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Diurnal variation in *Enterococcus* species composition in polluted ocean water: A potential role for the enterococcal carotenoid in protection against photoinactivation

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ABSTRACT

Enterococcus species composition was determined each hour for 72 hours at a polluted marine beach in Avalon, Santa Catalina Island, California, USA. Species composition was significantly different during the day versus the night based on an analysis of similarity. *E. faecium* and *E. faecalis* were more prevalent at night than the day while *E. hirae* and other *Enterococcus* species were more prevalent during the day than the night. *Enterococcus* spp. containing a yellow pigment were more common during the day than the night suggesting that the pigmented phenotype may offer a competitive advantage during sunlit conditions. A laboratory microcosm experiment established that the pigmented *E. casseliflavus* and a pigmented *E. faecalis* isolated from the field site decay at a slower rate than a non-pigmented *E. faecalis* in a solar simulator in simulated, clear seawater. This further supports the idea that the yellow carotenoid pigment in *Enterococcus* provides protection during sunlit conditions. The findings are in accordance with previous work with other carotenoid-containing non-photosynthetic and photosynthetic bacteria that suggests the carotenoid is able to quench reactive oxygen species capable of causing photoinactivation and photostress. The results suggest that using enterococcal species composition as a microbial source tracking tool may be hindered by the differential environmental persistence of pigmented and non-pigmented enterococci.

Full Text

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