Leids Universitair Medisch Centrum

Facilities

Our studies are aimed at developing interventions against human malaria, such as novel drugs and vaccines. Both by manipulating and examining the human malaria-parasite *Plasmodium falciparum* in culture, and by exploiting rodent malaria parasites (*Plasmodium berghei, P. yoelii)* in mice, mosquitoes and *in vitro.*

In vitro cultivation of the blood stages of malaria parasite

In our laboratory technologies have been developed for the short- and long-term *in vitro* culture of *P. berghei* blood stages. In addition we have facilities for the culture of *P. falciparum* blood stages. Cultures of blood stages are used for a wide range of applications, such as drug sensitivity testing, drug screening, phenotype analysis, production of parasites for genetic modification and isolation of the different parasite forms for molecular analysis.

Infections of mosquitoes by malaria parasites

Facilities are available for breeding of *Anopheles stephensi* mosquitoes and for mosquito transmission of the human malaria parasite *P. falciparum* and rodent malaria parasites.

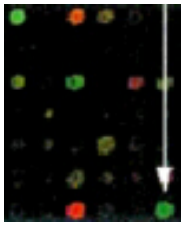
In vitro cultivation of mosquito stages of malaria parasites

We have developed standardized techniques for in vitro gamete production, fertilization and zygote development of *P. berghei*.

In vitro cultivation of liver stages of malaria parasites

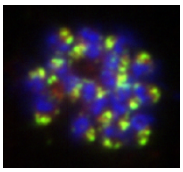
Facilities and technologies are available for in vitro cultivation of liver stages of rodent malaria parasites and for in vitro cultivation of liver stages of the human parasite *P. falciparum* in human primary hepatocytes. In addition, technologies are available for analysing liver stages of rodent malaria parasites in vivo in mice by in vivo imaging technologies

Molecular biology techniques and genomics and post-genomic analyses



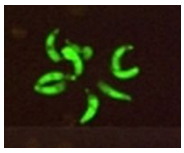
All the standard technologies for analysis of DNA and RNA are used routinely in our laboratory. These activities have generated resources that can be requested and provided a technology base that continues to be developed. In collaboration with other groups detailed genomic and high-throughput post-genomic expression analyses have been performed using rodent malaria parasites.

Genetic modification of malaria parasites



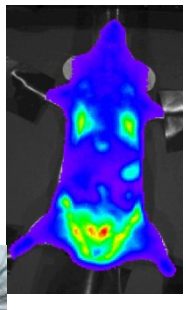
Technologies for genetic modification of *P. berghei* and *P. falciparum* have been developed in our laboratory. We have generated a large number of transgenic parasites expressing reporter proteins providing a broad range of genetic tools for the study of malaria parasite biology. New tools (including CRISPR/Cas9 genome editing) are continuously under development and a number of well-defined gene knockout and transgenic mutant parasite lines are available.

Technologies to study phenotype and cellular aspects of malaria parasite development



The combination of *in vitro* cultivation of the human and rodent parasite and *in vivo* infections of rodent parasites permit the detailed analysis of the phenotype of the parasites. For example, gamete fertilisation, zygote development, synchronous blood stage development, gametocyte formation. In addition: FACS analysis of growth characteristics of blood stages; drug screening assays; light- and fluorescence microscopy; visualisation of live, GFP expressing parasites.

(In vivo) imaging of parasite-host interactions



We study interactions between malaria parasites and their host in live animals using rodent models of malaria. For this research we make use of the latest (real-time, *in vivo*) imaging technologies and an array of transgenic (fluorescent and/or bio-luminescent) malaria parasites.

Preclinical and clinical evaluation of vaccine candidates

We evaluate novel vaccine candidates in preclinical studies using mouse models of malaria and in clinical studies in human volunteers using Controlled Human Malaria Infections (CHMI)