

13th EUROPEAN MULTICOLLOQUIUM OF PARASITOLOGY

emop 20^{XIII}
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changing climate
changing parasites




Programme
& Abstract
Book

Belgrade, Serbia
October
12-16, 2021





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PROGRAMME
&
ABSTRACT BOOK

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Layout and prepress:
Olivera Popović

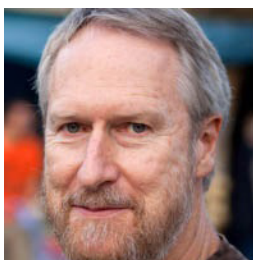


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EDITORIAL



Thomas Romig

President of the EMOP 2021
Scientific Committee

European Federation of
Parasitologists



**Olga Djurkovic-
Djakovic**

President of the
EMOP2021 Organizing
Committee

Serbian Society for
Parasitology

Dear colleagues,

On behalf of the Organizing Committee, the Serbian Society for Parasitology and the European Federation of Parasitologists (EFP), it is our great pleasure to welcome you to the 13th European Multicolloquium of Parasitology (EMOP XIII, Belgrade, Serbia, 12-16 October 2021). Here, you will find the programme and the abstracts of all communications to be presented.

At the heart of this edition of the EMOP is CHANGE. Changes that the world is currently going through, including climate change, migrations of both people and animals, and changes in food habits, favour the persistence and contribute to the re-emergence of parasitic infections at the global level. We tried to capture this in the motto of EMOP 2021, back when it was supposed to be EMOP 2020. The mere fact that this is the first time in its 50-year long tradition that an EMOP has had to be postponed (for more than a year after the originally set dates), speaks even louder about the changes that we are living through. In this case, of course, changes caused by the covid-19 pandemic that has claimed more lives and disrupted life like no other peacetime event in a hundred years.

So, we should all be proud that there will be an EMOP at this time, and that we are meeting, whether on-site or online, to exchange knowledge and ideas, and even share some hugs, or smiles at least. And there is an exciting programme to benefit from, on the latest discoveries and technological developments, tackling major current global issues such as Climate change and parasite re-emergence, Migrations and parasites, Food and Water-borne parasitology, the One Health approach to combatting parasitic diseases, to mention just a few. In addition, because of the geographical position of the host country, developments in the field in the region of South East Europe are under the spotlight.

The number of papers submitted to EMOP 2021 that you can find in this volume may not be as large as would have been expected before the “new normal”. But it has been an endeavour to reach this point, both from us as organizers and from you as participants. Moreover, whatever the programme has lost in quantity may have been made up in quality, since the structure of the conference consists largely of symposia on particular topics organized by leaders in the field, with invited talks by top experts. This means our programme represents not only a rich learning experience, but also an excellent cross-section of current developments and perspectives in the broad field of parasitology in Europe and beyond.

We wish you all a stimulating and fulfilling congress.

A handwritten signature in blue ink, appearing to read 'Thomas Romig'.

A handwritten signature in black ink, appearing to read 'Olga Djurkovic-Djakovic'.

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and NKT cells to the MIL-R parasites. In addition, we demonstrated that MIL could increase the *in vivo* fitness of MIL-R parasites by lowering NK and NKT cell activation, leading to a reduced IFN- γ production.

Conclusion. In conclusion, we found that differential induction of innate immune responses in the liver was, partially, responsible for the attenuated phenotype of the MIL-R parasite and its peculiar feature of drug-dependency. The impact of MIL on hepatic NK and NKT activation and IFN- γ production following recognition of a MIL-R strain indicates that this mechanism may sustain infections with resistant parasites and contribute to treatment failure.

THE IMPACT OF DRUG RESISTANCE OF VISCERAL *Leishmania* SPECIES ON THE PARASITE- VECTOR-HOST INTERACTION

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Background. At the moment only few chemotherapeutics are approved for the treatment of visceral leishmaniasis and these are confronted with increasing treatment failure rates and the emergence of drug resistance.

Objectives. We aimed to predict the potential effects of miltefosine (MIL) and paromomycin (PMM) resistance on the parasite life cycle in the mammalian host and sand fly vector.

Material and Methods. To evaluate the impact of drug resistance, MIL and PMM resistant *L. donovani* and *L. infantum* strains were experimentally selected *in vitro*. The resulting parasites were phenotypically and genotypically characterized in comparison to the original wild-type population. Moreover, their adaptive behaviour in different sand fly species was studied in order to predict the effects on parasite transmission.

Results. Mutations in the *MT* transporter gene are sufficient for acquisition of MIL resistance and are linked to a clear reduction of parasite fitness in mice and sand flies. PMM resistance seems multifactorial and could not be associated to one specific genetic alteration. PMM resistant parasites develop normally in the insect vector and higher parasite burdens in the mammalian host suggest efficient transmission of this resistance trait.

Conclusion. The drug-dependent changes of parasite fitness indicate that not all drugs are at risk of an immediate spread of resistance, but that vigilant use is required.

SEROPREVALENCE OF LEISHMANIOSIS IN STRAY DOGS IN NORTH MACEDONIA

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Background. Canine leishmaniosis is a zoonotic protozoan disease caused by *Leishmania infantum* and vectored by phlebotomine sand flies. Canids (dogs, foxes, coyotes) have the main role in maintaining the disease in endemic regions as reservoirs and source of infection for the sand flies and humans. The disease is endemic in North Macedonia, hence the aim of this study was to assess the seroprevalence of canine leishmaniosis in stray dogs in 2019 and 2020.

Material and Methods. Serum samples were collected from January 2019 to December 2020. A total of 2654 stray dogs' sera from all the 8 regions of the country were tested for presence of anti-*Leishmania* antibodies with commercial IFAT Leishmaniasis test-kit (MegaFLUO[®] LEISH, MEGACOR Diagnostik, Austria). The test was performed following the manufacturer's procedure and using a 1:80 titre cut-off. Samples were considered positive at titres \geq 1:160.

Results. Canine leishmaniosis was present in all regions and the seroprevalence varied from 1.9% in the Skopje region to 9.8 % in the Eastern region. The overall seroprevalence of canine leishmaniosis in this study was 4.8% (95% CI: 3.9-5.6).

Conclusion. The seropositive dogs have an important role in the epidemiology of leishmaniasis in North Macedonia. To reduce the possibility of human infection, it is necessary to detect infection in dogs in a timely manner and apply measures including treatment or elimination of positive dogs.

LONG-TERM HEMATOPOIETIC STEM CELLS AS SANCTUARY NICHE DURING TREATMENT FAILURE IN VISCERAL LEISHMANIASIS

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Background. The increasing frequency of treatment failure in visceral leishmaniasis (VL) has already resulted in discontinuation of various first-line drugs. Although most studies focus on associations with parasitic drug resistance, a knowledge gap remains about other factors determining cure versus relapse. For many pathogens it has been described that persistent infections can occur in many different tissues and cells throughout the host. Some of these niches give protection against active immunity and drug action.

Objectives. To identify the cellular niches responsible for *Leishmania* persistence and treatment failure.

Material and Methods. The present study used double bioluminescent/fluorescent *Leishmania infantum* and *L. donovani* reporter lines to study relapse at the tissue and cellular level, using bioluminescent imaging, flow cytometry and RT-qPCR as qualitative and quantitative techniques.

Results. In combination with observations made in golden Syrian hamsters subjected to 91 different treatments, the results provide evidence of parasites surviving in the bone marrow (BM), identifying this tissue as a sanctuary site from where the host can be recolonized. Long-term hematopoietic stem cells (LT-HSC; Lin- Sca1+ cKit+ CD48- CD150+) were found to become readily infected. Compared to other BM cells and macrophages, LT-HSCs constitute a hospitable cellular niche with low nitric oxide and reactive oxygen species levels and harbouring enormous parasite burdens. Moreover, we found that infected LT-HSCs are less sensitive to antileishmanial reference drugs in comparison to macrophages.

Conclusion. LT-HSCs are a protective cellular niche for persistent *Leishmania* parasites in the BM. Given the important clinical implications for the current field situation of increasing post-treatment relapse rates, this study represents an essential step towards unraveling *Leishmania* persistence and treatment failure.

Funding source: Fonds Wetenschappelijk Onderzoek (FWO), Flanders, Belgium

IDENTIFICATION OF ADIPOCYTES AS TARGET CELLS FOR *Leishmania infantum* PARASITES

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Background. *Leishmania infantum* is the causative agent of visceral leishmaniasis transmitted by the bite of female sand flies. The recommended drugs for treating leishmaniasis include Amphotericin B. But over the course of the years, several cases of relapses have been documented. These relapses call into question the efficiency of actual treatments and raises the question of potential persistence sites. Indeed, *Leishmania* has the ability to persist in humans for long periods of time and even after successful treatment. Several potential persistence sites have already been identified and named 'safe targets'.

Objectives. As adipose tissue has been proposed as a sanctuary of persistence for several pathogens, we investigated whether *L. infantum* could be found in this tissue.

Material and Methods. Experiments were approved by the ethics committee of the Nice School of Medicine, France (Protocol number: 2017-56). *In vitro* and *in vivo* experiments were performed with Recombinant *L. infantum* - expressing the Green Fluorescence Protein and *L. infantum* - expressing the Luciferase reporter,