PfMAP-2 is essential for male gametogenesis in the malaria parasite Plasmodium falciparum

ID 4600521
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Year 2020
Title PfMAP-2 is essential for male gametogenesis in the malaria parasite Plasmodium falciparum
Journal Scientific reports
Volume 10
Number 1
Pages / **Article-Number** 11930

In malaria parasites, male gametogenesis is a proliferative stage essential for parasite transmission to the mosquito vector. It is a rapid process involving three rounds of genome replication alternating with closed endomitoses, and assembly of axonemes to produce eight flagellated motile microgametes. Studies in Plasmodium berghei have highlighted tight regulation of gametogenesis by a network of kinases. The P. berghei MAPK homologue PbMAP-2 is dispensable for asexual development but important at the induction of axoneme motility. However, in P. falciparum, causing the most severe form of human malaria, PfMAP-2 was suggested to be essential for asexual proliferation indicating distinct functions for MAP-2 in these two Plasmodium species. We here show that PfMAP-2 is dispensable for asexual growth but important for male gametogenesis in vitro. Similar to PbMAP-2, PfMAP-2 is required for initiating axonemal beating but not for prior DNA replication or axoneme formation. In addition, single and double null mutants of PfMAP-2 and the second P. falciparum MAPK homologue PfMAP-1 show no defect in asexual proliferation, sexual commitment or gametocytogenesis. Our results suggest that MAPK activity plays no major role in the biology of both asexual and sexual blood stage parasites up until the point of male gametogenesis.

Publisher Springer Nature
ISSN/ISBN 0169-5487
edoc-URL https://edoc.unibas.ch/77842/
Full Text on edoc Available;
Digital Object Identifier DOI 10.1038/s41598-020-68717-5
PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/32681115
ISI-Number MEDLINE:32681115
Document type (ISI) Journal Article