

Oral Communication 15

Sublethal enantioxicity of MDMA on the development, teratogenicity, genotoxicity and swimming behaviour of zebrafish (*Danio rerio*) embryo

Ondina Ribeiro ^{1,2}, Luís Félix ¹, Cláudia Ribeiro ^{2,3}, Virgínia Gonçalves ^{2,3}, Maria Elizabeth Tiritan ^{2,3,4,5} and João Soares Carrola ^{1,*}

¹ Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB), Institute for Innovation, Capacity Building and Sustainability of Agri-food Production (4Inov4Agro), University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal

² UCIBIO - Applied Molecular Biosciences Unit, Translational Toxicology Research Laboratory, University Institute of Health Sciences (1H-TOXRUN, IUCS-CESPU), Gandra, Portugal

³ Associate Laboratory i4HB - Institute for Health and Bioeconomy, University Institute of Health Sciences - CESPU, 4585-116 Gandra, Portugal.

⁴ Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), University of Porto, Matosinhos, Portugal

⁵ Laboratory of Organic and Pharmaceutical Chemistry, Department of Chemical Sciences, Faculty of Pharmacy, University of Porto, Portugal

* Correspondence: joao@utad.pt

Abstract

Background: Chiral psychoactive substances (PAS) as amphetamine-like substances are among the main group of drugs seized in Europe. The increased attractiveness of these drugs resulted in their widespread occurrence in the environment raising concern about their possible hazardous effects to non-target organisms [1, 2]. PAS metabolism in humans and biodegradation in wastewater treatment plants is stereoselective. Enantiomers of PAS may differ in environmental fate and toxicological effects [2, 3]. Understanding their enantiomer-specific toxicity and sublethal effects using several biomarkers is crucial for an accurate risk assessment of chiral contaminants. **Objective:** Investigate the potential enantioselective effects of 3,4-methylenedioxymethamphetamine (MDMA) in zebrafish (*Danio rerio*) embryos. **Methods:** For zebrafish 96-h assay, 50 fertilized eggs (\approx 3 hpf) were exposed to different concentrations of MDMA racemate and enantiomers ranging from 0.02 to 200 μ g/L. Six replicates per test concentration and control were performed and organisms were exposed for 6 days. Embryonic development, malformations, genotoxicity and larvae swimming behaviour parameters were evaluated for MDMA. The range of concentrations for both organisms was selected to include environmental reported levels and higher concentrations to get insights into potential toxicity. **Results:** Regarding zebrafish, preliminary data showed an enantioselective effect with significant increase in the percentage of developmental malformations at 96 hpf in zebrafish larvae exposed to (S)-MDMA in comparison with (R,S)-MDMA and (R)-MDMA at the lower concentrations. An increase in larvae size was observed in the organisms exposed to the racemate in comparison to the enantiomers. Also, a significant increase in genotoxicity was observed in organisms exposed to racemate. Changes and enantioselective effects were also observed in swimming behaviour, (R)-MDMA inducing a reduction in the distance to the centre of the well compared to (S)-MDMA, and a decrease in inactive time in (S)-MDMA exposed organisms. **Conclusions:** This study showed the toxicity of MDMA towards zebrafish embryo, and importance of enantioxicity studies for a better risk assessment.

Keywords: recreative drug; zebrafish model; biomarkers; aquatic pollution; non-target species

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