Government of Canada Honors Research Group for Ocular Science Advancements

CORE's Dr. Lyndon Jones a Key Member of Interdisciplinary C20/20 Innovation Hub

WATERLOO, ONTARIO, **November 2, 2023**—An interdisciplinary, multi-institutional team has won the prestigious Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering. The Natural Sciences and Engineering Research Council of Canada (NSERC) bestowed the honor on the C20/20 Innovation Hub, which comprises scientists, engineers and clinicians from McMaster University, the University of Toronto, and the University of Waterloo.

Dr. Lyndon Jones, director the Centre for Ocular Research and Education (CORE) at Waterloo's School of Optometry and Vision Science, is one of seven core investigators on the team, which is led by Dr. Heather Sheardown, a McMaster professor of chemical engineering. The team's aim is to develop and commercialize methods to better deliver drugs to the eye.

Presented annually, the Brockhouse Prize is reserved for highly collaborative Canadian teams of researchers from different disciplines who have combined their expertise to produce achievements of outstanding significance in the natural sciences and engineering. NSERC stated that C20/20 has become an "internationally recognized innovation center for its ophthalmic therapies and devices, and for the wide-ranging training and mentoring of highly qualified personnel, whose impact has improved the lives of millions of Canadians suffering from ocular diseases and vision impairment."

Currently, most drugs for eye diseases are delivered in the form of eyedrops. However, drugs are removed from the surface of the eye very quickly via the tear draining system and due to blinking. As a result, most drops stay on the eye for only about five minutes.

"Typically, to get the relevant therapeutic effect, the drug needs to be at a very high concentration. That results in toxicity issues and extra cost," said Jones. "If we could slow the drainage of the drug from the eye, we'd have far more effective drops."

Some drugs are delivered via injection to the back of the eyes, which is unpopular with patients. The C20/20 team is working on ways to improve drug delivery methods to both the front and the back of the eye. The $250,000 CAD grant that comes with the Brockhouse Prize will help team members continue with their research efforts.

Jones' research focuses on making eyedrops more effective by having drugs bind to mucin receptors, which cover much of the surface of the eye. Mucin is a protein with a gel-like consistency, so if a drug is attached to something that's attracted to mucin, it would hold onto the eye surface much longer, while improving its uptake into ocular tissue.

"Some of the animal studies we looked at showed we could get an effective result with about one-tenth of the concentration of traditional dry eye prescription drugs," he said.

So far, the team has shown the safety and effectiveness of the new method in animal models. Jones estimates it will be five years before human clinical trials can be completed and another few years before new mucin-binding eye drops reach the market.

Jones' collaboration with Sheardown dates to the early 2000s, while the C20/20 team was formed in 2008. Since then, the team has trained some 100 early-career scientists, published numerous papers, and filed multiple patents.

"This prize is collaborative," noted Jones, who is cross appointed to the departments of Biology, Chemistry, Chemical Engineering and Physics at Waterloo. "You can't be good at everything, so I've always searched for collaborators. That's how research needs to be done these days."

Additional co-investigators on the C20/20 Innovation Hub team include Professor Todd Hoare (Chemical Engineering) and Dr. Judith West-Mays (Pathology & Molecular Medicine) at McMaster University; Professor Frank Gu (Nanoengineering) at University of Toronto; and Chiefs of Ophthalmology Professor Varun Chaudhary of St. Joseph's Hospital/McMaster University and Dr. David Wong of St. Michael's Hospital/University of Toronto.

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About the Centre for Ocular Research & Education (CORE)

The Centre for Ocular Research & Education (CORE) was established in 1988 at the University of Waterloo's School of Optometry & Vision Science. Over the next three decades, the organization evolved from a three-person operation into a thriving hub of basic and applied research, collaborating with sponsors, agencies and academia on advanced biosciences, clinical research and education. Its uncompromising independence and results of the highest quality have been at the heart of many of the

most prominent advances in eye health. Today, its approximately 50-person team serves a range of ophthalmic sectors, including medical devices, ocular pharmaceuticals, digital technology and others, with a focus on the anterior segment. For more information, please visit core.uwaterloo.ca.

Co-investigators from the C20/20 Innovation Hub have been awarded the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering from the Natural Sciences and Engineering Research Council of Canada. Pictured (L to R) during the recognition ceremony in Ottawa: Professor Frank Gu, Dr. Judith West-Mays, Professor Todd Hoare, Dr. Heather Sheardown, Dr. David Wong, and Dr. Lyndon Jones. Missing: Professor Varun Chaudhary.

Dr. Lyndon Jones, Director, CORE

MEDIA CONTACTS:
Aimee J. Lewis or Mike McDougall, APR, Fellow PRSA, FAAO
McDougall Communications for CORE
aimee@mcdougallpr.com +1.585.414.9838
mike@mcdougallpr.com +1.585.545.1815