

Hitting parasites where they hurt: New research shows promise in the fight against Toxoplasmosis

May 21 2012, by James Hataway

Toxoplasmosis, a disease caused by the parasite *Toxoplasma gondii*, is one of the most common parasitic infections in the world. In the U.S. it is estimated that more than 22 percent of the population 12 years and older have been infected with toxoplasma, according to the Centers for Disease Control and Prevention.

Now, thanks in part to a five-year, \$1.8-million grant from the National Institutes of Health, University of Georgia researcher Silvia Moreno has identified a potential target for new therapies against toxoplasma infection, which may help to protect people with compromised immune systems, developing [fetuses](#) and other sensitive populations from serious harm.

Toxoplasma works by invading healthy cells within the body, and once it has taken over, the cell's membranes protect the parasite from the [immune system](#). However, as it replicates and fills the cell, some parasites must venture out to find new cells to attack. It is during this process, when toxoplasma is outside the protective walls of the [host cell](#), that Moreno sees an opportunity to combat the parasite.

"We are interested in knowing how the parasite is able to survive long enough to find another host cell," said Moreno, professor of [cellular biology](#) in the UGA Center for Tropical and Emerging Global Diseases and the Franklin College of Arts and Sciences.

Moreno's lab found that while toxoplasma is outside the protective host cell, it develops a large internal organelle called a vacuole that they think may protect the parasite and help it prepare to invade the next cell. Moreno and her collaborators call the organelle a "plant-like vacuole" because it bears resemblance to similar [organelles](#) in plants.

"We think there are stresses the parasite encounters when it is outside, so it needs a mechanism to survive that shock," Moreno said. "At the same time, the parasite has to get ready to infect another cell; it needs to secrete proteins that will help it attach to the cell and invade."

For this vacuole to become a target, scientists must first understand the parasite's basic behaviors and biological functions. They can then start to create new therapies.

"We don't want to know how the parasite behaves just for the fun of it; we want to know where we can hit it," Moreno said. "That's the reason we study its biology because we want to know exactly where to hit toxoplasma with drugs."

Disrupting the function of the plant-like vacuole may render the parasite incapable of movement. If toxoplasma cannot safely leave the confines of a host cell, it cannot replicate and it cannot create a widespread infection.

Most people infected with toxoplasma are relatively safe from danger because the immune system is able to seek out and destroy the parasite before it causes harm.

"The parasite is very smart in that it does not kill healthy people," Moreno said. "If you are a parasite, you don't want to kill your host, because if you kill your host you're done too."

But toxoplasma can be incredibly dangerous to those with compromised immune systems, such as AIDS or chemotherapy patients, and to a fetus whose mother has been exposed to the parasite. In these situations, toxoplasma invades human cells and begins replicating, leaving behind cysts that damage brain and muscle tissue.

Moreno also said that toxoplasma serves as an excellent research and teaching tool because the plant-like vacuole may be present in the large and diverse group of animal [parasites](#) called apicomplexans, which are the cause of several important infectious human diseases, including malaria. She said the lessons learned from toxoplasma could be useful in the treatment of these diseases.

Provided by University of Georgia

Citation: Hitting parasites where they hurt: New research shows promise in the fight against Toxoplasmosis (2012, May 21) retrieved 25 April 2024 from <https://medicalxpress.com/news/2012-05-parasites-toxoplasmosis.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.