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Whole Cell Immunolocalization Of The Hepatotoxin Microcystin In Freshwater Cyanobacteria

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The cyanobacterial hepatotoxin microcystin has been implicated in numerous poisonings and deaths of humans, livestock and domestic animals worldwide. Microcystin-producing cyanobacteria, such as *Microcystis* and *Anabaena*, are ubiquitous freshwater organisms easily identified by traditional microscopic methods. However, toxicity cannot be established on the basis of morphology. Therefore, additional time-consuming and costly laboratory tests must be performed once a potential toxin-producer is identified in a water supply or recreational water body. In order to permit a one-step approach for the detection of microcystin-producing cyanobacteria, we have initiated development of a detection method for microcystin based on whole-cell immunolabeling. Whole-cell immunolocalization will permit direct examination of toxin production in field samples and will be a useful tool for studies of toxin segregation within cyanobacterial colonies. To date, whole-cell immunolocalization of microcystin and the constitutively expressed RubisCO enzyme has been evaluated in laboratory cultures of known toxigenicity. Initial results suggest microcystin can be successfully labeled in toxic cyanobacterial species. Microcystin has been labeled in five toxic strains of *Microcystis aeruginosa*, while two non-toxic *M. aeruginosa* strains did not label. RubisCO labeling ensured cells were permeabilized, thus avoiding false negatives. All results were confirmed with the enzyme-linked immunosorbant assay for microcystin (ELISA). Clearly, for environmental samples, this method will combine the specificity of immunological labeling with the certainty of microscopic confirmation. Furthermore, in situ detection of toxic cells will supply water management and public health officials with another tool for assessment of ecosystems prone to toxic bloom formation.