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Water quality in coastal wetlands: illicit drugs in surface waters of L'Albufera Natural Park (Valencia, Spain)

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A wide range of emerging pollutants have been identified in environment: antibiotics, hormones, personal care products, etc. But quite recently a new class of ecological threat has been reported: the presence in waters of abuse drugs coming from human consumption [1,2]. Treatment of wastewaters may remove a portion of these compounds, but sometimes, these treatments are insufficient or nonexistent, residues can reach into the aquatic environment.

L´Albufera Natural Park (Valencia, Spain) is a marsh area of a great interest because it is the habitat of a large quantity of unique species of flora and fauna, and a zone of refuge, feeding and breeding for a large number of migratory birds. However, this area is threatened by urban, industrial and agricultural pressures.

The aim of this work has been to develop a fast and sensitive multi-residue analytical method for to establish the occurrence and distribution of commonly consumed illicit drugs in surface waters of L´Albufera lake. A representative set of abuse drugs with different mode of action was chosen for this purpose, including: amphetaminics, opiates, cocainics and cannabinoids (THC and nor-9-carboxy-THC).

In April 2008 and October 2008 a total of 16 samples of water were collected, corresponding to different sampling points previously designed, and covering the most important channels that flow in to the lake.

Samples of 250 mL of water were concentrated by Solid Phase Extraction through an Oasis HLB cartridge and extracted subsequently with methanol as solvent.

Quantification was carried out by LC-MS/MS with an ESI interface. Performance characteristics of the PLE-SPE followed by LC-MS/MS were established by validation procedure. Selectivity, linearity, precision, recoveries and limits of detection (LOD) and quantification (LOQ) were studied.

Our search shows that current sewage treatment systems do not completely remove illicit drug residues from urban wastewater. Benzoylecgonine, the main metabolite from cocaine, was found in 100% of the samples tested, at concentrations ranging from 0.14 to 78.71 ng/L. Other substances found were nor-9-carboxy-THC, methadone, codeine, cocaine, morphine, ecgonine methyl ester, extasis (MDMA) and amphetamine, while MDA, methamphetamine, heroin, 6-acetylmorphine and THC were undetectable.

References:

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