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Data obtained from wastewater analysis can provide rapid and complementary insights in illict drug consumption at community level. Drug use has been assessed through wastewater analysis at national level in, for example, Australia, Belgium, Finland and South Korea and has also provided annually a one week snapshot of illicit drug volumes consumed in European cities (http://www.emcdda.europa.eu/topics/ pods/waste-water-analysis). However, a wastewater monitoring program did not exist in Spain, but leading experts have formed a network (https://www.esarnet.es/) to promote wastewater-based epidemiology at national level and communicate their findings to authorities and policymakers. Within Europe, Spain is an important country of transit of both cocaine and cannabis, due to its cultural, linguistic and colonial ties to Latin America and its proximity to Morocco. The quantity of seized cocaine and cannabis and prevalence of use, locates Spain at the top of Europe. In this work, a national wastewater campaign has been performed to get more insight on the consumption of illicit drugs and NPS within Spain for the first time. Wastewater results from 14 Spanish cities were compared with previously reported data and other national indicators. The cities, located in 7 of the 17 autonomous communities, cover approximately 6 million inhabitants (12.8 of the Spanish population). Untreated wastewater samples were analyzed for urinary biomarkers of amphetamine, methamphetamine, MDMA, cocaine and cannabis. In addition to these conventional drugs, weekend samples were monitored for several new psychoactive substances (NPS) (i.e. phenethylamines and cathinones). The selected NPS are known as possible replacement of these conventional drugs or among those previously reported. Finally, enantiomeric profiling of amphetamine was performed for one city in order to assure the results were due to consumption and not illegal dumping of production residues. This demonstrates another application of wastewater-based epidemiology, which allows to identify the origin of drugs in wastewater. *Acknowledgments:* This work has been supported by the Spanish State Research Agency (Agencia Estatal de Investigación, AEI) through the “Redes de Excelencia” programme, ESAR-Net, ref. CTM2016-81935-REDT

7.02P.3

Biomonitoring of human exposure to pesticides through wastewater analysis

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Humans are continuously exposed to pollutants by different routes, and human bio-monitoring is the tool commonly used to assess exposure to chemicals by measuring parent substances or metabolites in human body fluids, hair or nails. Wastewater-based epidemiology (WBE) is a complementary approach to human bio-monitoring that overcomes some of the existing limitations such as sampling biases, long realization time, high costs and ethical issues. Recently, alarming news stories in Dutch (press) media reported high exposure to pesticides of the population living near flower bulb fields. The WBE approach has until now been mainly applied and focussed on illicit drugs, but also has potential to estimate human exposure to pesticides. Some promising results have been published [1, 2], which allowed the evaluation of potential health risks by comparing the WBE data on pesticides with the acceptable daily intake [2]. In the present study the potential of WBE is explored for exposure assessment of pesticides, and to assess the actual human exposure in areas with relatively high use of pesticides. Several pesticide biomarkers have been identified and reference standards purchased (including isotopically labelled internal standards) for the development of a target analytical methodologies based on liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS), with triple quadrupole mass analysers. Method development consisted of several optimization and validation steps related to sample preparation (including evaluation of matrix effects), LC and MS/MS. The areas selected for wastewater collection were near bulb fields (the Netherlands) and near citrus orchards (Spain), and also urban or industrial areas where pesticides are applied less frequently or not at all. The latter were selected as “control” areas. Finally, the objective is to perform a comprehensive risk assessment based on existing data from exposure models as used in authorization procedures and the data obtained in this study. References [1] Rousis NI, Zuccato E, Castiglioni S (2017) Wastewater-based epidemiology to assess human exposure to pyrethroid pesticides. Environ Int 99:213–220 [2] Rousis NI et al. (2017) Wastewater-based epidemiology to assess pan-European pesticide exposure. Water Res 121:270–279

7.02P.4

Chemical fingerprint of alcohol and nicotine consumption in Spanish wastewaters

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Wastewater provides a fingerprint of a specific population lifestyle. Tracing the right chemical markers in a wastewater sample allows back-calculating the amount of alcohol and tobacco consumed by the people contributing to that sample. This approach, also known as wastewater-based epidemiology (WBE), provides information on substance abuse in a rapid, anonymous and objective way, complementing the information obtained by traditional methods (surveys, medical and criminal indices, etc). WBE has been used in Spain to estimate the consumption of legal and illicit psychoactive substances. While 4 Spanish cities systematically apply the WBE on an annual basis to report the use of illicit drugs to the European Monitoring Centre for Drugs and Drugs Addiction, the WBE has been only occasionally applied in few cities to estimate alcohol and tobacco use. Based on this, the present work aimed at extending the application of the WBE approach in the Spanish territory (14 cities, 17 WWTPs, 13% of the Spanish population) to obtain a more reliable picture on alcohol and tobacco consumption in the country. This work also aimed at evaluating spatial and weekly consumption trends of these legal drugs and compare WBE-derived data with official consumption figures. For this, 24-h composite wastewater samples were collected at the inlet of 17 wastewater treatment plants (WWTPs) during one week in spring 2018, covering approximately 13% of the Spanish population, and urban areas of different size. The samples collected were analysed for urinary biomarkers of alcohol and nicotine (main psychoactive substance of tobacco). Results showed the presence of the three metabolites in all samples analyzed. Spatial variations in alcohol and nicotine consumption were observed among the investigated cities, and in the case of alcohol, also different consumption patterns were observed during the week. Extrapolation of WBE-derived consumption data at national level showed an annual consumption of alcohol lower than that reported by the World Health Organization (WHO). However, in the case of nicotine, consumption obtained by WBE approach was very similar to tobacco sales*Acknowledgments:* This work has been supported by the Spanish State Research Agency (Agencia Estatal de Investigación, AEI) through the “Redes de Excelencia” programme, ESAR-Net, ref. CTM2016-81935-REDT.

7.02P.5

Monitoring Infectious Diseases in Near-Real-Time for Rapid Outbreak Response

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As the arms race continues against infectious diseases, community disease surveillance and management is increasingly important. Infectious disease outbreaks have been a major cause of suffering and death throughout human history. In light of the recent swine flu, Zika and Ebola outbreaks the UK government added emerging infectious disease to the National Risk Register of Civil Emergencies. Furthermore, recent trends in population growth, urbanisation and rapid mass movement have made the human species intrinsically more vulnerable to infectious disease. These threats, along with antimicrobial resistance, vaccine refusal and climate change present a formidable challenge for public health management. [1] This study aims to assess the strengths of wastewater-based epidemiology as a tool for community infectious disease monitoring. Wastewater-based epidemiology promises to provide near-real-time and quantitative methods for the monitoring of infectious disease to enable outbreak control. These systems should ideally be capable of providing community-based data to decision makers in near-real-time on an international scale. The use of reverse transcription digital polymerase chain reaction for detection of pathogenic RNA in wastewater will likely form an essential part of this approach. A reverse transcription digital polymerase chain reaction methodology was developed for the routine monitoring of community disease outbreaks, using norovirus as a test-case pathogen. A target RNA sequence was identified, by which norovirus was detected in influent wastewater at a concentration of 51 aM (30 gene copies μL^{-1}). Method development work was carried out towards the identification of a stable sample storage approach, as well as towards the identification and mitigation of the causes of variability within the methodology. Initial method validation work