Research eyes role of stress in mental illnesses

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Physiology and Pharmacology professor Wataru Inoue showed the progress of his research into stress and the brain this week to London North MP Peter Fragiskatos and representatives from the Mental Health Research Association (MHRA), who provided financial backing for his ongoing work. Credit: Paul Mayne // Western News

We all face stress in our lives. Even researchers seeking to understand why some people shrug it off while others face battles against disorders like depression or PTSD.

"I try to find the right balance in my life," said Wataru Inoue, a Physiology and Pharmacology professor at the Schulich School of Medicine & Dentistry. "I'm so grateful to have this job because I enjoy it. Sometimes it's stressful, I know. But we are chasing questions we don't know the answers to. A great discovery from your research and all the stress goes away."

Inoue explores "what our brains go through every day" – the biological mechanisms of how the brain deals with and adapts to stressful experiences. While current treatments and the progress in the development of new or improved drugs is slow, Inoue said advancing the understanding of stress neurobiology is a crucial step in identifying the key mechanisms causing mental illnesses and, ultimately, developing more effective treatment strategies.

His work hopes to provide answers and relief for the 13 per cent of Canadians and their families who deal with stress-related disorders. These issues are the fastest-growing category of disability insurance claims in Canada, costing an estimated $33 billion a year in lost productivity, as well as billions more in direct medical costs.

"When stress happens, it causes immediate changes. But, at the same time, we know it causes a long-lasting memory and those are important memories," he said. "For example, when you have a bad experience, you want to remember that to avoid those things in the future. But, sometimes, those accumulations of memories can cause bad consequences which is perhaps part of the reason we do develop so much stress."

Stress is necessary to guide us through our lives but can also have negative consequences, admitted Inoue, who wants to learn more about how stress causes memory formation and, subsequently, the resulting consequences.

"We need to remember those bad experiences. But maybe, in extreme conditions such as PTSD, it is a memory problem. You remember those traumatic experiences and they are so strong that it comes back all the time. So it actually causes more problems than benefits," he said.

Inoue showed the progress of his research this week to London North MP Peter Fragiskatos and representatives from the Mental Health Research Association (MHRA), who provided financial backing for his ongoing work.

"It's a very simple thing, but it didn't occur to me that stress is something we only self-report on. Unless I raise my hand and say, 'It's overwhelming,' there is no test," said Andrea Swinton, CEO of MHRA, who is touring around the province to learn more about some of the research her organization is backing. "While some stress is good, what's the tipping point to where it becomes dangerous? You never really think of stress as something that's in your brain. I feel it in my gut, all over my body.

"This is very interesting work because my stakeholders are the 1-in-5 living with mental illness and those who live with and love them."

Inoue said stress triggers a so-called 'fight-or-flight' response. This rapid defense mechanism involves coordinated changes in both psychological (i.e. fear, aggression) and physiological (i.e. release of stress hormone corticosteroids, elevation of heart rate) functions which, together, enhance the ability to handle impending challenges.

In addition to this immediate response, stress promotes associative learning that lasts beyond the stressful experience. In other words, we form a memory of a stressful episode and this memory reshapes the way we will respond to future challenges, he added.

Inoue focuses his work on the hypothalamus, the part of the brain that regulates hormonal response to stress. Stress-induced changes in this area may represent a key neurobiological mechanism for the abnormality of stress hormone levels and the changes in physiological behaviour, seen in many serious diseases.

"Why are those difference happening? Are they at the mechanistic level? We don't know. We do have pieces of evidence. But it's not all put together. That's why we're chasing after those questions. We know what we don't know," Inoue said.

"We're hoping to make some difference on this complex problem. Stress in an important input that changes the outputs. Stress is part of our lives, and it's important to have some to get things done, but then when is it too much?"

Provided by University of Western Ontario