Investigating the Role of Ctr2 During Acute and Latent Stages of Toxoplasma gondii

Karikatti, Nishita (School: BASIS Oro Valley)

Toxoplasma gondii (T. gondii) is an obligate intracellular parasite that persistently infects the central nervous system (CNS) of up to a third of the world's population. In the immune competent, most infections are asymptomatic, but, in the immunocompromised (e.g., organ transplant recipients and fetuses), T. gondii can cause significant pathological consequences. T. gondii's persistence in the brain is enabled by the parasite's differentiation from the acute, tachyzoite stage to the latent, bradyzoite stage. This project focuses on a putative copper transporter (Ctr2), which is predicted to be dispensable in the tachyzoite stage and play a role in the bradyzoite stage. From preliminary data from the Koshy lab, I hypothesized that the absence of Ctr2 disrupts encystment and stage transition. To explore this, I worked with a generated T. gondii strain that lacks Ctr2 (Il?Ctr2) as well as an ectopically expressed, HA-tagged complement strain (Il?Ctr2::Ctr2HA). As predicted, Il?Ctr2 does not have an acute defect under tachyzoite culture conditions (normal pH, 5% CO2). However, we have shown here that under bradyzoite-inducing conditions (high pH, low CO2), Il?Ctr2 has an increased incidence of cysts with abnormal morphology, which appears to have decreased viability in vitro. While further experiments in vivo are necessary, our results suggest that Ctr2 plays an important role in maintaining cyst integrity during latent infection in vitro. This research advances our understanding of T. gondii persistence, offering novel insight into the importance of copper in chronic toxoplasmosis.

Awards Won: