

Who's to blame? Host-vector-parasite interactions in timing transmission

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The daily rhythms of malaria parasite development in the blood of the vertebrate host is famous for causing fever rhythms. Previous research suggests that these rhythms result in the production of sexual transmission stages (gametocytes) whose maturation coincides with the time-of-day that mosquito vectors are most likely to bite. Indeed, daily rhythms in the infectiousness of gametocytes to mosquitoes have been observed, with gametocytes being more infectious during their night time.

But parasites, hosts and vectors all display daily rhythms, so it's difficult to determine their relative contributions to the infectiousness of gametocytes. Because parasite and host time are inherently confounded in wild-type mice, we used *Per1/2* knock-out mice which do not display any circadian rhythms when kept in constant darkness. By separately disrupting parasite and mosquito rhythms, we tested their relative impacts on transmission efficiency, in the absence of host rhythms.

Our results reveal that mosquitoes are less susceptible to infection during their night time. However, night time gametocytes from arrhythmic mice did not display enhanced infectiousness compared to daytime gametocytes. Could enhanced infectivity of night time gametocytes in wildtype mice be the result of rhythmic host factors impeding / enhancing transmission at different time of day?