

SHORT REPORT

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Elevation of dopamine level reduces host-seeking activity in the adult female mosquito *Aedes albopictus*

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Abstract

Background: Mosquito-borne viruses are transmitted to human hosts *via* blood-feeding behavior of female mosquitoes. Female mosquitoes seek a host to take blood meals (host-seeking behavior). In order to prevent virus infections, it is important to understand how they modulate host-seeking behavior. Dopamine (DA) in the central nervous system acts as a neuromediator that regulates a variety of behaviors in insects. In female mosquitoes, host-seeking behavior increases when DA levels in the head decline after emergence. However, it remains unclear whether DA directly modulates host-seeking behavior in female mosquitoes. The aim of this study was to examine whether changes in DA levels in the head affects host-seeking activity in the adult female mosquito *Aedes albopictus* (*Ae. albopictus*).

Findings: We compared host-seeking behavior in one group of emerging female adults treated with L-β-3,4-dihydroxyphenylalanine (L-DOPA), the precursor of DA, (L-DOPA group), with that in an untreated control (control group) after confirming elevation of head DA in L-DOPA group by using high-performance liquid chromatography. The content of head DA in L-DOPA group significantly remained higher than that in controls on all days examined. The host-seeking activity in the control group showed a gradual increase over the 6-day experimental period. In contrast, there was no such increase in the host-seeking activity in the L-DOPA group. Therefore, the host-seeking activity of L-DOPA group was significantly lower than that of the controls between day 3 and 6 post-emergence.

Conclusion: Our results indicate that elevation of DA level reduces host-seeking activity in adult female mosquito *Ae. albopictus*.

Keywords: Host-seeking behavior, Dopamine, *Aedes albopictus*

Findings

Aedes albopictus (*Ae. albopictus*) is known as a vector of mosquito-borne viruses (e.g. Dengue virus and West Nile virus) [1]. Female mosquitos seek a host to take blood meals (host-seeking behavior). In order to prevent virus infections, it is important to understand how they modulate host-seeking behavior.

In the central nervous system of insects, biogenic amine dopamine (DA) acts as a neuromediator (*i.e.*

neurotransmitter, neuromodulator and neurohormone) to modulate a wide variety of behaviors, including insemination, diapause, and locomotory behavior [2-4]. In mosquitoes, it is demonstrated that DA levels in the head gradually decrease day by day after adult emergence [5]. Host-seeking behavior, on the other hand, is shown to increase after adult emergence. Interestingly, the period of change in DA level coincides with that in which host-seeking behavior changes. These observations suggested that DA could play a role in modulating host-seeking behavior in the mosquito. In female mosquitoes, however, the direct relation between DA in the head and host-seeking behavior remained unclear. In order to elucidate

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