2006 Biennial Research Report

We’re doing it here
Hamilton Health Sciences is home to many dynamic and significant research programs. Along with our partner institutes, the Faculty of Health Sciences at McMaster University and St. Joseph’s Healthcare, we are conducting leading-edge studies that are helping to improve health care around the world. This report describes those programs and the people who lead them. They have made Hamilton their home and they make us proud.

The mission of Hamilton Health Sciences is “to provide excellent health care to the people and communities we serve and to advance health care through education and research.”

Those are the words we live by, and they demonstrate that research is as fundamental to our organization as patient care and education. The reason for that is simple – innovation today leads to better patient care tomorrow. That’s why Hamilton Health Sciences remains dedicated to supporting health care research.

This report chronicles the many achievements of our scientists and investigators. Through our proud affiliation with McMaster University, research at Hamilton Health Sciences has grown tremendously over the last several years. For example, from 2004 to 2005, total research funding generated by Hamilton Health Sciences increased by 16 per cent to a total of $217,131,326. Every year, research is becoming a larger component of our overall hospital activity. At the same time, it’s driving economic growth across the community and creating jobs.

The federal and provincial governments are also providing more and more support to Canadian researchers and are showing a keen interest in health care research in particular. Hamilton Health Sciences is actively pursuing these funding opportunities with a major focus on building the capacity and critical mass required to allow our researchers to excel. Our vision for research at Hamilton Health Sciences is clear – we intend to become an international leader in many areas of clinical research. In so doing, we will be helping to improve health care and build a stronger economy.

Murray T. Martin,
President and Chief Executive Officer
Hamilton Health Sciences

McMaster University’s Faculty of Health Sciences and Hamilton Health Sciences have the same deep commitment to improving excellence in health care research leading to groundbreaking discoveries that can be translated into improved health for Canadians.

McMaster researchers, working in Hamilton Health Sciences hospitals, continually pursue medical breakthroughs in our laboratories, develop them into better health care and incorporate them into the practice of health care professionals to benefit patients. McMaster’s culture of innovation fosters a commitment to discovery and learning in teaching, research and service.

We are proud of our collaborations that have resulted in centres of excellence, including the Population Health Research Institute, the Henderson Research Centre, the Offord Centre for Child Studies, and the Supportive Cancer Care Research Unit, among many others.

The Faculty thrives on a team approach to health care that represents a true partnership between the community and the University. Within McMaster’s health care group is a broad spectrum of staff, faculty, students, alumni and community supporters, as well as our strong academic hospitals.

We congratulate Hamilton Health Sciences for its continuing dedication as we work together to advance health through learning and discovery.

John G. Kelton MD,
Dean and Vice President, Faculty of Health Sciences
McMaster University

Research activity at Hamilton Health Sciences is conducted in partnership with McMaster University to foster a culture of inquiry and to provide support for development, in order to be one of the most comprehensive health care providers in the country. We are committed to building collaborative research networks and bringing researchers and highly qualified professionals together in new and innovative ways.

Not only does research help to keep people interested and engaged in their work, it also leads to groundbreaking discoveries that can be translated into improved health for Canadians.

To help provide focus for Hamilton Health Sciences’ future, we are committed to supporting and developing key research areas that are consistent with, and will enhance our main clinical programs. Our plans for research development extend to our priority areas, including: cardiac, vascular and stroke, cancer care, pediatrics, orthopedics and rehabilitation, digestive diseases and a host of other programs and services.

Along with the redevelopment announcement made by the provincial government in November, 2005, we will strive to gain new resources as they become available, and will channel them into our focus areas to ensure that a strong and vibrant research program supports the patient care which is provided to the community we serve.

William B. MacLeod,
Vice President, Research and Corporate Development
Hamilton Health Sciences
About Hamilton Health Sciences

Hamilton Health Sciences is a family of five unique hospitals and a regional cancer centre that is affiliated with McMaster University’s Faculty of Health Sciences and has six research centres/institutes:

• Population Health Research Institute
• Henderson Research Centre
• Offord Centre for Child Studies
• Centre for Gene Therapeutics
• Juravinski Cancer Centre
• Michael G. DeGroote Institute for Pain Research and Care

In addition, a significant number of individuals and groups conduct exemplary research activities within the general research environment at Hamilton Health Sciences. Each centre/institute and independent research program is committed to investigating specialized research areas that build on existing strengths, and enhance the strategic direction of Hamilton Health Sciences.

Research Specialties/Programs at Hamilton Health Sciences
(Listed in alphabetical order)

Centre for Advanced Clinical Imaging – Nuclear Medicine
Centre for Gene & Cell Therapeutics
Centre for Knowledge Transfer
Digestive Diseases
Hematology
Henderson Research Centre:
• Thrombosis
• Vascular Biology including Atherosclerosis
• Clinical Trials and Clinical Trials Methodologies
• Cancer and Cancer/Thrombosis Interfaces
• Bone Metabolism
Infectious Diseases
Juravinski Cancer Centre
• Clinical Trials in Cancer
• Bone Metastasis
• Oncology – Basic, Health Services, & Translational Research
• Advanced Therapeutic Research (including Stem Cell )
Lipid Metabolism
Neurosciences – Stroke and Neurosurgery
Obstetrics and Gynecology
Orthopedic Surgery & Trauma
Pain
Pediatrics:
• McMaster Children’s Hospital
  • CanChild
  • Metabolism
  • Neonatology
  • Offord Centre for Child Studies
  • Oncology
Population Health Research Institute:
• Clinical Trials in Cardiovascular Diseases and Diabetes
• Obesity and Cardiovascular Diseases
• Prevention of Atherosclerosis
• Psychosocial Issues and Health
• Aboriginal Health
• Chronic Diseases in Developing Countries
Rehabilitation Medicine

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Research at Hamilton Health Sciences

Research Mission
To advance excellence in health care through research and education to benefit the people and communities we serve. To share our knowledge by collaborating beyond borders and promoting the adoption of best practices within Canada and internationally.

Research Vision
Hamilton Health Sciences will be a world leader in advancing and creating new knowledge that informs patient care by bringing evidence into practice through translation and application.

Research Priorities
1. Consistent with, and likely to enhance, the main clinical programs of Hamilton Health Sciences;
2. Multidisciplinary and collaborative;
3. Builds on existing strengths.

Research Planning Principles
Research development will:
1. Occur in collaboration with the Faculty of Health Sciences at McMaster University and give consideration to related activities within the City of Hamilton;
2. Support and promote research programs which are of direct relevance to the clinical mission and strategic plan of Hamilton Health Sciences;
3. Allow for flexibility in decision-making to react to opportunities (new funding initiatives, availability of star recruits);
4. Be pro-active in seeking out important new research areas that have the potential to enhance existing research and clinical programs; and
5. Strengthen weak research areas of high priority by recruitment or through linkages with strong research programs.

Framework for research activity
The framework for research activity adopted at Hamilton Health Sciences focuses on a view of the research process that is dependent on interaction between fundamental, translational, clinical, knowledge transfer and health services research platforms.

While in reality, there are many overlaps and intersections, adopting this model helps clarify where individual research projects best fit within the research themes that are identified as areas of focus. In addition, this paradigm assists with describing the key strategic benefits derived from researchers interacting to pose better or more relevant questions within a research theme.

It is the expectation for research activities to continually interface with one another across our four sites, to enhance existing programs and/or create research networks through collaborations. As an academic health centre, Hamilton Health Sciences is committed to providing resources to help researchers succeed in applying to federal and provincial funding agencies such as the joint Canada Foundation for Innovation (CFI) and Canadian Institutes of Health Research (CIHR), the Ontario Research Fund (ORF) and other peer-reviewed infrastructure programs.

A new Clinical Research Centre has been proposed for future development. This would be a virtual research network that would link all Hamilton Health Sciences research sites, as well as external resources to accelerate the knowledge transfer process. This institute would act as a centralized resource, with strong alignments with McMaster University’s academic departments to ensure that proven best practices for optimum health care delivery are adopted and communicated through education.

Hamilton Health Sciences is on an exciting path to enhancing research development. Along with our partner institutes, McMaster University and St. Joseph’s Healthcare, we embrace the challenges ahead and look forward to continuing our collaborative efforts to build Hamilton into a truly outstanding and innovative health research community.
Infrastructure investments to support Hamilton Health Sciences investigators with advancing their research careers

Many researchers and scientists associated with Hamilton Health Sciences demonstrate success in a number of peer-reviewed granting agencies, including the Tri-Council, which is comprised of the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), and Social Sciences and Humanities Research Council (SSHRC).

Hamilton Health Sciences is committed to providing ongoing annual funding to support research at all levels. Several internal funding programs are available to researchers, which focus on promoting and fostering a culture of inquiry to help mentor and encourage researchers to continue advancing their careers and to succeed in securing external funding.

Hamilton Health Sciences also recognizes the value in cultivating young students who may be the researchers of tomorrow; and therefore, has established a mentorship program for graduating high schools students pursuing post-secondary health research studies.

The following provides a brief description and annual investments for each program.

**New Investigator Fund**

Hamilton Health Sciences' commitment to “first stage” research led to the creation of this fund. Bi-annually, in March and October, staff members new to research are invited to apply for funding through an internal, peer-reviewed competition. This process provides novice investigators (supported by a formal mentor) with a means of accessing seed money to help explore their ideas and gain the experience of a formal peer-review process.

Annual allocation: $400,000-$450,000

**Hamilton Health Sciences Foundation Research Career Awards**

Each year in November, senior researchers are invited to nominate a junior faculty member for a research career award (also internally peer-reviewed) to be used for research purposes, or a portion of time for a practitioner to facilitate research in their specialty area.

Annual allocation: $105,000

**High School Research Bursary Awards**

Each year in May, schools from across the Central West region including Hamilton-Wentworth, Halton, and Niagara are invited to participate and nominate top high school graduating science students for an opportunity to work alongside researchers over the summer months and receive a $1,500 research bursary award upon completion of their placement. (minimum of 6 awards per year)

Annual allocation: $9,000

**A New Initiative Underway**

Hamilton Health Sciences is working in partnership with McMaster University's Faculty of Health Sciences in developing a proposal for two additional research career awards – Early and Mid-Career Research Awards. Each award will be open to Hamilton Health Sciences staff that are members of the Faculty of Health Sciences at McMaster University.

**Early-Career Awards**

An annual competition to provide funding, for salary support, for exceptional new investigators to develop and demonstrate independence in conducting health research, and who do not yet hold external career support funding.

**Mid-Career Awards**

This program will provide bridge funding, for salary support, to assist with retention of potentially exceptional investigators in need of ongoing base funding. The director of the research program and academic chair will jointly propose candidates, with funding awarded on a case-by-case basis.
Groundbreaking studies involving the populations of the world are rooted in Hamilton

Working collaboratively to improve the health of the populations of the world

The Population Health Research Institute (PHRI) is a world-renowned centre for the coordination of large, international clinical trials and population health studies. Founded in 1999 under the directorship of Dr. Salim Yusuf, the PHRI collaborates with more than 1,000 clinical sites in 66 countries around the world, and is regarded as a pre-eminent training centre for young researchers.

Affiliated with Hamilton Health Sciences and McMaster University, the PHRI is committed to building the resources necessary for the development of global research programs on a local, national and international level. Originally formed with a focus on cardiovascular disease (CVD), the PHRI has since expanded to explore innovative projects in a variety of medical disciplines including diabetes, obesity and societal influences on health, with specific emphasis on variations by ethnicity and geographic region. The Institute is also involved in researching risk factors for heart disease in urban and rural populations, developing countries and in children.

Research out of the PHRI has led to more than 800 publications in the last 10 years in prestigious medical journals such as The New England Journal of Medicine, Lancet, the Journal of the American Medical Association, British Medical Journal, Circulation, Journal of the American College of Cardiology and the European Heart Journal.

In 2005, the PHRI published the results of a ground breaking global study indicating that waist-to-hip ratio, not body mass index (BMI), is the best obesity measure for assessing a person’s risk of heart attack. The team calculated that if obesity is redefined using waist-to-hip ratio instead of BMI, the proportion of people at risk of heart attack is three times as great.

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Previous research has shown that obesity increases the risk of heart disease. However, these studies have been mainly conducted in populations of European ethnicity and geographic region. The evidence for other populations is therefore sparse. Thanks to the waist-to-hip ratio study, physicians around the world now have a better way of understanding the risk related to obesity, which can lead to more effective health interventions.

Further obesity studies will be led by Dr. Arya Sharma (see page 19) at a new clinic that was established with a $1.5 million grant from the Heart and Stroke Foundation. The clinic will house a multidisciplinary team of 14 researchers examining both the social and biological factors that contribute to obesity. One of these researchers, Dr. Heather Arthur, will focus on the psychosocial factors of obesity (See page 22 CVNSU.)

The year 2005 also saw the release of the world’s largest study on acute coronary syndromes (ACS). This Canadian-led study, named OASIS-5/MICHELANGELO, involved researchers from 41 countries and proved that a new anti-thrombotic therapy (to prevent blood clots), fondaparinux, is safer and as effective as the traditional therapy used in preventing heart attacks, death and ischemia (death of heart tissue) in people with serious heart conditions. The study findings demonstrate that the therapy should be the new drug of choice for patients with acute coronary syndromes who are already receiving aspirin and clopidogrel, a blood-thinning drug that helps to prevent blood clots to prevent strokes and heart attacks in patients at risk for these problems.

One of the most notable clinical studies conducted by the PHRI was the HOPE (Heart Outcomes and Prevention Evaluation) study that was cited by the American Medical Association as being among the top ten medical discoveries in 2000, and the most cited article in clinical medicine that year. This study demonstrated the value of ramipril, an ACE inhibitor, in reducing deaths, heart attacks and stroke, thus improving the lives of people around the world by refining and clarifying clinical practice guidelines.

This line of research is continuing to be pursued in ongoing studies that include more than 30,000 patients (ONTARGET and TRANSCEND) by Drs. Salim Yusuf and Koon Teo. Many of the population health studies the PHRI has been involved in have also led to significant health benefits for people around the world. The SHARE (Study of Health Assessment and Risk in Ethnic groups) study for example, by Dr. Sonia Anand, examined CVD risk factors among populations of varying ethnic origin. Ultimately it added new information to the body of knowledge about why South Asians and aboriginal people are at increased risk of CVD in comparison to other ethnic groups.

With sponsorship from the World Heart Federation and the World Health Organization, the PHRI is also actively involved in establishing cardiovascular research programs in developing countries. Analysis shows that more than 80 per cent of CVD occurs in low- and middle-income developing countries, yet the overwhelming majority of data on risk factors and prevention of CVD is derived from developed countries with primarily white, European populations. With varying lifestyles and social circumstances, it is unclear whether data from Western countries is applicable to other regions of the world.

This concern has been addressed through two important studies. The first, INTERHEART, led by Drs. Salim Yusuf and Stephanie Ounpuu, involved about 30,000 people in 52 countries. This study indicated that nine modifiable risk factors accounted for more than 90 per cent of the global burden of heart attacks. This information provides a firm basis for a global strategy on CVD prevention. The second study, PURE (Prospective Urban Rural Epidemiological study), coordinated by Drs. Yusuf, Koon Teo, Anwar Merchant, Sonia Anand and Arya Sharma, examines the hypothesis that CVD rates are increasing in developing countries due to changes in urbanization and industrialization. This study will take place in 15 countries and involve more than 10,000 individuals.

An important area of research for the PHRI is explaining the relationship of elevations of blood glucose and cardiovascular disease. The DREAM and ORIGIN studies led by Dr. Hertzel Gerstein are exploring new ways of preventing and treating diabetes. Another exciting area of research is the assessment whether environmental influences during pregnancy and early childhood predispose a child to developing risk factors for cardiovascular disease. This project (FAMILY study) involves extensive collaboration between pediatricians Drs. Katherine Morrison and Stephanie Atkinson and cardiologists and epidemiologists Drs. Teo and Yusuf.

Other major programs include:
- Preventing perioperative cardiac events - Dr. P. J. Devereaux;
- New antithrombotics and atrial fibrillation - Dr. Stuart Connolly;
- Better treatments for hearts and unstable angina - Dr. Shamir Mehta;
- Efficient care for heart failure patients - Drs. Catherine Demers and Robert McKelvie;

With the aid of funding from the federal government, the Population Health Research Institute will hopefully move into a new and much larger building at the Hamilton General Hospital site. The facility being designed in conjunction with McMaster University, tentatively named the Hamilton Cardiac, Vascular and Stroke Research Institute, will allow for the consolidation of heart and stroke research into one facility, ultimately providing additional resources for both clinical and basic research.

With a staff of about 200, the PHRI employs a wide range of research personnel including physicians, nurses, epidemiologists, research coordinators, biostatisticians, computer programmers, data management assistants and administrative staff. They all share Dr. Yusuf’s commitment to finding answers to important heart health questions.

“Our unique niche is identifying new opportunities for interfaces between research areas.”

– Dr. Salim Yusuf
HAVING PUBLISHED MORE THAN 450 ARTICLES, Dr. Salim Yusuf is among the top one per cent of cited medical scientists in the world, with several articles regarded as citation classics. The Director of the Population Health Research Institute (PHRI), Dr. Yusuf is also a Professor in the Department of Medicine at McMaster University and a Joint Member of the Department of Clinical Epidemiology & Biostatistics.

Dr. Yusuf graduated from St. John’s Medical College in Bangalore, India. He then attended Oxford as a Rhodes Scholar where he received both his clinical training in cardiology and developed his skills as an epidemiologist. For eight years, he was a scientific project officer at the National Institutes of Health (NIH) in Bethesda, Maryland, where he led several landmark studies. In 1992, Dr. Yusuf moved to Hamilton to establish an international program of research in cardiovascular diseases and their prevention. Initially called the Preventive Cardiology and Therapeutics Research Program, it is now known as the PHRI.

A holder of a Heart and Stroke Foundation of Ontario Research Chair, Dr. Yusuf was a Senior Scientist of the Canadian Institutes of Health Research and was recently inducted as a Fellow of the Royal Society of Canada. He has received several prestigious research awards, including the Prix Galien in 2001, the Lucian Award, the Paul Wood Medal in 2003, the Population Health Lecturer of the European Society in 2004, the finalist of the Michael Smith Prize in 2005 and the International Lecturer award of the American College of Cardiology in 2006.

Dr. Yusuf’s involvement in developing the concept of large, simple trials and meta-analysis ultimately changed the way that research is conducted today. Meta-analysis is the process or technique of synthesizing research results by using various statistical methods to retrieve, select, and combine results from previous separate but related studies. Rather than small trials of a few hundred patients, many trials now involve thousands of patients - a trend which allows researchers to gain more conclusive evidence, and which marks a significant change in the culture of research.

The HOPE (Heart Outcomes and Evaluation) study has been widely acclaimed as one of the most influential studies ever conducted in cardiac care, redefining the way we treat heart disease around the world. Another study led by Dr. Yusuf, called INTERHEART, was conducted in 52 countries and redefined our approaches to prevention of heart disease and has influenced the direction for global efforts in this area.

As Director of the PHRI, Dr. Yusuf shares his values and passion for research with his team and others. He has played an integral role in mentoring and supervising young inspiring researchers over the years. He has also acted as a visiting professor to St. John’s Medical College in India for the past 12 years, collaborating with them on several projects including a national epidemiological study examining the effects of urbanization on health (PURE).

In addition to building a world-renowned reputation, Dr. Yusuf has contributed significantly to the development and strengthening of research programs by identifying much-needed infrastructure support in order to attract highly qualified professionals to Hamilton. He has also assisted leaders at Hamilton Health Sciences capitalize on funding opportunities to facilitate the expansion of existing research programs in order to build Hamilton into an outstanding and innovative health research community.

“...The future really is to develop prevention strategies and to find therapies that are just as effective or more effective, but safe and also affordable by most societies.”

– Dr. Salim Yusuf
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stablished in 1988, the Henderson Research Centre (HRC) is home to a group of dedicated researchers who have achieved international success. The HRC is a joint initiative of Hamilton Health Sciences and McMaster University, with research activities focused on clinically relevant problems of vascular disease including heart attacks, stroke and other cardiovascular disorders, thrombosis (blood clots), and atherosclerosis (hardening of the arteries.)

The majority of heart attacks and strokes are caused by blood clots that form due to a build up of cholesterol and fatty material within arteries that have progressively narrowed and hardened over time. In developed countries, such as Canada, heart disease and stroke are the number one cause of death and disability.

Blood clots can also form in the deep veins of the leg, mainly because of blood that pools and ceases to flow. This explains why clots are common after surgery or in patients who are immobilized because of medical illness. Because clots in the leg veins block the outflow of blood, they cause pain and swelling of the leg. More dangerous, however, is the fact that parts of the clot can break off and travel through the heart into the lungs. If these lung clots are large, they prevent blood from reaching the lungs, a situation that can be fatal.

The Centre, which is based at the Henderson General Hospital, has more than 200 staff, all of whom are involved in researching various aspects of vascular disease. The HRC staff include basic scientists, physicians, surgeons, nurses, laboratory physicists, and epidemiologists, who are experts in conducting clinical trials, and epidemiologists, who are experts in population-based studies. A clinical trial is a research project that assigns consenting human subjects to intervention and comparison groups to study the cause-and-effect relationship between a medical intervention and a health outcome.

“The research is laboratory-, clinically- and population-based since we believe that the bench-to-bedside approach is critical to the development of new knowledge and its efficient transfer to patient care and prevention,” says Dr. Jeffrey Weitz, Director of the HRC. Research activity covers the entire life cycle, ranging from abnormal blood clotting in pregnancy and in the fetus, through disorders of infancy and children, to those of adult and geriatric populations. In addition, problems unique to specific ethnic groups who are particularly prone to vascular disease and thrombosis are investigated.

The HRC's main programs and corresponding directors are:
- Experimental Thrombosis and Atherosclerosis - Dr. Jeffrey Weitz
- Clinical Trials Methodology Group - Dr. Mark Levine (see page 20)
- Clinical Thromboembolism - Dr. Jeffrey Ginsberg

The Henderson Research Centre has a long and distinguished reputation for innovation and excellence. Probably the earliest and most significant discovery at the Centre occurred 20 years ago when the HRC began investigations of a new blood thinner called low molecular weight heparin. This substance is made up of molecules that are about one third the size of molecules in conventional heparin. Scientists expected that low molecular weight heparins would be better than conventional heparin, but evidence was needed to prove this concept.

A research team at the HRC led by Dr. Mark Levine took up the challenge and conducted a landmark clinical trial. The results demonstrated that low molecular weight heparin was effective and did not require the careful, in-hospital monitoring needed with heparin. Instead of being admitted to hospital to receive heparin and undergoing frequent blood tests, patients using low weight heparin can inject the medication themselves at home. They need neither hospitalization nor monitoring—a big plus for chronically ill patients who want so much to be home. Today more than 80 percent of patients who need heparin use the low molecular weight form in this way.

“This research is driven by clinically relevant problems that, if solved, have the potential care to improve patient care or the health of populations.”
- Dr. Jeffrey Weitz

These initial heparin trials led HRC researchers to seek out answers to other questions about blood thinners. For example, Dr. Agnes Lee conducted a study comparing the effectiveness of daily injections of low molecular weight heparin with warfarin, another blood thinner that is taken orally by cancer patients with blood clots in their legs or lungs.

She found that the low molecular weight heparin was more effective than warfarin and patients did not have to undergo the routine blood tests required when taking warfarin. Again, this finding changed the way patients are treated worldwide.

HRC researchers Drs. Clive Keanon and Jeffrey Ginsberg have conducted a series of studies focusing on warfarin. Although warfarin is an appealing medication because it can be taken orally, there was little information concerning length of use and the most effective dosage. In the initial study, they showed that patients who developed blood clots in the legs or lungs in the absence of provoking factors had a 25 per cent risk of recurrent blood clots if they took warfarin for only three months as compared with long-term treatment. The next study identified the optimal intensity of warfarin needed to reduce the risk of recurrent blood clots.

Many patients are on long-term treatment with warfarin. These individuals need regular blood test monitoring to ensure that the warfarin dose is correct. Dr. Samuel Schulman at Hamilton General Hospital is evaluating the factors that influence warfarin dosing. In particular, he is planning a study to determine whether it is safe to monitor less frequently in patients whose warfarin doses are stable.

Dr. John Eikelboom is investigating another problem that arises from blood thinner therapy. The most serious complication of anticoagulant treatment is bleeding. Dr. Eikelboom is evaluating the short and long-term consequences of anticoagulant-related bleeding.

Another problem with extended treatment with heparin is osteoporosis or thinning of the bones. Dr. Stephen Shaughnessy has defined the mechanism by which heparin causes osteoporosis. These studies have identified a new pathway in bone regulation and Dr. Shaughnessy is using this information to develop novel treatments to prevent and reverse osteoporosis.

Drs. Ginsberg and Shannon Bates are building on a scoring system that helps doctors evaluate patients for their risk of a blood clot and are evaluating the utility of a blood test that indicates blood clot formation. Called D-dimer, this test detects the presence of small pieces of blood clot material that may be floating in the patient's blood stream. The scoring system includes other risk factors such as immobility or if the patient has cancer. By using the HRC scoring system together with the D-dimer, the doctor is better able to predict if a clot has formed. Building on this information, Drs. Lori Linkins and Keanon are investigating how best to use this test in various situations.

Another team interested in risk factors is Drs. Richard Austin and Geoffrey Wistock. They are investigating why diabetics and people with elevated levels of homocysteine or hypertension (high blood pressure) are at risk of blood clots. They are studying this at a cellular level and so far their findings indicate that, in these patients, plate accumulates on the inside of their blood vessels and then becomes inflamed. The researchers' long-range goal is to help develop drugs that block this process.

Dr. Anthony Chan and Leslie Berry are exploring the possibility of using a special heparin preparation to coat small stents, grafts and catheters that are inserted into patients. Their hope is that the heparin will help prevent clogging and therefore extend the usefulness of these devices.

Dr. Patricia Liaw is investigating links between blood clotting and inflammation. She is focusing on a specific protein in the blood called activated protein C or APC. This protein has a dual role as both an anticoagulant and an anti-inflammatory agent. Although we know a lot about its anticoagulant activity, we know little about how APC blocks inflammation.

Researching the link between blood clots and cancer, Dr. Janusz Rak's work indicates that cancer cells produce proteins that contribute to the formation of clots. Although Dr. Rak's research is still in the early stages, his findings could have a big impact on cancer survival rates.

Like other research programs at Hamilton Health Sciences, the HRC takes research from the laboratory (bench) to the bedside (patients). Patients right here in Hamilton will continue to be the first to benefit from our cutting edge research,” says Dr. Weitz. “We are expanding our programs and recruiting more researchers. We're heading in a direction that is exciting and very promising.”

Henderson Research Centre
D R. JEFFREY WEITZ, an internationally renowned expert on thrombosis, is Director of the Henderson Research Centre (HRC) and leader of its Experimental Thrombosis and Atherosclerosis Program.

A clinician-scientist with expertise in the biochemistry of coagulation (blood clotting) and fibrinolysis (the breakdown of the essential portion of blood clotting), Dr. Weitz has established an active laboratory with funding from the Heart and Stroke Foundation of Ontario, the Canadian Institutes of Health Research, and the Ontario Research and Development Challenge Fund.

Dr. Weitz’s research has contributed significantly to the basic understanding of the working of drugs that interfere with the formation of blood clots. He has been involved in clinical evaluation of both new and existing drugs including anticoagulants (blood thinners) and thrombolytic agents (clot digesting drugs). Some of his research findings have stimulated the development of new drugs, many of which are already being used in clinical practice. He has also helped to develop improved treatments and better ways of testing and diagnosing clotting problems.

A professor of Medicine and Biochemistry at McMaster University, Dr. Weitz holds the Heart and Stroke Foundation of Ontario/J. Fraser Mustard Chair of Cardiovascular Research, the Canada Research Chair (Tier 1) in Thrombosis and a Career Investigator Award from the Heart and Stroke Foundation of Ontario. He is an active participant in the education of medical students, residents, and postdoctoral fellows and oversees a laboratory that acts as a fertile training ground for these students – the researchers of tomorrow.

The Thrombosis Research Group at the HRC has a well-established record of collaboration with national and international researchers. As Director of the Henderson Research Centre, Dr. Weitz is building on its strength as one of the leading institutes of its kind in the world. He is also pursuing new partnerships for the Centre with the orthopedic program at the Henderson General Hospital and oncologists at the Juravinski Cancer Centre.

Recently, Dr. Weitz had the opportunity to work on a new and unique research specimen: bats. Bat saliva contains a special substance that is similar, but not identical, to tissue plasminogen activator (t-PA), a clot busting drug that is widely used for the treatment of heart attacks and strokes. A major complication of t-PA treatment is bleeding, which can be fatal. Dr. Weitz has shown that the t-PA-like material in bat saliva is safer than t-PA. Furthermore, he has worked out the mechanisms responsible for the improved safety profile of bat saliva t-PA. Based on this information, bat t-PA is now in advanced testing in patients with certain forms of stroke. Already, it appears that bat t-PA will prolong the window of opportunity for clot busting therapy and may well improve outcome in patients with stroke.

“We see this research, using bat saliva, as a useful opportunity develop a safer class of drugs to dissolve clots in human patients. This includes the treatment of clots in patients following major orthopedic surgery and cardiac events. More patients are likely to benefit from treatments and fewer will suffer complications,” says Dr. Weitz.

"Research encourages new discoveries and innovative approaches that directly impact patient care.”

– Dr. Jeffrey Weitz
Research at the Juravinski Cancer Centre

War on cancer calls for innovation and collaboration

“What is broken in cancer cells is genes, usually genes that control some aspect of cell growth and division,” says Dr. Gurmit Singh, head of research at the Juravinski Cancer Centre (JCC). “Hundreds of genes are involved in this process, and more than three dozen have been identified as playing a role in cancer.”

“Some are like accelerators, telling cells to grow, grow, grow. Others put the brakes on growth. Some regulate steps in cell division to make sure that DNA is copied correctly from mother to daughter cell. Some play executioner, killing mutant cells in which the copying has gone awry. Cancer is caused by errors in these genes, usually multiple errors. Though some of these errors may be inherited, most are acquired during years of living. Sunlight, cigarette smoke, environmental toxins, and aging itself help these errors to accumulate.”

At the JCC, clinicians, medical physicists and scientists are working together to find answers to the many mysteries of cancer. Research at the JCC can be divided into three general areas or themes that overlap to some extent. These broad categories are: Basic Research, Clinical Trials Research, and Health Services & Supportive Care Research. Basic research conducted at the JCC can be divided into a number of specialized areas and considered as investigations into either the fundamental biology of cancer or the physics relating to cancer treatment and diagnostics. It is focused on two themes of excellence:

Stopping the spread of cancer

Many types of cancer, including breast and prostate cancer metastasize, or spread to the bone, for reasons that are not fully understood. This occurrence affects 70 per cent of patients with advanced breast or prostate cancer and results in further treatment to treat the new cancer. JCC researchers are working to advance knowledge of how and why these cancers spread, and develop novel therapeutic strategies to help stop the spread of cancer.

The Tumour Invasion and Metastasis group is led by Dr. Gurmit Singh and includes: Drs. Mary Richardson, Sujata Persad, Juliet Daniel, Richard Tozer, Hal Hirtle, Mark Levine, Nigel Colterjohn, Jehonathan Pinthus, Michelle Ghert and Michael Patterson.

Lighting the way to new cancer diagnosis and treatments

In health care, light is instrumental in diagnosing and treating disease. Researchers at the JCC are working to find innovative ways of using light to diagnose disease and determine how advanced a tumour is, in order to treat and monitor cancer.

The Optical Diagnostics and Therapeutics group is led by Dr. Michael Patterson and includes: Drs. Tom Farrell, Joe Hayward, Gurmit Singh, Andrew Rainbow, Raimond Wong and Ranjan Sur.

Supporting the needs of cancer patients

The management of cancer involves much more than the medical treatments that doctors use to care for the patient. People living with cancer have informational, psychological, social, physical and practical needs that, if met, can help them enjoy the best possible quality of life during and after their cancer treatment.

Dr. Tim Whelan is the Head of the Supportive Care Research Unit (SCCR), a large multidisciplinary group that actively investigates health services that support the needs of cancer patients. Located at the JCC, the SCCR focuses on the areas of information exchange and shared decision-making involving healthcare professionals and patients, quality of supportive care and evaluation and use of new cancer therapies.

The SCCR Unit was established in 1991 and is a Health System-Linked Research Unit sponsored by McMaster University, Faculty of Health Sciences, and funded in part by the Ontario Ministry of Health. The Unit is composed of a team of investigators working in partnerships with agencies, which provide supportive cancer care services to patients in Central West, Northwestern, and Eastern Ontario.

Dr. Whelan is also a Co-Chair of the Breast Disease Site Group for the National Cancer Institute of Canada (NCIC) Clinical Trials Group and practices as a Radiation Oncologist at the JCC.

“As more treatments for cancer become available, it is important for patients to be involved in deciding on the best treatment for them and actively supported during and after their treatment,” says Dr. Whelan.

Quality improvement and quality gaps in cancer care

There are often ‘quality gaps’ between optimal treatment standards versus actual care delivered to patients. As a surgeon with a clinical specialty in colorectal cancer, Dr. Marko Simunovic and his research team are interested in identifying and addressing such quality gaps among patients undergoing cancer surgery. Of particular interest are studies on surgeon and hospital factors that influence patient outcomes at the population level, and studies that help understand how surgeons can be supported to improve the quality of care they deliver.

Dr. Simunovic is leading a six-year, Canadian Institutes of Health Research (CIHR) funded study, titled the Quality Initiative in Rectal Cancer Trial, which is testing if a multi-pronged quality improvement strategy can improve patient outcomes following rectal cancer surgery.

Other Ontario-based research efforts by this team have identified problems regarding the causes of waiting times for cancer surgery and have provided a rationale for the regionalization of complex cancer surgeries to a small number of hospitals, and, through an NCIC grant, will assess results from years 1994-2004 for pancreatic cancer surgery.

“Every process can be improved in a large or small way. Researchers, clinicians and policy makers have a great deal of work to do to integrate the quality improvement imperative into cancer care, but the potential benefit is immense for individual patients and the public purse,” says Dr. Simunovic.

Clinical trials bring hope and answers

Clinical trials provide people with access to new therapies that may take many years to be approved as an accepted treatment. A clinical trial is a research study designed to ask and answer a relevant clinical question in medicine and follows a strict plan or protocol to accomplish this.

In oncology, clinical trials may test the usefulness of new drugs, new approaches to surgery or radiation therapy, or new combinations of treatments. Some trials look at ways of preventing or detecting cancer early, or measuring the quality of life in cancer patients. This information contributes to our knowledge of cancer, results in progress in the treatment of cancer, and gives direction for future research.

At the Juravinski Cancer Centre, there are 100 trials currently underway, spanning every cancer disease site. These trials are coordinated in the Clinical Trials department at the JCC, which has a long history of excellence for its dedication to informing patients about clinical trials.

“The success of the JCC Clinical Trials program is really a reflection of the dedication of our local physicians to advancing clinical care through high quality research.”

– Dr. Jim Wright

Clinical trials are the best way we can test promising treatments, and the more patients we can involve in the process, the faster we can improve clinical care,” says Dr. Wright.

Research is a high priority at the Juravinski Cancer Centre. The caregivers, as well as the investigators, know that the best way to give cancer patients hope is by pursuing new treatments and working towards finding a cure. As in all other areas of research at Hamilton Health Sciences, the JCC is looking to the future.

“We have a solid research track record with peer-reviewed funding and an international reputation. Because of this, the Centre attracts some of the best scientists from across Canada,” says Dr. Singh. “The training of basic scientists and clinician scientists within the laboratories at the Cancer Centre is extremely important. It ensures continuity in research and the training of highly qualified personnel for the future.”
As the President of the Juravinski Cancer Centre and the Regional Vice President of Cancer Care Ontario, Dr. Bill Evans spends much of his time in meetings focused on improving cancer care in our region, as well as provincially and nationally; but Dr. Evans will never forget why he is so dedicated to his work. He is reminded of his mission every day because he wears a bracelet he received more than 25 years ago from a patient with metastatic cancer, who was cured by his aggressive treatment. “The bracelet is a reminder to me to make a difference in patient care,” says Dr. Evans.

Dr. Evans has been making a difference in many important ways throughout his career. He achieved his landmark research breakthrough early on in his career while working as a medical oncologist at Toronto General Hospital. During this time, he was conducting a trial of a drug called Etoposide, which was being tested as a treatment for small-cell lung cancer. Based on his observation that patients in the trial weren’t doing very well, he opted to give one of his patients a second drug concurrently - a drug called Cisplatin. The drug combination worked well in the initial group of patients treated, so Dr. Evans and his team undertook a national study through the National Cancer Institute of Canada to evaluate the use of Etoposide and Cisplatin in the treatment of small cell lung cancer. Twenty-five years later, the combination of Etoposide and Cisplatin is still the standard of care for small-cell lung cancer world-wide.

His involvement with the Health Analysis Modelling Section of Statistics Canada in the early 1990s led to important observations that have shaped cancer care and treatment. Administrative data was obtained to inform a model of cancer care costs and this data demonstrated that the lack of well integrated health care systems were contributing to the high costs of treating cancer. As a result, Dr. Evans began developing the concept of diagnostic assessment units to maximize efficient use of resources, avoid test duplication, and most importantly, provide a one-stop shop for patients in need of a timely diagnosis.

He has also conducted important research related to the costs of treating lung cancer, which, historically, was viewed as a disease for which there was little effective treatment and as well, not felt to be cost-effective. Dr. Evans’ economic analysis studies showed that treating lung cancer was cost-effective. This, and related work, has been extensively published and presented around the world and has contributed to the growing awareness of the importance of understanding the cost and cost-effectiveness of care.

Dr. Evans is extremely active on a number of provincial policy committees that evaluate new anti-cancer drugs and health technologies. He also chairs the Working Group for Economic Analysis of the National Cancer Institute of Canada, which advises the Clinical Trials Group on which trials should have economic analysis and on the methodology for undertaking pharmaco-economic analysis. He is on the national board of the Canadian Cancer Society and is a member of the governing council for the Canadian Strategy to Control Cancer.

Dr. Evans brings his enthusiasm and vision for care, research and innovation to his role as president of the Juravinski Cancer Centre. “I want to see the Juravinski Cancer Program at the forefront of patient care and research. I particularly want the Centre to be a place for innovation, that constantly looks to improve its processes of care and service delivery so that the Centre provides maximum benefit to patients and staff,” says Dr. Evans.

“My passion is to improve the care of the individual cancer patient and to reduce the risk of people developing cancer.”

– Dr. Bill Evans
Digestive Diseases Research

The Intestinal Diseases Research Program is home to the revolutionary Farncombe Gnotobiotic Facility

The Intestinal Diseases Research Program (IDRP) is the platform for research performed within the Centre of Excellence for Digestive Diseases at Hamilton Health Sciences. Since its establishment in 1983, the IDRP has become internationally renowned, with a wide range of research being conducted. Its main focus is on understanding how the gut’s resident bacteria (flora) influence an array of bodily functions to maintain health, and, under certain circumstances, to trigger diseases both within and outside the gastrointestinal tract.

The gastrointestinal tract represents the largest interface between the body and the environment. It is very extensive in length and has many folds in its inner lining. The gut contains about 10 trillion bacteria and there are more bacteria in the gut than there are cells in the human body. These bacteria colonize in the gut soon after birth and their presence is tolerated by the immune system.

The gut is home to the largest and the most sophisticated immune system in the body. Bacteria in the gut constitute part of the defence against bad bacteria. They share our food and are able to digest and break down complex components, which are indigestible to humans. Their metabolism also generates chemicals that are essential for the normal functioning of the gut.

In the absence of these bacteria, the lining of the gut is vulnerable to injury; the motility of the gut (movement of food through the gut) is altered as is the absorption and processing of nutrients from the diet. Recent evidence suggests that these bacteria play a role in how we process dietary fat and that these bacteria could influence whether or not a person becomes obese following the ingestion of fat.

In a new born baby, bacteria interacts in the gut with the developing immune system and antibodies and immune cells present in the mother’s milk allows the baby to develop a tolerance. It is now believed that these critical interactions take place in life will determine how robust the immune system is later in life. Under standard hygienic conditions, exposure to bacteria is quite limited, and as a result, the immune system develops only limited tolerance. This results in a vulnerability to such disease processes as allergy, autoimmunity, and chronic inflammatory diseases. This is known as the hygiene hypothesis of diseases.

Allergic diseases, autoimmune diseases such as diabetes, and chronic inflammatory conditions such as Crohn’s Disease and Ulcerative Colitis are much more common in urbanized societies. Understanding of the interaction between resident bacteria and the immune system is key to understanding the susceptibility of these diseases.

Traditional microbiological methods do not permit the study of these bacteria. An environment is required in which contaminant bacteria are eliminated and where the composition of gut bacteria can be carefully controlled and manipulated. This involves gnotobiotics; the study of organisms or environmental conditions that have been rendered free of bacteria or contaminants or into which a known microorganism or contaminant has been introduced for research purposes.

Such a facility has now been constructed at McMaster University Medical Centre. The Farncombe Gnotobiotic Facility was opened in April 2005 following a generous donation from the Farncombe family. This is the only facility of its kind in Canada, and one of just a few in the entire world. It is the only such facility that is entirely dedicated to studying how these bacteria can influence the expression of gastrointestinal diseases.

The Director of the Facility is Professor Andrew Macpherson who has been recruited from the Institute of Experimental Immunology in Zurich, Switzerland. Dr. Macpherson is a recipient of a Senior Canada Research Chair and is also the first recipient of the Farncombe Chair in inflammatory bowel diseases research. His research addresses how the exposure to bacteria early in life determines the reactivity of the mucosal immune system and the body’s susceptibility to conditions and diseases later in life.

Inflammatory bowel disease (IBD) includes ulcerative colitis and Crohn’s Disease. Canada has one of the highest rates of IBD in the world with at least 150,000 sufferers. IBD is believed to result from a convergence of a genetically determined susceptibility and a trigger in the environment, which arises as a result of the breakdown of the tolerance between the mucosal immune system and resident bacteria. Once resident bacteria are diverted, inflammation rapidly follows.

Dr. Ken Croitoru, a mucosal immunologist, is interested in how particular species of bacteria, including Helicobacter species, can influence the expression of inflammatory bowel disease. Dr. Mary Perdue, a former Director of IDRP investigates how these bacteria may translocate the first layer of cells in the gut wall. Her work has shown that emotional stress is a facilitator of the translocation of resident bacteria into the bowel wall where they presumably induce immune activity and inflammation in susceptible individuals. Dr. Alison Fox-Robichaud, an intensive care physician, studies the sequence of events that result from bacteria translocating across the gut wall in critically ill individuals. In patients with weakened defences, this translocation of bacteria can result in multi-organ failure and Dr. Fox-Robichaud is studying how this process is initiated and orchestrated within the liver.

The most common form of intestinal illness is functional bowel disease, including functional dyspepsia and irritable bowel syndrome. These are disorders in which pain, bloating, indigestion, nausea or changes in bowel habit occur in the absence of any structural abnormality. The annual costs of these conditions in Ontario alone have been estimated at $351 million in direct costs and $400 million in indirect costs.

Dr. Jan Huizinga, Louis Liu, and Stephen Collins have been investigating the factors that determine how these physiological functions of the bowel are controlled and how they may be altered following inflammation. With the availability of the Gnotobiotic Facility, this team of researchers are now able to investigate how bacteria influence these functions and how changes in the bacterial environment in the gut can lead to persistent dysfunction in the gut. It is now recognized that acute gastroenteritis, following food or water poisoning, is a common trigger for the development of irritable bowel syndrome. Such infections are known to disturb the normal bacterial composition of the gut.

Dr. Wailul Khan studies how specialized hormone producing cells in the body (enteroendocrine cell) are altered in disease processes and how gut bacteria influences this. These cells produce a critical chemical hormone known as serotonin, which influences a variety of gastrointestinal functions and which have been implicated as a mechanism of symptom generation in the irritable bowel syndrome.

Dr. John Marshall, a clinical health economist, and Dr. Paul Moayyedi, the first recipient of the prestigious Richard Hunt-AstraZeneca Chair in Gastroenterology, are interested in the prevalence and socioeconomic impact of gastrointestinal disorders in our society. Drs. Marshall and Moayyedi, together with Dr. Collins, are part of the research team investigating the long-term consequence of the outbreak of water poisoning in the town of Walkerton, Ontario. A substantial number of the residents of Walkerton now suffer from a condition known as post-infective irritable bowel syndrome. This will provide a unique opportunity to study how a transient bacterial infection can result in long-term gastrointestinal dysfunction and complements the work being done in the Gnotobiotic Facility.

The diagnosis of gastrointestinal diseases often requires endoscopic evaluation. Dr. Frances Tse is a gastroenterologist in the Program with specific training in advanced endoscopy. Alongside Dr. David Armstrong, he has specific interest in assessing how clinicians, both novice and experienced, acquire and maintain competence in these procedures.

Drs. Richard Hunt, David Armstrong and Paul Moayyedi are interested in how acid-related disorders of the gastrointestinal tract are caused and treated. It is now well established that, for example, duodenal and stomach ulcers, as well as stomach cancer, are caused by the bacterium Helicobacter pylori, which was identified over 150 years ago, but the significance of its presence was never clear.

For the most part, resident bacteria are beneficial to the host; which is important to research as it can translate into therapy. There is currently considerable enthusiasm in the use of probiotics, supplements of good bacteria in the treatment of a variety of conditions both within and outside the gastrointestinal tract. There is now a resurgence of interest in the therapeutic potential of probiotics and several of the scientists in the IDRP, including Drs. Collins, John Bienenstock and Verdu will evaluate how probiotics can assist in restoring normal function in various aspects of the gastrointestinal tract.
Dr. Stephen Collins is one of the world’s leading researchers in gastroenterology. Former Director of the Intestinal Diseases Research Program, he is now a Professor of Medicine and Head of the Division of Gastroenterology in the Faculty of Health Sciences at McMaster University. He is also the past president of the Canadian Association of Gastroenterology. Dr. Collins obtained his medical training in London, England where he specialized in internal medicine. He also completed three years of research training in cell biology at the Digestive Diseases Branch, National Institutes of Health (NIH) in Bethesda, Maryland.

Dr. Collins’ area of interest is focused on the impact of inflammation on gut function. He has more than 200 publications to his credit, including papers in the following prestigious journals: Nature Medicine, Lancet, JCI, Gastroenterology and Gut. He sees the interface between the body and the large population of bacteria that reside in the gut as the new frontier of gastrointestinal research. “As the majority of these bacteria cannot be cultured using traditional methods, investigation of their role was halted until the molecular tools that permit the identification of bacteria based on their genetic sequences became available,” says Dr. Collins.

The main focus of his research is understanding how the gut’s resident bacteria (flora) influence an array of bodily functions, maintain health, and, under certain circumstances, precipitate the expression of diseases both within and outside the gastrointestinal tract. The study of this interface requires stringent control of the bacterial environment. A new specialized laboratory that permits this kind of study was opened this year at McMaster University Medical Centre, and is the only one of its kind in Canada. Dr. Andrew Macpherson, who runs the laboratory, is a gastroenterologist with an international reputation for his work on how resident bacteria shape the body’s immune system. These developments place the Intestinal Diseases Research Program (IDRP) in a global leadership position to understand the critical role of bacteria in the maintenance of health and the expression of disease.

In 2005, the Nobel Prize in Medicine was awarded to two gastroenterologists, Drs. Barry J. Marshall and J. Robin Warren, for their identification of Helicobacter pylori – a bacteria that lives in the stomach – as the cause of stomach and duodenal ulcers as well as gastric cancer. The findings of Drs. Marshall and Warren have prompted Dr. Collins to further pursue his research on the lower gut.

“The stomach is bathed in acid and is the most inhospitable part of the gut,” says Dr. Collins. “If a bacterium living innocuously in such an environment can cause ulcers and cancer, then consider the probability that some of the trillions of bacteria that live in the lower gut play a role in the expression of other poorly understood chronic diseases of the gut.” These diseases usually include Inflammatory Bowel Disease (Crohn’s Disease and Ulcerative Colitis), Irritable Bowel Syndrome and colon cancer.

Thanks in part to Dr. Collins’ vision and leadership, Digestive Diseases has been recognized by Hamilton Health Sciences as a Centre of Excellence. The Centre has been established at McMaster University Medical Centre and consists of a fully integrated medical-surgical unit for treatment and study of gastrointestinal diseases. It now matches gastroenterology’s clinical profile to its already strong research profile.

“We believe that prevalent gastrointestinal diseases currently of unknown etiology are infective in origin. Until proven otherwise, we propose to be at the forefront of this research.”

– Dr. Stephen Collins
A world leader in researching pediatric diseases, McMaster Children’s Hospital is already on the cutting edge...

McMaster Children’s Hospital is advancing our knowledge of children’s health care to better meet the needs of all children, from the smallest premature infants to young adults. A world leader in researching pediatric diseases and illnesses, McMaster Children’s Hospital is already on the cutting edge in neuromuscular and neurometabolic disorders, the design and conduct of neonatal clinical trials, neonatal high-risk follow-up research, childhood disability, quality of life studies in oncology and epilepsy, childhood nutrition and exercise, and aspects of childhood cancer and bleeding disorders.

• Dr. Mark Tarnopolsky is a world leader in researching neuromuscular and neurometabolic disorders. Thousands of Canadian children suffer from these devastating disorders that include diseases such as Duchenne Muscular Dystrophy, spinal muscular atrophy, mitochondrial disorders and other metabolic/genetic disorders. A new clinic has just been opened at McMaster University Medical Centre that will allow Dr. Tarnopolsky and his team to provide care and conduct research in a state-of-the-art environment. Patients at the clinic receive a range of services including molecular and metabolic testing and rehabilitation for their long-term care. Dr. Tarnopolsky is also evaluating nutrition, exercise and pharmaceutical strategies to enhance muscle function in health and disease. Under Dr. Tarnopolsky’s strong leadership, McMaster Children’s Hospital will continue to offer excellence in both patient care and research in this growing field.

• The tiniest babies are cared for at McMaster Children’s Hospital, which is the regional referral centre for neonatal intensive care in Hamilton and the surrounding region. Dr. Saroj Saigal is a neonatologist and Director of the Growth and Development Clinic at McMaster Children’s Hospital, a follow-up facility for high-risk infants. When babies graduate from the Neonatal Intensive Care Unit at McMaster Children’s Hospital, Dr. Saigal and her team conduct follow-up assessments to advance our understanding of the outcomes of high-risk infants. Studies performed on these children to adulthood have provided valuable information on the health, social, educational, employment and quality of life outcomes, which are relevant in counseling parents of high-risk infants. These studies are unique and recognized internationally.

• McMaster Children’s Hospital conducts groundbreaking research involving children with disabilities and their families, including studies to evaluate family-centred care. Dr. Peter Rosenbaum and his colleagues at CanChild Centre for Childhood Disability Research, a world-class centre for research of childhood disabilities, are working in partnership with the Ontario Ministry of Children and Youth Services to develop and implement a database system for childhood disability. CanChild also works with service providers and consumer groups to identify issues for research, conduct multi-site and multidisciplinary research, and transfer knowledge into practice through education of consumers, service providers, policy makers and students. CanChild’s focus is broad and includes children and youth with physical, developmental and/or communicative needs who require rehabilitation services.

• Dr. Lonnie Zwaigenbaum is a developmental pediatrician specializing in autism and its related disorders. His current research focuses on the early identification of infants who are at high risk for developing autism, and the development and evaluation of intervention strategies for these children. He has also conducted research to better understand the genetic relationship between autism and other related traits such as language delay and anxiety.

• In recent years, the public health spotlight has been on nutrition and exercise for children and youth. McMaster Children’s Hospital is home to the Children’s Exercise and Nutrition Centre, which was established under the leadership of the late Dr. Oded Bar-Or in 1983. The Centre is internationally renowned for its research related to the effects of physical activity, training, nutrition and fitness, physical and mental health, well being, social interaction and physical performance of children and adolescents. Although Dr. Bar-Or passed away in December 2005, his visions will live on in the team of dedicated caregivers and researchers who share his passion for improving the physical and nutritional health of children.

• McMaster Children’s Hospital is also extremely fortunate to have the talents of Dr. Stephanie Atkinson, a nutritional scientist. Over the past 20 years, Dr. Atkinson has built nutrition research, education and training programs at McMaster Children’s Hospital from the ground up. Dr. Atkinson has set high standards in research, and has contributed greatly to our understanding of nutritional requirements for term and premature infants. She has also made important discoveries regarding abnormalities in bone metabolism that impact on skeletal development in children and youth with chronic diseases, such as acute lymphoblastic leukemia, epilepsy, cystic fibrosis, and nephrosis. This research has led to approaches to treatment with nutrition, exercise or bone building agents that can preserve bone mass even when the skeleton is compromised by disease or drug therapy.

• McMaster Children’s Hospital is home to an internationally renowned team specializing in cancer and disorders of the blood. Dr. Ronald Barr, who has a particular interest in the measurement of health status and health-related quality of life, leads the team. Dr. Barr has played a key role, as its President, in the achievements of the Pediatric Oncology Group of Ontario, a non-profit organization working to improve the circumstances of all children with cancer. He is also the co-chair of the Canadian Children’s Cancer Surveillance and Control Programme of the Federal Government. Dr. Anthony Chan conducts clinical and laboratory research in pediatric thrombosis and stroke, and provides a free consultation service for other physicians caring for children with these disorders worldwide.

“Researching pediatric health and disease will continue to be a priority at McMaster Children’s Hospital.”

– Dr. Peter Steer

• McMaster Children’s Hospital is caring for our future, one child at a time.

(See Offord Centre for Child Studies story, pg. 14)
As President of McMaster Children’s Hospital, Chief of Pediatrics at McMaster Children’s Hospital and St. Joseph’s Healthcare Hamilton, and Professor and Chair of the Department of Pediatrics at McMaster University, Dr. Peter Steer is strengthening the position of the Hospital and the University as leaders in pediatric care, research and academic excellence in Canada and around the world.

Trained as a neonatologist in Australia and New Zealand, Dr. Steer has held numerous research grants and is a contributor to the neonatal module of the Cochrane collaboration, an international non-profit organization providing up-to-date information about evidence-based health care. His research interests have included Neonatal Clinical Trials, particularly the use of caffeine in preterm infants and the pharmacokinetics of drugs used in neonatology.

Since arriving in Canada, Dr. Steer has played an active role with the Specialized Pediatric Chairs of Canada (SPCC), a group providing strategic planning advice to the Ministry of Health and Long-Term Care on child health issues. He is also a key player in the Ontario Child Health Network, a collaboration of pediatric academic health science centres in Ontario.

Research is at the top of Dr. Steer’s agenda as President of McMaster Children’s Hospital. “In the next few years, the renewal and redevelopment of several key areas at McMaster Children’s Hospital will provide our researchers with the facilities and tools they need to do their work,” says Dr. Steer. “This will enable them to make further advances aimed at improving children’s health, not only for children in Hamilton and the surrounding region, but for children everywhere.”

“The renewal and redevelopment of several key areas at McMaster Children’s Hospital will provide our researchers with the facilities and tools they need to do their work.”

Dr. Peter Steer
The Offord Centre for Child Studies works to build promising futures for all children

They began by asking questions:

- How is it that some young people are able to overcome enormous obstacles and grow up to be well-adjusted and productive adults while others are not?
- How do we ensure that promising, cost-effective treatments are developed and made available early enough to prevent destructive emotional and behavioural problems from taking root?
- How do we influence governments to support services and interventions that are evidence-based?

To find the answers, the group conducted the first population-based epidemiological study of child mental health in North America and what they learned surprised the world. They found that one out of every five children suffers from emotional or behavioural problems. They warned that these children were not receiving the mental health services they needed, often because the results of research were not being put it into practice. The group was the first to argue for a community-wide approach to children’s developmental health. They urged the public to focus on prevention and early intervention in hopes of making a real difference in the lives of children.

The experiences of those early pioneers in child mental health led them to a fundamental insight that, to this day, continues to guide the work of the Offord Centre. Traditional, one-patient-at-a-time clinical approaches are not enough. If practical solutions are to be devised in order to help every child live to the fullest, we need to understand the role of the social environment in shaping a child’s development, particularly the role played by families and institutions such as schools. A broader understanding of the causes and natural history of emotional and behavioural problems in children must also be developed.

The Offord Centre pursues this by focusing not on any single problem but on the many problems that children experience growing up in our world today. These developmental health problems include not just emotional and behavioural challenges, but also attention problems, learning problems, low self-esteem, clumsiness, extreme shyness, school readiness and chronic health problems that impair a child’s ability to meet normal developmental milestones.

Today’s Offord Centre includes more than 25 members representing disciplines and clinical specialties as diverse as psychiatry, psychology, epidemiology, developmental pediatrics, neuroscience, occupational therapy, anthropology and economics. These dedicated clinicians and investigators work collaboratively, creating new knowledge around problems of early child development and children’s mental health. They share that knowledge with parents, practitioners and policy makers to improve programs and services for children and youth, and training future generations of scientists to take up where they leave off.

Core members of the Offord Centre include:

- Dr. Michael Boyle, an epidemiologist, who along with Research Associate Yvonne Racine, was instrumental in the development of the first phase of the groundbreaking Ontario Child Health Study. Holder of a Canada Research Chair, Dr. Boyle has continued to be involved with subsequent phases of this study evaluating the impact of early childhood experiences and development on later adult health, quality of life and functioning.
- Dr. Kathryn Bennett, an epidemiologist, who is investigating the causes of school-related anxiety and chronic school suspension – problems that can lead to school dropout, substance abuse, depression, suicide and unemployment.
- Dr. Martin Dooley, an economist, who is studying the impact of family income and neighbourhood quality on children’s health and development.
- Dr. Magdalena Janus, a behavioural scientist specializing in “school readiness.” The Early Development Instrument she developed is now being used worldwide to assess children’s strengths and deficits at school entry, providing communities with a snapshot of the health and well being of their youngest citizens that they can use to improve outcomes over time.
- Dr. Ellen Lipman, a child psychiatrist, who specializes in developing and evaluating community interventions for single-parent families, disadvantaged children and children with aggressive behaviour. Her innovative work has been recognized by the Canadian Academy of Child and Adolescent Psychiatry.
- Dr. Harriet MacMillan, a pediatrician and child psychiatrist, whose research is focused on preventing violence against women and children. She is currently funded by the Ontario Women’s Health Council to evaluate the effectiveness of routine screening for violence against women in healthcare settings.
- Dr. Alison Niccols, a psychologist specializing in infant-parent interaction, who has designed courses for parents of children with behaviour disorders, developmental disabilities and other at-risk infants and toddlers. Her courses are being used throughout Canada, the United States and Sweden, earning her an award from the Ontario Association for Infant Development.
- Dr. Louis Schmidt, a psychologist specializing in anxiety. Assisted by a grant from the Natural Sciences and Engineering Research Council, he is currently looking at whether differences in the brain may affect the socio-emotional development of children, making them shy, fearful, anxious or aggressive.
- Dr. Tracy Vaillancourt, an authority on bullying, who has been awarded $1 million from the Social Sciences and Humanities Research Council to develop a community-based approach to this problem now affecting almost one in three school-aged children.
- Dr. Lonnie Zwaigenbaum, a developmental pediatrician, who is leading an international consortium of researchers studying the infant siblings of children diagnosed with autism. His groundbreaking work promises, within the next five years, to push the diagnosis from the current average of four years to as young as 16 months for children affected by this disorder.

“Offord Centre for Child Studies works to build promising futures for all children”

“Our efforts have been hugely successful in encouraging governments both in Canada and elsewhere to recognize the importance of putting resources into the early years,” says Dr. Peter Szatmari, Director of the Offord Centre for Child Studies. “The challenge now is to ensure that those resources continue for older children and youth, whose problems may develop or worsen later in life. Really, our work has just begun.”
IN THE EARLY ‘80s, AS A CHILD PSYCHIATRIST just beginning to specialize in autism, Dr. Peter Szatmari learned an important lesson about what makes for good research.

“The theory at the time was that autism was a form of psychosis, that it was untreatable, and caused by bad parenting,” says the holder of Canada’s first research chair in child psychiatry and the recently appointed Director of the Offord Centre for Child Studies. “Working directly with autistic children and their families, listening to them and learning about what they were going through in their daily lives, I quickly discovered that what was considered common knowledge was hogwash.”

Dr. Szatmari has dedicated his career to unraveling the mystery of this complex developmental disorder, earning acclaim as one of the world’s leading autism experts and helping to establish a centre of excellence in autism research at McMaster University that, with more than $2 million annually in external funding, is second to none in Canada.

He has accomplished this by maintaining direct contact with children and their families and by using the knowledge he gains from them to fuel his research. He believes that a collaborative approach is essential to doing research that makes a difference in people’s lives.

“We need to understand the pressing issues that families are dealing with so that we can formulate research questions that are most in need of answers,” says Dr. Szatmari. “We need to focus not on one problem, but on the many problems that children experience. And then we need to tackle those problems from every possible perspective using the skill sets of many scientists from a broad range of disciplines.”

It’s a model that he believes can work for the entire field of children’s developmental health. As Director, Dr. Szatmari has expanded the scope of the Offord Centre for Child Studies to examine healthy child development more broadly, adding economics, anthropology and occupational therapy to the Centre’s established research expertise in psychiatry, psychology and developmental pediatrics.

“Team science is the way of the future,” says Dr. Szatmari. “In order to build a coherent picture of what contributes to, and what hinders healthy child development, we need to explore it from many different angles, from the family’s perspective, from a school perspective and from a population perspective.”

“A collaborative approach is essential to doing research that makes a difference in people’s lives.”

– Dr. Peter Szatmari
Pioneer in gene therapy is accredited with coining the term “gene therapeutics”

Dr. Jack Gauldie

Centre for Gene Therapeutics

A PIONEER IN THE FIELD OF GENE THERAPY, Dr. Jack Gauldie coined the term “gene therapeutics” to describe the innovative combination of immunology and gene therapy that he uses to stimulate the immune system and fight diseases. Dr. Gauldie is Director of the Centre for Gene Therapeutics, in the Michael DeGroote Centre for Learning and Discovery at McMaster University, and a member of the Hamilton Regional Laboratory Medicine Program at Hamilton Health Sciences. He is also a Fellow of the Royal Society of Canada, the highest academic accolade available to scientists and scholars in the country. He received the Medal of Honour from the Canadian Medical Association and the 1999 Who’s Who in Healthcare Award.

The Centre for Gene Therapeutics investigates the basic pathobiology of inflammatory, infectious and immune diseases. The Centre focuses on creating and implementing methods of using genes as therapeutic agents for the treatment of disease in humans and animals. Laboratory studies aim to better understand gene characteristics, the development of transfer technology, and rapid translation of promising medicines to benefit patients. The Centre strives to develop novel cures for cancer, infectious diseases such as West Nile Virus and SARS, and inflammatory diseases such as respiratory diseases, allergy and rheumatoid arthritis. They do this using state-of-the-art gene transfer technology, coupled with the most recent information on the application of genomics.

Information acquired from past studies have given researchers high hopes to continue exploring the concept of developing gene transfer techniques that use normal genes to replace and manipulate or supplement abnormal genes thereby modifying the body’s immune defenses. This field of study is growing rapidly, demonstrating potential to further develop current applications, and possibly expand to other clinical areas.

Dr. Gauldie builds on the foundation of basic and clinical research activities undertaken by world-class researchers who are clinicians, scientists, postdoctoral fellows, plus graduate and undergraduate students. The Centre successfully integrates expertise in pulmonary and gastrointestinal research, virology, immunology and cytokine biology at McMaster University, as well as national and international collaborative initiatives.

There has been significant progress in studies of gene transfer, new vaccine approaches based on cell and gene-based systems, definition of gene responses crucial for maintenance of chronic inflammation, and characterization of genes and interaction with infectious organisms.

In the field of cancer research, researchers are investigating methods to introduce genes directly into cancer cells to modify their growth and stimulate rejection of the tumour mass by the immune system. This work depends heavily on advanced gene transfer technologies developed at the Centre, as well as a thorough understanding of the cancer cell. Drs. Jonathan Bramson and Yoonghong Won have developed gene-based and cell-based cancer vaccines to re-educate the immune system so it can attack the cancer.

Dr. Ronan Foley is the lead clinical researcher responsible for bringing these new therapies to patients (see opposite page). Dr. Foley’s group, in collaboration with Drs. Richard Tozer, Mark Levine, Bindi Dhely-Thind and other clinicians at the Juravinski Cancer Centre, have initiated clinical trials testing this therapy in skin cancer, breast cancer and most recently, chronic lymphocytic leukemia.

These collaborative approaches are creating a multi-pronged approach to the treatment of cancer.

The Centre for Gene Therapeutics has profited greatly from the expertise of Dr. Frank Graham, retired Professor Emeritus of McMaster University and world leader, who developed ways of using adenovirus (also known as the common cold virus) as a tool to transfer genetic information. The adenovirus approach has been used for most, if not all, of the pioneering research at the Centre. Techniques include adding one or two normal functioning genes to the patient to modify abnormal genes that may be causing disease. This gives the body a chance to use its own defence mechanisms to stop the disease process and return to normal.

Dr. Kenneth Rosenthal has been the Centre’s lead investigator using a similar approach for the treatment of, and protection from, infectious diseases. This includes a Canadian initiative for a gene-based vaccine for SARS and an international effort to develop a gene-based mucosal vaccine for HIV. As well, similar work to develop gene-based vaccines for tuberculosis is being carried out by Dr. Zhou Xing. Drs. Jonathan Bramson, Karen Mossman and Mark Loeb are pursuing the genetics of the host response to West Nile Virus (see page 18) for protection and resistance.

Chronic diseases are another area where gene therapeutics is being used in order to advance treatment of acquired and hereditary chronic diseases. In pulmonary fibrosis (scarring of the lungs), gene therapy is being used to target abnormal genes for modification, as well as generate animal models for therapeutic drug development. This will enable researchers to stop the progression of this disease and allow the lung to recover its normal function. In addition, Dr. Manel Jordan and colleagues are using transient gene transfer technology to better understand and modify lung tissue and allergic responses in asthma attacks and allergic reactions to peanut exposure.

Dr. Gauldie is optimistic on this growing field of research. “Gene therapeutics will one day be as effective in preventing and treating chronic illnesses as vaccination has been in preventing infectious diseases,” says Dr. Gauldie.
Clinical hematologist is testing unique cancer vaccine to prevent the recurrence of cancer

Dr. Ronan Foley, a clinical hematologist, is Director of the Stem Cell Laboratory at the Juravinski Cancer Centre and Chair of the Clinical Trials Network of the Canadian Bone Marrow Transplant Group (CBMTG). Following Dr. Foley’s medical and subspecialty training, he completed a Terry Fox Fellowship under the supervision of Dr. Jack Gauldie at the Centre for Gene Therapeutics (see page 16), McMaster University. During this time, he became interested in the evaluation of cellular gene transfer in the context of cancer immunotherapy, which led to his current research focus: the development of therapeutic cancer vaccines.

An Associate Professor of Pathology & Molecular Medicine at McMaster University, Dr. Foley’s research interest is in cancer-based gene therapy, one of the most exciting developments in health and medical science in recent years. The ability to harness an individual’s personal immune system to fight off disease, by delivering genes as therapeutic agents, holds enormous potential to manage, and ideally prevent, the recurrence of certain illnesses. Dr. Foley and other researchers at Hamilton Health Sciences and McMaster University are collaborating on a number of trials that involve gene therapeutics to target diseases such as breast cancer, metastatic melanoma and lymphocytic leukemia.

“The ultimate goal of these trials is to combine conventional therapies to induce remission and subsequently treat patients with cancer vaccines to prevent relapse,” says Dr. Foley. He is the principal investigator on several studies looking at the development of a novel genetic vaccine and vaccination strategy for cancer patients that have gone into remission.

To create the vaccine, the patient is given a medication that safely moves adult stem cells from the bone marrow into the blood. Stem cells are rare blood cells that live in bone marrow and are created without any specific function, and are therefore capable of turning into any kind of cell in the body. Once they develop, they grow and can expand into numerous types of cells; for example, heart or muscle cells.

A blood sample is withdrawn and purified so the stem cells can be genetically modified using gene transfer technology pioneered in the Stem Cell Laboratory at the Juravinski Cancer Centre. During a two-week processing period, the cells are then grown into culture where they are transformed into dendritic cells (DCs). DCs are potent immune stimulating cells that are rarely present in the blood but can be generated in high numbers in the laboratory.

The genetically modified DCs are then injected back into the patient as their own unique cancer vaccine. The process takes place in Ward 396 at the Henderson General Hospital, where patients are also monitored. The vaccine will be studied to assess the tolerability and safety of the process. As well, the study results are contributing to establishing standards for shipping cellular vaccines across Canada.

Currently, the Stem Cell Laboratory is the only one of its kind in Canada performing this type of function. The lab is an air tight, positive pressure ‘clean facility.’ Its primary function as a cell culture facility is to house the harvested cells for the transformation into DCs. It was created to accommodate the growing number of trials in this exciting new field. Oncology patients from all over Canada fly into Hamilton in order to have their stem cells cultured and their unique vaccine created.

The study is investigating the safety of the vaccine, its ability to evoke an immune response in treated patients, the effect of multiple injections and the impact on patients’ health following genetic vaccination. The vaccine is being used in patients who have chronic lymphocytic leukemia. To date, there have been encouraging preliminary laboratory results supporting a role for further evaluation of this novel therapy, which may ultimately be used in conjunction with conventional cancer treatments.

The transition from “bench to bedside” has required the collaborative skills of a diverse and cohesive multidisciplinary team. It has involved both clinical and lab staff, in particular, the Department of Hematology Lab where special techniques are used to process and store the cells. His collaborators on the study include the Director of the Centre for Gene Therapeutics, Dr. Jack Gauldie, breast cancer specialist Dr. Mark Levine (see page 20), medical oncologist Dr. Bindi Dhesy, and McMaster Associate Professor Jonathan Bramson. Drs. Foley and Gauldie are also collaborators on a phase II study evaluating the role of Tri-Melan, a cell-based vaccine, in patients with stage III/IV metastatic melanoma.

“This is one of the few places in Canada where all of the right players have come together and where it is both safe and feasible to conduct this research,” says Dr. Foley.
Dr. Mark Loeb, a medical microbiologist and infectious disease physician, is at his best when involved in large multidisciplinary studies that allow him to better understand emerging infectious diseases. The Medical Head of Infection Control at Hamilton Health Sciences, Dr. Loeb is also an Associate Professor in the Departments of Clinical Epidemiology & Biostatistics, and Pathology & Molecular Medicine at McMaster University.

Dr. Loeb has led multi-disciplinary research programs on emerging infectious diseases such as West Nile Virus and SARS (Severe Acute Respiratory Syndrome), as well as respiratory infections in the elderly, and antimicrobial use and resistance.

Dr. Loeb’s keen interest in West Nile Virus has led to his most acclaimed study to date; a population genetics research program that is being funded by the U.S. National Institutes of Health (NIH). This study is being conducted in collaboration with Drs. Jonathon Bramson, Karen Mossman and James Mahony. West Nile Virus is a type of virus, mainly infecting birds and mosquitoes but also transmitted by them to humans and other animals. Usually it causes no symptoms, or just mild flu-like symptoms. In some cases, however, it can cause serious illness requiring hospitalization – even death. This $19 million grant is believed to be the largest amount of NIH funding ever provided to a Canadian researcher. Twenty-four hundred people with genes associated with this neuroinvasive virus are participating in the study, which will hopefully answer why some people who contract the virus develop serious complications, while others seem to shrug it off. While Dr. Loeb continues to study the long-term impact of severe West Nile Virus infection, he is also investigating SARS.

According to the World Health Organization (WHO), a total of 8,098 people worldwide became sick with SARS, a viral respiratory illness, during the 2003 outbreak, of these, 774 died. As the Scientific Director of the Canadian SARS Research Network and a Member of the WHO Working Group on SARS Therapy, Dr. Loeb is aiming to develop predictable models for this disease. He found that increased time in a patient’s room, closeness to the patient’s airway and lack of masks increased the risk of transmission of SARS among health care workers.

Dr. Loeb acts as a consultant for infection control in an effort to reduce the burden of infections in hospitals and in seniors. This has included consultation for the Center for Disease Control and Prevention (CDC) in Atlanta, Georgia. Intervention in this area could greatly reduce the burden of infections disease.

He is also working on two major studies involving seniors, both funded by the Canadian Institutes for Health Research (CIHR). A $1.3 million project is looking into antibiotic use and resistance, and a $2.2 million project involving 25 researchers in seven provinces aims to better understand the broader determinants and health care delivery issues of respiratory infections in older adults.

Dr. Loeb’s leadership in fighting infectious diseases has earned him many noteworthy awards including the 2004 Society for Healthcare Epidemiology of America Investigator Award, an international award given annually to one investigator for outstanding research in healthcare epidemiology, the Premier’s Research Excellence Award and a CIHR New Investigator Award, among others.

Recently, he was appointed as a member of the LHIN 4 (Local Health Integration Network) for the Central South Regional Infection Prevention and Control Steering Committee.

With recent concerns regarding a possible flu pandemic, Dr. Loeb confirms that researchers’ first priority is ensuring that a flu pandemic virus is diagnosed as quickly as possible once it strikes. Be on the lookout for Dr. Loeb as studies emerge in this field.

“I am grateful to have the opportunity to do this kind of work. There is nothing I would rather be doing,” says Dr. Loeb. “Having an impact on the health of individuals is the bottom line and I hope that I am able to continue making an impact by being able to answer research questions about emerging infectious diseases.”

“ Infectious diseases are a major global threat to health, and given their complex nature lend themselves to a variety of research approaches.”

– Dr. Mark Loeb
Obesity researcher envisions a world-class centre in obesity management

Dr. Arya M. Sharma leads the Centre for Cardiovascular Obesity Research and Management (CORM), a sub-group of the Population Health Research Institute (PHRI), and is an integral part of its research. His research is a collaborative effort with Drs. Salim Yusuf, Sonia Anand, Hertzel Gerstein and others at the PHRI.

Clinical research in obesity, mainly focused on the link between fat tissue and heart disease, is Dr. Sharma’s specialty. Armed with funding supplied from the Canadian Institutes of Health Research (CIHR) and Heart and Stroke Foundation of Ontario (HSFO), he is the principal investigator of a New Emerging Team grant that focuses on obesity and atherothrombosis. This team is composed of 14 clinical and basic researchers from McMaster University who work in various areas of obesity and heart disease. Recent studies show that increased fat content of muscle and other tissues may increase the risk for diabetes and heart disease; subsequently, Dr. Sharma is working on new treatments to reduce the amount of muscle fat.

He is also spearheading a proposal to develop a comprehensive clinical obesity program that addresses the needs of patients with severe obesity in Hamilton. The project, which would be a joint initiative of Hamilton Health Sciences, St. Joseph’s Healthcare and McMaster University, would include a surgical bariatric program.

According to Dr. Sharma, obesity management involves two distinct phases: the weight loss phase, and the weight-loss maintenance phase. “In most patients, the weight loss part is relatively easy,” says Dr. Sharma. “Keeping the weight off is where the real challenge of obesity treatment lies. Unfortunately, we now know that most patients will fail with lifestyle changes alone – many will eventually need pharmacotherapy or surgery for keeping the weight off.”

Unfortunately, access to advanced laparoscopic obesity surgery, (such as gastric bypass surgery or gastric banding), that has been shown to significantly reduce the medical complications of severe obesity, is not readily available in Ontario.

Dr. Sharma’s priority and passion is to bring world-class obesity treatments, including state-of-the-art obesity surgery, to Hamilton, in order to provide much needed care for the over 20,000 individuals in this region, and over 150,000 in Ontario struggling with morbid obesity. The surgery is covered by OHIP, but unfortunately, not available in our health care system, with the only alternative being offered across the border.

Indeed, obese patients are faced with bias, discrimination and misconceptions. Many people dispute the idea of obesity as a chronic disease, and believe that all that is required to overcome obesity is sufficient will power. “Obesity should be dealt with as a chronic, debilitating disease that can destroy a person’s mental, physical and economical well-being,” says Dr. Sharma.

He goes on to explain, “In most cases, telling an obese patient to just eat less is like telling someone with depression to just cheer up. We forget that appetite and food intake is controlled by a complex sociology, psychology and biology that are most often beyond the control of even the most highly motivated individuals. We realise that prevention comes too late for obese patients, whose only option now is effective treatment.”

“Obesity should be dealt with as a chronic, debilitating disease that can destroy a person’s mental, physical and economical well-being.”

– Dr. Arya M. Sharma
The CTMG acts as a clinical trials resource to clinicians around the world

HAMILTON HEALTH SCIENCES IS HOME to the Clinical Trials Methodology Group (CTMG), one of the largest academic-based clinical trials development organizations in Canada, which is part of the Henderson Research Centre (see page 6). CTMG is a multi-faceted research group that conducts clinical trials. It also acts as a resource to clinicians locally, in Canada and abroad and is comprised of more than 40 individuals including methodologists, statisticians and clinician researchers who focus their work in the areas of cancer, venous thrombosis (blood clots), and neonatology.

The Director of CTMG is Dr. Mark Levine, a medical oncologist who has received numerous awards and honours for his work in breast cancer clinical care and research. He is recognized as a world leader for his research with breast cancer patients and in cancer patients who develop blood clots (venous thromboembolism). He has also performed research in quality of life and the decision-making process to improve how doctors communicate with women who have breast cancer.

In addition to serving as Director of the CTMG, Dr. Levine is Chairman of Health Canada’s Steering Committee on Clinical Practice Guidelines for the Care and Treatment of Breast Cancer, an Associate Editor of the Journal of Clinical Oncology and a Professor in the McMaster University Departments of Clinical Epidemiology & Biostatistics (CE&B), and Medicine.

Faculty members of CTMG include Drs. Jim Julian, Tulay Koru-Sengul and Robin Roberts (CE&B), Clive Kearn, Tim Whelan and Bindi Dhesy (Medicine), and Kathleen Pritchard (Medicine – University of Toronto). The team works together to conceive, design, organize, manage, analyze and publish clinical trials. It conducts trials ranging in size from approximately 20 to several thousand patients through a worldwide network of clinical trials centres and investigators.

CTMG has engaged in trials sponsored by peer-reviewed agencies including the Canadian Institutes of Health Research (CIHR), the Heart and Stroke Foundation of Ontario, the National Cancer Institute of Canada and pharmaceutical companies. Many trials have led to the registration of new drugs with government regulatory agencies such as Health Canada and the United States’ Food and Drug Administration.

In the area of venous thrombosis, a series of studies is being conducted to optimize the use of D-dimer for the diagnosis of acute deep vein thrombosis (DVT, or clots that originate in the legs or pelvis) and pulmonary embolism (clots in the pulmonary artery or one of its branches to the lung). D-dimer is a blood test that is ordered along with other imaging scans, to help diagnose or rule out deep vein thrombosis and pulmonary embolism. Drs. Shannon Bates, Lori-Ann Linkins, Clive Kearn and Jeff Ginsberg are conducting these studies. A pilot study is being led by Dr. James Douketis, evaluating a radioactively labeled antibody to D-dimer for the diagnosis of acute DVT.

Cancer patients are at high risk for blood clots. A trial currently being conducted by Drs. James Perry (Toronto, Sunnybrook and Women’s College Health Sciences Centre) and Mark Levine is evaluating long-term dalteparin low molecular weight heparin for the prevention of venous thromboembolism in patients with brain tumours. Low molecular weight heparin is a blood thinner. In the FOCUS trial, Drs. Agnes Lee and Laurie Elit are studying low molecular weight heparin as an anti-cancer drug by interfering with the blood vessels needed by tumours to grow.

In 1982, Dr. Levine helped to create the Ontario Clinical Oncology Group (OCOG), which falls under the CTMG umbrella. This group was established as a way to develop, co-ordinate and promote cancer clinical trials throughout Ontario’s regional cancer centres and the Princess Margaret Hospital in Toronto. Since then, more than 7,000 cancer patients have been entered into OCOG trials for cancers of the breast, head and neck, ovary, prostate, lung, brain metastases, and pre-malignant conditions for the lung and cervix.

OCOG is currently leading a technology assessment of PET imaging (Positron Emission Tomography) in oncology sponsored by the Ontario Ministry of Health and Long-Term Care (MOHLTC). Through this research initiative, five multi-centre clinical trials are being conducted in Ontario in breast, head and neck cancer, early stage lung cancer, locally-advanced lung cancer and colon cancer that has spread to the liver. The results of these trials will provide important information to the MOHLTC on how best to incorporate PET into practice.

OCOG has recently received funding from CIHR to conduct two trials evaluating novel radiation therapy regimens in early stage breast cancer and early stage prostate cancer. Women who undergo lumpectomy for breast cancer routinely receive breast irradiation. The usual duration of treatment is about four weeks. An innovative five-day radiation regimen called accelerated partial breast irradiation is being compared to standard breast irradiation in more than 2,000 women with breast cancer in this trial. Dr. Tim Whelan of the Juravinski Cancer Centre (JCC, see page 8) and Dr. Ivo Olivotto, from Victoria, B.C. are leading this trial.

Dr. Charles Catton from the Princess Margaret Hospital in Toronto and Dr. Himu Lukka from the JCC are leading a study in conformal therapy. The usual duration of treatment is about four weeks. An innovative five-day radiation regimen using a specialized planning procedure called conformal therapy is being compared to standard therapy in this trial involving more than 1,000 patients.

“This development of new medical technologies and treatment regimens are increasing rapidly which provides our group with many opportunities to rigorously evaluate these innovations through the design and execution of clinical trials. Clinical trials give us the opportunity to improve health care,” says Dr. Levine.
PAIN IS CENTRAL TO MANY MEDICAL CONDITIONS and ailments, and has a tremendous impact on quality of life, health care costs and economic productivity. The two leaders of the Michael G. DeGroote Institute for Pain Research and Care are laying the groundwork that will lead to the fulfillment of a vision; to create a pre-eminent institute that will conduct leading edge research, develop new therapies and provide the highest quality of care to patients suffering from chronic pain.

Scientific Director Dr. James Henry and Medical Director Dr. Akbar Panju have been collaborating for nearly a year with many other researchers and physicians associated with Hamilton Health Sciences and McMaster University, as they develop a blueprint for achieving the long-term goal of operating a world-class facility. Both see the institute’s work as being interfaced with already established programs in research, care and education.

Until recently, pain was treated as a symptom of another ailment,” says Dr. Henry. “Now, scientists and health care professionals are recognizing that chronic pain is an illness unto itself, and should be treated as such.”

The beginnings of the Institute were made possible with $20 million in funds donated by prominent Hamilton area businessman, Dr. Michael G. DeGroote. While the institute is still, for the most part, in planning, Drs. Panju and Henry are both overseeing projects that will soon yield tangible results in the effort to better understand the mechanisms of pain, and ultimately improve treatment.

It will focus on researching and finding treatments for patients suffering with pain, particularly thalamic pain. The thalamus is part of the brain known as the ‘pain centre.’ Sometimes, after suffering a stroke, patients experience pain. In a few of those patients, that pain is severe and almost constant. Dr. DeGroote appreciates just how debilitating this is because he suffers from thalamic pain.

“Dr. DeGroote knows that the advances this unit will make will probably come too late for him,” says Dr. Panju. “But he wants to promote research so that someday effective therapies are available to help everyone who has pain.”

Initiatives of the Institute include the establishment of a comprehensive website, preparation of materials to assist in approaching pharmaceutical companies about partnerships, sponsorship and organization of an international symposium on pain, and the launching of a local support group for those who suffer from chronic pain.

The directors have also been successful in securing funds to advance research projects that will come under the umbrella of the pain institute.

Dr. Henry’s research team has recently established the world’s first animal model of central post-stroke pain, and is studying data on the neurochemical changes in the brain that occur when pain is present.

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As well, Dr. Henry is completing work funded by a five-year, $1.5 million grant from the Canadian Institutes of Health Research and the Canadian Arthritis Network, which involves studying pain associated with osteoarthritis and how it can be prevented. He is also developing partnerships with pharmaceutical companies in large-scale research projects that will help speed the development of drug therapies to treat various types of pain.

Dr. Henry, a neurophysiologist, is a Professor in the Departments of Psychiatry & Behavioural Neurosciences, and Anesthesia at McMaster University and holds a new endowed chair in central pain, provided through the funding from Dr. DeGroote. Widely respected for his important advancements in the basic science of pain, as well as training young investigators, he founded the Canadian Consortium on Pain Mechanisms, Diagnosis and Management, a multidisciplinary, all-Canadian think-tank to promote pain research, improve pain management and disseminate information on pain to patients, practitioners and policymakers.

On the clinical side, Dr. Panju’s extensive experience as a physician complements Dr. Henry’s scientific background. Dr. Panju is the Chief of the Department of Medicine at Hamilton Health Sciences and is a Professor of Medicine in the Faculty of Health Sciences at McMaster University. He specializes in internal medicine, thromboembolism (blood clots) and cardiology. He combines his clinical and administrative roles with academic pursuits including both research and teaching. In 2003, he was awarded the national Osler Award by the Canadian Society of Internal Medicine, as an individual who exemplified the best in medicine. Previously, he received McMaster’s John C. Sibley award for his outstanding contribution to health sciences education and research.

A grant from Hamilton Health Sciences Foundation has allowed Dr. Panju to launch a pilot clinical trial of patients who have suffered a stroke, to determine the predictors of the development of post-stroke central pain. Dr. Panju is working in conjunction with Martin O’Donnell and Ammar Gilani, both assistant professors in the Faculty of Health Sciences, on the pilot project.

Post-stroke central pain has been chosen as the focus for the development of the new Institute’s initial research studies and programs. “By choosing one type of pain as our initial focus and building on existing infrastructure and knowledge in the Hamilton area, progress will demonstrate how change and improvements can be achieved by a convergence of expertise,” says Dr. Henry.

In an effort to create a comprehensive online library for health care professionals and patients, Dr. Panju is striving to collect all available literature from the past 100 years dealing with post-stroke pain. “Such a repository of information will help lead to international collaborations of pain experts on research projects,” says Dr. Panju.

Another project is an assessment and evaluation of the various models of care for patients with central post-stroke pain, both locally and across the country, to determine which models work best.
Changing the professional identity of nurses

There are approximately 231,000 registered nurses in Canada. Of these, approximately 671 have Doctoral level education, the basic training required for independent investigators. Of those with formal PhD research training, only a small percentage identifies research as a major component of their role. The reality is that few nurses with PhDs are actively engaged in peer-reviewed, competitively funded research, a recognized benchmark of research success. Still fewer, an estimated 10 to 15 per cent in Canada, have successful, funded programs of research specializing in the cardiovascular area.

The limited cadre of nurse-scientists with a cardiovascular research focus may be due, in part, to a lack of:
- Specific post-graduate cardiovascular training opportunities (as opposed to the generic curriculum of current graduate programs);
- Appropriate and accessible mentors;
- A cohesive infrastructure and networks for both investigators and clinically based nurses to pursue scientific inquiry.

"Canada’s few cardiovascular nurse-scientists have tended to work in isolation, and more importantly, have been almost invisible to nurses in the clinical setting," says Dr. Heather Arthur. "Cardiovascular research, led by nurses, has not been optimized."

With appropriate mentorship, leadership, and resources, nurses are ideally suited to lead investigations that focus on health promotion, determinants of health, the impact of interventions to reduce heart hazards, novel approaches to health service delivery and understanding cardiovascular disease from the patient and family perspectives. Further, nurses have the opportunity to lead the way in health-related knowledge development by blending both qualitative and quantitative approaches. This kind of methodological diversity has much to offer knowledge development in the cardiovascular field and, in Hamilton, it’s becoming a reality.

A joint initiative of Hamilton Health Sciences and McMaster University is trailblazing this approach. The Hospital’s Cardiac and Vascular Program and the University’s School of Nursing have joined forces to create the Cardiac and Vascular Nursing Science Unit (CVNSU). Dr. Heather Arthur, Director of the CVNSU, and Charlotte Daniels, Integrated Vice President of Patient Services at Hamilton Health Sciences, developed the concept for this unit. The Director of the Cardiac and Vascular Program, Susan Gregoroff, is the co-Director of the CVNSU.

Dr. Arthur is a Professor in the School of Nursing, Faculty of Health Sciences at McMaster University and holds the Heart and Stroke Foundation of Ontario Chair in Cardiovascular Nursing Research.

Her research focuses on behavioural cardiology. She is interested in psychosocial factors that contribute to risk for, and recovery from, cardiac illness and is keen on assisting with the development of research questions. She also has a special interest in women’s cardiovascular health and has conducted research specifically related to women and heart disease. Dr. Arthur holds research grants from the Heart and Stroke Foundation of Ontario, the Canadian Institutes for Health Research (CIHR) and the Canadian Health Services Research Foundation. In addition to her own research, she has a strong interest in the development of research capacity and is the Director of the FUTURE Program for Cardiovascular Nurse Scientists, which is part of the Strategic Training Initiative in Health Research, a national program supported by CIHR and its partners.

The CVNSU, which was officially launched in October 2005, includes a core group of key stakeholders who act as planners and facilitators of the unit’s mission. These individuals are leaders in cardiovascular nursing and include Irene Travale, Tammy Cosman, Leslie Gauthier, Kelly O’Halloran, Charlotte Daniels and Karen Antoni. The goal of the CVNSU is to engage nurses in scientific inquiry across the research spectrum, from utilization to generation of evidence.

After consultation with nurse stakeholders at all levels within the Cardiac and Vascular Program, it was decided that the CVNSU would be a virtual unit, accessible to all nurses who work in the Program. The core group disseminates information about the CVNSU and assists interested nurses in bringing their ideas forward. It is anticipated that pockets of research or scholarly activity will develop in various areas within the Cardiac and Vascular Program.

Susan Gregoroff facilitates organizational support for nurses who are motivated to participate and will endeavour to alleviate organizational barriers that prevent interested nurses from engaging in scientific inquiry. Susan has worked at Hamilton Health Sciences (HHS) for the past 29 years in cardiac and vascular care in a variety of roles and clinical units.

"Enhancing nurses’ utilization of evidence and engagement in research-related activities would ultimately affect patient care and nurses’ professional practice,” says Dr. Arthur. Susan Gregoroff adds, “Identification of nurses with an interest in research, eliminating organizational barriers and fostering partnerships between active nurse-scientists and nurses in clinical settings are important first steps in achieving these goals.”

"Enhancing nurses’ utilization of evidence and engagement in research-related activities would ultimately affect patient care and nurses’ professional practice.”

– Dr. Heather Arthur

Dr. Heather

Susan

Gregoroff

The Cardiac and Vascular Nursing Science Unit
Dr. Jack Hirsh has always been a person to whom others could turn to for advice and support. Throughout his distinguished career as a clinician scientist, he has mentored hundreds of colleagues and students as they have pursued their own research endeavours. As a world-renowned hematologist, the founding Director of the Henderson Research Centre (see page 6), formerly known as the Hamilton Civic Hospitals Research Centre, and Professor Emeritus of Medicine at McMaster University, Dr. Hirsh has provided inspiring leadership as a researcher and administrator. As a pioneer in investigations on the prevention, diagnosis and treatment of abnormal blood clots, known as thrombosis and atherosclerosis, he has received a number of prestigious national and international awards. These include: the Prix Galien; the Trillium Award; the Gairdner Award; and Hamilton Health Sciences’ Cornerstone Award. Most notably, Dr. Hirsh is a member of both the Order of Canada and the Canadian Medical Hall of Fame.

In today’s highly competitive world of health care research, scientists who want to capture the full potential of an innovation need to consider the possibility of patenting their ideas. Collaborating with the private sector or the government to develop those ideas fully is the best way to provide the most benefit to patients.

This is Dr. Hirsh’s specialty. As the consultant on commercialization of intellectual property for Hamilton Health Sciences and the Faculty of Health Sciences at McMaster University, he is available to advise health care researchers on how to optimize their ideas for commercial development.

Dr. Hirsh has had firsthand experience with filing patents and taking advantage of commercial opportunities. Over the 15 years that he was Director of the Henderson Research Centre, 40 patents were awarded. In addition to being highly successful in basic and clinical research, the Centre became involved in commercial ventures, which advanced research capabilities through the generation of considerable funding from the private sector and government.

Dr. Hirsh’s research group pioneered the discovery and development of low molecular weight heparin, increased the safety and utility of warfarin and heparin anticoagulants, helped to establish the use of Aspirin in treating heart attack and stroke, and developed objective testing for diagnosis of venous thrombosis.

The initial challenge for all researchers is to come up with ideas that are both novel and needed. Dr. Hirsh meets regularly with investigators to help them determine if their work fits the necessary criteria to be patentable. The idea must be original, cannot have been publicly discussed or published and should not be obvious to people who are skilled and experienced in the field.

“I explain to the researchers that they have to have a high level of commitment if they want to carry an invention through to the stage where it can be commercialized,” says Dr. Hirsh. “It takes a lot of time, money and effort to bring a product forward to the stage where it is attractive to a commercial partner.”

Once an idea is deemed to be of potential interest, the Office of Research Contracts and Intellectual Property (ORCIP) at McMaster University reviews its potential for commercialization by assessing the criteria for patentability, market need and commercial potential. ORCIP then recommends to McMaster’s Intellectual Property Board whether the University should proceed with commercialization of the invention. If the Board accepts the invention, the University will undertake responsibility for protecting the intellectual property, maintaining any patents and assisting in fundraising and commercialization.

In return, a profit-sharing arrangement is drawn up with the researchers splitting the net profits from the invention 50/50 between the researchers, the University and the Hospital in accordance with the Joint Intellectual Property Policy. If researchers decide to pursue commercialization of the invention on their own, various incentive programs offered by the provincial and federal governments can provide them with development money. Researchers can pursue commercialization in one of two ways: by establishing their own company or by selling the idea to an established company.

“Twenty years ago, it was felt that anyone working in a public institution should not be involved in private ventures,” says Dr. Hirsh. “But that attitude has changed dramatically. The government is very supportive of commercialization because of its potential to improve health and to stimulate the local development of a vibrant biomedical industry. It takes money to develop treatments and products – money that needs to come from sources outside of hospitals and universities. Commercializing an idea is the quickest way to realize its potential and get it out to the patients who could benefit from it.”

In essence, Dr. Hirsh is a catalyst for innovation. He draws on his own extensive scientific expertise, his knowledge of clinical opportunities, and his experience in the commercial world to provide valuable advice to Hamilton researchers. He has the experience and knowledge to bridge the gap that often exists between basic science and clinical application.

“My advice to budding researchers is to be passionate about your research, train with the best in your area of interest and spend as long as it takes to develop the skills required to be an independent researcher,” says Dr. Hirsh.
Canada Research Chairs Program

In 2000, the Government of Canada created the Canada Research Chairs, a new permanent program to establish 2000 research professorships in universities across the country by 2008. The Canada Research Chairs Program invests $300 million a year to attract and retain some of the world’s most accomplished and promising minds. Chair holders advance the frontiers of knowledge in their fields, not only through their own work, but also by teaching and supervising students and coordinating the work of other researchers.

Canadian universities both nominate Canada Research Chairs and administer their funds. Each eligible degree-granting institution receives an allocation of Chairs. For each Chair, a university nominates a researcher whose work complements its strategic research plan and who meets the program’s high standards. Three members of a college of reviewers, composed of experts from around the world, assess each nomination and recommend whether to fund the position.

There are two types of Canada Research Chairs:

Tier 1 Chairs
Tenable for seven years and renewable, are for outstanding researchers acknowledged by their peers as world leaders in their fields. For each Tier 1 Chair, the university receives $200,000 annually for seven years.

Tier 2 Chairs
Tenable for five years and renewable once, are for exceptional emerging researchers, acknowledged by their peers as having the potential to lead in their field. For each Tier 2 Chair, the university receives $100,000 annually for five years.

Infrastructure Support
Chairholders are also eligible for infrastructure support from the Canada Foundation for Innovation (CFI) to help acquire state-of-the-art equipment essential to their work.

Canada Research Chairs at Hamilton Health Sciences

Tier 1
- Dr. Michael Boyle – the Social Determinants of Child Health, May 1, 2003
- Dr. John G. Kelton – Transfusion Medicine, January 1, 2001
- Dr. Andrew Macpherson – Mucosal Immunology, July 1, 2004
- Dr. Peter L. Rosenbaum – Childhood Disability Research, Dissemination and Mentoring, January 1, 2001
- Dr. Arya M. Sharma – Cardiovascular Obesity Research and Management, September 1, 2002
- Dr. Jeffrey Weitz – Thrombosis, April 1, 2001

Tier 2
- Dr. Mohit Bhandari – Musculoskeletal Trauma and Surgical Outcomes, September 1, 2004
- Dr. John Eikelboom – Cardiovascular Medicine, September 1, 2004
- Dr. Catherine P. Hayward – Molecular Hemostasis, January 1, 2001 Renewed: November 1, 2005
- Dr. Timothy Whelan – Health Services Research in Cancer, April 1, 2001

Hamilton Health Sciences Foundation - Linking donors with discoveries

Hamilton Health Sciences Foundation is proud to work with world-class researchers and many generous donors that support the leading-edge research being undertaken in our family of hospitals.

In 2005, the Foundation contributed almost $12 million to support medical and surgical equipment, redevelopment of our hospitals, education, scholarships and bursaries including nearly $2 million for fellowships and research and direct research support.

As part of our $100 million Cornerstone of Care Campaign, the Foundation is raising funds to help build a new Cardiac, Vascular and Stroke Research Institute.

Medical research donors support new investigators funds, research programs and clinical trials that allow ideas to match dollars - creating treatment and cures for some of life’s most debilitating diseases. Our role is to help donors determine the best match for your funds – to help you meet the researchers and to choose the research project of your choice. We provide regular reports including financial and progress reports.

Tours of our research centres are available and may be scheduled by contacting the Foundation at (905) 522-3863. For more information, please visit www.cornerstoneofcare.ca.

Your gifts are working right here, right now, for today…and tomorrow.
151% growth in research funding from 2002 to 2006

- Projects reviewed by Clinical Research Ethics Board
- Projects reviewed by Basic Sciences Research Ethics Board

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Figures reported in the above charts include research funding held by all Hamilton Health Sciences’ clinical and basic sciences investigators affiliated with McMaster University’s Faculty of Health Sciences. Funding amounts reported reflect cash basis excluding peer-review grants and contracts. Data for peer-reviewed are reported as per the funding agreements or contracts reflecting the full annual approval amount within the fiscal year regardless of cash receipt timing.
160% growth in research funding from 2002 to 2005
- 16% growth from 2004 to 2005
- 70% growth from 2003 to 2004
- 32% growth from 2002 to 2003

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<td>2005</td>
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Growth from:
- 2002 to 2003: 32%
- 2003 to 2004: 70%
- 2004 to 2005: 16%

125,366,093 INDUSTRY
2,656,342 MOHLTC
123,176 NCIC
10,027,080 Not-for-Profit
248,850 NSERC
12,320,339 CIHR
8,838,108 CFI
1,205,635 CIHR
1,235,176 CIHR
10,433,916 Not-for-Profit
3,110,894 MOHLTC
120,5635 NCIC
1,784,102 NIH
13,532,547 OTHER
192,583 NSERC
377,669 HHS Fdn
8,850,155 OIT
9,989,895 NIH
19,500,122 OTHER
1,560,284 HHS Fdn
8,830,155 OIT

2004 $187,775,442

2005 $217,131,326

Figures reported in the above charts include research funding held by all Hamilton Health Sciences' clinical and basic sciences investigators affiliated with McMaster University's Faculty of Health Sciences. Funding amounts reported reflect cash basis excluding peer-review grants and contracts. Data for peer-reviewed are reported as per the funding agreements or contracts reflecting the full annual approval amount within the fiscal year regardless of cash receipt timing.
The New Investigator Fund gives health professionals the help they need to launch careers as researchers

Hamilton Health Sciences has earmarked financial support, approximately $400-450,000 per year, to assist novice investigators in advancing their research careers. Each year in March and October, Hamilton Health Sciences' staff members who are new to research are invited to apply for funding through an internal, peer-reviewed competition. Applications are judged based on scientific merit and feasibility. Over the years, this program has been an essential stepping-stone for successful candidates, allowing novice investigators to secure funding from external granting sources.

**Statistics and Facts to date:**
- Total grants awarded – $3,130,372
- Total projects submitted and internally peer-reviewed – 392
- Total projects awarded grants – 199
- Success Ratio – 50.8%

**Highlight on two novice investigators: Models for new researchers to emulate**

Both investigators profiled below, along with other award recipients, applaud Hamilton Health Sciences and Hamilton Health Sciences Foundation for their innovative approach in their unflinching support of the aspiring scientific community. A sincere thank you is extended to both, for their financial support and for continuing to assist novice researchers advance the fields of science, which ultimately leads them to secure long-term external funding.

**Joseph Macri, Ph.D.**
*Assistant Professor, Department of Pathology & Molecular Medicine, McMaster University*

*Dr. Joseph Macri obtained honours degrees in Psychology and Biochemistry as well as a PhD in Biochemistry and Post-doctoral Diploma in Clinical Chemistry from the University of Windsor. In 2000, following a Post-doctoral Fellowship at Parke-Davis Pharmaceuticals in Michigan, he was recruited by the Hamilton Regional Laboratory Medicine Program (HRLMP) as a Clinical Biochemist. He is also an Assistant Professor in the Department of Pathology and Molecular Medicine at McMaster University.*

*A great deal of Dr Macri's research focuses on the use of proteomics; the simultaneous analysis of the thousands of proteins present in a biological sample such as blood, tissue etc. This study is a discovery tool that has the potential to identify proteins that may be used to develop new diagnostic tests or drugs to combat a specific disease.*

*The initial funding to support Dr. Macri’s research was obtained largely through grants from Hamilton Health Sciences. In 2001, he received two New Investigator Fund (NIF) grants to use proteomics to investigate how changes in the proteins involved with cholesterol metabolism may be linked to the development of cardiovascular disease. The results of this research were presented at several international scientific meetings and were used to help obtain a five-year NSERC Discovery grant to continue this research.*

*In 2004, in collaboration with Dr. Boris Sakic of McMaster University, Dr. Macri was awarded another New Investigator Fund grant to use proteomics to identify novel markers of acute coronary syndrome. Dr. Macri received his final NIF grant to use proteomics to help elucidate the underlying mechanisms of autoimmune disorders such as lupus. The results from these initial proteomics studies helped secure a three-year CIHR grant.*

(over)
Dr. Mazen J. Hamadeh, Ph.D.
Assistant Professor, Department of Pediatrics, McMaster University

Dr. Mazen Hamadeh completed his Ph.D. degree in Human Nutrition at McGill University, and has been pursuing his postdoctoral work at McMaster University since September 2002. The experience and knowledge gained during his graduate studies varied. Following his Bachelor’s degree in Biology, Dr. Hamadeh pursued a Master’s degree in Food Technology at the American University of Beirut, where he developed baby food with vitamin C as the sole preservative, investigated the applicability of a laboratory method to test the freshness of pita bread and successfully produced Turkish coffee-flavored instant coffee using freeze drying methodology.

While pursuing his Master’s degree at the University of Toronto, Dr. Hamadeh’s work focused on lipid metabolism. Following this, he pursued his doctoral degree at the School of Dietetics and Human Nutrition at McGill University and conducted clinical research with healthy subjects and subjects with diabetes mellitus.

Under the supervision of Dr. Mark Tarnopolsky, Dr. Hamadeh has been successful at receiving several grants from Hamilton Health Sciences’ New Investigator Fund, which have allowed him to conduct the following studies:

- The influence of estrogen in men and menstrual cycle phase in women on substrate oxidation and protein metabolism, with secondary objectives to study carbohydrate metabolism, inflammation and gene expression, during moderate intensity endurance exercise.
- The effect of 40% energy restriction in G93A mice, an animal model of amyotrophic lateral sclerosis (Lou Gehrig’s disease), on paw grip endurance, oxidative status, clinical onset of disease, disease progression and life span.
- The effect of coffee, caffeine and coffee polyphenols (chemicals that possess antioxidant qualities) on paw grip endurance, oxidative status, clinical onset of disease, disease progression and life span in G93A mice, with emphasis on gender differences.

Over the past few years, Dr. Hamadeh has presented some of his research results at national and international conferences. Upon completion of his research studies, it is anticipated that he will have published about eight articles in reputable peer-reviewed, scientific journals and presented no less than 11 abstracts at national and international conferences.

Dr. Hamadeh has also received the 2005 William E. Noonan Research Career Award from Hamilton Health Sciences Foundation to conduct the above studies. The funding Dr. Hamadeh has received from Hamilton Health Sciences Foundation in the last three years has helped him establish himself as an independent researcher in the field of nutrition, Lou Gehrig’s disease and exercise physiology and metabolism.
Akhtarm, Mahmood  Obesity, Cardiovascular Diseases
Alvarado, Kim  Nursing Policy/Practice
Anand, Sonia  Cardiology & Aboriginal/ethnicity Health
Anderson, Julia  Clinical Thrombosis
Anderson, Tom  Child Psychiatry
Antoni, Karen  Cardiovascular
Archie, Suzanne  Psychiatry
Armstrong, David  Gastroenterology/Digestive Diseases
Arnold, Andrew  Lung Cancer
Arsenault, A.L.  Electron Microscopy
Arthur, Heather  Cardiac Rehabilitation, Women’s Health
Athale, Uma  Pediatric Haematology/Oncology
Atkinson, Stephanie  Child Risk Factors/Pediatric Nutrition
Austin, Richard  Cardiovascular Disease
Bair, James  Pediatric Orthopedic Surgery
Ballon, Cynthia  Bioanalytical Chemistry
Bar-Or, Oded  Children’s Exercise and Nutrition
Barr, Ronald  Pediatric Haematology/Oncology
Barreca, Susan  Stroke
Bates, Shannon  Clinical Thrombosis
Bennett, Kathryn  Child Psychiatry/Knowledge Transfer
Bhandari, Mohit  Trauma
Blajchman, Morris  Hematology, Transfusion Medicine
Borenstein, Steven  Pediatric Surgery
Bosch, Jackie  Cardiovascular Disease, Diabetes Prevention
Bourgeois, Jacqueline  Pathology
Boyle, Michael  Child Social Determinants of Health
Bradley, Christine  Critical Care/Respirology
Brennan, Barbara  Maternal Fetal Medicine
Bryant-Lukosius, D.  Nursing - Oncology
Bugaresti, Joanne  Rehabilitation Psychology
Burrow, Sarah  Pediatric Orthopedic Surgery
Cameran, Brian  Pediatric Surgery
Capes, Sarah  Diabetes & CVD
Carter, Ronald  Cancer Genetics
Chan, Anthony  Pediatrics Haematology
Chan, Rita  Pharmacy
Chang, Patricia  Pediatric Genetics
Charles, Cathy  Oncology Health Services/Supportive Care
Choong, Karen  Pediatric Critical Care
Chorneyko, Kathy  Electron Microscopy
Chouinard, Edmond  Genetic/Breast Cancer
Chrolavicius, Susan  Perioperative Ischemia
Cina, Claudio  Vascular & Carotid Disease
Clark, David  GI and Breast Cancer
Clanton, Jean  Child Early Development
Coblenz, Craig  Cardiology
Collins, Stephen  Gastroenterology/Digestive Diseases
Connolly, Stuart  Arrhythmias/Cardiology
Corbett, Tom  Genitourinary Cancer
Cosman, Tammy  Cardiology
Crankshaw, Denis  Reproductive Biology
Croitoru, Kenneth  Gastroenterology/Digestive Diseases
Cunningham, Chuck  Community Parenting Programs
Cupido, Cynthia  Pediatric Critical Care
Cubylsky, Irene  Cardiac Surgery
Dal Cin, Arianna  Oncology Surgery
Davis, Clive  Critical Care/Respirology
Daya, Salim  Reproductive Biology
Dayes, Ian  Breast/Neurosciences Cancer
DeBeer, Justin  Orthopaedic Surgery
DeFrance, Bryon  Maternal Fetal Medicine
deMarieja, Jorge  Pediatric Surgery (Urology)
deMatteo, Carol  Pediatrics/Rehab
Demers, Catherine  Cardiology/Heart Failure
Dooley, Martin  Family Income/Child Outcome
Bradley, Christine  Immunology, Allergy
Dent, Peter  Pediatric Rheumatology/Immunology
Devereaux, Phillip  Perioperative Ischemia
Dhesy, Bindu  GI & Breast Cancer
Dore, Sharon  Obstetrics/Gynecology, Women’s Health
Drew, Brian  Orthopaedic Surgery
Dunn, Geoffrey  Anesthesia
Eikelboom, John  Cardiovascular Therapeutics/Thrombosis
Eisen, Andrea  Genetic & Breast Cancer
Elavathil, Leelama  Anatomical Pathology
Elit, Laurie  Gynecology Cancer
Ellis, Peter  Lung/Breast Cancer & Health Services Research
Evans, Bill  Lung Cancer/Economic Analysis
Evans, Peter  Child Psychiatry
Evans, Rhodri  Child Psychiatry
Farrell, Tom  Medical Physics
Fedorkow, Donna  Obstetrics/Gynecology
Figueredo, Alvaro  Sarcoma
Finch Cruz, Clara  Hematology
Finlay, Karen  Musculoskeletal Imaging
Fitzgerald, Peter  Pediatric Surgery
Foley, Ronan  Haematology
Foster, Warren  Reproductive Biology/Toxicology
Fox-Robichaud, Alison  Digestive Diseases/Critical Care
Freitag, Andreas  Respirology/Critical Care
Gafni, Amiram  Health Economics
Garside, Sarah  Psychiatry
Gaudie, Jack  Gene and Cell-based Therapeutics
Gauthier, Leslie  Cardiovascular
Gerstein, Hertzl  Diabetes/Endocrinology
Gillani, Amar  Central Post-Stoke Pain
Gillis, Linda  Nutrition - Child Exercise & Nutrition
Ginsberg, Jeff  Clinical Thromboembolism
Goldberg, Jeremy  Child Psychiatry
Gregoroff, Susan  Cardiovascular
Grey, Vijay laxmi  Pediatric Lab Medicine
Guyatt, Gordon  Internal Medicine
Haider, Shariq  Infectious Diseases
Hamadheh, Mazen  Nutritional Interventions
Hamielec, Cindy  Intensive Care
Hanson, Mark  Child Psychiatry
Hapidou, Elien  Pain Management
Harkness, Karen  Heart Failure/Cardiac Rehabilitation
Harper, Theresa  Patient Education
Harper, William  Diabetes & Cardiovascular Disease
Harvey, Pat  Pediatric Surgery (Ophthalmologist)
Haynes, Brian  Clinical Epidemiology, Knowledge Translation
Hayward, Joseph  Medical Physics
Healey, Jeff  Arrhythmias/Cardiology
Heddie, Nancy  Transfusion Medicine
Henderson, Jennifer  Preoperative Rehabilitation
Henry, James  Pain/Anaesthesia
Hicks, Fran  Child Psychiatry
Hill, Stephen  Special Chemistry / Immunology
Hirsh, Caroline  Pediatric Surgery (Ophthalmologist)
Hirsh, Jack  Thrombosis
Hirte, Holger  Ovarian/Breast Cancer
Hodson, Ian  Pediatric & Breast/Neuro Cancer
Holbrook, Anne  Clinical Pharmacology & Health Policy
Hollenburg, Robert  Pediatric Neurosurgery
Holloway, Alison  Reproductive Biology/Toxicology
Hotte, Sebastien  Melanoma/Genitourinary Cancer
Hughes, Edward  Fertility Treatment
Hunt, Richard  Gastroenterology/Digestive Diseases
Huizinga, Jan  Gastroenterology/Digestive Diseases
Iacobellis, Gianluca  Obesity, Cardiavascular Diseases
Ireland, Sandra  Neurosciences
Isaza, Gloria  Pediatric Neurosurgery
Issenman, Robert  Pediatric GI/Nutrition
Ivanus, Magdelana  Early Child Development
Jayaratne, Magdelana  Critical Care
Jeff  Arrhythmias/Cardiology
Jewitt, Renee  Dysphagia
Jones, Glen  Skin Cancer
Julian, Kim  Clinical Epidemiology & Biostatistics
Kahamouni, Kamyar  General Surgery, Critical Care
Kaly, Angela  Neonatology
Karnis, Megan  Reproductive Care
Kearon, Clive  Clinical Thromboembolism
Keith, Paul  Allergy/ Asthma
Khan, Wallid  Gastroenterology/Digestive Diseases
Kirpalani, Haresh  Neonatology
Klement, Petr  Thrombosis/Haemostasis
Korman, Bruce  Pediatric Ear/Nose/Throat
Koroukis, Tom  Critical Care
Kraus, Peter  Critical Care
Ladhani, Moyez  Pediatrics
Lamy, Andre  Cardiac Surgery/Health Economics
Leber, Brian  Haematology
Lee, Agnes  Clinical Thromboembolism
Lee, Christine  Diseases, Microbiology
Lee, Kyong  Neonatology
Lee, Ruth  Nursing Evidence-based
Levine, Mark  Breast Cancer & Venous Thromboembolism
Levis, Carolyn  Plastic Surgery
Levitt, Cheryl  Family Medicine
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