AUTUMN 2011

IN THIS ISSUE

This Is Your SRI

By Stephanie Roberts

On Thursday, October 13, Sunnybrook Research Institute (SRI) held a Town Hall. **Dr. Michael Julius**, vice-president, research, summarized changes at SRI over the last 18 months. Chief among these are the incorporation of SRI and SRI's new status as a Scientific Research and Experimental Development (SR&ED)-approved institution, but the biggest news was the official unveiling of the new structure of the research institute.

The previous five disciplines—molecular and cellular biology, clinical integrative biology, clinical epidemiology, imaging and combined health services sciences—have been collapsed into three platforms: biological sciences, evaluative clinical sciences and physical sciences.

"This streamlined structure captures the spectrum of activity at SRI, from fundamental discovery through to clinical translation and research that informs policy," said Julius. "We've done away with silos and flattened the playing field."

As part of the reorganization, policies on categories of affiliation, and progression and promotion criteria have been revised. Also updated were role profiles for platform directors and program research directors, with an eye to enabling the directors to work together closely on core SRI functions, such as recruiting scientists and crafting large-scale multidisciplinary grant proposals.

Two of the three platform directors are in place—**Dr. Kullervo Hynynen**, director of physical sciences and **Dr. Don Redelmeier**, director of evaluative clinical sciences. A search for a leader for biological sciences is well underway; for now, **Dr. Juan Carlos Zúñiga-Pflücker** oversees this platform.

Left to right: Drs. Kullervo Hynynen, Don Redelmeier, Michael Julius, Sandra Black and Juan Carlos Zúñiga-Pflücker at the SRI Town Hall held on October 13

The research programs remain the same: Brain Sciences; Holland Musculoskeletal; Odette Cancer; Schulich Heart; Trauma, Emergency & Critical Care; Veterans & Community; and Women & Babies.

Realignment of all SRI scientists to the new grid is underway, and will be ratified by the Research Executive Committee this fall.

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Sunnybrook RESEARCH INSTITUTE

News @ SRI

A Rare Honour

Imaging scientists launch new prize to highlight excellence in undergraduate research

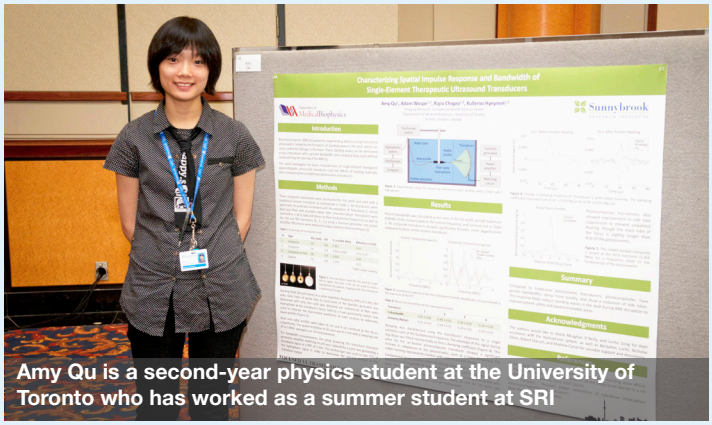
In any research lab, you can find them maintaining equipment, setting up experiments and recording results. Here for the summer or a semester, undergraduate students are a mainstay at Sunnybrook Research Institute (SRI). To acknowledge the hard work done by these investigators-in-training, SRI's physical sciences researchers have established the Sunnybrook Prize, an award saluting outstanding undergraduate research.

"Undergraduates do important work, but sometimes it doesn't link to a paper. Often they are not recognized, and maybe some get discouraged from going into research. So, we wanted to make a prize that would recognize their contribution," says **Dr. Kullervo Hynynen**, director of the physical sciences platform at SRI.

The idea of an undergraduate research prize was conceived last year by SRI's physical sciences faculty who were keen on supporting undergraduate students and honouring their work. After much discussion on the finer points of the award, the Sunnybrook Prize was created.

Physical sciences and engineering students in their final year at a Canadian university who have completed a research project can apply for the award, which comes with a $10,000 cash prize. Ten finalists will be chosen to present their research; the first award will be handed out in January 2012.

The aim of the award is to laud superb undergraduate students in the physical sciences and encourage them to pursue a career in biomedical research. "What's unique about imaging is that we don't have an undergraduate program in medical physics. We don't have a natural stream of students," says **Dr. Rajiv Chopra**, a scientist in physical sciences at SRI. "We want students who may be in the physical sciences who've done a project, but maybe haven't thought of medical imaging as a graduate area to pursue, to give it a second thought."



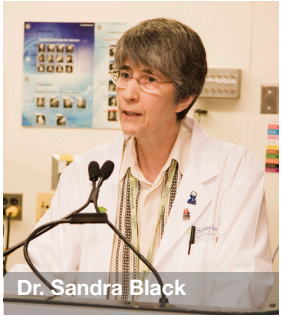
Amy Qu is a second-year physics student at the University of Toronto who has worked as a summer student at SRI

Amy Qu is a second-year physics student at the University of Toronto who has worked as a summer student in Hynynen's focused ultrasound lab. As the winner in imaging at last summer's research project poster competition at SRI, Qu says she looks forward to applying for the Sunnybrook prize in two years and thinks it could help steer her peers toward a research career.

"I think that to intelligent and hard-working undergraduates, an award like this would mean a great boost in confidence about their capabilities in research, hopefully attracting more students towards it as a career," she says.

Hynynen, who is also a professor in the department of medical biophysics at U of T and holder of the Canada Research Chair in Imaging Systems and Image-Guided Therapy, says he anticipates the award will be a "huge motivator" for undergraduates interested in research. For him, mentoring the next generation of medical scientists is not a duty, but a pleasure. "I enjoy working with really smart people, and the students are great because they are enthusiastic. It's fun."—Alisa Kim

Heart and Stroke Foundation Bolsters Stroke Research


Dr. Sandra Black

The Heart and Stroke Foundation announced on September 27, 2011 that it will invest $10 million in the Heart and Stroke Foundation Centre for Stroke Recovery to fund research into stroke treatment and recovery.

Created in 2002, the Heart and Stroke Foundation Centre for Stroke Recovery is a multidisciplinary research centre that brings together the expertise of researchers and clinicians from Baycrest, Memorial University, Sunnybrook Health Sciences Centre, the University of Ottawa and the Ottawa Hospital Research Institute.

Dr. Sandra Black, director of the Brain Sciences Research Program at Sunnybrook Research Institute, leads the Sunnybrook site of the Centre for Stroke Recovery.

The investment will support the centre's research into key areas of stroke recovery including: exercise and brain health; white matter injury, covert stroke and cognitive function; and regenerative approaches to recovery including neurogenesis and cell transplants.

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Julius also gave an update on construction of the Centre for Research in Image-Guided Therapeutics. Sam Marafioti, vice-president of corporate planning and development at Sunnybrook, attended the town hall and spoke to the question on everyone's mind: When will it open? He noted that several key processes need to be completed, including satisfying requirements for infection prevention and control, procuring special equipment for labs, and ensuring that SRI has the operating costs of the space covered. He then gave April 1, 2012 as the new proxy date for complete occupation.

The presentation is available on the SRI section of the intranet (visit www.sunnynet.ca, then go to "Education and Research" and then choose Sunnybrook Research Institute from the drop-down menu). The revised policies and organization chart will be posted soon.

CIHR Backs SRI Scientists


Dr. Elizabeth Asztalos

The Canadian Institutes of Health Research awarded seven Sunnybrook Research Institute (SRI) scientists operating grants totalling $2.9 million through its spring 2011 funding competition.

Dr. Elizabeth Asztalos, an associate scientist in evaluative clinical sciences and the Women & Babies Research Program, was awarded $999,454 over five years to study domperidone—a drug used to boost breast milk production—for mothers who are feeding their preterm infants pumped breast milk.

Dr. Rena Buckstein, an associate scientist in biological sciences and the Odette Cancer Research Program, will receive $100,000 in bridge funding for her project "Myelodysplastic syndromes in Canada: a national prospective study of the epidemiology, quality of life and impact of comorbidity or frailty on disease outcome."

Drs. Krista Lanctôt and **Nathan Herrmann**, researchers in the Brain Sciences Research Program, will receive $394,841 over three years to study the association between ceramides and cognitive decline in coronary artery disease.

Dr. Anne Martel, a senior scientist in physical sciences and the Odette Cancer Research Program, will receive $198,878 over three years to develop a computer technique to correct automatic motion for dynamic contrast-enhanced magnetic resonance imaging (MRI).

Dr. Damon Scales, a scientist in evaluative clinical sciences and the Trauma, Emergency & Critical Care (TECC) Research Program, was awarded $760,947 over four years to study the initiation of a cooling process by emergency medical services on heart attack patients.

Dr. Juan Carlos Zúñiga-Pflücker, interim director of biological sciences and senior scientist in cancer, will receive $439,578 over three years for his research on generating human progenitor T cells with immune-reconstituting potential.

The agency also awarded grants to the following SRI scientists through other competitions.

Dr. Rajiv Chopra, a scientist in physical sciences and cancer, was awarded a one-year proof-of-principle grant worth $147,500 to evaluate MRI-controlled interstitial ultrasound therapy for the treatment of cerebral neoplasms.

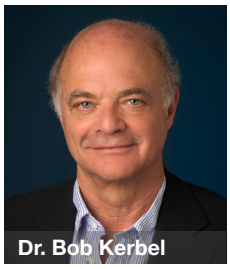
Dr. Robert Fowler, an associate scientist in evaluative clinical sciences and the TECC Research Program, was awarded an operating grant through CIHR's secondary analysis of databases program. He will receive $99,208 over two years to study the quality of end-of-life care in Canada.

Dr. Simon Graham, a senior scientist in physical sciences and the Brain Sciences Research Program, also received a one-year proof-of-principle grant. He was awarded $116,402 to develop a tablet technology for assessing dementia.

Dr. Don Redelmeier, director of evaluative clinical sciences and senior scientist in the TECC Research Program, was also awarded a grant through the databases program. He will receive $97,307 over two years to study whether women who had pregnancies associated with reproductive assistance are at a higher risk of subsequent premature cardiovascular disease.

Dr. Jack Tu, a senior scientist in evaluative clinical sciences and the Schulich Heart Research Program, was awarded a team grant worth $10,000 to measure the quality of care for patients with cardiovascular risk factors or chronic cardiovascular diseases.

SRI Cancer Researcher Gets "Distinct" Praise


Dr. Bob Kerbel

Dr. Bob Kerbel, a senior scientist in biological sciences and the Odette Cancer Research Program, was named a 2011 Man of Distinction by the Israel Cancer Research Fund. The award, which recognizes people who exhibit "leadership, innovation and excellence within their communities and beyond," was presented to Kerbel on October 12, 2011 at the Fourth Annual Men of Distinction Awards in Toronto.

Kerbel, who is the Canada Research Chair in Tumour Biology, Angiogenesis and Antiangiogenic Therapy, was honoured for his cutting-edge research on metronomic chemotherapy and antiangiogenic drugs, both of which aim to make cancer treatments safer and more effective. His discoveries are being tested in clinical trials, particularly in breast, ovarian, colorectal and pediatric cancers.

Major Equipment Competitions Launched

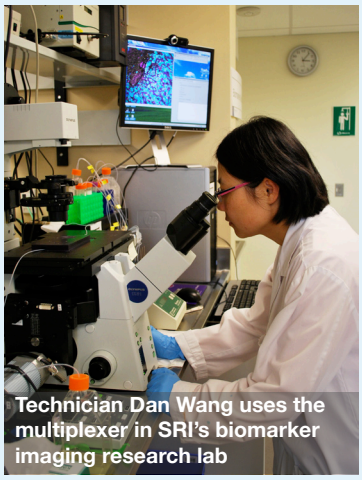
The Canada Foundation for Innovation (CFI) has announced a call for proposals to its Leading Edge Fund (LEF) and New Initiatives Fund (NIF). In addition, the Ministry of Research and Innovation has launched its Ontario Research Fund-Research Infrastructure (ORF-RI), the "matching" program to the LEF and NIF.

The LEF and NIF fund equipment and renovation of space, but not construction of new space. This competition emphasizes LEF proposals, which build on past CFI awards and can show that previous CFI investment has been successful, further investment is timely and the research is at the leading edge internationally.

The CFI will fund up to 40% of a project's cost. Of the remaining budget, 40% is matched by ORF-RI via a separate application. The final 20% must come from the institution. Since there is an externally imposed limit on what we may apply for, Sunnybrook Research Institute applies strict selection criteria in determining which proposals go forward.

Notices of intent are due December 7 for ORF-RI and January 20, 2012 for the NIF and LEF. Contact **Kevin Hamilton**, director of strategic research programs, at khamilton@sri.utoronto.ca to learn more.

Tool Kit: GE Multiplexer


Technician Dan Wang uses the multiplexer in SRI's biomarker imaging research lab

Imaging scientists at Sunnybrook Research Institute (SRI), in collaboration with researchers at GE Global Research Center, are evaluating a prototype for a biomarker imaging system that would be able to take the "fingerprint" of disease in tissue by measuring several molecular markers simultaneously. The GE multiplexer system is part of the biomarker imaging research lab, a core component of SRI's Centre for Research in Image-Guided Therapeutics. Sunnybrook Research Institute alone in Canada has the system.

"The potential this device has and what we're seeing it can do is remarkable," says **Dr. Martin Yaffe**, a senior scientist in physical sciences at SRI and head of the biomarker imaging research lab. "The techniques are in the early stages, but we've looked at many sections of tissue and we're enthusiastic about how this technique might be useful in the future."

The multiplexer produces 2-D histopathological images, which enable researchers to look at various molecules and proteins that tend to be overexpressed in cancer. By studying the presence and correlation of multiple proteins, researchers can gain insight into the nature of the disease, for example, how aggressive or advanced it is—essentially creating a "map" or "signature" of the disease. Although the multiplexer can be used on any tissue that has molecular markers associated with it, scientists have been looking at cancers of the breast, prostate and colon.

This unique device allows researchers to look at multiple areas where a particular biological marker is present. Research staff in the biomarker imaging research lab use pathology slides made up of thin sections of cancerous tissue that are stained one at a time and associated with a fluorescent colour. Each tissue is scanned through the microscope, digitally photographed and stored in a computer program for analysis. This "multiplexing" process is repeated several times and images of each slide are automatically stacked on top of each other in the computer's memory and visually displayed together. As a result, researchers can study different markers that appear in the image, such as estrogen and progesterone receptors found in breast cancer, to determine how best to treat and prevent the disease.

Researchers in other programs at SRI have shown interest in using the system, which has spurred partnerships with pathologists, oncologists and neurologists.

"It's an interesting tool and a nice example of a good collaboration between industry and an academic research lab," Yaffe says.

Sunnybrook Research Institute received the multiplexer for prototype development in July 2010.

CV: Dr. Elizabeth David

Bio basics: An associate scientist in physical sciences and the Odette Cancer Research Program at Sunnybrook Research Institute (SRI). Graduated from medical school at the University of Toronto in 1997 and completed her fellowship in interventional radiology at St. Michael's hospital, Toronto. Has worked as an interventional radiologist at Sunnybrook since 2004.

What is your research focus?

We're trying to see how effective a new machine from Philips is in treating fibroids using high-intensity focused ultrasound ablation, which **Dr. Kullervo Hynynen** [director of the physical sciences platform at SRI, and a pioneer of the technology] has been involved in for many years. With his help, we're trying to see if we can tweak the system to get the best ablation possible for patients with fibroids. We would like to achieve symptom control with significant volume ablation and shrinkage of the fibroid, but in a manner that creates minimal discomfort for the patient. Most of our patients are able to return to work within 48 hours after the procedure. Our embolization patients certainly do not have such a speedy recovery.

That must excite you.

Absolutely. This is the next frontier, where you're moving to doing things through external beams and doing it in a way that's so minimally invasive that you have very little discomfort at the end. Not everything will be amenable to that, but this is another technique where we can basically cook the tumour and get the same effect.

What are the next steps in this research?

We're finishing Phase 1 of the trial, which has 15 patients. We're starting Phase 2 in November or December with 150 patients, pending ethics approval, across multiple sites in North America. With other transducers and other machines, high-intensity focused ultrasound has been proven to be very safe. So it isn't so much a question of safety, it's the efficacy. We're trying to see if this is an effective treatment for fibroids. Is it equivalent to embolization? Is it equivalent to surgical techniques?

If you weren't in medicine, what would you be doing?

I would probably be in engineering. As a radiologist, I'm in a position where I directly see how medical technology improves the quality of patients' lives. I've always been impressed at how important biomedical engineering is within the field of imaging and medicine as a whole. I'm amazed at how fast things have progressed within the course of my training.

What do you enjoy doing outside of work?

I have a four-year-old and a one-year-old. They are the focus of my life right now. It's all about swimming lessons and skating lessons and birthday parties. That's what we do at home. We run around after them.

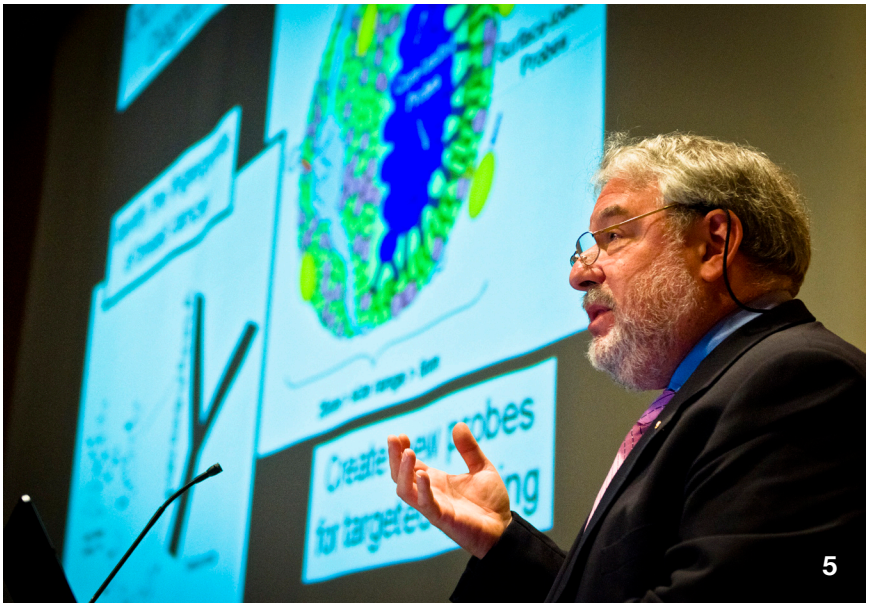
Sunnybrook Research Institute Celebrates Milestone in Imaging Research

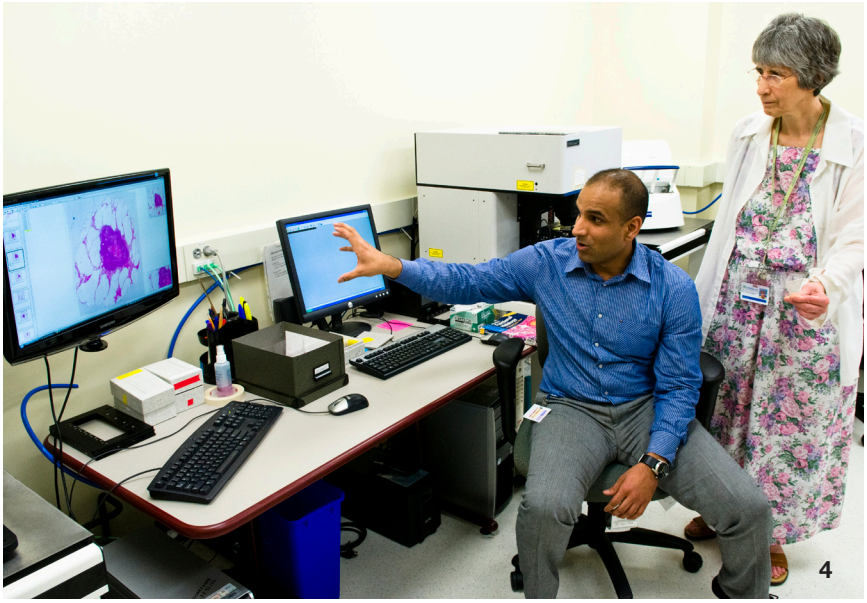
Leading-edge lab will advance innovation in pathology

Sunnybrook Research Institute (SRI) officially opened its new biomarker imaging research laboratory on June 28, 2011. The facility is a core component of SRI's Centre for Research in Image-Guided Therapeutics, the whole of which is set for completion at the end of this year.

The lab, headed by **Dr. Martin Yaffe**, a senior scientist in physical sciences, enables researchers to use 3-D histopathology techniques to advance their work in many clinical areas, including cancer, and diseases of the brain and heart. It brings together scientists and clinicians with expertise in anatomic and molecular pathology; quantitative imaging; surgical, medical and radiation oncology; and probe development.

The Centre for Research in Image-Guided Therapeutics was established with an investment of $57 million from the Canada Foundation for Innovation.





Clockwise from top: 1. Adebayo Adeeko, a technician in the lab of Dr. Martin Yaffe, displays breast tissue samples prepared for sectioning. 2. Yaffe and Dr. Michael Julius, vice-president, research, Sunnybrook, cut the event cake. 3. Technician Dan Wang demonstrates the biomarker multiplexer for guests touring the lab. 4. Technician Taha Rashed shows Dr. Sandra Black, director of SRI's Brain Sciences Research Program, an image of a digitized lumpectomy slide. 5. Yaffe presents his research on biomarker imaging.

For the full story and more photos from the event, visit **www.sunnybrook.ca/research**.

Trainees' Post

For Students and Postdocs

From lab employee to PhD student: getting a head start

Behrouz Moemeni is unlike most graduate students in that his experience working in a hospital-based research lab gave him a head start in his graduate studies and the field of academic research—rather than the other way around, as is typical.

After graduating from the University of Toronto with an honours bachelor of science degree in cell and molecular biology, Moemeni secured a position as a research technician in the lab of **Dr. Michael Julius**, vice-president of research at Sunnybrook Health Sciences Centre and Sunnybrook Research Institute (SRI), and senior scientist in biological sciences at SRI. Two years later, Moemeni became an interim research associate in Julius's lab; in this role, he managed the lab and did experiments. At that point, Julius encouraged him to pursue graduate studies and continue his research project in T cell signalling.

Heeding that counsel, Moemeni enrolled in the PhD program in the department of immunology at U of T in January 2008. He is now a fourth-year PhD student supervised by Julius.

Behrouz Moemeni is a fourth-year PhD student in the lab of Dr. Michael Julius, vice-president of research, Sunnybrook

Here, Moemeni tells **Eleni Kanavas** about his work experience and transition into graduate studies.

What led you to pursue a career in science?

I love solving puzzles! Working in a research lab is like solving puzzles and it's very interesting to me. There's something new every day. Sometimes you think you're going in one direction, but you find something new and might end up somewhere else.

How did you end up at Sunnybrook Research Institute?

When I graduated [from] university, I was thinking about medical school, but I wasn't sure. I did a fourth-year project at Princess Margaret Hospital, and then I found a job here at SRI as a research technician. I was working with Michael, and after a few years he encouraged me to go to graduate school because he recognized my passion for research and I was already doing the work in his lab.

How was the transition going from employee to graduate student?

As a technician, I learned a lot of background information related to immunology and about various biochemical and cell and molecular techniques. This made designing and conducting experiments as a graduate student a lot easier as I was already proficient in the necessary hands-on laboratory techniques.

What is the focus of your research project?

The focus is the examination of proteins involved in the activation of a specific subset of immune system cells, called T cells. Our studies have indicated the importance of two proteins involved in the activation of T cells, and hence the development of an appropriate immune response to pathogens and other foreign substances. We have shown that T cell activation depends on the activation of one of these proteins, which can then physically interact with the second protein leading to its activation. We now have evidence that these two proteins retain unique and interdependent roles in T cell activation, and that the absence of one or the other results in an impaired immune response.

Why is your research project important?

Our understanding of the interaction of these two proteins would enable the design of small molecules to either enhance or impede their interaction, that in turn will either enhance or inhibit T cell activation. This would lend itself to potential therapeutic impact in circumstances of immunodeficiency and vaccine delivery, or inflammatory diseases.

What advice do you have for other students?

First, they need to figure out what they want to do with their lives and why. If research is of interest, then I recommend spending at least six months in a laboratory prior to pursuing a graduate degree. When applying to graduate school, finding a good supervisor is more important than the type of research. I believe it's essential to work with an established supervisor whose personality is compatible with that of the student's.

What's next for you?

My focus is on finishing my PhD. I'd like to do academic research, but I'm keeping all options open, and everything is on the table.

Would you trade this experience for anything else?

No. It's been a really good experience with a lot of learning and growing up in the past few years, especially since I started my PhD. If someone likes learning, they would love doing a PhD program.

Applause

Dr. David Gladstone
Ministry of Research and Innovation Early Researcher Award

The Ministry of Research and Innovation awarded **Dr. David Gladstone**, a scientist in the Brain Sciences Research Program, an Early Researcher Award. The highly competitive prize recognizes researchers who show great promise in their early careers, and provides them with support to build a research team. Gladstone and his colleagues are developing an image-guided emergency treatment protocol for patients with bleeding in the brain.

Dr. Stanley Liu
Prostate Cancer Canada Clinician Scientist Award

Dr. Stanley Liu, a scientist in biological sciences at Sunnybrook Research Institute and radiation oncologist in the Odette Cancer Research Program, received a Clinician Scientist Award from Prostate Cancer Canada. The award, worth $300,000 over two years, recognizes outstanding researchers and provides support for their research in the prevention and treatment of prostate cancer. Liu will use the funds to study notch inhibition and radiotherapy as a novel way to treat prostate cancer.

Dr. Chlöe Milsom
Canadian Institutes of Health Research Fellowship

The Canadian Institutes of Health Research awarded **Dr. Chlöe Milsom** a fellowship worth $90,000 over two years. Milsom is a postdoctoral fellow in the lab of **Dr. Robert Kerbel**, a senior scientist in biological sciences. She will use the funds to study the impact of chemotherapy-induced activation of platelets on therapeutic efficacy outcomes.

Sunnybrook Research Institute Celebrates Summer Students at Poster Competition

By Eleni Kanavas

Forty-two summer students presented their hospital-based experiments at the annual Best Summer Research Project competition sponsored by Sunnybrook Research Institute (SRI). The event took place August 18, 2011 at Sunnybrook Health Sciences Centre.

It was the last one to be organized using the "old" discipline structure.

Students showcased their discoveries to judges and onlookers with posters that illustrated and explained the research methods, observations and results of the experiments they developed with their supervisors.

Through hands-on research training, the four-month summer student program gives students an opportunity to conduct intensive research in the labs and work with SRI scientists. The placements aim to provide high school and university students a unique research experience that promotes the postgraduate environment as a prospective career in science.

This year's competition represented the disciplines of clinical epidemiology (CE), clinical integrative biology (CIB), imaging, and molecular and cellular biology (MCB). Of the 42 entries, six were from CE, 23 from CIB, seven from imaging and six from MCB. Judges from each of the disciplines selected a winner. Four students took top honours. There were second-place and third-place winners in CIB due to the number of participants in this discipline.

"The posters we see here today are very high quality and students are doing a variety of work that is interesting and quite impressive," said **Dr. Yana Yunusova**, an associate scientist in CIB who was one of the judges. "This is a training opportunity for students to see what you can do in research, and the goal is to teach them what research is all about."

Dr. Michael Julius, vice-president of research at Sunnybrook, congratulated the students on their hard work and announced the winners at the end of the event.

Fahima Dossa, who was supervised by **Dr. Sandra Black**, director of the Brain Sciences Research Program, placed first in CIB. Dossa is a second-year medical student at Queen's University in Kingston, Ontario, and has been working in Black's lab for the past two summers.

"Through this experience, I had the opportunity to learn about novel techniques in imaging research, as well as build on my understanding of various neuropsychiatric test measures," Dossa said. "Members of my lab were extremely supportive and always ready to lend a hand or an explanation when one was needed."

Takeshi Goda travelled from Kyoto, Japan to participate in the summer research program. Supervised by SRI scientist and oncologist **Dr. Urban Emmenegger**, Goda placed first in MCB. He is a fourth-year medical student at Kyoto Prefectural University of Medicine.

"I'm very happy and surprised to win this award," Goda said. "My experience working at Sunnybrook this summer has been the most memorable, and I had a lot of fun presenting my poster to everyone today."

For the full story visit **www.sunnybrook.ca/research**. See last page for a photo of the winners.

WHAT'S ON

October 31
6th Annual Cancer Research Day
9:00 a.m.–3:00 p.m.
Sunnybrook Health Sciences Centre
Jenkin Auditorium, TB 21

November 14–15
CIHR Symposium: Novel Cancer Therapies and Innovations in Treatment Monitoring
Sunnybrook Health Sciences Centre
Vaughn Estates

December 15–16
Pregnancy and Birth: Current Clinical Issues Annual Conference
Sponsored by the Centre for Mother, Infant and Child Research, SRI
Marriott Toronto Downtown Eaton Centre
525 Bay Street, Toronto

November 10
CeRIGT Research Day
8:30 a.m.–4:15 p.m.
Sunnybrook Health Sciences Centre
Harrison Hall, EG 21

November 23
Schulich Heart Program Research Day
Sunnybrook Health Sciences Centre
Harrison Hall, EG 21

Editor: Stephanie Roberts
Contributors: Eleni Kanavas, Alisa Kim
Photography: Eleni Kanavas, Doug Nicholson and Dale Roddick

Nexus **is published by the office of communications, Sunnybrook Research Institute: www.sunnybrook.ca/research.**
We welcome your suggestions. Please send them to Eleni Kanavas at eleni.kanavas@sri.utoronto.ca.

Winners from SRI's Best Summer Research Project competition held on August 18, 2011 (left to right): Takeshi Goda, Raman Tatla, Tiffany Scarcelli, Hamid Ebrahimi, Fahima Dossa and Amy Qu.