Evaluation of a new DNA amplification technique to screen cyanobacteria isolated from drinking water sources for microcystin toxins

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Abstract

The quality of drinking water may be significantly reduced by the presence of cyanobacteria capable of producing toxins, taste, and odor. Several different genera of cyanobacteria are capable of producing microcystin toxins. Moreover, toxin-producing cyanobacteria share specific ribosomal RNA (rRNA) sequences not found in non-toxin-producing strains. Consequently, an rRNA gene probe can be a useful tool for distinguishing potential toxin-producing strains of cyanobacteria from nontoxin-producing strains, regardless of genus. This study involved eight strains of cyanobacteria belonging to three different genera, which were isolated from drinking water sources at the Metropolitan Water District of Southern California. The cyanobacteria were cultured in Carolina Spring Water and Alga-Gro® concentrate. Enzyme Linked Immunosorbent Assay (ELISA) was set up to evaluate the level of microcystin toxin present. Although all isolates tested negative by ELISA, the organisms may still have the genetic capacity to produce toxin. To address this issue, the polymerase chain reaction was used to amplify 16S rRNA sequences specific to toxin-producing strains. Based on the data, the conclusion is that the cyanobacterial isolates tested from the Metropolitan Water District of Southern California do not have the genetic capability of producing microcystin toxins.