Gene expression of enteroepithelial stages of Toxoplasma gondii in the domestic cat

Summary / Zusammenfassung
Felids play a critical role in the transmission of T. gondii. Cats are the only known definitive hosts for this parasite, in which it undergoes sexual development in epithelial cells of the small intestine. This results in the excretion of infectious oocysts with the feces, which constitutes a major route for transmission to humans and animals. Following a primary infection and a period of oocyst shedding, most cats do not shed detectable levels of oocysts when re-exposed to tissue cysts from intermediate hosts. The occurrence of the enteroepithelial cycle appears to be essential for the establishment of this intestinal immunity. Parenteral vaccination of cats with any developmental stage does not prevent oocyst shedding after challenge with orally administered infectious stages. It is assumed that some antigens expressed during the intestinal cycle by the enteroepithelial stages are essential for the immune mechanisms that prevent or impair a new oocyst shedding in previously infected cats. The identification and characterization of these antigens is of great importance, as this will be the first step in the elaboration of vaccines.

The aims of this project are to optimize an isolation and concentration method for enteroepithelial stages of T. gondii harvested from cat intestine and to generate gene expression by RNA deep-sequencing. This data will allow us to identify genes and pathways in Toxoplasma gondii that are essential for the parasite to complete its life cycle in the cat intestine. With this information we will be able to begin designing strategies for a vaccine that will be used to immunise cats in an attempt to block formation and excretion of oocysts of, ultimately preventing infection of people and other animals. A proof of concept phase has been completed in 2012. Enteroepithelial parasites have been successfully isolated and RNAseq datasets were produced and analyzed. Based on these results we obtained additional funds for a 2 year project (2012-2014) from the NIH (see also Project Nr. 17532). The primary goal is to obtain statistically significant triplicate transcriptomics datasets from parasites at three time points during enteroepithelial development. In addition, we will produce proteomics datasets and transgenic lines expressing tagged stage-specific antigens for localization of specific developmental stages. These projects are conducted in close collaboration with the Functional Genomics Centre Zurich.

Keywords / Suchbegriffe
Toxoplasma gondii, cat, gene expression

Project Leadership and Contacts / Projektleitung und Kontakte
Prof. Peter Deplazes, senior (Project Leader) deplazesp@access.uzh.ch
Prof. Adrian Hehl, senior (Project Leader) adrian.hehl@access.uzh.ch
Dr. Walter Basso walter.basso@access.uzh.ch
Dr. Christoph Lippuner c.lippuner@access.uzh.ch

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In Collaboration with / In Zusammenarbeit mit
Project Leadership and Contacts:
med. vet. Sabine Glor - sabine.glor@uzh.ch
Dr. Michael Grigg, Molecular Parasitology Unit, Laboratory of Parasitic Diseases, National Institutes of Health, NIAID, Bethesda, USA
Prof. Nick Smith, Queensland Tropical Health Alliance, Faculty of Medicine, Health and Molecular Sciences, James Cook University, Cairns

**Duration of Project / Projektdauer**
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