A high throughput targeted and non-targeted method for the analysis of microcystins and anatoxin-A using on-line solid phase extraction coupled to liquid chromatography - quadrupole time-of-flight high resolution mass spectrometry

Xavier Ortiz
Ontario Ministry of the Environment and Climate Change, Canada

Microcystins are cyclic heptapeptide hepatotoxins produced by cyanobacteria in freshwater. Sample preparation for the analysis of these cyanotoxins in water from algal blooms can take up to several days due to the matrix complexity and the low detection limits required complying with current legislation. Moreover, there is a large number of unknown microcystins that could potentially exist in the environment resulting from different amino acid substitutions into the microcystin skeletal structure. To tackle these problems, the present study involved the development of a high throughput method based on on-line solid phase extraction coupled to liquid chromatography that can provide quantitative results for 12 microcystin variants (LR, YR, RR, HtyR, HilR, WR, LW, LA, LF, LY, Dha7-LR and Dha7-RR) and anatoxin-A in less than three hours with detection limits between 0.004-0.01 µgL-1 and uncertainty between 4-14%. Data dependent acquisition was employed for the non-targeted analysis of these cyanotoxins. Filtering the data based on structure diagnostic fragments, two unknown microcystin variants not previously reported in the literature were detected. The structures Leu1-microcystin-Met(O)R and Leu1-microcystin-LY were fully characterized by accurate mass measurement, collision induced dissociation and fragmentation prediction software.

Speaker Biography

Xavier Ortiz obtained his PhD degree at IQS-Barcelona (Spain), where he developed methods for the analysis of Persistent Organic Pollutants in food using GC-HRMS technology. Before coming to Canada, he worked in the pharmaceutical and biotechnology private sectors as Analytical Lab Manager; characterizing, isolating and purifying natural products from microalgae by preparative LC. Currently, he is a Research Scientist at the Ontario Ministry of the Environment and Climate Change, developing new methods for the analysis of emerging pollutants in the Canadian Environment using chromatography and mass spectrometry. He is the Ministry's Lead Scientist in cyanotoxins analysis, specializing in lab automation to increase productivity and non-targeted analysis of previously unknown toxins.

e: xavier.ortiz@ontario.ca

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