

-EMBARGOED UNTIL WEDNESDAY 15 MAY 2019, 10.00H CET-

- PRESS RELEASE -

Protection by the malaria vaccine is not only a matter of antibody quantity but also of quality

A study shows for the first time that the higher the avidity of antibodies induced by the RTS,S vaccine, the greater the protection

Barcelona, 14 May 2019- The quantity and quality of antibodies recognising the end region of the malaria parasite's CSP protein is a good marker of protection by the RTS,S/AS01E vaccine, shows a study led by the Barcelona Institute for Global Health (ISGlobal) – an institution supported by “la Caixa”- in collaboration with the Bagamoyo Research and Training Centre, Ifakara Health Institute, Tanzania, the Kintampo Health Research Centre, Ghana, the Institut de Recherche en Sciences de la Santé in Nanoro, Burkina Faso, and the Swiss Tropical and Public Health Institute, Switzerland, among others. The study, published in *Nature Communications*, provides valuable information for guiding the design of future, more effective vaccines.

Most vaccines contain inactivated pathogens or pathogen fragments against which the body produces protective antibodies – ideally, a complete and long-lasting protection. This is not the case for RTS,S, which has the merit of being the first vaccine approved for large-scale pilot studies in Africa, but that protects only partially and for a limited amount of time. Over the last years, ISGlobal researcher Carlota Dobaño and her group have tried to understand why, and identify markers related to vaccine protection.

The RTS,S vaccine contains a fragment of the *Plasmodium falciparum* CSP protein, that goes from the central part, rich in amino acid repeats (NANP region) to the end (called the C-terminal end). In this study, Dobaño and her team focused on measuring not only the quantity of antibodies against the NANP and C-terminal regions, but also their avidity (i.e. the strength with which they bind to their ligand). To do so, they analysed samples from over 1,000 infants (between 6 and 12 weeks of age) and children (5 to 17 months-old), vaccinated or not during the RTS,S phase 3 clinical trial in an area with low malaria transmission (Bagamoyo in Tanzania) and two areas with high malaria transmission (Nanoro in Burkina Faso and Kintampo in Ghana).

The results show for the first time that vaccination not only induces a strong increase in the amount of antibodies against both CSP regions, but also in their avidity. This increase is stronger in children than in infants, which could explain why the former are better protected by the vaccine. “We see that, in terms of protection, the avidity of C-terminal antibodies is more important than the quantity, while for NANP antibodies quantity is more important than quality,” explains Dobaño. The results also indicate that when a child has already been exposed to malaria (and therefore has anti-CSP antibodies), the protective effect of the vaccine is lower. “This suggests that the vaccine will better protect children who have been less exposed to the parasite, for example those living in low-transmission areas,” adds Dobaño.

The research team stresses the need to understand the mechanisms underlying the partial protection conferred by RTS,S, in order to guide the design of new and better vaccines.

Reference

“Concentration and avidity of antibodies to different circumsporozoite epitopes correlate with RTS,S/AS01E malaria vaccine efficacy”. *Nature Communications*. doi:10.1038/s41467-019-10195-z.

About ISGlobal

The Barcelona Institute for Global Health (ISGlobal), the result of an innovative alliance between “la Caixa”, academic institutions and government bodies, was set up to contribute to the work undertaken by the international community to address the challenges of health in a globalised world. ISGlobal is a consolidated hub of excellence based on research and health care that has grown from the work first started in the world of clinical 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 core 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 belongs to the Catalan Government’s CERCA network.

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