EFFECTS OF PYRIPROXYFEN EXPOSURE ON SPERMATOGENIC CELLS IN *DANIO RERIO*

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INTRODUCTION: Pyriproxyfen (PPX) is an insecticide widely used to control *Aedes aegypti*, having been applied to drinking water since 2014 through the Brazilian National Dengue Control Program, and also utilized in agriculture. It acts as an analog of the insect juvenile hormone, blocking metamorphosis and reproduction. Although effective for vector control, PPX has been associated with negative effects on non-target organisms, including fish, aquatic invertebrates, and mammals. Studies have shown that the compound may induce cellular damage, hormonal imbalances, and reproductive system toxicity. Moreover, its potential action as an endocrine disruptor raises environmental and public health concerns, particularly due to its environmental persistence and possible bioaccumulation. **OBJECTIVES:** This study aims to investigate the effects of PPX on the morphology of male germ cells in *Danio rerio* and to predict its interactions with target proteins, such as protein kinase C (PKC) and the T-type voltage-dependent calcium channel (T-VDCC), through molecular docking simulations. **MATERIAL AND METHODS:** Adult fish were maintained under controlled conditions and exposed to PPX (10^{-9} M). Following treatment, the testes were processed for histological and morphometric analyses. The nuclear areas of different testicular cell types were measured. Statistical analysis considered $p \leq 0.05$ as significant. For molecular docking assays, three-dimensional structures of the human target proteins (PKC and T-VDCC) were optimized through modeling and energy minimization. The structure of PPX was obtained and prepared for simulation, which was conducted using Chimera and AutoDock Vina, and further analyzed with PyMOL and LigPlot+ software. **RESULTS AND CONCLUSION:** Exposure to PPX significantly increased the nuclear area of Leydig cells, spermatids, and spermatozoa, suggesting interference with chromatin compaction and possibly reproductive function. Docking simulations revealed a high binding affinity of PPX to PKC and T-VDCC, suggesting direct interaction with these proteins and potential modulation of their physiological roles. These findings indicate a potential

endocrine-disrupting effect of PPX, underscoring the need for further studies to elucidate its toxicological and reproductive implications.

Keywords: Pyriproxyfen; *Danio rerio*; spermatogenesis; calcium channel; PKC.

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