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DISCOVERY

LIGHT AT THE END OF THE ALZHEIMER'S TUNNEL

Dr. Steven Pasternak, neurologist and scientist at Robarts

Schulich MEDICINE & DENTISTRY

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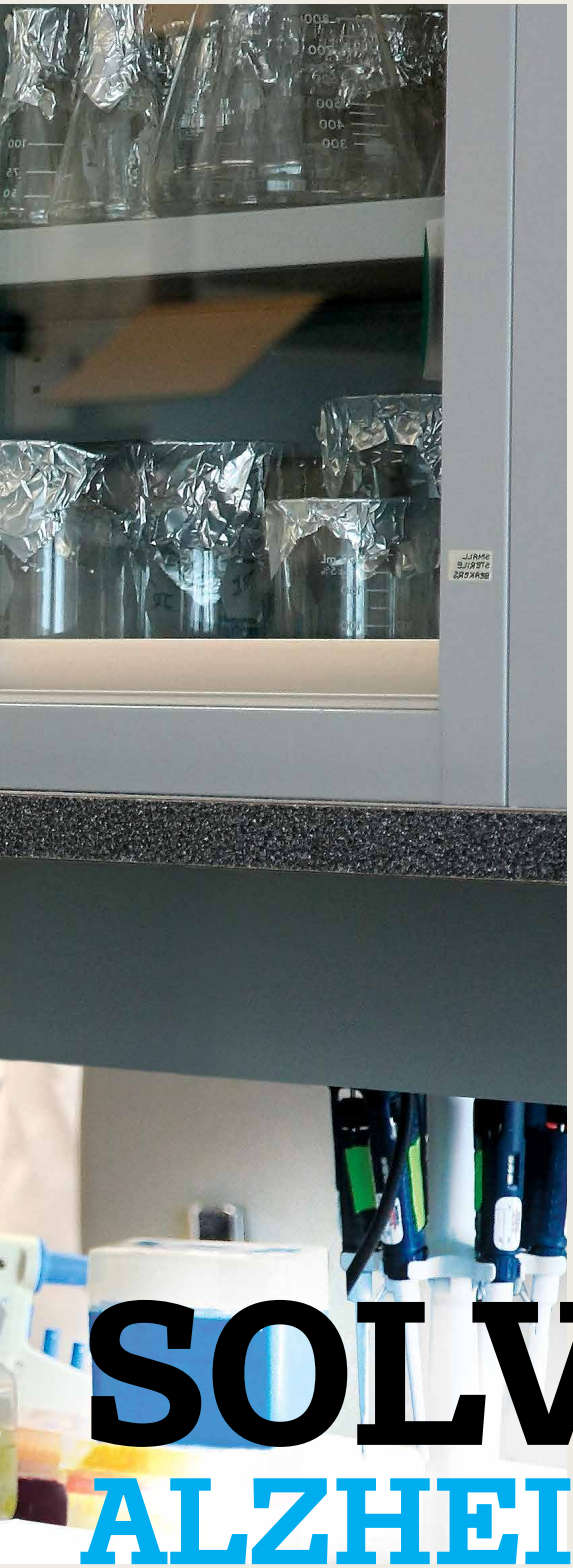
ROBARTS DISCOVERY

Jane Rylett, PhD



SOLVING THE ALZHEIMER'S PUZZLE

For those diagnosed with Alzheimer's disease, the journey is a long and frightening one. It is a slowly progressing disease that takes over the mind of its sufferers, leaving them confused and unsure of who they are. And the reality is that it's not a question of *if* you are going to get Alzheimer's disease, it's a question of *when*

As we continue to live longer and as our population ages, the number of people affected is staggering. Nearly 750,000 Canadians are currently living with Alzheimer's disease, with that number expected to double in the next 20 years. A group of researchers at Robarts Research Institute is vigorously working to find ways to understand and treat the disease in order to slash those numbers. Their motivation shines a harsh light on the prevalence of the disease. →

BY CRYSTAL MACKAY, MA'05

"I spent my whole life studying this disease and then my father got Alzheimer's," said Jane Rylett, HBSc'75, PhD'80, one of a team of researchers investigating various aspects of Alzheimer's at Robarts. "I suddenly had an entirely new perspective on it, watching it happen right in front of me."

Rylett's story is not unique; she is one of three in the group whose family has been directly impacted. This tough reality solidifies the group's collective commitment to solving the mysteries of this complex disease.

In Rylett's lab, the team is looking at the changes in the microenvironment in brain tissue that surrounds nerve cells and how that affects their function and communication with other cells. "What we are aiming to do is identify the changes occurring in the brain that might appear even decades before the person has any clinical symptoms," said Rylett. "And this is always the challenge because how do you know that what you are looking at relates to someone who is going to get the disease in the end?"

The team at Robarts is studying Alzheimer's disease across the entire spectrum from the cellular and molecular level, to monitoring behavioural changes in Alzheimer's animal models, right through to looking for anatomical and metabolic changes in the brains of patients.

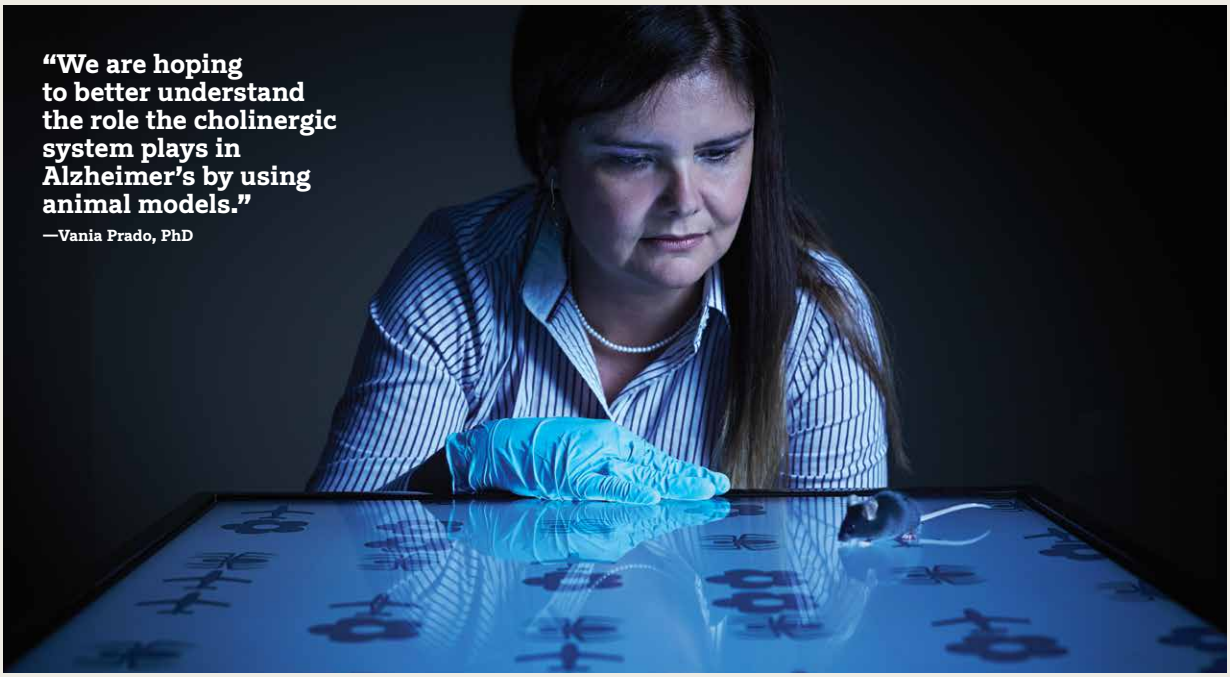
"This collaboration at Robarts is absolutely wonderful because we can look at the very fundamental discovery-based part of it, and we can also translate those findings into developing therapeutics and do drug testing," said Rylett. The goal of all of these studies is to understand the underlying causes of the disease so that it may be detected earlier at a time when the patient has a better chance of responding to therapies.

"You can imagine that it is very hard to study a disease that takes 80 years to develop," said Dr. Steven Pasternak, a neurologist and scientist at Robarts. Every day he sees patients come through his clinic who are suffering from the early symptoms of the disease. Dr. Pasternak says the discouraging part is that when a person first starts to have memory deficits and begins to show even the earliest symptoms, the nerve cells in the brain have already started to die, causing damage that can't be reversed.

Armed with this knowledge, Dr. Pasternak and imaging scientist Robert Bartha, PhD, are developing new imaging contrast agents that attach themselves to specific proteins associated with the disease. Their focus at the moment is on trying to detect changes in the synapse, based on the working theory that the earliest changes that happen in Alzheimer's happen here. The goal is to use these contrast agents to develop an MRI screen that will identify patients who are on the road toward the disease but who aren't yet showing symptoms. →

RIGHT: Robert Bartha, PhD, is working on developing an MRI screen that will help identify Alzheimer's disease in patients before they show symptoms

BOTTOM: Vania Prado, PhD, uses touch-screen technology and pattern recognition with mice to mimic the congnitive testing that is used with actual Alzheimer's patients



"We are hoping to better understand the role the cholinergic system plays in Alzheimer's by using animal models."
—Vania Prado, PhD

Robert Bartha, PhD

"People always ask me why I care about early diagnosis considering that at the moment there is no treatment," said Bartha. "But I think we can get closer to developing treatment if we can identify who is going to get Alzheimer's disease earlier."

Currently, clinical trials for new therapies are tested on patients in the end stages of the disease when much of the brain has already deteriorated. By testing drugs before this deterioration has occurred, scientists believe they will have a clearer picture of whether or not there is a benefit.

For early detection to be successful, much of the work at Robarts is focused on pinpointing the event or mechanism that initiates the disease. Vania Prado, PhD, and her team are focused on the changes that occur in the cholinergic neurons, which are the first to be affected in Alzheimer's.

Using genetically modified mouse models and sophisticated cognitive testing, the Prado lab is looking at how these changes in the brain affect memory and behaviour. Prado and her colleagues are using touch-screen technology and pattern-recognition testing in mouse models that mimic the tests used with Alzheimer's patients. Working in collaboration with other scientists, they are also attempting to identify the cellular and molecular changes that occur in the brain when these neurons are shut off.

"By doing this, we are hoping to better understand the role the cholinergic system plays in Alzheimer's, and at the moment because we can't detect the disease early in humans, using animal models becomes critically important," Prado said.

She says by understanding the mechanisms causing the disease, the hope is they will be able to delay the onset, or ideally, prevent it altogether.

For Prado, a search for a cure hits close to home. Like Rylett, Prado's mother has been diagnosed with the disease and she has watched it take its hold first-hand. ■