Canadian Cancer Society

Lotte & John Hecht Memorial Foundation

Disruptive Innovation Research Grant (DI-25) Grant Recipients

Applicant Institution	Project Title Summary	Grant Duration
Ali Bashashati University of British Columbia **Dr Taha Azad** Université de Sherbrooke		**$250,000** **2025-2027**

A faster way to find new immunotherapy drugs using artificial intelligence

Drs Ali Bashashati and Taha Azad are using glowing biosensors and artificial intelligence to develop a faster, more efficient way of discovering immunotherapy drugs for people with cancer. Immunotherapy has revolutionized the treatment of some cancers. A particular type of treatment called immune checkpoint inhibition (ICI) works by “releasing the brakes” on the immune system, stimulating specialized cells called T cells to destroy cancer. However, there is a need for more drugs that help the immune system recognize and attack cancer cells, making treatments like ICI more effective. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Drs Ali Bashashati and Taha Azad are leading a team to develop a new way of discovering drugs that can modify the immune response to cancer. The researchers are working with a new type of biological sensor that glows when experimental chemicals impact immune pathways. They will then use artificial intelligence to quickly analyze this data and cross-reference it with large datasets to discover potential new drugs. This process will be faster and more efficient than existing methods, speeding up the discovery of new cancer treatments. This project could lead to the discovery of new immunotherapy drug candidates that can then be tested in clinical trials and eventually improve outcomes for people with cancer.

Steven Chan
Princess Margaret Cancer Centre – UHN

$250,000
2025-2027

Tracking cancer cell changes in real-time by making them glow

Dr Steven Chan is developing a new way to study the genetic changes in cancer cells while keeping them alive. This new technique could lead to more comprehensive research and discoveries in cancer treatment. Cancer tumours are like complex communities made up of different cell types. Right now, studying these cells is like taking a snapshot – researchers have to destroy the cells to see what's happening inside them. This means they can't watch how cells change over time or how they react to different treatments. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Steven Chan's team is creating an innovative technique that makes specific cancer cells glow based on their genetic characteristics. This allows researchers to identify specific types of cells for study while keeping them alive. The team aims to understand how genetic differences affect cancer cells' responses to treatments. In the future, this technology might even help target and eliminate specific types of cancer cells. This innovative approach could transform how scientists study living cancer cells and potentially lead to new treatment options for patients.

Leo Chou
University of Toronto
Kim Tsoi
University of Toronto

$250,000
2025-2027

Making lab models of rare tumours to speed up the discovery of new treatments

Drs Leo Chou and Kim Tsoi are developing lab-based models of soft tissue cancers to find the right drugs for each patient, ultimately improving outcomes for people affected by these cancers. Treatments for cancer are evolving rapidly, with new therapies now targeting specific abnormalities in cancer cells and their environments and boosting the immune system. However, people with rare or more complex cancers, like soft tissue cancers called sarcomas, are often excluded from clinical trials for new treatments, limiting benefits for these patients. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Drs Leo Chou and Kim Tsoi are leading a team to develop a way to grow sarcoma tissues outside the body. The researchers will grow tissues donated by people with sarcomas on jelly-like scaffolds with nutrients that will be optimized for each sarcoma type to ensure that the tumours grow properly in a lab environment. They will then use these 3D sarcoma models to test new drugs for the disease, improving outcomes for people with sarcomas. This project could revolutionize how treatments are tested for sarcomas and other rare tumour types, leading to new treatment strategies and better outcomes for people affected by rare cancers.

Jean-Simon Diallo
Ottawa Hospital Research Institute

$250,000
2025-2027

Combining immunotherapy drugs with cancer killing viruses for cancer treatment

Dr Jean-Simon Diallo is using machine learning to find new potential immunotherapy drugs to increase treatment responses for people with cancer. Immunotherapy drugs boost the anti-tumour immune response and have provided great benefits to many people with cancer, but they are expensive and may not work for all patients. Finding new drugs or drug combinations that boost the immune system could mean more people respond positively to these treatments. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Jean-Simon Diallo is leading a team that will use advanced computing to find new drug candidates for immunotherapy. Aided by AI, the researchers will test thousands of potential new drugs using a special lab test that lights up when proteins that block anti-tumour immune responses interact. If the test signal goes down after being exposed to a drug, this tells the researchers that drug could be an effective treatment. The team will also investigate whether these drugs can work in combination with cancer killing viruses, which help alert the immune system to the presence of cancer. This innovative project has the potential to discover new immunotherapy approaches for people with cancer, allowing more people to benefit from these drugs and ultimately improving outcomes.

Gerardo Ferbeyre
Université de Montréal

$250,000
2025-2027

Targeting a newly discovered protein complex to develop innovative cancer treatments

Dr Gerardo Ferbeyre and Dr Ivan Topisirovic are evaluating and targeting a protein complex found in high levels in advanced breast and prostate cancers. Although many treatments are initially effective for people with cancer, tumour cells can evolve to resist therapies. Sometimes, genetic changes in cancer cells allow them to adapt to treatments like chemotherapy, but recent evidence suggests that changes in the cells' metabolism can also help them survive. Understanding these non-genetic adaptations to therapy can lead to new ways of targeting cancer cells, increasing their sensitivity to treatment. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Gerardo Ferbeyre and Dr Ivan Topisirovic are leading a team to investigate a protein complex that is elevated in advanced breast and prostate cancers and is linked to cancer spread. This complex helps cancer cells produce energy and protect themselves from damage, making them resistant to treatment and allowing them to adapt and grow. The research team will identify how the complex functions in cancer cells and design ways to block it. The researchers will then use samples donated by people with breast cancer to generate and study 3D breast cancer models in the lab, giving them a better understanding of how the protein complex works in cells directly from people with cancer. This project could lead to innovative drugs that target this protein complex, improving outcomes for people with cancer.

Saima Hassan
Centre de recherche du CHUM

$250,000
2025-2027

Using blood tests and artificial intelligence to identify young women who have or are at high risk of breast cancer

Dr Saima Hassan is integrating laser technology with immune cell profiling to develop a cutting-edge artificial intelligence-based blood test that can detect breast cancer earlier in younger women. Breast cancer will affect 1 in 8 women in Canada in their lifetimes. The incidence of breast cancer is increasing in younger women, who often present with advanced and aggressive disease that is hard to treat. Mammography screening guidelines vary across Canada and are not well established for women under 50 years old, so better ways of identifying young women with or at risk of breast cancer are urgently needed. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Saima Hassan will lead a team to develop a new blood test that can detect breast cancer in young women and identify those at high risk of developing the disease. The researchers will shine laser light on blood samples to detect cancer and analyze immune cells. By comparing samples from young women with and without breast cancer, they will map patterns of biological differences between the two sets of samples. They will also look for tiny fragments of genetic material from cancerous cells. Finally, the researchers will use artificial intelligence to process this data and develop a new test to identify young women who have or are at high risk of developing breast cancer. This project has the potential to improve breast cancer screening for younger women, leading to prevention and earlier diagnoses as well as improved outcomes.

Hartland Jackson
Lunenfeld-Tanenbaum Research Institute

$250,000
2025-2027

Identifying new ways to predict response to therapy for people with ovarian cancer

A team led by Dr Hartland Jackson is developing a new test that can help predict how people with ovarian cancer will respond to therapy to improve treatment outcomes. Over 3,000 women are diagnosed with ovarian cancer each year, but less than half of them survive 5 years or more after diagnosis. Although normal cells respond to DNA damage by repairing it, these processes are defective in some ovarian cancer cells, meaning the cells accumulate genetic damage. However, defective DNA damage repair can also make cells vulnerable to targeted therapies. Identifying people with ovarian cancer who have DNA repair defects means they can be prescribed targeted therapies that are known to improve outcomes. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Hartland Jackson is leading a team to develop a new method of analyzing whether ovarian cancer cells have defective DNA repair. Using laboratory experiments and samples donated by people with high-grade ovarian cancer, the researchers will test single cells from several different areas of a tumour to see whether they can repair damage to their DNA, aiming to have a result within three days. This project could lead to a new, more efficient way to detect DNA repair defects in people with ovarian cancer and other cancer types in the future, meaning they can receive personalized treatments quickly to improve their outcomes.

Kian Jafari
Université de Sherbrooke

$250,000
2025-2027

Developing an ultra-sensitive tool to study cancer cell signaling

A team led by Dr Kian Jafari in collaboration with Dr Kazem Nouri is developing an innovative sensor to look at the cell signals cancer uses to survive and grow, potentially leading to new targeted treatments. Cancer cells behave differently from healthy cells. They often grow and multiply uncontrollably or fail to respond to signals that tell them to stop growing or die. By studying the molecules that control these processes, called signaling molecules, researchers can identify which ones are malfunctioning and may be good targets for treatment. With funding from the Lotte & John Hecht Memorial Foundation, a team led by Dr Kian Jafari in collaboration with Dr Kazem Nouri (University of British Columbia) is developing a highly sensitive tool that can detect several common signaling molecules at once even in very small samples. The researchers plan to use their sensor to identify the signals driving cancer cell reproduction so that treatment can specifically target them, potentially slowing or stopping tumour growth. This project could lead to new ways of analyzing a person's cancer and choosing the treatment that is most likely to be effective – reducing treatment length, minimizing side effects and ultimately improving outcomes.

Paul Jurasz
University of Alberta

$250,000
2025-2027

New mRNA-based treatment strategies for metastatic breast cancer

Dr Paul Jurasz is developing an innovative mRNA-based treatment for people who have breast cancer that has spread to other parts of the body. Metastatic breast cancer, or breast cancer that has spread to other parts of the body, is currently considered incurable and new treatment strategies are needed to improve outcomes. However, some people with certain types of metastatic breast cancer survive a long time. The development of new types of treatments is giving hope that these cancers may eventually become curable. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Paul Jurasz is leading a team to develop and test a new mRNA-based therapy intended for people with breast cancer that has spread to other parts of the body. mRNA vaccines have become well known due to the COVID-19 pandemic, but researchers can also use this technology to kill breast cancer cells and the blood vessels that support their growth. The team will package cancer-targeting mRNA in tiny particles and test them in the lab to make sure they can reach and kill tumour cells. This project could result in a new way to treat people with metastatic breast cancer. If successful, it could even be used for people with other types of cancer.

Lothar Lilge **$240,500**
Princess Margaret Cancer Centre – UHN **2025-2027**

Breathing light: a new therapy for lung cancer

A team led by Dr Lothar Lilge is testing an innovative lung cancer therapy that uses breathable light to activate a chemical agent that kills cancer cells when stimulated. An estimated 1 in 15 people in Canada are expected to be diagnosed with lung cancer in their lifetime. Treatment often involves invasive surgeries or long chemotherapy regimens with toxic side effects. To change this, researchers are testing a new approach called photodynamic therapy that uses light to activate a cancer-killing chemical agent known as a photosensitizer. Although photosensitizers can be safely introduced to the lungs, delivering light evenly to the entire organ is still a challenge and often involves invasive procedures. With funding from the Lotte & John Hecht Memorial Foundation, Dr Lothar Lilge and his team are testing a new way to illuminate the lungs by having patients breathe in a light-emitting aerosol to activate the photosensitizer. The researchers will study whether these aerosols can be safely and uniformly inhaled and exhaled after having delivered the light they carry, and whether they can provide enough light for photodynamic therapy to be effective. Lilge and his colleagues will conduct a series of experiments to find the right combination of aerosol design, delivery and activation and to demonstrate the technology in a model lung. This project could eventually lead to clinical trials of photodynamic therapy as a potentially faster, less invasive and less toxic treatment approach for lung cancer.

Harinad (Hari) Maganti **$250,000**
University of Ottawa, Canadian Blood Services **2025-2027**

New immune-based therapies for hard-to-treat brain cancer

Dr Hari Maganti is leading a team to develop a new cellular therapy to improve outcomes in people with devastating brain cancers.
Glioblastoma is an aggressive and difficult-to-treat type of brain cancer. Only 1 in 20 people diagnosed with glioblastoma survive for 5 years or more and those who do often experience many long-term side effects of the treatments they receive. Better therapies are desperately needed to improve survival and increase quality of life during and after treatment. With funding from the Canadian Cancer Society and the Lundin Cancer Fund, Dr Hari Maganti is working with Dr Shawn Beug (University of Ottawa), Dr Andrew Harris (Carleton University) and Dr Umar Iqbal (National Research Council Canada) to develop innovative new cellular therapies for people with glioblastoma. The researchers will focus on a type of immune cell called a natural killer cell, which they will produce from donated cord blood stem cells and genetically engineer to target glioblastoma. Cellular therapies in use now often involve extracting immune cells from each person with cancer, engineering them to target the tumor and growing large numbers of the cells before treatment can begin. Because this is costly and time-consuming, Dr Maganti's team aims to generate an off-the-shelf version that is always ready for people with glioblastoma when they need it, without delay. This project could lead to a more efficient and affordable treatment for glioblastoma. It could also be used for other solid tumors in the future, improving outcomes for many patients.

Christoph Ortner
University of British Columbia
Jörg Gsponer
University of British Columbia

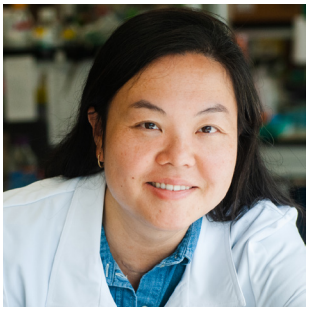
$250,000
2025-2027

Using machine learning to find new drugs for people with cancer

Drs Jörg Gsponer and Christoph Ortner will use machine learning to study proteins in cancer cells and develop new ways to discover drugs for precision medicine. Precision medicine aims to give people with cancer a combination of drugs that will work specifically for them and minimize side effects. However, despite advancements in targeted therapies, many tumour types still can't be targeted well using existing drugs. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Drs Jörg Gsponer and Christoph Ortner will lead a team to develop a new way of studying cancer drug targets at the molecular level. The researchers will focus on proteins that are important in cancer but are generally difficult to analyze because they constantly change shape. The aim is to develop new techniques for determining the specific characteristics of these proteins so that they can be matched with drugs that might work against them in cancer cells. This project could lead to new ways of targeting the proteins that help cancer cells survive and spread, particularly those that have previously been considered "undruggable" in the past.

Mathieu Quesnel-Vallières
Université de Sherbrooke
Lee-Hwa Tai
Université de Sherbrooke

$179,960
2025-2027



Developing immune therapies for rare bile duct cancer

Dr Mathieu Quesnel-Vallières, Dr Lee-Hwa Tai and patient partner Julie Carignan are developing lab-based models of cholangiocarcinoma and immune therapies to improve outcomes in people with this type of cancer. Cholangiocarcinoma is a rare cancer affecting the bile ducts. There are only 1,000 cases diagnosed in Canada each year and the prognosis is poor, especially when diagnosed at later stages. Surgery and conventional therapies are often not curative for people with advanced cholangiocarcinoma. Although immune-based therapies have shown promise in recent years, new strategies are still needed to address this aggressive cancer. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Mathieu Quesnel-Vallières, Dr Lee-Hwa Tai and patient partner Julie Carignan are leading a team that will use advanced computer analysis to identify genetic features present in cholangiocarcinoma cells, but not in healthy cells. This data will guide the design of personalized cancer vaccines that can prompt the immune system to attack the tumour. Because they are designed based on the specific genetic features of each person's tumour, the vaccines help trigger an immune response that can target cancer cells while leaving non-cancerous cells unharmed. This project could lead to innovative immune-based therapies for people with cholangiocarcinoma, improving survival from this rare cancer.

Anthony Rullo
McMaster University

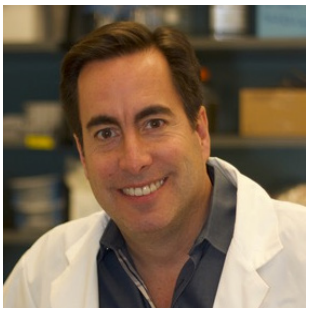
$250,000
2025-2027

A new type of "chemical synthetic" immunotherapy for cancer treatment

Dr Anthony Rullo is developing an innovative immunotherapy that will recruit and activate more immune cells to attack tumours, potentially improving outcomes and reducing treatment side effects. Immunotherapies have revolutionized cancer treatment. Some of these therapies are designed to attract existing immune cells to tumours, stimulating them to attack the tumour. Drugs of this type often work to tether one type of immune cell, a T cell, to the tumour, making it more likely that the T cells will target the tumour. The success of this approach depends on how likely the cell is to become activated and infiltrate the tumour. Notably, other immune cells also help with the anti-tumour response. For instance, immune cells called macrophages are common in the tumour environment, but there is a lack of therapies that harness these cells' unique capabilities. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Anthony Rullo is leading a team to create innovative therapies that tether macrophages to tumour cells. The researchers are developing new synthetic molecules to attract macrophages and enhance their ability to recognize tumour cells, increasing the chances of eradicating the tumour with fewer side effects and a lower chance of relapse. This innovative project could lead to a new type of "synthetic" immunotherapy that could be used in several different cancer types, ultimately improving outcomes for people with cancer.

Juan Carlos Zúñiga-Pflücker
Sunnybrook Research Institute

$250,000
2025-2027



Revolutionizing cellular therapies to target acute myeloid leukemia

Dr Juan Carlos Zúñiga-Pflücker is testing a novel system to precisely deliver engineered immune cells that recognize and target genes only present in acute myeloid leukemia cells. Acute myeloid leukemia (AML) is a hard-to-treat blood cancer that can develop in people of any age. Chemotherapy is effective for some people with AML, but new approaches are needed for those who do not respond well to treatment. Many cases of AML are caused by fusion genes, in which two pieces of DNA that should be separate get stuck together during cell division, affecting the genes' normal functions. The fusion genes found in AML are present only in cancer cells, making them good targets for therapy. With funding from the Canadian Cancer Society and the Lotte & John Hecht Memorial Foundation, Dr Juan Carlos Zúñiga-Pflücker is leading a team to genetically engineer specialized immune cells that specifically target fusion genes in AML. By growing immune cells from stem cells and then engineering them to target fusion genes, the research team hopes to be able to target and kill AML cells without harming healthy blood cells. The researchers will test this new therapeutic approach in the lab and aim to use it in clinical trials in the future. This project could lead to an innovative new treatment approach for people with AML, improving their outcomes and reducing side effects compared with conventional treatments.