

## Effect of X-ray Contrast Media, Chlorination, and Chloramination on Zebrafish Development

Joan M. Hedge<sup>1</sup>, Cristina Postigo<sup>2</sup>, Shad Mosher<sup>3</sup>, Mikayla Higgins Armstrong<sup>4</sup>, Tony McDonald<sup>1</sup>, Yusupha Sey<sup>1</sup>, Susan Richardson<sup>5</sup>, Jane Ellen Simmons<sup>1</sup>, and Stephanie Padilla<sup>1</sup>

<sup>1</sup>ISTD;NHEERL, US EPA, RTP, NC; <sup>2</sup>IDAEA-CSIC, Barcelona, Spain; <sup>3</sup>ORISE Fellow, NCCT, US EPA, RTP, NC; <sup>4</sup>SCC,Cary, NC; <sup>5</sup>Univ of South Carolina, Columbia, SC.

Little is known about the vertebrate developmental toxicity of chlorinated or chloraminated drinking water (DW), iodinated X-ray contrast media (ICM, a common contaminate of DW) or how the combination modifies the toxicity of the ICM. Four ICM (iopamidol, iopromide, diatrizoate, or iohexol) at concentrations of 5  $\mu$ M were added to source water collected from a DW treatment plant prior to disinfection. Source water alone and source water with one of the four ICM added were disinfected with chlorine or preformed monochloramine for 3 days. All samples were extracted on cleaned conditioned XAD resins, concentrated by evaporation and solvent-exchanged to DMSO. Extracts were analyzed for disinfection byproducts (DBPs) by GC-MS. Vertebrate developmental toxicity using zebrafish, *Danio rerio*, was used to assess toxicity of the concentrated samples. At 5-7 hours post fertilization, individual embryos were treated in 96-well glass vial plates with the test material (8 doses, 40 to 0.7x times concentrated,  $\frac{1}{4}$ -log spacing, n=5-10 per condition per dose). Positive and negative controls were included on each plate. Overt toxicity (lethality, dysmorphology, and hatching) was assessed via visual inspection at 5 days post fertilization. In general, formation of the investigated DBPs was favored during the chlorination process. ICM alone did not lead to the formation of any of the investigated DBPs. The chloraminated water did not appear to elicit toxicity in a dose dependent manner, whereas chlorinated water did at 40x. All the ICM caused death, non-hatching or significant dysmorphology at 40x concentration, except iopamidol. Chlorination or chloramination of water containing ICM showed no change in developmental toxicity compared to ICM alone, except for diatrizoate, which increased toxicity 5 fold over chlorination or diatrizoate alone. *This abstract does not necessarily reflect U.S. EPA policy.*