

Cholesterol Depletion from Mayaro Virus Envelope: Implications in Virus Infectivity

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Alphaviruses are enveloped viruses that enter host cells through receptor-mediated endocytosis. The subsequent viral envelope fusion to endosomal membrane is triggered by low pH and requires the presence of both cholesterol and sphingolipids in the target membrane. Besides, it also seems to exist a cholesterol requirement to an efficient alphavirus budding from the cellular plasma membrane, which results in a high loading of this lipid on the viral envelope. In this study, we have examined the role of Mayaro virus envelope cholesterol, via depletion by methyl- β -cyclodextrin. The pretreatment of virions with methyl- β -cyclodextrin efficiently depleted envelope cholesterol and significantly reduced Mayaro virus infectivity. Negative-staining electron microscopy and atomic force microscopy analysis revealed that envelope cholesterol depletion markedly affected virus morphology, by means of permeabilization of the viral membrane, suggesting that this lipid plays a role in the maintenance of virus particle integrity. Analysis of laurdan fluorescence allowed us to evaluate the effect of methyl- β -cyclodextrin treatment on the lipid-packing of virus envelope. Our results suggest that the cholesterol present in Mayaro virus envelope is related to the maintenance of a high organization degree in this membrane, being a critical structural component.

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