

The use of zebrafish embryos as an alternative approach for ecotoxicity testing

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ABSTRACT

The use of fish embryos for acute ecotoxicity tests has been widely documented and over recent years there has been significant progress in the use of zebrafish embryos as an alternative approach to juvenile fish. However, there are still some questions preventing the unilateral adoption of this surrogate life stage as an alternative to the use of juvenile fish for regulatory testing purposes. Many of the concerns that have been raised include the absolute sensitivity of fish embryos. For example, published work has shown that fish embryos are not as sensitive as other more developed life-stages (such as the eleutheroembryos) to certain classes of compounds including, but not exclusively, cationic polymers. However, there is limited understanding of why fish embryos do not behave similarly and exhibit a toxic response to these classes of chemicals. One possible reason is that fish embryos have a protective envelope called a chorion, which could prevent these certain chemicals from passing into the embryo. The research described within this thesis has focussed on understanding the need for alternative approaches in ecotoxicity testing, particularly regarding the use of fish embryos. In addition, the developmental ontogeny of zebrafish embryos has also been studied. Finally, the research investigated whether the chorion is indeed a barrier to entry to certain chemicals, and a technique for quantifying the proportion of bio-available chemical within the different components of the embryo was developed.

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