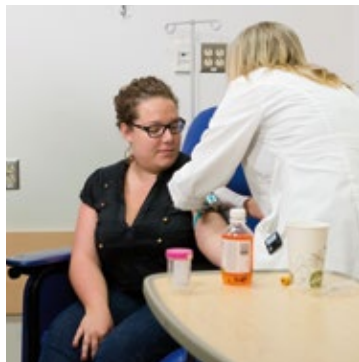


2014 • 2015 ANNUAL REPORT



People at the Heart of Our Achievements



CENTRE DE
RECHERCHE



TABLE OF CONTENTS

DIRECTORS' MESSAGE	3
HIGHLIGHTS.....	6
HEALTH RESEARCH IN THE MEDIA.....	7
SCHOLARSHIPS AND DISTINCTIONS	9
DISCOVERIES AND INNOVATIONS.....	13
RESEARCH AXES	16
RESEARCH IN NUMBERS	22
PARTNERS	23

Mission

FOR A NEW RESEARCH DYNAMICS

The Centre de recherche du Centre hospitalier universitaire de Sherbrooke (CRCHUS) plays a leadership role in creating and transferring knowledge to improve health. In achieving this end, the CRCHUS fosters the excellence of its researchers by building on its strengths and setting as well as by providing a collaborative environment conducive to creativity and partnerships. The research activities supported by the center help produce innovative treatments and health care services.

Vision

EXCELLENCE – BOLDNESS – CREATIVITY

The CRCHUS is an environment for research, innovation, and knowledge transfer of world-class ranking that is dynamically integrated into its clinical and university setting. The CRCHUS' collective achievements have a real impact on improving health.



Message from the President and Executive Director

Centre intégré
universitaire de santé
et de services sociaux
de l'Estrie – Centre
hospitalier universitaire
de Sherbrooke

Québec 



The April 2015 enactment of the *Act to Modify the Organization and Governance of the Health and Social Services Network, in Particular by Abolishing the Regional Agencies* resulted in the creation of a new institution in order to improve the access, flow, efficiency, and effectiveness of services for users. I accepted the challenge to head this new institution with a great deal of pride and determination. The system's transformation under the Act constitutes an opportunity for Estrie and can even serve as a lever. Joining forces and sharing our best practices and innovative vision will allow us to go ever further.

«*In Estrie, together, we innovate for LIFE!*» is the institution's new vision. This statement embodies strength through collaboration and the determination to strike out off the beaten track, while always keeping in mind our raison d'être: LIFE. While LIFE refers to the health care and social services sector that we work in, it also points to the fact that the Centre intégré universitaire de santé et de services sociaux de l'Estrie - Centre hospitalier universitaire de Sherbrooke (CIUSSS de l'Estrie – CHUS) provides the broadest range of services of Québec's institutions, from prevention to end-of-life care, from primary to highly specialized care and services.

Research figures among the missions of the new CIUSSS de l'Estrie – CHUS, which now consists of three research centers:

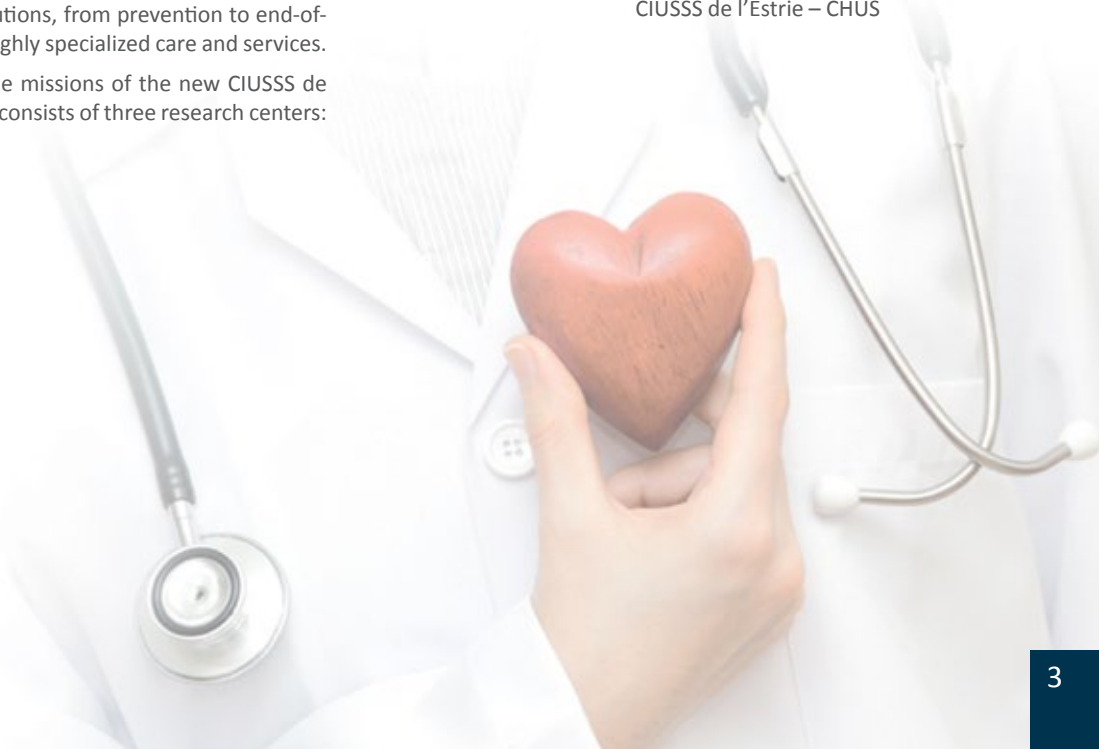
the Centre de recherche du Centre hospitalier universitaire de Sherbrooke (CRCHUS), the Centre de recherche sur le vieillissement du CSSS-IUGS, and the Institut universitaire de première ligne en santé et services sociaux.

By offering a collaborative environment for health research conducive to creativity and partnerships, the CRCHUS makes a major contribution to our region's scientific and academic development. The discoveries made by our researchers translate into tangible results that benefit patients through improvements to the quality of care.

In closing, I want to underscore the involvement of the researchers, research professionals, and administrative staff of the CRCHUS who, due to their commitment and dedication during this transformation, have made it possible for the Estrie health and social services system to become a center for research, care, treatment, and meaningful work for the well-being of our population.



Patricia Gauthier
President and Executive Director
CIUSSS de l'Estrie – CHUS



Directors' Message

We are pleased to join our voices in presenting to you the annual report of the Centre de recherche du Centre hospitalier universitaire de Sherbrooke (CRCHUS). Fiscal 2014–2015 brought a multitude of achievements enabling us to consolidate our strengths and distinctive expertise.



In addition, the CRCHUS saw its status renewed by the Fonds de recherche du Québec – Santé (FRQS). We are quite proud of the overall rating of excellence earned for CRCHUS directions, operating structure, operations, and management. The leadership of our six research axes in their respective sectors also figured prominently with ratings ranging from excellent to exceptional. We are particularly honored by this outstanding accomplishment of our researchers, considering the major restructuring of our research axes in 2012, reducing them from 12 to 6. The evaluating committee also strongly underscored the importance of the support provided by our main partners, in particular, the Fondation du CHUS and the Faculty of Medicine and Health Sciences (FMSS) at the Université de Sherbrooke. In addition, we want to thank our entire scientific community, consisting of more than 234 researchers, 524 students, and 172 research professionals, for their contribution to this success.

The new Strategic Plan entitled *Audace et créativité pour une nouvelle dynamique de recherche – Au cœur de la recherche translationnelle 2014-2019* (Boldness and Creativity for a New Research Dynamics: At the Heart of Translational Research 2014–2019) was developed in collaboration with researchers and external partners. Consistent with the CRCHUS' strategic planning—which has research as one of its four priorities—new missions and visions as well as ambitious organizational objectives have been identified to support the fuller integration of research into care in order to give patients access to the most recent health care developments.

Fiscal 2014–2015 also saw the completion of the CRCHUS expansion project. This \$31.7 million project included renovation work and the deployment of research activities in our new facilities. Our new facilities, which the FRQS evaluation committee referred to as remarkable, help maintain our competitive advantage in various key sectors nationally and internationally, especially in the fields of medical imaging and in studying diabetes, obesity, and cardiovascular complications.

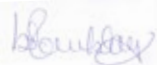
Indeed, CRCHUS infrastructure supports major projects, including one in partnership with the University of Alberta and Advanced Cyclotron System Inc. to produce technetium in a cyclotron funded by Natural Resources Canada's Isotope Technology Acceleration Program. The infrastructure also serves as the foundation for an entirely new collaboration with Charles River Laboratories Inc. that, by adding medical imaging to their catalogue of services, opens a whole new market for the company. At the same time, the collaboration gives the CRCHUS access to Charles River's huge customer base, combining the know-how of our two organizations in a synergy aimed at optimizing drug development. We hope that the quality of our infrastructure and expertise can continue to make the CRCHUS and its researchers valuable partners.

The upcoming year holds new challenges with the creation of the Centre intégré universitaire de santé et de services sociaux de l'Estrie – Centre hospitalier universitaire de Sherbrooke (CIUSSS de l'Estrie – CHUS). This entirely new entity will lead us into an area of development to improve the quality, accessibility, and fluidity of all services. The CRCHUS is committed to putting its many talents to work in collectively building our new organization.

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The CRCHUS serves as a nerve center in deploying research from the molecular level to the patient by providing infrastructure for conducting basic biomedical research as well as structures dedicated to preclinical and clinical projects narrowing the gap between research and care.
–



Dr William D. Fraser, MD, MSc, FRCS(C), CCFP
Scientific Director, Centre de recherche du CHUS



Dr Stéphane Tremblay, MD, MBA
General Director, CHUS

Highlights



CRCHUS Expansion and Renovation: A resounding success!

The last phase of the expansion project was completed in fall 2014 with the redesign of the CRCHUS' clinical-research facilities, making them more functional, increasing the capacity for conducting studies, and fostering translational research.

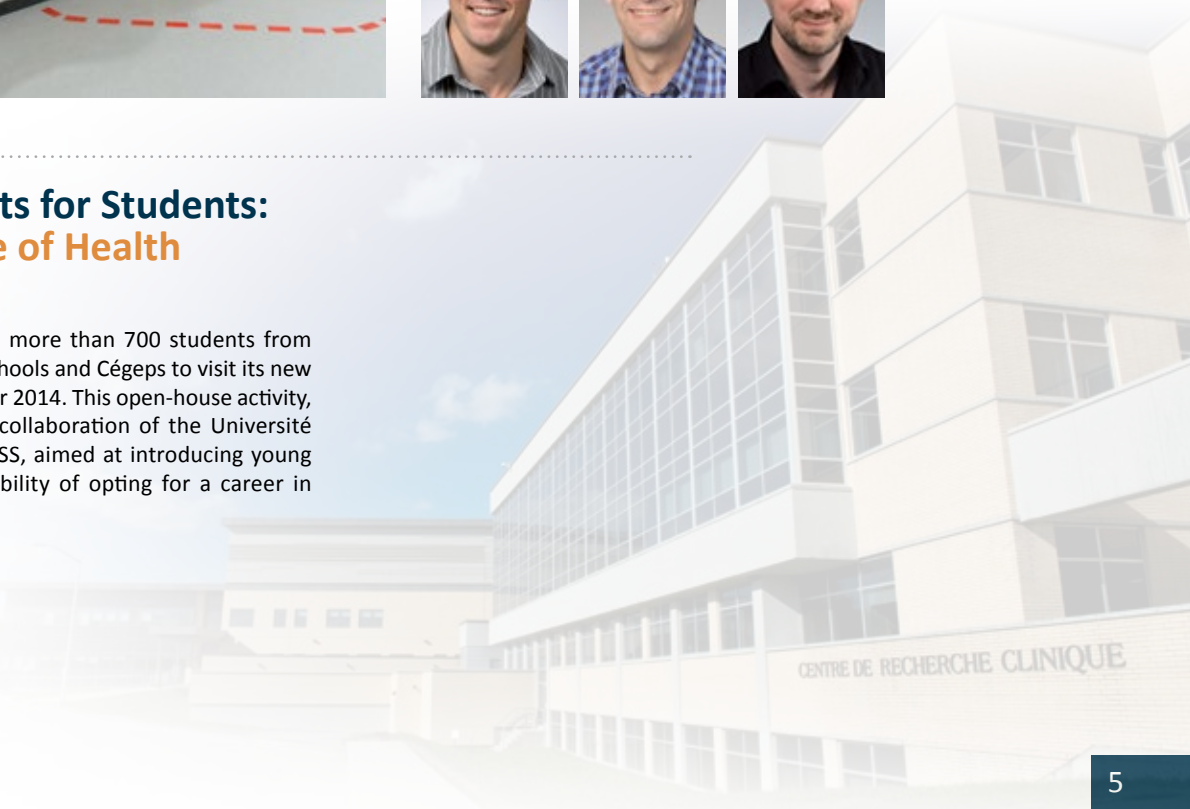


Researchers now have new space for clinical studies that responds to their needs. The medical-imaging sector has been completely redesigned, making it larger and more ergonomic, and now has a new 3 Tesla MRI. The Canada Foundation for Innovation and the Fondation du CHUS contributed to the acquisition of this cutting-edge equipment, which is the only one in its category in Estrie. Researchers **Maxime Descoteaux**, **Martin Lepage**, and **Kevin Whittingstall** initiated a number of studies on this device in September 2014.



Guided Visits for Students: A Showcase of Health Research!

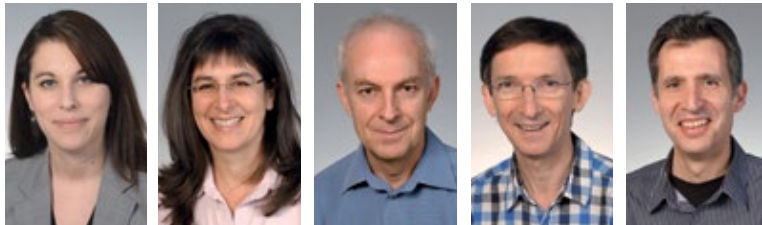
The CRCHUS invited more than 700 students from Estrie's secondary schools and Cégeps to visit its new facilities in November 2014. This open-house activity, organized with the collaboration of the Université de Sherbrooke's FMSS, aimed at introducing young people to the possibility of opting for a career in science.



Highlights

The CHUS Underscores the Excellence of Many Researchers

Five researchers stood out during the 14th edition of the gala for awards for excellence held by the CHUS Board of Directors. **Béline Carranza-Mamane** received the *Relève* (succession) award and **Marie-France Langlois** the *Rayonnement* (outreach) award. **Roger Lecomte** was given the *Carrière* (career) award **Jean-Paul Praud** the *Mentorat* (mentoring) award, and **Xavier Roucou** the *Créativité et innovation* (creativity and innovation) award.



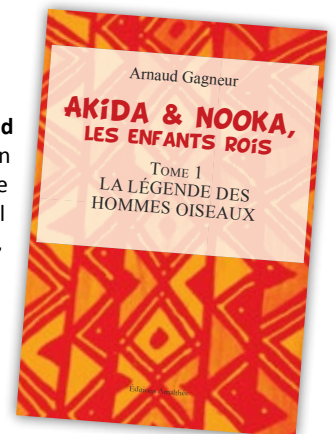
Diplomatic Mission to China

Radio-oncologist **Chang Shu Wang** accompanied Québec Premier Philippe Couillard on a diplomatic mission to China in October 2014. They visited the Qilu University Hospital in Jinan, the capital city of Shandong province, where they discussed Québec–Shandong cooperation in the field of radiation oncology. Dr. Wang was one of 140 people from business, research, education, and culture that served on the delegation.



A Children's Story

In winter 2015, pediatrician **Arnaud Gagneur** published a story for children young and old that conjures up the wisdom of elders and the young as well as the links that connect past, present, and future generations. Gagneur originally wrote *Akida & Nooka, les enfants rois—La légende des hommes oiseaux* (Child Kings: The Legend of the Bird People) for his own children, who convinced him to share it with others.



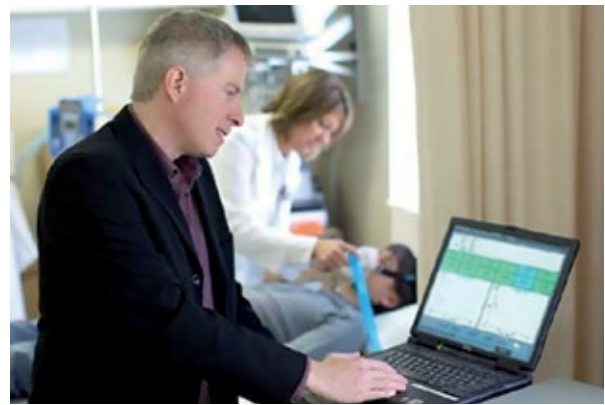
Health research in the media

50 Years of Research in Québec

In fall 2014, on the occasion of its 50th anniversary, the Fonds de recherche du Québec — Santé (FRQS) highlighted major breakthroughs in the field of health research. For the occasion, four videos of scientists from each of the province's university hospitals were produced. Given the importance and innovativeness of his work, **David Fortin**, CHUS clinician researcher, neurosurgeon, and neuro-oncologist, talked

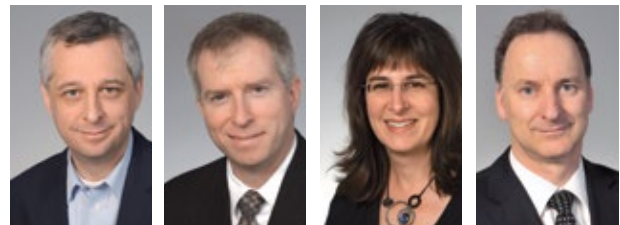


about the new approaches he developed for treating brain cancer. Moreover, a special section published in *Le Devoir* on September 13, 2014, featured endocrinologist **André Carpentier**, a key actor in the field of research on diabetes, obesity, and cardiovascular complications.



L'Estrie respire la santé: Overweight and Obesity

In September 2014, *La Tribune Sherbrooke's* daily newspaper published a special section entitled *L'Estrie respire la santé* dealing with the issues of overweight and obesity. Four of the CHUS' endocrinologists and clinical researchers—**Jean-Patrice Baillargeon**, **André Carpentier**, **Marie-France Langlois**, and **Patrice Perron**—who study related health problems, were featured in this special section.



Research Collaboration A Promise for Tomorrow's Health

In order to inform the regional population about health research, the CRCHUS and the Université de Sherbrooke's FMSS published a special section in the October 22, 2014 edition of *La Tribune*, including 100,000 copies that were distributed at no charge throughout Estrie. This section brought out the extent of the local research capacity and the tangible contribution of our researchers in responding to health issues and offering care for the benefit of patients.





Curieux Métiers

In July 2014, pain specialist **Serge Marchand** shed light on his profession as a scientist in an episode of the Radio-Canada series *Curieux Métiers* (Unusual Jobs) entitled *Repousser les limites* (Pushing Back Boundaries).

Une pilule, une petite granule

In early 2015, the Télé-Québec network aired two reports with CRCHUS researchers on its *Une pilule, une petite granule* program. The January broadcast, which involved Larissa Takser, a researcher in the field of environmental health, looked at how toxicity in clothing affected children and pregnant women. The second, broadcast in February, was with gynecologist–oncologist Paul Bessette, who is involved in awareness activities about ovarian cancer.



Années Lumières

In September 2014, two researchers granted interviews to *Les Années Lumières* (Light Years), a Radio-Canada program. **Marie-France Langlois** took part in a report entitled *Le diabète au bistouri* (Diabetics Under the Knife), which dealt with using bariatric surgery to treat morbid obesity in order to control type 2 diabetes. **Maxime Descoteaux** discussed his study aimed at reducing concussion-related sequelae by installing impact sensors in the helmets of players on the Université de Sherbrooke's Green and Gold football team with a view to achieving breakthroughs in the field of imaging.



Scholarships and distinctions



Longtime CHUS researcher and generous donor to cancer research, radiation oncologist **Dr. Abdenour Nabid** received major recognition by the American Society for Radiation Oncology (ASTRO) for his research that could modify how prostate cancer is treated with radiation therapy. In front of an audience of 5,000 at the ASTRO annual conference, Dr. Nabid demonstrated that it is possible to shorten the duration of hormone therapy from 36 to 18 months in men with localized high-risk prostate cancer with no reduction in survival rate.

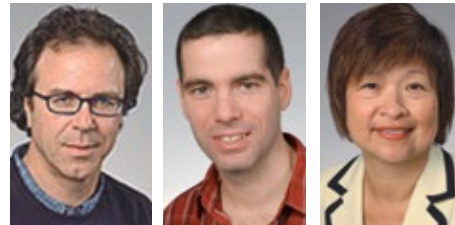
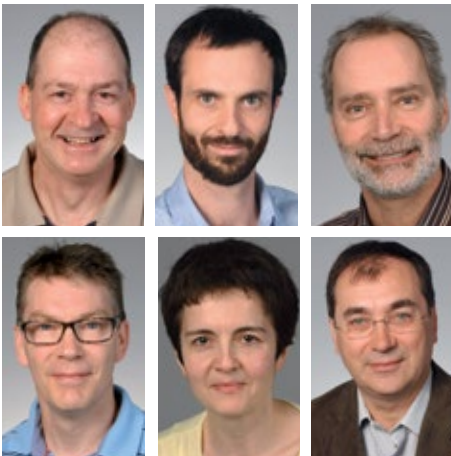
INTERNAL COMPETITIONS

The CRCHUS Supports Excellence and Offers Four \$20,000 Postdoctoral Fellowships

- Alex Eyraud (**Éric Massé**) who works on Salmonella, a bacterial pathogen.
- Sandrine Lavenus (**Michel Grandbois** and **Richard Leduc**) for her research project on pulmonary hypertension
- Mandy Malick (**Jean-François Beaulieu**) whose research focuses on intestinal diseases.
- Azaden Piri-Sedigh (**Yves Dory**, **Louis Gendron** and **Brigitte Guérin**) who is interested in a new class of tracers for molecular imaging.

Six Research Projects Receive Support from the CRCHUS' Internal Funding Program

This year, six \$25,000 grants were awarded to our researcher for pilot projects. Congratulations to the following researchers: **Simon Labbé** (Martin Bisailon, Louis Valiquette and Alex Carignan), **François Lamontagne** (Martin Lepage, William D. Fraser, André Carpentier, Yanick Sansoucy, and Frederick D'Aragon), **Serge Marchand** (Yanick Sansoucy and Philippe Goffaux), **Alain Piché** (Paul Bessette, Claude Laplante, and Perrine Garde-Granger), **Sophie Roux** (Gilles Boire, Roscoe Klinck, and Artur José De Brum-Fernandes), and **Alain Vanasse** (Pierre Larivée and Shengrui Wang).



Innovation Grant

In order to help start up an innovative, interdisciplinary research project in pharmacology, the Centre de recherche du CHUS and Pharmacology Institute of Sherbrooke awarded a \$40,000 research grant to researchers **Pierre Lavigne**, **Guillaume Grenier**, and **Le May Tu** to carry out a project for the development of a promyogenic peptide (MyoD) to reestablish urethral sphincter function in cases of stress urinary incontinence.



Congratulations to FRQS Research Scholars

- Mannix Auger-Messier**,
Research scholar – Basic science (Junior 1)
Pierre-Étienne Jacques,
Research scholar – Basic science (Junior 1)
Arnaud Gagneur, Clinical research scholar – Clinical and epidemiological (Junior 2)
Julie Carrier, Clinical research scholar – Basic science (Senior)

CRCHUS Researchers Rate High with the Canadian Institutes of Health Research (CIHR)

The CIHR funding obtained by our researchers, co-researchers, and students in competitions in spring 2014 and winter 2015 totaled \$7,481,572 invested in research and represents a success rate higher than the national average.



Congratulations to the researchers who distinguished themselves:

- | | |
|---|--|
| Jean-François Beaulieu | Marie-France Dubois
(Pasquale Roberge) |
| Guylain Boissonneault
(Pierre-Étienne Jacques) | Alain Frigon |
| Chantal Bouffard
(Patricia Birch, Régen Drouin, and Marie Farmer) | Louis Gendron (Yves Dory and Brigitte Guérin) |
| André Cantin
(Claire Dubois) | Gaétan Guillemette
(Emanuel Escher, Pierre Lavigne, and Richard Leduc) |
| Benoit Chabot | Nathalie Perreault
(François Boudreau) |
| Nils Chaillet
(William D. Fraser and Jean-Charles Pasquier) | Sheela Ramanathan
(Marie-France Langlois and Marek Rola-Pleszczynski) |
| Alan Cohen | Xavier Roucou
(Fernand Gobeil) |
| Pedro D'Orléans-Juste
(Robert Day) | |

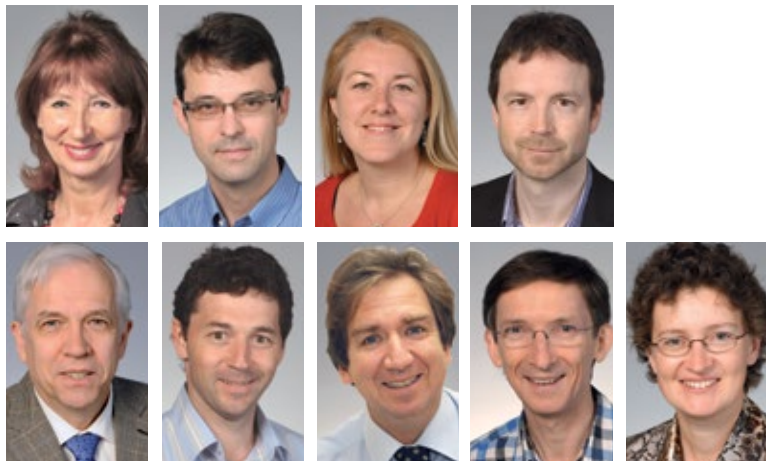


Prostate Cancer Canada

Researcher **Robert Day** is one of the recipients of a national research funding initiative made possible by the Movember Foundation. Three research teams in Edmonton, Toronto, and Sherbrooke will share close to \$5 million for projects that will help prevent the overtreatment of prostate cancer.

Foundation of Stars

The Foundation of Stars is the largest nongovernmental funding source for pediatric research in Québec. Since 2000, the Foundation has generously awarded more than \$2.8 million to CRCHUS researchers. This year, nine researchers received Foundation funding: **Christiane Auray-Blais, Francois Corbin, Mélanie Couture, Frédéric Dallaire, William D. Fraser, Denis Gris, Jean-Charles Pasquier, Jean-Paul Praud, and Larissa Takser.**



DISTINCTIONS



Physicist **Roger Lecomte**, inventor of the avalanche-photodiode positron tomography device, accepted the *Prix Michel Sarrazin* (award) from the *Club de recherche clinique du Québec* (Québec Clinical Research Club), underscoring the importance of his scientific breakthroughs in medical imaging and his overall career.



In recognition of his 45 years in research development, **Johannes E. van Lier** received the Thomas Dougherty Award for Excellence in PDT for his notable achievements in photodynamic therapy. This type of therapy destroys cancer cells by using a photosensitive medication. He received the award at the 8th International Conference on Porphyrins and Phthalocyanines in Istanbul.



Neuropediatrician **Guillaume Sébire** received the Jonathan Ballon Memorial Prize for his project on the role of the mother/fetus inflammatory response in the physiopathology of perinatal strokes. The award underscores the excellence of this researcher whose project submitted to Québec's Heart and Stroke Foundation earned the highest assessment score for a first scientific research project.



Alain Vanasse was appointed as the Université de Sherbrooke representative for the CIHR patient-centered research strategy aimed at ensuring that the right patient receives the right care at the right time. Each Canadian province has its own support unit. In Québec, the Support for Patient and People Oriented Research and Trials (SUPPORT) Unit will become the center of expertise for patient-centered research. Vanasse's mission is to implement the strategy of the services and data-access platform on the provincial scale. This initiative provides for demonstration projects, including the creation of a Québec experimentation site for evaluative clinical research. Moreover, SUPPORT offers a major opportunity to make use of the CIRESSS platform developed at the CHUS.

AWARDS



Jean-Patrice Baillargeon received the Certificate of Merit Award from the Canadian Association for Medical Education.



André Carpentier received the 2014 Physician Scientist Award during the Canadian Lipoprotein Conference.



The *Prix Jeune chercheur 2015* (Young Researcher Award) was given to **Luigi Bouchard** during the annual scientific meeting of the FRQS *Réseau de recherche en santé cardiométabolique, diabète et obésité* (Research Network on Cardiometabolic Health, Diabetes, and Obesity).

He also received the Robert H. Haynes Young Scientist Award of the Canadian Society for Molecular Biosciences for his publication "Increasing evidence supporting epigenetic programming and regulation of HDL-cholesterol metabolism".



Alain Frigon was given the Beverly Petterson Bishop Award for Excellence in Neuroscience by the American Physiological Society. This distinction is given to the best new researcher in the fields of neuroscience and neurophysiology.



Lise Talbot received Laval University's *Prix d'excellence 2014* (Award for Excellence) in the category Achievement : Nursing: *Soins infirmiers aux aînés en perte d'autonomie* (Nursing Care for the Elderly with Reduced Independence).

CRCHUS RESEARCHERS RECOGNIZED BY THEIR PEERS



François Bachand was appointed to serve a two-year term on the editorial committee of *Scientific Reports*, published by the *Nature Publishing Group*.



Jean-Paul Praud served as the president of the 10th International Course on Pediatric Pulmonology (ICPP), held in Lisbon, Portugal. Moreover, he was a member of the organizing committee and guest speaker at the 13th ICPP in Bruges, Belgium.



Ghassan Bkaily was chosen as editor of the *European Journal of Physiology* (Pfluger Archives).



Nathalie Rivard became a member of the editorial academy of the *International Journal of Oncology*, a journal that provides an international forum for publishing cutting-edge research in the fields of oncology and cancer treatment.



Benoit Chabot agreed to serve again on the editorial committee of *Molecular and Cellular Biology* for the next three years. He has been on the committee since 2000.



Philippe Sarret was appointed to a four-year term as director of the *Réseau québécois de recherche sur la douleur* (Québec Network on Pain Research). This network, which comes under the Fonds de recherche du Québec – Santé, helps improve the quality of life of Quebecers through fundamental, clinical, evaluative, and epidemiological research.



Louis Gendron accepted to serve another term as a member of the Board of Directors of the Fonds de recherche du Québec – Santé. In addition, he was appointed as associate editor for *Progress in Neuro-Psychopharmacology & Biological Psychiatry*.



Discoveries and innovations

CANCER: BIOLOGY, PROGNOSIS, AND DIAGNOSIS



Improving the Treatment for Recurrent or Refractory Hodgkin's Lymphoma

Researchers **Hans Knecht** and **Raymund Wellinger** with the collaboration of Sabine Mai (University of Manitoba) were able to develop an in vitro model for the pathogenesis of Hodgkin's lymphoma associated with the Epstein-Barr virus. The research team published a ten-page scientific article on the topic in the March 2015 issue of BLOOD. The was also featured on the journal's cover.



A New Fundamental Mechanism of the Cell Brought to Light

François Bachand discovered a new mechanism of cellular termination transcription involving the exosome. Published in *Nature Structural & Molecular Biology*, this discovery sheds light on the potential role of the exosome and termination transcription in the development of certain types of cancers, including myelomas and acute myeloid leukemia, both of which are highly prevalent in Canada.

DIABETES, OBESITY, AND CARDIOVASCULAR COMPLICATIONS



Discovery of a New Role for G Protein Will Have a Tangible Impact on Patient Health

Christine Lavoie demonstrated that protein G—referred to as “Gas”—could be involved in the traffic and elimination of receptors coupled to G proteins. Published in *Nature Communications* in

August 2014, this discovery could have major impacts on the development of medications and the improvement of several pharmacological treatments, such as those used to fight against AIDS and several types of cancer, including breast, prostate, and bowel cancer.



Obese Men Could Increase Their Chances of Fertility by Losing Weight

Jean-Patrice Baillargeon has gained worldwide recognition after disseminating the preliminary results from his study entitled “Impacts of Lifestyle and Anthropometric Changes in Male Partners of Obese Infertile Women on Couples’ Fertility” during the annual conference of the Endocrine Society, which was held in San Diego in February 2015. This study demonstrated that obese men could increase their fertility by losing weight, shortening the time to pregnancy for the couple. Researchers **Béline Carranza-Mamane**, **Marie-France Langlois**, and **Marie-Hélène Pesant** also contributed to this project.



HEALTH: POPULATIONS, ORGANIZATION, PRACTICES



The Origin of AIDS published in *Science*

Jacques Pépin took part in a study entitled “The Early Spread and Epidemic Ignition of HIV-1 in Human Populations” published in October 2014 in the highly prestigious *Science*. Thirty years after the discovery of HIV, the article highlights the origins of AIDS, its causes and its evolution over time through the role of social changes and transportation networks in the early transmission, spread, and the establishment of the pandemic status of HIV.



Research on Aging in *PLOS ON*

Alan Cohen saw a report on his interdisciplinary study entitled “Detection of a Novel, Integrative Aging Process Suggests Complex Physiological Integration” published in March 2015. This research work used analytical approaches to evolutionary biology, epidemiology, and biostatistics to investigate relevant issues in system biology and physiology with applications in medicine.



Technology Transfer

Pasquale Roberge developed a province-wide dissemination strategy for a program to apply new first-line knowledge in mental health. This training seeks to improve care and services for anxiety and depression disorders provided by mental health teams in health and social services centers.

INFLAMMATION – PAIN



A New Class of Antibiotics to Fight against *Clostridium difficile*

In 2014, the project of a multidisciplinary research team comprised of **Louis-Charles Fortier**, **Rafael Najmanovich**, **Daniel Lafontaine**, and **Éric Marsault** made it to the preclinical trial phase with the goal of testing a new class of antibiotics against the *C. difficile* bacterium.

This antibiotic is based on the discovery of PC1, a guanine riboswitch for *C. difficile* that earned **Daniel Lafontaine**, **Louis-Charles Fortier**, and François Malouin the *Découverte de l'année 2010* (2010 Discovery of the Year Award) from *Québec Science*.—The premarketing phases of this antibiotic is financed by the MSBi Valorisation group, Québec’s Ministry of the Economy, Innovation, and Exports as well as the national organization Mitacs and the Université de Sherbrooke’s Société de valorisation et de commercialisation (Development and Marketing Corporation). The new antibiotic class—with no bacteria resistance even after prolonged contact—opens the way to an alternative treatment for *C. difficile*, the main cause of nosocomial infections.



MEDICAL IMAGERY

Major Scientific Breakthrough for Cyclotron-Produced Technetium

Researchers **Éric Turcotte**, **Brigitte Guérin**, and **Roger Lecomte** demonstrated the equivalence of technetium (^{99m}Tc) produced in a cyclotron to that produced by a nuclear reactor in individuals with thyroid-gland disorders. This major clinical breakthrough—a result of several years of research—demonstrated that a promising green technology could provide the future supply of medical isotopes.

The worldwide demand for technetium—used in more than 85% of nuclear medicine diagnostic exams—has been estimated at 40 million doses per year, with a 15% increase expected during the next 10 years due to population aging. In light of the imminent closure of the Chalk River nuclear reactor, being able to produce technetium in a cyclotron would respond to needs while providing the added benefit of not producing nuclear waste. In addition, the cyclotron is a less costly solution than a nuclear reactor.

CRCHUS researchers have access to two cyclotrons for producing medical isotopes, namely, a TR-19 (19 MeV), and a TR-24 (24 MeV) with higher output used to produce technetium. This array of equipment stands out internationally in the field of medical imaging.



MOTHER & CHILD



Potential Treatment for Patients with Fragile X Syndrome

François Corbin's research team carried out a pilot study aimed at determining the effectiveness of lovastatin for treating the behavior of children and adults with fragile X syndrome (FXS), a rare genetic disease. It is associated with intellectual impairment ranging from mild to severe and can also be related to behavior disorders and typical physical characteristics.

The hypothesis put forward by physician and biochemist François Corbin is that lovastatin—used to treat high cholesterol—could partially compensate for the lack of fragile X mental retardation protein (FMRP), whose production is inhibited in patients with the syndrome. The participants, recruited from the CHUS' fragile X clinic, received two doses of lovastatin over a period of 12 weeks. Improvements were observed in terms of aberrant and adaptive behavior in patients, thereby demonstrating that lovastatin can be of benefit to such individuals. This study gives hope to families who have a member afflicted with this syndrome.

Research axes

Cancer: Biology, Prognosis, and Diagnosis

Basic-science researchers and clinicians work together to understand the mechanisms underlying cancer biology, integrate fundamental knowledge into clinical practice and develop new diagnostic strategies and treatment approaches. Some of the axis outreaching strengths are the establishment of a tumor biobank and the development of complementary mouse models integrating the main characteristics of colorectal carcinogenesis, improving the effectiveness of radiation-therapy treatments through the development of radiosensitivity agents and the use of RNomics in developing more individualized and more sensitive diagnostic approaches. New technologies are also being explored to offer a more effective and less harmful alternative to conventional radiation therapy. The axis brings together researchers with diverse expertise such as biochemistry, cellular and molecular biology, intracellular signaling, RNomics, proteomics, functional genomics, genomic instability, bioinformatics, oncology and gastroenterology, physics, nuclear medicine, and radiobiology. Although the research projects cover a significant number of disciplines, everyone involved is committed to improving the understanding, detection, diagnosis, and treatment of many gynecological, gastrointestinal, and brain cancers.



Axis Director
Benoit Chabot, PhD

Investigators

Sherif Abou Elela, PhD
François Bachand, PhD
Annie Beaudoin, MD
Brendan Bell, PhD
Paul Bessette, MD
Martin Bisailon, PhD
Guylain Boissonneault, PhD
François-Michel Boisvert, PhD
Nicole Bouchard, MD
Marie-Josée Boucher, PhD
François Boudreau, PhD
Rachel Bujold, MD
Julie Carrier, MD
Antonio Conconi, PhD
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Diabetes, Obesity, and Cardiovascular Complications

This axis aims to develop multidisciplinary research on cardiometabolic health, diabetes, obesity, cardiac and vascular diseases; to transfer knowledge; and to make good use of this knowledge to promote the quality of life of Québec residents. This axis aims at consolidating strengths with an objective of achieving excellence in its translational research work and its patient-centered approaches. Its themes focus on understanding the underlying mechanisms of diabetes and obesity as well as how they impact the incidence of cardiovascular diseases and neurodegenerative diseases affecting cognition. The approach is multidisciplinary, integrative (molecular biology, cellular biology, electrophysiology, preclinical animal studies and modeling), and clinical (metabolic imaging, cardiology, endocrinology, and clinical research). We aim to develop new therapeutic approaches, thereby leading to effective clinical interventions to better organize the health care provided to patients.



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Research axes

Health: Populations, Organization, Practices

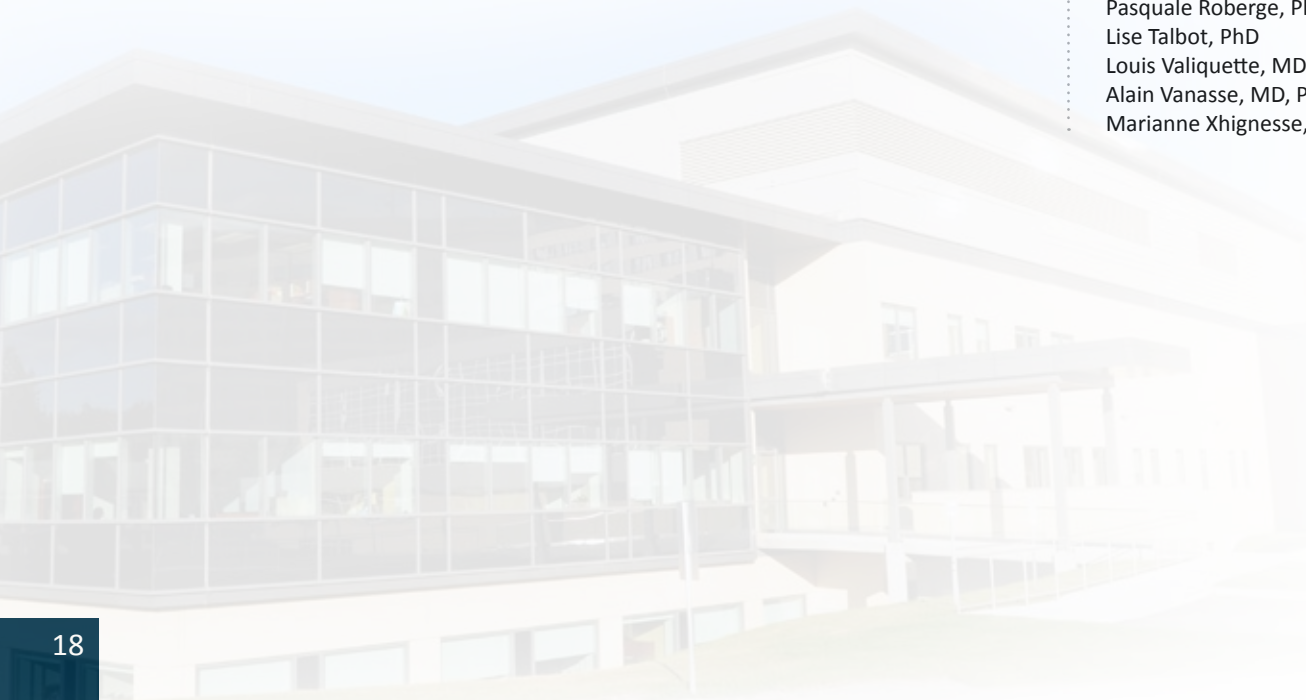
This multidisciplinary axis investigates several health areas such as infectious diseases, chronic diseases and pain, and mental health. It brings together diversified research initiatives focused on the same interests: innovative practices, improving the health care system, patient health and well-being. The axis brings together many researchers who carry out evaluative research such as clinical trial, and conduct secondary analyses of existing data such as clinical, administrative, and socioeconomic databases. It also aims at promoting the use of databases for health research by facilitating access to CIRESSS, which is the CHUS hospital database.



Axis Director
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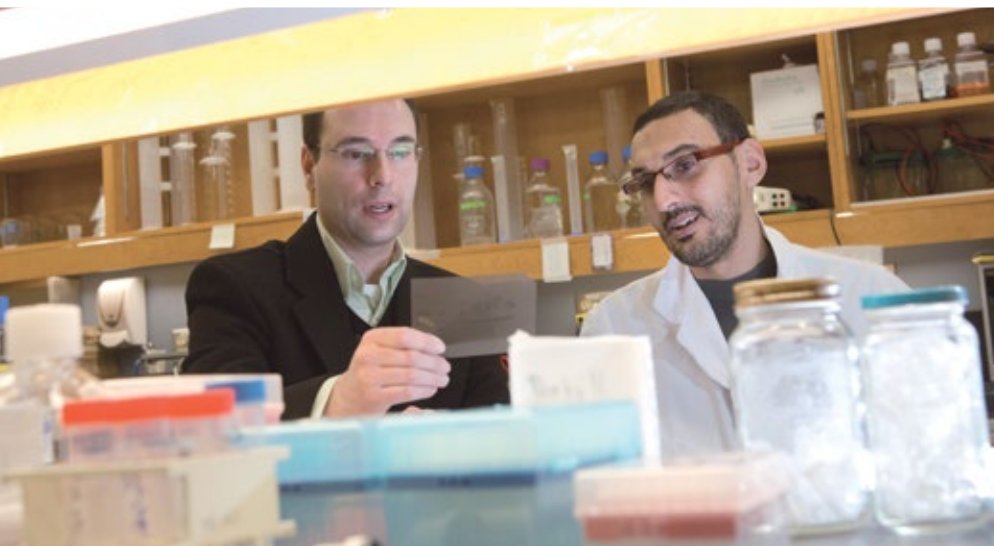
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Inflammation – Pain

Studying phenomena related to inflammation and pain is this axis' main objective. Its researchers are investigating the inflammatory processes involved in inflammatory bowel and joint diseases, autoimmune diabetes, aging, cystic fibrosis, asthma, neurodegeneration, and neuroinflammation in order to shed light on the mechanisms involved in these phenomena. Several other researchers are working on the development and characterization of new molecules for the treatment of pain, the analysis of brain responses, and the role of sex hormones in pain as well as studies on pain physiopathology, neurophysiology, and chronification. Other areas of research are intestinal flora as well as the interactions between a host and its pathogens, such as influenza and prions. The various types of research work are carried out from the basic-science and clinical approaches on different pathologies ranging from asthma and cystic fibrosis to rheumatoid arthritis, including Crohn's disease and gynecological pain.



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Research axes

Medical Imagery

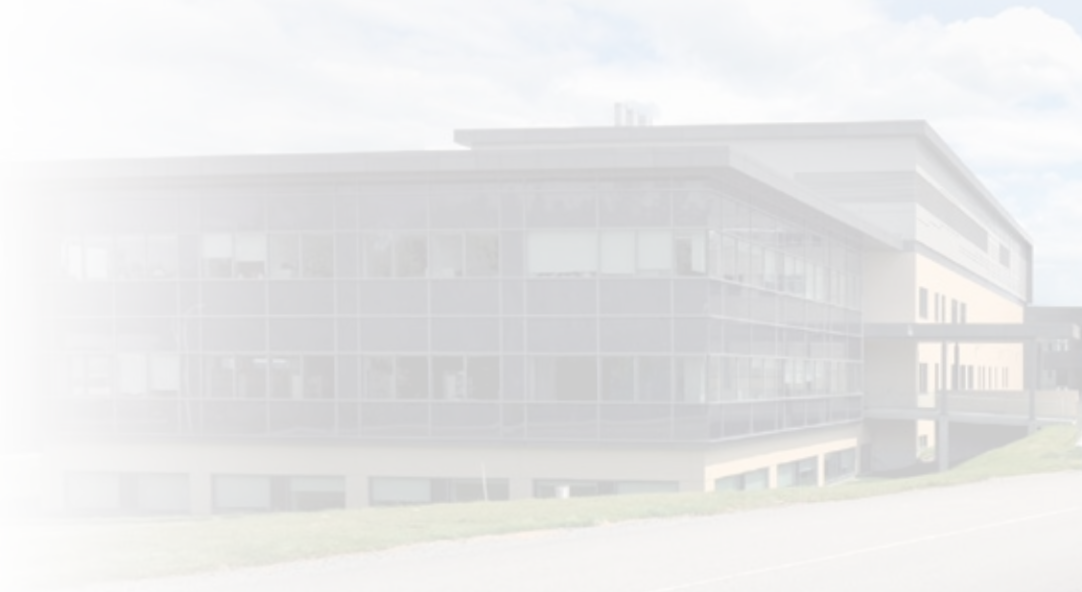
The researchers involved in this axis develop and use new imaging approaches based on technologies such as positron emission tomography (PET), tomodensitometry (TDM), magnetic resonance imaging (MRI), optical imaging, and electroencephalography (EEG). These imaging methods represent powerful screening tools for early diagnosis, therapeutic management, and personalized medicine. Preclinical imaging with animal models and clinical imaging with humans are used to study cancer and metabolic, cardiovascular, and neurological disorders. A major portion of the research effort deployed in this axis focuses on developing new devices and on the reconstruction, analysis, modeling, and processing of images generated by various imaging means. Its researchers are also working on synthesizing new radiotracers, contrast agents, and radiosensitivity agents, as well as developing preclinical and clinical trials to validate these substances resulting from research prior to their marketing.



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Mother & Child

The Mother & Child axis focuses on the human being from conception to adolescence. Of the topics that we deal with, perinatal health stands out as a distinctive strength, although we are also very active in a variety of areas, including neurodevelopmental disorders. Our wealth of expertise in fundamental and clinical research provides for transdisciplinary research from a translational point of view in which transferring new knowledge to the mother and child remains our prime concern.



Axis Director
Jean-Paul Praud, MD, PhD

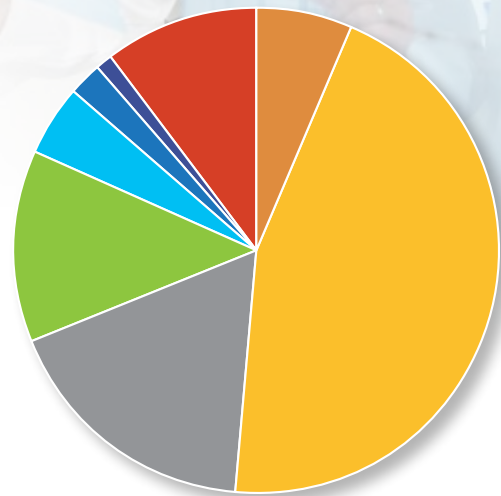
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Paula Waters, PhD
Ju Yan, PhD

Research in numbers

Funding sources in 2014–2015

FRQS grant (Center)	\$1 973 930
Grants from FRQS recognized organizations	\$13 454 071
Scholarships from FRQS-recognized organizations	\$5 194 994
Research contracts with the private sector	\$3 798 291
Sales and services	\$1 418 211
Contribution from the CHUS and its Foundation	\$653 874
Donations for teaching and research	\$370 270
Other income	\$4 923 988
Total	\$31 787 629



Note: The total amount of funding cited herein may differ from that in the financial statements of the Centre hospitalier universitaire de Sherbrooke, since certain partner grants are managed by the Université de Sherbrooke.

CLINICAL RESEARCH AS OF MARCH 31, 2015

Active research projects: **876**

Clinical research projects submitted to the CHUS research Ethics Board: **204**

Including:
54 Industry projects
56 Grant funded projects
94 In-house projects

AXES	RESEARCHERS	ASSOCIATE RESEARCHERS	STUDENTS				SCHOLARSHIPS AND GRANTS (RGA*)	PUBLICATIONS	
			MSc	PhD	Post-Doc	Fellow		REGULAR	ASSOCIATE
Cancer: Biology, Prognosis, and Diagnosis	33	16	50	56	13		\$29 868 214	75	21
Diabetes, Obesity, and Cardiovascular Complications	19	16	34	22	10	1	\$660 593	67	23
Health: Populations, Organization, Practices	12	14	18	8	6		\$306 465	75	48
Inflammation - Pain	34	16	78	60	13		\$1 406 985	92	20
Medical Imagery	23	4	37	38	15		\$399 610	80	10
Mother & Child	20	27	37	25	3		\$723 307	96	22
TOTAL	141	93	254	209	60	1	\$5 194 994	485	144
	234		524					629	

* Recognized granting agencies

Partners

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Agence de la santé et des services sociaux de l'Estrie
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Canadian Cancer Society
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Canadian Center for Vaccinology
Canadian Diabetes Association
Canadian Institutes of Health Research
Canadian Medical Protective Association (CMPA)
Cancer Research Society
Centre de recherche de l'Hôpital du Sacré-Cœur de Montréal
Centre de recherche du CHU Sainte-Justine
Centre de recherche en santé mentale de Montréal
Centre des neurosciences de Sherbrooke
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Institut universitaire de cardiologie et de pneumologie de Québec
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Crohn's and Colitis Foundation of Canada
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Heart and Stroke Foundation of Québec
Kidney foundation of Canada
Québec Breast Cancer Foundation
The Lawson Foundation
The Rare Disease Foundation

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Centre de recherche du CHUS

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La Tribune

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Graphic-art

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We are grateful to everyone who took part in preparing this annual report.

Paper: Enviro100, Cascades
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