Virus-like particle of Macrobrachium rosenbergii nodavirus produced in Spodoptera frugiperda (Sf9) cells is distinctive from that produced in Escherichia coli

ABSTRACT

Macrobrachium rosenbergii nodavirus (MrNV) is a virus native to giant freshwater prawn. Recombinant MrNV capsid protein has been produced in Escherichia coli, which self-assembled into virus-like particles (VLPs). However, this recombinant protein is unstable, degrading and forming heterogenous VLPs. In this study, MrNV capsid protein was produced in insect Spodoptera frugiperda (Sf9) cells through a baculovirus system. Dynamic light scattering (DLS) and transmission electron microscopy (TEM) revealed that the recombinant protein produced by the insect cells self-assembled into highly stable, homogenous VLPs each of approximately 40 nm in diameter. Enzyme-linked immunosorbent assay (ELISA) showed that the VLPs produced in Sf9 cells were highly antigenic and comparable to those produced in E. coli. In addition, the Sf9 produced VLPs were highly stable across a wide pH range (2ï 12). Interestingly, the Sf9 produced VLPs contained DNA of approximately 48 kilo base pairs and RNA molecules. This study is the first report on the production and characterization of MrNV VLPs produced in a eukaryotic system. The MrNV VLPs produced in Sf9 cells were about 10 nm bigger and had a uniform morphology compared with the VLPs produced in E. coli. The insect cell production system provides a good source of MrNV VLPs for structural and immunological studies as well as for hostï pathogen interaction studies.

Keyword: Giant freshwater prawn; Nodavirus; Eukaryotic expression; Recombinant protein; Virus-like particles