Behavioral alteration in the male adult zebrafish (*Danio rerio*), after exposure to raw multi-walled carbon nanotubes (MWCNTs)

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Abstract

Carbon nanotubes, which had been discovered in 1991, comprise of two different types of variety; the single walled carbon nanotubes (SWCNTs) and multi walled carbon nanotubes (MWCNTs). Both of these differ in their structures, depending on the number of graphene layer forming the concentric tube. To date, published research related to the carbon nanotubes by using zebrafish as the model organism, were mainly focused on the toxicity effects of carbon nanotubes on the developing embryos. Most of these studies mainly concentrated on the use of SWCNTs as the toxicant. It is likely due to the fact that purified SWCNTs are more toxic than the purified MWCNTs. Nevertheless, it is hard to determine the exact toxicity effects of the carbon nanotubes, since different preparation methods will likely yield different results. In this study, we were investigating the toxicity effects of different concentrations of raw MWCNTs (control, 1ug/L, 10mg/L and 100mg/L) on the anxiety-like behavior of the male adult zebrafish, by using the light-dark plus maze paradigm. Prior to the experiment, the MWCNTs were dispersed in the distilled water for 60 minutes by using the bath sonicator. Then, each of the fish replicates was exposed to different concentrations of MWCNTs about 60 minutes before it was transferred into a black holding cup (placed at the center of the plus maze), for acclimatization period. After 5 minutes, the holding cup was removed and the movement of the fish was recorded by using a camera situated at the top of the maze. The recording was then used for the analysis purpose. The parameters measured include the latency to enter the arms and the mean duration per visit.

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