SCCWRP Annual Report 2009

Comparison of rapid QPCR-based and culture-based methods for enumeration of *Enterococcus* sp. and *Escherichia coli* in recreational waters

Rachel T. Noble[1], A. Denene Blackwood[1], John F. Griffith, Charles D. McGee[2] and Stephen B. Weisberg

[1]*University of North Carolina, Institute of Marine Sciences, Chapel Hill, NC*
[2]*Orange County Sanitation District, Fountain Valley, CA*

ABSTRACT

Recreational water quality is currently assessed by measuring bacterial indicators using United States Environmental Protection Agency (EPA) approved culture-based methods that require 18 to 96 hours for results, limiting the immediacy of public health warning systems. Quantitative polymerase chain reaction (QPCR) methods that can be completed in less than two hours have been developed, but measure a different endpoint that could yield different water quality conclusions than the existing EPA approved methods they are intended to replace. Here we present two studies in which samples were processed simultaneously using QPCR- and culture-based methods of enumeration for *Enterococcus* sp. and *Escherichia coli* to assess how frequently disparities occur between these classes of methods. The first study involved processing 54 blind samples, in which QPCR analysis was conducted by developers of the assays. The second study involved 163 samples processed by personnel from a State certified microbiology laboratory with little previous experience with QPCR. The correlation between QPCR- and culture-based methods was 0.80 for *Enterococcus* and 0.84 for *E. coli*, which is only slightly less than the 0.92 correlation observed between the two culture-based methods. There were no false positives on blank samples and repeatability between replicates was as high for QPCR as it was for the culture-based methods, even when performed by the laboratory without previous QPCR experience. The QPCR results would have led to the same beach management decision as the culture-based methods for 88% of the samples: only slightly less than the 94% agreement in beach management decisions based on the two culture-based methods. The samples for which there was disagreement suggest a slight bias toward underestimation for the QPCR-based method. This underestimation might have been due to amplification inhibition or greater target specificity in the QPCR assays. While there is still a need to understand these minor differences, the high level of agreement should facilitate transition from culture-based to rapid QPCR-based methods.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2009AnnualReport/AR09_211_221.pdf