The Effects of Glyphosate [N- (phosphonomethyl) Glycine] in Metabolism and Embryogenesis of Zebra Fish (Danio rerio)

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Introduction: One of the most widely herbicide used is Glyphosate that acts as an inhibitor of 5-enolpyruvylshikimate-3-phosphate synthase enzyme interfering in the synthesis of essential aromatic amino acids. Objectives: Show the effects of glyphosate on energetic metabolism during embryogenesis of zebra fish (Danio rerio). Material and Methods: For Fish Embryo Toxicity (FET), females and males are held together in a ratio of 2:1 in glass tanks in a temperature of 26°C and 8/16 h light cycle. 20 viable eggs are transferred to a 24 well plate with different concentrations of compound and are incubated at 26°C for 24h, 48h, 72h and 96h. Acute toxicity causes the coagulation of embryo, absence of displacement of the tail and somite formation and detection of heartbeats. Dosage of proteins, glycogen, glucose and activity of hexokinase, pyruvate kinase, glucose-6-phosphatase, glucose 6-phosphate dehydrogenase, phosphoenolpyruvate carboxykinase, aspartate aminotransferase, alanine aminotransferase and glutamate dehydrogenase followed the literature. Results and Discussion: "FET" test was performed with Glyphosate at different concentrations: 150 mg/L, 60 mg/L, 30 mg/L, 25 mg/L, 20 mg/L, 15 mg/L, 10 mg/L, 5 mg/L and 1,5 mg/L. The mortality rate was: 100%, 100%, 80%, 50%, 31,6%, 29%, 25%, 23% and 5%, respectively. In 80% of embryos at the concentration of 15 mg/L the development of bladder problems were found. The embryos from concentrations of 5 mg/L, 10 mg/L, 15 mg/L and 20 mg/L presented changes in all enzymes tested and differences in total contents of glycogen, glucose and proteins., Conclusions: These data show that Glyphosate was able to induce both embryonic morphological modifications and energetic metabolism of Zebra fish.

Key words: Glyphosate, Zebra fish, embryo, toxicology, metabolism.

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