

Optimization, validation, and application of LC-(QqQ)MS/MS for the determination of new drugs of abuse in wastewater samples

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The last few years the profile of illicit drugs used has changed. New synthetic drugs of abuse have become increasingly popular and are highly consumed. "Spice" is the name given to mixtures of medicinal herbs, which appeared in many countries in 2008, that produce euphoria and relaxation. The active ingredients in these products are some synthetic cannabinoids, such as JWH-018, JWH-073 and CP47,497. These new drugs may cause serious toxicity or impairment. The analysis of ever new designer drugs in wastewater can be used to track their use in communities. This is important to assess the risks of, and control these potentially dangerous substances. It is an ongoing challenge for analytical toxicologists in forensics, because they are not covered by established analytical methods for several reasons.

The aim of the present study was to develop a novel SRM-LC-(QqQ)MS/MS method for the determination of some synthetic cannabinoids (JWH-018, JWH-073 and CP47,497), piperazine-derived designer drugs (Benzylpiperazine, BZP), b-keto-amphetamines (Mephedrone) and pyrrolidinophenones (4'-Methyl- α -pyrrolidinopropiophenone, MPPP) in influent and effluent samples of the WWTP of Athens, in order to study their occurrence and fate during wastewater treatment. Deuterated analogues of the compounds were used as internal standards. ESI and MS/MS parameters were optimized for each compound. In addition, three columns were tested to separate the compounds analyzed in positive and in negative ionization mode. Sample preparation using SPE was optimized by comparing different sorbents. The method was validated for each compound by assessing the following parameters: linearity, accuracy, precision, recovery, and relative process efficiency. Additional emerging drugs of abuse can be determined in wastewater sample with the same validated method.

Acknowledgements

This research has been co-financed by the European Union and Greek national funds through the Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) – ARISTEIA 624.