

Response to Principal's Vision Document  
Compilation of Responses from the Faculty of Health Sciences Research Centres/Groups/Foci

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### ***Centre for Health Services and Policy Research (CHSPR)***

The Centre for Health Services and Policy Research is still undergoing transition since the departure of former Director Dr. Sam Shortt several years ago. A prolonged and to date unsuccessful search for a permanent director and new senior or mid career faculty member needs to be brought to a successful conclusion. The centre continues to feel the loss of capacity at the senior investigator level that has not been replaced and that is vital its future success. Despite this, the Centre is thinking ahead to the future of health services and policy research at Queen's. CHSPR is a one of several centres/research groups here at Queen's that are engaged in research in CIHR's pillars 3 and 4. Pillar 3 and 4 research often cuts across disciplinary boundaries and has been growing rapidly in terms of share of research dollars over the past 5 years. The recent decision by SSHRC and CIHR to divert health related social science research to CIHR, the ever increasing importance of knowledge translation research as well as enhanced support for cross cutting research initiatives in the future will only serve to enhance this trend. On the other hand, the Centre will be facing renewal of its core funding agreement with the MoHLTC in 2011, and in the current fiscal climate such a renewal is by no means certain. At present CHSPR collaborates regularly and shares cross appointed faculty with a number of other key research foci at Queen's. I think that future success for this centre and for the success of pillar 3 and 4 research at Queen's, our centre and some others should be looking at ways to work more closely together and share resources, perhaps by forming a single larger research centre or institute that brings together our centre with others such as ICES-Queen's, the Centre for Studies in Primary Care and others. As Acting Director, one of my plans for this year is to engage with these and other appropriate centres to initiate discussions on this topic. I have already met with the Acting Director of ICES-Queen's and established that there is an interest in pursuing this as quickly as possible in the upcoming year. While we already embrace interdisciplinary research we need to develop joint projects with other key resources on campus such as the GIS lab ( I have the first such project here starting this year) and to renew out ties with policy studies, which have become rather tenuous over this transition period.

We will continue to focus on attracting external funding in our core areas of expertise:

- Primary Care – Evaluation of models of care and care processes, primary care HHR policy, chronic disease management in primary care, integration of primary care and other parts of the health care system – much of this jointly with the CSPC
- Disability Policy and Practice – in close collaboration with Rehab. Our two core MoHLTC assigned projects for 2009/10 are in this area.
- Care for Disadvantaged populations: Mental Health and Indigenous Health

As a group, we have begun to seek synergies between these areas of expertise, for example current funded projects or proposals under review look at issues such as primary care for adults with disabilities, chronic disease care for aboriginal patients in primary care, mental health in indigenous patients, primary care of mental health conditions, etc....

## ***Centre for Neuroscience Studies (CNS)***

### **Plans and Aspirations – Three Year Plan**

#### ***Develop a Plan to Expand Core Facilities:***

The Centre for Neuroscience Studies currently has core research facilities in the lower level of the Cancer Research Institute, Botterell Hall, and Abramsky Hall, as well as testing labs in St Marys Hospital, Hotel Dieu Hospital, and Kingston General Hospital. These facilities are being shared by more and more researchers. The CNS wants to elaborate on these facilities and also develop new ones. Specifically, the CNS wants to enhance the testing laboratories in the 3 area hospitals as more researchers engage in collaborative, multidisciplinary research in the clinical setting. In addition, there is a strong desire to also develop new core facilities and bring more neuroscientists into contiguous space. Therefore, the CNS wants to pursue the strategy of getting more space in Abramsky Hall (2<sup>nd</sup> and 3<sup>rd</sup> floors) and Botterell Hall on the 2<sup>nd</sup> floor (Biochem teaching labs) that is adjacent to other CNS space. These areas are highly prized for development for CNS because the space is contiguous with existing CNS space. It is much harder to develop new space that is not contiguous with existing space. The mandate from CIHR for the past 10 years is clear that we need to be engaged in multidisciplinary research that includes strong collaborative links to clinical research and influencing clinical practice. This is a key goal for the CNS in the coming years and the development of core labs in contiguous space is the way to get there.

#### ***Developmental Neuroscience and Neuroscience of Aging:***

The Centre will develop core research nodes in development and aging. There are numerous strong researchers and clinicians working in both of these areas on campus from the Faculties of Health Science, Arts and Science, Education, and Applied Science. The CNS has started hosting retreats to bring these individuals together. However, until now there has been no formal mechanism to bring these people and ideas together. The goal of the CNS retreat meetings is to explore new opportunities for collaborative interdisciplinary research in both development and aging as we work to strategically align our research priorities to prepare in advance for future funding opportunities, particularly those of CIHR. Many of the issues here are related to development and expansion of core facilities (see above).

#### ***Undergraduate Social Neuroscience Program:***

The Centre has begun and will continue to develop a new interdisciplinary undergraduate program in Social Neuroscience in which students will collaborate across traditional core disciplines. The scope of this program is now being developed and it will be summarized and submitted to relevant Deans and VPs as the University undergoes its academic planning process. This program will be a multi-faculty program that will likely span basic medical sciences, clinical sciences, psychology, sociology, education, and computational sciences with probable ties to law, economics, business, and applied sciences.

## ***Centre for Studies in Primary Care (CSPC)***

### **Planned Activities for the Forthcoming Year:**

Last year we developed a strategic plan in conjunction with the Department of Family Medicine. This plan has resulted in developing research foci and some changes in the structure of the Advisory Council which will bring a wider view of the research the centre undertakes from both the Queen's University and Kingston communities.

Next year we will continue to provide a core education in critical appraisal and research for family medicine residents, and have added Dr. Michael Green as an Associate Director of the CSPC which has resulted in expansion of this program to enhance resident experience in planning their projects and understanding of the research process.

The future looks bright for the Centre. We are looking forward to further expansion of the CPCSSN project and continuing research projects related to assessment of primary care models, inter-professional team function and provision of care among others. We will also be continuing with our contract research. One of the areas that has been dormant over the last few years has been the Network for Studies in Primary Care. A major goal next year will be to have this Practice based research network become active again and increase our use of southeastern Ontario as a 'laboratory' to answer questions relevant to primary care. However, the most significant activity next year will be devoted to nurturing the growth and expansion of the CPCSSN project.

### **CPCSSN Activity summary:**

During this reporting period the Centre secured funding for Phase 1 and 2 of a multi-year pilot project led by the CSPC Director, Dr. Birtwhistle. This has led to the formation of a pan-Canadian Primary Care sentinel surveillance network (CPCSSN). CPCSSN is funded by the Public Health Agency of Canada (PHAC) and is a subentity of the College of Family Physicians of Canada (CFPC). It currently involves collaboration between nine Primary Care Practice-Based Research Networks (PBRNs) across six provinces, (Alberta, Manitoba, Ontario, Québec, Newfoundland, and Nova Scotia). The Canadian Institute of Health Information (CIHI) is also a key stakeholder. CPCSSN collects and stores primary care chronic disease health information from Electronic Medical Records (EMRs) from participating family medicine practices associated with primary care practice based research networks across Canada. The Public Health Agency of Canada provided approximately \$0.5M in funding for Phase 1, \$2.5M for Phase 2 and a five year proposal for Phase 3 for \$12M has passed the a PHAC scientific review and a final decision is pending the Minister's approval. As the lead centre for this proposal the Centre for Studies in Primary Care and Queen's University houses the central office and data repository. As the holder of the central data repository CSPC and Queen's University will be the leader in primary care chronic disease surveillance and research over the next 5 years and a large amount of the Centre's time will be devoted to making this a project a success. This data repository will be a resource for epidemiological information on chronic disease in primary care as well as a resource for primary care researchers interested in chronic disease in Canada. We anticipate interest from graduate students from a number of disciplines to come and work with the data which will lead to the development research proposals as well as MSc and PhD fellowships in primary care research.

## ***Protein Function Discovery (PFD) Group and Facility***

### **Current and future academic/research mandate**

***Background:*** The Queen's Protein Function Discovery (PFD) Group and Facility was formed in 2000-2001 by a group of internationally recognized leaders in protein chemistry at Queen's, who led a successful ~\$9 million CFI proposal that provided proteomics/mass spectrometry, structural, and biophysical-based infrastructure for the characterization protein structure and function. ***The mandate of the PFD is to act as a core research node within the Faculty to enable faculty to expand/enhance their protein-based research endeavors by providing access to and training on the housed infrastructure, and to the assembled faculty and technical expertise in the group.*** Since its inception, PFD has operated on a fee-for-service basis and has been financially subsidized by continued CIHR support (Multi-user Equipment/Resource funding) and by the Faculty of Health Sciences. PFD is an integral and core resource which enhances the interdisciplinary research ventures within the Faculty.

***PFD in undergraduate and graduate research training and education:*** PFD has been involved in the training of undergraduate and graduate students. ***Undergraduate:*** Members of the group actively participate in the undergraduate Biochemistry program (BCHM 313, BCHM 410, BCHM 441) and in the Drug Discovery & Human Toxicology Stream in the Life Sciences Program (DDHT 459). The facility also plays a substantial role in the undergraduate 4th-year thesis project courses (BCHM 421, BCHM 422, LISC 499), where the PFD technical staff provided hands-on training and assistance to undergraduate students who wish to utilize the PFD infrastructure to characterize their proteins of interest (20-30 students/yr). ***Graduate:*** PFD provides hands-on training components for the techniques available within the facility that parallel the didactic lecture material in BCHM 824. In addition to these formal links, undergraduate, graduate, and postdoctoral training by PFD has more typically been on an informal basis, where trainees approach the group to learn/use a particular technique in an effort to identify/characterize their protein(s) of interest. ***The assembled technical expertise within the group and the in-depth hands-on training that they provide is a prominent strength of PFD.***

### ***Towards the future:***

- 1) Recognizing the benefits of interfaculty research efforts and the fiscal realities within the group, we have joined with the Department of Chemistry to establish the Queen's University Mass Spectrometry and Proteomics Services Unit (MSPSU). This venture received 'unit' status within the university and support to go forward with a CFI-LOF application for a new instrument that will substantially enhance the proteomic and small-molecule capabilities of the unit. In the next three years PFD, in partnership with Chemistry, will pursue sustainability of the unit, look to establish it as an acknowledged teaching/training centre in Eastern Canada, integrate with other entities (ie. OCBN and KGH), and continue to pursue opportunities to upgrade the infrastructure.
- 2) The combination of infrastructure, in-house full-time technical expertise, and the assembled expertise among the core members of the PFD is a unique and enviable organization in Canada, both from an educational and research perspective. We will look to more fully integrate our knowledge and activities into the undergraduate curriculum, with a particular emphasis on hands-on training. With a push towards more problem-based and group learning and offers 'real-life' experiences, we see our hands-on training capacity as a substantial benefit and new direction in this regard. This will also be extended to graduate education and training. Over the next three years, we are looking to reinvigorate the PFD graduate training program (ie. through the NSERC Create program), which was

initially supported through CIHR. This graduate program will offer transdisciplinary training, as students will be located in a variety of areas with a common focus on protein structure and function.

- 3) Given the group's particular strength in structural biology, we seek to establish a centralized nationally recognized structural biology unit that will complement the PFD biophysical infrastructure housed on the 2nd floor of Botterell Hall. This will include applying for CFI-based infrastructure support, introducing a graduate specialization in structural biology, expanding the faculty expertise to SAXS and cryoelectron microscopy, and fostering independent and large-scale structure-based research programs.

## ***Environment and Human Health Research Group***

### **Plan: 2010-2012**

This Research Group is grounded in the Faculty of Health Sciences with additional members from other faculties. The expertise of members reflects the multi-disciplinary approaches that are necessary to tackle complex adverse human health effects of environmental agents. We are toxicologists, epidemiologists, clinicians, environmental hygienists, and environmental biologists and chemists. Our overall goal is to identify high-priority environmental agents that could be associated with human health and to characterize the mechanisms by which these act.

In the next two years we will continue to develop an internationally recognized research program focusing on environmental influences on reproductive health.

In the next two years we will continue to foster the development of multi-disciplinary research projects in environmental determinants of human health.

Specific goals for the next two years include:

- To request official University Research Group Status with the Advisory Research Committee at Queen's.
- To hold a Research Day to be held in summer 2010 (we have already secured funds). Our first research day held on May 10, 2007 was a great success and fostered inter-disciplinary communication between those of us at Queen's who share an interest in the effects of environmental factors on human health. The goal of our Research Day is to provide a forum for the members of EHHRG and all members of their individual research groups to discuss each their research. The agenda for Research Day will include student/postdoctoral fellow oral presentations and a poster session in the morning, followed by lunch.
- To continue to explore opportunities for Group members to apply for funds through the NSERC Collaborative Health Research Projects (CHRP). A potential project could involve the analysis of the potential for toxicological interactions between arsenic and other compounds.
- To co-host seminars with other groups (ie CRI, Research group in Reproduction, Development and Sexual Function).

In summary we believe that our research group shares the Principal's vision, particularly with the identified areas of expertise.

## ***Gastrointestinal Disease Research Unit (GIDRU)***

### **Response to: "Where next? Toward a University Academic Plan"**

GIDRU will strive to enhance its strength as a unique multidisciplinary combined basic and clinician scientist research unit within the Faculty and University. Strategies to accomplish this goal will include obtaining University center status in the coming year. It will also continue to advocate for adequate protection for Clinician-Scientists, which is essential for the ongoing success of this group. Greater protection would enable the potential of GIDRU to be more fully realized. It will also work with the Kingston hospitals to promote the research identity of the Institutions and to enhance this reputation.

GIDRU will enhance its contribution to the University priority of "Global Human Health" by increasing its translational capacity. While recognized for its strength in animal models of diseases, the ability of GIDRU to translate their discoveries in human disease is less well developed. Given the strategic priorities of its funding agencies including CIHR, CCFC and its National organization, the Canadian Association of Gastroenterology, this is an area of growth and will include significant new resources. GIDRU has significant potential to increase its capacity to examine mechanisms of disease in humans. It will accomplish this goal by examining existing opportunities and expertise within its membership and by recruiting new members with expertise in this area. It will also continue to explore opportunities to work with Pharmaceuticals and Biotech companies to develop new areas of translational research opportunities and funding.

GIDRU will increase its multi-disciplinary strength. While already recognized for its multi-disciplinary strength, GIDRU will continue to expand its breadth of expertise in both the basic and clinical sciences. It will achieve this by expanding its active membership within the Faculty including the surgical disciplines and explore new opportunities, initially in the area of Nutrition. This will include re-visiting the CFI opportunity to establish a Center for Nutraceutical Research with a broader membership and expertise. It will also explore growth of expertise in the area of clinical research, including clinical trials.

GIDRU will enhance training opportunities for undergraduate and graduate students. GIDRU is an ideal environment for the training of undergraduate and graduate students given its unique combination multi-disciplinary basic and clinician scientists but it has significantly greater capacity than is currently utilized. One important area is the incorporation of medical students into research community through summer studentships, and research opportunities during the academic year. It will explore means of training increasing numbers of undergraduates through summer studentships and project courses by involving its graduate students. It will also expand its post-doctoral pool by formalizing International partnership opportunities, including those with China and Mexico.

### ***Infection, Immunity, and Inflammation (III) Research Group***

Infectious agents have a major impact on global health. Recent data compiled by the World Health Organization indicate that upwards of 13.75 million people die each year due to infectious diseases – the leading cause of death on earth. These diseases caused by bacteria, fungi, viruses and other pathogens are also major causes of morbidity, and social and economic hardships for many millions more. The current influenza A H1N1 and HIV pandemics, the recent emergence of pathogens such as the SARS coronavirus, the re-emergence of bacterial pathogens such as *M. tuberculosis*, the increasing prevalence of once-controlled pathogens that are resistant to our antimicrobial drugs, and the frequency of sporadic outbreaks of highly virulent bacterial pathogens contaminating our food and water supplies are just a few examples that serve as important reminders of our vulnerability to infectious diseases. Furthermore, inflammation, a process closely associated with the clearance of infections, is also responsible for a large variety of human diseases. These disorders include allergy, cancer, cardiovascular disease and inflammatory intestinal diseases, to name a few. These observations highlight the need for strong investment in research into infection, immunity and inflammation.

Supporting basic research in infection, immunity and inflammation will result in advances in our understanding of the basic biology of pathogens and the development of disease, the beneficial and detrimental aspects of the host response to infection, as well as the development of new diagnostic tools, vaccine strategies and pharmacological interventions. The long term goals of researchers in this field are to eradicate pathogens and lessen the severity of disease, thereby preventing millions of deaths and improving the wellbeing of many more.

The time has come to recognize and invest in this vital research theme at Queen's. A number of investigators, listed below, with interests in infectious agents, immunity and inflammation wish to form a new research group. By forming this group we hope to achieve several goals. In addition to official University recognition, our interactions will provide a mechanism to bring trans-disciplinary researchers together to discuss their work and inspire each other to address their research problems in new and innovative ways. We also hope to reveal heretofore unappreciated opportunities for collaboration that will enhance our ability to achieve our individual research goals while providing an opportunity for us to garner new support through University, Provincial, Federal and International funding initiatives. As we are all aware, funding agencies are clearly focused on supporting interdisciplinary/ translational collaborative research

programs and forming this group is an important step in making infection, immunity and inflammation research at Queen's more competitive for these funding opportunities.

By forming this research group we will further enhance the international profile of Queen's University as a leader in infection, immunity and inflammation research and will be even more successful in attracting young talent that will shape the future of this field.

## ***Research Group in Reproduction, Development and Sexual Function***

The Queen's University Research Group in Reproduction, Development and Sexual Function would like to achieve Centre status with external funding within 5 years. To achieve this, a request for recognition as an Official Queen's University rather than a Faculty level Research Group was made in February 2010. A request to change the name of this research group was also made in that application to reflect the shared core values of the active participants in the promotion of human health. The proposed new name for the group is the Queen's University Research Group for the Study of Reproductive and Developmental Origins of Health, Disability and Disease. This reflects our interdisciplinarity, areas of research strength and interest in global health promotion.

Our existing executive committee established a substructure to implement the University's developing 2010 Strategic Plan. One subcommittee will seek to develop and integrate strong new educational experiences with transdisciplinary components. Our second subcommittee will develop innovative and scholarly continuing education and enrichment programs for the Queen's community with a mandate of joint development of activities with University Centres and other groups with overlaps of interest. The third subcommittee will communicate and translate our research findings to end users, be they professionals or the public, locally, nationally and internationally. The fourth subcommittee will seek out emerging opportunities for the group to participate in international education, research and service. Our remaining subcommittee will serve in an advisory capacity to the administration on special projects. We have identified the need for advice from others outside of Queen's University on how to achieve success in our goals and encompass the University's principles of Innovation, Interdisciplinarity, Internationalization and Imagination. This advice will come from an advisory board.

We plan to continue to offer our unique Human Placenta Summer Workshop at Queen's University. This one week long wet lab program attracts participants globally, offers training to our graduate students and postdoctoral fellows, opportunities for recruitment of trainees, staff and faculty to Queen's University and for development of new collaborations locally, regionally and internationally. It also establishes Queen's University as a leading centre in human gestational research.

We will substantially develop existing undergraduate and graduate courses related to women's health into elective educational opportunities for the entire Queen's community. An envisioned 3 year cycle might address basic clinical components in year 1; animal models addressing reproductive clinical questions in year 2 and molecular cell biology in year 3. We will explore videoconference, podcasting and other technology links to enable shared development and delivery of our courses with other Ontario Universities.

We propose to apply to CIHR and to hold a Scientific Café to discuss Women's Reproductive Health and Fetal Outcomes. This will be linked with prenatal classes and local retailers of maternity and baby supplies. We will also develop other methods for explanation to the public of our research and for education of the public on the importance of reproductive and gestational health as a fundamental way to provide health to subsequent generations of Canadians.

We will expand our own continuing education efforts by formalizing arrangements with other investigator groups in Canada for linked seminar programs, especially for distinguished visiting lecturers. This will include the 5 maternal fetal medicine training centres in Ontario.

Expanded financial support to enable these goals is requested from the Faculty of Health Sciences.

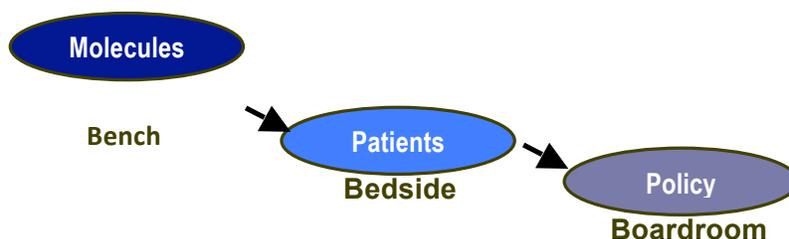
## ***Cancer Research Institute***

### **a. Program Structures**

**Research:** The Queen's Cancer Research Institute (QCRI) was established in 2001. It provides approximately 60,000 square feet of research space populated by approximately 250 faculty, graduate and post-doctoral trainees and support staff, working in three divisions dedicated to cancer research extending from discovery, through clinical trials to health services and policy development.

**QCRI's vision** is to provide an outstanding cancer research environment, unique in Canada, which fosters innovation in research and education, and which delivers novel training opportunities for physicians and scientists.

**QCRI's mission** is to conduct cancer research that spans the spectrum from *bench* (molecular research in the Cancer Biology & Genetics division) to *bedside* (patient research by the Cancer Clinical Trials division) to *boardroom* (policy research conducted by the division of Cancer Care & Epidemiology).



**QCRI's objectives** are to:

- accelerate the development of novel approaches for preventing and treating cancer, by promoting close collaboration between basic and clinical scientists;
- train a new generation of scientists in transdisciplinary cancer research; and
- enhance cancer control in Canada by translating of knowledge into more effective and efficient programs of prevention and treatment.

### **Education:**

Graduate and post-doctoral training opportunities are offered in partnership with several departments at the University, including: Anatomy & Cell Biology, Biochemistry, Community Health & Epidemiology, Mathematics and Statistics (specifically, statistics), Microbiology & Immunology, Oncology, Pathology & Molecular Medicine, Pharmacology & Toxicology, Psychology and the Queen's School of Policy Studies. The Institute has now formalized these interdisciplinary ties with the creation of a Senate approved, cooperative cancer graduate program.

The Institute also operates a unique training program in transdisciplinary cancer research. The program was created approximately 7 years ago with peer reviewed support from the Canadian Institutes of Health Research (CIHR) and the Cancer Research Society, and was reapproved in 2009 with a further 6 years of funding from CIHR and the Terry Fox Foundation. The program is

now tightly meshed with the Collaborative Graduate Program in Cancer and further reinforced by the creation of an undergraduate Life Sciences stream in Cancer which involved the development of several new 4<sup>th</sup> year courses. Resources available through the Training Program have contributed greatly to our ability to offer the latter two Programs.

The Training Program in Transdisciplinary Cancer Research showcases our strength in providing multidisciplinary undergraduate, graduate and post-graduate training opportunities in cancer research. Training opportunities extend from undergraduate summer studentships, through MSC and PhD studies to post-PhD and MD fellows and sabbatical opportunities for faculty from other institutions. The Program welcomes basic science, applied clinical (including translational research), statistical, population health and health services trainees and offers each of these groups a training program specifically tailored to their background and previous educational path. Members of the QCRI are also active in outreach educational programs for high school students, as exemplified by Dr. Bruce Elliott from the Cancer Biology and Genetics Division who was recognized last year with one of two CIHR Synapse Awards for exceptional contributions to the promotion of health research among Canadian secondary school students. Additional local commitments of matching funds would significantly enhance our potential for expanding all three Programs and for renewal of the Training Program in subsequent competitions.

**b. Interdisciplinarity:**

The promotion of interdisciplinary research was the main driving force for creation of the QCRI and as indicated above, the QCRI has now evolved into a major driver of inter-and transdisciplinarity in education at all levels.

**c. Curriculum reform and inclusivity**

The above examples of new programs and courses at both the graduate and undergraduate levels provide examples of curriculum reform. These programs and courses also promote inclusivity in the sense that they involve team teaching and research mentoring by both 'basic' and clinical faculty from a number of different departments. These thematically based courses, particularly at the graduate level, encourage alignment and uniformity of requirements and expectations for trainees in different departments.

**d. Degree Structure (e.g., credit hours)**

This is outside of the scope of the QCRI.

**e. Course format (length, weight, delivery mechanisms, location, etc.)**

Several of the undergraduate cancer courses that have been introduced over the last 2 years employ small group teaching methods, combining didactic lectures by faculty, primary literature review and oral presentations by students and interactive critical analysis. Courses are presented in 3h weekly sessions and students are required to complete essays on individualized, specific topics.

**f. Innovative teaching and learning techniques (i.e. e-learning, field study, exchange, capstone experiences, co-curricular activities, etc.)**

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The Cancer Biology and Genetics Division of the QCRI is actively involved in undergraduate 4th year research project courses offered through several departments, particularly to students enrolled in the cancer stream of the Life Sciences Program. These courses are extremely

popular and demand exceeds capacity. They are also heavily subsidized by the research funds of individual investigators. Additional funding for graduate student TAs would increase our ability to provide these offerings. Similarly, we are oversubscribed with requests for summer research positions and are currently limited by the availability of summer studentships.

The transdisciplinary training program offers the opportunity for co-op placements with industry for both graduate students and PDFs with support from the MITACS ACCELERATE program. The Division of Cancer Clinical Trials also provides peer-review and industry supported fellowships and contributes to graduate studies in clinical trials methodology, design and statistics.

#### **g. TA support and adjunct teaching**

TA support for graduate students and PDFs is currently the limiting factor in offering undergraduate research experience. Similarly, PDFs (PhD and MD) are an under-utilized teaching resource.

#### **h. Infrastructure (physical)**

As indicated above, the QCRI has excellent facilities with a present total of ~60,000 sq.ft. The institute offers state-of-the-art research imaging services to the Queen's community on a fee for service basis (ultrasound, biophotonics, multi-photon confocal and spinning-disc confocal microscopy). Future opportunities for expansion will be provided with the opening of the new Medical School Building which will free up existing teaching laboratories in Botterell Hall.

### **2) Areas of Demonstrated Excellence In Research and Graduate Teaching?**

#### I) Cancer Biology and Genetics:

- drug resistance and metabolism,
- tumour progression
- regulation of cell growth, proliferation and differentiation

#### II) Cancer Care and Epidemiology:

- etiological research in oncology,
- health services research
- medical decision-making/patient education

#### III) Cancer Clinical Trials:

- investigational new drugs (including phase I-II trials)
- biomarker development
- comparative randomized (phase III) trials
- clinical trials design and methodology
- biostatistics

#### **a) Metrics do you use to establish "excellence"?<sup>3</sup>**

Training of PhD / MSc / Post-PhD and Post-MD fellows:

- 2009 statistics: Fellows 11 post-PhD, 19 post-MD; graduates 39 PhD, 50 MSc;

Publications:

- 2009 statistics: Peer review journal papers 71, Book chapters 4, Full conference papers 3

Research Grants and contracts:

- 2009 statistics: Total committed funding: Tri-council \$11.4 million, all sources \$71.4 million.

Educational Grants/ Program Awards:

- CIHR/Terry Fox Training Program \$3 million.

Recognition of individual investigators by National and International Agencies:

- Chairs: endowed (3), Canada Research (2), Cancer Care Ontario (1)
- National awards: Since 2001 senior investigators of the QCRI have been recipients of 7 major awards from Canadian Cancer Society/National Cancer Institute of Canada.

Involvement of members in management and governance of major cancer agencies, including currently:

- Member, National Board of Directors of the Canadian Cancer Society.
- Member, Advisory Council on Research, Canadian Cancer Society Research Institute
- Co-Chair Canadian Cancer Research Alliance; President, Canadian Partnership Against Cancer (Research); Co-chair board Ontario Institute for Cancer Research.
- Chair, Advisory Board CIHR Institute of Cancer Research

**b) Parallel areas of strength in other units in your Faculty or elsewhere at Queen's that might merit this being a University area of emphasis?**

Cancer related research involves many diverse areas of scholarship, from population and public health, the biomedical and social sciences, through physics, computing and engineering. Specific examples of aligned strengths elsewhere at Queen's might include the School of Computing has outstanding investigators who are working on medical imaging and robotic surgical procedures, with a major interest in the management and treatment of prostate cancer. Links are developing but more is possible.

Similarly, the medical physicists at the Cancer Centre/KGH (who are Associate members of the QCRI) have been growing in research strength and have recently been awarded substantial funding through the Ontario Research Fund as part of a Provincial consortium for Adaptive Interventions in Radiation Oncology (which also involves members of the School of Computing alluded to above). The research focus of the medical physicists is to develop combined imaging and treatment devices based on a well established and relatively simple technology, suitable for use in less well developed countries. This work is receiving significant support from the industry leader in this type of technology and has the potential for considerable impact on global health.

Additional opportunities exist for greater interaction with the Departments of Chemistry and its focus on drug development and with the Department of Pharmacology and Toxicology and its Cancer and Biochemical Toxicology theme.

There is expertise across the Divisions of the QCRI that spans the basic and applied (methodological) aspects of biomarker development. With the explosion in the understanding of the molecular mechanisms of disease, research into the concepts of "personalized medicine" is exemplified across the Institute. The potential exists to use this expertise as a platform to enhance research initiatives and understandings of these processes as they relate to other diseases.

The Divisions of Cancer Clinical Trials and Cancer Care and Epidemiology include a cadre of highly trained biostatisticians. These individuals already contribute to activities in other faculties (i.e., Mathematics and Statistics). The potential exists to build upon this expertise through engagement and collaborations with other Departments and Faculties.

In the areas of population and public health, the Division of Cancer Care and Epidemiology has established linkages to the Centre for Health Services and Policy Research and some of its members are involved in the recently introduced 'masters' program in public health.

### **3 Current and future relationship between research and teaching in your unit and programs.**

#### **a Undergraduate participation in research (current and future)**

Members of the Divisions of Cancer Biology and Genetics and Cancer Care and Epidemiology supervise students involved in 4th year research based thesis courses offered through the Departments of Biochemistry, Pathology and Molecular Medicine, Pharmacology and Toxicology and Community Health and Epidemiology, as well as the Life Sciences Cancer Stream. In addition, medical students undertaking critical enquiry electives and specific medical research rotations in oncology are supervised, primarily, by members of Cancer Care and Epidemiology.

As indicated above, the opportunities for undergraduate research experience and the number of summer studentships is currently capped by the availability of support for TAs.

#### **b Graduate student role in the relationship between research and teaching (current and future)**

In future, our graduate students would benefit from more opportunities to participate in teaching. However, there is potential conflict with regard to the effects on research output. Diversion of time and financial resources to the support of undergraduate teaching can have a negative effect on research progress and on the time to graduate degree completion. This is particularly true when undergraduates have little prior exposure to relatively complex experimental techniques and as a consequence require extensive supervision with little probability of actually contributing to research objectives. Thus the extent of commitment needs to be carefully monitored.

#### **c Role of postdoctoral fellows and research associates if applicable**

As mentioned above, PDFs and RA are an important resource for both research and education. They typically participate in mentorship of graduate and undergraduate students. There is increasing pressure to utilize PDFs and RAs in teaching and one of the metrics they will be assessed on in future job searches is their teaching experience. However, as with graduate students diversion of their efforts from research goals, particularly for PDFs, can have a deleterious impact on research productivity and potentially career development.

### **4 International activities**

The Division of Cancer Clinical Trials (CCT) is composed of Queen's faculty and staff that comprise the Central Office of the NCIC/CCSRI Clinical Trials Group (NCIC CTG). The CTG is a cooperative oncology group that carries out clinical trials in cancer therapy, supportive care

and prevention across Canada and internationally. The phase III Program of the CTG conducts randomized controlled trials that are both national and international in scope. It also participates in trials led by its international partners in the United States, Australia and Europe. Typically the number of active phase II trials is 60-70 and average annual accrual is 4000 patients.

Investigators in the Division of Cancer Biology and Genetics are currently involved in formal collaborations with investigators in the US, UK, France and Sweden. Members are also involved in co-organizing international meetings and serve on various committees of organizations such as the American Association for Cancer Research.

Similarly, individual investigators in the Division of Cancer Care and Epidemiology are involved in several international initiatives including committee membership in the Society for Medical Decision Making and the International Patient Decision Standards, and Board membership in the International Society for the Quality of Life. They are also involved in international research collaborations and consortia involving investigators from Italy, Turkey, Poland, Spain, Portugal, England, The Netherlands, and Germany, as well as the US and Australia.

**5 What factors distinguish your unit from similar ones in other universities?**

There is no comparable university based cancer research institute in Canada or internationally. Other cancer research institutes, with the obvious exception of national institutions, are generally associated with large research intensive hospitals or stand alone entities which provide neither the breadth of academic disciplines nor the educational resources that distinguish the QCRI.

**6 The Ministry of Training, Colleges and Universities (MTCU) is interested in multilateral partnerships between universities and between colleges and universities as mechanisms to improve student access to and mobility in the post-secondary sector (i.e. university transfer credits, college credit transfer toward baccalaureate degrees, college offerings of baccalaureate degrees)<sup>4</sup>. Are there opportunities within the evolution of your academic programs to consider these types of partnerships?**

No

**7 Some funds will be centrally allocated beginning in the 2011/12 budget year for new initiatives and established or emerging areas of excellence. State how you would allocate any net new resources awarded to your unit.**

TAs, summer studentships and PDF support would enhance our ability to provide undergraduate research experiences as well as teaching opportunities. The imaging facilities represent an untapped teaching resource that could be extremely popular with trainees at all levels. Currently, this would be limited by space and staff. The space issue might be addressed with development of newly freed up space and support for additional staff could free up time from research obligations to provide additional teaching opportunities. Funds could be maximized by matching to funds from a number of other sources (MITACS-ACCELERATE, CIHR Training Program, Bequests) to enhance our ability to offer these programs as broadly as possible.

**8 Provide a brief response on behalf of your unit to the general content of *Where Next?*, paying particular attention to areas in which you see the potential for your unit to move forward using existing resources.**

**Major, planned divisional activities**

**CANCER BIOLOGY & GENETICS DIVISION (CBG)**

One of the major objectives of the CBG is to increase translational and transdisciplinary research, particularly research crossing the continuum between basic and clinical. Over the last couple of years, there have been two critical recruitments. The first is the appointment of a Director of Translational Studies for the Cancer Clinical Trials Division, whose laboratories are located in the CBG division of QCRI and Department of Pathology and Molecular Medicine. The second is the appointment of a Director of High Content Clinical Trials for the Ontario Institute for Cancer Research, who is a member of the QCRI's Division of Cancer Clinical Trials. These two appointments have had a very significant impact on translational research spanning the two divisions. Thus a major area of focus, which will be developed in collaboration with the Department of Pathology and Molecular Medicine, will be to identify new prognostic and predictive molecular markers for disease progression and outcome for various types of cancer. Several members of the CBG, CCT and the Department of Pathology and Molecular Medicine have very recently submitted a letter of intent to the Canadian Breast Cancer Research Alliance in the area of 'Predictive Oncology' for a team grant. If successful, this grant will bring together oncologists, pathologists, population scientists and cancer biologists to bring their expertise to bear on developing new approaches to predicting outcome and response to treatment in advanced breast cancer.

The Division also anticipates taking the lead on a CFI application to upgrade and expand the current imaging facilities that are operated on a fee for service basis by the CBG. The current equipment was obtained with CFI/MRI funding more than 10 years ago and many of the existing instruments are in need of replacement.

**CANCER CLINICAL TRIALS DIVISION**

The Cancer Clinical Trials (CCT) Division, will continue to conduct multi-centre phase I-III clinical trials in cancer, spanning developmental investigational new drug trials to large international randomized controlled trials. Increasingly, these trials include correlative biologic questions addressing aspects of translational research. The Group is well positioned to address this strategic priority through its recruitment of the above mentioned Directors of Translational Studies and High Content Clinical Trials who will lead this component of the program. The Group's agenda continues to include over 60 trials that span all forms of cancer.

In February 2010, the NCIC CTG underwent its regular 5-year grant renewal process with the Canadian Cancer Society Research Institute. This included a rigorous site visit review by more than 20 international leaders, the outcome of which is pending. As part of this grant renewal, the Group is seeking new funds to expand its Investigational New Drug Program to now include the evaluation of pediatric cancers. If funded this will be a major new program for the group.

Through a systematic strategic planning process conducted through 2008 – 2009, the CTG identified 6 strategic priorities that will guide its activities through the next 5-year grant cycle:

1. To assess novel therapeutics, including evaluation of new systemic agents, in phase I-III clinical trials.
2. To evaluate biological endpoints within clinical trials; in particular, identifying biomarkers that facilitate individualization of therapies may be crucial to improving the outcomes of cancer patients.
3. To conduct pragmatic phase III trials. The NCIC CTG recognizes the unique positioning of an academic cooperative group in being able to conduct these trials that compare or test interventions for the purpose of direct application to health care delivery policies. This role is particularly important in informing delivery of health care that is relevant to Canadians.
4. To evaluate interventions that will prevent cancer.
5. To develop and evaluate new methodologies of clinical trial design, conduct and analysis.
6. To provide and facilitate investigator education and training.

There is considerable discussion nationally and internationally about challenges to clinical research, specifically to with respect to the conduct of clinical trials. These challenges relate to balancing opportunities and expectations. Given the explosion of knowledge related to the molecular mechanisms of cancer there is unprecedented opportunity to include high-quality translational research within a clinical trial setting. However, opposing pressures include the need to comply with an increasingly complex regulatory environment, and funding constraints faced by health care institutions in attempting to support clinical research. The NCIC CTG will continue to play a leadership role, provincially, nationally and internationally, in seeking solutions to these issues, and in continuing to collaborate with researchers globally, who share the group's priorities.

### **CANCER CARE & EPIDEMIOLOGY DIVISION (CCE)**

In 2009, the CCE carried out a review of its current research activities and accomplishments, and to identify its strategic priorities. Further strategic planning sessions with partners at, and outside of, Queen's will take place. Discussions to date have identified the following research priorities and directions for the next five years.

CCE will build on its current strengths. In addition to its current work, CCE intends to explore promising new directions by:

- Capitalizing on its knowledge of database development and manipulation for new applications, specifically in the area of systemic therapy; and exploring the use of new databases through collaborations with ICES-Queen's.
- Enhancing the profile of CCE for the purposes of:
  - increasing research capacity by attracting high quality researchers/research fellows/trainees
  - improving productivity and effectiveness of its knowledge exchange activities
  - increasing potential stakeholder engagement in CCE research
  - advocating for Health Services Research in Oncology

- Exploring new synergistic relationships with research partners that are highly relevant to stakeholders and collaborators at provincial and national levels. For example, with the NCIC-CTG through expanded research designed to assess Provincial clinical uptake of phase III trial findings, and to assess the effectiveness of clinical interventions at the population level.
- Monitoring and contributing to strategic planning and new initiatives planned by research partners, such as the Canadian Cancer Society and its Research Institute, CIHR, OICR, ICES, and others.

## ***Cardiovascular & Respiratory Research Centre (CRRC)***

Despite significant progress in diagnosis and prevention, cardiovascular, cerebrovascular and respiratory diseases continue to cause disability and death at a staggering rate in countries of the developed world, including Canada. Since the occurrence of these diseases increases with age, and Statistics Canada projects a steady increase in the mean age of our population for the foreseeable future, it is undeniable that improved treatments and preventative strategies will be necessary to limit the burden of these diseases on the Canadian health care system. It is our belief that such improvements will only come from concerted efforts in both fundamental and clinical sciences and through the integration of the results of these separate efforts.

Between now and 2013, the goal of the current Cardiac, Circulatory and Respiratory (CCR) Research Program is to establish a Cardiovascular & Respiratory Research Centre (CRRC) at Queen's University. The CRRC will have several mandates:

1. Given the emerging strategic directions of the Canadian Institutes for Health Research (CIHR), most particularly its mandate to more significantly support ventures in which "basic" and "clinical" research are integrated, the CRRC will formally promote and foster interactions between the wide-ranging research activities currently undertaken by both basic and clinical researchers in the CCR. While we propose that the CRRC will initially be a Virtual Centre, as research integration occurs and synergies emerge we anticipate that the CRRC would be housed in an integrated facility to allow outreach beyond the Faculty of Health Sciences and Queen's University and the functioning of the Centre-associated Core Facility (see below).
2. Training of undergraduate and graduate students and of residents and post-doctoral fellows in the cardiovascular and respiratory sciences by members of the Centre will build on our currently highly successful undergraduate CardioRespiratory Science Stream (CRSS) in the Life Sciences Program and will integrate residents from within our allied clinical departments. Indeed, the multidisciplinary research programs of the CRRC will expose trainees to a wide spectrum of approaches and techniques and provide a broad perspective suitable for future leaders in cardiovascular and respiratory science and medicine and will be designed to prepare the trainees for careers in either academia or the pharmaceutical industry. The structure of the research training program will allow for intensive mentored research training as well as coursework created by CRRC-based faculty. Key to the success of the training program will be the integration between the fundamental and clinical "sides" of research and the collaborations among scientists in these complementary disciplines. Currently, several possible linkages with over-sea institutions in China and Korea are being contemplated in order to link with these international partners. In fact, the Director is currently visiting with potential partners at Korean Universities (Chung-Ang University, Korea University) and Institut Pasteur Korea.
3. In order to train future scientists and technologists, and provide a potential source of revenue for CRCC functions, we will establish a CardioRespiratory Sciences Small Animal Imaging Core Facility (CarRespAIC). The goals of the Core will be to 1) make technology and expertise available to all faculty members, students, trainees and 2) provide fee-for-service training. It is our plan to institute this Core by partnering with current imaging facilities at Queen's University, with the Office of the University Veterinarian as well as several training programs at Saint-Lawrence College.

## ***Practice Research in Nursing Group***

Established in 2004 – officially recognized through ARC Queen's University

1. In excess of 1 million dollars in new principal investigator, for the four senior scholars, funding each year.
2. Only site of the Joanna Briggs Collaboration in Canada. QJBC funded by the Ministry of Health and Long Term Care in Ontario and now by CIHR
3. Four nursing scholars in PRN designated as senior scholars who have all held or hold now external career awards.
4. All nursing faculty are members except for two tenured faculty.
5. Nine of ten PhD students enrolled in the SON are supervised by PRN scholars. All master's students except one are supervised by PRN scholars.
6. PRN is linked with the University of Toronto/ McMaster Nursing and Health Services Utilization Unit.
7. Yearly face to face meeting of PRN Advisory Committee provides input into strategic direction.
8. Three year aspirations
  - To have dedicated Chair in Nursing
  - To have all research space co-located in new renovated space at Queen's
  - To be provided with financial support from Queen's to pay for infrastructure costs including permanent administrative assistant
  - To be given centre status at Queen's while maintaining the focus of nursing practice and research.
  - To increase the number of PhD students who have external funding to support their studies
  - To support 1-2 post doctoral fellows each year
  - To increase the number of nurses in PRN through increased faculty complement in the School of Nursing
  - To create linkages with other units and researchers whose interests are knowledge translation and knowledge exchange

## ***Human Mobility Research Centre***

### Summary of Development Plans

The purpose of this report is to describe the strategic plan of HMRC in the context of the Principal's working paper: *Where Next? Toward a University Academic Plan*.

HMRC is becoming recognized as a national leader for multidisciplinary research and HQP training in the area musculoskeletal health. The Centre's activities encompass a spectrum of research that are unique in the integration of engineering, biological, and computing technologies for novel diagnostic techniques, new drug therapies, improved repair and reconstruction procedures, and enhanced rehabilitation strategies. At the same time, it is recognized that this integrative strategy is being adopted by other institutions, and that there will be considerable competition for research funding and access to trainees over the next decade.

The focus over the next five years is to further strengthen the position of the Centre by developing a culture of excellence and leadership among the researchers, research staff and trainees. This will be reflected not only in scientific and technical advancements, but in all aspects of the Centre, including its physical appearance, public presence, management, governance, and interactions with other research groups and teaching units.

Two issues dominate current strategic planning: the need for additional faculty and researchers, and the need to secure long-term funding to support the operation of the Centre. The financial pressures on Queen's, KGH and Hotel Dieu Hospital are significant and it is unlikely that faculty complement in any of the Queen's departments will be increased in the near future to support HMRC activities. There has also been an important shift in the philosophy of both the federal and provincial governments towards funding of major projects. Scientific excellence must now be coupled with commercialization potential. In the case of HMRC, it is necessary to convince granting bodies that commercialization potential should be interpreted more broadly in terms of reduced wait times and a better quality of life. In addition, academic teaching hospitals are also much more interested in the management of intellectual property.

Key elements of the Principal's working paper suggest opportunities that meet HMRC goals while at the same time promoting the long term vision of a highly integrated research and teaching environment at Queen's and KGH. Like many other groups at Queen's, HMRC is highly active in the alignment of research and teaching, the development of new approaches to undertaking these activities, the promotion interdisciplinary study, and seeking partnerships internationally and outside the academic domain. Four areas are envisioned as priorities for the Centre.

### **1) Integration of educational programmes within the research structure**

Over the next two decades, the impact of bone and joint disease and injury on the loss of mobility in patients will be greatly reduced through the integration of emergent biological, information, and engineering technologies. HMRC will be among the leaders in developing a generation of researchers who can achieve this goal. A guiding principle is to provide professional skills to trainees that will improve the quality, impact, and efficacy of research in this area.

In the current educational system, it is necessary to obtain more than one degree in order to participate in successful careers in biomedical sciences and engineering. As such, a continuum paradigm is used to model the integration of educational programmes at the undergraduate,

graduate, and post doctoral levels within the research structure. Undergraduate programs in these areas have two main objectives: to provide core competencies in an accredited curriculum and to prepare the student for a second degree in the field. Graduate programmes promote the ability to integrate clinical and basic sciences in a patient-focused environment while providing skills in translating research outcomes to clinical practice.

The Centre has been active the integration of undergraduate programmes in the School of Computing, and the Departments of Mechanical and Materials Engineering, Chemical Engineering, and Electrical Engineering with research activities of the Centre. This is progressing with the development of programmes at the graduate level including the Collaborative Programme Biomedical Engineering, the NSERC CREATE Training Program in Bone and Joint Health Technologies, and a proposed future graduate programme in School of Computing. An exciting outcome of this effort has been progress in the linkage of the research program to the Orthopaedic Residency training programme within CanMed guidelines.

### **Challenges**

This area will be a major focus over the next five years, and is explicitly linked to the research programme within the Centre. This requires a significant commitment of time in order to manage and integrate the activities, especially in the area of curriculum development and programme management. Furthermore, these highly specialized skills are beyond those typically available in HMRC. The success to date can be attributed to continued efforts by dedicated faculty members; however this generally decreases the time available for other research activities. Most recently, significant progress has been made due to the active involvement of the Queen's Centre for Teaching and Learning who has partnered with HMRC in the development of the CREATE Training Program in Bone and Joint Health Technologies. A strategy is required by which the integration of teaching and research can be sustained in the long term.

### **2) Building on current strengths and fostering new emergent teams**

The Human Mobility Research Centre is a multidisciplinary group of clinician-scientists, basic scientists, and engineers who participate in a collaborative research facility that is supported by a core staff of engineering, scientific and administrative professionals. The current practice of managing multidisciplinary projects at HMRC has been formalized in a model termed *Integrated Research Teams (IRTs)*. With the assistance of NSERC-CREATE funding, these are being piloted in early 2010 and will be fully implemented in 2011. It is anticipated that this approach, in coordination with more traditional research delivery models, will enhance the activity, participation, and productivity of the Centre. In addition, IRTs will be used to facilitate the establishment of a number of new research teams. Specific research foci include:

- **Computer Assisted Therapies.** This theme integrates the resources of the ISS at Kinston General Hospital and will include studies in a broad range of projects such as joint replacement and reconstruction, fracture management, paediatric surgery, and cartilage repair.
- **Bone and Joint Health Assessment.** This will focus on assessment of musculoskeletal pathology and interventional outcomes and will use newly develop resources at Hotel Dieu Hospital for evaluation of high performance activities of daily living.

- **Regenerative Medicine.** Novel technologies will be developed and tested for the replacement of damaged bone and joint tissues using tissue engineering, stem cell, biomaterial, pharmaceutical and microelectromechanical machine (MEMS) methods.

### **Challenges**

This is a core area of activity for the Centre and is critical to its long term goals and sustainability. The management of interdisciplinary teams requires a significant infrastructure beyond that needed for a traditional single-research leader model. Collaborative research laboratories, such as those of HMRC, require technical and administrative support with expertise in that can manage and coordinate complex capital projects as well as oversee the implementation of best practices in a broad variety of scientific areas. The Centre relies almost entirely on external corporate funding for these activities, since there are few grant or contract sources that can fund these needs. The current strategy to reduce the reliance on this source is to develop a philanthropic donor base that will provide an endowment that will fund the support infrastructure over the long term. However, there is a need for time and resources in HMRC to coordinate efforts with the offices of Advancement at Queen's and KGH in this initiative.

The integration of clinical and basic scientists is critical the success of HMRC and this requires a consistent and long term commitment to research activities. In the case of basic scientists, this is compatible with the workload expected of a faculty member, and is generally manageable. This is less so for the clinical scientist who has a commitments to patient care as more demands are placed on the health care delivery system. This is placing demands on young clinical faculty in particular. There is a need to ensure that there is adequate time available for clinical practitioners to participate meaningfully in research.

New expertise is continually needed In order to maintain HMRCs role in the integration of multiple technologies into bone and joint health care. The Centre has participated in the recruiting and selection of new faculty in participating units and this has led significantly to the strengthening of capacity in key areas. However, there is also a need for expertise in allied areas that is not aligned well with research programmes in other units. A coordination strategy is needed by which needs of a number of research initiatives could be supported in the hiring process across units.

### **3) Participation in Multi-centre and Multi-institutional initiatives**

A core value of HMRC is to maintain its research focus in mobility while supporting initiatives with other groups and centres to facilitate the application of technologies to a broader therapeutic domain. This includes the active participation of HMRC in Queen's and Kingston University Hospital major project development, advancement, and commercialization activities. In addition, researchers are actively developing research projects with other research centres within the institutions. There is also interest and participation on a limited scale for the development of an Ontario Bone and Joint Health Consortium. Most recently, HMRC has been a participant in the planning process for proposed patient treatment and research initiatives within the Canadian Forces.

### **Challenges**

This activity requires the time and commitment of senior faculty in the coordination of a number of research groups. In addition, the development of specific projects in areas outside its core

expertise dilutes the focus on human mobility and musculoskeletal health. This is not considered a deficiency, but rather a section of priorities within the Centre. In order to take advantage of potential multi-centre projects, there is a need to facilitate activities across research teams that allows groups to maintain a core focus while at the same time contributing to these activities.

#### **4) Participation in translational activities**

It is anticipated that HMRC will increase its participation in activities related to commercialization and the development of guidelines for clinical practice. This includes the collaboration with *Parteq Innovations* in intellectual property development for assistive devices, surgical technology, software, regenerative repair technologies and novel biomaterials. Clinical practice guidelines are expected to arise as a result of population studies and as a direct result of projects undertaken in the ISS of KGH. A particular focus is the promotion of case study reporting that will highlight procedures undertaken using computer assisted methods

#### **Challenges**

There is a need for product development and intellectual property management coordination that does not rely on a large time commitment from researchers. In addition is a need to recognize the contribution of multiple institutions and groups to the development of new technologies. In addition, a particular challenge exists in the translation of technologies to clinical practice, especially with regard to surgical procedures. There is a need to provide expertise and strategies for the implementation of new technologies into clinical practice that meets the budgetary constraints of the health care institution while meeting the needs of the translational research project.