EFFECT OF OXYFLUORFEN ON DEVELOPMENT OF MEDAKA (*Oryzias latipes*)

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Abstract: Increased and substantial productivity of commercial farming for many vegetable, fruit, textile, and ornamental crops is enhanced with the application of herbicides to reduce the impact weeds and other obnoxious plants could exert, impeding growth and yield capacity. However, the environmental safety of herbicides (and other pesticides) as related to animals and human, should be clearly established and available to the consumer. Oxyfluorfen (OXY), 2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl) benzene, a persistent polychlorinated diphenyl ether (PCDE), is applied to several food crops targeting weeds on contact, pre-emergently and post emergently. Though solubility is low, OXY is persistently stable, sorbs to sediment, and is highly toxic to freshwater fish. We have used the fish model, Japanese medaka, to validate the toxicity of this herbicide. We proposed to establish the effects of OXY on early life of medaka by identifying LC₅₀, hatching efficiency, post hatch growth rate, and skeletal development. Medaka embryos (21 hours post fertilization, hpf) and hatchlings (1 day post hatch, dph) were exposed to OXY (0.5 ppm-8 ppm) in 96 h static renewal replicates. Our results suggest a low chorionic permeability to this omnipresent organofluorine compound, revealing no LC₅₀ (no mortalities), and no significant change in duration of hatch for this dosage. However, developmental deformities in cardiovascular structure were observed in the higher OXY concentrations of 4-8 ppm, which indicates that limited OXY was able to cross the chorion. Treatment of hatchlings determined a LC₅₀ of ~3 ppm. Additionally, we observed scoliosis and alimentary canal hemorrhaging in hatchlings after a 96 h exposure to concentrations of 4-8 ppm, and vertebral surface irregularities in hatchling exposed to 2 ppm. After 7 days of depuration, 96 h exposed fish were stained and measured using micro-photographic techniques, wherein we observed a decrease in neurocranium length when compared to control groups. These findings encourage additional toxicity study involving OXY exposure and its effect on medaka development.

Key words: Oxyfluorfen, herbicide, PCDE, toxicity, Japanese medaka, development