Institute	Stem cells, muscle

Muscle Health Reseach Centre: 2014-2019 Budget Plan						
Revenue	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	
Muscle Health Awareness Day sponsorship	2,000	2,500	2,500	2,500	2,500	
Muscle Health Awareness Day conference registration fees	1,750	2,000	2,000	2,250	2,250	
Continuing professional development workshop fees	1,500	1,500	2,000	2,000	2,500	
Diagnostic services fees (@ $5/sample)	2,500	2,500	3,000	3,000	3,500	
Anticipated overhead from research contracts	1,000	1,000	1,500	1,500	1,500	
Contribution from Health - Director's course release (1.0 FCE)	20,000	20,000	20,000	20,000	20,000	approximate
Contribution from Health - under discussion						TBD during November
Costs covered by Director's CRC	10,000	10,000	10,000	10,000	10,000	
Total Revenue	**38,750**	**39,500**	**41,000**	**41,250**	**42,250**	
Expenses						
Operating Expenses						
Director's Stipend and Benefits	7,200	7,200	7,200	7,200	7,200	
Director's course release (1.0 FCE)	20,000	20,000	20,000	20,000	20,000	approximate
Admin Support (CUPE GA 270hr + 135hr assignment @ 60%)	10,920	10,920	10,920	10,920	10,920	approximate
Office/Computer Supplies	1,200	1,200	1,200	1,200	1,200	
Telephone	1,200	1,200	1,200	1,200	1,200	
Research, Training and KMb Expenses						
MHRC Faculty Research Awards (1 @ $3000)	3,000	3,000	3,000	3,000	3,000	seeking donor
MHRC Student Scholarships (2 @ $1000)	2,000	2,000	2,000	2,000	2,000	seeking donor
Muscle Health Awareness Day	5,000	5,000	5,000	5,000	5,000	seeking additional sponsors
Poster Prizes for Muscle Health Awareness Day (4 @ $150)	600	600	600	600	600	seeking additional sponsors
Seminar series - hospitality and invited speakers	4,500	4,500	5,000	5,000	5,000	
Total Expenses	**55,620**	**55,620**	**56,120**	**56,120**	**56,120**	
Total Revenue Less Expenses	**(16,870)**	**(16,120)**	**(15,120)**	**(14,870)**	**(13,870)**	
Carryforward From Previous Year	**25,000**	**8,130**	**(7,990)**	**(23,110)**	**(37,980)**	
Carryforward to Next Year	**8,130**	**(7,990)**	**(23,110)**	**(37,980)**	**(51,850)**	

Muscle Health Research Centre Annual Report
July 1, 2011 - April 30, 2012

Director:	David A. Hood
Admin Contact:	Ayesha Saleem
Address:	302 Farquharson
Tel:	Ext 66640
Fax:	Ext 55728
E-Mail:	dhood@yorku.ca or mhrc@yorku.ca
Website:	http://www.yorku.ca/mhrc/

1. Mandate of the Unit

The mandate of the MHRC is to provide a centralized and focused research emphasis on the importance of "muscle health" for the overall health and well-being of Canadians. The MHRC became York University's first organized research unit (ORU) in the Faculty of Health dedicated to Biomedical Sciences, and it continues to increase the University's visibility in this important area of research. The MHRC consists of a strong cohort of very well-funded and highly productive scholars (including a Canada Research Chair) and graduate students from the Faculty of Health and the Faculty of Science & Engineering. Its intent is to become a renowned centre for muscle health research in North America.

2. Organizational Structure of the Unit

Executive Committee (elected for a 3 year term):
Director: David A. Hood
Faculty Members: Mike Connor, Olivier Birot (both Kinesiology and Health Science) and Robert Tsushima (Biology);
PhD student member: Sobia Iqbal.
Advisory Board: we do not have one

3. Membership List

Appendix A contains the list of the 15 active, 2 Adjunct and 1 Emeritus Faculty members of the MHRC in 2011-12. We added a new member this past year, Dr. Jennifur Kuk, who studies obesity, exercise body composition and health risk factors. New members to the MHRC require a nomination from an existing member, and membership is voted upon by the group. Support by fifty percent plus one of the existing members is required to gain MHRC membership.

4. Activities of the Unit

The research accomplishments of the MHRC are outlined in detail in Appendices B (Funding obtained), C (Awards) and D (Publications in peer-reviewed journals). It is very clear from these extensive lists that the MHRC is fulfilling its mandate in promoting muscle research for the health and well-being of Canadians. We are very successful at obtaining NSERC, CIHR, Heart and Stroke Foundation and Canadian Diabetes Association research funding, at publishing our findings.

We held a successful Research Colloquium in the Fall of 2011, attended by approximately 70 faculty members and students. In addition, we brought in our first MHRC-sponsored external speakers in the Winter term, 2012. These were Dr. Vickie Baracos (University of Alberta) and Dr. Patrick Seale (University of Pennsylvania). They spoke on the topics of "Cancer Cachexia" and Brown Fat Gene Expression", respectively, two topics that are very current in the literature on muscle health and metabolism. We are currently planning our most successful event of the year, the Muscle Health Awareness Day (MHAD). In May, this will represent our 3rd annual event of this kind continue to develop and expand the annual Muscle Health Awareness Day. Thus, we had a very successful year, and we continue to expand our functions and our outreach.

- Number of Collaborative grants between MHRC members: (**3**; See Appendix B).
- Number of collaborative peer-reviewed publications between MHRC members: (**8**, see Appendix D)

5. Measures taken to Promote Equity as Enunciated in the University Academic Plan

There are now 3 female faculty members and 1 female administrative assistant within the MHRC out of 16 members. This inequity can be addressed within the hiring of future faculty members in both the faculty of Health and the faculty of Science and Engineering. However, student membership is more evenly balanced, at approximately 45% female, and 55% male. Our list of research publications and grants provide clear evidence for excellence and innovation in research. This fulfills an important component of the mandate of the University Academic Plan.

6. Statement of Operations

Attached along with this document for 2011-12.

7. Budget for Current Fiscal Year

Attached along with this document for 2011-12.

8. Graduate Training Activities/Accomplishments

In its third full year of operation, the MHRC had 66 graduate student and trainees (50% male, 50% female):

Post-doctoral fellows: - 6
PhD students: – 13
MSc students: – 34
Undergraduate students: – 13
TOTAL current trainees: - 66
Alumni – 37

9. Any Changes in Physical Space at the Unit: None.

10. List of all Contractual Obligations Entered into By or on Behalf of the Unit: None.

Updated: May 15, 2012

Muscle Health Research Centre

Contact list

Faculty Member	Rank	Research Area	Office Number/ E-Mail	Office Location
School of Kinesiology and Health Science				
Hood, David	Professor, Canada Research Chair, Director of the Muscle Health Research Center	Molecular basis of Mitochondrial Biogenesis in health and disease	dhood@yorku.ca (416)736-2100 x 66640	Farquharson Building, 302
Adegoke, Olasunkanmi	Assistant Professor	Protein and amino acid nutrition and metabolism	oadegoke@yorku.ca (416)736-2100 x 20887	Norman Bethune College, 362
Belcastro, Angelo	Professor, Chair, School of Kinesiology and Health Science	Muscle injury and damage in health and disease	anbelcas@yorku.ca (416)736-2100 x 21088	Norman Bethune College, 333B
Birot, Olivier	Assistant Professor	Vascular plasticity in striated muscle (angiogenesis vs. capillary regression)	birot@yorku.ca (416)736-2100 x 44043	Norman Bethune College, 353
Ceddia, Rolando	Associate Professor	Glucose and fat metabolism in muscle and adipose tissue	roceddia@yorku.ca (416)736-2100 x 77204	Lumbers Building, 225A
Connor, Michael	Associate Professor	Muscle Development and Cancer	mconnor@yorku.ca (416)736-2100 x 77206	Lumbers Building, 224
Gage, William	Associate Professor	Biomechanics of postural control and of joint stability	whgage@yorku.ca (416)736-2100 x 33027	Sherman Health Science Research Centre, 2022
Haas, Tara	Associate Professor	Angiogenesis in Muscle	thaas@yorku.ca (416)736-2100 x 77313	Farquharson Building, 341
Hamadeh, Mazen	Associate Professor	Human Nutrition and Exercise Physiology, Diabetes and ALS	hamadeh@yorku.ca (416)736-2100 x 33552	Norman Bethune College, 365
Kuk, Jennifer L.	Assistant Professor	Obesity, CVD, Type 2 diabetes and exercise interventions	jennkuk@yorku.ca (416)736-2100 x 20080	Sherman Health Science Research Centre, 2002
Riddell, Michael	Associate Professor, KAHS Graduate Program Director	Exercise Physiology, Stress and Diabetes Metabolism	mriddell@yorku.ca (416)736-2100 x 40493	Norman Bethune College, 347
Scime, Anthony	Assistant Professor	Stem Cell Biology; Muscle Regeneration; Adipose Differentiation	ascime@yorku.ca (416) 736-2100 x33559	Norman Bethune College, 327C

Department of Biology				
Coe, Imogen	Professor and Chair, Dept. of Biology	Cardiac Muscle Biochemistry	coe@yorku.ca (416)736-5243	Farquharson Building, 246 A
McDermott, John	Professor and Biology Graduate Program Director	Muscle Development	jmcderm@yorku.ca (416)736-2100 x 30389	Farquharson Building, 327
Tsushima, Robert	Associate Professor	Cardiac Muscle Physiology and Disease	tsushima@yorku.ca (416)736-2100 x 20996	Farquharson Building, 344
Adjunct Members				
Cafarelli, Enzo (Emeritus)	Professor Emeritus	Neuromuscular Physiology	ecaf@yorku.ca	
Hawke, Thomas	Associate Professor	Muscle Development and Regeneration	hawke@mcmaster.ca	McMaster University
Jacobs, Ira	Dean, Faculty of Physical Education	Muscle Metabolism, Applied Physiology and Pharmacology	ira.jacobs@utoronto.ca	University of Toronto
MHRC Coordinator				
Saleem, Ayesha (till June 2012)	Graduate Student		asaleem@yorku.ca X 77832	Farqhuarson Bldg, 342 X 22999 Fax: 416-650-8483

Appendix B: FUNDING RECEIVED or CONTINUING between July, 1 2011 – April 30, 2012

1. O. Adegoke

- NSERC Discovery Grant, 2008/2009 Competition: $100000.00 over 5 years to study 'Mechanism of nutritional regulation of protein metabolism in skeletal muscle'.

2. O. Birot

NSERC discovery grant (5 years)
France-Canada Research Fund (FCRF 2011)

3. R. Ceddia

NSERC *Discovery Grant*
Project Title: Regulation of whole-body energy metabolism
Funding period: 5 years (2011 – 2016) Amount awarded: $200,000.00

4. I. Coe

EXTERNAL RESEARCH FUNDING

1. NSERC Discovery Grant 2011-2016 $56,000 per year.

2. 2007-2012, Canadian Institutes for Health Research Operating Grant
Amount: $541,930
Role of Nucleoside Transporters in Cardiovascular Physiology

3. 2012: NSERC RTI; "Components to support a Spinning Disk Confocal Microscope" $140,767.

5. M. Connor

Natural Sciences & Engineering Research Operating Grant
$29,500/yr 09/2006- 08/2011

6. W. Gage

Title: Acute effects of mechanical loads on bone and cartilage turnover:
A pilot study to develop a model for human research.
Investigators: William Gage (PI), David Hood (co-Applicant), Jason
Vescovi (co-Applicant)
Amount: $98,875

7. T. Haas

New: NSERC Research Tools and Instrumentation; $140,767 (Dr. Imogen Coe, PI +6 co-applicants)
Continuing:
2010 Heart and Stroke Foundation of Ontario; $75,000/year (3 years);

2008 NSERC Discovery Grant (renewal); $40,050/year (5 years).

8. D.A. Hood

2011-17 Canadian Institutes for Health Research (CIHR) Research Grant entitled "Autophagy in skeletal muscle" (103,661 per year). (New, July 1, 2011);

2008-12 Canadian Institutes for Health Research (CIHR) Research Grant entitled "Mitochondria in aging muscle" (106,000 per year);

2011-16 Natural Science and Engineering Research Council of Canada Discovery Grant entitled: "Mitochondrial Biogenesis in Skeletal Muscle" ($110,000 per year). (Continuing);

2012 NSERC RTI grant: "Components to support a Spinning Disk Confocal Microscope" $140,767 (co-applicant, PI: I. Coe).

9. M. Hamadeh

Project RADICAL: Race/ethnicity And the perception of Diabetes and cardiovascular disease risk factors In the context of Canada's Lifestyle and obesity guidelines
Heart and Stroke Foundation of Ontario, Pilot Grant, Co-applicant, $50,000 (PI: Dr. Jennifer Kuk).

10. J. Kuk

Project RADICAL: Race/ethnicity And the perception of Diabetes and cardiovascular disease risk factors In the context of CAnada's Lifestyle and obesity guidelines (2011-2012) - $50,000 (Heart and Stroke Foundation - Principal Investigator)

11. J. McDermott

2012-2017 NSERC Discovery grant, $175,000
Role of AP-1 in skeletal myogenesis

2012-2014 Heart and Stroke Foundation of Canada operating grant, $180,000
Effects of blockers on cardiac gene expression

2010-2013 CIHR operating grant, $375,000
Regulation of MEF2 by signalling pathways

2010-2013 Heart and Stroke Foundation of Canada operating grant, $287,000
Regulation of Vascular Smooth Muscle Cells by MEF2 dependent signalling pathways

12. M. Riddell

Principle Investigator or Cc-Principle Investigator (M Riddell):
(Total awarded= $774,350)

1. MaRS Innovation MSCPoP Program Round 2. Treatment of hypoglycemia in Insulin-treated diabetes. Feb 2012 to Feb 2013- amount $100,000 (with M Vranic).

2. Ministry of Health Promotion and Sport- Project Title: "Pre-Diabetes Detection and Physical Activity Intervention"- Phase IIIb April 1, 2011 to March 31, 2012- amount $30,000 (with V Jamnik).

3. CIHR Proof of Principle Program - $160, 000 (August 2011- December 2012) Phase I: Pharmaceutical intervention to decrease the threat of hypoglycemia in insulin-treated diabetics (with M. Vranic).

4. NSERC Discovery Grant (individual). $190,000 (2007-2012), Project Title: Mechanisms of exercise training induced alterations in the hypothalamo-pituitary-adrenal axis.

5. Centre for Drug Research and Development (Pfizer CDRD Innovation Fund) with support from MaRS Innovation. Pharmaceutical intervention to decrease the threat of hypoglycemia in insulin-treated diabetics (Leaders M. Vranic, M. Riddell and D. Coy). $294,350 (2011-2012).

External grants as co-applicant (M Riddell)
(Total Awarded= 2,575,297)

1. 1. CIHR Operating Grant (P.I. Timmons, Co-investigators MORRISON, Katherine Mary; RIDDELL, Michael C). $225,347 (20011-2013). Metabolic flexibility in obese youth: Exercise as a screening test and a treatment, Competition 2010/09.

2. 2. CIHR Team Grant (Nutrition, Metabolism and Diabetes): Obesity and Related Diseases - Principle Investigator(s): ANDERSON, Gerald Harvey ; HAMILTON, Jill Krysti ; MCCRINDLE, Brian Wayne ; PARKIN, Patricia ; PENCHARZ, Paul Bernard Co-Investigators: BELLISSIMO, Nicola ; BIRKEN, Catherine Sari ; DETTMER, Elizabeth Lynn ; HANLEY, Anthony James ; LANGER, Jacob Charles ; O'CONNOR, Deborah Louise ; RIDDELL, Michael Charles ; TEIN, Ingrid ; WELLS, Greg D. Operating Grant Title: CIHR Team in Childhood Obesity Research. 2008-05-01 to: 2013-04-30. 468,799 per year, (2,349,950 total).

13. A. Scimè

2012	NSERC- Discovery Grant	$125,000 5 years
2012	Canadian Foundation for Innovation (CFI-LOI)	$342,288

14. R. Tsushima

07.2009 – 06.2013	*SNARE Protein Regulation of Cardiac Ion Channels and ANF Secretion* Principal Investigator Heart and Stroke Foundation of Ontario (T6770) - $409,181 (total)
07.2011 – 06.2014	*Role of Endogenous Cholesterol in Beta-Cell Stimulus-Secretion Coupling* Principal Investigator Canadian Diabetes Association (OG) - $274,725 (total)
01.2012 – 12.2013	*In Vivo Imaging of Cardiovascular Function* Principal Investigator: Robert Tsushima Leaders Opportunity Fund Canadian Foundation for Innovation - $350,720

Appendix C: AWARDS RECEIVED between July, 1 2011 – April 30, 2012

J. Kuk
Laboratory Equipment Scientist of the Week (2011)

R. Tsushima
2009.07 – 2014.06 Career Investigator Award
Heart and Stroke Foundation of Ontario – $438,750

Appendix D: PUBMED-listed publications by MHRC Faculty members between July, 1 2011 – April 30, 2012

- **Olasunkanmi Adegoke**

Olasunkanmi A.J. Adegoke, Abdikarim Abdullahi, Pegah Tavajohi-Fini. mTORC1 and the regulation of skeletal muscle anabolism and mass. Applied Physiology, Nutrition, and Metabolism, 2012, 37(3): 395-406, 10.1139/h2012-009

Serino AS, **Adegoke OA**, Zargar S, Gordon CS, Szigiato AA, Hawke TJ, Riddell MC.Voluntary physical activity and leucine correct impairments in muscle protein synthesis in partially pancreatectomised rats.Diabetologia. 2011 Dec;54(12):3111-20. *senior authorship shared between Adegoke OA, Riddell MC*

- **Olivier Birot**

Delghingaro-Augusto V, DÃ©cary S, Peyot ML, Latour MG, Lamontagne J, Paradis-Isler N, LacharitÃ©-Lemieux M, Akakpo H, **Birot O**, Nolan CJ, Prentki M, Bergeron R. Voluntary running exercise prevents Î²-cell failure in susceptible islets of the Zucker diabetic fatty rat. Am J Physiol Endocrinol Metab. 2012 Jan;302(2):E254-64. Epub 2011 Nov 1.

Birot O. Genetic background, endurance performance and muscle capillarization: lessons from the 'mini mice'. Exp Physiol. 2011 Nov;96(11):1116-7. No abstract available.

- **Rolando Ceddia**

Souza RP, Tiwari AK, Chowdhury NI, **Ceddia RB**, Lieberman JA, Meltzer HY, Kennedy JL, Müller DJ. Association study between variants of AMP-activated protein kinase catalytic and regulatory subunit genes with antipsychotic-induced weight gain. J Psychiatr Res 46(4):462-8, 2012.

Ceddia RB. Motilin beyond gut motility: A novel role in the regulation of adipose tissue metabolism. Am J Physiol Endocrinol Metab 301(5):E756-7, 2011.

Gonzalez R, Perry RLS, Gao X, Gaidhu MP, Tsushima RG, **Ceddia RB**, Unniappan S, Nutrient Responsive Nesfatin-1 Regulates Energy Balance and Induces Glucose-Stimulated Insulin Secretion in Rats. Endocrinology 152(10):3628-37, 2011.

Gaidhu MP, Frontini A, Hung S, Pistor K, Cinti S, **Ceddia RB**. Chronic AMP-kinase activation with AICAR reduces adiposity by remodeling adipocyte metabolism and increasing leptin sensitivity. J Lipid Res 52(9):1702-11, 2011.

- **Imogen Coe**

Grenz, A., Bauerle, J.D., Dalton, J.H., Ridyard, D., Badulak, A., Tak, E., McNamee, E.N., Clambey, E., Moldovan, R., Reyes, G., Klawitter, J., Ambler, K., Magee, K., Christians, U., Brodsky, K.S., Ravid, K., Choi, D.-S., Wen, J., Lukashev, D., Blackburn, M.R., Osswald, H., **Coe, I.R.,** Nürnberg, B., Haase, V.H., Xia, Y., Sitkovsky, M., and Eltzschig, H.K. 2012. Equilibrative nucleoside transporter ENT1 regulates post-ischemic blood-flow during acute kidney injury in mice. *Journal of Clinical Investigation*, 122(2):693-710

Rose, J., Naydenova, Z., Bang, A., Ramadan, A., Klawitter, J., Schram, K., Sweeney, G., Grenz, A., Eltzschig, H., Hammond, J., Choi, D-S., and **Coe, I.R**. 2011. Absence of equilibrative nucleoside transporter 1 in ENT1 knockout mice leads to altered nucleoside levels following hypoxic challenge. *Life Sciences.* 89(17-18):621-30

Reyes, G, Nivillac, NMI, Karim, M.Z., DeSouza, L, Siu, K.W.M., and **Coe, IR**. 2011. The Equilibrative Nucleoside Transporter 1 (ENT1) is a phosphoprotein. *Molecular Membrane Biology*, 28(6):412-26

Nivillac, NMI, Bacani, J, and **Coe, IR**. 2011. The life cycle of the human equilibrative nucleoside transporter 1: From ER export to degradation. *Experimental Cell Research* 317(11):1567-79.

- **Tara Haas**

Kobus, K, J. Kopyciñska, A. Kozlowska-Wiechowska, E. Urasinska, P. Milkiewicz, A. Kempinska-Podhorodecka, T.L. Haas, M. Milkiewicz. Angiogenesis within the duodenum of patients with cirrhosis is modulated by mechanosensitive Kruppel-like factor 2 and microRNA-126. Liver Int. 2012 May 10

Gorman, J.L., E. Ispanovic and T.L. Haas. Regulation of Matrix Metalloproteinase Expression. Drug Discovery Today: Disease Models 2011 8(1):5-11

Unthank, J.L., T.L. Haas and S.J. Millar. Impact of shear level and cardiovascular risk factors on bioavailable nitric oxide and outward remodeling of mesenteric arteries. pp. 89-119 *In* "Arteriogenesis – Molecular regulation, pathophysiology and therapeutics I", E. Deindl and W. Schaper, Editors, Shaker Verlag Aachen, 2011.

- **Will Gage**

Vergara ME, O'Shea FB, Inman RD, GAGE WH. (2012). Postural control is altered in patients with ankylosing spondylitis. Clinical Biomechanics.,*27(4),334-40.*

Maki BE, Sibley KM, Jaglal SB, Bayley M, Brooks D, Fernie GF, Flint GF, GAGE WH, Liu BA, McIlroy WE, Mihailidis A, Perry SD, Popovic MR, Pratt J, Zettel JR. (2011). Reducing fall risk by improving balance control: Development, evaluation and knowledge-translation of new approaches. Journal of Safety Research.,*42(6),473-85.*

Tung JY, GAGE WH, Zabjek KF, Fernie GR, McIlroy WE. (2011). Frontal plane standing balance with an ambulation aid: Upper limb biomechanics. Journal of Biomechanics.,*14(8),1466-70.*

- **Mazen Hamadeh**

Ma X, **Hamadeh MJ**, Christie BR, Foster JA, Tarnopolsky MA. Impact of treadmill running and sex on hippocampal neurogenesis in the mouse model of amyotrophic lateral sclerosis. PLoS One 2012;7(4):e36048. doi:10.1371/journal.pone.0036048

Al-Sahab B, Ardern C, **Hamadeh MJ**, Tamim H. Age at menarche and current substance use among Canadian adolescent girls: Results of a cross-sectional study. BMC Public Health 2012;12:195. doi:10.1186/1471-2458-12-195

Solomon JA, Gianforcaro A, **Hamadeh MJ**. Vitamin D3 deficiency differentially affects functional and disease outcomes in the G93A mouse model of amyotrophic lateral sclerosis. PLoS ONE 2011;6:e29354. doi:10.1371/journal.pone.0029354

Solomon JA, Tarnopolsky MA, **Hamadeh MJ**. One universal common endpoint in mouse models of amyotrophic lateral sclerosis. PLoS ONE 2011;6:e20582. doi:10.1371/journal.pone.0020582

- **David Hood**

Menzies, K.J., B. Chabi, **D.A. Hood**, S. Schenk, A. Philp, V.A. Braga and D.D. Guimaraes. Commentaries on Viewpoint: Does SIRT1 determine exercise-induced skeletal muscle mitochondrial biogenesis: differences between in vitro and in vivo experiments? J. Appl. Physiol. 112:929-30, 2012.

Joseph, A.M., D.R. Joanisse, R.G. Baillot, and **D.A. Hood**. Mitochondrial dysregulation in the pathogenesis of diabetes: potential for mitochondrial biogenesis-mediated interventions. Exp Diabetes Res. Epub ahead of print. 2012.

Joseph, A.M., and **D.A. Hood**. Plasticity of TOM complex assembly in skeletal muscle mitochondria in response to chronic contractile activity. Mitochondrion. 12:305-12, 2012.

Menzies, K. and **D.A. Hood**. The role of SirT1 in muscle mitochondrial turnover. Mitochondrion 12: 5-13, 2012.

Saleem A., H.N. Carter, S. Iqbal, and **D.A. Hood.** Role of p53 within the regulatory network controlling muscle mitochondrial biogenesis. Exerc Sport Sci Rev. 39:199-205, 2011.

Hood, D.A., G. Uguccioni, A. Vainshtein and D. D'souza. Mechanisms of exercise-induced mitochondrial biogenesis in skeletal muscle: implications for health and disease. Compr. Physiol. 1: 1119-1134, 2011 (July).

Hood, D.A., M.F.N. O'Leary, G. Uguccioni and I. Irrcher. Metabolic Systems: Mitochondrial Mitochondrial Biogenesis induced by Endurance Training. Farrell, P.A., M.J. Joyner and V.J. Caiozzo (Eds). ACSM Graduate Textbook of Exercise Physiology. Baltimore: Lippincott, Williams and Wilkens Chapter 18, pp. 447-465, 2012.

Hood, D.A. and K. Singh. Mitochondrial Biogenesis. In: Mooren, F.C. and J.S. Skinner (Eds) Encyclopedia of Exercise Medicine and Disease. Heidelburg: Springer Verlag, (in press, 2011).

Saleem, A., L. Kazak, M.O'Leary, and **D.A. Hood.** Muscle. In: J.C. Reed and D. Green D (Eds.) Apoptosis: Physiology and Pathology of Cell Death New York: Cambridge University Press, pp. 313-322, 2011.

- **Jennifer Kuk**

Kowal C, Kuk J, Tamim H: Characteristics of Weight Gain in Pregnancy Among Canadian Women (Maternal and Child Health Journal – Apr 16(3): 668-676, 2012).

Reddigan JI, Riddell MC and Kuk JL: Physical activity level is as critical as glycemic control in predicting cardiovascular death and all cause mortality in the US population (Diabetelogia –Mar;55(3):632-5, 2012).

Taing K. Ardern CI, Kuk JL: Effect of the Timing of Weight Cycling and Weight Variability During Adulthood on Mortality Risk in Women (Obesity – Feb: 20(2): 407-413, 2012).
Wharton S, VanderLelie S, Sharma AM, Sharma S, Kuk JL: The short term effectiveness of a medically supervised, interdisciplinary program for obesity management in a Canadian setting (Canadian Family Physicians – Jan;58(1):e32-8, 2012).

Sharma S, Wharton S, Forhan M, Kuk JL: Influence of weight discrimination on weight loss goals and self-selected weight loss interventions (Clinical Obesity – Dec 1: 153-160, 2011).

Reddigan JI, Ardern CI, Riddell MC and Kuk JL: Physical activity and cardiovascular disease mortality: The influence of cardiometabolic risk factors (Am J Cardiology –Nov; 15;108(10):1426-31, 2011).

Kuk JL, Ardern CI, Church TS, Sharma AM, Padwal R, Sui X and Blair SN: Edmonton Obesity Staging System: Association with Weight History and Mortality Risk (APNM – Aug;36(4):570-6, 2011).

- **John McDermott**

Salma J, McDermott JC.Suppression of a MEF2-KLF6 Survival Pathway by PKA Signaling Promotes Apoptosis in Embryonic Hippocampal Neurons.J Neurosci. 2012 Feb 22;32(8):2790-803.

Pagiatakis C, Gordon JW, Ehyai S, McDermott JC. A novel RhoA/ROCK- CPI-17 -MEF2C signaling pathway regulates vascular smooth muscle cell gene expression. J Biol Chem. 2012 Jan 23. [Epub ahead of print]

Miyake T, McDermott JC, Gramolini AO. A method for the direct identification of differentiating muscle cells by a fluorescent mitochondrial dye. PLoS One. 2011;6(12).

Chan CY, McDermott JC, Siu KW. Secretome Analysis of Skeletal Myogenesis Using SILAC and Shotgun Proteomics. Int J Proteomics. 2011;2011:329467.

Chan CY, Masui O, Krakovska O, Belozerov VE, Voisin S, Ghanny S Chen,J, Moyez D, Zhu P, Evans KR, *McDermott JC, *Siu KW. Identification of differentially regulated secretome components during skeletal myogenesis. Mol Cell Proteomics.(5):M110.004804, 2011 (* co-corresponding authors)

- **Michael Riddell**

M.C. Riddell. Chapter 2: The Impact of Type 1 Diabetes on the Physiological Responses to Exercise. In Type 1 Diabetes: Clinical Management of the Athlete. Editor I. Gallen, Springer; 2012 edition (Mar 16 2012). ISBN-10: 0857297538.

M.C. Riddell. “Diabetes Mellitus, Juvenile” in the Encyclopedia of Exercise Medicine in Health and Disease. Editor: Frank C. Mooren, Springer, 2012 ISBN 978-3-540-36065-0.

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- **Anthony Scimè**

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- **Robert Tsushima**

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Appendix E: – List of Specialized Equipment

Olivier Birot

- Harvard Isoflurane anesthesia station
- Tissue lyser Retsch MM400 using stainless steel beads.
- Imaging station Kodak 4000MM Pro.

Rolando Ceddia

- Scintillation counter (Beckman Coulter LS 6500)
- Plate reader (Biotek Synergy HT)

- Temperature controlled spectrophotometer (Ultrospec 4300 Pro)
- Real Time - PCR (Biorad CFX96)

Mike Connor

- Kodak In Vivo FX Pro imaging station
- Hunter apparatus
- Cell culture electrical stimulator
- Ultracentrifuge
- Nanodrop spectrophotometer

Will Gage

- 7 camera optoelectronic motion capture system (Vicon)
- Six 6-degree of freedom force plates (AMTI)
- Wireless, 16 channel EMG data collection system (Noraxon)
- XY gantry for perturbing postural control and balance
- Wireless three-dimensional accelerometers for measuring movement "in the field"
- HUMAC isokinetic muscle strength testing system

Tara Haas

- Heraeus Table top centrifuge (up to 100 mL volumes)
- UV Crosslinker
- Hybridization Oven
- Shaking Water Bath
- Bacterial Incubator with shaking platform
- Bioptechs closed Flow Chamber for cultured cells
- FlexCell Fx4000 Cell Stretch Apparatus
- Gel Dryer
- Homogenizer
- MilliQ water purification
- Arcturus PixCell II Laser Capture Microdissection system
- Zeiss M200 Inverted Fluorescence microscope with Quantix57 Digital Cooled CCD imaging system and Metamorph image analysis software.

Mazen Hamadeh

- Microcentrifuge
- Mettler balance
- Equipment to run Western blots
- Electrophoresis apparatus
- PCR machine (Bio-Rad MyCycler)
- Spectrophotometer
- HPLC with -ve conductivity dectector

David Hood

- Real-time PCR system (Applied Biosystems)

- Kodak In Vivo Fx Pro Imaging System
- Cell culture facility
- Ultracentrifuge (Beckman)
- Flow Cytometer (non-sorting, BD)
- Small animal surgical facility
- Mitochondrial respirometer (Strathkelvin)
- Muscle contractile activity equipment
- Fluorescent plate reader
- Upright and inverted fluorescent microscopes
- Cryostat for muscle sectioning
- Rodent treadmills and activity wheels

Michael Riddell

- Rodent voluntary activity wheels and forced activity wheels
- Muscle stimulator and Power lab in situ muscle stimulation equipment
- Luminex multiplex
- Cryostat
- Metabolic cart-human
- Metabolic cages
- Tissue freeze dryer
- Paediatric cycle ergometer
- RT-PCR
- Spectrophotometer
- Plate reader
- Imaging station for in situ hybridization

Robert Tsushima

- 2 patch-clamp electrophysiology setups
- 2 isolated perfused heart systems
- Low speed tabletop centrifuge
- Beckman spectrophotometer
- Mitochondria respirometer (Strathkelvin)

STATEMENT OF OPERATIONS

Fund Code: 200 **Cost Centre:** 157001 FH-Muscle Health Reseach Ctre **For the Period Ended: 30-Apr-12**
Start Date: 7/1/2008 **End Date:** 12/31/2099 **Fiscal Year:** 2012
Cost Centre Status: ACTIVE **HST Rebate Rate:** 73 %

Run Date/Time: 5/24/2012 2:34:25 PM
Manager: Verrilli,Mary
Location: Health, Nurs & Envir Stud Bldg
Department: 53850 HH-Office of the Dean

Current Month Actual	Account Description	Account#	Annual Budget	Current YTD Actual	Current YTD Commitment	Current YTD Total (Act+Commit)	Budget to YTD Total Var	% Remaining	Prior YTD Total
	Revenue								
-	ECR Registration Fees	045000	3,500.00	-	-	-	(3,500.00)	0%	3,250.00
-	ECR Conf-Registr-Fees	050305	1,500.00	1,630.00	-	1,630.00	130.00	9%	8,488.00
-	**Total External Cost Recoveries**		5,000.00	1,630.00	-	1,630.00	(3,370.00)	0%	11,738.00
-	ICR Donations & Grants	034040	3,000.00	3,000.00	-	3,000.00	-	0%	3,000.00
-	**Total Internal Cost Recoveries**		3,000.00	3,000.00	-	3,000.00	-	0%	3,000.00
-	OTO Trsf within F/D F200 CC Ra	099912	10,500.00	10,500.00	-	10,500.00	-	0%	32,240.00
-	**Total OTO Budget Allocations**		10,500.00	10,500.00	-	10,500.00	-	0%	32,240.00
-	**Total Central Allocations**		10,500.00	10,500.00	-	10,500.00	-	0%	32,240.00
-	**Total Revenue**		18,500.00	15,130.00	-	15,130.00	(3,370.00)	0%	46,978.00
	Expenses								
446.33	Admin Stipend Yufa	113000	5,356.00	5,355.96	-	5,355.96	0.04	0%	5,355.96
446.33	**Total Faculty - Admin Salaries**		5,356.00	5,355.96	-	5,355.96	0.04	0%	5,355.96
89.27	Ben Admin Stipend Yufa	213000	1,071.00	1,071.24	-	1,071.24	(0.24)	0%	1,071.24
89.27	**Total Faculty - Admin Benefits**		1,071.00	1,071.24	-	1,071.24	(0.24)	0%	1,071.24
535.60	**Total Fac Admin Salary & Benefits**		6,427.00	6,427.20	-	6,427.20	(0.20)	0%	6,427.20
-	Asst'Shp-Ft Yk Grad Stud - Can	194001	7,200.00	-	-	-	7,200.00	100%	2,000.00
-	GuestLecturers&Honoraria NYork	195001	1,300.00	850.00	-	850.00	450.00	35%	300.00
-	**Total Research Staff - Salaries**		8,500.00	850.00	-	850.00	7,650.00	90%	2,300.00
-	Ben Guest Lecturers- employees	295000	-	-	-	-	-	0%	31.50
-	**Total Research Staff - Benefits**		-	-	-	-	-	0%	31.50
-	**Total Res Staff Salary & Benefits**		8,500.00	850.00	-	850.00	7,650.00	90%	2,331.50
535.60	**Total Total Salaries and Benefits**		14,927.00	7,277.20	-	7,277.20	7,649.80	51%	8,758.70
-	Repair & Maintenance-Building	431000	100.00	-	-	-	100.00	100%	71.79
-	Alterations	439000	-	-	-	-	-	0%	20.21
-	Cleaning Services	451000	-	53.76	-	53.76	(53.76)	0%	-

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Current Month Actual	Account Description	Account#	Annual Budget	Current YTD Actual	Current YTD Commitment	Current YTD Total (Act+Commit)	Budget to YTD Total Var	% Remaining	Prior YTD Total
	Expenses								
-	**Total Equipment, Furniture, & Bldgs**		100.00	53.76	-	53.76	46.24	46%	92.00
-	L.D./Telegrams	332000	25.00	-	-	-	25.00	100%	2.83
-	Pay-At-Bank Charges	370700	-	15.00	-	15.00	(15.00)	0%	-
-	Minor Research Grants	382500	-	2,850.00	-	2,850.00	(2,850.00)	0%	-
-	**Total Other Expenses**		25.00	2,865.00	-	2,865.00	(2,840.00)	0%	2.83
-	Hotel Expense-Faculty	401300	-	-	-	-	-	0%	1,415.24
-	Travel-General-Other	402500	-	718.44	-	718.44	(718.44)	0%	-
713.15	Visiting Speakers-Travel -Gen	405000	3,000.00	1,941.85	-	1,941.85	1,058.15	35%	-
-	Functions - Campus	406000	5,000.00	1,276.44	-	1,276.44	3,723.56	74%	2,841.63
294.40	Hospitality - Campus	406200	1,500.00	2,245.54	-	2,245.54	(745.54)	0%	1,392.55
1,007.55	**Total Travel & Hospitality**		9,500.00	6,182.27	-	6,182.27	3,317.73	35%	5,649.42
-	Office Supplies Gen	301000	3,000.00	187.64	-	187.64	2,812.36	94%	3,706.42
435.00	Teach.&Res Gen Sup	305000	3,000.00	(2,178.36)	-	(2,178.36)	5,178.36	173%	2,626.47
-	Audio-Visual	305300	-	25.00	-	25.00	(25.00)	0%	-
-	Printing And Photocopy Gen	320900	-	2,232.07	-	2,232.07	(2,232.07)	0%	-
435.00	**Total Supplies-Comprehensive&General**		6,000.00	266.35	-	266.35	5,733.65	96%	6,332.89
1,442.55	**Total Operating Costs**		15,625.00	9,367.38	-	9,367.38	6,257.62	40%	12,077.14
198.30	Telephone Equip Rental-Telecom	467000	1,200.00	1,189.80	-	1,189.80	10.20	1%	1,189.80
198.30	**Total Telephone & Power**		1,200.00	1,189.80	-	1,189.80	10.20	1%	1,189.80
198.30	**Total Taxes and Utilities**		1,200.00	1,189.80	-	1,189.80	10.20	1%	1,189.80
-	Scholarships - Pay Off	802000	-	1,000.00	-	1,000.00	(1,000.00)	0%	-
-	**Total Scholarships & Bursaries**		-	1,000.00	-	1,000.00	(1,000.00)	0%	-
2,176.45	**Total Expenses**		31,752.00	18,834.38	-	18,834.38	12,917.62	41%	22,025.64

STATEMENT OF OPERATIONS

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Current Month Actual	Account Description	Account#	Annual Budget	Current YTD Actual	Current YTD Commitment	Current YTD Total (Act+Commit)		Budget to YTD Total Var	% Remaining	Prior YTD Total
(2,176.45)	**Surplus/ (Deficit) Current Year**		(13,252.00)	(3,704.38)	-	(3,704.38)	**(1)**	9,547.62	0%	24,952.36
					Employee Advances	-	**(2)**			
					Carry Forward from Previous Year	55,601.47	**(3)**			
					Balance Available (Overspent)	51,897.09	**(4) = (1-2+3)**			

Muscle Health Reseach Centre: 2012-2013 Budget	
Expenses	**2012-13**
Operating Expenses	
Director's Stipend and Benefits	6,428
Centre Coordinator Salary and Benefits (2 days/wk)*	6,000
Office/Computer Supplies	1,500
Telephone	1,200
Research, KT and Training Expenses	
Research Supplies	1,000
MHRC Faculty Research Awards	3,000
MHRC Student Scholarships	2,000
Muscle Health Awareness Day	2,000
Poster Prizes and Guest Speaker Honoraria	1,850
Travel for visiting speakers	3,600
Hospitality for events, meetings, visitors	3,000
Printing costs	1,500
Total Expenses	**33,078**
Revenue	
Membership Fees (15 x $250)	3,500
Conference registration fees	1,500
Contribution from FSE	3,000
Contribution from Health	10,500
Costs covered by CRC	10,000
Total Revenue	**28,500**
Total Revenue Less Expenses	**(4,578)**
Carryforward From Previous Year	**51,897**
Carryforward to Next Year	**47,319**
Other Costs - Health	
Approximate cost of Director's course release 1.5 FCE	27,900

Muscle Health Research Centre Annual Report
May 1, 2012 - April 30, 2013

1. Contact Information

Director:	David A. Hood
Admin Contact:	Heather Carter
Address:	302 Farquharson
Tel:	Ext 66640
Fax:	Ext 55728
E-Mail:	dhood@yorku.ca or mhrc@yorku.ca
Website:	http://www.yorku.ca/mhrc/

2. **List Faculties that supplied active members to the ORU, indicating the number of active members from each**.

Faculty of Health (13), Faculty of Science and Engineering (2)

3. **Charter date**: July 1 2008

4. Mandate

The mandate of the MHRC is to provide a centralized and focused research emphasis on the importance of "muscle health" for the overall health and well-being of Canadians. The MHRC became York University's first organized research unit (ORU) in the Faculty of Health dedicated to Biomedical Sciences, and it continues to increase the University's visibility in this important area of research. The MHRC consists of a strong cohort of very well-funded and highly productive scholars (including a Canada Research Chair) and graduate students from the Faculty of Health and the Faculty of Science & Engineering. Its intent is to become a renowned centre for muscle health research in North America.

5. Membership and Governance

Active members (York faculty): 15; a complete list of active and adjunct members of the MHRC and their departmental affiliations is provided below.

Other members: Adjunct faculty members: 4; Graduate and UG student members (York): 63; Graduate and UG student members (non-York, other Universities): 79

Executive Committee members: Drs. David Hood (Director), Olivier Birot, Mike Connor, Robert Tsushima, and Ms. Sobia Iqbal (Graduate Student Member)

Executive Committee Subcommittee (name and members)(if any): N/A

Faculty Member	Rank	Research Area	Office Number/ E-Mail	Office Location
School of Kinesiology and Health Science				
Hood, David	Professor, Canada Research Chair, Director of the Muscle Health Research Center	Molecular basis of Mitochondrial Biogenesis in health and disease	dhood@yorku.ca (416)736-2100 x 66640	Farquharson Building, 302
Adegoke, Olasunkanmi	Assistant Professor	Protein and amino acid nutrition and metabolism	oadegoke@yorku.ca (416)736-2100 x 20887	Norman Bethune College, 362
Belcastro, Angelo	Professor, Chair, School of Kinesiology and Health Science	Muscle injury and damage in health and disease	anbelcas@yorku.ca (416)736-2100 x 21088	Norman Bethune College, 333B
Birot, Olivier	Assistant Professor	Vascular plasticity in striated muscle (angiogenesis vs. capillary regression)	birot@yorku.ca (416)736-2100 x 44043	Norman Bethune College, 353
Ceddia, Rolando	Associate Professor	Glucose and fat metabolism in muscle and adipose tissue	roceddia@yorku.ca (416)736-2100 x 77204	Lumbers Building, 225A
Connor, Michael	Associate Professor	Muscle Development and Cancer	mconnor@yorku.ca (416)736-2100 x 77206	Lumbers Building, 224
Gage, William	Associate Professor	Biomechanics of postural control and of joint stability	whgage@yorku.ca (416)736-2100 x 33027	Sherman Health Science Research Centre, 2022
Haas, Tara	Associate Professor	Angiogenesis in Muscle	thaas@yorku.ca (416)736-2100 x 77313	Farquharson Building, 341
Hamadeh, Mazen	Associate Professor	Human Nutrition and Exercise Physiology, Diabetes and ALS	hamadeh@yorku.ca (416)736-2100 x 33552	Norman Bethune College, 365
Kuk, Jennifer L.	Assistant Professor	Obesity, CVD, Type 2 diabetes and exercise interventions	jennkuk@yorku.ca (416)736-2100 x 20080	Sherman Health Science Research Centre, 2002
Perry, Christopher G.R.	Assistant Professor	Redox Metabolism, Skeletal Muscle, Diet and Exercise	cperry@yorku.ca (416)736-2100 x 33232	Norman Bethune College, 324
Riddell, Michael	Associate Professor, KAHS Graduate Program Director	Exercise Physiology, Stress and Diabetes Metabolism	mriddell@yorku.ca (416)736-2100 x 40493	Norman Bethune College, 347
Scime, Anthony	Assistant Professor	Stem Cell Biology; Muscle Regeneration; Adipose Differentiation	ascime@yorku.ca (416) 736-2100	Norman Bethune College, 327C

			x33559	
Department of Biology				
McDermott, John	Professor and Biology Graduate Program Director	Muscle Development	jmcderm@yorku.ca (416)736-2100 x 30389	Farquharson Building, 327
Tsushima, Robert	Associate Professor	Cardiac Muscle Physiology and Disease	tsushima@yorku.ca (416)736-2100 x 20996	Farquharson Building, 344
Adjunct Members				
Cafarelli, Enzo (Emeritus)	Professor Emeritus	Neuromuscular Physiology	ecaf@yorku.ca	
Coe, Imogen	Professor, Dean, Faculty of Science	Cardiac Muscle Biochemistry	imogen.coe@ryerson.ca	Ryerson University
Hawke, Thomas	Associate Professor	Muscle Development and Regeneration	hawke@mcmaster.ca	McMaster University
Jacobs, Ira	Dean, Faculty of Physical Education	Muscle Metabolism, Applied Physiology and Pharmacology	ira.jacobs@utoronto.ca	University of Toronto
MHRC Coordinator				
Carter, Heather (July 2012 onwards)	Graduate Student		heathery@yorku.ca X 77832	Farqhuarson Bldg, 342 X 22999 Fax: 416-650-8483

6. Annual Progress in Fulfilling Mandate

The MHRC continues to expand its activities every year within its limited budget, consistent with the goal of uniting muscle health researchers and graduate students and providing a platform which will serve to increase the visibility of York University, and the MHRC, in Canada and around the world. Despite the achievements of our goals over the past year, we have a continuing list of impressive plans for the future (see Section 8, below). Our accomplishments are listed in Appendix 2, including the funding obtained, awards received and most significant publications in peer-reviewed journals. This appendix contains a truncated version of the vast list of accomplishments of our faculty members (a complete list is provided on the MHRC website). Nonetheless, it is very clear from this Appendix that the MHRC is fulfilling its mandate in promoting muscle research for the health and well-being of Canadians. We are very successful at obtaining NSERC, CIHR, Heart and Stroke Foundation and Canadian Diabetes Association research funding, and at publishing our findings.

a) Funding proposals: Perhaps because of the many individual successes noted above, there is less emphasis or necessity within the MHRC to develop large-scale collaborative grants to help support trainees and graduate students. In addition, graduate students are largely funded by departmental teaching assistantships. Nonetheless, several collaborations do exist among MHRC faculty members,

and among faculty at other institutions, and a large scale CREATE grant application is planned for submission in the coming year;

b) Events organized: We held 3 types of events in the last year: 1) Colloquia, featuring internal speakers discussing their work in an informal interactive research presentation, 2) Seminars, in which external speakers from other Universities were invited, presented their work, and interacted with faculty members and graduate students, and 3) the Annual Muscle Health Awareness Day (MHAD), which attracted 10 external speakers, 40-50 posters presented by graduate students, and a total registration of 120-130 people. This was our third Annual MHAD, and the event grows progressively every year. Indeed all events were extremely successful;

c) Knowledge Mobilization / Outreach: All MHRC faculty members are involved in promoting knowledge mobilization of their research via the MHRC website. 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;

d) Mentorship: MHRC faculty members are extremely active in the training and development of graduate students. 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 trained and mentored 57 MSc and PhD students, 56 undergraduate students, and 4 post-doctoral fellows over the past year alone;

e) Continuing Education: Over the past year the Director, in collaboration with faculty of Health staff, began to investigate the possibility of providing continuing education programs in "Muscle Health", "Exercise" and "Muscle Physiology" for the Board of Education (Teacher training), as well as the fields of Nursing and Message Therapy. Discussion are ongoing;

f) Other leadership activities: The MHRC sponsored one Faculty Research Award ($3000) and one MHRC Student Fellowship directed against the Graduate Student's fees.

7. Financial Accountability

The attached Excel spreadsheet provides the 3 year rolling budget and line-by-line explanation. At the moment, there are no research grants or contracts that are administered by the MHRC. In addition, the MHRC is surviving on the financial surplus acquired in previous years. The faculties of Health and Science have made no commitment to provide supportive funding for the Centre beyond 2013-14. Thus, the MHRC will continue to investigate the possibility of acquiring financial support through other initiatives, such as Continuing Education programs (see above), fundraising, or industry or granting agency contract overhead contributions.

8. Objectives for Upcoming Year

a) Continue to try to develop Continuing Education initiatives with Teachers, Nurses, Massage Therapists in an effort to bring in revenue to support the MHRC;

b) Develop more relationships with industry to initiate contractual agreements which will bring in revenue for the MHRC;

c) Develop more Knowledge mobilization initiatives to increase the exposure of the MHRC to the public for educational purposes, as well as to encourage the involvement of potential donors;
d) Consider having a grant crafting workshop, one or twice a year;
e) Organize a workshop related to clinical/human research, involving dialogue between individuals who are already participating;
f) Generate interest and ideas to formulate a CREATE grant for submission next Winter, 2014;
g) Organize a 1-day Professional development presentation for trainees to critique and video tape student presentations. Involve the career Centre or industry representative in this initiative;
h) Develop more collaborations between laboratories within the MHRC.

9. Other relevant items the Director wishes to report

(None)

10. **Appendix 1** – Additional Information about Progress in Fulfilling Mandate (that does not appear elsewhere in the Report). (N/A; not included)

11. **Appendix 2** – Individual Member Contributions (up to five most notable items only for each member)

Appendix 2 is attached. Please note that this represents only a small sampling of the publications and achievements of our MHRC faculty members, as requested for this Annual Report template. A more complete list is available at **yorku.ca/mhrc/**

Cumulative Financial Statement

ORU: MUSCLE HEALTH RESEARCH CENTRE (MHRC)							
Cost Centre: 157001							
					3 Year Rolling Budget		
Account Description	**2010-11 Budget**	**2011-12 Budget**	**2012-13 Budget**	**Comments**	**2013-14**	**2014-15**	**2015-16**
Revenue:							
Base Allocation from Central							
VPRI support							
Faculty support	35240	13500	13500	Contributions from Health and Science. (Director's course release not in included - this is funded directly by Health)	13500		
Endowment Revenue							
Indirect Costs (Overhead)							
Support from Grants and Contracts							
Other Internal Revenue	3250			Faculty membership fees are no longer charged			
Other External Revenue	8488	1630	1720	conference (MHAD) fees	2000	2000	2000
TOTAL REVENUE	**46978**	**15130**	**15220**		**15500**	**2000**	**2000**
Expenses:							
Total Faculty Administrators	6427.2	6427.2	6427.2	Director's stipend	7200	7200	7200
Total Research Staff	2331.5	850	9361.95	RA, honoraria	3000	3000	3000
Total Support Staff				Centre Coordinator supported directly via Director's CRC			
Total Scholarships and Awards		3850	4000	Faculty Research Award, Student Awards	5000	5000	5000
Total Miscellaneous expenses	13266.94	7707.18	9397.51	travel, events, maintenance, phone, supplies	10000	10000	10000
TOTAL EXPENSES	**22025.64**	**18834.38**	**29186.66**		**25200**	**25200**	**25200**
Total Revenue Less Total Expenses	24952.36	-3704.38	-13966.66		-9700	-23200	-23200
Carryforward from Previous Year	30649.11	55601.47	51897.09		37930.43	28230.43	5030.43
Carryforward to Next Year	55601.47	51897.09	37930.43		28230.43	5030.43	-18169.57

Appendix 2: Individual Member Contributions
(Five most notable contributions)
May, 1 2012 – April 30, 2013

O. Adegoke

1. Funding Received:

- NSERC Discovery Grant, 2008/2009 Competition: $100000.00 over 5 years to study 'Mechanism of nutritional regulation of protein metabolism in skeletal muscle'.

2. - Minor Research: Branched-chain amino acid metabolism and regulation of muscle differentiation.
Amount awarded: $3000;
Organization: Faculty of Health, York University. May 2012.

3. Funding Applied for:

- Title: Liquid Chromatography System
Co-investigators: Riddell MC, Hamadeh M
Amount requested: $149,000.00
Organization and program: NSERC; Research Tools and Instruments, Fall 2012

4. Olasunkanmi A.J. Adegoke, Abdikarim Abdullahi, Pegah Tavajohi-Fini. mTORC1 and the regulation of skeletal muscle anabolism and mass. Applied Physiology, Nutrition, and Metabolism, 2012 Jun, 37(3): 395-406, 10.1139/h2012-009

5. In submission:

Dhanshri Kakade**, Nushaba Islam**, and **Olasunkanmi A.J. Adegoke**. Regulation of PDCD4 by amino acids and growth factors in L6 myotubes is sensitive to mTORC1 and the proteasome. Submitted to PLoS ONE, April 2013.

A. Belcastro

1. Fundng Applied for:

- Community-Driven Solution for Active Healthy Kids. (Submitted – not received) SunLife Community Foundation ($74,100)

2. Angelo N. Belcastro, Katherine S. Morrison, Emma Hicks, and Helin Matta. (2012) Cardiorespiratory and metabolic responses associated with children's physical activity during self-paced games. Canadian Journal of Physiology and Pharmacology, 90: 1269–1276.

O. Birot

Funding Received:

1. - NSERC Research Tool Infrastructure, 2013, **Co**-PI with Dr. Haas, $40,741, Awarded.

2. - NSERC Discovery Grant, 2011-2016, PI, $120,000, Awarded.

3. 2012 Nomination by the School of Kinesiology and Health Science for the award of International recognition in research.

4. Roudier E, Forn P, Perry ME, **Birot O**. Murine Double Minute-2 is required for capillary maintenance and exercise-induced angiogenesis in skeletal muscle. FASEB Journal 26: 4530-4539, 2012 - (IF 5,712)

5. Gouzi F, Prefaut C, Abdellaoui A, Roudier E, de Rigal P, Molinari N, Laoudj-Chenivesse D, Mercier J, **Birot O**, Hayot M. Blunted muscle angiogenic training-response in COPD patients versus sedentary controls. European Respiratory Journal, In press 2012 (IF 5,895)

R. Ceddia

1. Funding Received:
NSERC *Discovery Grant*
Project Title: Regulation of whole-body energy metabolism
Funding period: 5 years (2011 – 2016) **Amount awarded**: $200,000.00

2. Funding Applied for:

- Operating grant – CIHR – Amount requested: $437,100.00

3. Vitzel KF, Bikopoulos G, Hung S, Pistor KE, Patterson J, Curi R, **Ceddia RB**. Chronic treatment with the AMP-kinase activator AICAR increases glycogen storage and fatty acid oxidation in skeletal muscles but does not reduce hyperglucagonemia and hyperglycemia in insulin deficient rats. Plos One 2013 (Ms # PONE-D-13-06759 – *In Press*)

4. **Ceddia RB**. The role of AMP-activated protein kinase in regulating white adipose tissue metabolism. Mol Cell Endocrinol. 25;366(2):194-203, 2013.

5. Gaidhu MP, Bikopoulos G, **Ceddia RB**. Chronic AICAR-induced AMP-kinase activation regulates adipocyte lipolysis in a time-dependent and fat depot-specific manner in rats. Am J Physiol Cell Physiol. 1;303(11):C1192-7, 2012.

M. Connor

Funding Received:

1. York University Faculty of Health Minor Research Grants. *The Paracrine Role of Adipokines in Prostate Cancer.* This project will look at the paracrine role of adipose tissue obtained from prostate cancer patients on prostate cancer cell cycle regulation. This project uses a co-culture model (primary adipose tissue and prostate cancer cells). Value: $2,850 over 2 years (2013-2015).

2. Canada Foundation for Innovation Infrastucture Operating Funds. *Molecular regulation of muscle development.* This project will look at the role of electrical activity in the molecular regulation of muscle development/differentiation. Value: $50,000 over 3 years (2012-2015).

3. Funding Applied for:
Title: *The paracrine/endocrine effects of adipose tissue on prostate cancer.*
Source: Prostate Cancer Canada

Dollars Requested: $190,400
Dates of Project: 07/ 2013 - 06/2015
PI: **Michael Connor**
Co-PIs: Fleshner N,
Major Goal of project: Investigate whether metformin and statin administration alter the serum adipokine profile in obese prostate cancer patients from one that promotes disease progression to one that prevents progression.

4. Title: *The interaction between stress hormones and adipokines.*
Source: N.S.E.R.C. Discovery Grant
Dollars Requested: $265,050
Dates of Project: 04/ 2013 - 03/2018
PI: **Michael Connor**
This project is designed to evaluate the effects of stress hormones (cortisol) and their effects on skeletal muscle cell cycle regulation and differentiation. In addition, cortisol has been shown to affect adipocyte adipokine secretion patterns and these adipokines can have affects skeletal muscle cell cycle regulation. Thus, we will look at the combinatory effects of cortisol and adipocyte effects on cell cycle control in skeletal muscle.

5. Walker, O.S., D.N. Trivedi, C.F. Theriau, M.P. Gaidhu, R.B. Ceddia and **Connor, M.K**. Adipokines Create a Growth Microenvironment in Breast Cancer That Depends on the Adiponectin:Leptin Ratio and Involves AMPK. Submitted to J. Biol. Chem. August 2012. Currently in revision.

W. Gage

1. Funding Received:
Harris L (PI), Gage WH (Investigator), + 7 others. (2012). Full field vision and spatial orientation. Canadian Foundation for Innovation – Leading Edge and New Initiatives Fund. $790,891

2. Harris L (PI), Gage WH (Investigator), + 7 others. (2012). Full field vision and spatial orientation. Ontario Research Fund. $790,891

3. Tung JY, **Gage WH**, Poupart P, McIlroy WE. (in press). Upper Limb Contributions to Frontal Plane Balance Control in Rollator-Assisted Walking. Assistive Technology.

4. Prajapati SK, Mansfield A, **Gage WH**, Brooks D, McIlroy WE. (in press). Cardiovascular responses associated with daily walking in sub-acute stroke. Stroke Research and Treatment.

5. Street BD, **Gage WH**. (in press) The effects of an adopted narrow gait on the external adduction moment at the knee joint during level walking: evidence of asymmetry. Human Movement Science.

T. Haas

Funding Received:

1. 2013 NSERC Discovery Grant (renewal); $33,000/year (5 years)
"Regulation of capillary sprouting and stabilization in skeletal muscle"

2. 2013 NSERC Research Tools and Instrumentation; $40,741 (PI; 1 co-applicant)
"Multi-modal plate reader"

3. E.Roudier, M.Milkiewicz, O.Birot, D.Slopack, A.Montelius, T.Gustafsson, J.H. Paik, R.A. DePinho, G.P. Casale, I.I. Pipinos, **T.L. Haas**. Endothelial FoxO1 is an intrinsic regulator of thrombospondin1 expression that restrains angiogenesis in ischemic muscle. Journal of Angiogenesis, 2013

4. Kopycinska,J., P. Milkiewicz, A. Kempińska-Podhorecka, **T.L. Haas**, E. Elias, R.A. DePinho, J. Paik, M. Milkiewicz. Activation of FoxO3a/ Bim axis in patients with Primary Biliary Cirrhosis. Liver Int. 2013 Feb;33(2):231-8. doi: 10.1111/liv.12030.

5. Shikatani, E.A., A. Trifonova, E.R. Mandel, S.T.K. Liu, E. Roudier, A. Krylova, A. Szigiato, J. Beaudry, M.C. Riddell, and **T.L. Haas**. Inhibition of proliferation, migration and proteolysis contribute to corticosterone-mediated inhibition of angiogenesis. Plos One 2012 Oct, 7: e46625. doi:10.1371/journal.pone.0046625

M. Hamadeh

1. Funding Received:

October 2012 Does vitamin D deficiency influence skeletal muscle pathology in amyotrophic lateral sclerosis?
Muscle Health Research Centre Faculty Research Award, York University, $3,000 (PI).

2. Funding Applied for:

March 2013 Optimal vitamin D supplementation in mitigating amyotrophic lateral sclerosis
CIHR – $125,234 over 2 years (PI)
Results: Awaiting response

3. 2012 Dean's Service Award (Early Career), Faculty of Health, York University

4. **Gianforcaro A, **Hamadeh MJ**. Vitamin D as a potential therapy in amyotrophic lateral sclerosis. CNS Neurosci Ther 2013 (in revision; ms# CNSNT-2012-133.R1).

5. **Seevaratnam R, Tarnopolsky MA, **Hamadeh MJ**. Coffee is more effective than caffeine and chlorogenic acid in reducing oxidative stress, inflammation and the pro-apoptotic Bax in male G93A mice. PLoS One 2013 (*in revision;* ms# PONE-D-11-12506R1).

D.A. Hood

1. Funding Received:

Natural Science and Engineering Research Council of Canada Research Tools and Instruments Grant entitled: "Ultracentrifuge and rotors" ($143,438)

2. Natural Science and Engineering Research Council of Canada Discovery Grant entitled: "Mitochondrial Biogenesis in Skeletal Muscle" ($110,000 per year; continued).

3. Canadian Institutes for Health Research (CIHR) Research Grant entitled "Autophagy in skeletal muscle" (103,661 per year; continued).

4. Menzies, K.J., K. Singh, A. Saleem and **D.A. Hood**. Sirtuin 1-mediated effects of exercise and resveratrol on mitochondrial biogenesis. J. Biol. Chem. 288: 6968-79, 2013 (March).

5. O'Leary, M.F., A. Vainshtein, S. Iqbal, O. Ostojic and **D.A. Hood**. Adaptive plasticity of autophagic proteins to denervation in aging skeletal muscle. Am J Physiol Cell Physiol. 304: C422-30, 2013 (March).

J. Kuk

1. Funding Received:

Project RADICAL: Race/ethnicity And the perception of Diabetes and cardiovascular disease risk factors In the context of CAnada's Lifestyle and obesity guidelines (2011-2012) - $50,000 (Heart and Stroke Foundation - Principal Investigator)

2. Funding Applied for:

Causes and Implications of Metabolically Healthy Obese. Canadian Diabetes Association - $111,780 (PI)

3. Spassiani NA, Jeffery-Tosoni S, **Kuk JL** and Fraser-Thomas J: Understanding Youths' Experiences in a Holistic Weight Management Program (Journal of Youth Development – 7(2), 15-26, 2012).

4. Abramovitch SL, Reddigan JI, Hamadeh MJ, Jamnik VK, Rowan CP, **Kuk JL**: Estimating serving sizes and food intake using Canada's Food Guide (APNM – Oct;37(5):923-30, 2012).

5. Yates EA, MacPherson A, **Kuk JL**: Secular trends in the diagnosis & treatment of obesity among U.S. adults in the primary care setting (Obesity – Sep;20(9):1909-14, 2012).

J. McDermott

1. 2013-2018 CIHR operating grant, $578,000 Regulation of MEF2 in cardiac and skeletal muscle cells (NEW)

2. 2013-2018 CIHR operating grant, $542,000 Role of Smad7 in Cardiac and Skeletal muscle (NEW)

3. Dionyssiou MG, Salma J, Bevzyuk M, Wales S, L LZ, **McDermott JC.** Kruppel-like factor 6 (KLF6) promotes cell proliferation in skeletal myoblasts in response to TGFbeta/Smad3 signaling. Skelet Muscle. 2013 Apr 2;3(1):7.

4. Dionyssiou MG, Nowacki NB, Hashemi S, Zhao J, Kerr A, Tsushima RG, **McDermott JC**. Cross-talk between glycogen synthase kinase β (GSK3β) and p38MAPK regulates myocyte enhancer factor 2 (MEF2) activity in skeletal and cardiac muscle. J Mol Cell Cardiol. 2013 Jan;54:35-44.

5. Belozerov VE, Lin ZY, Gingras AC, **McDermott JC**, Michael Siu KW High-resolution protein interaction map of the Drosophila melanogaster p38 mitogen-activated protein kinases reveals limited functional redundancy. Mol Cell Biol. 2012 Sep;32(18):3695-706.

Christopher Perry

1. Funding Received:

NSERC Discovery 2013-2018
Total Award: $145,000

2. Funding Applied for:

CFI Notice of Intent – York University internal competition ($349,500)

3. **Perry CGR***, Kane DA*, Lanza I, Neufer PD. Methods for assessing mitochondrial function in Diabetes. *Invited Review,* Diabetes. 62: 1041-1053, 2013. (1st publication during faculty position)

4. Lally JS, Herbst EA, Matravadia S, Maher AC, **Perry CGR**, Ventura-Clapier R, Holloway GP. Over-expressing mitofusin-2 in healthy mature mammalian skeletal muscle does not alter mitochondrial bioenergetics. *IN PRESS,* PLoS One. 2013.

5. Wan Z, **Perry CGR**, MacDonald T, Beaudoin MS, Castellani L, Chan CB, Schertzer J, Holloway GP, Wright DC. IL-6 is not necessary for the regulation of mitochondrial content in mouse adipose tissue. *IN PRESS*, PLoS ONE. 2013

M. Riddell

Funding Received:

New Grants

1. NSERC Discovery Grant (individual- 3rd renewal). $165,000 (2013-2017), Project Title: Examining the mechanisms for the lipolytic and antilipolytic effects of glucocorticoids in adipose tissue.

2. Corcept Therapeutics contract. $22,633.90 (5/7/2012-5/7/2013). Project Title: Glucocorticoid Inhibitors in a Rodent Model of Diabetes.

3. MaRS Innovation MSCPoP Round 2b. Prophylactic treatment of hypoglycemia in insulin-treated diabetes 11/15/2012- 7/31/2013) (partners Drs. Herbert Gaisano, Mladen Vranic, MaRS Innovation and the Centre for Drug Research and Development)- amount $65,000.

4. C. Panagiotopoulos, **M. C. Riddell** and E.A. Sellers. Canadian Diabetes Association 2013 Clinical Practice Guidelines. Chapter 35: Type 2 Diabetes in Children and Adolescents. Can J Diabetes 37 (2013) S117-S118.

5. Shpilberg Y, Beaudry JL, D'Souza A, Campbell JE, Peckett A, **Riddell MC**. A rodent model of rapid-onset diabetes induced by glucocorticoids and high-fat feeding. Dis Model Mech. 2012 Sep;5(5):671-80. doi: 10.1242/dmm.008912. Epub 2011 Dec 19. PubMed PMID: 22184636; PubMed Central PMCID: PMC3424464.

A. Scimè

Funding Received:

1. 2012 NSERC- Discovery Grant $125,000 5 years

2. 2012 Canadian Foundation for Innovation (CFI-LOI) $342,288 one time

3. 2012 NSERC-RTI $56 138 one time Co-Investigator (not received)

Funding Applied for:

4. 2013 Stem Cell Network (Stem Cell Drug Discovery) $75 000 one time
Principal Investigator (in Review)

5. **Scimè A**, (2012). The heat is on: a new avenue to study brown fat formation in humans. Frontiers in Cellular Endocrinology. Jan. 13: 2:118.

R. Tsushima

Funding Received:

1. 07.2009 – 06.2013 *SNARE Protein Regulation of Cardiac Ion Channels and ANF Secretion*
Principal Investigator
Heart and Stroke Foundation of Ontario (T6770) - $409,181 (total)

2. 07.2011 – 06.2014 *Role of Endogenous Cholesterol in Beta-Cell Stimulus-Secretion Coupling*
Principal Investigator
Canadian Diabetes Association (OG) - $274,725 (total)

3. 01.2012 – 12.2016 *In Vivo Imaging of Cardiovascular Function*
Principal Investigator: Robert Tsushima
Leaders Opportunity Fund
Canadian Foundation for Innovation - $350,720

Funding Applied for:

4. 2013.07 – 2018.06 *SNARE Protein Regulation of Cardiac Ion Channels and ANF Secretion*
Principal Investigator
CIHR – applied

5. Dionyssiou MG, Nowacki NB, Hashemi S, Zhao J, Kerr A, **Tsushima RG**, McDermott JC. Cross-talk between glycogen synthase kinase 3β (GSK3β) and p38MAPK regulates myocyte enhancer factor 2 (MEF2) activity in skeletal and cardiac muscle. Journal of Molecular and Cellular Cardiology 54:35-44, 2013