



Spring / Summer 2013

Rare tumour study yields new findings to help diagnose and treat **unusual cancers**

What can we learn from studying rare and unusual tumours? It turns out a lot. British Columbia-based cancer pathologist and Terry-Fox funded researcher Dr. David Huntsman is studying these tumours in uterine, ovarian and sarcoma cancers with \$3.1 million in funding as the recipient in 2010 of a three-year New Frontiers Program Project Grant (PPG) from the Terry Fox Foundation.* The program supports research excellence and teams conducting cure-oriented, biomedical research.

The only way you can do this type of research is through a team grant and the New Frontiers Program is Canada's premier, team-science (program) for cancer researchers. It's allowed us to take on a large challenge, something much greater than any of us would have been able to deal with as individual researchers.

– DR. DAVID HUNTSMAN

"If you can imagine cancer as a very complex problem and if you can think of a giant ball of wool and you want to untangle this wool and figure out what's going on, it's very difficult to start from the inside. But, sometimes, you can pick a single thread from the outside and you can start unravelling it, and this is the approach we are taking by studying rare cancers," says Dr. Huntsman. "Rarer tumours offer some real advantages because they tend to be more homogeneous, so it's easier to find what mutation is actually causing that cancer... These cancers can also be keys to unlocking biology which is important for other more common cancers."

Dr. Huntsman says this work is possible due to the development of new technology (genome sequencing) that has enabled researchers to decode cancers and do experiments in a matter of days rather than what previously would have been years. He and team members identified some interesting cancers from a biological perspective that were in dire need of diagnostics and treatments and undertook the work in collaboration with the Genome Sciences Centre at the BC Cancer Agency in Vancouver.

"Even though each of the cancers we are studying are quite rare, when you put them all together they become quite a problem. One of the many reasons it is more important now to study rare entities is that as we personalize care, everybody's cancer becomes a rare disease. So, not just in the specifics of how we are going to manage each type of rare cancer, but in the processes in which we are going to test treatments in rare cancers, this will be the blueprint for how we are going to test the treatments for more common cancers in the future."

His research team has already taken the science beyond where they thought they would be in three years. "One of the major discoveries that we have made in this project already is that we found that a type of endometrial or uterine sarcoma (cancer of uterus), but not of usual type,



Dr. David Huntsman pictured near a sequencing machine in his laboratory in Vancouver.

is characterized by a specific mutation and this has redefined the disease. Though we made the discovery just a few years ago, and it was published just over year ago, it is already being considered the standard diagnostic for that cancer. Furthermore, we are working with colleagues at the University of British Columbia and elsewhere to take this discovery and use it as the basis for new treatments for this cancer."

He says other team members have discovered why certain types of sarcomas, cancer of the bones and joints, (similar to the cancer that Terry Fox had) occur and how best to treat them, and their discoveries are now moving into clinical trials.

"Our team is really grateful for the funding we've received from The Terry Fox Foundation for the past three years and we're very proud of what we've accomplished. We've taken several cancer types which were real diagnostic challenges and we've redefined them and now we're developing new drugs for those and other cancers."

*Project title: *The Genomics of Forme Fruste Tumours: New Vistas in Cancer Biology and Management*

See Dr. Huntsman's video on our YouTube site:
<http://www.youtube.com/user/TerryFoxResearchInst>

The Annual Terry Fox Run Sunday, Sept 15, 2013

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NOTICE

TFRI and the Saskatchewan Health Research Foundation fund fellowship at University of Saskatchewan

TFRI and the Saskatchewan Health Research Foundation (SHRF) have announced Dr. Ayman Mohammad as the first recipient of the Terry Fox Post-doctoral Fellowship held at the University of Saskatchewan's College of Pharmacy and Nutrition. This partnered fellowship brings a top-notch new scientist to Saskatchewan, adding capacity there to tackle the cancer challenge.

The award, won in a highly competitive process, provides \$50,000 a year for two years, allowed Dr. Mohammad to come from overseas to conduct his leading-edge work in Saskatoon, alongside Dr. Azita Haddadi, his fellowship supervisor.

This fellowship supports research excellence and connects Dr. Mohammad to a national team of top researchers across Canada who, through funding from the Terry Fox Foundation, work collaboratively on finding solutions for understanding, diagnosing and treating cancer. - DR. VICTOR LING

We thank the Saskatchewan Health Research Foundation and our supporters in Saskatchewan who participate in our annual school and community runs to raise money to make research possible in important areas like the one Dr. Mohammad is studying – cancer vaccines and immunotherapy,” said Dr. Victor Ling, TFRI President and Scientific Director.

“We are very pleased to have a researcher of Dr. Mohammad’s caliber receive this award,” said June Bold, SHRF chief executive officer.

“SHRF’s Postdoctoral Research Fellowship Program aims to advance

health research careers and research productivity. Our partnership with TFRI, its community of cancer researchers and broader community of survivors, patients and families, provides a unique environment for this promising research.” SHRF is the provincial agency that funds and facilitates health research in Saskatchewan.

Conventional cancer treatments often fail, leading to tumour recurrence. This may be due to an inability of patients’ immune systems to recognize cancer cells as something to attack. Hence, cancer vaccines must be specially designed to stimulate the immune system against cancer. Dr. Mohammad is exploring the use of polymeric nanoparticles as a better way of doing that. These biodegradable particles are attracting scientific attention as potential drug-delivery devices, with a role in targeting specific tissues. Dr. Mohammad’s goal is to generate sufficient evidence to begin testing the approach in human trials.



Dr. Ayman Mohammad at the University of Saskatchewan. Photo credit: Debra Marshall

TFRI partners with Taiwan Science Council

This spring scientists at the National Science Council of Taiwan (NSC) and the Terry Fox Research Institute (TFRI) embarked on studies in three specific areas of cancer research as part of an international scientific collaboration reached between them.

This is the first collaboration entered into by the two parties, paving the way for scientists in both countries to conduct research together for the first time in areas of relevance and expertise.

“This intellectual collaboration brings together the brightest minds from both countries, strengthens the linkages between the best research organizations in both countries, and jointly honours the memory and spirit of Terry Fox,” said TFRI president and scientific director Victor Ling.

The Memorandum of Understanding signed in November 2012 supports scientific collaborations between our scientists valued at up to \$2.5 million over a period of five years. Each country is funding their scientists participating in the projects.

Following is a breakdown of the research teams and projects:

- Leukemia is a cancer of the blood system where there is rapid growth of abnormal white blood cells that accumulate in the bone marrow. Drs. Keith Humphries and Aly Karsan (BC Cancer Agency) and Professor Hwei-Fang Tien and colleagues at the National Taiwan University Hospital will share unique resources on each side to better understand a particular genetic mutation that is found in around 10 percent of Taiwanese patients with acute myeloid leukemia (AML). These research teams hope to develop new diagnostic tests to identify those patients who generally succumb to AML earlier, and who desperately need better treatments.
- Lung cancer. This project will study clinically significant differences in patients with lung cancer living in Taiwan and Canada. Dr. Stephen Lam (BC Cancer Agency) will collaborate with Dean Pan-Chyr Yang of the National Taiwan University Medical College on a number of connected studies. The Canadian team has developed a series of early lung cancer detection

tests which will be tested on patients in Taiwan while researchers in Taiwan have identified a number of interesting genetic markers to detect lung cancer. These teams will share techniques and test new methods to detect lung cancer at an earlier, more treatable stage.

- Two projects in liver cancer are being supported.

» Dr. John Bell (Ottawa Hospital Research Institute) and Professor Pei-Jer Chen at the National Taiwan University College of Medicine will study the use of a novel therapeutic approach called oncolytic viruses (from Canada) to treat liver cancer in the woodchuck (from Taiwan). This group hopes to better understand how the novel therapy works and to find biomarkers to help detect liver cancer earlier.

» Dr. François Benard (BC Cancer Agency) will collaborate with Professor Kai-Yuan Tzen of the National Taiwan University Hospital (NTUH) to produce and compare two promising Positron Emission Tomography imaging agents in liver cancer patients at BCCA and at NTUH to help doctors decide which procedure will help them to more effectively diagnose liver cancer.

Talented and newly funded investigators study cancer **genetics, growth and treatment**

Three exciting young researchers – two in Ontario and one in British Columbia – have been awarded a total of nearly \$1.35 million under the Terry Fox Foundation's New Investigator Awards (2012). The awards are for three years and commenced in November 2012.

The Terry Fox Foundation has supported top new investigators for more than 30 years. A review committee of international scientific experts determines recipients from a pool of talented applicants in a competitive process. Every year, applications are submitted by Canada's best new

researchers and those determined to be the best are selected.

A new feature of the competition in recent years is the pairing of award recipients with scientists recognized in their fields and who are working on Terry Fox-funded discovery or translational research projects. New investigators are matched with funded programs and supported by principal investigators* who have committed to mentoring them and incorporating them into their research teams.

*PI=principal investigator



DR. REBECCA AUER

Where: Ottawa Hospital Research Institute
Project Title: A Personalized Oncolytic Vaccine: Using Oncolytic Viruses to Exploit Neo-Antigens Derived from the Tumour Mutanome
Award: \$450,000
Mentoring Program: TFF-PPG: Canadian Oncolytic Virus Consortium (Dr. John Bell, PI*)

Dr. Auer, a surgical oncologist at the Ottawa Hospital and University of Ottawa assistant professor, is developing a personalized vaccine that is combined with a cancer-fighting virus. The immune system is very good at killing unwanted invaders, like viruses, and can be very effective at killing cancer cells once it recognizes these as foreign. Introducing the vaccine via the virus will allow the immune system to mount a powerful response against both the virus and the cancer itself. This vaccination strategy has all the strength of a viral vaccine but will pinpoint specific mutations found only within a given patient's cancer.

"As a cancer surgeon I am particularly interested in preventing cancer from coming back after cancer surgery and in this project I will use the vaccine around the time of surgery to prevent cancer recurrences," says Dr. Auer.

Dr. Duncan Stewart, scientific director of the Ottawa Hospital Research Institute, says: "Dr. Auer has shown extraordinary initiative in forging links between her laboratory and clinical colleagues. She has an excellent mix of innovation, drive and practicality that allows her to flourish in the challenging career path of a clinician-scientist."



DR. SOHRAB SHAH

Where: BC Cancer Agency
Project Title: Are Genomic Instability and Clonal Diversity Prognostic Indicators of High Grade Serious Ovarian Cancer?
Award: \$449,503
Mentoring Program: TFRI's Pan-Canadian Platform for the Development of Biomarker-Driven Subtype-Specific Management of Ovarian Carcinoma (COEUR). (Dr. Anne-Marie Mes-Masson, PI)

Dr. Shah is an assistant professor at the University of British Columbia and a scientist with the BC Cancer Agency in Vancouver. He is studying the question of whether instability and diversity in ovarian cancer genes can help predict which patients will relapse versus which will respond to chemotherapy and live longer.

"The genetic make-up of high-grade serous carcinomas varies from tumour to tumour," says Dr. Shah. "Within the same tumour, populations of cells can be very different from one another. Our research group recently observed that there are, in fact, global patterns of diversity that exist among this group of tumours."

Dr. Shah's research will study how tumours evolve and why some have this diversity, potentially pointing the way to new avenues for treating the disease and avoiding relapse.

Dr. David Huntsman, medical director at the BC Cancer Agency's Centre for Translational and Applied Genomics (CTAG), says, "Having Sohrab in our research community will empower cancer researchers in British Columbia to be leaders in genomic and other data-intensive research activities for years to come."



DR. GELAREH ZADEH

Where: University Health Network
Project Title: Exploring Novel Mechanisms of Tumour Vascularization in Malignant Brain Tumours
Award: \$449,899
Mentoring Program: TFF-PPG: Terry Fox Program: Genetic Analysis of Signalling Pathways for Vascular Development and Tumour Angiogenesis (Dr Andras Nagy, PI)

A neurosurgeon and scientist with Toronto's University Health Network, Dr. Zadeh is studying how cancerous tumours in the brain create their own blood supply and blood vessel network from bone marrow cells. She proposes to use live imaging to see how tumours grow blood vessels and how they respond to therapy. "Our research focuses on the role of progenitor cells derived from the bone marrow that can help form new blood vessels or provide a supportive role to the existing tumour blood vessels," she says. Research results will identify ways that cancer cells trigger new vessel formation.

"I think the exciting aspect of the research is that it is an entirely new way of looking at how blood vessels form in tumours, which can provide as-yet-unexplored methods of blocking blood supply to the brain tumours," says Dr. Zadeh.

Dr. Hao Ding at the University of Manitoba's Faculty of Medicine says Dr. Zadeh is "well on her way to becoming a recognized independent successful researcher in the field of brain cancer angiogenesis. Her ability as a neurosurgeon to translate her findings into clinical practice places her at an extremely unique and desirable position."



Ottawa meeting highlights

Top: This happy group of runners – mostly funded researchers and clinicians – arose early May 10 in Ottawa, Ontario to participate in the traditional Early Morning Run held annually during the Terry Fox Research Institute's Annual Scientific Meeting (ASM). Held for the first time outside British Columbia, our 4th ASM (May 9-11) brought together 200 members of the Institute under the theme of "The Research Continuum: From Discovery to Outcomes." West Vancouver MP John Weston (second row, fourth from right) and his family were among the early risers and run participants.

Right: Judged the best from among 70 submitted posters, these 10 trainees took top honours for their posters and gave "Quick Fire" presentations of their work. Front (left to right): Simon Gebremeskel, Christine Tam, Elite Possik, Emily Skrastins, Victoria Bentley. Back (left to right): Dale Corkery, Sylvie Noordermeer, Guillaume Tambutet, Liang Zhang, Jean-François Spinella. *Photos: James Park*



TFRI is an institute without walls linking the capabilities of over 50 leading cancer care and cancer research institutes and universities organized through six regional nodes.

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The Terry Fox Research Institute
tfri.ca

This publication is produced by
The Terry Fox Research Institute.

675 West 10th Ave
Vancouver, BC
Canada V5Z 1L3
T 604.675.8222

info@tfri.ca | www.tfri.ca