SCIENCES & BIOENGINEERING SCIENCES

The Research Group

Cellular and Molecular Immunology

has the honor to invite you to the public defense of the PhD thesis of

Hang Thi Thu Nguyen

to obtain the degree of Doctor of Bioengineering Sciences

Joint PhD with UGent

Title of the PhD thesis:

Chronic pathology of experimental Trypanosoma evansi infection is the combined result of an extra-medullary erythropoiesis abrogation, a failing host B cell response, and the induction of a unique Th1 cell population

Promotors:
Prof. dr. ir. Stefan Magez (VUB)
Prof. dr. Magdalena Radwanska (UGent)

The defense will take place on
Thursday, May 25, 2023 at 10h in Ghent University Global Campus, Korea

The defense can also be followed through a live stream: https://rb.gy/apygp

Members of the jury

Prof. dr. Savvas Savvides (UGent, chair)
Prof. dr. ir. Benoit Stijlemans (VUB, secretary)
Prof. dr. ir. Kiavash Movahedi (VUB)
Prof. dr. ir. Jens Staal (UGent)
Prof. dr. Guy Caljon (UAntwerpen)
Prof. dr. Annette MacLeod (University of Glasgow, Scotland)

Curriculum vitae

Hang Thi Thu Nguyen began her joint PhD program between UGent and VUB in 2018. Her research focuses on interactions between the host immune system and chronic *Trypanosoma evansi* parasites. Alongside her research, Hang works as teaching assistant at Ghent University Global Campus, Korea and successfully guided 4 master students and 14 bachelor students for their theses. During her PhD, Hang published 5 papers and 2 book chapters in international peer-reviewed journals. She frequently presents her work at several seminars and one international conference. In 2022, Hang had a brief visit and delivered a presentation as visitor at Yale University, USA where she received an offer to continue her research on Trypanosomes after completing her PhD.

Abstract of the PhD research

Trypanosoma evansi (T. evansi) parasites are found in many regions of the world, and infect a wide range of animals. In some rare occasions even human infections have been reported. In livestock, the infection causes a chronic wasting disease called Surra. When an animal gets infected by this parasite, the latter is not only able to escape the host's immune system but also destroys the B cell memory, erasing the protective effect of other disease vaccines. Despite its serious impacts, there is currently no vaccine against *T. evansi* infection. As a result, it is crucial to understand the mechanisms involved in *T. evansi* mediated suppression of the host's immune system.

Through screening 10 *T. evansi* field isolates with varying levels of virulence, this doctoral research identified an experimental disease model which mimics major features of natural chronical livestock infections. Single cell RNA sequencing (scRNA-seq) and other protein-based analyses of this model provided a new in-depth understanding of the interaction between the parasite and the host immunity, at the cellular level. Obtained results show that the muscle breakdown, seen in chronically infected mice, is caused by an increase in blood lactic acid level. This increase is related to persistent anemia, which is caused by the failure of the bone marrow and spleen to generate enough red blood cells during infection. In addition, as the infection progresses, the humoral immune response is destroyed through the exhaustion of the B cell pool, and antibodies are no longer effective in clearing parasites due to their low binding ability. At the chronic stage, when infected animal are left with hardly any B cell response, T helper 1 cells play a self-regulatory role by generating the anti-inflammatory cytokine IL-10. This cytokine is a signal molecule that contributes to a balanced cytokine environment that prolongs host survival.

From a scientific perspective, this study is the first to use scRNA-seq technology to examine cellular immunity in trypanosome infection setting. This research has generated a number of scRNA-seq datasets that have been publicly shared. These datasets can now serve as valuable future resources for the wider scientific community, and will help in studying the host immune response to pathogenic infections.