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Using an in vivo model to assess NADES toxicity

AUTHORS

Inês FERREIRA / NOVA.ID.FCT, CAMPUS DA CAPARICA, CAPARICA
Mário DINIZ / NOVA.ID.FCT, CAMPUS DA CAPARICA, CAPARICA
Alexandre PAIVA / NOVA.ID.FCT, CAMPUS DA CAPARICA, CAPARICA
Corresponding author : Ana Rita DUARTE / ard08968@fct.unl.pt

PURPOSE OF THE ABSTRACT

Deep Eutectic Systems (DES) are part of a new class of green solvents1 and have been coined as biocompatible and biodegradable2. DES can be defined as a combination of two or more components where one is a hydrogen bond acceptor (HBA) and the other a hydrogen bond donor (HBD). One relevant physical feature of these systems is the fact that the melting point of the mixture is lower than the melting point of any of the components individually3,4. Natural Deep Eutectic Systems (NADES) are a subclass of DES, where the compounds are all naturally occurring molecules5, such as betaine, citric acid, glucose and lactic acid. Nevertheless, currently, the number of studies involving toxicity assessment is very limited and in addition, each system is unique and needs to be taken into consideration. The main goal of this work was to assess the toxicity of three different NADES (Citric acid: Trehalose: Water (2:1:3), Betaine: Glycerol (1:2) and Betaine: Sorbitol: Water (1:1:3)) by injecting them intraperitoneally in zebrafish (Danio rerio) at four different concentrations. This is a biological model often used in pharmacological and environmental trials. In this work, the activity of different enzymes involved in antioxidant pathways or xenobiotic elimination and lipid peroxidation were assessed. The results suggest that NADES are do not show significant toxicity at the tested concentrations. The promising results obtained here suggest that these systems have the potential to be employed as a new class of green solvents that can be used in several applications, for example, pharmaceutical and cosmetic industry and cell cultures without harming living organisms.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

DES | toxicity | zebrafish

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