Bringing Research to LIFE

Upcoming Events

How Your Immune System Helps—and Harms—You

Dr. Kent T. HayGlass

Recipient of the 2012
Dr. John M. Bowman Memorial
Winnipeg Rh Institute
Foundation Award

Canada Research Chair
in Immune Regulation
Professor, Immunology

March 27
7 pm

Robert B. Schultz Theatre
St. John's College
Fort Garry Campus

Visionary Conversations

Global Pandemic: Another Y2K or Future Apocalypse?

Talk of the inevitability of a global pandemic abounds in popular media. Is it necessary? Are we prepared? Learn about the science behind the hype from our experts and join the discussion.

April 17

Frederic Gaspard Theatre
Basic Medical Sciences Building
Bannatyne Campus

Reception in Buhler Atrium
6:30 – 7 pm
Panel discussion
7 – 8:30 pm

Featured speakers:

Frank Plummer – Canada Research Chair in Resistance and Susceptibility to Infections, Faculty of Medicine

Michelle Driedger – Canada Research Chair in Environment and Health Risk Communication, Faculty of Medicine

Anand Kumar – Associate Professor, Medical Microbiology/ Pharmacology/ Internal Medicine, Faculty of Medicine

Joanne Embree – Head and Professor, Medical Microbiology and Infectious Diseases, Faculty of Medicine

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visionary.conversations@
ad.umanitoba.ca

The top three of the Three Minute Thesis

Graduate students cut to the chase about their research

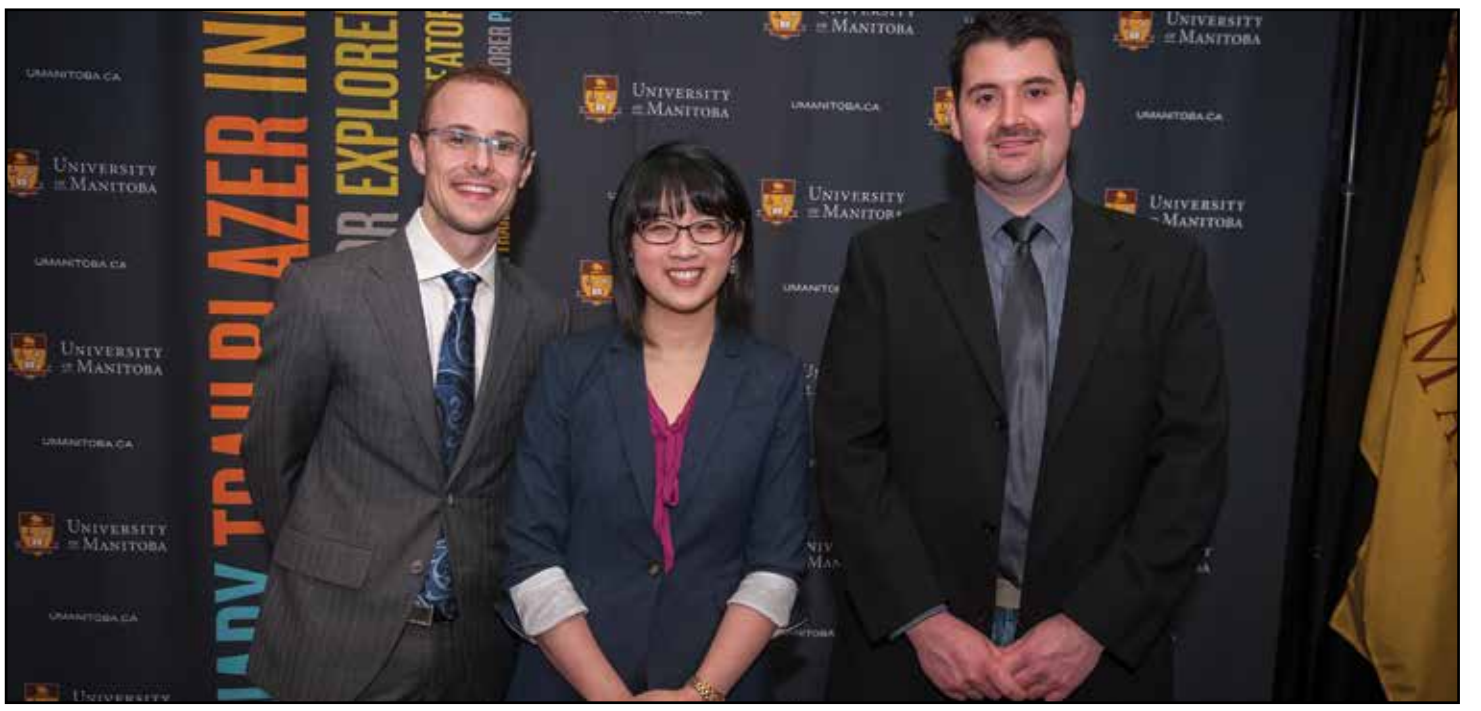

Photo by Mike Latschislaw

Winners at 3MT® from left: U of M graduate students Christopher White, Leah (Wong) Guenther and Anthony Signore

BY KATIE CHALMERS-BROOKS
For The Bulletin

How do you sum up countless hours of complex research in just three minutes?

"Practice, practice, practice," says PhD student Christopher White.

He earned the People's Choice award at the U of M's inaugural Three Minute Thesis (3MT®) event. The competition, originating in Australia, challenges graduate students to explain their thesis to a layperson audience in a super succinct and digestible way.

White, who is working on his PhD in physiology, is also completing his residency in cardiac surgery. He has witnessed heartbreak of both kinds: the physical heart that no longer works as it should, and the sadness of patients who struggle to take even a few steps.

He has also seen the joy that a new heart brings.

"For someone to go from not being able to walk to their kitchen to cook a meal to being able to go about their daily life again, that's certainly a rewarding part of medicine to be involved in," says White.

His research tackles the imbalance between the number of people who need a heart transplant and the number of healthy donor hearts available. "The lack of suitable organs is really the biggest limiting factor of cardiac transplantation as a treatment for end-stage heart failure," he says.

The solution may involve *ex vivo* heart perfusion, a technical term for "heart in a box". During conventional heart transplant surgery, the donor heart sits idle in a bag in a bucket of ice until it's transplanted. During ex vivo heart perfusion, which is now undergoing clinical trials, the donor heart is tricked into thinking it's still inside a warm body. The heart is supplied with blood and oxygen, which allows it to keep beating so doctors can assess how well it works before it finds a new home. White is investigating the ideal conditions for this procedure. "What is the best perfusion pressure and temperature? What kinds of drugs or pharmaceuticals should be in the solution? What is the best way to assess the function of the heart? None of these things have really been determined before," he says.

This technique could make it possible to resuscitate and preserve many of the hearts now considered unsuitable and discarded.

The competition's first-place winner Leah (Wong) Guenther, who is working towards a master's in mechanical and manufacturing engineering, is also focused on the people who will benefit from her research. Her efforts could lead to a Manitoba-born solution for the flawed testing of new, artificial hip and knee joints. The number of joint replacement surgeries is on the rise but the artificial joints available today aren't lasting long enough and some fail all together. "These joint replacements aren't being tested properly," Guenther says.

There has been several recalls worldwide in recent years on artificial joints already in people's bodies. "These recalls cost billions of dollars and affect hundreds of thousands of people," she adds.

To test the wear performance of new and existing joint replacements using machines, the orthopedic industry replicates the joint movement and the surrounding synovial fluid, which reduces friction when we move. Guenther is trying to improve on the synthetic version of this fluid so testing would better reflect the real thing and garner more accurate results. She says her analysis shows the synthetic lubricant is actually "quite different" from synovial fluid.

"If we can screen these joint replacements more accurately, we can catch any problems beforehand so that we can make improvements to these products before they are implanted into patients," she says.

Second-place winner and biological sciences PhD student Anthony Signore is looking to the past to make life better for people today. For the latest insight into how to improve the way we perform heart surgery, he's investigating some long extinct Arctic species—the woolly mammoth, extinct 4,000-10,000 years ago, and Steller's sea cow, gone since 1768.

What's the connection between surgery and these species? Body temperature. During heart surgery, the body is cooled so it requires less oxygen and doctors can stop the heart to operate on it. But the hemoglobin, the protein that carries the oxygen in the blood, also performs more poorly when the temperature drops. This can shorten the window for how long a body can be cold without a risk of damaging major organs.

Signore is sequencing the DNA extracted from the fossilized bones of these extinct Arctic animals, whose hemoglobin had adapted to work better in the cold. He then reproduces their hemoglobin and determines how it's able to maintain its function in chilly temperatures. The methods he is developing could help create a better blood substitute for surgery patients.

This field of paleo-physiology is brand new. It was Signore's advisor, Kevin Campbell, who, as part of an international team, first brought back to life a complex protein from the woolly mammoth. The process is essentially like going back in time and taking a blood sample from a living creature.

"It's really exciting to be a part of something like this," says Signore. "When you're doing research, you know things that no one else in the world knows at that time. There's something pretty neat about that."

View video of the winning presentations at umanitoba.ca/3mt/

umanitoba.ca/research

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Comments, submissions and event listings to: research_communications@umanitoba.ca
Phone: (204) 474-7300 Fax (204) 261-0325