ACUTE PERFLUOROOCTANE SULFONIC ACID (PFOS) EXPOSURE MODULATES BEHAVIORAL TRENDS AND BRAIN MITOCHONDRIAL FUNCTION IN ADULT ZEBRAFISH

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INTRODUCTION: Perfluorooctane sulfonic acid (PFOS) is a persistent environmental contaminant widely detected in aquatic ecosystems. Although chronic exposure has been associated with neurotoxicity, the immediate effects of acute PFOS exposure on behavior and mitochondrial function remain underexplored. OBJECTIVES: This study aimed to investigate behavioral outcomes and brain mitochondrial responses following acute PFOS exposure in adult zebrafish (*Danio rerio*). MATERIALS AND METHODS: Adult zebrafish (*WT*, 3–4 months old, 50:50 sex ratio) were acutely exposed to 0.1, 1, or 10 μM PFOS for 24 hours. Behavioral assays included the novel tank diving test, social preference test, and mirror-induced aggression test. High-resolution respirometry was conducted to assess acute changes in brain mitochondrial respiration and bioenergetic parameters. RESULTS AND CONCLUSION: Acute PFOS exposure did not cause statistically significant behavioral changes, but notable trends were observed. Treated fish exhibited reduced top transitions and increased avoidance-like behaviors in the novel tank and aggression tests, alongside decreased social exploration. These alterations suggest a potential shift toward reduced exploratory drive and social withdrawal. Mitochondrial assessments revealed significant decreases in routine respiration and increases in residual oxygen consumption (ROX) at 1 μM PFOS, indicating potential oxidative stress. Complex I–linked OXPHOS capacity was significantly elevated at 1 and 10 μM, while bioenergetic efficiency increased significantly in both groups, indicating a compensatory effect to the acute exposure. These findings suggest that even short-term PFOS exposure can induce measurable mitochondrial adaptations, potentially related to elevated reactive oxygen species and early neurotoxic responses.

KEYWORDS: PFAS; zebrafish; environmental toxicology; high-resolution respirometry; animal behavior