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Non-target detection of the contaminants of emerging concern (CECs) in sewage sludge

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The human activity generate anthropogenic compounds that end up in the wastewater treatment plants (WWTPs). In these plants, part of them could be retained in the sewage sludge. The study of the presence of contaminants in this sludge involve a great challenge due to its high organic matter content. This is the reason why this sample has not been as widely study as the influent and effluent water of the WWTP. However, in Spain, similarly to other European countries, the 80% of the sewage sludge is used as a fertilizer for the crops, being of great interest to know the different compounds present in them and asses the environmental risk of their utilization. The sludge samples are from 8 WWTPs next to the natural park of the Albufera in Valencia. Samples were extracted using a Methanol-McIlvaine Buffer (4.1) mixture and assisted by ultrasound, the supernatant was cleaned up by the solid phase extraction (SPE) using StrataTMX cartridges and then the analytes were eluted with methanol at gravity flow. Samples were analyzed using a suspected screening workflow with a liquid chromatography triple quadrupole time-of-flight (LC-QqTOF), providing high quality information about the different compounds present in the sludge. As overall results, 50 different compounds were identified with high degree of confidence. Pharmaceuticals were the most relevant group with 31 compounds identified. Furthermore, human metabolites were present all the samples, including, nucleotides (adenosine triphosphate), amino acids (phenylalanine) or peptides (leucine-phenylalanine). Other compounds were tentative identify by the accurate mass, but are pending of confirmation by the product ion mass spectrum. Further study is still needed to obtained more data about them. In conclusion, this method is suitable to identify emerging contaminants in sewage sludge, and the non-target techniques provide information of their potential environmental risk in the areas where they are utilized.

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