

## BIONAND 2019 CONFERENCE SERIES

### IMFAHE- SCIENCE 2.0

**SESSION 1:** Impact of malaria-protective polymorphism on plasmodium falciparum invasion.

**SESSION 2:** Career path in research: full of obstacles...or opportunities?

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Abstract:

Malaria has had a major effect on the human genome, with many protective polymorphisms such as sickle cell trait having been selected to high frequencies in malaria endemic regions<sup>1,2</sup>. Recently, we showed that a novel blood group variant, Dantu, provides 74% protection against all forms of severe malaria in homozygous individuals<sup>3,4,5</sup>. This is a similar degree of protection to sickle cell trait and considerably greater than the most advanced malaria vaccine, but until now the mechanism of protection has been unknown. In the current study, we demonstrate a significant impact of Dantu on the ability of Plasmodium falciparum merozoites to invade RBCs. The Dantu variant was associated with extensive changes to the RBC surface protein repertoire, but unexpectedly the malaria protective effect did not correlate with specific RBC-parasite receptor-ligand interactions. By following invasion using video microscopy, we found a strong link between RBC tension and parasite invasion and, even in non-Dantu RBCs, identified a tension threshold above which RBC invasion did not occur. Dantu RBCs had higher average tension, meaning that a higher proportion of Dantu RBCs could not be invaded. These findings not only provide an explanation for the protective effect of Dantu against severe malaria, but also provide fresh insights into the essential process of P. falciparum parasite invasion, and how invasion efficiency varies across the heterogenous populations of RBCs that are present both within and between individuals.

References:

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Bibliography:

His main research interest is finding novel alternatives to current medicines to treat human infectious diseases. He has studied and worked in some of the most prestigious Universities and Research Centres in 8 different countries across the world. Among other experiences, he has played an active role in two European Consortiums (DNA-TRAP and NAREB) devoted to the fascinating field of nanoparticle development for drug delivery and in a global consortium studying the Epidemiology of malaria in pregnant women (PregVax). At the moment, he is investigating a rare polymorphism that might be associated to natural resistance to malaria infections at both the Wellcome Sanger Institute in Cambridge (UK) and the Kenyan Medical Research Institute-Kilifi (Kenya) where he has engaged in several training and public engagement initiatives. Aiming to train new generations of promising students he has been registered as a STEM Ambassador and joined the International Mentors Program to promote excellent science education among undergraduate students.