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Chitosan/double-stranded RNA nanoparticle-mediated RNA interference to silence chitin synthase genes through larval feeding in the African malaria mosquito (*Anopheles gambiae*)

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KEYWORDS

African malaria mosquito • chitin synthase • nanoparticle • RNA interference • systemic RNAi

ABSTRACT

The purpose of this study was to examine whether the expression of two chitin synthase genes, *AgCHS1* and *AgCHS2*, can be repressed by chitosan/*AgCHS* dsRNA-based nanoparticles through larval feeding in *Anopheles gambiae*. The *AgCHS1* transcript level and chitin content were reduced by 62.8 and 33.8%, respectively, in the larvae fed on chitosan/*AgCHS1* dsRNA nanoparticles compared with those of the control larvae fed on chitosan/GFP dsRNA nanoparticles. Our study suggested for the first time that RNA interference (RNAi) in mosquito larvae is systemic, and demonstrated that the larvae fed on the nanoparticles assembled from *AgCHS1* and *AgCHS2* dsRNA increased larval susceptibilities to diflubenzuron, and calcofluor white (CF) or dithiothreitol, respectively. These results suggest great potential for using such a nanoparticle-based RNAi technology for high-throughput screening of gene functions and for developing novel strategies for pest management.

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