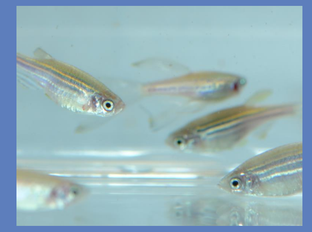
Utility of Larval Zebrafish Behavior: Comparison of Behavioral and Developmental Toxicity



BN Hill[1], M Waalkes[1], D Hunter[2], JM Hedge[2], K Jarema[3], J Olin[2], S Padilla[2]

[1]ORISE at US EPA, ORD/CCTE; [2]US EPA, ORD/CCTE; [3]US EPA, ORD/CPHEA

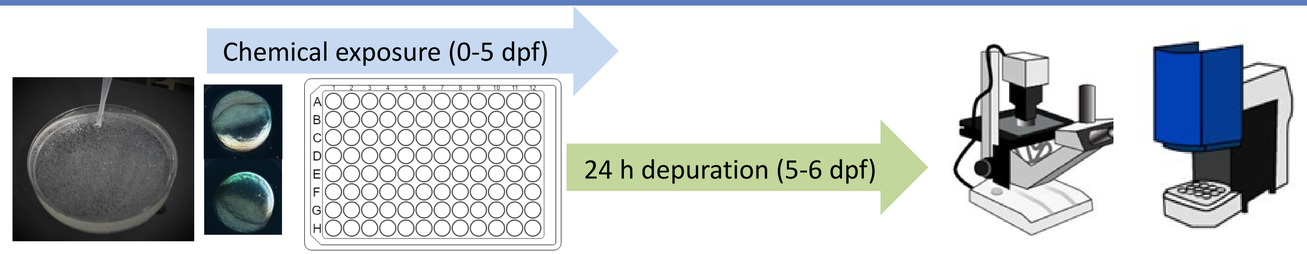
hill.bridgett@epa.gov ; padilla.stephanie@epa.gov

US EPA screens large sets of chemicals in early life stage zebrafish to assess:

(1) developmental toxicity

(2) developmental neurotoxicity / behavioral toxicity

Understanding the relationship between both endpoints will help elucidate the role of behavior in traditional environmental assessments.



DEVELOPMENTAL TOXICITY → Mortality or malformations

Larval zebrafish images at 6 days post fertilization (dpf)

NORMAL

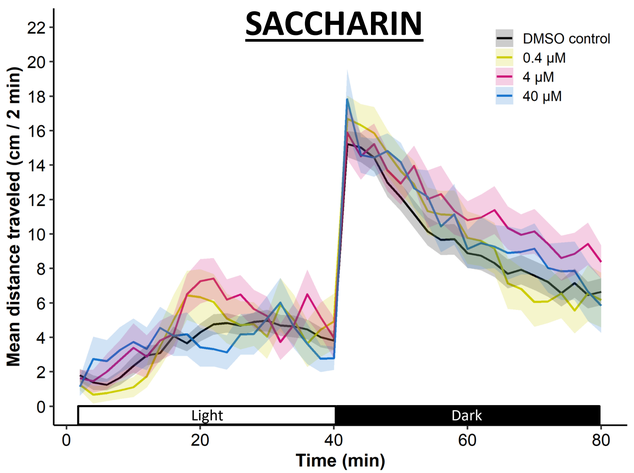
ABNORMAL

SEVERLY ABNORMAL

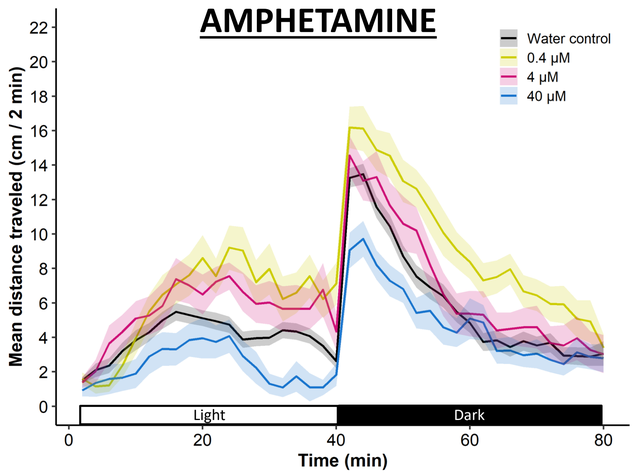
Abnormal larvae include those with gross malformations such as edema, craniofacial deformities, spinal curvatures and uninflated swim bladders

BEHAVIORAL TOXICITY → Locomotor activity changes, in response to light/dark photoperiods, in the absence of developmental toxicity

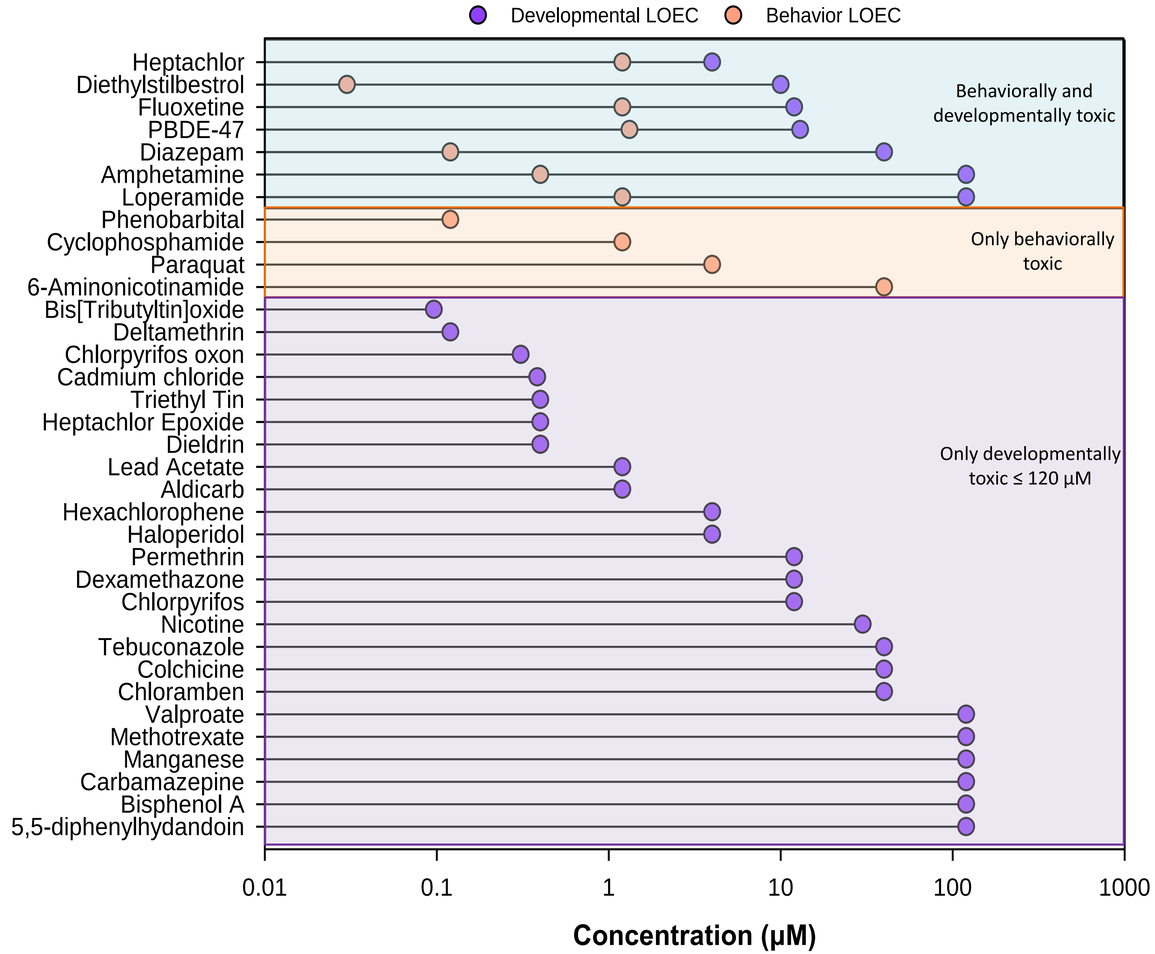
NOT DEVELOPMENTALLY NEUROTOXIC: SACCHARIN



DEVELOPMENTALLY NEUROTOXIC: AMPHETAMINE



BEHAVIOR IS OFTEN MORE SENSITIVE THAN DEVELOPMENT.
Lowest observable effect concentration is lower for behavioral alterations.



U.S. Environmental Protection Agency
Office of Research and Development

We would like to thank D Holman, G Orozco, F Yerumo, C Kridler, J Dunn, M King, and L Jarrell for oversight, maintenance, and upkeep of zebrafish facility. Disclaimer: *The views expressed in this presentation are those of the authors and do not necessarily reflect the views or policies of the US EPA.*