

Monitoring of organic contaminants in raw wastewater by targeted and non-targeted screening: an effective tool for assessing urban metabolism

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In the last decade, Wastewater-Based-Epidemiology (WBE) has emerged as a powerful tool to assess daily consumption or exposure to chemicals through the quantitative analysis of wastewater composition collected from a given population. Initially developed for the purpose of monitoring illicit drugs use (Zuccato *et al.*, 2008), WBE approach now allows the identification of biomarkers that may reflect socio-economic inequalities (Choi *et al.*, 2020).

Here, we study socio-demographic trajectories at the city scale by monitoring raw wastewater of the Parisian conurbation, through a long time (≈ 2 years) observatory, with, twice a week, analysis of raw wastewater collected upstream WWTP. The analytical setup rely on two complementary strategies: i) target screening analyses by HPLC-MS², allowing the quantification of roughly 60 selected compounds (which include pharmaceutical products, dietary tracers, *etc.*) for which usage/consumption can be estimated on the basis of literature data and ii) non-target screening analysis (UPLC-IMS-QTOF) allowing the detection of previously unidentified suspects, and the constitution of geochemical fingerprints allowing non-discriminating monitoring of the composition of raw wastewater.

The first results presented here will concern i) the development of a common extraction/purification protocol based on solid phase extraction allowing to perform both analyses from the same extract; and ii) the first identification by non-target screening of

potentially innovative tracers that can be considered in future target analyses to monitor new practices from the citizens. These newly identified tracers might need further development before being assessed as reliable biomarkers (i.e., to keep a quantitative link between use/exposure and quantification in wastewater), by assessing their stability.

Finally, this study will further aim to develop innovative tracers of citizen practices, allowing the application of WBE to other fields (health, demography, alimentation...) and thus using wastewater analyses to reflect their temporal trajectories, leading to a better understanding of urban metabolism.

Zuccato, E., Chiabrando, C., Castiglioni, S., Bagnati, R., Fanelli, R., 2008. Estimating community drug abuse by wastewater analysis. *Environ. Health Perspect.* 116 (8), 1027–1032. <https://doi.org/10.1289/ehp.11022>.

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