

Cyanobacteria risk assessment and risk management in a small water supply system in Italy by LC-MS/MS analyses.

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Abstract

During the development of a WSP (1,2), LC-MS/MS was used as analytical approach for cyanobacteria risk assessment and management of proliferation of *Planktothrix rubescens*, cyanobacterium responsible of cyanotoxin production, in Vico Lake and in the drinking water chain of the municipality of Caprarola (Latium Region, Italy).

LC-MS/MS was applied to determinate [D-Asp³]-MC-RR, MC-RR, MC-YR, [D-Asp³]-MC-LR, MC-LR, MC-LA, MC-LY, MC-LW, MC-LF, MC-HiLR, MC-HtyR, MC-WR, CYP-1041, CYP-1007, Microginin 527, Microginin 690, Microginin 704, Microginin 527 methyl ester, Microginin 690 methyl ester, Anabaenopeptin A, Anabaenopeptin B, Anatoxin-a and Cylindrospermopsin.

The risk assessment step, carried out during 2015, evidenced in raw water [D-Asp³]-MC-RR, MC-YR, [D-Asp³]-MC-LR, Anabaenopeptin A and Anabaenopeptin B, respectively at concentrations of up to 3.700, 0.862, 0.709, 4.690 and 6.950 µg/L, with related *Planktothrix rubescens* concentration of 7.6×10^7 cell/L (February 2015). Data obtained on the control measures showed the effectiveness of treatments conventionally carried out on raw waters, with reduction of total cyanotoxins concentration of 94% in treated water.

To improve cyanobacterial cell removal, during the risk management step of WSP development, the installation of a coagulation treatment stage upstream the sand filtration has been adopted in 2016 as an additional control measure. LC-MS/MS successfully proved the efficiency of this latter measure; the integration of the control measures with coagulation treatment stage guarantees total cyanotoxins concentration values in treated water of at least 10 times below the Italian maximum acceptable value for cyanotoxins (3) during the monitoring period, also during *Planktothrix rubescens* sp. huge algal bloom (concentration up to 2.9×10^8 cell/L).