University of Lethbridge

NEWS RELEASE

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U of L scientists receive two New Frontiers in Research awards

Two innovative University of Lethbridge projects will bring together expertise from different fields to bring new light to promising research thanks to Exploration grants from the Social Sciences and Humanities Research Council's (SSHRC) New Frontiers in Research Fund (NFRF).

"When only 20 per cent of applications for NFRF grants were successful across the country, having two come to our institution demonstrates that our researchers are advancing the frontiers of knowledge and creative activity," says Dr. Robert Wood, interim vice-president (research).

Dr. Aaron Gruber, a neuroscience professor in the Canadian Centre for Behavioural Neuroscience at the U of L, and his collaborators will use the grant to study how the active compound in magic mushrooms (psilocybin) may rewire the brain to alleviate depression and anxiety and boost creativity.

"The idea of this project is that psychedelics help the brain get out of a pattern of worry by changing brain connectivity in a positive manner," says Gruber. "We're going to use sophisticated analytical techniques often used for complex physical systems, such as galaxies, to test if psilocybin does weaken patterns of neural activity associated with previous stressful experiences in mice."

Gruber and his fellow researchers, Dr. Jörn Davidsen (professor of theoretical physics with the University of Calgary) and Dr. Michael Stingl (U of L philosophy professor with expertise in neuroscience ethics), suspect psilocybin will cause a long-lasting expansion in neural signaling, which may facilitate future creative problem solving. They are looking to evaluate the claim that psychedelics actually do expand the mind, as measured by the diversity of brain activity patterns. Their goal is to gather neurobiological evidence on this potentially useful class of compounds to treat the growing crisis of mood disorders.

The researchers will employ high-density imaging techniques to record the activity of thousands of neurons in the neocortex of mice before and after exposure to psilocybin. Once they've recorded the subsequent brain activity in mice, they'll relate their findings to human use to see if the neural changes observed in mice explain the lived experience and therapy results reported in people.

"This kind of work highlights how modern neuroscience has become highly interdisciplinary," says Gruber. "We are teaming up with physicists, engineers, neuroethicists and computer scientists to do this work."

In his project, Dr. Nehal Thakor, a professor in the Department of Chemistry & Biochemistry and Campus Alberta Innovation Program Chair of Synthetic Biology and RNA-based Systems, and his co-applicants, Drs. Seyed Mehdi Jafarnejad (Queen's University Belfast), Marc Roussel, Stacey Wetmore and Paul Hayes, will use expertise in several fields of research to investigate therapeutic targets for the treatment of glioblastoma patients. The team also includes nine world-renowned collaborators.

Glioblastoma is one of the deadliest cancers and the average survival time is about 15 months after diagnosis. The standard of care for glioblastoma includes surgical removal, radiation and chemotherapy. Despite these treatments, the prognosis remains poor for the approximately 3,000 Canadians who are diagnosed with glioblastoma every year. New treatments are urgently needed.

"We are taking a paradigm-shifting approach and trying to find chemical compounds that can inhibit protein synthesis in glioblastoma. When we stop that type of protein synthesis, the cancer cells will succumb," Thakor says.

The team will combine mathematical modelling, computational biochemistry, chemical synthesis, cell biology and multi-omics in the search for new targets. Multi-omics is an approach that uses data sets from different omics groups, such as genomics and metabolomics, to do a biological analysis. This approach allows scientists to study complex biological processes holistically.

"The advantage of working with many teams with completely different expertise is that we are working from the ground up," says Thakor. "We know the mechanism of how the protein synthesis machinery works and we want to pinpoint and validate a target in that machinery. These fundamental discoveries will provide knowledge that may be used for many other types of cancers."

This news release can be found online at NFRF awards.

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