

BP 35: Posters - Physics of Parasites (Focus Session)

Time: Tuesday 14:00–16:00

Location: P2-OG1

BP 35.1 Tue 14:00 P2-OG1

Monitoring the blood-stage infection and hemozoin clearance in malaria rodent models by a novel malaria diagnostic device — ●MARIA PUKANCSIK¹, AGNES ORBAN¹, PETRA MOLNAR¹, ADAM BUTYKAI¹, MARIA REBELO², THOMAS HANSCHIED², AHMED S I ALY³, and ISTVAN KEZSMARKI¹ — ¹Dept. of Physics, Budapest University of Technology and Economics and MTA-BME Lendület Magneto-optical Spectroscopy Research Group, 1111 Budapest, HU — ²Instituto de Medicina Molecular, Faculdade de Medicina, Lisbon, PO — ³Tulane University, Dept. of Tropical Medicine, New Orleans, USA

The first prototype of a diagnostic device was developed as a sensitive platform for malaria diagnosis. The rotating-crystal magneto-optical diagnostic technique (RMOD) targets the natural biomarker hemozoin, which is a magnetic microcrystalline heme compound produced by all species of malaria parasites such as *Plasmodium falciparum* and *Plasmodium vivax*. The *in vivo* investigation of the RMOD device was performed using *P. falciparum*-like and *P. vivax*-like species of malaria parasites infecting mice (e.g. *P. berghei*, *P. chabaudi*, *P. yoelii*, *P. vinckei*) in collaboration with the Instituto de Medicina Molecular and with the Department of Tropical Medicine at Tulane University. The lethal and non-lethal rodent malaria parasites that model different human strains and characteristics of the human blood stage were used in order to monitor the onset of the blood stage infection and compare the sensitivity of the device depending on the rodent strains. The hemozoin clearance was also monitored *in vivo* during and following

the drug treatment of infected mice.

BP 35.2 Tue 14:00 P2-OG1

The physical principles of a novel malaria diagnostic device — ●TAMAS PROK¹, ADAM BUTYKAI¹, AGNES ORBAN¹, PETRA MOLNAR¹, MARIA PUKANCSIK¹, TIVADAR ZELLES², STEPHAN KARL³, and ISTVAN KEZSMARKI¹ — ¹Department of Physics, Budapest University of Technology and Economics and MTA-BME Lendület Magneto-optical Spectroscopy Research Group, 1111 Budapest, HU — ²Department of Oral Biology, Semmelweis University, 1089 Budapest, HU — ³Infection and Immunity Division, Walter and Eliza Hall Institute of Medical Research, Parkville, Victoria, AU

A novel cost-effective, automated, yet sensitive diagnostic method is needed for malaria detection both as an in-field instrument and as a laboratory tool for malaria researchers. Our group has developed the prototype of such device based on the detection of the magnetically induced linear dichroism of the malaria pigment crystals (hemozoin). These micrometer-size crystals are promising malaria-diagnostic targets as they are unique indicators of the infection exhibiting specific magnetic and optical properties. I am going to present our investigations unravelling the details of their anisotropic magnetic properties and linear dichroism; and I am going to show how these findings led us to the development of a highly sensitive detection setup comprising of a cheap laser diode, permanent magnets, simple polarization optics and computer-based data collection and analysis.