The PHIST protein GEXP02 targets the host cytoskeleton during sexual development of Plasmodium falciparum

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A hallmark of the biology of Plasmodium falciparum blood stage parasites is their extensive host cell remodelling, facilitated by parasite proteins that are exported into the erythrocyte. Although this area has received extensive attention, only a few exported parasite proteins have been analysed in detail, and much of this remodelling process remains unknown, particularly for gametocyte development. Recent advances to induce high rates of sexual commitment enable the production of large numbers of gametocytes. We used this approach to study the Plasmodium helical interspersed subtelomeric (PHIST) protein GEXP02, which is expressed during sexual development. We show by immunofluorescence that GEXP02 is exported to the gametocyte-infected host cell periphery. Co-immunoprecipitation revealed potential interactions between GEXP02 and components of the erythrocyte cytoskeleton as well as other exported parasite proteins. This indicates that GEXP02 targets the erythrocyte cytoskeleton and is likely involved in its remodelling. GEXP02 knock-out parasites show no obvious phenotype during gametocyte maturation, transmission through mosquitoes, and hepatocyte infection, suggesting auxiliary or redundant functions for this protein. In summary, we performed a detailed cellular and biochemical analysis of a sexual stage-specific exported parasite protein using a novel experimental approach that is broadly applicable to study the biology of P. falciparum gametocytes.
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