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Effects of MDMA on the development of Zebrafish (Danio rerio) embryos – preliminary data

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Resumo

Introduction: The abuse of psychoactive substances (PAS) has been increasing and can reach aquatic ecosystems because wastewater treatment plants do not remove completely PAS and their metabolites [1] or by public urination during big music events as a direct route of river pollution [2]. Thus, PAS like 3,4-methylenedioxymethamphetamine (MDMA/ecstasy) can reach rivers presenting high levels during Gastonbury Festival, with 322 ng/L. This concentration is deemed harmful to aquatic life [2]. Zebrafish (Danio rerio) has been used increasingly in ecotoxicology and teratology and is an important animal model to study MDMA effects and adverse outcome pathways [3]. The environmental concentrations of MDMA in general (except social or music festivals events) are very low (ng/L) [3] but in laboratory conditions higher concentrations are normally used to compensate for lower exposure time. Residues of drug of abuse are widespread contaminants in surface water in populated areas or greenfield land (during music events) and consequently is important to study the impacts in non-target organisms like fish. **Objectives:** The aim of this work was to study MDMA embryotoxicity using an ecologically relevant organism, the zebrafish embryo. **Materials and Methods:** D. rerio embryos were randomly distributed in 6-well plates and exposed to different MDMA concentrations (0.02; 0.2; 2.0, 20, 200 µg/L), for 96 hours, according to OECD test guideline no. 236. We evaluated mortality, malformations, hatch ratio, tail and head detachment, spontaneous movements, heart ratio and morphometric measures (done at 96hpf, when eye area, yolk sac area, oedema area, head area, and tail detachment were measured). Three replicates were performed. **Results:** Even for the higher levels tested, data showed no significant effects in mortality, head and tail detachment, hatch ratio, larvae length, oedema area and malformations of the organisms exposed to MDMA, compared to the control group. **Conclusions:** We can conclude that this PAS does not affect significantly all the parameters studied and no significant embryo developmental changes were observed. More studies should be done to confirm these data using D. rerio and non-target fish species, like brown trout (Salmo trutta).

Keywords: Zebrafish embryo; ecotoxicology; embryonic development; MDMA; pollution.

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