

CENTRE DE
RECHERCHE



2019-2020
ANNUAL REPORT

Our
KNOWLEDGE
brings
HOPE

SINCE **1980**



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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.

MESSAGE FROM THE DIRECTOR

The year 2019-2020 marks the last full year during which I serve as Scientific Director of the CRCHUS. I have been privileged to lead this exceptional community of researchers, research professionals and trainees for the last 7 years. The period during which I assumed this role has witnessed important changes. The Centre is now a full partner with the Faculté de médecine et des sciences de la santé (FMSS) in the process of recruitment, through the selection of new investigators and by providing salary support and start-up funds during their initial years in the Centre. The CRCHUS has undergone a restructuring of its platforms with the goal of offering professional and technical support to our researchers at a reasonable cost. The creation of the Clinical and Epidemiological Research Unit (URCE), along with the professional support that it provides to clinical researchers, increased our capacity to plan and implement multicentre clinical studies, with many being sponsored by national and international peer review agencies. In partnership with the CHUS Foundation, we have been able to launch a series of internal programs providing our researchers with seed money to test their hypotheses and generate preliminary results prior to the submission of their proposals to national funders. As well, we have worked with the Foundation to develop a series of Research Chairs in key areas. These Chairs continue to have a major impact, locally and nationally. Finally, the creation of a Patient-Partner Committee has been a great success, its dynamism being felt at all levels of the Centre's activities and beyond.

In January 2020, the CRCHUS underwent a review process that was organized by its major sponsor, the Fonds de recherche de Québec – Santé (FRQS). A committee of experts visited the Centre and evaluated the full range of our programs and activities, as well as progress that has been made since the previous visit in 2014. Our strategic plan, which had been developed through a process of consultation and discussion in the months prior to the visit, was also reviewed in detail. The findings of the expert committee were extremely encouraging. They considered that the CRCHUS had made major progress on virtually all fronts. They provided constructive comments as to the challenges that we may face in implementing our strategic plan. I am confident that the new scientific Director (to be named shortly) will ensure that the CRCHUS maintains its trajectory of development during these challenging times and implements its strategic plan.

I would be remiss not to mention the unique context that we have experienced since the onset of the COVID-19 pandemic, which commenced toward the end of the 2019-20 fiscal year. The effects of the pandemic on research have been huge: laboratories have been closed, clinical research projects have been interrupted, student projects have been suspended. Despite these challenges, the scientific community, including researchers, research professionals, administrative staff and students, has maintained an optimistic, determined and positive perspective. Many researchers have taken advantage of the new funding programs that have been made available in the context of COVID-19. Dr. Lamontagne, a researcher in our centre, co-leads the new FRQS COVID-19 research network. Research assistants have maintained their dedication to continuing research projects that are considered essential to patient care, as well as by their relaunching research of activities in a context where there is a shortage of staff. I salute the courage and dedication of the whole research community.

I would like to express my thanks to the administrative staff of the CRCHUS for the dedication and their creativity in addressing some of the major challenges that we have faced. Also, I would like to thank the members of the Direction of the CIUSSS de l'Estrie – CHUS for their support during my tenure. I would also like to express my gratitude to the FMSS for the collaboration that they have given to the CRCHUS.



William D Fraser MD

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

HIGHLIGHTS

A SUCCESSFUL FRQS EVALUATION VISIT

The renewal of the CRCHUS' status as an FRQS centre marked the fall and winter of 2019. On October 7, 2019, the CRCHUS welcomed evaluators Dr. Gillian Bartlett-Esquilant, Dr. Anne Monique Nuyt and Dr. Bruce Murphy for an FRQS evaluation visit. Several researchers and students took part in the simulation! The renewal application was submitted on December 3, 2019, and the official FRQS member visit took place on February 24 and 25, 2020.

This event required the collaboration as well as the involvement of several people who contributed namely to drafting the application and to organizing the visit, which was a huge success!



A USER-CENTRED COMMITTEE

On November 22, 2019, the CRCHUS won the 2019 Prix de cancérologie: Implication des personnes touchées par le cancer award for the project entitled *Le Comité stratégique patient-partenaire du Centre de recherche du CHUS : deux années d'accomplissements des patients en oncologie*. Awarded by Quebec's Ministère de la Santé et des Services sociaux, the purpose of this award is to reward people who have implemented innovative cancer-fighting projects.



NEW STATE-OF-THE-ART EQUIPMENT MAKES ITS DEBUT AT THE CRCHUS

Construction for the installation of a new scanner combining positron emission tomography and X-ray computed tomography (PET-CT) began in the fall of 2019 at the CRCHUS. The space has been redesigned and enlarged to make room for new examination rooms. This equipment will be used namely by Dr. **André Carpentier**'s team as well as by several other CRCHUS researchers. Dr. Carpentier will head a research project that enables patients with type 2 diabetes to know if they are at risk of developing heart failure or complications from their diabetes. This new equipment, which cost \$5 million, was funded jointly by the Ministère de l'Économie et de l'Innovation and the CHUS Foundation.

HIGHLIGHTS (CONTINUED)

OPTIMIZING CARE FOR PATIENTS WITH PROSTATE CANCER

Through their research, **Brigitte Guérin** and her team hope to offer more effective and customized treatments to patients with prostate cancer. In 2019, they set up the 3TMP0 multicentre clinical study thanks to the large-scale production of gallium (^{68}Ga) by cyclotron. Gallium is used for the preparation of two PET tracers that will improve characterization of metastatic prostate cancer, thus enabling better treatment. Coordinated by the CRCHUS with support from the Clinical and Epidemiological Research Unit (URCE), this multicentre project is currently underway in five centres across Quebec. Two international patents resulting from this project have been filed.



PREVENTING ALCOHOL ABUSE AMONG YOUNG PEOPLE

On Halloween night, hospital admissions for alcohol abuse-related medical emergencies are frequent and serious among young adults, notes Dr. **Claude Cyr**. Through prevention, awareness and education, Dr. Cyr hopes to reduce the harm associated with excessive alcohol consumption among young people. Based on the results of his research, which paint a clear picture of alcohol consumption in Sherbrooke, several local players have joined forces to actively contribute to the well-being of young people. Partners have taken concrete actions, such as the *Garde ça l'fun!* (Keep it Fun!) campaign, which reminds young people that you don't have to binge drink to have fun at a party.

OUTREACH

IN SCIENTIFIC JOURNALS



Dr. **Marie-France Langlois** and Dr. **Jean-Patrice Baillargeon** published an article in the May-June 2019 edition of the *Obesity Research & Clinical Practice journal* entitled [Male partners of subfertile couples in which the spouse is obese display adverse weight and lifestyle associated with reduced sperm quality](#). This is the first study to focus on the partners of spouses who are obese and visiting a fertility clinic. The team showed that it is relevant to provide men with the tools to adopt a healthy lifestyle in order to improve their health and reproductive potential, as well as the couple's fertility.



The findings of a vasopressor study conducted by CRCHUS researcher Dr. **François Lamontagne** were published in the prestigious *Journal of the American Medical Association* (JAMA). The title of the study is [Effect of Reduced Exposure to Vasopressors on 90-Day Mortality in Older Critically Ill Patients With Vasodilatory Hypotension](#).



Dr. **Frédéric D'Aragon** acted as co-investigator in a study to reduce the use of chest imaging in patients with suspected pulmonary embolism in order to prevent unnecessary radiation exposure. This research project could have a concrete impact on the practice of medicine. The results of the study were shared with the scientific community in the prestigious [New England Journal of Medicine](#).



Ahmed Chraïbi is the principal author of the article entitled [Apelin-13 Regulates Vasopressin-Induced Aquaporin-2 Expression and Trafficking in Kidney Collecting Duct Cells](#) which was published in the *Cellular Physiology & Biochemistry scientific journal*. The purpose of his research is to better understand the role of apelin in the regulation of fluid homeostasis.

ON TELEVISION



The CTV television network team visited the CRCHUS in January 2020 to [report on the LOVIT study](#), conducted by Dr. **François Lamontagne** and his team. The study is investigating the effects of vitamin C on patients with sepsis who are being treated in the intensive care unit.



In addition to a reassuring manner, since the beginning of the COVID-19 pandemic, Dr. **Alex Carignan** has demonstrated his dynamic nature as he provides information to the public in the regional and national media. Every weekday, the infectious disease specialist and microbiologist provides clear explanations to the public, both on television and on the radio, to help people understand what the new coronavirus is and how to protect themselves from it.



To highlight the 10th anniversary of the Institut universitaire en déficience intellectuelle et en trouble du spectre de l'autisme, the Institute produced [a video](#) featuring several Quebec researchers. Among others, the video presents **Mélanie Couture** and P-POP 2-5, a research project implemented jointly with **Chantal Camden**.



In January 2020, Dr. **Claude Cyr**'s research on farm accidents was featured in an episode of the [La semaine verte](#) television show on ICI Radio-Canada.

AT CONFERENCES AND OTHER EVENTS



The aim of the Fondation *Il était une fois* annual fundraiser is to collect donations for families who must cover high medical expenses for a loved one. This year, the foundation sponsored Richard Chabot's family. Richard is a young man who has struggled with diabetes since he was 16. Dr. **André Carpentier** shed some light on his specific type of diabetes during the fundraising [event](#).



Maxime Descoteaux was selected to give the very first *Rising Star in Bio-imaging in Quebec* keynote lecture during the Annual Quebec Bio-imaging Network Scientific Day



In collaboration with Research Centre on Aging researcher Dr. Tamàs Fülöp, **Alan Cohen** organized the *Biology of Aging: Understanding aging to better intervene* international symposium. The event gathered some forty guest speakers from among the most highly renowned researchers in the biology of aging field. The symposium was held in Montréal in November 2019.



The *Mieux comprendre la diversité* event was held in April 2019. **Mélanie Couture** provided her expertise as a guest speaker. The purpose of this event is to share medical practices that help provide daily support to people with a neurological, physical, intellectual or sensory disability. People from across the Eastern Townships took part in this event, as did several resources from the healthcare field.

AT CONFERENCES AND OTHER EVENTS (CONTINUED)



In June 2019, as part of the Sherbrooke RBC Half Marathon, the Colorectal Cancer Canada *Giant Colon Tour* made a stop at Jacques-Cartier Park. The public was invited to walk through the colon, which is 2.5 metres high and 12 metres long, and to chat with patient partners about the importance of citizens' input in research. [ICI Radio-Canada](#) was also on site to talk to Dr. **Nathalie McFadden** and **Jean-François Beaulieu** about colorectal cancer and other digestive system diseases such as Crohn's disease and diverticulitis.

IN PRINT



In the second edition of the [Report Card on Access to Obesity Treatment for Adults in Canada](#), Dr. **Marie-France Langlois** took a stand on the obesity care provided in Canada. Her opinion resonated strongly with a journalist from [Le Devoir](#) newspaper who even wrote an article about how difficult it is for obese Canadians to access care.



Developing medical imaging techniques to better detect cancer is what Dr. **Éric Turcotte**'s team is doing remarkably well. In fact, the team caught the attention of [La Presse](#) newspaper for its work enabling more effective detection, and even characterization, of breast tumours.



Dr. **Alain Vanasse**'s research was featured in an article in [Le Devoir](#). Monitoring a patient following hospitalization is problematic in the healthcare system. The researcher argues that adding a layer of evidence and quantitative analysis could enhance patient follow-up and improve the care trajectory.



Neonatologist Dr. **Arnaud Gagneur**'s research is bearing fruit in maternity hospitals across Quebec! This is reflected in an article infused with great humanity that was published in [STAT magazine](#), a US-based popular science and national news publication affiliated with the *Boston Globe*. The article discusses the vaccination promotion strategy used by Dr. Gagneur.



An article on medical imaging and cyclotron-based production of technetium at the CRCHUS was published in [Québec sciences](#) magazine. In the piece, **Brigitte Guérin** and Dr. **Éric Turcotte** discussed the innovative medical imaging facilities that enable the Centre to offer unparalleled services in the field of imaging in northeastern North America.



Dr. **Claude Cyr** discusses the issue of alcohol abuse among young people in a report entitled [Quand le party se termine aux urgences](#), published on December 14, 2019, in *La Presse +*.



Dr. **Larissa Takser** is contributing her expertise to a study assessing the quality of drinking water in certain regions. Test results show that pesticides and pharmaceuticals are found in the tap water of several municipalities. The topic was featured in a report on [ICI Radio-Canada](#).

SCHOLARSHIPS AND DISTINCTIONS

INTERNAL COMPETITIONS

Winners of the Small Research Equipment Funding Program

Researchers obtained financial support as part of the latest edition of the CRCHUS Small Research Equipment Funding Program. This financial assistance is available to them for the purchase of research tools and instruments that cost between \$5000 and \$20,000. The winners of the 2019 edition are: Dr. **Hugues Allard-Chamard** and **Pedro Miguel Gerales**.

Recipients of the internal funding assistance program

Eight research teams each received \$25,000 for their research project:

- Dr. **Hugues Allard-Chamard** (Alessandra Bruns and Sophie Roux)
- **Mannix Auger-Messier** (Michel Nguyen and Jean-Luc Parent)
- **Luigi Bouchard** (Véronique Gingras, Marie-France Hivert, Patrice Perron and Kevin Whittingstall)
- **Mélanie Couture** (Dorothée Boccanfuso, Marie-Christine Cotton, Anne-Marie Tougas and Alain Webster)
- **Maxime Descoteaux** (Newton Pimenta, Charles Touchette and Kevin Whittingstall)
- Dr. **Maxime Richer** (Michelle Scott)
- **Sébastien Rodrigue** (Jean-Philippe Côté and Pierre-Étienne Jacques)
- Dr. **Etienne Rousseau** (Brigitte Guérin and Éric Turcotte)

Recipients of the 2019 structuring projects program

In conjunction with the Axes, funding in the amount of \$25,000 or \$50,000 was awarded to the following recipients to help them structure their research teams in order to respond to strategic funding initiatives supported by external organizations:

- **François Boudreau** (Dr. Julie Carrier, Dr. Yves Collin and Lee-Hwa Tai)
- **Nicolas Gévry** (Dr. André Carpentier and Pierre-Étienne Jacques)
- **Mélanie Morin** (Yves Bérubé Lauzière, Josianne Paré and Dr. Le-Mai Tu)
- Dr. **Alain Vanasse** (Dr. André Delorme, Marie-Josée Fleury, Thomas Poder, Dr. Marc-André Roy, Dr. Emmanuel Stip and Dr. Jean-François Trudel)

EXTERNAL COMPETITIONS



The Canadian Institutes of Health Research launched a funding competition in February 2020 for projects studying COVID-19. **Richard Leduc** and his team received \$865,000 in funding over two years to research the emergence of this new virus.



Two research teams received a grant of \$250,000 from the New Frontiers in Research Fund for their study. The recipients are Dr. **Frédéric D'Aragon** and his team for the project entitled *Flipping the paradigm on organ transplants: a scientific multidisciplinary strategy combined to a patient-oriented approach study* and **Benoit Paquette** and his team for their project called *Dynamic culture system to assess the efficacy of a cell trap targeting cancer cells infiltrated in the brain*.



The Ministère de l'Économie et de l'Innovation (MÉI) awarded \$585,666 to the CRCHUS to broaden its range of services by offering innovative radiotracers produced according to Health Canada standards, for both research and clinical use. **Brigitte Guérin** is responsible for bringing this project to completion. These radiotracers can even be shipped to external collaborators.

SCHOLARSHIPS AND DISTINCTIONS

EXTERNAL COMPETITIONS (CONTINUED)



Éric Marsault received a \$320,000 grant from Mitacs Accelerate for his project entitled *Bacterial ATP synthase inhibitors as novel antibiotics for Gram-positive and Gram-negative bacterial infections*.



Chantal Camden obtained a grant for her project entitled *The SCOOPPP Study: An International Perspective of Scope, Context, Organization of Services and Practices in Paediatric Physiotherapy*. The \$6830 grant was awarded by the International Organization of Physical Therapists in Paediatrics.



The *National Institute of Neurological Disorders and Stroke* awarded **Alain Frigon** a grant of \$923,665 over 5 years, for his project entitled *Limb coordination during locomotion before and after spinal cord injury*.



Thanks to the support of the Stem Cell Network of Canada, **Florian Bentzinger** received \$330,000 to pursue his most innovative studies. His research enables the stimulation of muscle stem cell activity, thus slowing the progression of muscular dystrophy, a disease that is currently incurable.



Through the CHUS Foundation, the Groupe Laroche awarded a grant of \$100,000 for the creation of Dr. **Claudio Jeldres's** Fonds de la santé des hommes. This project aims to support research into diseases affecting men, such as prostate and testicular cancers.



In support of research for better care and treatment of children, Leucan donated \$60,000 to Dr. **Josée Brossard** to further prioritize clinical research in pediatric oncology in Sherbrooke. This donation will help build and maintain a clinical research team with close ties to the healthcare team.



Dr. **François Lamontagne** was appointed Co-Director of the Canadian Sepsis Research Network, which is funded by the Canadian Institutes of Health Research (CIHR) and the FRQ (\$5.8 million). This is a new national research network aimed at improving the treatment and recovery of patients with a severe infection known as sepsis. This network will study various promising treatments in patients with sepsis and build a database of evidence-based tools to provide information to the public and to healthcare professionals about the prevention, diagnosis and management of sepsis.



Xavier Roucou obtained a grant of \$116,621 from Compute Canada for his project entitled *Functional Proteomics and Discovery of Novel Proteins*.



Sheela Ramanathan and **Véronique Giroux** both received a \$120,000 grant over two years from the Cancer Research Society for their respective research projects: *Mechanism of IL-15-mediated protection against neoplastic transformation of thymocytes and Tumor-initiating capacity of Krt15+ stem cells in colon cancer*.

EXTERNAL COMPETITIONS (CONTINUED)

Canadian institutes of health research (CIHR) grants

A large number of grants were awarded to researchers to pursue their health-related research efforts: **Sherif Abou Elela, Jean-François Beaulieu, Dr. Marie-Claude Beaulieu, M'Hamed Bentourkia, Florian Bentzinger, François Boudreau, Vincent Burrus, Patricia Bourgault, Benoit Chabot, Jean-Bernard Denault, Claire Dubois, Louis-Charles Fortier, Dr. Étienne Fortin-Pellerin, Dr. Sameh Geha, Fernand-Pierre Gendron, Louis Gendron, Nicolas Gévry, Véronique Giroux, Dr. Catherine Hudon, Pierre-Étienne Jacques, Steve Jean, Christine Lavoie, Pierre Lavigne, Richard Leduc, Martin Lepage, Christine Loignon, Éric Marsault, Patrick McDonald, Alfredo Menendez, Philippe Michaud, Dr. Michel Nguyen, Benoit Paquette, Jean-Luc Parent, Dr. Jean-Paul Praud, Sheela Ramanathan, Pasquale Roberge, Sébastien Rodrigue, Dimitri Ryczko, Philippe Sarret, Caroline Saucier, Léon Sanche, Lee-Hwa Tai, Dr. Éric Turcotte and Kevin Whittingstall.**

Under the *CIHR Projects Grant* program, CRCHUS researchers received \$5.5 million. Their projects will enhance health-related knowledge as well as the care and services provided to the public: **Benoit Chabot, Dr. Frédéric Dallaire, Robert Day, Nathalie Perreault, Dr. Patrick Richard, Nathalie Rivard and Christian Rochefort.**

Natural sciences and engineering research council of Canada (NSERCC) grants

The following researchers received NSERCC grants: **Sherif Abou Elela, Mannix Auger-Messier, Brendan Bell, Pierre-Michel Bernier, Denis Blondin, Hubert Cabana, Félix Camirand Lemyre, Jean-Philippe Côté, Fernand-Pierre Gendron, Nicolas Gévry, Véronique Giroux, Michel Grandbois, Denis Gris, Brigitte Guérin, Daniel Lafontaine, Roger Lecomte, Éric Marsault, François Michaud, Dimitri Ryczko, Léon Sanche and Elijah Van Houten.**

Fonds de recherche du Québec (FRQ) grants

Several researchers obtained new scholarships and grants from the FRQ, namely: **Pierre-Michel Bernier, Luigi Bouchard, Dr. Artuela Çaku, Alan Cohen, Yves Couturier, Alain Frigon, Dr. Arnaud Gagneur, François Michaud, Thomas Poder, Nicolas Quaegebeur, Maxime Richer and Philippe Sarret.**



RESEARCH CHAIRS



Dr. **André Carpentier** was awarded the Canada Research Chair (Tier 1) in Molecular Imaging of Diabetes, including \$1.4 million in funding over 7 years. Thanks to this chair, he will study type 2 diabetes and the development of new molecular imaging tools capable of diagnosing and treating certain complications related to the disease.



Denis Blondin was awarded the GlaxoSmithKline Research Chair in Diabetes from the Université de Sherbrooke, which includes \$250,000 in funding over 5 years. This research chair seeks to discover and validate molecular imaging tools to identify the mechanisms at the root of metabolic dysfunctions in lean tissue inherent in the development of type 2 diabetes and to assess the effectiveness of emerging antidiabetic therapy.



Véronique Giroux was awarded a research chair in gastrointestinal stem cell biology, which includes \$500,000 in funding over 5 years, from the Canada Research Chair Program.

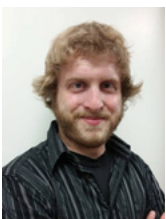
Thanks to this chair, she will study the role of digestive tract stem cells in tissue regeneration as well as in cancer. Her ultimate goal: To develop new therapeutic approaches targeting these characteristically distinctive cells.



Philippe Sarret's Canada Research Chair in Neurophysiopharmacology and Chronic Pain was renewed. The chair, which includes \$1.4 million in funding over 7 years, aims to determine the role of G-protein-coupled receptors in chronic pain control.



Nathalie Rivard was awarded \$1.4 million over 7 years, as part of the renewal of her Canada Research Chair (Tier 1). These funds are earmarked for her work on colorectal cancer and intestinal inflammation. Thanks to the renewal of this chair, the researcher will be able to analyze the formation of tumours and the inflammatory response of intestinal epithelial cells. Her work could lead to better screening and new treatment strategies, including new drugs.



CIFAR, a Canadian-based global charitable organization that brings together researchers in cutting-edge fields, has awarded a brand new research chair in artificial intelligence to **Martin Vallières**. This chair, which includes funding of \$500,000 over 5 years, will be used to develop a platform for the integrative modeling of oncology data: MEDomicsLab. This platform will integrate heterogeneous data from hospitals using deep learning and machine learning methods based on graph theory.

AWARDS AND DISTINCTIONS

A tribute to commitment and passion



Organized by *La Tribune*, the M rite estrien event was held in February 2020. Several Sherbrooke-area recipients were honoured as part of the celebration, including **Kevin Whittingstall** and **Florian Bentzinger**, in the *Innovation* category, and **Patricia Bourgault**, in the *Health/Education* category.



In January 2020, Dr. **Gilles Boire** also received *La Tribune's* M rite estrien of the week award. The feature pays tribute to his entire career as a rheumatologist, which has enabled him to make significant medical advances in the field of Rheumatology.



R jean Fontaine received the most prestigious award of his career

R jean Fontaine received the *Emilio Gatti Radiation Instrumentation Technical Achievement Award* at the annual *IEEE Nuclear Science Symposium and Medical Imaging Conference*. The award is presented annually to a researcher, in recognition of their innovative technical contributions in the area of radiation detectors, radiation instrumentation, and/or nuclear electronics, and/or measurement techniques for ionizing radiation.



Discoveries that are making their way around the world

Roger Lecomte received the ACFAS Jacques-Rousseau Award, which is given to a researcher to highlight the excellence and outreach of work that goes beyond his field of specialization to create innovative bridges between different disciplines.

New directors at the head of specialized research networks



Martin LePage was named co-director of the Quebec Bio-Imaging Network (QBIN). As part of his new position, he will chair the Scientific Committee of the QBIN, the largest imaging network in Quebec, which funds collaborative multi-institution research.

For is part, **Louis Gendron** was appointed director of the Quebec Pain Research Network (QPRN). He took over the position from his colleague, Philippe Sarret, who did exemplary work throughout his tenure as director of the Network.



Two New investigator mentions



Pedro Miguel Gerales received the 2020 New Investigator Award from the Soci t  qu b coise de l'hypertension art rielle (SQHA). His research focuses on the vascular complications of diabetes, including diabetic nephropathy and peripheral artery disease in diabetics leading to amputation, two areas of research directly related to the mission of the SQHA.



The Heart and Stroke Foundation of Canada also bestowed on **Mannix Auger-Messier** the title of New Investigator for the excellent quality of his research. This distinction comes with a \$300,000 grant.

AWARDS AND DISTINCTIONS (CONTINUED)



Relève scientifique 2019 award

Maxime Descoteaux received the Relève scientifique 2019 award! Every year, this prize is awarded by the Ministère de l'Économie et de l'Innovation to a person who is 40 years of age or less, who has distinguished him or herself through the excellence of their work and has demonstrated the ability to establish and maintain constructive and long-lasting



Far-Reaching analysis

A meta-analysis carried out by Dr. **Alex Carignan** and his team was chosen by the *International Society for Human and Animal Mycology* as one of their 10 articles of the year presented in the [Fungal Disease Awareness Collection](#).



Frances Gallagher received the Denise-Paul award

The Ordre des infirmières et infirmiers du Québec (OIIQ) presented the Denise-Paul Award to **Frances Gallagher**, who became a nurse in 1975.

This award is given to a nurse who stands out among OIIQ members for her contribution to the development and promotion of the profession.



Léon Sanche honoured by the Radiation Research Society

Léon Sanche received the 2019 Failla Award from the Radiation Research Society. This award is presented annually to an outstanding member of the radiation research community in recognition of their numerous scientific contributions.



A Notable Career for Dr. Gilles Boire

Dr. **Gilles Boire**, who has worked for over thirty years to discover new avenues for three complex areas of research, namely autoimmunity, inflammation and pain, has been rewarded by the Canadian Rheumatology Society for his remarkable career. As a tribute, he was invited to give the Dunlop-Dottridge Lecture at the Society's annual conference. He took the opportunity to share recent and future developments related to biomarkers in rheumatology with the general public.



Finalist for a prestigious annual award

Florian Bentzinger was a finalist of the Sartorius & Science Prize for Regenerative Medicine & Cell Therapy awarded by the Sartorius pharmaceutical company. This award is intended for researchers focused on basic or translational research that advances medical progress in regenerative medicine and cell therapy. The researcher stood out from the other candidates for one of his essays published in the prestigious [Science](#) magazine featuring an overview of his research.

DISCOVERIES AND INNOVATIONS



CANCER : BIOLOGY, PROGNOSIS, AND DIAGNOSIS



A breakthrough in cancer treatment using mass spectrometry

François-Michel Boisvert's team is conducting a research project that seeks to identify a marker that will help to understand why some patients with rectal cancer are resistant to radiotherapy and chemotherapy. The researchers worked with rectal tumour samples from some 20 patients treated at the CHUS. They extracted the proteins, microscopic entities with many functions that are required for proper cell function. From the protein content of the tumour samples, the team identified a marker associated with resistance to treatment.

Using mass spectrometry, the protein content of tumours is analyzed and then compared to a database. Thus, it is possible to name each protein and measure the quantity of it in the sample. By comparing the proteins identified in treatment-sensitive patients with those found in resistant patients, the team was able to put a name on the proteins responsible for resistance to radiotherapy and chemotherapy, making it possible to identify a specific marker.

In patients with rectal cancer, detecting this specific marker would be evidence that further radiotherapy and chemotherapy would not be effective. Therefore, these patients would not have to suffer the negative effects of this treatment unnecessarily.



When molecular biology and infertility meet

Nicolas Gévry and his team recently found a new avenue to treat female infertility: The LRH-1 nuclear receptor. Using analytical techniques in molecular biology and bioinformatics, they discovered that this receptor can be altered to allow the egg to reorganize its skeleton so it can change shape. Thus, the egg moves more easily to begin its 24-hour journey to the fallopian tubes, where the encounter with a spermatozoon is possible. Without LRH-1, transformation of the egg cannot take place.

It is essential for fertility. Considering that the transcription factor's activity can be altered, this discovery could open the door to new avenues for the treatment of infertility. The researcher and his colleagues received funding of \$940,000 from the CIHR that will allow them to further their research in connection with this promising discovery.



DIABETES, OBESITY AND CARDIOVASCULAR COMPLICATIONS



Daring to alter the insulin molecule

Since its Nobel Prize-winning discovery in 1923, insulin has been considered a pure and noble molecule that cannot be modified. Challenging scientific foundations and paradigms can sometimes lead to major discoveries, and this is what the recipients of the Prix de la recherche et de la création en médecine et sciences de la santé, Dr. **Jean-Luc Ardilouze** and **Fernand Gobeil**, have dared to do. Their new insulin formulations will offer real benefits to people with diabetes. By adding different vasodilator and anti-inflammatory molecules to the insulin solution, they developed two insulin formulations: One that increases insulin absorption in patients who are obese or have type 2 diabetes and another that helps prolong the duration of catheters for those who use pumps. Showing great commercial potential, these two inventions have been patented. The first was sold to the pharmaceutical industry last year, and the second is being consolidated.



Simulating to learn: the usefulness of neck collars in skiing accidents

In February 2020, Dr. **Marc-Antoine Despatis** and his team went to Mont-Orford to perform a series of tests on ski accidents. The tests helped determine whether immobilizing the victim's neck with a cervical collar is still necessary when managing a ski accident. Thanks to Frank, the smart mannequin used in the study, Dr. Despatis' team was able to simulate various accident scenarios while comparing the differences between the movements of the head when immobilized with a cervical collar to movements without a collar. This study was featured in [La Tribune](#).



Imaging at the speed of light

Researchers **Jean-François Pratte**, **Yves Bérubé-Lauzière**, **Roger Lecomte** and **Réjean Fontaine** are currently attempting to use photons' "time-of-flight" to improve the quality of images in positron emission tomography (PET) and computed tomography (CT). This project involves detecting and measuring X-rays and gamma rays with a temporal precision in the order of ten millionths of a millionth of a second, which could help reduce the radiation doses received by patients who must undergo these types of exams!



MEDICAL IMAGING



Brigitte Guérin and **Fernand Gobeil** have developed and patented new PET (positron emission tomography) imaging radiotracers. These radiotracers bind to tumours or metastases expressing the bradykinin B1 receptor and help to measure the extent of metastases. The researchers validated the stability of the new tracers in animals with tumours.

Battling cancer thanks to the invention of new tracers

Currently, there are few imaging tools that can track the progression of aggressive forms of breast, prostate or brain cancer. Of course, magnetic resonance imaging (MRI) enables us to see tumours, but it does not provide molecular information, which makes it difficult to determine the nature of the metastases.

They found that, in addition to acting as effective imaging agents at low doses, at higher doses, the molecules could help treat certain cancers. Their research was featured in a capsule presented on the website of the [*Fonds de recherche du Québec – Nature et technologies*](#).



Deep Learning: at the heart of the problem!

Artificial intelligence and deep learning (DL) make it possible to analyze medical images. However, DL algorithms sometimes generate abnormal results, which limits their use. **Pierre-Marc Jodoin** recently published a new mathematical model guaranteeing that the results produced by a neural network are anatomically valid 100% of the time. This breakthrough will make it possible, for example, to precisely delineate the heart in MRI or ultrasound images just as well as a radiologist would.



INFLAMMATION – PAIN



Advancing science, one stem cell at a time

Florian Bentzinger is interested in muscular dystrophy, a rare skeletal muscle disease that often affects young children. It is characterized by a loss of the muscle's ability to regenerate itself caused by a dysfunction of the stem cells in muscle tissue. As this neuromuscular disease is incurable, any potential progress is received with great hope.

Florian Bentzinger and his team, in collaboration with researchers **Éric Marsault** and **Mannix Auger-Messier** as well as Ubaka Ogbogu from the University of Alberta and Penney Gilbert from the University of Toronto, have developed a new pharmacological approach that stimulates the muscle stem cells, which would help slow the progression of the disease considerably. Thanks to this discovery, Florian Bentzinger obtained \$330,000 from the Stem Cell Network of Canada. This investment will make it possible to put this breakthrough into practice and develop clinical applications to slow the progression of muscular dystrophy.

Louis Gendron: Crucial to the recipe for new analgesics

As part of a study led by the University of Bonn and ShanghaiTech University, in collaboration with the Université de Sherbrooke, **Louis Gendron** participated in the discovery of the binding mechanism of a significant opioid receptor. The results should facilitate the development of new active substances. The opioids used today to treat severe pain can be addictive and often have serious side effects, such as nausea. The results were published in the prestigious [*Science Advances*](#) magazine.



MOTHER-CHILD



Researchers Camden and Couture put children's development under the microscope

A team led by **Chantal Camden** and **Mélanie Couture** has implemented the P-POP 2-5 (Population portrait of the development of children aged 2 to 5 years) research project. The purpose of the project is to document the development of Sherbrooke-area children in order to get a clear picture of the current situation. The project also seeks to identify children with particular challenges in one of the following spheres of development:

- Physical health and well-being (health, fine and gross motor skills)
- Social skills (empathy, sharing and caring)
- Emotional maturity (management of emotions and self-control)
- Cognitive and language development (reasoning and language skills)
- Communication skills and general knowledge

A survey filled out by parents helps screen children at risk of developmental delay. The parents of an at-risk child are invited to meet with a healthcare professional to confirm the screening and to get referrals to appropriate resources. This research project makes it possible to better meet the needs of children by directing them to appropriate services as early as possible. This study was featured in [La Tribune](#).

A robot that specializes in ASD

Mélanie Couture and **Audrée-Jeanne Beaudoin** are currently conducting a pilot project that involves using a robot to diagnose autism spectrum disorder (ASD). This luminous robot makes it easier to bring out stereotypical behaviours in children. These behaviours are markers for autism, but they can be difficult to detect during a conventional assessment for ASD. The robot helps to confirm the diagnosis.

Controlled by a therapist, the illuminated robot can produce several sounds and movements. It was tested on 19 children, half of whom had been diagnosed and the other half had not. The results were highly conclusive! The team noticed that children who are developing normally and those with ASD behave differently when interacting with the robot. The research team now wishes to assess whether the robot can differentiate between children with confirmed ASD and those for whom it is uncertain or children who present a primary language disorder or attachment disorder. These parameters will be validated during Phase 3 of the study. This study was featured in [La Tribune](#).



HEALTH: POPULATIONS, ORGANIZATION, PRACTICES



Cycling for intensive care patients

At Fleurimont Hospital, physiotherapists Pascale Girard and Christine Lafond are working actively with Dr. **Frédérick D'Aragon** to carry out the CYCLE research project.

Using an ergocycle, this international study aims to demonstrate that it is possible to reduce muscle weakness following immobilization, and, consequently, to improve user recovery.

Specifically, the study seeks to validate whether patients admitted to the ICU recover faster if they use the ergocycle in bed compared to those who do not. Muscle weakness is common in ICU users and begins within six hours of starting artificial respiration. Using the ergocycle in bed is a promising intervention because the patient can be mobilized quickly and safely, even if they are in an induced coma.

Fleurimont Hospital is the only hospital in Quebec to have an ergocycle and the only one to participate in this international research project. This study was featured in [La Tribune](#).



Development of a new device to ensure the success of organ donation

Dr. **Frédérick D'Aragon** and his team, which includes **Félix Camirand Lemyre**, among others, are currently working on the creation of a device intended to make the injection of a drug into an organ donor automatic and autonomous in order to maintain the integrity of the donor's organs. Made possible thanks to a grant of \$250,000 from the New Frontiers in Research Fund, this medical breakthrough would take into account the characteristics of the donor and of the corresponding recipients.



PATIENT PARTNER INVOLVEMENT IN RESEARCH

The axes highlight the contribution of patient partners

Every year, CRCHUS patient partners are invited to a recognition activity. Organized in each of the research axes, these activities allow patient partners to meet and to chat with one another. It is also an opportunity for researchers to share the results of their studies and to underline the patients' significant contribution to research. It is a great opportunity to acknowledge these person's engagement which makes research so meaningful!

THE CRCHUS PATIENT PARTNER COMMITTEE: A DYNAMIC INITIATIVE



Over **1900 hours** of volunteer commitment, representing **54 weeks of full-time work**



The committee is comprised of **3 clinical investigators**, **5 institutional staff members** and **16 patient partners**, ranging from **36 to 80 years old**

The first committee created to collaborate on the governance of a research centre



36 patient partners work in tandem with researchers or with CRCHUS research axes





Patient partner's choice award

Several patient partners participated in the evaluation of student oral presentations as part of various scientific days organized by CRCHUS research axes. Awards were given to students who stood out for their talent in conveying information in layman's terms and for the relevance of their project to patients. The recipients are:

- **Matéa Bélan**, PhD student in Clinical Sciences – Diabetes, Obesity and Cardiovascular Complications Axis Scientific Day (May 17, 2019)
- **Andréa Dépelteau**, master's student in the Health Sciences Research program – Inflammation-Pain Axis Scientific Day (May 8, 2019)

When research and patient become one

Dedicating oneself to research in order to enhance healthcare. This is what the role of a patient partner boils down to. And it is exactly what Ms. Véronique Sabourin has been doing for many years. This patient partner, who works namely with clinical investigator Dr. **Catherine Hudon**, has been working with the VISAGES research group that aims to promote adequate care for patients with complex needs. In an article published in [La Tribune](#), Ms. Sabourin describes her journey as a patient partner and explains why she believes it is important to get involved in research.

True research ambassadors

Whether they are healthcare system users or family caregivers, patient partners all have one thing in common: They are committed to research. Patient partners are involved in many different ways:

- They take part in discussions with research teams to ensure that research efforts result in practical applications based on fundamental knowledge.
- They participate in the conceptualization of the research question, in hypotheses, in the choice of methods and in the development of measurement instruments and recruitment strategies.
- They discuss the keys to success that will increase the project's feasibility.
- They contribute to the production of documents intended for patients or family caregivers as well as to their distribution.

They are true research ambassadors! An article in [La Tribune](#) and a news report on [Radio-Canada](#) provided a real sense of their contribution.



STUDENT INVOLVEMENT IN SCIENTIFIC LIFE

The Neuro-Show team, composed of **Jérôme Côté**, **Marie-Pierre Cyr**, **Marc-André Dansereau** and **Camille Simard**, was declared the winner in the *Society, Communication and Education* category at the 2019 Forces Avenir Gala. The award was given to them for the creation of the *Neuro-Show* play, which was presented to a full house at the Granada Theater in December 2018.

The Frederick Banting and Charles Best Canada Graduate Scholarship Award offered by the Canadian Institutes of Health Research (CIHR) aims to promote continued excellence in Canadian research by recognizing the achievements of high calibre scholars. This year, two CRCHUS students received the scholarship.

Audrey-Ann Dumont's (**Mannix Auger-Messier**, Director) involvement and efforts earned her this scholarship, which will enable her to obtain equipment that is essential to her work and to cover the fees to attend an international conference.

Sébastien Dion (**Richard Leduc**, Director) has been passionate about science for many years. After obtaining his bachelor's degree in Pharmacology, he continued his educational journey to get his master's degree, and in less than a year, he embarked on an accelerated path to a PhD. This scholarship will be used to continue his research while providing him with a certain level of autonomy.

Isabelle Quintal (**Mélanie Morin**, Director) was awarded the \$50,000 Women's Health Clinical Mentorship Grant from the Canadian Institutes of Health Research (CIHR) for her project entitled *Efficacité de la rééducation sensitive pour réduire la douleur lors des relations sexuelles chez les femmes atteintes de vestibulodynie provoquée : essai clinique randomisé*.

Justine Benoit-Piau (**Nathalie Gaudreault** and **Mélanie Morin**, Directors), a master's student in health sciences, received funding in the amount of \$3000 from the CRCHUS for the organization of the 4th edition of the **PAINTalks** event. Organized by the Quebec Pain Research Network, the purpose of this activity is to share the latest breakthroughs in pain research with the general public.

Francis Loignon-Houle (**Roger Lecomte**, Director) won 1st Prize for best oral presentation at the 2019 edition of the *IEEE Nuclear Science Symposium and Medical Imaging Conference*, which was held in Manchester, UK. The lecture given during the symposium was an opportunity for him to present his research findings on the development of scintillation detectors for applications in positron emission tomography.

RESEARCH IN NUMBERS

FUNDING SOURCES FOR THE 2019-2020 PERIOD

Grant from the FRQS (Centre)	\$2 460 963
Grant from FRQS-recognized organizations	\$16 811 996
Scholarships from FRQS-recognized organizations	\$5 104 911
Research contracts with the private sector	\$6 409 234
Sales and services	\$842 368
Contribution of the CIUSSS de l'Estrie-CHUS and its Foundation	\$976 906
Donations for teaching and research	\$223 265
Other income	\$845 727
Total :	\$42 454 685

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

CLINICAL RESEARCH AS OF MARCH 31, 2019

Active
research
projects

1046

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

204

Which include:

31 INDUSTRY PROJECTS

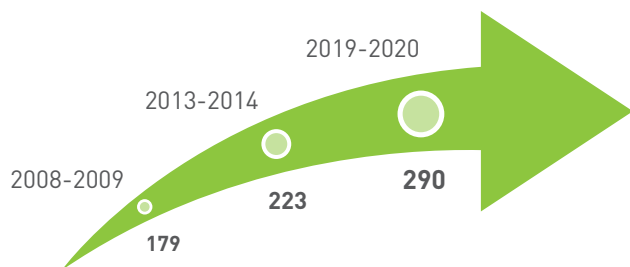
57 FUNDED PROJECTS

116 IN-HOUSE PROJECTS

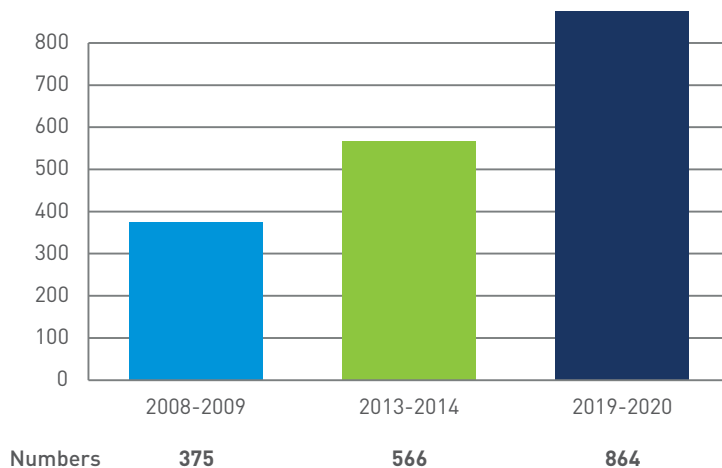
AXIS	UNIVERSITY RESEARCHERS	UNIVERSITY CLINICAL RESEARCHERS	ASSOCIATE RESEARCHERS	STUDENTS			SCHOLARSHIPS AND GRANTS (RGAs*)	CONTRIBUTION TO PUBLICATIONS
				M. Sc.	Ph. D.	Post-doc		
Cancer: Biololy, prognosis and diagnosis	38	14	9	49	63	23	\$6 620 108,71	167
Diabetes, obesity and cardiovascular complications	21	10	8	31	26	15	\$4 150 605,99	108
Medical imaging	29	3	2	77	59	21	\$3 027 802,19	105
Inflammation – Pain	33	15	10	86	60	13	\$4 333 380,98	151
Mother-Child	22	17	19	64	52	14	\$2 110 967,52	141
Health –	19	16	5	61	30	12	\$1 674 042,09	192
TOTAL	162	75	53	368	290	79	\$21 916 907,48	864

*Recognized granting agencies, regular researchers only

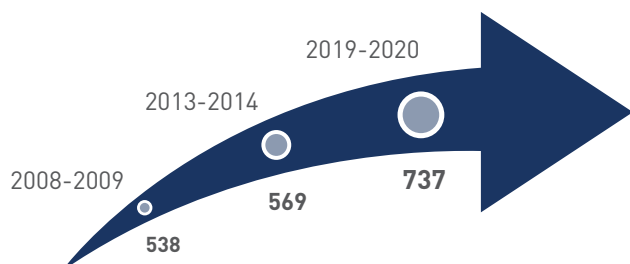
Researchers



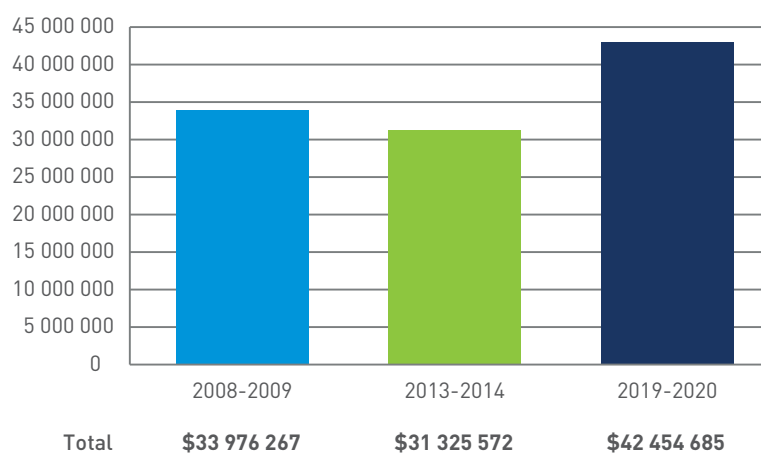
Publications



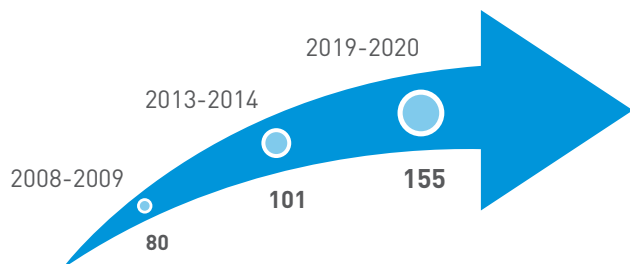
Students and postdoctoral fellows



Research funding



Clinical and administrative staff



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