Bringing Research to LIFE

In Brief

New centre of excellence for medicine

University of Manitoba researchers and students will benefit from a new Centre of Excellence for Regenerative Medicine thanks to a $1.7 million investment from the Government of Canada through Western Economic Diversification.

Regenerative medicine is an emerging field focused on accelerating the healing process to fully restore the health of damaged tissues and organs. Regenerative therapies have been demonstrated (in trials or the laboratory) to heal broken bones, bad burns, blindness, deafness, heart damage, nerve damage, Parkinson's and other conditions. Regenerative medicine will lead to improved patient care while eliminating the cost of treatments such as insulin injections or dialysis.

The new centre will allow the university's regenerative medicine program to expand its research endeavors and collaborations with industry and attract the highly qualified personnel required to support the growing life sciences cluster in Manitoba. The centre will also provide students with the opportunity to access the modern scientific equipment necessary for research and development of products and technologies.

Upcoming

Scientific Conference and Strategic Workshop:

Traceabilty Research and Development

Tuesday, June 2, 2009 to Wednesday, June 3, 2009

Hosted by the Faculty of Agriculture and Food Science

For more information: www.trace-rd.com

Workshop:

Canadian Institutes of Health Research (CIHR) Grant Writing

Monday, June 8, 2009

9:00 AM - 11:00 AM

Room 210, Helen Glass Centre for Nursing

RSVP by June 3, 2009 to: amanda_shawcross@umanitoba.ca

NO damage control for muscles

BY SEAN MOORE

Photo by Sean Moore

Biological Sciences department head Judy Anderson studies how nitric oxide activates a specific group of cells that stimulate skeletel muscle repair and growth.

It was during a seminar on the liver that Judy Anderson decided to see if nitric oxide (NO) played a role in muscle development and repair.

"I knew nothing of nitric oxide but I like going to seminars that have nothing to do with my work because I gain new perspectives. This seminar was about NO as a mechanism for something in liver and I just began to wonder if it had anything to do with muscles. So I thought about it, read a few papers, and designed an experiment," the head of biological sciences said.

That seminar was 11 years ago, and now, in a recent paper published in *Molecular Pharmaceutics*, Anderson and her colleagues Frank Burczynski and Guqi Wang, showed that by attaching NO to an over-the-counter muscle relaxant, they activated a specific group of cells that stimulate skeletal muscle repair and growth.

Hugging every skeletal muscle cell or fiber is a group of satellite cells, stem cells that divide and then join the old fibers to make new muscle. Damaged muscles send a get-to-work signal to satellite cells. Anderson reported on this signaling in 2000; it involves NO and the discovery revealed a few new paths for her research to take.

One path revealed that muscular dystrophy does the opposite from what you might first think: It doesn't under stimulate satellite cells, it over stimulates and exhausts them. A drug, therefore, needs to turn the NO tap in the "off" direction. But sometimes, Anderson found, the tap needs to be turned towards "on", as in the case of atrophy.

Another path that her research may soon take involves growing muscle for food in a variety of species.

"It might be that if you use more than one method to stimulate the growth of muscles in fish or chicken, you might get food more effectively because you are also using the muscle stem cells to add tissue rather than supplementing nutrition or hormones to force the animal to get bigger."

MyoNovin is the drug designed in her lab that can potentially do all this; for you chemists, it's a guaifenesin dinitrate compound. The muscle-relaxant used in this compound seems to act like a molecular taxi cab, giving NO a ride to the muscle.

In adult mice, an ointment formulation of MyoNovin on the skin increased satellite cell activation in the back and thigh compared to mice given a placebo; and the results were the same when an oral dose was given, so it's systemic. Anderson doesn't know if it travels anywhere else, but has so far found no side-effects of the drug.

The published studies were on healthy mice, and the lab is now examining MyoNovin effects on dystrophic mice and old mice to see the outcome and how it happens.

Nitric oxide itself is a formidable molecule, yet the gas is a key signaler and of vital importance to numerous body systems. Our muscles normally puff puff puff it out and these satellite cells get used to having regular NO puffs hit them.

"It's like rocking a baby," Anderson said. "You rock a baby gently and it falls asleep. Stop rocking it, or rock it too hard and it wakes up. It's the same with these satellite cells.

"That's what happens in muscular dystrophy: the cells wake up because the NO puffs are changed. So if we can start rocking it again at the right pace, it would be cool to see the cells respond normally to muscle damage.And if we can take old muscle in people like me, and wake it up by adding this drug, then we might be able to keep muscles strong in our aging population."

The elite come to compete

About 450 students from across Canada arrived to the University of Manitoba on May 9 for the Canada-Wide Science Fair, an event last held in Manitoba in 1988.

Wearing team jackets, the Grade 7 to 12 students gathered in the Engineering atrium on May 11 to take tours of our university labs and attend lectures held by some of our professors.

Before departing for such rooms as the SIMS lab (the secondary ion mass spectrometry lab) in the Wallace Building, the participants mingled, talking about their projects and exchanging pins from their schools, cities or provinces.

"We, like, made biodegradable plastic," Shirley Nakhshon, a Grade 10 student from Thornhill Secondary School in Ontario said. The plastic, which she developed with classmate Revi Bonder, is made from corn starch and biodegrades in 100 weeks; they want it to be faster.

Photo by Sean Moore

The Canada-wide science fair was recently held at the University of Manitoba.

The students at this fair were chosen from 25,000 competitors in more than 100 regional science and technology fairs across the country. Here, at this fair, the elite compete in nine divisions and three age categories for medals and other prizes worth over $360,000.

"We're here for the experience," Bonder said.

"If we win, that's extra," Nakhshon added.

Walking past them just then was Kacherine Leach-Ross, a Grade 7 student from Stratford Central School in Ontario. A small girl with long hair and a smile that could jump-start a car, she developed an online dictionary for the deaf and hard of hearing; instead of words, it shows signs.

Asked if she knows anyone who is hard of hearing, she unhesitatingly throws her hair back to showcase two tied-dyed hearing aids, one orange and one pink.

"I can't believe the level of science," Calgary teacher and first-time participant Jessica Raskob said. "These kids just put so much effort into their work and their projects, they are incredible. But it's not all hard work; I mean a smart kid is a smart kid."

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