

June 14, 2007

R&D

U of A math student designs “Virtual Liver”



EDMONTON and CALGARY – Using a combination of mathematics, physics and computer science, University of Alberta graduate student Rebeccah Marsh (pictured) has made the first steps towards designing a computer-simulated “virtual liver.”

Working as an intern at Calgary-based Computer Modelling Group (CMG) and with guidance from Dr Jack Tuszynski, Allard Chair at the Cross Cancer Institute, Marsh and CMG’s senior research scientist, Dr. Dennis Coombe, collaborated on the initial development of the virtual organ to help doctors and pharmaceutical companies better understand how the human liver – a major site for drug metabolism – responds to medications.

Based on the virtual liver’s reaction to different drug compounds, pharmaceutical companies will be able to change the make-up of a drug to increase its effectiveness in treating diseases in patients, explains Marsh.

Marsh and the Computer Modelling Group were brought together thanks to the MITACS Internship Program, a first-of-its-kind initiative which moves Alberta graduate students with expertise in mathematical sciences out of the classroom and into the workforce, giving them the opportunity to use their math skills to address high-level industrial issues.

The program, supported by Alberta Ingenuity and Western Economic Diversification Canada, benefits both the students, who gain valuable practical experience, and the companies, which benefit from a unique skill set and connection with the province’s up –and–coming research talent.

The next stage for CMG involves using the virtual liver to analyze diseased livers and tumour-forming regions in collaboration with Marsh’s graduate supervisor, Dr. Jack Tuszynski at the University of Alberta . Plans also include extending this approach to other virtual organ models, such as the kidney.

“This internship with Rebeccah greatly exceeded our expectations,” said Dr. Coombe. “Her mathematical and computer knowledge of drug distribution behavior, coupled with her enthusiasm and medical physics background, allowed us to explore a much wider range of topics than first thought possible. Indeed, the follow-up work that CMG is currently undertaking in this area is a direct result of our discussions with her.”

The Computer Modelling Group eventually hopes to make these virtual reality simulations available to the medical community to improve the accuracy, specificity and cost-effectiveness of pre-clinical testing.

“The success of Rebeccah’s internship, as well as the other internships, proves that connecting graduate students with expertise in mathematical sciences with companies in Alberta really does result in valuable, commercial developments,” said Dr. Arvind Gupta, Scientific Director of MITACS. “Alberta companies will continue to benefit by connecting with these grad students who offer a unique cross-disciplinary skill set.”

Under the MITACS Internship Program, graduate student researchers spend approximately 50 percent of their time over a four month period at a company, undertaking research on a problem jointly identified by the business,

MITACS and the students' supervising professors. The rest of the students' time is spent at the university, further advancing their research under the guidance of their supervisors.

"My MITACS internship provided me with valuable tools to perform much more sophisticated simulations of drug processes in the body than were previously possible," said Marsh. "I was able to probe my thesis topic in greater depth and the results from my preliminary research should lead to several publications. Dennis and I share the same curiosity and interest in creating models of the amazing and complex processes occurring in the body, and we hope to expand this project into a lasting collaboration."

"We are so happy to see the results of this project that Rebecca is part of. These collaborations are already offering benefits that not only help solve industry problems, they are also creating better health prospects for anyone who will ever take a medical treatment," said Dr. Peter Hackett, President and CEO of Alberta Ingenuity Fund. "Alberta's creative young minds are using sophisticated tools that were unimaginable even five years ago – and they are shaping our future along the way. We can't wait to see what tomorrow will bring."

"Canada's New Government is getting things done for the people of Alberta by providing increased opportunities to foster an educated and highly-skilled workforce," said the Honourable Rona Ambrose, President of the Queen's Privy Council for Canada, Minister of Intergovernmental Affairs and Minister of Western Economic Diversification. "Through our investment of \$150,000, we want to help create an environment where Canadian students and businesses are provided with the right conditions to thrive and succeed."

About MITACS

MITACS (www.mitacs.ca) is a Network of Centres of Excellence (NCE) for mathematical sciences hosted by Simon Fraser University, in Burnaby, B.C. The only Canadian organization of its kind, it focuses on developing mathematical solutions in five of the economy's fastest growing sectors: biomedical and health, environment and natural resources, information processing, risk and finance and communication, networks and security. Each MITACS research project partners academic scientists and their graduate students from universities across the country with Canadian organizations. For more information about the MITACS Internship Program, visit www.mitacsinternships.ca.

About Alberta Ingenuity Fund

The Alberta Ingenuity Fund supports science and engineering research and innovation of the highest calibre to create a strong and prosperous future for the province. It draws funding from a \$1 billion endowment established by the Government of Alberta to build the capacity for innovation in areas with enduring social and economic impact.

About Western Economic Diversification (WD)

Western Economic Diversification Canada is a department of the Government of Canada that works in partnership with the four western provinces, industry associations and communities to stimulate and encourage diversification of the western economy, as well as to represent the interests of the West in national economic policy. For more information, visit www.wd.gc.ca.

About CMG (Computer Modelling Group Inc.)

CMG (Computer Modelling Group Ltd.) is a computer software engineering and consulting firm engaged in the development, sale and technology transfer of reservoir simulation software. CMG began as a company known for its expertise in heavy oil, and expanded its expertise into all aspects of reservoir flow modelling. Over the past 29 years, CMG has remained focused on the development and delivery of reservoir simulation technologies that assist oil and gas companies to determine reservoir capacities and maximize potential recovery. CMG is traded on the TSX Stock Exchange under the symbol CMG. With over 250 oil and gas companies and consulting firms in more than 45 countries, CMG is one of the largest independent providers of reservoir simulation software in the world. Visit www.cmggroup.com.
