Diversity And Seasonality Of cyanotoxins In Lake Garda (Italy): Potential For Hepatotoxic Microcystins Transfer Through The Food Web

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ABSTRACT

Toxic cyanobacteria occurrence is a global concern in many eutrophic freshwater ecosystems due to their production of highly toxic secondary metabolites (cyanotoxins): hepatotoxins (microcystins, nodularins), neurotoxins (saxitoxins, anatoxins, and BMAA), and specific protein synthesis inhibitors (cylindrospermopsins). Cyanotoxins have the potential to accumulate in aquatic organisms at different trophic levels.
In Lake Garda, *Planktothrix rubescens* and *Dolichospermum lemmermannii* are the most frequent potentially toxic species. *P. rubescens* produces primarily microcystins, while *D. lemmermannii* is known to produce both microcystins and anatoxins. The temporal dynamics of microcystin production in Lake Garda was investigated. Since April 2010, monthly samplings have been conducted and the occurrence of toxins analyzed via LC/MS. Desmethylated MC-RR was the most abundant microcystin (more than 90% of the total). The highest microcystin concentrations were found in the summer months, coinciding with the metalimnetic development of *Planktothrix* populations.
In order to elucidate the potential transfer of microcystins produced by *P. rubescens* through the food web of Lake Garda, a set of lab experiments was implemented for preliminary studies of trophic transfer. For this purpose, the cladoceran *Daphnia magna* and the European white fish (*Coregonus lavaretus*) were chosen as models for intermediate and top trophic levels, respectively. The experimental design aims to demonstrate toxin accumulation in fish fed with daphnids previously exposed to different densities of toxin containing *Planktothrix*. Preliminary data provide evidence for the transfer of microcystins.