Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Christina Addison, Ottawa Hospital Research Institute

A new sugar-based dye for detecting breast cancer

Dr Christina Addison is developing a new fructose-based dye that will detect breast cancers at an early stage.

Early diagnosis of breast cancer is linked with a greater chance of survival, but some of our current diagnostic imaging methods are unable to reliably do this. Dyes injected into the body to help the scanner detect breast cancer cells don't find up to 50% of breast cancers, which means some cancers are missed. With funding from the Canadian Cancer Society, Dr Addison will develop and test a new dye based on fructose – a sugar found in fruits and vegetables – to find breast cancer cells. Recent research has shown that fructose can be used by breast cancer cells as an energy source. The dye will first be tested on breast cancer cells grown in a dish, before seeing if it is able to detect breast cancer cells in mouse models, including those which have spread to other parts of the body. The researchers then plan to test the new dye on patients in a clinical trial within the next few years. If successful, this new dye will improve the reliability and accuracy of breast cancer detection, leading to more people being diagnosed at an earlier stage and more people surviving breast cancer across Canada.

Dr Tommy Alain, Children's Hospital of Eastern Ontario

Using viruses to treat and prevent colorectal cancer.

Dr Tommy Alain is engineering a viral therapy to prevent pre-cancerous growths from turning into colorectal cancer.

Colorectal cancer is the second leading cause of cancer death in Canada, resulting in 10,000 deaths per year. Colorectal tumours often start off as growths called polyps, which develop slowly and are asymptomatic in the early stages. Detecting and removing these polyps is key to preventing the development of colorectal cancers. With funding from the Canadian Cancer Society, Dr Alain is leading a team to develop a unique preventative treatment that can eliminate existing polyps and prevent more from developing. The treatment will be based on a type of virus that can be engineered to attack polyps and cancerous cells in the gut. Administered by mouth, there is already some evidence in laboratory models that the virus can prevent cancers from forming. If successful, this project will result in the development of a new therapeutic strategy for preventing and treating early-stage colorectal cancers. It could also be combined with other drugs such as immunotherapies to further improve outcomes in people with early-stage colorectal cancer.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Alison Allan, Western University

A blood test to detect if cancers have spread

Dr Alison Allan is developing a blood test to identify how far cancer has spread in people with metastatic disease.

When cancer spreads away from the original tumour, it becomes much harder to treat and reduces the likelihood of survival. Some scientists think that once cancer has spread, it is likely to be in many different parts of the body, but others theorise that cancer sometimes only spreads to one, or a small number of other places. In this case, focusing treatment such as radiotherapy on these areas could work well at targeting these cancer cells that have spread. However, at the moment there is no way to easily and reliably tell how many areas cancer cells have spread to in people with metastatic cancer. With funding from the Canadian Cancer Society, Dr Allan will design a special blood test to detect how many sites cancer has spread to, before testing it on almost 500 people with metastatic cancer. The test detects tumour cells, immune system cells and small chunks of DNA that have come from tumour cells and been released into the bloodstream. By looking at this data, the researchers hope to easily determine which people have metastatic disease that has only spread minimally. These people could be treated with radiotherapy, increasing survival and potentially even curing some people with minimally metastatic cancer.

Dr Rebecca Auer, Ottawa Hospital Research Institute

Immune cell therapy to reduce the chance of cancer cells spreading after surgery

Dr Rebecca Auer is designing an innovative new type of cell therapy which will reduce the chance of remaining cancer cells growing after the surgical removal of tumours.

Surgery to remove tumours is a vital treatment for cancer, and over 65,000 Canadians a year have this procedure. But surgery causes a lot of stress on the body and temporarily suppresses the immune system. This lower immune response can increase the chance of remaining cancer cells growing and spreading to the rest of the body, potentially leading to relapse. Dr Auer's research has previously shown that a particular type of immune cell called 'Natural Killer' cells are dramatically impaired in the days following surgery. Now, with support from the Canadian Cancer Society, Dr Auer will find out exactly why Natural Killer cells are so badly affected by surgery and will create Natural Killer cells in the lab that are resistant to the stressful effects of surgery. The researchers hope that the project will lead to the development of an innovative cellular therapy, which can be given to people undergoing cancer surgery to reduce the risk of cancer cells spreading and increase their chance of survival.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr. Mark Basik, Jewish General Hospital

Targeting fat droplets inside breast cancer cells

Dr Mark Basik will investigate whether an anti-obesity drug can make triple-negative breast cancer cells sensitive to chemotherapy.

Triple-negative breast cancer (TNBC) causes around 30% of all breast cancer deaths, resulting in 1,500 people in Canada, including some young people, losing their lives each year. Chemotherapy treatments frequently don't work well on TNBC, and those with the disease often run out of treatment options. Dr Basik previously found that chemotherapy resistant TNBC cells contain lots of fat droplets, which he thinks may be providing energy to help the tumour cells evade chemotherapy. With Canadian Cancer Society funding, Dr Basik is leading a team to investigate whether a drug originally designed for treating obesity can stop the cells from using this extra fat as an energy source and make them sensitive to chemotherapy again. The obesity drug will be tested in combination with chemotherapy drugs on TNBC cells in a lab to see whether it might work in people. In the future, the researchers hope that adding an anti-obesity drug to the treatment of patients with TNBC will make their tumours sensitive to chemotherapy and improve survival, and spare some women total mastectomies as tumours will shrink more before surgery.

Dr Jackie Bender, Princess Margaret Cancer Center – UHN

An app to help young adult cancer survivors

Dr Jackie Bender will design a digital app to help young adult cancer survivors connect with each other and to empower them to be proactive about their health and accessing care.

Many young people who undergo treatment for cancer find it difficult to access adequate care and support and experience unique challenges. These include impacts on their education, careers, relationships and finances, with many young adult cancer survivors reporting that they don't receive relevant information, emotional support or sufficient after care. This group also frequently reports that they don't feel connected with others who have shared their experience. With support from the Canadian Cancer Society, Dr Bender will design a digital app to address these needs. The app will be adapted from a previous version which was successful in helping men with prostate cancer and the research will test whether it is effective in helping young adults. Part of the project will involve training 20 young adult cancer survivors to be peer-navigators to help others who have experienced cancer. The digital health program will be tested on young adults who have completed cancer treatment to see whether it helps improve their quality of life. The researchers hope that the project will help empower young adult cancer survivors to be proactive in managing their health and overcome barriers to accessing care.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Francois-Michel Boisvert, Université de Sherbrooke

Detecting bladder cancer in urine samples

Dr Boisvert is developing a way to detect bladder cancers by testing urine for specific proteins.

Bladder cancer is the 5th most common cancer in Canada, affecting 12,000 people a year. The current way of diagnosing bladder cancer involves inserting a camera through the urinary tract into the bladder, which can be an unpleasant and uncomfortable experience. With Canadian Cancer Society funding, Dr Boisvert will develop an innovative new way to test for bladder cancer by looking at proteins found in urine which indicate the presence of cancer. The researchers do the test on around 100 urine samples, before expanding to samples from 1,000 people, both with and without bladder cancer. If successful, this test could replace the uncomfortable and invasive camera method and make earlier detection of tumours better, increasing survival from bladder cancer. The urine test could also improve the quality of life for patients who have survived bladder cancer and require regular screening to check for tumour recurrence. The researchers hope the new method will also be less expensive than the camera test, paving the way for routine screening for bladder cancer in the general population and leading to earlier diagnosis and better survival.

Dr. Yvonne Bombard, St. Michael's Hospital

Providing genetic counselling for patients with newly diagnosed cancer

Dr Bombard is designing a digital program to improve care for patients with newly diagnosed cancer by providing them with faster access to genetic counselling support.

Sequencing the genetic information in tumours is becoming more common and can alter treatment plans for people with cancer. But people with cancer often have to wait several months for their test results and to discuss them with specialised genetic counsellors. This can significantly delay their access to life-saving treatments. In Canada, genetic counselling services are experiencing an unprecedented demand, and some oncologists are now bypassing this service so that they can do the test and act on the results sooner. However, not much is currently known about how effective this new method is, whether it will improve patient outcomes or whether patients feel they are adequately supported without traditional genetic counselling. With Canadian Cancer Society funding, Dr Bombard will develop a digital platform to provide education and genetic counselling to support patients who opt for genetic testing on the recommendation of their oncologists. The researchers will look at whether the platform helps improve patient experience and outcomes as they navigate genetic testing. If successful, they hope this program can be implemented across Canada to improve the care of newly diagnosed people with cancer who undergo genetic testing while mitigating the demand on genetic counsellors.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Jesse Chao, Sunnybrook Research Institute

Artificial intelligence-aided detection for oral cancer

Dr Chao will design software to analyze and detect oral cancers, leading to earlier diagnosis.

Oral cancer is rare but has a poor survival rate, and early diagnosis is crucial to improving outcomes. Currently, samples from potential oral tumours are looked at under a microscope by specialist pathologists who decide whether they are likely to be cancerous or not. Many oral growths are also pre-cancerous and can be removed before they actually turn into cancer, but the process of diagnosing patients can be quite slow and is not always accurate. With Canadian Cancer Society funding, Dr Chao will design software to assist pathologists in diagnosing oral cancer. The researchers will use artificial intelligence to analyze pictures of samples from over 500 patients with oral cancer to train the software to accurately detect cancer. After this, they will make the software available online so that pathologists can submit samples remotely and use the software to aid in their diagnoses. Earlier detection of oral cancer will mean that more people will survive this type of cancer and also be spared substantial surgeries which can dramatically affect quality of life in survivors.

Dr. Guojun Chen, McGill University

A new combination therapy for triple negative breast cancer

Dr Guojun Chen is investigating whether a new, innovative therapy called cold atmospheric plasma can be combined with immune-stimulating drugs to tackle triple negative breast cancer.

Triple negative breast cancer (TNBC) is aggressive and is often resistant to many treatments, giving those with the disease a poor long-term prognosis. More targeted treatment options are badly needed to improve survival. Immunotherapy, which harnesses the immune system to fight tumours has shown some promise in TNBC, but only in a small number of patients. With support from the Canadian Cancer Society, Dr Chen will undertake a study to improve immunotherapy responses in women with TNBC by combining it with another treatment called cold atmospheric plasma, which also stimulates the immune response. Dr Chen has previously combined these 2 therapies successfully in treating skin cancer and hopes to see the same result in TNBC. The therapy combination will first be tested in a lab to see whether it is effective against breast tumours and tumours which may have spread to other parts of the body. If successful, the researchers hope that the therapy combination will be a promising new treatment option for people with TNBC, improving their chances of survival.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Andrea Covelli, Mount Sinai Hospital

Improving breast cancer experiences for Black women in Canada

Dr Covelli and her team will interview Black women in Canada to understand their experiences and to identify barriers and inequalities in the care they receive.

Black women with breast cancer in the United States are known to have a lower chance of survival and often experience delays in care. But in Canada, very little research has been done to find out whether Black women with breast cancer in this country experience lower survival and poorer care. With Canadian Cancer Society funding, Dr Covelli will lead a study to understand the experiences and outcomes for this group. Black women from across Ontario will be invited to participate in the study via a partnership with a national breast cancer support service organization. They will be interviewed about their experiences throughout their breast cancer journey, and the research team will then study the interviews to identify any challenges and barriers experienced by Black women with breast cancer in Canada. Lastly, the researchers will develop a list of goals to address these disparities in care, to improve the survival of Black women in Canada with breast cancer and their quality of life during and after treatment.

Dr Charles Cunningham, Sunnybrook Research Institute

Predicting the response to radiation therapy for people with cancer that has spread to the brain

Dr Charles Cunningham is using a new type of MRI scan to predict which patients with breast cancer that has spread to the brain will respond to radiation therapy.

Approximately 1 in 3 people with cancer will have their cancer spread to the brain, with breast cancer being one of the most common types that spreads. Patients are frequently treated with a very precise type of radiation therapy, but this treatment does not work for everyone. With Canadian Cancer Society funding, Dr Cunningham will design a way to predict which people are unlikely to respond to this radiation therapy, sparing them a treatment that won't work for them and allowing them to try other treatment options more quickly. The study will use a new form of MRI scanning, which looks at the presence of a biochemical molecule called lactate in the brain. The researchers will use the new scanning method on people with breast cancer who have disease that has spread to the brain before they have radiation therapy. After six months, the researchers will look at which patients have and have not responded and will verify whether the MRI results predicted this. In the future, the researchers hope this work will enable closer monitoring of people with breast cancer that has spread to the brain and enable them to receive better, more personalized treatment.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Leandra Desjardins, CHU Sainte-Justine Research Centre

Finding the best way to identify cognitive impairment in childhood cancer survivors

Dr Leandra Desjardins will find out the best way to identify childhood cancer survivors who have cognitive impairment following their treatment so that they can be referred to appropriate care.

Most children now survive a cancer diagnosis, but both their cancer and the treatments used can come with long-term, chronic side effects. A third of pediatric cancer survivors experience cognitive impairment after treatment, which can significantly affect their quality of life. Despite this, many childhood cancer survivors do not receive referrals to specialist care, because evaluation techniques are not standardized or proven to be reliable. With funding from the Canadian Cancer Society, Dr Desjardins will conduct a study to identify the best screening measure to detect cognitive issues in childhood cancer survivors. Working with childhood cancer survivors and their caregivers in Toronto and Montreal, the team will test both questionnaire and computer-based cognitive screening measures to identify the best one. With this information, the researchers will recommend an optimal screening tool which will enable hospitals to quickly identify and care for childhood cancer survivors in need of support for cognitive impairment, improving their quality of life.

Dr Antoine Eskander, Sunnybrook Research Institute

Reducing unplanned emergency room visits for people with head and neck cancer

Dr Antoine Eskander is conducting a study to help people with head and neck cancer manage their symptoms and to help prevent unplanned emergency room visits.

During their treatment for head and neck cancer, about one-third of patients experience symptoms that lead to an emergency department visit or an unplanned hospitalization. But of those who go to the emergency room, only 1 in 4 actually require hospitalization. Better monitoring and proactively managing symptoms could reduce these visits, improving care for patients and minimizing the demands on the healthcare system. With Canadian Cancer Society funding, Dr Eskander will lead a team to look at existing data from people with head and neck cancer to see whether reported symptom burdens were correlated with the likelihood of an emergency room visit. The researchers will also interview and their caregivers to ask them about symptom management at home, their views on current methods for managing their symptoms and what kind of supports they feel would help them avoid emergency department visits. With this information, the researchers will develop and test a digital platform to help people with head and neck cancer monitor and manage their symptoms at home, reducing the chance of them needing to go to the emergency room. If successful, this platform could be rolled out for people with other types of cancer across Canada, improving care and quality of life for while reducing burden to the healthcare system.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Sharon Gorski, BC Cancer, part of the Provincial Health Services Authority

Better tailored treatment for people with pancreatic cancer

Dr Sharon Gorski will investigate the genetic alterations that cause a type of pancreatic cancer to improve treatment strategies and outcomes for patients.

Pancreatic neuroendocrine neoplasms (PNEN) are a rare type of pancreatic cancer, and very little is currently known about the genetic alterations which drive these tumours. Some people with PNEN have relatively good outcomes. But others with tumours that appear very similar have poor outcomes, and it isn't clear why there are such differences in response to treatment. Canadian Cancer Society-funded researcher Dr Gorski will lead a team to characterize the genetic alterations which cause PNENs, to better understand the differences between PNEN tumours and help patients get more personalized treatments for their tumour type. The researchers will also identify molecular markers which allow them to predict how a patient will respond to therapies. This will mean that physicians can more effectively and quickly identify people who need more aggressive treatment, improving their outcomes. Additionally, the researchers hope that identifying the ways in which PNENs grow will lay the groundwork to develop new, targeted cancer therapies for PNEN. More targeted and personalised treatment options holds promise to improve outcomes for patients with PNENs.

Dr Peter Greer, Queen's University

A new targeted treatment for people with metastatic breast cancer

Dr Peter Greer will lead the development of a new treatment targeting a protein which is involved in breast cancer spread and treatment resistance.

Breast cancer is one of the most common cancers in Canada. Although survival rates are generally good, people who have metastatic disease that has spread to other parts of the body have poor outcomes and represent the majority of deaths from breast cancer. People with metastatic breast cancer often become resistant to treatments such as radiotherapy and chemotherapy. A possible reason for this resistance is a protein called Ezrin, which researchers think may influence breast cancer cells to spread and become resistant to treatment. Canadian Cancer Society-funded researcher Dr Greer will lead a team investigating whether targeting Ezrin with new drugs could be a promising treatment strategy for people with metastatic breast cancer. The researchers will conduct laboratory experiments to find out more about how Ezrin works and how it influences the immune system. The team will then test experimental drugs and other approaches to target Ezrin to see what effect this might have on sensitivity to therapies and metastatic disease. If successful, the researchers hope that drugs targeting Ezrin can be used in patients with aggressive metastatic breast cancer to improve survival.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Kristin Hope, Princess Margaret Cancer Centre – UHN

Uncovering new therapeutic targets for acute myeloid leukemia

Dr Kristin Hope will investigate early genetic changes in acute myeloid leukemia cells with the aim of developing new, targeted treatment strategies.

Less than a quarter of people diagnosed with Acute Myeloid Leukemia (AML) survive 5 years after their diagnosis. One of the main reasons for this poor survival rate is that AML is often diagnosed when it has become very aggressive and AMLs frequently contain numerous, varied genetic alterations, making effective treatment very difficult. Some patients who go on to develop AML are diagnosed with a pre-leukemic blood disorder called myelodysplastic syndrome (MDS). With funding from the Canadian Cancer Society, Dr Hope will lead a team of researchers to study MDS and investigate the early genetic changes that cause cells to become leukemic. The team have already identified a protein called PLAG2 which drives the development of MDS. With this grant, they will do further experiments to find out precisely how PLAG2 works to stimulate the growth of MDS cells. The researchers hope that understanding more about how PLAG2 works in pre-leukemic cells will lead to the development of more therapies for MDS and early-stage AML, improving survival from this type of blood cancer.

Dr Xi Huang, The Hospital for Sick Children

A new drug for deadly brain tumours

Dr Xi Huang is developing an innovative new peptide treatment for glioblastoma, an incredibly hard to treat brain tumour.

Glioblastoma is a devastating brain cancer with a poor survival rate. Chemotherapy treatments can slow down or temporarily stop glioblastoma from growing, but tumours quickly evolve to resist these therapies. With funding from the Canadian Cancer Society, Dr Huang is developing an innovative new therapy for glioblastomas based on disrupting how tumour cells transport molecules called ions in and out of the cell. The research team will learn more about how these ion transporters work in glioblastoma cells by looking at glioblastoma cells donated by patients. They will then test a new experimental drug treatment targeting ion channels on the donated human cells and on mouse models of glioblastoma. Through these experiments, the team will assess whether the new drug effectively kills glioblastoma cells while leaving healthy cells alone. If these experiments are successful, the research team will further develop their drug to move towards clinical trials in people with glioblastoma, with the hope of improving outcomes for people with this disease.

Dr Jonathan Irish, Princess Margaret Cancer Centre – UHN

Glowing nanoparticles to help surgeons operate more precisely

Dr Jonathan Irish will develop and test glowing particles which can help mouth cancer surgeons tell the difference between healthy tissue and tumour tissue.

Over 5,000 people in Canada are diagnosed with mouth cancer per year, and almost one-third die from their disease. The main treatment for mouth cancer is surgery but figuring out exactly where tumour tissue ends and healthy tissue begins can be difficult. Surgeons must be careful to spare as much healthy tissue as possible for patients to preserve crucial functions such as swallowing, speaking and eating. That can mean some tumour cells are left in the mouth, and many patients have a recurrence of their disease after surgery. Canadian Cancer Society funded researcher Dr Irish is leading a team developing a new way to aid surgeons in distinguishing between cancerous tissue and healthy tissue in the mouth. By using nanoparticles which accumulate in the tumour and glow, surgeons will be able to more clearly see the difference between these 2 types of tissue, helping them more accurately remove the tumour while preserving healthy tissue. The nanoparticles have already been shown to be safe in the laboratory, and the researchers will partner with veterinary surgeons to test the nanoparticles on dogs and cats who have naturally occurring mouth cancers. The team hopes to see improved surgical outcomes for dogs and cats with more surviving mouth cancer and will then work to further develop the nanoparticles for human clinical trials.

Dr Kathryn Issac, University of British Columbia

A better model to track breast cancer relapse

Dr Kathryn Issac is using artificial intelligence to analyse medical records to better detect breast cancer relapse.

Breast cancer survival has been increasing over recent years, but some people still experience recurrence of their cancer, sometimes many years after treatment. Provincial cancer registries, which house information about people with cancer across Canada, are not set up to track individuals throughout their lives after a cancer diagnosis. This makes it challenging to understand how many people experience a breast cancer relapse, and what their outcomes are. More information is needed to drive better strategies to prevent and treat relapses more effectively. With support from the Canadian Cancer Society, Dr Issac will lead a team to develop a computer system capable of mining medical records of breast cancer survivors. They will use artificial intelligence to review these documents and any interactions with the healthcare system to look for signs of relapse. If successful, this project will help people with breast cancer and their medical team decide on treatments to avoid or reduce their risk of relapse, as well as help policymakers plan resources to treat people who relapse. The researchers will start this work in British Columbia but hope to

expand to other Canadian provinces to help more patients, eventually expanding to include other types of cancer.

Dr Keith Jarvi, Mount Sinai Hospital

A non-invasive test for prostate cancer

Dr Keith Jarvi is developing a new molecular test for prostate cancer, which will reduce the need for invasive and painful prostate biopsies.

Prostate cancer is the most common cancer in men in Canada. Diagnosing prostate cancer frequently involves a number of invasive procedures, including a rectal examination and prostate biopsies. Biopsies are painful, stressful and sometimes come with serious side effects, causing significant distress to patients. Canadian Cancer Society funded researcher Dr Jarvi is leading a team to develop a non-invasive molecular test which will allow for accurate prostate cancer diagnosis. Semen samples from patients will be tested for the presence of small pieces of genetic material which indicate the presence of prostate cancer. The researchers hope that when combined with an innovative MRI scanning technique, this test will also be able to differentiate between aggressive cancer that likely needs treatment and low-grade tumours that may need monitoring and minimal to no treatment. If successful, the test could dramatically decrease the need for painful prostate biopsies, reducing distress for patients.

Dr Rama Khokha, Princess Margaret Cancer Centre – UHN

Understanding how pancreatic tumours interact with the tissues around them to develop new therapies

Dr Rama Khokha will use genetic analysis and tiny, lab-grown pancreatic tumours to develop new treatments for pancreatic cancer.

Pancreatic cancer survival is very poor, with many tumours being aggressive and hard to treat. In recent years more research has focused not just on tumours themselves but also the immediate tissues and the environment around them that influences how the tumours grow and respond to treatment. Targeting this tumour microenvironment with therapy is a promising treatment strategy in many types of cancer. Canadian Cancer Society-funded researcher Dr Khokha will lead a team to investigate how the pancreatic cancer microenvironment interacts with the tumour, using genetic analysis of pancreatic tumour samples donated by patients. From these samples, the team will also grow tiny versions of pancreatic tumours called organoids in the lab, allowing them to do experiments to see how they interact with different types of cells and to test potential treatments. The researchers hope that by understanding how pancreatic tumours interact with their microenvironment, they can develop new, innovative targeted treatments and improve the survival of people diagnosed with pancreatic cancer.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Rejean Lapointe, Centre de recherche du CHUM

Improving the response of breast cancer to immunotherapies

Dr. Rejean Lapointe will analyse breast tumours' the natural "environment" of bacteria and immune cells (known as the microbiome) in breast tumours to improve the effectiveness of immunotherapies for breast cancer.

Treatments which harness a patient's own immune system to treat their tumours have been very successful in some people. However, many tumours do not respond to these immunotherapies at all, partly because there are very few immune cells in their tumours to start with. Some tumours also contain microbes such as bacteria, but little is currently known about how these bacteria influence the number of immune cells in tumours. Breast cancers typically do not respond well to immunotherapies, and a better understanding of the unique microbiome in breast tumours could help researchers improve the effect of immunotherapies targeting breast cancer. Canadian Cancer Society funded researcher Dr Lapointe will lead a team to investigate how bacteria influence the number and type of immune cells in breast tumours. Using tumour samples donated by patients, the researchers will find out more about where the bacteria are located and how much bacteria are present. They will also analyse if different types of bacteria has any relation to how a person's immune system responds to cancer cells.By understanding how bacteria influence the immune cells within breast tumours, the researchers hope to come up with new ways to make immunotherapies more effective for people with breast cancer.

Dr Jane C McGlade, The Hospital for Sick Children

Preventing breast cancer cells from spreading to other parts of the body

Dr Jane C McGlade will find out more about why breast cancer cells spread to other parts of the body and identify treatments to prevent this from happening.

Although significant progress has been made in treating solid tumours, once tumours spread to other parts of the body, they become much more difficult to treat and patients experience poor outcomes. Preventing tumours from spreading is a major goal in cancer research, but researchers still don't know much about why tumours spread to other sites in the body. Canadian Cancer Society-funded researcher Dr McGlade is leading a team of researchers to identify new ways to stop breast cancer spreading by targeting a protein that is 'switched on' by breast cancer cells, allowing them to spread to other parts of the body. By understanding how some tumour cells switch this protein on, the researchers will find ways to switch it off again, preventing these cells from spreading. The researchers will investigate this by using breast cancer cells grown in the lab to identify the cellular changes that control this switch. They will then test a large number of potential drugs on the cells to see if any of them can reverse this switch and stop the breast cancer cells from spreading. If successful, this project will uncover new ways to stop breast cancer cells from spreading

and could lead to the development of new cancer drugs. The researchers also hope their findings will be relevant to preventing other types of cancer from spreading, such as tumours of the lung and colon.

Dr Michael Moran, The Hospital for Sick Children

Better tailored treatment for people with lung cancer

Dr Michael Moran is doing molecular analysis of lung tumours to come up with more personalised treatment options for patients.

Non-small cell lung cancer is the most common type of lung cancer and is the leading cause of cancer-related death in Canada. Most people with this type of cancer have their disease spread to other parts of the body, most commonly the brain, where treatment options are more limited. New, targeted therapies are desperately needed to improve outcomes for people with this disease. With Canadian Cancer Society funding, Dr Moran is leading a team doing in-depth molecular analysis of lung cancer samples and brain metastases that have been donated by patients. This analysis will allow the team to predict which patients are likely to have their cancer spread to the brain and to identify possible ways to stop that process. The team has already identified five distinct groups of lung tumours which could benefit from different tailored treatment. In the future, using this molecular analysis to select the treatments most effective at targeting a person's specific lung tumour could improve outcomes for people with non-small cell lung cancer.

Dr Catherine O'Brien, Princess Margaret Cancer Centre – UHN

Targeting drug-tolerant cells in colorectal cancer

Dr Catherine O'Brien will analyse drug-tolerant cells that evade initial cancer treatments and contribute to tumour recurrence.

Around half of all tumours initially respond well to therapy, with some people seeing their tumours disappear completely. However, for many people, their tumours will become resistant to treatment and grow again. One theory as to why this happens is that tumours contain a combination of different cells, and some of these cells can withstand chemotherapy and continue to proliferate. Canadian Cancer Society-funded researcher Dr O'Brien is leading a team to understand more about these drug tolerant cells by using innovative genetic techniques and laboratory models. The team will study tumour cells in various ways – including using samples of colorectal tumours donated by patients, studying mouse models, and finally, by growing tiny organs – called organoids – in a dish. If these drug-tolerant cells can be identified and targeted earlier, responses to treatment can be maximized and intervention may even help prevent cancers spreading. If successful, targeting drug-tolerant cells early on in treatment will dramatically increase response to therapy and survival rates not only in colorectal cancer, but other types of tumours too.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Claude Perreault, Université de Montréal

Why do immunotherapies not work for most people with breast cancer?

Dr Claude Perreault will look at why the immune system does not naturally recognize breast tumour cells and find ways to trigger the immune system to do this.

Treatments that stimulate the immune system to tackle tumours have been successful in many types of cancer but have yet to show much benefit in breast cancer. Some scientists have suggested that breast cancer cells don't have any proteins on their surface to make the immune system recognize them as cancer cells. However, Canadian Cancer Society-funded researcher Dr Perreault has found that breast cancer cells have plenty of these proteins, but they are still not detected by the immune system. Now, he will lead a team to find out exactly why the immune system cannot recognize these breast cancer proteins and artificially design a system in the lab to make immune cells recognize the proteins. The team will then lead the development of a cancer vaccine which can train the immune system to attack proteins on breast cancer cells. If successful, this cancer vaccine could be used in people with breast cancer who have exhausted other treatment options to trigger their immune system to tackle their tumours. In the future, the vaccine could also be used earlier in treatment and perhaps even replace some chemotherapy treatments.

Dr Daniela Quail, McGill University

Can different types of diet increase response to immunotherapies?

Dr Daniela Quail is researching how different types of diet affect gut bacteria and influence response to immunotherapies in cancer treatment.

Obesity increases the risk of at least 13 different types of cancer and is one of the leading causes of cancer, along with smoking tobacco. But people who are obese are also less likely to die from lung cancer and more likely to respond to therapies that boost the immune system to tackle tumours. The reasons for this are not currently well understood, but one theory is that different diets cause people to have different gut bacteria, which may influence their response to immunotherapies. With funding from the Canadian Cancer Society, Dr Quail is leading a team to custom-design diets that can increase the response to immunotherapies. By using mouse models of lung cancer, the team will look at how the different diets affect gut bacteria, tumour growth, and ultimately, treatment response to immunotherapies. If successful, modifying a person's diet could be a completely new, non-invasive treatment strategy for increasing their response to immunotherapies, boosting their chance of surviving cancer.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Brian Raught, Princess Margaret Cancer Centre – UHN

New treatments for childhood leukemia

Dr Brian Raught is testing 2 new drugs for the treatment of childhood leukemia containing genetic abnormalities called fusions.

Childhood leukemia has a relatively high survival rate, but chemotherapy still does not work for some children and those who survive often experience long-term side effects caused by the treatment. Patients who respond well to treatment but later relapse have a poor survival rate, and more treatment options are urgently needed. Canadian Cancer Society-funded researcher Dr Raught will lead a team focusing on a type of damaged DNA which is found in childhood leukemia called a fusion. The researchers will investigate how these fusions lead to leukemia and test 2 new drugs to see whether they can specifically target them. The drugs have already been used in human clinical trials for other types of cancer, so if they are successful at targeting the fusions, they could be made quickly available for children with leukemia. The researchers hope that these new drugs can provide more treatment options for children with leukemia.

Dr Michael Reedijk, Princess Margaret Cancer Centre – UHN

Could immune-boosting therapies work for triple-negative breast cancer?

Dr Michael Reedijk is combining a drug that targets an inflammatory protein with immune system-boosting therapies to create a new treatment option for triple-negative breast cancer.

Triple-negative breast cancer (TNBC) is an aggressive type of cancer representing around 15% of all breast cancer cases, but almost 30% of deaths from breast cancer. TNBC is aggressive. It frequently does not respond well to chemotherapy treatments and many patients suffer recurrence of disease even if they do initially respond to therapies. With funding from the Canadian Cancer Society, Dr Reedijk is leading a team to develop a new treatment strategy for TNBC which involves targeting a cytokine protein stored by the tumour cells. Drugs which target this protein are already used to treat inflammatory diseases like arthritis, and the researchers will test to see if the drug works on TNBC cells in the lab, both on its own and in combination with therapies that prime the immune system to attack tumour cells. Immunotherapies don't generally work well for people with TNBC, but the researchers hope that targeting the cytokine protein will make TNBC cells more susceptible to immunotherapies. Since cytokine-targeting drugs already exist and are approved for use in humans for other diseases, this project, if successful, could rapidly lead to a new treatment option that improves survival for people with TNBC.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Amanda Roberts, Odette Cancer Centre-Sunnybrook HSC (CCO)

Pre-surgical chemotherapy for people with aggressive breast cancer

Dr Amanda Roberts is looking to increase the number of people with aggressive breast cancer who are offered chemotherapy treatment before surgery.

It is recommended that most people with aggressive breast cancer get chemotherapy before they have surgery, and provincial, national and international guidelines support this. Despite this, only 1 in 5 patients in Ontario with aggressive Her2+ve or triple-negative breast cancer receive this pre-surgical chemotherapy treatment. Having the treatment prior to surgery can decrease the extent of surgery required, improving quality of life for survivors. With support from the Canadian Cancer Society, Dr Roberts is leading a team to find out why more people are not offered this pre-surgical treatment, despite guidelines recommending it. The researchers will use data from Ontario to look for information about people with aggressive breast cancer who are and are not offered this initial treatment. A questionnaire for oncologists and surgeons in the province will also be created to find out what influences their decisions as to whether to offer this initial treatment to patients. Using this information, the researchers will design targeted interventions to address these barriers and increase the number of people being offered chemotherapy treatment prior to surgery for aggressive breast cancer getting.

Dr Gilles Robichaud, Université de Moncton

A new way of stopping breast cancer spreading

Dr Gilles Robichaud is looking at how to stop breast cancer cells from tapping into the by-products from healthy cells to fuel their own growth and spread.

Nine out of 10 deaths from breast cancer are caused by the disease spreading to other parts of the body, but what causes this spread is still not well understood. With Canadian Cancer Society funding, Dr Robichaud is leading a team to understand more about how breast cancer spreads. Dr Robichaud will build upon previous research in which he discovered that breast cancer cells can upcycle other bits of cells from their environment and use them for energy and growth. The research team will use cells cultured in the lab to figure out how this upcycling affects the ability of breast cancer cells to spread. If successful, this project will identify new targets for anti-cancer therapy to stop breast cancer cells from using upcycled cellular components, stopping them from spreading to other parts of the body. Preventing breast cancer from spreading will reduce the amount of treatment people with breast cancer need, minimise long and shot term side effects of treatment and also increase survival.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr April Rose, Jewish General Hospital

Better targeted treatment for tumours with less-common DNA alterations

Dr April Rose is investigating new treatment strategies for patients whose tumours have less common mutations in a gene called BRAF.

A gene called BRAF is one of the most commonly altered pieces of DNA in cancer, and mutations in this gene are found in several types of cancer, including lung, colorectal and skin cancer. Approximately two-thirds of tumours with alterations in BRAF have the same type of mutation and can be treated with existing drugs. But the remaining one-third have different, less common mutations in BRAF and only sometimes respond to targeted drugs. With Canadian Cancer Society funding, Dr Rose is leading a team to understand why some tumours with these less-common BRAF alterations respond to therapy and some do not. The team will use lab techniques to identify which alterations make cancer cells resistant to therapy and will test combinations of drugs to develop new treatment strategies for patients with less-common alterations in BRAF. If successful, this research project could lead to new treatment strategies for patients with several different types of cancer who carry these less-common mutations in BRAF, providing a new way of treating their tumours and improving their outcomes.

Dr Calvin Roskelley, University of British Columbia

A new therapy for aggressive breast cancers

Dr Calvin Roskelley is developing a new antibody-based treatment to target aggressive breast cancer cells.

Breast cancer is one of the most common types of cancer in Canada and new, targeted therapies are urgently needed to treat people with aggressive tumours that have spread to other parts of the body. People whose breast cancer has spread often don’t respond to treatment and have a poor survival rate. Canadian Cancer Society-funded researcher Dr Roskelley has discovered that a molecule present on the surface of aggressive breast cancer cells could be a target for new, innovative anti-cancer therapies that kill breast cancer cells before they spread. The research team will conduct experiments to find out more about how this molecule influences breast cancer cells to grow and spread. They will then further develop antibody drugs that can bind to the molecule on breast cancer cells and spare healthy tissues. If this preliminary work is successful, the researchers will conduct clinical trials to test these innovative new drugs in people with aggressive breast cancer, potentially leading to better outcomes for those affected.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Khara Sauro, University of Calgary

Improving transitions of care for people with cancer

Dr Khara Sauro is conducting a study to identify ways to help people with cancer transition between healthcare providers.

All people with cancer will experience a transition between different healthcare providers during their cancer care. This has many potential impacts on patients, including compromised communication, lower patient satisfaction and safety issues. With funding from the Canadian Cancer Society, Dr Sauro will examine these transition points during cancer care to identify improvements that can be implemented to enhance the health and wellbeing of people with cancer. To conduct their study, the research team will look at information from databases in Alberta, as well as interviews and surveys with patients and healthcare providers. With this information, the researchers will make recommendations to help people with cancer transition between healthcare providers more smoothly, improving their quality of life and wellbeing.

Dr Daniel Schramek, Mount Sinai Hospital

A new targeted drug for people with head and neck cancer

Dr Daniel Schramek is investigating a new therapy for people with head and neck cancer.

Head and neck cancer is the sixth most common cancer type in Canada and is often linked to infection with the human papillomavirus (HPV). Standard treatments are surgery, radiotherapy and chemotherapy, but many patients relapse with tumours that are treatment-resistant. With Canadian Cancer Society funding, Dr Schramek is leading a team to develop a new, targeted therapy for head and neck cancer. Building upon their previous work, the research team will find out more information about a protein called IGFBP3 which they know to be important in head and neck cancer. Blocking this protein stops head and neck cancer growing in laboratory experiments and now the team will figure out exactly why this is, as well as identifying which head and neck cancer patients might benefit from a drug targeting IGFBP3. The research team will develop new drug candidates to block the protein and test them in the laboratory. If successful, this work could lead to a new, innovative cancer drug to improve survival in patients with head and neck cancer.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Adam Shuhendler, University of Ottawa

Quicker detection of treatment resistance in lung cancer

Dr Adam Shuhendler is developing a novel imaging technique to predict how lung tumours will respond to chemotherapy much more quickly than is currently possible.

People with lung cancer in Canada are frequently treated with chemotherapy, but often become resistant to these drugs. For patients who become resistant to a drug called cisplatin, it can sometimes take 4 to 6 months to detect that the treatment isn't working properly. This means that patients are receiving a toxic treatment that isn't beneficial. Meanwhile, their treatment-resistant tumours can grow and progress. With Canadian Cancer Society funding, Dr Shuhendler is leading a team to develop a new way to predict how lung tumours will respond to chemotherapy by using a type of non-invasive scanning. The researchers have found that lung tumours become resistant to chemotherapy when they change how they use Vitamin B6. By using a special imaging agent and standard PET scanning, the researchers will do experiments in the lab to see if they can detect when lung tumours change how they use Vitamin B6. If successful, the new imaging method will be able to identify within only a week if a new treatment is working, allowing doctors to change treatment quickly, sparing the patient from unnecessary side effects and saving time.

Dr Sheila Singh, McMaster University

A new way to tackle a common childhood brain tumour

Dr Sheila Singh will find new therapeutic targets for treating recurrent medulloblastoma in children.

Brain tumours are the leading cause of death in children, and medulloblastoma is the most common brain cancer in this group. Although recent improvements in treatment strategies have improved outcomes for the disease, children whose tumours recur have significantly reduced odds of surviving. Canadian Cancer Society-funded researcher Dr Singh will lead a project to better understand how recurrent medulloblastoma cells function and grow, with an aim to find new ways that they can be targeted. The researchers will study medulloblastoma cells and normal brain cells in the lab to uncover differences between the way that they function and grow. By doing this, they will find targets for therapies that are only present on the cancer cells and not normal, healthy brain tissue. If successful, this project could result in the development of a new class of treatments that improve survival in children with recurrent medulloblastoma, and that have minimal toxicity to healthy tissue – thereby reducing the neurocognitive side effects that often come with current treatments.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Vuk Stambolic, Princess Margaret Cancer Centre – UHN

Better tailored treatment for people with breast cancer who have excess bodyweight or obesity

Dr Vuk Stambolic will analyze breast cancer samples from people who have excess bodyweight to develop targeted treatments.

Obesity increases breast cancer risk and is associated with poorer outcomes across many types of breast cancer. Two-thirds of people with breast cancer have excess bodyweight or obesity, so it is important to consider this when treating these patients. With support form the Canadian Cancer Society, Dr Stambolic will lead a team to learn more about breast cancers in people who have excess bodyweight or obesity with the goal of being able to better tailor treatment. The team has an international clinical trial looking at the potential benefit of the diabetes drug metformin in this group. The project will analyze samples from the trial to find molecular markers that can predict breast cancer outcomes in people who have excess bodyweight or obesity and to predict whether these patients are likely to benefit from metformin. If this project is successful it will lead to more informed treatment decisions for people with breast cancer, improving outcomes and survival.

Dr Thai Hoa Tran, CHU Sainte-Justine Research Centre

Preventing recurrence in childhood leukemia

Dr Thai Hoa Tran will identify markers to predict whether children with a specific type of leukemia are likely to relapse.

Thanks to research into childhood leukemia, survival rates for the disease have risen substantially in recent years. Childhood leukemia caused by a particular type of genetic alteration called the Philadelphia chromosome is treated with chemotherapy and tyrosine kinase inhibitor (TKI), which has improved outcomes. However, approximately 4 in 10 children with this type of leukemia still die from disease recurrence and toxicities associated with treatment. With support from the Canadian Cancer Society, Dr Tran aims to learn how some of these leukemias resist treatment and relapse by analyzing leukemia samples donated by patients to identify genetic abnormalities. Having a better understanding of how leukemia cells become resistant to therapies, may enable researchers to identify markers to predict which children will relapse and develop better strategies to prevent recurrence and increase survival in children with this type of leukemia.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Josie Ursini-Siegal, Jewish General Hospital

Overcoming therapy resistance in breast cancer

Dr Josie Ursini-Siegal will identify new treatment combinations for aggressive breast cancers that are resistant to chemotherapy.

People with breast cancer who develop therapy resistance or whose cancer spreads to other parts of the body have poor outcomes and rarely respond to chemotherapy. These tumours are generally caused by many different genetic alterations, making treatment with targeted therapies difficult. With funding from the Canadian Cancer Society, Dr Ursini-Siegal will lead a team to identify new therapeutic strategies for these hard-to-treat breast cancers. The team will focus on drugs that inhibit the cancer cells' ability to produce the building blocks that support their growth and survival. These types of drugs are already used in diabetes, but so far have not shown significant benefit in people with breast cancer. The research team will investigate why these drugs are not currently working for this group and will develop strategies to sensitize tumour cells to the drugs. By researching innovative combination therapies for therapy-resistant breast cancer, the researchers hope to provide a new treatment option and improve survival for patients.

Dr Timothy Whelan, McMaster University

Avoiding overtreatment of people with early-stage breast cancer

Dr Timothy Whelan will conduct a study to see whether radiotherapy can be avoided in people with early-stage breast cancer who have breast conserving surgery.

Most people with early-stage breast cancer will have breast conserving surgery and then be given radiotherapy treatment to try to remove any remaining tumour cells, reducing their risk of recurrence. But some patients have a very low chance of recurrence, meaning that the radiotherapy is unnecessary and the painful side effects associated with it could be avoided. With support from the Canadian Cancer Society, Dr Whelan is leading a team to look for biological markers that can predict whether a breast tumour is likely to recur after breast conserving surgery and whether radiotherapy can be avoided. The researchers will follow the progress of over 500 women who have had breast cancer for 10 years after their treatment to track their risk of recurrence. If the team concludes the risk of recurrence is very low without radiotherapy, up to 5,000 Canadian people per year could be spared this treatment and the significant side effects that often come with it.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Alexander Wyatt, University of British Columbia

Analyzing prostate cancer using a blood test.

Dr Alexander Wyatt will design a blood test to detect fragments of tumour genetic material to predict the aggressiveness of prostate cancers.

Prostate cancer that has spread to other parts of the body has poor outcomes and varies greatly between people, with some having slow-growing disease and others experiencing highly aggressive cancers. Deciding which treatments to give people with metastatic prostate cancer can be challenging as it is difficult to predict how aggressive metastatic prostate cancer is. With support from the Canadian Cancer Society, Dr Wyatt is leading a team to develop an innovative test that detects small fragments of genetic material from tumours in the bloodstream. The team will use their test to compare blood samples from people with metastatic prostate cancer with clinical information on each patient. They will then use computer modelling to develop a program that predicts the aggressiveness of a patient's cancer. This minimally invasive and quick test will allow clinicians to adapt and personalise treatment strategies for each patient.

Dr Yan Yuan, University of Alberta

Using artificial intelligence to update cancer registries

Dr Yan Yuan will use innovative technologies to update Canadian cancer registries with information about brain tumours.

The Canadian Cancer Registry contains a wealth of data on cancers in Canada and is used by researchers and policymakers to help plan health services. However, some information is missing from the registry, including data on brain tumors that have developed as the result of the spread of other cancers. Only around one-quarter of brain metastases are currently reported in the registry, making it very difficult for specialists to use this data to plan health services such as accurately anticipating a neuro-oncologist's workload or allocating sufficient funding to associated services. With support from the Canadian Cancer Society, Dr. Yuan will lead a team to fill these data gaps. The team will use an artificial intelligence solution that extracts data from medical reports. This automated system will scan and analyze these reports and integrate the data into the registry, saving time and money. If successful, this artificial-intelligence driven project could be expanded to include other types of cancer and cancer data, allowing the Canadian Cancer Registry to be easily updated and ensuring that the best possible data is available to researchers and policymakers.

Canadian Cancer Society

Challenge Grants
(CHA-22)

Dr Arash Zarrine-Afsar, Techna Institute – UHN

Analyzing brain tumours in 10 seconds to help guide surgeons in real-time

Dr Zarrine-Asfar is developing a technique to give surgeons real-time information about brain tumors while they are operating on them to help guide their decision-making.

Brain tumours are common in children, and many children with brain tumours undergo surgical resection of their tumour as part of their treatment. At the moment, limited information is available to neurosurgeons during surgery to help guide the resection. With funding provided by the Canadian Cancer Society, Dr Zarrine-Asfar previously developed a way to extract and analyze cancer tissue in just 10 seconds using a laser that can quickly examine a particular type of pediatric brain tumour called medulloblastoma. Dr Zarrine-Asfar will now lead a team to adapt this method to work on different types of childhood brain tumours, with the aim of progressing to clinical trials. If successful, this technique will allow surgeons to make quick decisions about how aggressively to remove a brain tumour based on analysis of the tumour type. In some cases, it may mean that they decide to preserve more healthy surrounding tissue, minimizing side-effects, and in other cases the surgeon may decide to remove the tumour more aggressively to give the patient a higher chance of a better outcome. This technique has the potential to improve treatment and quality of life for children with brain tumours.

Dr Laurie Zawertailo, Centre for Addiction and Mental Health

Can synchronizing attempts to quit smoking with the menstrual cycle result in greater success?

Dr Laurie Zawertailo will study over 1,000 people to see whether attempts to quit smoking are more successful at different times during the menstrual cycle.

Smoking is the leading preventable cause of cancer in Canada. Quitting can dramatically reduce the risk of cancer, but despite this, many people still struggle to give up tobacco products. With support from the Canadian Cancer Society, Dr Zawertailo is investigating whether advising individuals to quit at a particular time during their menstrual cycle might lead to them to be more successful. The research team will determine whether people are more successful at quitting when levels of 2 specific hormones are higher or lower. Over 1,000 participants will enroll in an online program that provides behavioural support and nicotine replacement therapy. The group will be guided to synchronise their quitting attempts at different stages of their menstrual cycle and the researchers will analyse whether there is any correlation between hormone levels and success in quitting. If synchronising quitting attempts with menstrual cycle phases increases the chance of success, this will be a low-cost and simple way to help people quit smoking and reduce their risk of several types of cancer.