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Enterovirus detection by reverse transcriptase polymerase chain reaction from the coastal waters of southern California

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ABSTRACT

Assays for the detection of enteroviruses by reversetranscriptase-polymerase chain reaction (RTPCR) were performed on 63 coastal seawater samples taken from the coastline of the Southern California Bight, with the majority of the samples taken from Santa Monica Bay, California. These samples were taken at sites either influenced by freshwater outlets or proximal to highuse sandy beaches that are popular recreational areas. The RT-PCR is a primer-based molecular biology technique that can be used to detect the genomes of specific groups or types of RNA viruses. Our results indicate that the concentration methods and RT-PCR protocol used in this study could be used to detect enteroviruses from 20l samples of coastal seawater. Of the 63 samples, 21 (33%) were positive for enteroviruses, 35 (56%) were negative, and 7 (11%) were inconclusive. No direct correlation was observed between RT-PCR results and measurable rainfall (>0.5 inch either immediately prior to or during sampling), but our analyses demonstrated that positive results for enteroviruses were significantly more likely during the winter "wet" season than during the summer "dry" season. Results of 60 and 54 samples did not demonstrate any significant logistical correlation to total and fecal coliforms, respectively ($p>0.05$). Correlation analysis of 14 samples showed a significant, but weak, logistical correlation to levels of enterococci ($r = 0.50$, $p < 0.05$) in samples from only Santa Monica Bay. Inconclusive results occurred for approximately 1/9 of the samples, where inhibition of PCR occurred due to substances in the seawater. Optimization of our concentration procedure has improved the RT-PCR method over time and has reduced the incidence of inconclusive results; e.g., during the last two years, only one analysis was inconclusive. Our results indicate that there is no strong relationship between the presence of enteroviruses and levels of indicator bacteria.

Full Text

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