University of Lethbridge News Release

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CCBN research capabilities expand with state-of-the-art optical imaging lab

Media are invited to speak with the researchers and see the lab at 10 a.m. on Tuesday, June 28

A state-of-the-art optical imaging lab in the Canadian Centre for Behavioural Neuroscience (CCBN) is giving University of Lethbridge scientists a leg up in unlocking the secrets of how our brains function. Two-and-a-half years in the making, this lab is giving new insight into neurological disorders such as stroke or Alzheimer's disease.

The technology, along with the establishment of a population of transgenic mice, will allow Dr. Majid Mohajerani and his colleagues to study the mouse brain in action. Transgenic mice look like ordinary mice but they have been genetically modified. They are used in research because they carry many of the same genes as humans and can be used to study many illnesses, including neurological diseases.

"We know that some diseases in our nervous systems are happening due to changes in particular genes. Researchers have been identifying those genes and translocating them into a mouse genome," says Mohajerani. "When the mouse grows up, it looks like the gene that affects humans also does something similar in a mouse brain. Now we can use the mouse as a model to study that type of disease."

With these developments, CCBN researchers will now be able to answer more complicated and detailed questions about what goes on in the brain with neurological diseases like stroke and dementia.

"One of the questions we are currently addressing in the lab is how a very small stroke that we don't notice can work towards the progression of Alzheimer's and dementia," he says. "A single small stroke doesn't necessarily change our function because it is too small and the brain is able to compensate. If you look at magnetic resonance imaging (MRI) of the brain, many of us have those little lesions and we can have more and more of them as we get older. The problem happens when we get many of them accumulating and they prevent network activity in our brains."

In Alzheimer's disease, scientists know a protein in the brain doesn't function properly and they want to better understand the changes in brain functions. Because human subjects cannot be used, researchers isolate the genes associated with a particular disease, translocate them in mice and then simulate what might be happening in the human brain.

"If you want to see how the brain works, you have to watch. You have to have the tools in order to measure brain activity. We know that the brain is composed of many different cell types which have different functions and, in order to understand the function of each of those cells, we have to be able to label them separately," he says.

Neurons can be engineered to fluoresce in different colours when exposed to light, giving researchers a way to get a better picture of what's happening in the brain.

"Now we can watch each one of those neurons and see which one is doing what. This is important because now we can look at the same neurons over days and months and years. How a child learns to do a particular task, how we remember a specific event, or how we can use our fingers to grab an object, these are things that were almost impossible to understand in great detail in the past. Now, we can do all of those things with our current technology, which is a combination of genetics and light and microscopy," says Mohajerani. "I invested a lot of effort in order to bring our infrastructure to acceptable levels. We can basically consider ourselves a world leader."

The equipment allows researchers to shine a light on a particular area in the brain of a transgenic mouse and activate the neurons involved in a particular activity, such as running or recalling a particular memory. Not only will Mohajerani's research program reveal more information about how the brain functions, but the results could point the way to treatments that will eventually help human patients.

"We don't know whether the findings we make with mice are necessarily translatable to humans but we don't have any other choice. We have to try different things and hope to see one of them get translated into actual use in humans," he says.

Mohajerani can now see how the efforts of the past two-and-a-half years are coming together.

"This would not be possible without the talented people who work with me in this department—my colleagues, other professors who are very knowledgeable about brain function, and also technicians and people who take care of the animals. This is a collective effort of many people. I'm very glad that the senior members of this department had this vision," he says.

Dr. Michael Kyweriga's auditory research study details some of the work being done in Mohajerani's lab.

Media Availability
Who: Drs. Majid Mohajerani, Michael Kyweriga and Maurice Needham
What: Meet the researchers and tour the lab
Where: Canadian Centre for Behavioural Neuroscience, meet at the west entrance
When: 10 a.m., Tuesday, June 28, 2016

Please confirm your attendance by sending an email to caroline.zentner@uleth.ca.

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Contact:
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