

A New Study Identifies Possible Biomarkers of Severe Malaria in African Children

The analysis identified a series of small molecules called microRNAs that are released as a result of organ damage and are associated with disease severity

Barcelona, 13 January 2021.- The levels of small molecules called microRNAs (miRNAs) circulating in blood could help **identify early on children with life-threatening forms of malaria**, according to a study led by the Barcelona Institute for Global Health, an institution supported by “la Caixa” Foundation, in collaboration with the [Manhiça Health Research Center \(CISM\) in Mozambique](#). The results, published in *Emerging Infectious Diseases* journal, could also help **better understand the mechanisms underlying severe malaria**.

Malaria mortality among young African children remains unacceptably high. To improve the outcome, it is important to rapidly identify and treat children with severe forms of the disease. However, **at the beginning of the infection**, it is not always easy to distinguish early on between uncomplicated and life-threatening disease symptoms. One characteristic of severe malaria is the **sequestration of red blood cells infected with the malaria parasite (*P. falciparum*)** in vital organs such as the lungs, kidneys or brain. This leads to organ damage, which in turn results in the release of **small molecules called microRNAs (miRNAs)** into body fluids, including blood.

“We hypothesised that **miRNA levels in plasma** would be differently expressed in children with severe and uncomplicated malaria, due to parasite sequestration in vital organs,” explains ISGlobal researcher **Alfredo Mayor**, who coordinated the study. To test this hypothesis, he and his team first used an **advanced sequencing technique** to identify miRNAs released by human brain endothelial cells when exposed to red blood cells infected by *P. falciparum* in a dish. They then measured expression of these miRNAs in **blood samples from Mozambican children** with severe or uncomplicated malaria. They found that **six of the identified miRNAs** were higher in children with severe malaria. One of these miRNAs, which is expressed by a variety of tissues, was also positively related with the amount of a **parasite-derived protein named HRP2**. “This suggests that increasing amounts of parasite associated with parasite sequestration may lead to higher levels of secretion of this miRNA by damaged tissues,” explains **Himanshu Gupta**, first author of the study.

“Our results indicate that the different pathological events in severe and uncomplicated malaria lead to **differential expression of miRNAs in plasma**,” says Mayor. “These miRNAs could be used as prognostic biomarkers of disease, but we need larger studies to validate this”, he adds. The findings also provide a ground for better understanding the mechanisms underlying severe malaria.

Reference

Gupta H, Rubio M, Siteo A et al. [Plasma MicroRNA Profiling of *Plasmodium falciparum* Biomass and Association with Severity of Malaria Disease](#). *Emerging Infectious Diseases*. 2021. <https://doi.org/10.3201/eid2702.191795>

About ISGlobal

The Barcelona Institute for Global Health, ISGlobal, is the fruit of an innovative alliance between the "la Caixa" Foundation and academic and government institutions to contribute to the efforts undertaken by the international community to address the challenges in global health. ISGlobal is a consolidated hub of excellence in research that has grown out of work first started in the world of health care by the Hospital Clínic and the Parc de Salut MAR and in the academic sphere by the University of Barcelona and Pompeu Fabra University. The pivotal mechanism of its work model is the transfer of knowledge generated by scientific research to practice, a task undertaken by the institute's Education and Policy and Global Development departments. ISGlobal has been named a Severo Ochoa Centre of Excellence and is a member of the CERCA system of the Generalitat de Catalunya.

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