

# MATHEMATICAL MODELING OF THE INTERACTION BETWEEN HUMAN IMMUNE SYSTEM AND *TRYPANOSOMA* *CRUZI*

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## Abstract

Chagas disease is an illness transmitted primarily through Triatominae insect commonly known as kissing bug. Since its discovery, there has been a prediction that this disease would disappear as life quality in Latin American population would improve; however, the disease persists. The responsible agent is a protozoan called *Trypanosoma cruzi*, which is transmitted when a person scratches the area bitten by the kissing bug, causing the feces eliminated by the insect to penetrate the skin. Furthermore, the transmission may also occur by blood transfusion or orally by food contaminated with the parasite responsible for the disease. The action of the immune response to *T. cruzi* infection involves two mechanisms: one that results in the production of specific antibodies against parasite antigens and the other corresponding to the cellular immune response cytotoxic activity. In order to address the process of *Trypanosoma cruzi* infection mechanism and delimiting the host organism promoted by the immune system, a mathematical model of the interaction between the immune system and *Trypanosoma cruzi* is presented. Numerical simulations were run on MATLAB using parameters obtained from the biological literature and for those not specified in the literature, reasonable correlation was established with the homeostasis of cells in the body. Therefore, the parameters which most influence the model have been identified allowing the outline in future studies of a new mathematical model in which the use of biomarkers to identify antibodies in Chagas chronic patients will be introduced.

## REFERENCES

- [1] OLIVEIRA, L. S. *Modelling the interaction between the human immune system and Trypanosoma cruzi*. Master's Thesis, IMECC - UNICAMP (2010)