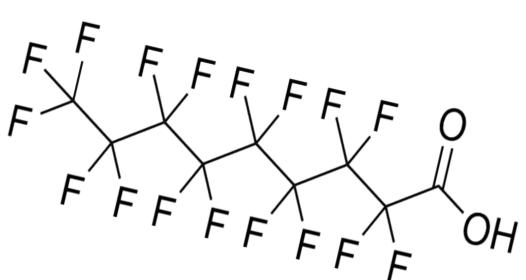
Introduction

- PFNA is a PFAS and a synthetic compound used to produce non-stick, waterproof, and stainrepellent coatings.
- PFNA is classified as a perfluorocarbxoylic acid, and a long chain PFAS, meaning it is more harmful compared to short chain PFAS
- PFNA persists longer in the environment due to its numerous Carbon-Fluorine bonds
- PFNA has been detected around the world: 0.690nM to 28.497nM in a sample of Polish residents' blood, and at 7.7 ng/L in a New Jersey river
- PFNA has been previously observed to pass through the placental barrier into fetuses, activate signaling pathways involved in ovarian cancer, and lead to hepatomegaly and toxicity
- This study aimed to provide new toxicological insight to the neurotoxicity potential of PFNA by measuring developmental endpoints, locomotor behavior, and genes related to oxidative damage, apoptosis, and neurotoxicity





Toxicological Responses to Perfluorononanoic acid (PFNA)

Veterinary Medicine

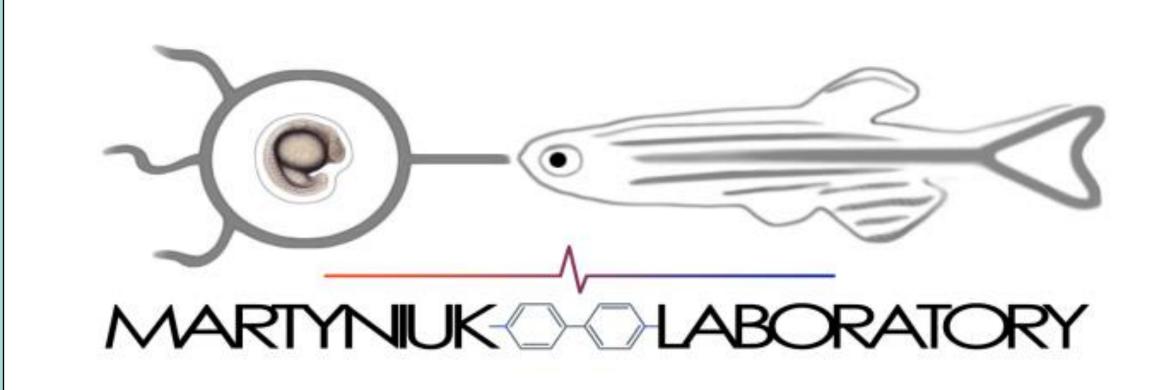
UNIVERSITY of FLORIDA

College of

Lev Avidan, Cole D. English, Emma Ivantsova, Amany Sultan, Christopher J. Martyniuk

Results

- Survival, hatch rate, and deformity rates were not found to be significantly affected for all tested concentrations
- No significant differences were found in gene transcript levels related to neurotoxicity, oxidative stress. and apoptosis
- An increase in apoptosis was observed in the 1µg/L concentration
- Hypoactivity effects in locomotor activity were observed in 1, 10, and 1000 μg/L concentrations, suggesting neurotoxicity or motor deficits



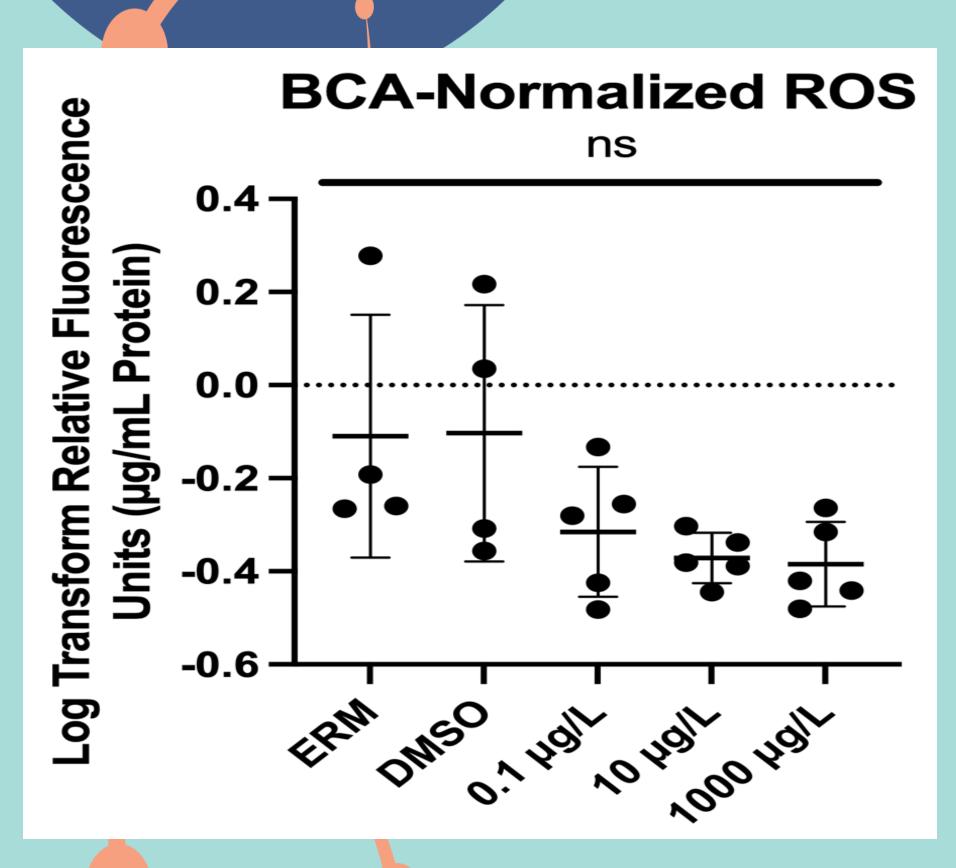


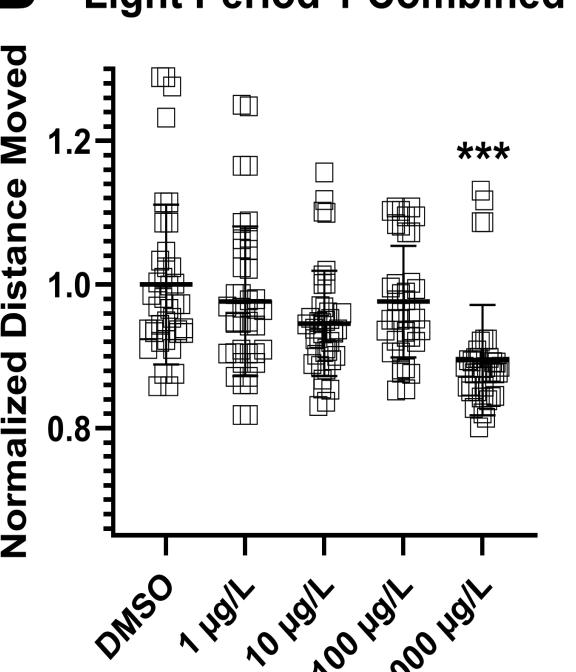
Figure 5: No significance was found in the levels of Reactive Oxygen Species (ROS)

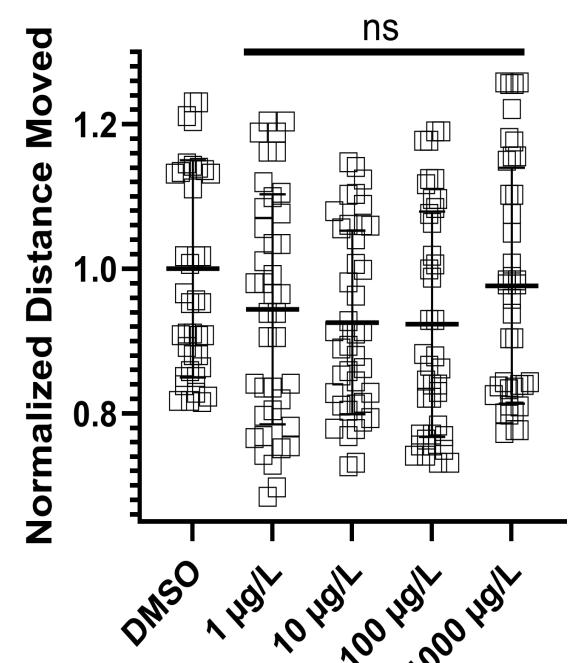
Methods

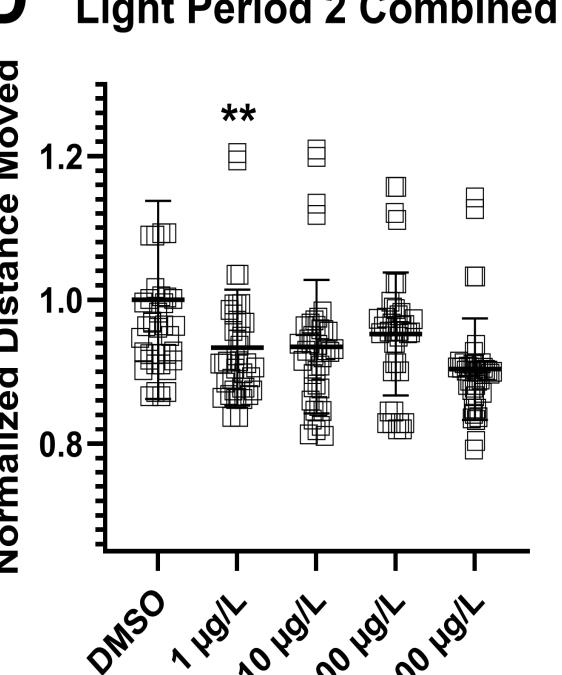
- 1) Zebrafish were exposed to five treatment groups (0.1 -1000 µg/L), and negative controls (ERM and DMSO) at 0dpf 2) Zebrafish larvae was renewed daily for seven days. Daily counts of the mortality rate, hatch rate, and prevalence of deformities were taken. This exposure cycle was repeated 3 more times.
- 3) On the final exposure day, zebrafish were immediately collected for locomotor assays (VMR) or were flash-frozen in liquid nitrogen prior to ROS and qPCR assays
- 4) Upon assay completion, data was analyzed using PRISM

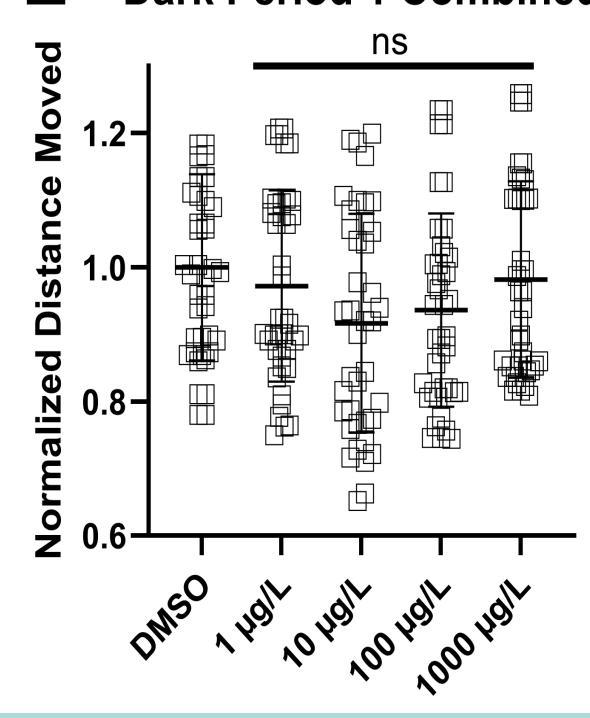
PFNA Acridine Orange Values

A Dark Period 1 Combined B Light Period 1 Combined C Dark Period 2 Combined D Light Period 2 Combined E Dark Period 1 Combined









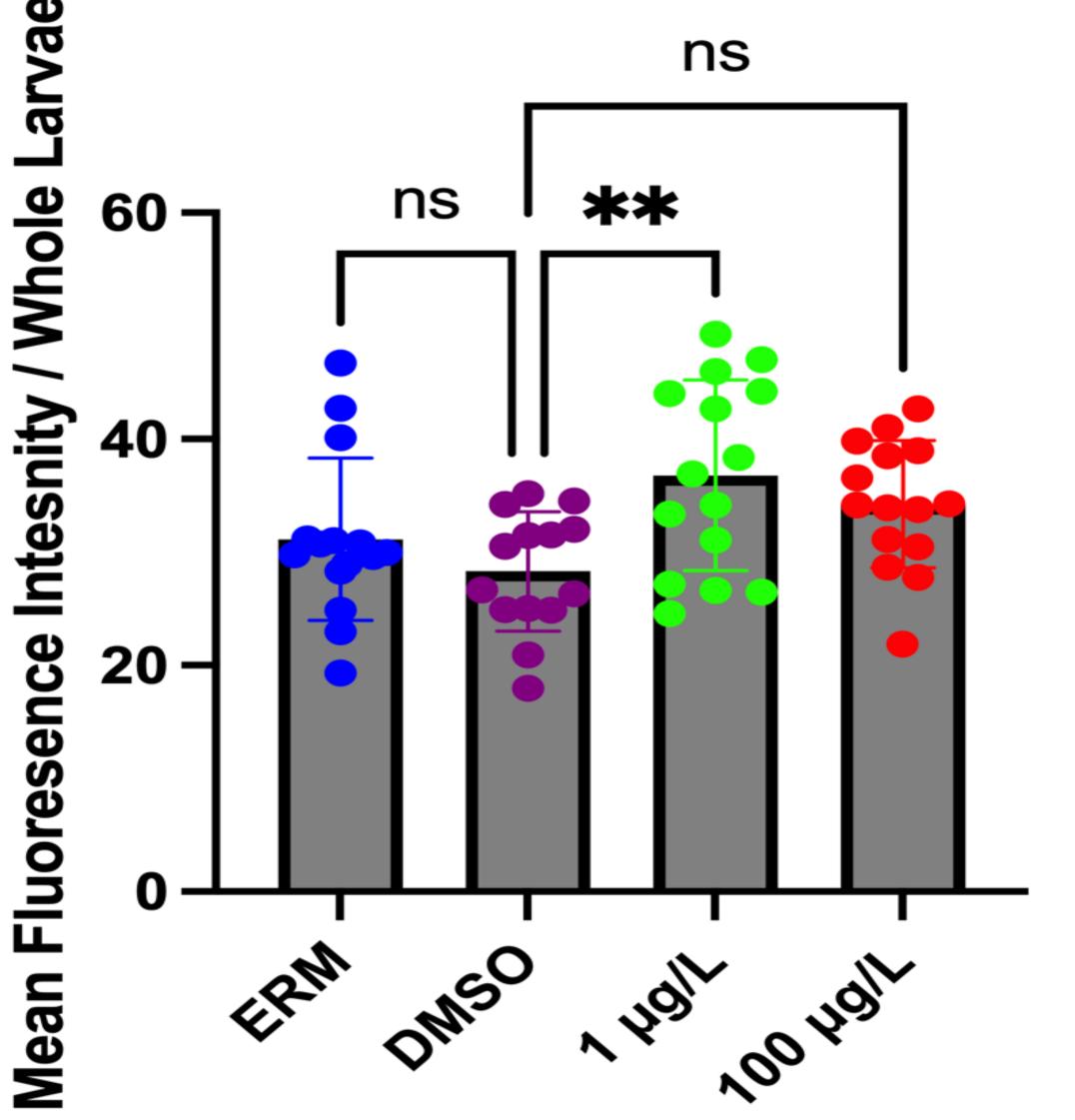


Figure 1: Levels of fluorescence (higher fluorescence indicates higher apoptosis levels)

Figure 2: Observed locomotor activity, featuring hypoactivity in periods 1,2, and 4

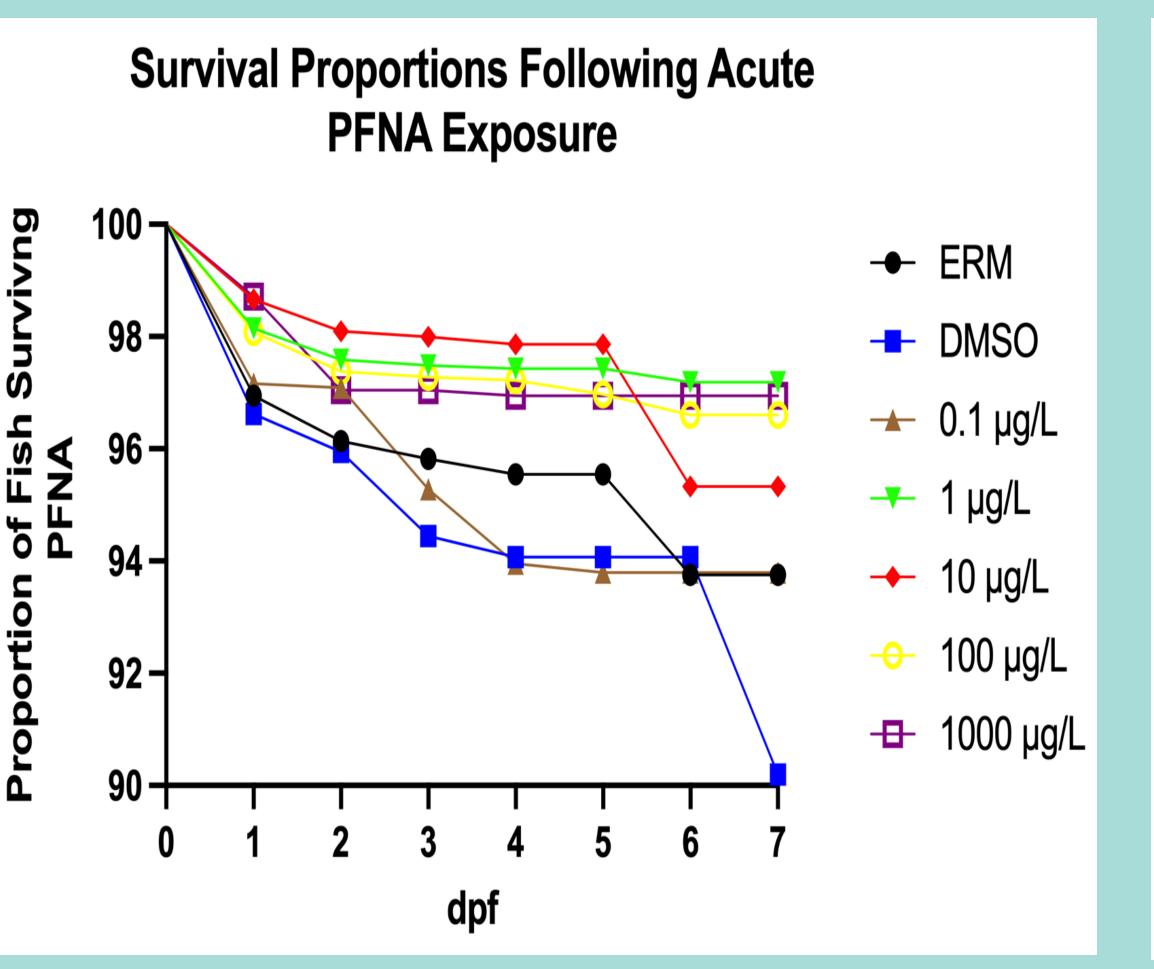


Figure 3: Surival rates per exposure day

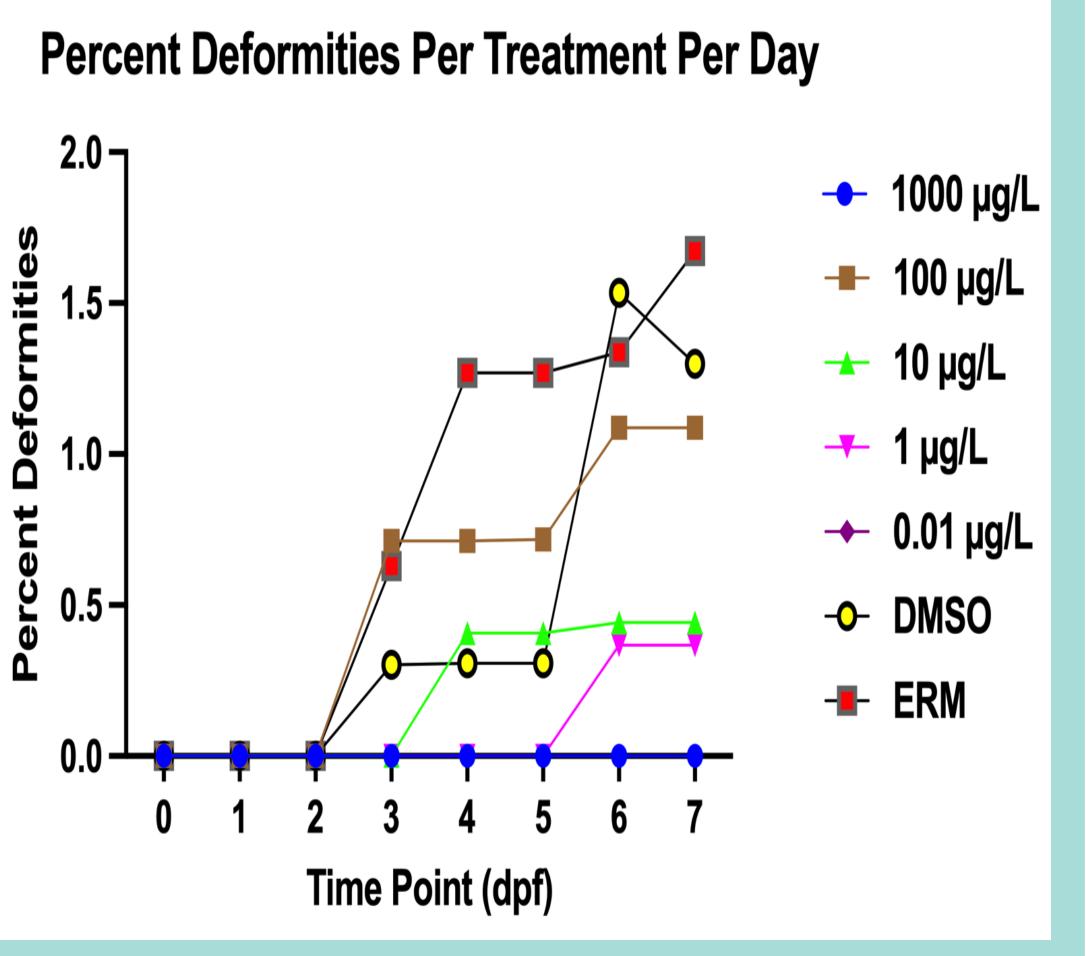


Figure 4: Percent defrmities per exposure dayr

Discussion and Conclusion

- The observed hypoactivity effects on locomotor activity in larval zebrafish suggest neurotoxicity or motor deficits with PFNA exposure
- Since PFNA was not found to impact gene transcript levels of oxidative stress and apoptotic genes, future research can study genes related to lipid pathways, or neurotransmitter pathways like GABA and Serotonin
- Further research can be done on apoptosisrelated signaling pathways, as PFNA was found to induce apoptosis in the 10 µg/L concentration
- Early developmental exposures to PFNA may have long-lasting detrimental effects on the adult brain and should be further investigated
- Sex differences studying developmental exposure to PFNA could also be further investigated