October 2016 (INNOV17-1) Competition Awarded Innovation Grants
Listed by panel in alphabetical order

I1a   Biomarkers and Genomics

Done, Susan
Ontario Cancer Institute/Princess Margaret Cancer Centre
Heterogeneity and immune response in breast cancer
The immune system plays a key role in eliminating cancer in the body, and immunotherapies have been developed to boost its attack. However, there is still much to be learned about how this attack is coordinated and how it is influenced by different tumours. Dr Susan Done will study how the immune system responds to an aggressive form of breast cancer in women whose tumours have spread. She will also develop a test to help predict how each tumour will behave. This research could improve immunotherapies and guide treatment decisions for this hard-to-treat form of breast cancer. This grant is funded in partnership with the Institute for Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

Kleinman, Claudia
Jewish General Hospital
Novel biophotonic tools for understanding breast cancer metastasis signalling
Many cancer deaths are due to the cancer spreading to other organs through a process called metastasis. The final step in this process relies on the cancer cells' ability to learn to survive and grow in an entirely new tissue. Dr Claudia Kleinman will study what makes some breast cancer cells able to grow alongside liver cells using a new laser technique for labelling and capturing single cells for analysis. This could reveal changes in gene activity that allow breast cancers to spread to the liver, which may identify new therapeutic strategies to block this process.

Reimand, Jüri
Ontario Institute for Cancer Research
Integrative discovery of ion channels as drug targets in glioblastoma
Many different diseases are treated with drugs that act on tunnels that pass through the cell's surface that allow it to generate electrical signals. So far, these channels have not been the target of cancer drugs. Dr Jüri Reimand will identify which channels are abnormal in cancer and can be targeted with drugs currently used to treat other diseases. He will then study the role of these channels in glioblastoma – an aggressive form of brain cancer – and test promising drugs in the lab. This could rapidly lead to new therapeutic options for hard-to-treat brain cancer. This grant is funded in partnership with Brain Canada with the financial support of Health Canada.

Ross, Colin
University of British Columbia
Preclinical therapeutic development of targeted cardioprotectants for use in cancer patients receiving anthracycline chemotherapy
While chemotherapy can be highly effective, all treatments have side effects. By minimizing their "off-target" impact on healthy normal cells, they can be made safer. One widely used type of chemotherapy causes life-threatening heart damage in some people. Dr Colin Ross found that activating a gene using an existing drug can protect rat heart cells from damage in the lab. He will now test and optimize this treatment in human heart cells and other lab models. This approach could eventually improve cancer treatment and enhance patients' quality of life.

Steidl, Christian
BC Cancer Agency (Vancouver)
Deciphering the cellular crosstalk in the tumour microenvironment of classical Hodgkin lymphoma
Hodgkin lymphoma is a form of blood cancer that typically arises in young adults. While many can be cured with chemotherapy, for about 30% of patients this is not the case. Hodgkin lymphoma growth is affected by the microenvironment surrounding the cancer, including normal immune cells. Dr Christian Steidl will use 2 novel technologies to study the nearby immune cells and learn whether the cancer actively manipulates its surroundings. These new biological insights could help guide cancer treatment.

Tai, Isabella
University of British Columbia
Targeting tumour initiating cells in hepatocellular carcinoma to identify novel approaches in patient management
Liver cancer has one of the lowest survival rates of all cancer types in Canada. Advances in treatment have been hampered by a need to avoid repeated liver biopsies to gather tissue for research, since biopsies can promote cancer spread. Instead, Dr Isabella Tai will capture liver cancer stem cells that make their way into the blood to study the genetic changes that allow the tumour to develop and evolve. This may lead to new diagnostic tests to detect liver cancer earlier and could identify new therapeutic opportunities. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes of Health Research (CIHR).

I1b   Gene Regulation and Cell Biology

Aldape, Kenneth
Princess Margaret Cancer Centre - UHN
Molecular characterization of transcriptional repressor capicua (CIC) in glioblastoma
The capicua (CIC) protein acts as a brake on cell growth in normal cells. This brake is often lost in glioblastoma, an aggressive form of brain cancer, but little else is known about its role in cancer. Dr Kenneth Aldape will study the impact of CIC loss in glioblastoma and whether this can cause resistance to therapies that have so far had disappointing results in patients. Understanding these new aspects of brain cancer biology will help researchers develop new treatments for these hard-to-treat tumours. This grant is funded in partnership with Brain Canada with the financial support of Health Canada.

Giguere, Vincent
McGill University
A nuclear mTOR/DNA-PK complex: interaction with chromatin and its impact on prostate cancer
We need to think outside the box to better understand how prostate cancer develops and how to target it with new treatments. Dr Vincent Giguère discovered how 2 proteins work together in a new way to fuel cancer growth and spread. He will now develop lab models to study how these proteins act in hard-to-treat forms of prostate cancer and test new ways to block their activity. Uncovering more about these proteins could lead to innovative new cancer treatments.

Gray, Douglas
Ottawa Hospital Research Institute
A novel therapeutic target for metastatic lung cancer
Lung cancer is often detected after it has spread, and new treatments are needed to improve its poor survival. Dr Douglas Gray discovered USP4, a protein that helps lung cancer cells spread to the brain. He will now study how USP4 is controlled in the cell and will determine if any approved drugs can block it. These existing drugs would be prime candidates for continued study as treatments to prevent lung cancer spread. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes of Health Research (CIHR).

Hakem, Razqallah
Princess Margaret Cancer Centre - UHN
Breast cancer associated with BRCA1 mutations: synthetic lethality and therapeutic implications
Women who inherit mutations in the BRCA1 gene have a much higher risk of developing aggressive breast tumours that have limited treatment options. Dr Razqallah Hakem discovered that inactivating 2 specific proteins protects mice against this form of breast cancer. He will now study how this protection occurs and how the proteins impact the response of breast cancers to therapy. This research will reveal whether the 2 proteins are promising targets for the development of new breast cancer treatments.

Kim, Philip
University of Toronto
Developing inhibitors against c-Myc
Researchers are thinking outside the box to develop innovative new cancer treatments. Transcription factors like c-Myc are proteins that switch genes on and off in the cell's DNA. Overactive c-Myc drives many cancers, but attempts to develop drugs to block it have had little success so far. Dr Philip Kim will integrate several innovative technologies in a new strategy to develop a drug that blocks how c-Myc interacts with DNA. If successful, this could define a new class of cancer treatments targeting transcription factors.

I2 Imaging and Technology Development

Beauregard, Jean-Mathieu
Laval University
Upregulating expression of somatostatin receptors to enhance peptide receptor radionuclide therapy for neuroendocrine tumours
Neuroendocrine tumours develop from cells that release hormones in response to signals from the nervous system. They are often detected late, when they are very hard to treat. A new treatment called peptide receptor radionuclide therapy (PRRT) uses radioactive drugs that specifically target tumour cells. PRRT has shown promise in clinical studies, but there is still room for improvement. Using realistic mouse models, Dr Jean-Mathieu Beauregard will test whether he can boost the effectiveness of PRRT by priming cancer cells with chemotherapy. If successful, this could change the outlook for many people facing neuroendocrine cancers.

Chan, Warren
University of Toronto
Increasing nanoparticle tumour delivery efficiency
Tiny nanoparticles designed to carry cancer-fighting drugs to tumours have shown promising activity in the lab, but delivering enough of them to the tumour site remains a challenge. If nanoparticles are injected into the body, most of them get trapped and removed by cells in the liver. Dr Warren Chan will test a new way to improve nanoparticle delivery. It involves using a drug to partially block liver clearance, followed by the nanoparticles. This research will help Dr Chan design new nanoparticles that will be more effective by increasing the number that reach the tumour site.

Cunningham, Charles
Sunnybrook Research Institute
The feasibility of hyperpolarized 13C-Pyruvate MRI for monitoring patients with intracranial metastasis
Surgery and radiation are standard treatments for cancer that has spread to the brain. Recent research has revealed that cancer cells with high levels of the chemical lactate are aggressive and resist radiation therapy. Dr Charles Cunningham will study whether an enhanced imaging method that can detect lactate can help predict how cancer in the brain will behave. He will compare it to other routine imaging techniques used to assess patients before brain radiation therapy. This new method may help tailor treatment plans to prolong survival. This grant is funded in partnership with Brain Canada with the financial support of Health Canada.

Geyer, Clarence
University of Saskatchewan
Using synthetic antibody parts to construct antibody-based imaging devices: anti-EGFR molecular targeted imaging probes for diagnosing and monitoring glioblastoma
Diagnostic features of glioblastoma, an aggressive form of brain cancer, are difficult to visualize using standard medical imaging techniques. Given that glioblastoma cells display high levels of the EGFR protein on their surface, Dr Clarence Geyer will generate new imaging molecules that can detect EGFR in glioblastoma and display it on a positron emission tomography (PET) scan. These imaging tools could be used to improve glioblastoma detection and diagnosis and to guide surgery. This grant is funded in partnership with Brain Canada with the financial support of Health Canada.

Ravi, Ananth
Sunnybrook Research Institute
MOLLI: magnetic occult lesion localization and imaging
Many women with early-stage breast cancer have tumours that are too small to be felt or seen by eye during surgery. For this reason, small wire or radioactive markers are implanted into the breast near the tumour when it is scanned using imaging to mark the tumour location for later surgery. This can cause discomfort and undesirable radiation exposure. Dr Ananth Ravi will develop and test a new magnetic marker that avoids these pitfalls. Successful translation of this marker to the clinic could improve both the cosmetic and therapeutic outcomes of surgery in women with early breast cancer and improve their overall experience.

I3 Immunology, Signalling and Stem Cells

Boudreau, Jeanette
Dalhousie University

Development of natural killer cell–based precision immunotherapy for pancreatic cancer
Pancreatic cancer has a poor survival rate and limited treatment options. Each person's tumour is unique, as is their immune system's ability to fight it. Dr Jeanette Boudreau will study how immune cells called natural killer (NK) cells interact with pancreatic tumour cells to predict if certain NK cells with specific features will be more effective at killing an individual's pancreatic cancer. She will then test these matched NK cells as an immunotherapy in mice. This could lead to an innovative new therapy for pancreatic cancer. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

Delisle, Jean-Sebastien
Hôpital Maisonneuve- Rosemont
Resident memory T cells as a new tool for adoptive T-cell therapy
Cancer immunotherapies are designed to teach immune cells to mount an attack on tumours throughout the body. The success of this approach hinges in part on how many immune cell "soldiers" can travel to the site of the tumour and invade its structure. Dr Jean-Sébastien Delisle will train mouse immune cells in the lab to be better at infiltrating tumours when injected into mice with cancer to control tumour growth. If successful, this could lead to new immunotherapies for further clinical testing.

Hoang, Trang
Université de Montréal
Dual molecular functions of LMO2 as a master oncogene in T-cell acute lymphoblastic leukemia
Acute lymphoblastic leukemia (ALL) is the most common childhood cancer and also affects adults. To develop new treatments for ALL, researchers need to understand more about how this aggressive blood cancer develops. Dr Trang Hoang has found that the LMO2 protein may be involved in the earliest steps in ALL development. She will now use state-of-the-art technologies to study how LMO2 may act as a master switch to turn normal blood cells into pre-leukemic cells. Insight into this new cell biology may ultimately lead to new therapies.

Smith, Matthew
Université de Montréal
Real-time surveillance of multiplexed, reversible cancer signalling markers in perturbed RAS networks
Tumour growth can be driven by mutations in cancer proteins like RAS. These mutations have a domino-like effect on cell signalling pathways, leading to complex molecular "rewiring." Instead of studying each abnormal change individually, Dr Matthew Smith will use a new technology to simultaneously study the diverse molecular changes that arise from cancer-causing RAS. This may help answer why RAS has historically been difficult to block with drugs and could identify opportunities to develop new cancer treatments. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

Wan, Yonghong
McMaster University
Enhancement of adoptive cell therapy by oncolytic vaccines
In one form of immunotherapy, immune cells are taken from the patient, trained to fight their own cancer cells in the lab and then injected back into their bloodstream to mount an attack. This approach has shown promise for blood cancers in clinical trials. However, treating solid tumours poses additional challenges. Dr Yonghong Wan will combine this form of immunotherapy with a cancer-fighting virus to boost the immune attack and enhance the number of immune cells that reach solid tumours. If successful, this could make substantial progress in the field of immunotherapy.

I4   Novel Therapeutics

Di Noia, Javier
Institut de recherches cliniques de Montréal
A novel enzyme capable of metabolizing anticancer deoxycytidine analogs
One of the biggest hurdles to successfully treating cancer with chemotherapy is the emergence of drug resistance. Dr Javier Di Noia proposes that an enzyme called CDADC1 may hold the key to how cancer cells resist a class of chemotherapy drugs meant to interfere with DNA. Almost nothing is known about CDADC1, including how it acts in cancer. Dr Di Noia will test whether it inactivates chemotherapy drugs and if blocking it will restore drug sensitivity. This could identify a new strategy to counteract drug resistance in cancer therapy.

Jiang, Xiaoyan
BC Cancer Agency (Vancouver)
Targeting PAK6, a new target gene of miR-185 in drug-insensitive leukemic stem cells

Despite encouraging advances in the treatment of leukemia, many of these blood cancers resist therapy or come back after initially responding. This is because slow-growing leukemic stem cells (LSCs) escape treatment and replenish the cancer. Dr Xiaoyan Jiang will develop new combination treatments to tackle these cells. She will combine standard treatment with a chemical that blocks PAK6, a protein that is abnormal in drug-resistant LSCs. This new therapeutic strategy could be a key to improving survival in leukemia.

Minchinton, Andrew
BC Cancer Agency (Vancouver)
Delivery and efficacy of targeted monoclonal antibody therapies in cancer: opportunities for therapeutic gains
Large drugs like trastuzumab (Herceptin), a targeted therapeutic currently approved for breast and gastric cancer treatment, can have difficulty passing through tumour blood vessels in order to reach the cancer cells. This can lead to uneven penetration into the tumour. Dr Andrew Minchinton will attach trastuzumab and similar therapeutics to a protein called transferrin that is easily taken up by cancer cells. He will study whether this improves therapy in mice with breast or ovarian cancer, including those that have spread, which may translate to better treatments in humans.

Pollak, Michael
Lady Davis Institute
Direct inhibition of mRNA translation for treatment of pancreatic cancer
Pancreatic cancer is hard to treat and has a poor survival rate. New therapeutic options are in great need. Dr Michael Pollak has developed a new drug candidate to block how key cancer proteins are made in the cell, crippling aggressive cancer cell growth. It has been designed to enhance its accumulation inside cancer cells to have the strongest effect. Dr Pollak will now test the effectiveness of this potential treatment in a realistic mouse model of pancreatic cancer. This could justify further clinical studies of this promising new therapy. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

Schmitzer, Andreea
Université de Montréal
New biguanides for mitochondrial accumulation and inhibition of cancer progression
Drugs called biguanides have shown promise in their ability to block cancer growth and spread in the lab. This is mediated through their activity in the cell's energy hubs – the mitochondria. Dr Andreea Schmitzer developed new versions of these molecules that home in on the mitochondria better. She will now study how they work in pancreatic tumours in order to make further improvements. This could lead to new treatments to prolong survival in pancreatic cancer. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

Sidhu, Sachdev
University of Toronto
Co-targeting sensitizing integrin receptors and oncogenic growth factor receptors in lung cancer with bispecific antibodies
Abnormal signals from proteins on the surface of lung cancer cells support uncontrolled tumour growth. Blocking these signals is a mainstay of cancer therapy, but tumours often find ways to escape existing drugs. Dr Sachdev Sidhu will identify which pairs of signalling proteins should be blocked together to have the strongest therapeutic effect. He will then design antibodies that can block both proteins simultaneously in an innovative treatment approach for lung cancer. Targeting multiple proteins at once will make it harder for tumours to outsmart the therapy. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

I5   Prevention and Quality of Life

Howell, Doris
Princess Margaret Cancer Centre - UHN
Adaptation, feasibility and acceptability study of the advanced symptom monitoring and management system (ASyMS) mobile health intervention to reduce chemotherapy toxicities in Canadian cancer patients
ASyMS is a mobile technology that will allow cancer patients receiving chemotherapy to track symptoms of their side effects in real time on a cell phone every day. Mild symptoms trigger automated advice on self-care, while severe ones alert a nurse to phone the patient to provide more support. Dr Doris Howell will perform a clinical trial to see whether integrating ASyMS into routine cancer care is feasible and whether it improves patient care. ASyMS could empower patients by involving them in personalizing their care and could improve their quality of life. This grant is funded in partnership with the Institute of Cancer Research (ICR) of the Canadian Institutes for Health Research (CIHR).

Tinmouth, Jill
Sunnybrook Research Institute
Can online physician ratings be used to provide meaningful and actionable patient feedback? A mixed methods feasibility study
Colonoscopies are commonly used to diagnose colorectal cancer, but the quality of these procedures is variable, leading to worldwide initiatives to improve them. The perspective of patients themselves should be considered, but it is difficult to gather this information systematically. Dr Jill Tinmouth will develop a way to extract and analyze data from patients' online ratings and reviews of their colonoscopy doctors to learn how to improve healthcare delivery. If successful, this unique approach of incorporating patient feedback could be expanded to other aspects of cancer care.