

Poster 17

## Zebrafish as a valuable vertebrate model to study teratogenicity of pharmaceuticals and psychoactive substances

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### Abstract

**Background:** The number of pharmaceuticals and psychoactive substances on the market increases each year, posing a need to understand their teratogenic effects on vertebrates. In the last two decades, there has been a growing interest in alternative vertebrate models, as part of the 3 R's principle (*Replacement, Reduction, and Refinement*) which led to the increased use of the zebrafish (*Danio rerio*) [1]. Besides, the easy observation of embryo development and the early developmental stages are not classified as experimental animals in the guidelines of the European Directive 2010/63/EU [2], which highlights the ethical advantages in teratogenic potential evaluation [3]. **Objective:** The study aimed to make a minireview of zebrafish as a model to assess the potential of teratogenicity of pharmaceuticals and psychoactive substances and analyse the major methodologies used to evaluate the malformations severity. **Methods:** The scientific literature search was done using *ScienceDirect* and *PubMed* search engine, looking for: zebrafish, *Danio rerio*, ecotoxicology, toxicology, malformations, teratogenicity, teratogen potential, and a selection of original papers and review was done. **Results:** This review confirm that zebrafish is a good model to make a pre-screening of the teratogenicity of pharmaceuticals and psychoactive substances, among others. However, the results reflect that several methodologies are used to assess the zebrafish malformations, showing a high variability and inconsistency in the evaluated endpoints and the nomenclature used. Additionally, each study uses its own scale of malformations severity, which can be evaluated using a quantitative method (different degrees of severity) or a binary method (present or absent). **Conclusions:** Zebrafish are a suitable alternative and complementary model to rodents (and other vertebrates) for massive screening of the potential teratogenic substances despite presenting differences for rodents. In addition, there is a need to standardize the classification and severity system for assessing malformations to improve the reproducibility and comparison between studies.

**Keywords:** Zebrafish; teratogenicity; psychoactive substances; animal model

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