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CoM researchers breaking ground with epilepsy brain bank



Brain banks aren't all that uncommon when it comes to neurological research in Canada, but a bank recently created in Saskatoon by two College of Medicine researchers is a definite rarity.

The Epilepsy Brain Bank at the University of Saskatchewan is one of the first epilepsy-centric brain banks in Canada, and the first focused solely on adult epilepsy research.

"The concept of bio-banks are as a storage facility," said Dr. Jose Tellez-Zenteno, a neurologist and epileptologist with the University of Saskatchewan. "But many universities in Canada are in the process of creating bio-banks to help with research that requires the study of human tissue."

Tellez-Zenteno has been working with Dr. Farzad Moien-Afshari, a neurologist, epileptologist and clinical pharmacologist, for several years in order to bring their idea for a brain bank to a reality – a process that has required both approvals and a significant amount of funding.

"We were given seed funding in the amount of \$250,000 (from College of Medicine) with the idea that I develop not only the possibility of an epilepsy brain bank, but also put together a team of people who can work with the brain," Tellez-Zenteno explained. "Not only to save the brain tissue, but to aid in creating links with scientists."

Since then an additional \$25,000 grant from The Saskatchewan Health Research Foundation to bolster the pairs' project.

And while the epilepsy research is key at the brain bank, one of the most fascinating aspects of the research is that the tissue samples are donated by living patients.

"The driving factor is that molecular research in human epilepsy is far behind other neurodegenerative diseases like Parkinson's, and Alzheimer's because those patients with those diseases often donate post-mortem brains for research," Moien-Afshari continues. "But this is analyzing the problem completely upside down, because right now the drugs are developed using animal samples, and if they think a medicine might have an effect they try it in the animal model

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seizure, and if it works it is then applied to humans.

“But we have not done much on the other end, and that’s where we want the medications to work: on the human side.”

So the team, who assessed approximately 2,500 patients in 2014, are piggy-backing - so to speak - on lobectomy surgeries. When a possible candidate who has passed the screening is preparing to undergo a temporal lobectomy as a possible way to treat their epilepsy, the Brain Bank team is in touch with the surgeon, and a team is sent to preserve the live tissue that was removed.

In the future these samples from temporal lobe epilepsy patients will then be compared to a control group, whose studies were performed on tissue that was removed for a separate disease, like tumours, to help determine the differences between a diseased epilepsy brain and the control.

“One of the interesting things about this bank is that all of the patients who have been taken in for surgery have had their medications-based treatments fail,” said Tellez-Zenteno. “So these are desperate cases, and the beauty of that is that we may be able to help.

“But we also have all this data we can collect, and that kind of information – the clinical profile, psychological profile, and psychiatric profile –can be correlated within the tissue sample.”

“It doesn’t mean that every temporal lobe epilepsy patient doesn’t respond to medication,” Moien-Afshari stressed, revealing that a statistically significant portion of patients don’t respond to conventional medicinal treatments. “These patients are the ones who have to go in for the surgery. So they are automatically different than the ones who are responding to medication.

“And while all the patients are different, if we can find common pathways amongst the majority of patients with temporal epilepsy they can be used as biomarkers, so these biomarkers could be translated into novel therapeutic *targets for developing new antiseizure* or a potential cure for this group.”

And since a lot of people suffering from epilepsy are young, without a method of treating the disease they can have long lives ahead of them in which they’ll be limited by their symptoms.

The team expects to have five samples by the end of March, but Moien-Afshari is hoping that they’ll be able to collect 10 before the research commences, in the hopes of better categorizing the results and hopefully finding more similarities between samples.

“You always start with the first-line antiepileptic drug treatment and assume the patient is going to respond,” Moien-Afshari said in regards to how a patient gets to the point of being considered for the lobectomy. “And if they fail two medications over two years, they become a candidate. But if we look at the samples of the patients who are refractory to the first line treatments, we can perhaps find a better way to treat them with medication as opposed to resorting to surgery.”

The work being done at the brain bank, and the research potential that goes along with it, are subjects that the CoM is quite proud of.

“The College of Medicine is delighted with the initiative of this team of researchers, and to help support their efforts the College has offered to house the tissue collection in its soon to be complete, central repository for research specimens,” said Vice-Dean of Research, Gord McKay. “In this way the College will be able to help these researchers ensure stability of the tissue samples with back-up power supply, spare ultra-cold freezer storage and centralized, confidential data base support.

“The college is then also able to help with the assembly of an oversight committee to deal with requests for tissue specimens, and complete custodial and technical support to ensure compliance with the modern principals of ethical conduct of research using humans and specimens of human origin.”

Tellez-Zenteno and Moien-Afshari are working as part of a team that include neurosurgeon Adam Wu, neuropathologist Mark Hiken, student Lizbeth Hernandez, and Neuroscience Cluster leader Lisa Kalynchuk.

By: Marg Sheridan

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