CENTRE DE RECHERCHE | CHUS

THE PATIENT AS OUR RESEARCH PARTNER

2017-2018 ANNUAL REPORT

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RESEARCH AXES

MISSION

FOR A NEW RESEARCH DYNAMIC

The Centre de recherche du Centre hospitalier universitaire de Sherbrooke (CRCHUS) plays a leadership role in the creation of knowledge and its translation towards improving health. To this end, the CRCHUS fosters the excellence of its researchers by building on its strengths and setting while providing a collaborative environment conducive to creativity and partnerships. The research activities supported by the CRCHUS, contribute to the creation of innovative treatments and improved health care services.

VISION

EXCELLENCE – BOLDNESS – CREATIVITY

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

DIRECTORS' MESSAGE

We are proud to present the 2017-2018 Annual Report for the Centre de recherche du CHUS (CRCHUS). This document is a reflection of a year of change, accomplishments and great discoveries. It was marked by the arrival of eight new researchers at our Centre, to whom I extend a warm welcome!

Many researchers from the Centre have distinguished themselves as a result of their leadership at the regional and provincial level this year. I wish success to the researchers that have taken on the various director and administrative roles in our network. The Centre also welcomed two new directors: Benoit Chabot for the *Cancer: Biology, prognosis and diagnosis* axis, and Pasquale Roberge for *Health: populations, organization, practices* axis. I would like to extend my gratitude to Nathalie Rivard and Andrew Grant for their contribution at the direction of these axes in the past years.

I wish to highlight the new inter-axis collaborations that have been created thanks to an active and diversified scientific programming, carried out largely thanks to the contribution of Axis coordinators and the growing Clinical and Epidemiological Research Unit (URCE). Although inter-axis activity is alive and well, the CRCHUS is always searching to develop activities to create links between researchers of different axes as well as with internal and external partners. For example, the continued collaboration between the *Diabetes, obesity and cardiovascular complications* and the *Medical Imaging* axes has led to the funding of a positron emission tomography (PET) scanner that will be entirely dedicated to research. In addition, the creation of a new university-hospital research chair for Maxime Descoteaux will be an important lever for inter-axes cooperation including the *Medical Imaging, Cancer: Biology, prognosis and diagnosis and Pain and Inflammation* axes.

In 2017-2018, the Center continues to work closely with our largest partner, the Foundation du CHUS, to put research at the forefront. In fact, we are actively contributing, with CIUSSS de l'Estrie – CHUS, in the implementation of the Foundation's next major fundraising campaign. One of the major goals of this campaign is to highlight the needs of the medical and the research community. The contribution of the Foundation du CHUS in the development of research at the CRCHUS is remarkable and our research community is grateful for their support. Multiple collaborations with our other partner Foundations have also been fruitful for research, as they provide important levers for our researchers to pursue their projects.

The year has ended with the development of a new image for the Centre, one that our researchers and partners will be able to rally behind. I expect this brand to become an integral part of our communications and identity for years to come. In closing, I would like to thank the CRCHUS management team for its support as well as the CIUSSS de l'Estrie – CHUS Research Administrative Services team for its collaboration.

William D Fraser MD

Dr. William D. Fraser, M.D., M. Sc., FRCSC, CCFP
Scientific Director of the Centre de recherche du CHUS

HIGHLIGHTS

OUR RESEARCHERS APPOINTED TO KEY LEADERSHIP POSITIONS

Serge Marchand, expert in chronic pain, became Scientific Director of the Fonds de recherche du Québec – Santé (FRQS). He has a leading role in the development of partnerships and alliances with research and government circles, and provincial, Canadian and international public and private sectors.

In August 2017, **Alain Vanasse** was appointed Scientific Director of the Strategy for Patient-Oriented Research (SPOR) Support Unit of Québec.This investigator had also been Director of the Data Access component of the Support Unit since its creation. **Jean-François Éthier** was thus named for the position of Director of the Data Access component of the Support Unit.

Jean-Pierre Perreault, biochemist and RNA specialist, became Vice-Rector of Research and Graduate Studies at the Université de Sherbrooke (UdeS).

Dominique Dorion was appointed Dean of the Faculty of Medicine and Health Sciences at the UdeS.

Nathalie Rivard was appointed Vice-Dean of Graduate Studies, Research, and Innovation at the Faculty of Medicine and Health Sciences at the UdeS.

ANOTHER STEP FORWARD FOR MEDICAL IMAGING AT THE CRCHUS

The CRCHUS received close to $5 M for the acquisition of equipment and a facility expansion, an addition that will lead to improved prediction of clinical outcomes of type 2 diabetes using molecular imaging. This announcement was made at the CRCHUS in August 2017, by Health and Social Services Minister, Gaétan Barrette. The Government of Québec granted $3,999,330 in funding for this project and the Foundation du CHUS also contributed $1 M to the project.

HIGHLIGHTS

PATIENT-PARTNERS ARE BROUGHT TO THE FOREFRONT IN SEVERAL STRATEGIC COMMITTEES

The CRCHUS Strategic Patient-Partner Committee officially launched!

The activities of the CRCHUS Strategic Patient-Partner Committee officially began in May 2017. The Committee is composed of twelve representative members of the patient-partner dimension of the CRCHUS axes, as well as six institutional members. Nine meetings were held in 2017-2018, and the members worked to develop various activities to support the targeted mandates for the year: developing start-up tools; increasing the visibility of the patient-partner initiative; and developing a strong infrastructure to support researchers and their patient-partners, to ensure improved transparency in the research process and the dissemination of results.

The Patient-Partner: a priority for the DOCC axis

The Diabetes, obesity and cardiovascular complications (DOCC) axis has established its own Patient-Partner Committee, composed of members Jaime Borja, André Gaudreau, Denis Boutin and Gabriel Goulet. An invitation was sent to researchers and health professionals for training offered by Diabetes Action Canada on the fundamentals of patient-oriented research.

For a third consecutive year, the DOCC axis also held a patient recognition activity to inform patients involved in clinical research of the findings obtained from the studies that they were involved in. This activity assures the recognition and appreciation of their participation without which the clinical research could not have taken place.

An investment of $5 M to combat childhood obesity

Dr. William Fraser is leading a major international study to combat childhood obesity and cardiovascular disease. This study is part of the *Healthy Life Trajectories Initiative* (HeLTI) developed by the Canadian Institutes of Health Research (CIHR) and supported by a partnership with the World Health Organization.

Dr. Fraser's study is a combined effort with research teams in China, a country where industrialization and lifestyle changes have resulted in an unprecedented increase in childhood obesity. In China, the incidence of obesity in school-aged children and adolescents tripled between 2002 and 2012. For the first time, the research program is assessing a set of multifunctional interventions beginning at preconception and continuing in children until the age of 5.

To conduct this study, Dr. Fraser and his collaborators in China have obtained a $2.5 M grant from the CIHR and $2.5 M from the National Natural Science Foundation of China (NSFC) over a 5-year period.

YEAR IN REVIEW

OUR RESEARCHERS ON *DÉCOUVERTE*

Clinical investigators **Louis Valiquette** and **François Lamontagne** were featured in a report on antibiotic resistance presented on the *Découverte* program on March 11, 2018. Dr. Valiquette presented the innovative approach applied to optimal antibiotic management at the CIUSSS de l'Estrie – CHUS thanks to a software program developed by his team. Dr. Lamontagne discussed his participation in the Balance study, involves study that aims to reduce the amount of antibiotics given to patients hospitalized in intensive care.

On the March 18, 2018 episode of *Découverte*, researchers Stephen Cunnane, Tamas Fülöp (Research Centre on Aging) as well as **Maxime Descoteaux** and **Kevin Whittingstall** were featured in a report about cognitive aging and the role of an alternative fuel for the brain, ketones, that may slow down the development of Alzheimer's disease.

DEMYSTIFYING MENOPAUSE

Alan Cohen published the article *The mystery of life beyond menopause* in *Nature Ecology & Evolution*. Menopause is a paradoxical phenomenon from an evolutionary perspective: in fact, why would women stop reproducing if reproduction is the essence of evolution? Alan Cohen was invited to compose an editorial paper to contextualize an article on the first empirical test for several theories on this subject and that had rejected all known theories. Alan Cohen's paper highlighted the challenges of conducting this type of test in a definitive manner, while suggesting that an outline of the answer is known.

HEAVY HEALTH SERVICES USERS

Catherine Hudon's research on heavy health services users who seek emergency care or are hospitalized several times a year is featured on the website of The Chief Scientist of Quebec, Mr. Rémi Quirion.

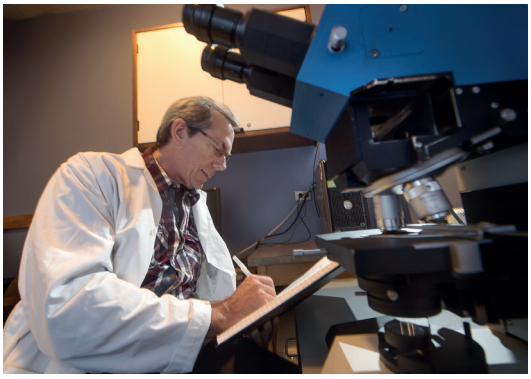
DAVID FORTIN CITED IN *NATIONAL GEOGRAPHIC*

An article that appeared in the prestigious American magazine *National Geographic* referred to a patient who was operated on with great success by neurosurgeon and neuro-oncologist **David Fortin**. *National Geographic* was preparing an article on frontal lobe damage and the effect on behaviour and emotions. The Sherbrooke researcher provided the MRI images of a patient from the region who had a very large meningioma in his frontal lobe.

RAYONNEMENT

OUR RESEARCHERS SPREAD THEIR KNOWLEDGE

Researcher **Éric Marsault** published a book in collaboration with the publisher Wiley, titled *Practical Medicinal Chemistry with Macrocycles: Design, Synthesis, and Case Studies*. Macrocycles are large ring compounds that offer medicinal chemists the benefits of both small molecules and biomolecules. Macrocycles have become a very important tool in the discovery of new drugs, hence the need for a handy guidebook explaining the basics and practices of working with such compounds. *Practical Medicinal Chemistry with Macrocycles* is a practical resource for scientists developing new therapeutic agents.



Researcher **Jean-François Beaulieu** published a book titled *Colorectal Cancer, Methods and Protocols* that explores the latest developments in the study of the mechanisms, diagnostics and therapeutics of colorectal cancer. It was developed in collaboration with **François-Michel Boisvert**, **Julie Carrier**, **Steve Jean**, **Caroline Saucier** and **Pierre Vachon**. The 22 chapters were written by researchers in the intestinal physiopathology field from all continents of the world. The book covers the techniques used in the discovery of molecular mechanisms involved in colorectal cancer development and explores the development of innovative tools in molecular biology to diagnose and detect colorectal lesions.

A LABORATORY IN THE SPOTLIGHT

The research performed by **André Carpentier** and his team research has an international appeal! The laboratory was showcased in the popular scientific magazine *Research Features*.

PATRICE PERRON'S RESEARCH TEAM RECOGNISED FOR ONE OF THE MOST CITED STUDIES OF 2014-2015

In December 2017, Dr. **Patrice Perron** and co-authors (**J.-L. Ardilouze**, M.-C. Battista, **M. Doyon**, M.-F. Hivert, **G. Houde**, M. Lacroix, J. Ménard) received a mention from the managing editor of the *Acta Diabetologia* journal. The 2014 publication *Lower vitamin D levels at first trimester are associated with higher risk of developing gestational diabetes mellitus* in the journal was honoured as being one of the most cited publications of 2014-2015.The paper was cited many times by the scientific community, which demonstrates its usefulness and importance.

PHILIPPE SARRET ON RADIO-CANADA

In April 2017, in a Radio-Canada news report, **Philippe Sarret** commented on the launch of companies such as CannaSher and Neptune (Green Valley Consortium). Such companies are working in partnership with the Pharmacology Institute of Sherbrooke (IPS) on the study of medical cannabis uses. He was also invited to the radio show *Les années lumières* to discuss this subject.

A STUDY BY RESEARCHER CLAUDE CYR GETS MEDIA COVERAGE

The results of a study on alcohol use in youth, conducted by **Claude Cyr**, were published in two media articles, in *La Presse* and on *Ici Radio-Canada*.

GREAT ACHIEVEMENTS IN GENETICS

The research of geneticists **Sébastien Lévesque** and Sébastien Chénier is highlighted in *Avancées génétiques: le legs de Malek* published on *Ici Radio-Canada*. They explain how they discovered a boy's genetic disease using a new technology developed in Sherbrooke.

SCHOLARSHIPS AND DISTINCTIONS

INTERNAL COMPETITIONS

Recipients of *Structuring Projects in Translational Research*

This competition aims at fostering the positioning of researchers with respect to large initiatives, priorities and funding opportunities supported by external agencies. The following teams distinguished themselves: **Jean-François Beaulieu** (J. Carrier, R. Day, J. Dubé, C. Ménard, A. Vanasse), **David Fortin** (M. Lepage, L. Masson-Côté, L. Sanche), **François Lamontagne** (M. Auger-Messier, F. D'Aragon, J-F Ethier, M-F Hivert), **Patrick Richard** (M. Lepage) et **Lee-Hwa Tai**.

Postdoctoral scholarships

The CRCHUS supported the excellence of emerging researchers by offering post-doctoral scholarships to the following recipients: Anita Bakrania (**Robert Day**), Marc Gruell (**Éric Massé**), Camille Lagard (**Philippe Sarret**), Massoumeh Langroudi (**Fernand Gobeil**, **Yves Dory**), Simon Lecoute (**André Carpentier**), Yohann Moanahere Chiu (**Catherine Hudon** et **Alain Vanasse**), Perla Ramesh (**Brigitte Guérin**).

CRCHUS Internal Funding Assistance Program (PAFI)

Six $25,000 grants were awarded to the following research teams: **Pedro Miguel Geraldes**, **Claudio Jeldres** (M.-A. Despatis, N. Faucheux, E. Langelier, J.-P. Praud), **Richard Leduc** (Y. Collin, L.-C. Fortier), **Benoit Paquette** (N. Faucheux, D. Fortin), **Lee-Hwa Tai** (J. Carrier, Y. Collin, N. McFadden) and **Éric Turcotte** (B. Guérin, R. Lecomte).

Small Research Equipment Funding Program (PERC)

The Internal Funding Program Assessment Committee, composed of five researchers, selected the proposals from the following CRCHUS members for the acquisition of research equipment totalling $40,000: **Jean-Bernard Denault**, **Roger Lecomte** and **Jean-François Lepage**.

OTHER SCHOLARSHIPS

Canadian Institutes of Health Research grants

During the year 2017-2018, the following researchers received grants from the Canadian Institutes of Health Research (CIHR), as principal investigators: **Mannix Auger-Messier**, **Luigi Bouchard**, **Vincent Burrus**, **Alan Cohen**, **Anne-Marie Côté**, **Pedro Miguel Geraldes**, **Catherine Hudon**, **Subburaj Ilangumaran**, **Simon Labbé**, **Daniel Lafontaine**, **François Lamontagne**, **Martin Lepage**, **Jeffrey Leyton**, **Alexandre Maréchal**, **Eric Marsault**, **Éric Massé**, **Patrick McDonald**, **Alfredo Menendez**, **Michelle Scott**.

Researcher **Catherine Hudon** and co-researchers **Pasquale Roberge** and **Thomas Poder** received a grant from the CIHR for their study *Case management in primary care for frequent users of healthcare services with chronic diseases and complex care needs: implementation and realist evaluations*. This $2 M grant was awarded to them as part of an operating grant: Strategy for Patient-Oriented Research (SPOR) network for innovations in integrated health care and primary care (ISSIPL). The objective of their project is to analyze the implementation of the V1SAGES case management intervention in primary care clinics in five Canadian provinces. V1SAGES is an acronym in French that signifies *Towards a better integration of care and improved self-management support for heavy users of health care services with chronic conditions*.



Researcher **Luigi Bouchard** and his team received funding from the CIHR totaling $582,823 over 3 years for his project *Development of a microRNA panel for the early screening of gestational diabetes*. The project aims to identify the microRNA in maternal circulatory system that predict the development of gestational diabetes and to determine their roles in glycemic regulation during pregnancy to derive potential clinical applications.

Grants from the Fonds de recherche du Québec

This year many researchers received new scholarships and grants from the Fonds de recherche du Québec (FRQ), as principal investigators: **C. Florian Bentzinger**, **Frederick D'Aragon**, **Pierre-Marc Jodoin**, **Pedro Miguel Geraldes**, **Nicolas Gévry**, **Brigitte Guérin**, **Martin Lepage**, **Jeffrey Leyton**, **Alexandre Maréchal**, **Éric Marsault**, **François Michaud**, **David Mathieu**, **Jean-Charles Pasquier**, **Jean-Pierre Perreault**, **Sébastien Rodrigue**, **Dimitri Ryczko**, **Michelle Scott** and **Éric Turcotte**.

SCHOLARSHIPS AND DISTINCTIONS

Developing robotic knowledge

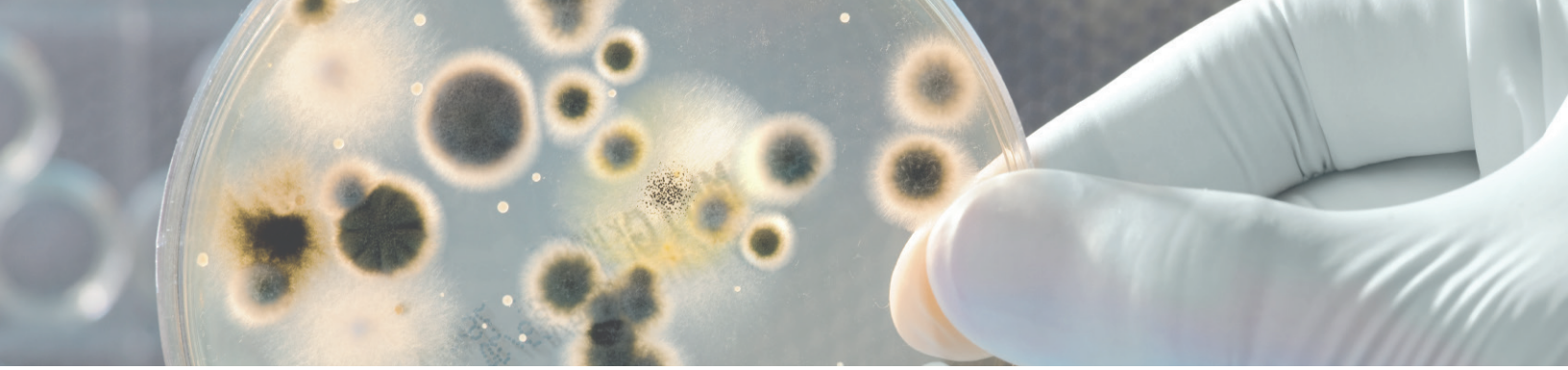
Researchers **François Michaud** and **Johane Patenaude** received a grant from the NSERC for a total of $1,650,000 for 6 years for the Enabling Technologies for *Collaborative Robotics in Manufacturing* project. This grant will enable them to develop specific collaborative robotic knowledge such as interaction and man-robot control, safety, and production planning. It will also be used to develop know-how in the design, integration and validation of complex mechatronic systems. This research is needed to develop an efficient man-machine interaction in future applications, particularly in connection with an aging population.

Developing a learning system

Jean-François Ethier, **Catherine Hudon** and **Alain Vanasse** received a $649,823 grant from the Canada Foundation for Innovation (CFI) for the *A learning health research system to bridge the gap between primary and specialized care* project. This project aims to create a learning system connecting and integrating hospital and primary care data in a coherent platform.

Using biosensors to understand cellular communication

Researchers **Éric Marsault**, **Michel Grandbois** and **Philippe Sarret** received a grant of $162,000 over 3 years from the Fonds de recherche Nature et technologies (FRQNT) as part of the Team Research Project program for the *Neurotensin 1 Receptor Modulation with Pepducins* project. Thanks to this funding, they will study the design and assessment of pepducins for the neurotensin 1 receptor (NTS1r), a receptor that has antinociceptive properties that are superior to those of morphine, but which is associated with a hypothermic phenomenon, using notably biosensors.



SCHOLARSHIPS AND DISTINCTIONS

$5.5 M for engineering, science, medicine and health science projects

Researchers **Steve Jean**, **Jean-François Ethier, Michelle Scott** and **Lee-Hwa Tai** are among 8 professors from the Université de Sherbrooke who, thanks to more than $5.5 M in funding from the John-R.-Evans Leader Fund of the Canada Foundation for Innovation, the Government of Québec as well as various partners, will be able to carry out large scale projects in engineering, sciences, medicine and health sciences.




Grants from the Natural Sciences and Engineering Research Council of Canada

Several researchers received a grant from the Natural Sciences and Engineering Research Council of Canada (NSERC): **François Bachand**, **Jean-François Beaulieu**, **C. Florian Bentzinger**, **François Boudreau**, **Hubert Cabana**, **Antonio Conconi**, **Jean-Bernard Denault**, **Yves Dory**, **Réjean Fontaine**, **Michel Grandbois**, **Pierre-Marc Jodoin**, **Jean-François Lepage**, **Alexandre Maréchal**, **Éric Marsault**, **Éric Massé**, **François Michaud**, **Jean-Pierre Perreault**, **Dimitri Ryczko**, **Caroline Saucier** and **Lee-Hwa Tai**.

Xavier Roucou received a $231,140 grant as part of Compute Canada's 2017 Resources for Research Groups Competition. In terms of high-performance calculation time allocation, all disciplines combined, this allocation ranks 27th in Canada and 8th in Quebec, and the largest high-performance calculation time allocation ever granted by Compute Canada to a CRCHUS researcher. He received this grant for the project *OpenProt, a unique web platform for the discovery and functional annotation of new proteins*. Compute Canada enables Canadian researchers to conduct world-class research using high-performance computing strategies in research.

Better intervention for heavy users of health care services

Catherine Hudon and her team received $270,000 in funding from the Fonds de recherche du Québec-Santé (FRQS) for the *Heavy users of health care services with chronic conditions suitable for outpatient treatment: properly identify the complex at risk clientele to better intervene* project. They also placed first in the competition!

SUPPORT FROM OUR PARTNER FOUNDATIONS

The Fondation du CHUS and Jean-Luc Mongrain, exceptional ambassadors for the CRCHUS

In February 2018, Jean-Luc Mongrain announced the funding of four research projects with the grant that bears his name. Mr. Mongrain's presentation, combined with short videos of each project, captivated the audience by exposing the passion and dedication of our researchers in bringing new knowledge to the forefront. Each project received $50,000, for a total of $200,000:

- **André Carpentier** for his project *Imaging for better type 2 diabetes management*.
- **Éric Turcotte** for his project *Imaging breast cancer biopsy: better diagnosis for personalized treatment*.
- **C. Florian Betzinger** and **Dimitri Ryczko** for his project *Regenerating destroyed tissue: a new approach*.
- **Pasquale Roberge** for her project *Cognitive Behavioural Therapy for anxiety disorders*.

The Jean-Luc Mongrain Fund was created in 2003 by the CHUS Foundation to encourage medical research by CRCHUS physicians and researchers.

Announcement of projects funded by the Fonds Brigitte-Perreault

Every year since 2006, interdisciplinary projects to improve the quality, safety and humanization of care and services provided at the Fleurimont and Hôtel-Dieu hospital sites in Sherbrooke have become a reality thanks to the Fonds Brigitte-Perreault. This year, **François Lamontagne** and **Frederick D'Aragon** received funding for their project *Providing more information to loved ones of users about intensive-care research*.

5th Edition of the Sherbrooke Wine Auction

During this evening, in an atmosphere of generosity, more than $134,000 was raised for the *Mother-Child* axis to further childhood disease research, proof of a strong dedication of donors to helping sick children.

SCHOLARSHIPS AND GRANTS

Grants from the Fondation du Grand défi Pierre Lavoie

The following researchers received a $25,000 grant:

- **Luigi Bouchard** for his project *Epigenetic regulation of clinical variability in myotonic dystrophy type 1*.
- **Jean-François Lepage** and **François Corbin** for their project *Multimodal study of the GABAergic system in patients with fragile-X syndrome and neurofibromatosis type I*.
- **Patrick McDonald** for his project *New therapeutic targets in cystic fibrosis.*

A grant for Cystic Fibrosis

Researchers **Éric Marsault** and François Malouin received $100,000 per year for 3 years from Cystic Fibrosis Canada for their project *New combination of antibiotics for MRSA and Pseudomonas aeruginosa for cystic fibrosis*.

2017 competition - Diabetes Québec

Patrice Perron received a $20,000 grant from Diabetes Québec for his project *Maternal hyperglycemia and neurocognitive development of 5-year-old children*. The grant will be used to determine if a connection exists between the effects of maternal glycemia and the neurocognitive development of young children.

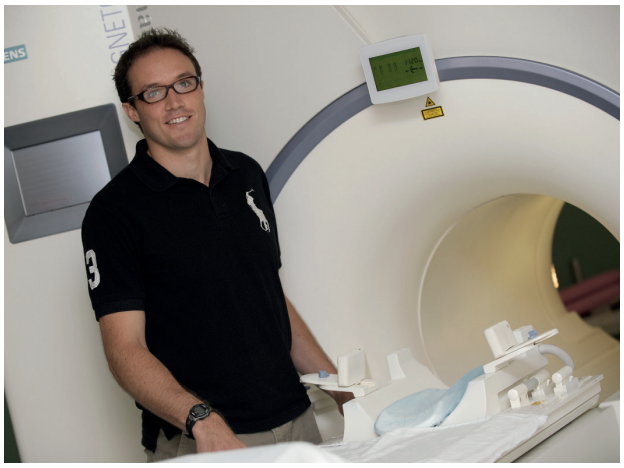
A grant to improve the diagnosis of preeclampsia

Anne-Marie Côté and her team received $100,000 in financing from the Kidney Foundation of Canada for the project *Detection of acute glomerular injury in the hypertensive disorders of pregnancy*. The objective of this study is to document the evolution of glomerular (albuminuria and podocyturia) and vascular (sFlt-1 and PlGF) biomarkers during pregnancy in women with chronic arterial hypertension with the aim of improving the diagnosis of preeclampsia in this population at risk.

RESEARCH CHAIRS

Researcher **Réjean Fontaine**, was awarded a new **Canada Research Chair in Time-of-Flight Positron Emission Tomography**. This award will enable him to work on designing a new scanner to obtain even more precise images to support research on, among other things, Alzheimer's disease and cancer.

A new Chair in **Neurocomputing Research** was created, awarded to **Maxime Descoteaux**. This chair will increase capacity for research on brain mapping, and improve knowledge on neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, concussions and Autism.



Pedro Miguel Geraldes' Canada **Research Chair in Diabetes and Vascular Complications** was renewed. The health care costs for a diabetic person are two to three times higher than for non-diabetic patients. A major part of the costs is directly related to treating diabetes complications, which mainly affect the heart, retina, kidneys and vessels. Researcher Pedro Miguel Geraldes' work aims to understand the effects of sugar and fat levels on tissues affected by diabetes. This research will lead to the discovery of new treatment targets with the goal of administering medications that will be able to prevent, even reverse, the vascular complications of diabetes.

DISTINCTIONS

Catherine Hudon accepted the position of Assistant Director of Réseau-1 Québec, the Réseau de connaissances en services et soins de santé intégrés de première ligne du Québec (Quebec Knowledge Network in Integrated Primary Care Health Services). As part of her mandate, she ensures the scientific co-management (with Yves Couturier, Scientific Director) of Réseau-1 Québec, and co-chairs the Management Committee.

Researcher **Benoit Chabot** will continue to contribute to the journal of *Molecular and Cellular Biology* for the next three years as a member of the Editorial Committee. This molecular biologist has a unique expertise in an underdeveloped field in Canada.

Thomas Poder was appointed member of the Clinical Excellence in Healthcare Services Committee of the Institut national d'excellence en santé et en services sociaux (INESSS). He has held the economist position since September 2017. The committee members help ensure the fairness of the recommendations as well as the social and professional acceptability of INESSS products. For this purpose, they share their knowledge and expertise to help INESSS carry out its activities cycle.

Cellular biologist **Fernand-Pierre Gendron** will continue to contribute to the *Journal of Immunology* for the next two years as Associate Editor. This researcher is responsible for reviewing the articles submitted by the section editors and evaluating whether the manuscripts submitted are acceptable or not for publication by the journal.

AWARDS

At the 13th Awards Gala of the Faculty of Medicine and Health Sciences of Université de Sherbrooke, **Claire Dubois** received the Jean-de-Margerie award for the best publication of the year in biomedical sciences for her article entitled *Hypoxia-induced mobilization of NHE6 to the plasma membrane triggers endosome hyperacidification and chemoresistance*.

In March 2018, researchers **Patricia Bourgault**, **Sylvie Lafrenaye** and Sandeep Mayer won the Clinical Innovation Award from the Ordre des Infirmières du Québec (OIIQ) – Estrie section for their project *Modernizing administration of analgesics, enhancing nurse autonomy and reducing postoperative pain in patients thanks to a Multimodal Analgesia Algorithm for Adults: results of an interprofessional collaboration in care service*. This project aims to reduce postoperative pain levels and improve postoperative patient quality of life through the implementation of a new pain management tool in the institution.

The CRCHUS shone at the very first CIUSSS de l'Estrie – CHUS Gala of Excellence. The event, held on October 26, 2017, highlighted more than 123 remarkable accomplishments throughout our region in 6 categories, 22 of which were rewarded. The five winning projects from the CRCHUS are:

Quality of care and services category:

- A step forward in neuroendocrine tumour screening, by the Dotatate team

Building for and with the staff and internal community category:

- Integration of research in critical care, by the critical care research team

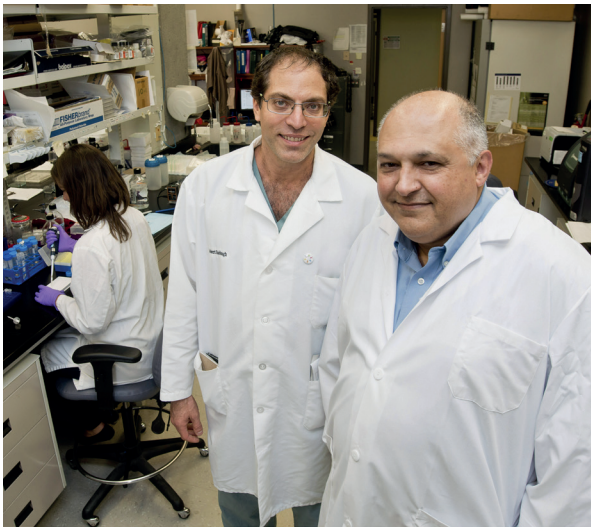
University and outreach mission category:

- **Christiane Auray-Blais**, biochemist and researcher, for her work on lysosomal diseases
- Production and distribution of radioisotopes, by the CRCHUS team and the CIUSSS de l'Estrie – CHUS Financial Resources and Logistics Directorate
- Barometer Project, by the Primary Health Care and Social Services University Institute (IUPLSSS) team, with the participation of researcher **Andrew Grant**.

Researcher **C. Florian Bentzinger** placed first in the Banting Research Foundation Discovery Award competition with his application entitled *Niche Regulation of Muscle Stem Cell Specification*. The Discovery Award comes with a $25,000 operating grant and is awarded for innovative health and biomedical research projects carried out by exceptional new researchers in universities and research institutes in Canada.

DISCOVERIES AND INNOVATIONS

CANCER: BIOLOGY, PROGNOSIS AND DIAGNOSIS



A major breakthrough in prostate cancer

Researcher and prostate cancer specialist **Robert Day** and urologist, surgeon and researcher **Robert Sabbagh** took advantage of #Movember to announce a major breakthrough in prostate cancer. They have discovered a major biochemical mechanism that could hold the key to the progression of this disease, which is the most common cancer in men. The researchers have succeeded in understanding the mechanism of action of an alternative form of the PACE4 enzyme, a protein that is overexpressed in prostate cancer and that seems to block the progression of the cancer independently of androgens. The study, published in the scientific journal Cancer Research, was on the Radio-Canada International news.

A discovery in the fight against an aggressive form of bladder cancer

A discovery made at the CRCHUS related to muscle-invasive bladder cancer (MIBC) was recently published in the prestigious journal *OncoImmunology*. Researchers **Jeffrey Leyton** and **Robert Sabbagh** are the first to identify a protein that is an attractive target for developing new therapies and imaging agents for this aggressive form of bladder cancer.

MEDICAL IMAGING

A vast group of researchers discover "traffic jams" in the brain

When the world's best minds on brain imaging get together, it can lead to extraordinary scientific discoveries. A group of 20 international teams, including researcher **Maxime Descoteaux**, just demonstrated that the brain has the equivalent of "traffic jams". This significant discovery was published in the scientific journal *Nature Communications* on November 7, 2017.

Mapping the *connectome*, a bit like a road map of the brain, is a representation of the neuron connections in the brain. While studying this map, the international team observed that this connectome formed a large number of false connections, representing pathways that didn't exist and that caused "traffic jams". A bit like a traffic circle where a number of routes are possible, many connections are available for nerve impulses which may follow different nerve pathways and easily fool the mapping techniques that pass through these traffic jams.

DIABETES, OBESITY AND CARDIOVASCULAR COMPLICATIONS

Towards new treatments for cardiometabolic diseases

Researcher **Nicole Gallo-Payet**, published an e-book entitled *ACTH action in the adrenal Cortex: From molecular biology to pathophysiology*. Published in *Frontiers in Endocrinology*, this book discusses the mechanisms of action of the adrenocorticotropic hormone (ACTH), its role in the excessive stimulation of glucocorticoids and their involvement in the development of many cardiometabolic diseases (type 2 diabetes, obesity). Understanding the mechanisms of action of hormones involved in these diseases will further the development of new strategies to reduce their prevalence and, potentially, develop new safe and effective treatments.

INFLAMMATION-PAIN

More effective chemotherapy treatments

Chemotherapy resistance is one of the main causes of cancer treatment failure, but the mechanisms involved remain largely unknown. One major factor that contributes to drug resistance of cancer cells involves tumour environment modifications, characterized by oxygen deficiency (hypoxia) and pH changes.

Claire Dubois and her team studied studied these effects, in research that may lead to the development of more effective chemotherapy treatments. Therapies directed against the relocation of the NHE6 protein could improve the toxicity of drugs in hypoxic cells, cells that are often associated with the development of metastases and cancer recurrence, while saving normal tissues. Their research was published in *Nature Communications*.

MOTHER-CHILD

To increase the number of vaccinated children

Arnaud Gagneur developed a novel strategy "Promovac" that aims at improving acceptability of the early childhood vaccination program. The technique involves an information session proposed to parents during their postpartum stay at the maternity ward. This session is proposed by healthcare workers trained in immunization and motivational interviewing (MI) techniques. It is a collaborative objective-focused communication style, with particular attention to a language of change. This strategy meets the needs of parents who lack information or who do not know whether the information they find on the Internet and social media is reliable.

Promovac, which significantly increased the number of children vaccinated in Dr. Gagneur's research studies, was adopted as a health program by the Minister of Health and Social Services (MSSS). In January 2018 as the provincial vaccination promotion program based on the Motivational Interviewing in the Maternity Ward for the Immunization of Children (EMMIE). The EMMIE program was implemented in 13 maternity wards, which represents 55% of births in Quebec. A fine example of how research projects can materialize and have far-reaching consequences!

François Lamontagne in *The Lancet*

The prestigious medical journal published Dr. Lamontagne's recommendations for providing primary care in an Ebola outbreak. In 2014, **Dr. François Lamontagne** spent three weeks in Liberia to take part in the fight against the Ebola virus disease. The international medical community did not have sufficiently established guidelines to deal with the situation. After the crisis, he led a team of 30 international experts to recommend a systematic patient care framework, applicable in all healthcare contexts. This team applied the *Grading of Recommandations Assesment, Development and Evaluation* (GRADE) *methodology.*

An organ donation study

On the occasion of National Organ Donor Week, **Frédérick D'Aragon** collaborated in an article demystifying the reality surrounding organ donation. Dr. D'Aragon heads the DONATE observational study, which is taking place at 25 sites in Canada and whose objective is to study new ways of doing things to help improve the use of available organs for transplantation. This study is the main element of Dr. D'Aragon's research program. In practical terms, the researcher hopes to identify the interventions that are associated with an increase in the number of organs retrieved from donors and a better quality of organs once transplanted.

ACTIVE STUDENT INVOLVEMENT IN SCIENTIFIC LIFE

The Center is proud to witness the implication of students in all levels of CRCHUS projects. Many receive scholarships, stand out for the excellence of their academic record, and get involved in CRCHUS activities.

Simon Boudreault, a doctoral student in biochemistry supervised by **Martin Bisaillon**, and **Jonathan Bouchard**, led by **Réjean Fontaine** and **Roger Lecomte**, were awarded a coveted Vanier Canda Graduate Scholarship. This scholarship is awarded to only 166 researchers across Canada at the start of their career who stand out for their academic excellence, research potential and leadership. The students will receive $50,000 per year for three years to concentrate on their projects.

To mark Canada's 150th anniversary, the national organization Mitacs revealed The next 150, a recognition that showcases 150 promising researchers thanks to their work, creativity and devotion. **Élie Simard,** postdoctoral trainee under the supervision of **Richard Leduc**, has earned a place among the promising researchers across the country.

The Diabetes, obesity and cardiovascular complications axis created a Student Advisory Committee to foster students' sense of belonging to the CRCHUS by further involving them in administrative decisions and scientific activities for the axis and the CRCHUS. Several students make up the committee: **Benoit Denhez** (**Pedro Miguel Geraldes**), **Lauralyn Dumont**, **Audrey Ann Dumont** (**Mannix Auger Messier**) and **Dominic Tremblay** (Pedro Miguel Geraldes).

Kévin Huguet (**Vincent Burrus**) received a postdoctoral scholarship from the Fondation pour la recherche médicale, based in France, for his project *The positive and negative interactions between Salmonella enterica Genomic Island 1 (SG/1) resistance and IncC conjugative plasmids.*

Samuel Wilson, directed by **François Boudreau** and **François-Michel Boisvert**, is a very actively involved student! Scholarship recipient from the Université de Sherbrooke, the Fonds de recherche Québec-Santé and the Canadian Institutes of Health Research, he is very involved in his community. Since 2013, he has been doing volunteer work with patients at the CIUSSS de l'Estrie – CHUS, namely by working with the elderly and adult populations at the Hôtel-Dieu and Fleurimont hospital sites. Since 2016, Samuel Wilson has also been a member of the Compton-Stanstead and Greater Sherbrooke Youth Council.

RESEARCH IN NUMBERS

FUNDING SOURCES IN FISCAL 2017-2018

Grant from the Fonds de recherche du Québec - Santé FRQ-S (Centre)	$2,460,963
Grants from FRQ-S-recognized organizations	$14,056,186
Scholarships from FRQ-S-recognized organizations	$4,468,497
Research contracts with the private sector	$5,395,568
Sales and services	$229,307
Contribution of the CHUS and its Foundation	$1,442,987
Donations for research and teaching	$108,244
Other income	$12,962,936
Total:	$41,124,688

Note: The total amount of funding cited herein may differ from that in the CIUSSS de l'Estrie – CHUS financial statements since some partner grants are managed by the Université de Sherbrooke.

CLINICAL RESEARCH AS OF MARCH 31, 2018

Active research projects

961

Clinical research projects submitted to the CIUSSS de l'Estrie – CHUS research-ethics committee:

270

Which includes:

50 INDUSTRY PROJECTS

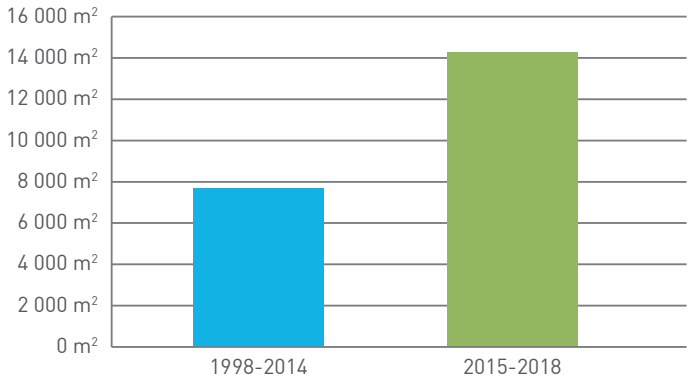
74 FUNDED PROJECTS

146 IN-HOUSE PROJECTS

AXIS	REGULAR RESEARCHERS	ASSOCIATE RESEARCHERS	STUDENTS			SCHOLARSHIPS AND GRANTS (RGAs*)	PARTICIPATION IN PUBLICATIONS
			M. Sc.	Ph. D.	Post-Doc		
Cancer: biology, prognosis and diagnosis	37	19	52	54	19	$5,575,587	122
Diabetes, obesity and cardiovascular complications	19	17	34	28	7	$2,291,147	88
Medical imaging	23	7	50	46	12	$2,165,416	100
Inflammation – Pain	37	16	75	56	12	$3,976,769	146
Mother-child	23	26	58	37	12	$2,965,969	105
Health – populations, organization and practices	15	18	38	17	12	$1,545,674	120
TOTAL	154	103	307	238	74	$18,520,562	681
	257		619				

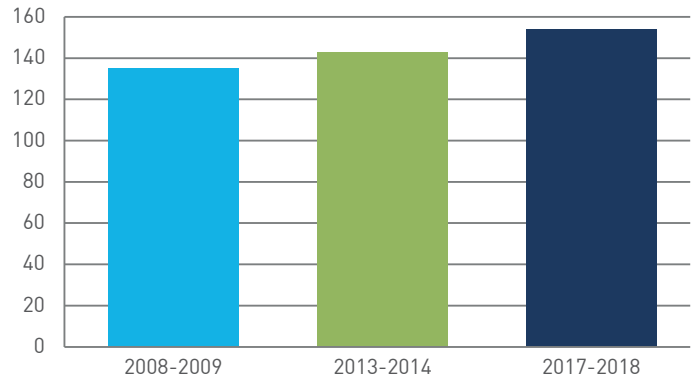
*Recognized granting agencies, regular researchers only

Area of the center



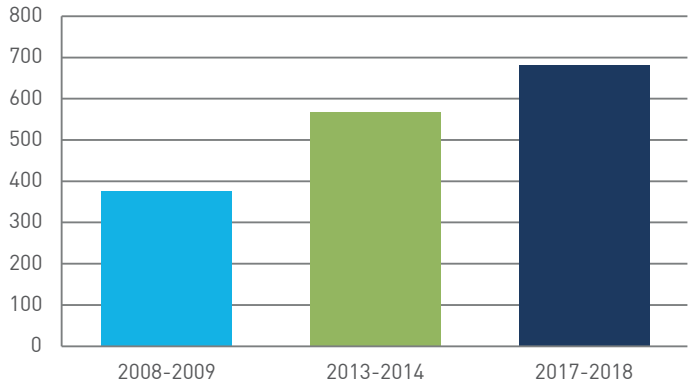
Square meters	**7 700 m²**	**14 250 m²**

Regular researchers



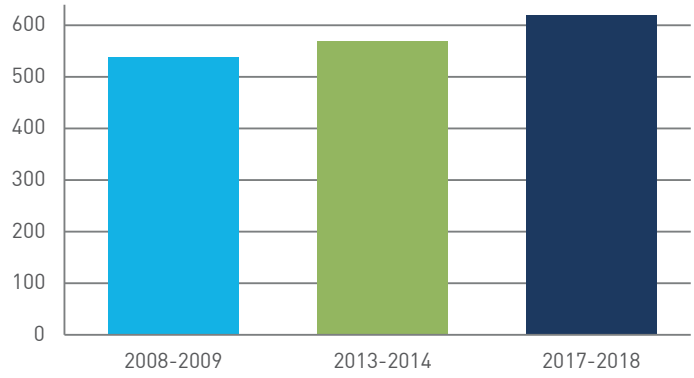
Number	**135**	**143**	**154**

Publications



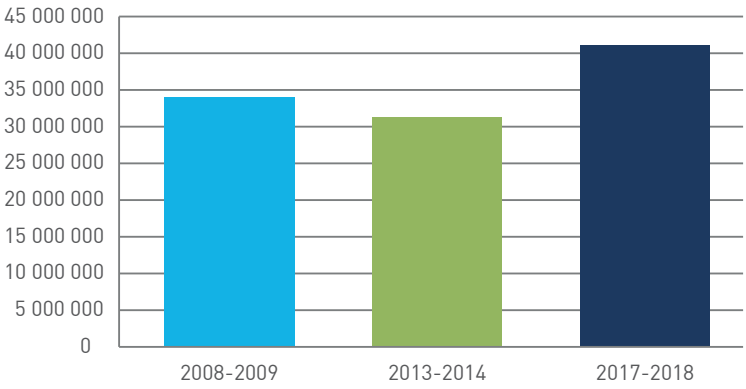
Number	**375**	**566**	**681**

Students and Postdoctoral Fellows



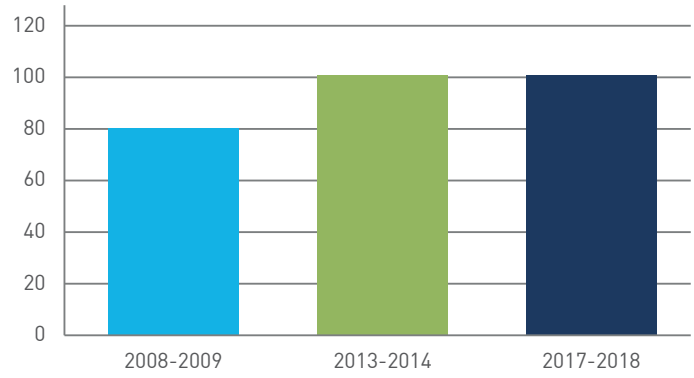
Number	**538**	**569**	**619**

Financing of research



Total	**$33,976,267**	**$31,325,572**	**$41,124,688**

Clinical and administrative staff



Full time equivalent	80	101	101

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Québec

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