Abstract

Vibrio cholerae is a gram-negative aquatic bacterium responsible for the acute diarrheal disease of cholera, which is an epidemic illness that causes significant morbidity and mortality in the developing world. V. cholerae is able to grow as biofilms over abiotic and biotic surfaces. It has been suggested that the formation of biofilm by V. cholerae could be an important factor for the survival of this bacterium in the aquatic ecosystem. The synthesis of an exopolysaccharide is required for biofilm formation. This work describes the construction of mutants, derived from the attenuated vaccine strain of V. cholerae 1333, by inactivating of the gene VC0934 that encodes a glicosiltransferase required for production of the exopolysaccharide. Inactivation of this gene, which renders the mutants unable to form biofilms, was aimed at diminishing the environmental impact of live vaccine candidates. The mutants retained desired characteristics of the parental strain such as normal morphology, serology, motility and colonization in the suckling mouse model. Besides their inability to produce biofilms the mutants were also unable to produce the rugose phenotype under inducing conditions. When a wild type copy of the VC0934 gene was restored to the mutants they recovered the capacity to produce biofilm. Additionally, a glicosiltransferase mutant of the toxigenic strain of V. cholerae C7258 was constructed and it was as virulent as the parental strain in the suckling mouse model, which suggests that the gene VC0934 does not play an important role in V. cholerae pathogenicity. These results allowed to conclude that mutation of the gene VC0934 is probably a desirable feature in live cholera vaccine candidates because it does not significantly affect important properties of the vaccine strains while it seems to affect its environmental survival.

Keywords

Vibrio cholerae, biofilm, exopolysaccharide, cholera mutants, vaccine candidates.