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Abstract

Reuse of Wastewater: Concerns about the Effects of Mixtures of Chemical Substances on Human Health †

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† Presented at the 1st International Electronic Conference on Toxics, 20–22 March 2024; Available online: https://sciforum.net/event/IECTO2024.

Keywords: wastewater; chemical mixtures; risk assessment; effects

Due to global warming, new practices should be adopted in the use of wastewater in the agricultural, industrial, and urban sectors. In the European context, the countries of the Southern Mediterranean are those that present the greatest vulnerabilities, and those on which inaction will take the greatest toll.

The regulation approved on 13 May 2020, by the European Parliament establishes minimum requirements for the reuse of treated urban wastewater, aiming to guarantee an alternative water supply.

Although low concentrations of chemical contaminants may be present in the environment, their effects can be exacerbated by the presence of other chemical substances, acting as chemical mixtures. In the specific case of wastewater, studies have reported the presence of biocides, pesticides, dermocosmetic products (including UV filters), pharmaceuticals, and detergents, among many others, which constitute a mixture of micropollutants with concentrations ranging between ng/L and µg/L. As individual components, all of these substances are toxic to humans. Since there is a gap in the risk assessment of chemical mixtures, an interesting proposal would be the implementation of a combined method comprising the chemical analysis of water and the study of these mixtures' potential effects through in vitro exposure to extracts isolated from different wastewaters in culture. This way, the potential genetic damage and the effects on immunomodulation, inflammation, and several other biomarkers can be studied at the chemical mixture level.

Even though these practices are not commonly adopted in Portugal and the maximum values of chemical substances are predetermined, the effects of a mixture are expected to exceed the effects of individual substances through toxicological reactions such as addition, potentiation, and synergy. Furthermore, through the phenomenon of globalization, the supply of these foodstuffs in national markets will become a reality, making food a route of exposure to these substances throughout the food chain.

Supplementary Materials: The presentation materials can be downloaded at: https://www.mdpi.com/article/10.3390/proceedings2024102004/s1.

Author Contributions: Conceptualization, investigation, writing—original draft preparation, review and editing were performed by J.C. and C.L. All authors have read and agreed to the published version of the manuscript.

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Citation: Cabêda, J.; Ladeira, C. Reuse of Wastewater: Concerns about the Effects of Mixtures of Chemical Substances on Human Health. *Proceedings* **2024**, *102*, 4. https://doi.org/10.3390/proceedings2024102004

Academic Editor: Yankai Xia

Published: 3 April 2024

Funding: Supported by H&TRC—Health & Technology Research Center, Escola Superior de Tecnologia da Saúde, Instituto Politécnico de Lisboa. H&TRC author gratefully acknowledges the FCT/MCTES national support through the UIDP/05608/2020 (https://doi.org/10.54499/UIDP/05608/2020), UIDB/05608/2020 (https://doi.org/10.54499/UIDB/05608/2020).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflicts of interest.