Brain parasite has potential to unlock neurobiology secrets

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(Medical Xpress)—Dr. Anita Koshy sees a common and typically harmless brain parasite as a potential key to unlocking secrets of neurobiology that can be used to intervene in diseases such as Alzheimer's and multiple sclerosis.

Koshy, a University of Arizona assistant professor of neurology and immunobiology, has developed new models for the study of Toxoplasma gondii, a parasite that infects more than 10 percent of Americans and up to 80 percent of the population in some countries.

Recruited to the UA in August, Koshy arrived with a medical degree from Duke University, residencies at the University of Washington and University of California, San Francisco, and a fellowship from Stanford University, where she was trained in one of the most prestigious molecular Toxoplasma labs in the country.

A member of the BIO5 Institute at the UA, Koshy balances clinical work with research into Toxoplasma, one of the most common parasites found in humans. Once a person is infected, the parasite lives in the person's brain for the rest of his or her life. Generally, however, the parasite produces no symptoms, and people likely will never know they've been infected, except if they develop a compromised immune system, such as is seen in AIDS patients. In these patients, the parasite can cause a serious or even fatal brain infection.

Koshy considers her approach to be "dual effort research." By seeking to

understand how the parasite persists in the brain, she hopes to be able to both improve treatments for toxoplasmosis and define new targets for controlling dysfunctional brain immune responses that play a critical role in diseases such as multiple sclerosis, Alzheimer's, Parkinson's and Huntington's.

"It's particularly interesting how (the parasite) persists in the brain without doing harm," Koshy says. "This is a particularly good opportunity to understand how to manipulate the brain's immune response."

To persist in the brain without causing harm, Toxoplasma has evolved to dampen the brain's immune response. And if the parasite can accomplish that, perhaps scientists can find a way to manipulate that same immune response. If doctors can understand and harness that capability at the molecular level, they could in turn design therapies for inflammatory brain diseases.

"The aim is to understand how the parasite is hiding from the immune system. If we can understand that, we can understand how to manipulate these pathways when things go awry," she says. "This is a novel approach to understanding some foundational neurobiology."

Dr. David M. Labiner, head the neurology department, says Koshy's work is valuable on multiple levels.

"Because she is both a clinician and a scientist, we are excited to have her in our department and hope that her work will lead directly to not only new discoveries scientifically but also new treatments for neurological disease," Labiner says. "We were thrilled to get her to come here to the UA because of her research and clinical potential but also her teaching skills. Our residents and medical students have really enjoyed working with her and confirmed her reputation as an outstanding

educator as well."

Koshy found her passion for the dual role of physician-researcher while in medical school and with the UA's College of Medicine and BIO5, has found a professional home tailored to nurture both interests.

"I wanted to be the classic physician-scientist, teaching, seeing patients and doing research," she says, describing the factors that brought her to the UA, where she established her lab with a National Institutes of Health mentored-physician grant as well as help from the Technology and Research Initiative Fund.

Koshy appreciates the open collaboration across disciplines and ready access to colleagues, scientists and engineers who can complement her expertise.

"When I met with UA faculty from different fields, they were such an engaged group, and I could tell they were really excited about the science," she says. "There's this feeling that a position such as mine is a very well thought-out opportunity to be a part of growing this place and establishing it as a national leader. I can pitch ideas and get a view of what I'm missing. It's not easy at many institutions to establish these inroads and make connections that allow you to do innovative and collaborative science."

Provided by University of Arizona