

Double stranded RNA elicits protective immunity against malaria parasites in *Anopheles* mosquitoes

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Double stranded RNA (dsRNA) induced RNA interference (RNAi) has been one of the mechanisms that work against virus infection in all levels of organisms from plant to animal. dsRNA can activate general innate immunity through the NF- κ B proinflammatory axis. In the current study, we show that dsRNA can elicit mosquito immunity against malaria, using two mosquito-malaria models: *An. gambiae*-*P. berghei* and *An. stephensi*-*P. yoelii*. dsRNA-pretreated mosquitoes were more resistant to malaria, which was manifested by less prevalence and lower oocyst burden in infected mosquitoes. The general activation of immunity by dsRNA was demonstrated by gene expression analysis. Here we applied an irrelevant non-mosquito derived dsRNA, Mal dsRNA, as an elicitor, injection of which into mosquitoes was used to stimulate mosquito immunity. Sterile saline injection was used as control. We tested two mosquito immune genes. TEP4 is an immune gene that is strongly responsive to early malaria infection, more than to bacteria; R28 is a bacteria responsive gene that is little responsive to malaria infection. Mal dsRNA treatment up-regulated the expression of both TEP4 and R28 genes upon malaria infection. TEP4 dsRNA pretreatment knocked down TEP4 gene expression as expected, but concomitantly enhanced R28 expression. Injury alone (saline injection) did not show a noticeable effect on the transcriptional pattern of these immune genes upon infection, indicating that activation of immunity induced by dsRNA is mediated by a mechanism independent of the injury that occurs during the injection of dsRNA into mosquitoes. Microarrays have been used to reveal the immune gene expression profiles in dsRNA pretreated mosquitoes upon malaria infection.