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

Zeng Li

to obtain the degree of Doctor of Bioengineering Sciences

Joint PhD with University of Antwerp

Title of the PhD thesis:

Development of new Recombinase Polymerase Amplification (RPA) and antigen-based diagnostic tools for the detection of *Trypanosoma evansi* infections

Promotors:

Prof. dr. ir. Stefan Magez (VUB)

Prof. dr. ir. Yann Sterckx (UA)

The defense will take place on

Friday, December 11, 2020 at 15h30

The defense can be followed through a live stream. Contact Zeng.Li@vub.be for more information

Members of the jury

Prof. dr. ir. Eveline Peeters (VUB, chair)
Prof. dr. ir. Benoit Stijlemans (VUB, secretary)
Prof. dr. ir. Wim Versées (VUB)
Prof. dr. ir. Sophie Hernot (VUB, Jette)
Prof. dr. Guy Caljon (UAntwerpen)
Dr. Veerle Lejon (University of Montpellier, France)
Dr. Philippe Holzmuller (University of Montpellier, France)

Curriculum vitae

Zeng Li obtained a Master degree of Science at Southwest University, China (2015). In the same year, she was granted by a scholarship from China Scholarship Council (CSC) to perform scientific research in the group of Structural and Functional Immunoparasitology at the CMIM lab. In 2019, she was granted by UAntwerp-BOF research grant (DOCPRO1) to be a joint PhD in UAntwerp in the group of Medical Biochemistry (LMB) and the Infla-Med Centre of Excellence. Her work resulted in three first-author publications, of which two publications in peer reviewed journals and one publication as a book chapter. She obtained an NSE travel grant to give an oral presentation at international scientific conference.

Abstract of the PhD research

Animal trypanosomosis (AT) is a neglected tropical disease affecting domestic and wild animals, which severely impairs the socio-economic development of endemic areas. The most widespread causative agent of AT is *Trypanosoma evansi*. This parasite has a lifecycle that allows transmission by a range of different insect vectors and has spread beyond the African continent to large parts of the world including the Middle East, the Mediterranean, Asia and South America. Disease control mainly relies on chemotherapy, as there are no effective vaccines available. In order to optimize treatment, reliable and sensitive point-of-care (POC) tests are needed to detect infected animals. Hence, the work presented in this thesis has focused on two diagnostic development approaches. First, a new technology called Recombinase Polymerase Amplification (RPA) was adopted for the molecular diagnosis of *T. evansi* infections by targeting the gene encoding *T. evansi* specific RoTat1.2 VSG. The technique is an isothermal nucleic acid amplification approach that is simple, fast, cost-effective and is suitable for use in minimally equipped laboratories. RPA was subsequently combined with lateral flow (LF) technology, providing a simple test readout suitable for use in resource-limited settings and field conditions. Secondly, the PhD work focused on the development of a serological antigen-based assay format, which would be suitable for the detection of active infections and could be used as a test-of-cure device to monitor anti-trypanosome treatment success in animals. The test we developed is based on Nanobody technology, as this allows antigen capturing through cryptic epitopes on parasite molecules that are hard to target with much larger conventional monoclonal or polyclonal antibodies. The use of an "unbiased" alpaca immunization strategy with *T. evansi* secretome resulted in the identification of the glycolytic enzyme enolase (*Tev*ENO) as a potential biomarker for the Nb-based detection of *T. evansi* infections. As our approach indicated that *Tev*ENO is actively released by the parasite in detectable quantitates, we initiated work that aims at the future elucidation of the role this secreted enzyme could play in the context of the host-pathogen interface. Initial results show the ability of *Tev*ENO to bind to human plasminogen (PLG), the precursor of plasmin, which itself an important factor in fibrinolysis and the prevention is of blood clotting.