**2017 Mercury Zebrafish PLoS ONE Summary**

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**Publication**

Carvan MJ 3rd, Kalluvila TA, Klingler RH, Larson JK, Pickens M, Mora-Zamorano FX, Connaughton VP, Sadler-Riggleman I, Beck D, and Skinner MK (2017) Mercury-Induced Epigenetic Transgenerational Inheritance of Abnormal Neurobehavior is Correlated with Sperm Epimutations in Zebrafish. PLoS ONE 12(5):e0176155.

**Summary**

Methylmercury (MeHg) is a ubiquitous environmental neurotoxicant, with human exposures predominantly resulting from fish consumption. Developmental exposure of zebrafish to MeHg is known to alter their neurobehavior. The current study investigated the direct exposure and transgenerational effects of MeHg, at tissue doses similar to those detected in exposed human populations, on sperm epimutations (i.e., differential DNA methylation regions [DMRs]) and neurobehavior (i.e., visual startle and spontaneous locomotion) in zebrafish, an established human health model. F0 generation embryos were exposed to MeHg (0, 1, 3, 10, 30, and 100 nM) for 24 hours ex vivo. F0 generation control and MeHg-exposed lineages were reared to adults and bred to yield the F1 generation, which was subsequently bred to the F2 generation. Direct exposure (F0 generation) and transgenerational actions (F2 generation) were then evaluated. Hyperactivity and visual deficit were observed in the unexposed descendants (F2 generation) of the MeHg-exposed lineage compared to control. An increase in F2 generation sperm epimutations was observed relative to the F0 generation. Investigation of the DMRs in the F2 generation MeHg-exposed lineage sperm revealed associated genes in the neuroactive ligand-receptor interaction and actin-cytoskeleton pathways being effected, which correlate to the observed neurobehavioral phenotypes. Developmental MeHg-induced epigenetic transgenerational inheritance of abnormal neurobehavior is correlated with sperm epimutations in F2 generation adult zebrafish. Therefore, mercury can promote the epigenetic transgenerational inheritance of disease in zebrafish, which significantly impacts its environmental health considerations in all species including humans.