



April 2016 (INNOV16-2) Competition Awarded Innovation Grants

Listed by panel in alphabetical order

I1a Biomarkers and Genomics

Bratman, Scott

Princess Margaret Cancer Centre - UHN

Early detection of tumour response for adaptive therapy in oropharynx cancer

Mouth and throat cancers are typically treated with intense radiation. Some patients probably only need a lower dose of radiation, which could spare them from unnecessary side effects, but identifying these patients is a challenge. Dr Scott Bratman will use a blood test to watch how a patient's cancer responds to radiation in real time. If fewer signs of cancer are found in blood samples partway through the treatment, subsequent treatments could use a lower radiation dose. This could change how treatment decisions are made and reduce radiation-related side effects.

Rosen, Kirill

Dalhousie University

Exosomal Perp emission in response to targeted breast cancer therapy: diagnostic implications

Lapatinib (Tykerb) slows breast cancer in some, but not all, women. Doctors need a simple way to predict which women will respond to lapatinib and to monitor whether the treatment is working. Dr Kirill Rosen found that lapatinib-susceptible breast cancer cells shed tiny particles containing a protein called Perp. He will now study Perp particles in the blood of mice and humans with breast cancer and link it to their response to lapatinib. This could help ensure that women with breast cancer get the best personalized treatment.

Zadeh, Gelareh

The Toronto Hospital (Western Division) - UHN

Exploring the role of R/S-2HG as a biomarker for optimizing glioma resection and understanding glioma microenvironment heterogeneity

Patients with gliomas – tumours in the brain and spinal cord – typically undergo surgery. The amount of tissue to remove must be balanced with the need to preserve brain function. Gliomas that have mutations in IDH genes may have better outcomes than those with normal IDH. Dr Gelareh Zadeh is developing a new test to rapidly detect which version of IDH a person with a glioma has while they're undergoing surgery. This will help surgeons tailor how much tissue to remove, with the goal of limiting potential side effects of treatment.

I1b Gene Regulation and Cell Biology

Fahlman, Richard

University of Alberta

The N-terminal program: a novel branch of N-terminal-dependent protein degradation that can destabilize large fractions of the cellular proteome

A cell's DNA is like its blueprint. The cell's proteins are like its workers, carrying out the blueprint's instructions. While protein turnover is normal, some proteins are destroyed faster than usual in cancer cells, especially when they have to grow in stressful conditions. This changes the balance of protein workers and promotes cancer spread and drug resistance. Dr Richard Fahlman will determine the rules of protein destruction in breast cancer cells. This work could reveal new ways to prevent drug resistance in cancer and combat cancer spread – 2 of the biggest hurdles in cancer treatment.

Stanford, William

Ottawa Hospital Research Institute

Inducing synthetic lethality in refractory acute myelogenous leukemia (AML)

Acute myelogenous leukemia (AML) is the most common blood cancer in adults. Unfortunately, about a third of people with AML don't respond to their primary treatment, leading to poor survival. Dr William Stanford found that most of these resistant AMLs are missing a specific protein. He will now study which other genes enable this form of AML to resist chemotherapy. This will identify genes that can be targeted as a novel way of treating these aggressive leukemias.

Yamanaka, Yojiro

McGill University

Elucidating epithelial homeostasis in the oviduct/fallopian tube as cells of origin in high-grade serous ovarian cancer

Women with ovarian cancer face a big challenge because these cancers are often diagnosed late and are hard to treat. Researchers have made the surprising discovery that many ovarian cancers form from cells from the nearby fallopian tube – not the ovary itself. Dr Yojiro Yamanaka will study the mystery of how these cells move from the fallopian tube to the ovary and become cancerous. Understanding how ovarian cancer starts will help us learn how to prevent it, diagnose it earlier and find new ways to treat it.

I2 Imaging and Technology Development**Zheng, Gang**

Princess Margaret Cancer Centre - UHN

Nature-inspired smart nanoparticles for image-guided photodynamic therapy of head and neck cancer

Treatment for head and neck cancers can leave patients with debilitating side effects due to the important functions of the tissues in this area. A new kind of cancer therapy that uses light – photodynamic therapy (PDT) – might spare normal tissue from damage. Dr Gang Zheng will develop a new PDT for cancer inspired by a reaction that some bacteria use in nature to convert light into chemical energy. He will test this therapy in animal models of oral cancer in a step toward an effective new treatment that preserves quality of life.

I3 Immunology, Signalling and Stem Cells**Ferguson, Sarah**

Princess Margaret Cancer Centre - UHN

Targeting the immune microenvironment of microsatellite instable non-serous ovarian carcinoma

Women with ovarian cancer have very few treatment options. Some ovarian cancers have a defect in their ability to repair damage to their DNA, which leads to the accumulation of many mutations. More mutations may in fact provide more opportunities for the immune system to recognize and attack these cancers. Dr Sarah Ferguson will study the interplay between ovarian cancers and immune cells to establish whether tumours with defective DNA repair would be good candidates for immunotherapy – therapy that leverages the immune system to attack the cancer. This could lay the groundwork for future clinical trials.

Thibodeau, Jacques

Université de Montréal

Novel tumour suppressive functions of the MARCH1 E3 ubiquitin ligase

Obesity puts people at risk of developing cancer, which may occur through its effects on inflammation in the body. Dr Jacques Thibodeau is studying the link between obesity, inflammation and liver cancer. He has identified an enzyme that may protect the liver from cancer by turning down obesity-associated inflammation. In this project, he will study how the enzyme works in greater detail. This could shed light on new ways to prevent and treat liver cancer, especially in high-risk individuals.

I4 Novel Therapeutics**Lange, Philipp**

University of British Columbia

Proteolytic protein termini as a new strategy for cancer cell-specific therapy

While advances in treatment have improved childhood cancer survival, current treatments can still lead to serious side effects and long-term health issues. New treatments that spare normal tissues from damage are needed. Dr Philipp Lange will explore protein fragments that are formed only in some childhood leukemias (but not in normal cells) and whether they can be targeted with new treatments. This could lead to a new class of therapies with fewer side effects to improve quality of life for children facing leukemia.

Senger, Donna

University of Calgary

Targeting neutrophil recruitment in cancer metastasis

Osteosarcoma is the most common type of bone cancer and most often affects children and adolescents. Once the cancer spreads to other organs like the lungs, it becomes extremely difficult to treat. Dr Donna Senger will study how certain immune cells are exploited by osteosarcoma cells to help them spread to the lungs. To do this, she will track single cancer cells as they travel through the body in mice. She will also test whether a new molecule that dampens

the immune response can help prevent the spread of this cancer. This work could lead to a new treatment to help more young people survive bone cancer.

Sidhu, Sachdev

University of Toronto

Manipulation of the erythropoietin signalling pathway by protein-engineered variants for anemia therapy in the oncology clinic

Anemia occurs when there aren't enough red blood cells to carry enough oxygen to tissues. People with cancer often suffer from anemia after chemotherapy, severely impacting their quality of life. Anemia can be treated with a hormone called erythropoietin (EPO), but since EPO may also promote the growth of some tumours, it may be withheld from some cancer patients. To solve this dilemma, Dr Sachdev Sidhu will develop an artificial molecule that increases red blood cell production like EPO but avoids its undesirable side effects.

I5 Prevention and Quality of Life

Barbera, Lisa

Sunnybrook Research Institute

What is the impact of a provincial program to screen for symptoms on health service use?

Since 2007, all people with cancer receiving care at regional cancer centres in Ontario can fill out a standardized questionnaire about their symptoms before seeing their healthcare providers. Dr Lisa Barbera will study people who use this tool compared to people who haven't used it. She will track how often users and non-users need to visit the emergency room and hospital, at what point in their treatment they are referred for palliative care and how much their care costs. If this study reveals that routine symptom screening can improve patient outcomes and decrease the burden on the healthcare system, it would provide the evidence to use this program more often and more broadly.

Courneya, Kerry

University of Alberta

Exercise during neoadjuvant rectal cancer treatment: the EXERT trial

People with rectal cancer are treated with radiation and chemotherapy to shrink their tumour before removing it with surgery. Unfortunately, these therapies can have physical and emotional side effects that can sometimes hinder patients from completing or recovering from their treatment. Dr Kerry Courneya will lead a clinical trial to determine if exercising during and after radiation and chemotherapy can help counter some of these side effects. If successful, this could identify a safe and affordable way to improve outcomes in rectal cancer.

Edelstein, Kim

Princess Margaret Cancer Centre - UHN

Does exercise improve progression-free survival in glioblastoma? A prospective single-arm intervention trial

Glioblastoma is a very aggressive form of brain cancer that can affect people's thinking, personality and physical abilities like mobility and strength. Dr Kim Edelstein will lead a pioneering study to test whether personalized home-based exercise programs can help delay cancer progression, improve daily functioning and enhance quality of life in people with glioblastoma. If successful, these programs could significantly change the experience of having this hard-to-treat brain cancer, allowing patients to live better, longer lives.