

# Effects of non-lethal arsenic contamination on manifesting fin strokes in zebrafish (*Danio rerio*)

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## **Abstract**

### ***Introduction***

The locomotion of fish is considered to be crucial in regulating activities such as prey-predation and foraging. Understanding the swimming patterns of fishes provides deep insights into the underlying neuroethological and biomechanical mechanisms. Fish locomotion mechanism, is predominantly controlled through regulated fin strokes, which involves correlation between the stroking pattern of the fins (pectoral, dorsal, anal, pelvic and caudal). However, the geometric morphology, and hydrodynamics also play critical role. The aim of our study is to elucidate whether non-lethal concentration of arsenic trioxide (As<sub>2</sub>O<sub>3</sub>) in the aquatic environment can affect the swimming pattern of a freshwater habitant zebrafish (*Danio rerio*).

### ***Methods***

A population of zebrafish was exposed to 1/50 LC<sub>50</sub> concentration of As<sub>2</sub>O<sub>3</sub> for 7 days. A comparative assessment of the fin strokes per minute was done between the fishes from uncontaminated and arsenic trioxide contaminated water. Stroking frequencies of all the fins were analysed to understand the effect of arsenic on fish locomotion.

### ***Results***

Our result demonstrates that fishes in arsenic contaminated water manifests more frequency of all fin strokes. All of the fins move significantly more in a given time frame, due to the arsenic trioxide contamination. There is a clear elucidation of the alteration of the fin stroke pattern of the fishes in polluted environment.

## ***Conclusion***

The study clearly indicates that arsenic contamination can be a causative abiotic stressor for the alteration in neuronal activities which in turn alters the muscular activities responsible for the movements of fins. *Danio rerio* is a promising model to study environmental pollution and neurotoxicity of arsenic. It is postulated that enhanced fin activity alters the locomotion pattern as well as the velocity of the fishes. This study encompasses the three disciplines of behavioural ecotoxicology, neurotoxicology and biomechanics, which highlights the locomotory abnormalities in fish due to environmental perturbation.

## ***Keywords***

Arsenic; Fin strokes; Behavioural ecotoxicology