

## Spatiotemporal epidemiology of malaria in Madagascar between 2006 and 2015

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► **To cite this version:**

Hanitriniaina Felana Angella Ithantamalala, Vincent Herbreteau, Jean-Marius Rakotondramanga, Gwenaëlle Pennober, Bienvenue Rahoilijaona, et al.. Spatiotemporal epidemiology of malaria in Madagascar between 2006 and 2015. 17th International Congress on Infectious Diseases, Mar 2016, Hyderabad, India. 45, pp.58-59, 2016, International Journal of Infectious Diseases. <<http://www.isid.org/igid/welcome.shtml>>. <10.1016/j.ijid.2016.02.173>. <ird-01377825>

**HAL Id: ird-01377825**

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Submitted on 28 Jun 2018

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play a role in the policy change, including availability of resources and formation of kala-core consortium. The technical expertise of MSF has proven invaluable in supporting government during initial phase of treatment policy change implementation.

**Conclusion:** High quality and contextualized evidence is crucial in policy change process. Policy change more likely to happen when funding, tools and required inputs for implementing evidence are available and MSF project contributes to all that.

<http://dx.doi.org/10.1016/j.ijid.2016.02.171>

**Type: Oral Presentation**

Final Abstract Number: 35.002

Session: Oral Presentations: Tropical Infectious Diseases

Date: Saturday, March 5, 2016

Time: 10:15–12:15

Room: G.05-06

### In silico and experimental studies of *Plasmodium* serpentine receptor predicts its role as putative purinergic receptor



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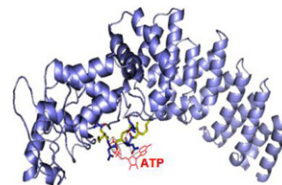
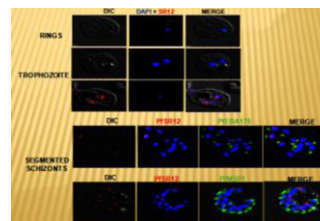
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**Background:** Invasion of red blood cells by *Plasmodium* merozoites involves specific receptor-ligand interactions. Previous reports suggest the role of secondary messengers like calcium and cAMP in invasion and egress of *Plasmodium*. However the receptors associated with calcium signaling and their relation with parasite growth remains undefined. Recently serpentine receptors with G-protein coupled receptor (GPCR) like seven transmembrane (7 TM) topology are identified in *Plasmodium*. A class of GPCR known as purinergic receptors binds to purines such as ADP, ATP and UTP and mediates important physiological functions including regulation of calcium signaling.

**Methods & Materials:** Here we performed *in silico* analysis of *P. falciparum* serpentine receptors to investigate the presence of conserved seven transmembrane domains and a consensus nucleotide binding sequence (P-loop). The interaction of serpentine receptor PfSR12 with ATP was analysed using docking programmes. The expression of PfSR12 in blood stages of life cycle was analysed by confocal microscopy. We also used agonists and antagonists of purinergic signaling in the growth inhibition assays to understand the role of this receptor in *Plasmodium*.

**Results:** Computational analysis of *P. falciparum* serpentine receptors showed that one of the *P. falciparum* serpentine receptors, PfSR12 possess nucleotide binding consensus P-loop sequence in addition to seven transmembrane domains. The presence of conserved seven transmembrane domains and a consensus nucleotide binding sequence (P-loop) suggest that PfSR12 is a putative purinergic receptor. On further analysis using docking programmes we found active binding residues in P-loop of PfSR12, interact with ATP. This work gives insights into the interactions between putative purinergic receptor PfSR12 and its ligand ATP which can be explored in structure based drug designing against malaria. Localization studies using antibodies against PfSR12, we have found that this receptor is expressed in malaria parasite. Our results highlighted that various antagonists used in study have a good inhibitory effect on growth cycle of malaria parasites suggesting the importance of purinergic receptors in growth of parasite.



**Conclusion:** Together our findings demonstrate that the approach that we have applied here is a powerful strategy to identify new inhibitory scaffolds suitable for further development of anti parasitic drug against these targets.

<http://dx.doi.org/10.1016/j.ijid.2016.02.172>

**Type: Oral Presentation**

Final Abstract Number: 35.003

Session: Oral Presentations: Tropical Infectious Diseases

Date: Saturday, March 5, 2016

Time: 10:15–12:15

Room: G.05-06

### Spatiotemporal epidemiology of malaria in Madagascar between 2006 and 2015



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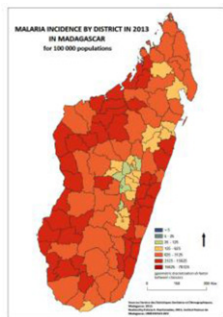
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**Background:** Malaria is endemic in Madagascar, with local specificities. Its transmission occurs throughout the year along the eastern coast, while it is unstable and seasonal on Central Highlands. In this study, we investigate the spatiotemporal patterns of the occurrence of malaria in relation to bioclimatic conditions.

**Methods & Materials:** The Service for Health and Demographic Statistics of the Ministry of Public Health provided epidemiological data related to complicated and uncomplicated malaria cases from 2006 to April 2015. We integrated these data into a Geographic Information System to map monthly incidence for each health district and identify spatiotemporal clusters. We also acquired environmental information (meteorological and vegetation indices) in order to assess relations with malaria incidences.

**Results:** Since 2010, the report of malaria cases has improved and malaria incidence shows more regular trends. Malaria transmission generally starts with the rainy season and has a distinct peak on February and March. Children under 15 years old are the most vulnerable over the country. Coastal districts can be

considered as a source of malaria because of their high incidence all over the year.



**Conclusion:** The quality of epidemiological data is discussed regarding the provision and access to health services. Case reports show weaknesses for some remote areas and at the end of each year. The persistence of malaria on the coast could induce the emergence of malaria in Central Highlands following reintroduction by travelers.

<http://dx.doi.org/10.1016/j.ijid.2016.02.173>

**Type: Oral Presentation**

Final Abstract Number: 35.004

Session: Oral Presentations: Tropical Infectious Diseases

Date: Saturday, March 5, 2016

Time: 10:15-12:15

Room: G.05-06

### Assessment of effect of intermittent preventive treatment of malaria in pregnancy on birth weight of babies in Nigeria: Life-saving dynamics



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**Background:** Malaria infection during pregnancy, although preventable and treatable, still has adverse effects on both the mother and fetus in Nigeria. These adverse effects; intrauterine growth retardation, low birth weight and maternal anemia are significant risk factors for neonatal and infant mortality. The 2014 national guidelines and strategies for control of malaria during pregnancy recommend administration of at least 3 doses of Sulphadoxine-Pyrimethamine (SP) as Intermittent Preventive Treatment in pregnancy (IPTp) to pregnant women attending Antenatal Care Clinic (ANC). However, implementation of the guidelines is still sub-optimal. The objective of the study was to assess the effect of scaled implementation of prevention of malaria in pregnancy (MiP) with IPTp on birth weight of babies born in states supported by the US President's Malaria Initiative.

**Methods & Materials:** The study used secondary data collected from July 2013 to June 2015 in 7 states where routine ANC data from all the health facilities are reported through the National District Health Information System to analyze trend and differences in reported birth weight following implementation of IPTp with SP. The interventions provided by the project include capacity building on control of malaria in pregnancy; strengthening of logistics management systems for SP, monitoring and supportive supervision.

**Results:** Between July 2014 and June 2015, 636,600 health facility ANC visits and 191,104 births were reported. The observed trend in the available data showed that the birth weight of babies improved as the IPTp uptake increased. Mean percentage of ANC revisits who received IPTp2 increased from 29% to 38%; the mean percentage of babies with low birth weight decreased from 14% to 10%; while the mean percentage of babies with birth weight higher than 2,500g increased from 86% to 90% between the previous year and the intervention period.

**Conclusion:** Though many confounders might contribute to the improved birth weight of babies reported within the period, however the contribution of the scaled implementation of IPTp is significant as previously documented in other malaria endemic countries. Concerted efforts are needed to scale up this intervention nationwide and strengthen health system in order to improve the birth weight of babies and consequently reducing neonatal and infant mortality.

<http://dx.doi.org/10.1016/j.ijid.2016.02.174>

**Type: Oral Presentation**

Final Abstract Number: 35.005

Session: Oral Presentations: Tropical Infectious Diseases

Date: Saturday, March 5, 2016

Time: 10:15-12:15

Room: G.05-06

### Rickettsial disease IFA-IgG titres in auto-immune diseases: What do they imply?



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**Background:** Rickettsial infections are known to present mimicking autoimmune disorders. The gold standard diagnostic test for rickettsial diseases is based on the detection of IgM and/or IgG antibodies against these infections by immuno-fluorescent technique (IFA). While confirmation of rickettsial diseases warrant demonstration of rising or declining antibody titres between acute and convalescent samples, high titres of either IFA-IgM or IFA-IgG in acute phase serum in patients with a compatible clinical illness may help in the presumptive diagnosis and introduction of anti-rickettsial antibiotics. During the IFA test, patient sera containing anti rickettsial antibodies are made to react with rickettsial antigens that are grown in cell culture media. However, presence of nuclear material in these cell cultures may react with anti-nuclear antibodies that are produced in autoimmune disorders and cause a false positive immunofluorescent signal.

**Methods & Materials:** In order to evaluate the reactivity of rickettsial disease IFA-IgG test [IFA-IgG-OT (*Orientia tsutsugamushi*) and IFA-IgG-SFG (spotted fever group)] among patients with autoimmune diseases, an analytical cross-sectional study was carried out using sera of 38 patients with confirmed auto-immune diseases.

**Results:** The 38 patients included 15 systemic lupus erythematosus (SLE), 5 autoimmune-thyroiditis, 13 idiopathic-thrombocytopenia (ITP), 4 autoimmune-haemolytic-anaemia (AIHA), 1 polymyositis, 1 polyglandular syndrome and 1 Anti-phospholipid syndrome. The IFA-IgG reactivity of  $\geq 1:128$  was