
Thesis Defense - Raghad Almofeez MS Biology

July 28, 2021, 1:00 - 3:00 PM

VIEW EVENT

All are invited to attend the defense. For more information please contact Graduate Coordinator at kharrism@gmu.edu.

Candidate: Raghad Almofeez

Program: Biology, M.S.

Date: July 28, 2021

Time: 1:00 PM

Place: <https://gmu.zoom.us/j/92281842031?pwd=UGJuNTQrY2I3QXQxSHNRVWNLMGQ5Zz09>

Title: INVESTIGATION OF URINARY PEPTIDES IN CONGENITALLY INFECTED CHAGAS DISEASE INFANTS

Committee Chair: Dr. Alessandra Luchini

Committee Members: Dr. Lance Liotta, Dr. Ancha Baranova

ABSTRACT:

Chagas disease (CD), caused by the protozoan *Trypanosoma cruzi*, is a neglected tropical disease endemic in Latin America with rising incidence in the United States. CD is mainly transmitted through vectors, blood transfusions or from mothers to their infants. It is estimated that around 25% of new CD infections occur through congenital transmission. In most CD cases, the infection remains asymptomatic for years; and being undetected and untreated, it can cause cardiac or gastrointestinal complications or even unexpected death. Detecting and treating CD in the asymptomatic phase is critical as it allows for more efficient treatment before tissue damage progresses to an irreversible stage. Current tests use blood specimens for diagnostics and most lack sensitivity and are unreliable without a combination of another test. Our study presents a novel non-invasive nanoparticle-enhanced mass spectrometry method to detect *T. cruzi* peptides in the urine of infants with Chagas disease. Nanoparticles harvest and concentrate low abundance protein markers, preventing their degradation while excluding high molecular weight, abundant proteins. 198 *T. cruzi* derived peptides were identified in 14 congenitally infected infants living in Bolivia. Of the identified peptides, mucin-associated surface protein, trans-sialidase and dispersed gene family protein 1 (DGF-1) were highly represented in the urinary peptidome of Chagas patients. Members of those family groups are involved in host invasion and pathogenesis. Some of those peptides were validated using two orthogonal technologies: Parallel reaction monitoring and Western Blot. In this study, we demonstrate for the first time that a nanoparticle-enhanced mass spectrometry workflow is able to detect urinary *T. cruzi* peptides in patients with Chagas disease. This investigation could be useful in developing a diagnostic test or finding new drug targets.

