

EFFECTS OF LITHIUM ON CANONICAL WNT SIGNALING DURING THE EMBRYONIC DEVELOPMENT OF SIAMESE FIGHTER FISH, *Betta splendens*

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Canonical Wnt signaling pathway is one of the first cell-cell signaling pathways to be switched on during early embryonic development. Several studies in animals have shown that lithium upregulate Wnt signaling, which leads to the abnormal development of the embryo. The present study aimed to determine the effects of lithium on early development in a popular aquarium fish, the Siamese fighter fish, *Betta splendens*. Since the embryonic development of *B. splendens* is not well documented, its early and late development was examined using a Zeiss primo-star inverted microscope. The most effective lithium concentration for the treatment of *B. splendens* embryos was determined by exposing 20 cleavage and blastula stage embryos each to a series of lithium concentrations ranging from 0.15 - 0.45 mol L⁻¹ and 0.15 - 0.35 mol L⁻¹, respectively. The lithium concentration which gave the most teratogenic effects was selected, its effects on external morphology was analyzed using live and whole mount preparations of the embryos, and the effects on internal anatomy was analyzed by preparation of histological sections. Embryogenesis of *B. splendens* started at 0:45 hours post fertilization (hpf), and the embryos hatched from the chorion at 48 hpf. Embryogenesis was categorized into periods of cleavage, blastula, gastrula, segmentation and pharyngula, and each of these periods was observed for 1.30, 5.30, 5.45, 14.15 and 20 hours, respectively. *Betta splendens* blastula stage embryos treated with 0.25 mol L⁻¹ lithium showed the most abnormalities in development. During gastrulation, many lithium treated embryos showed exo-gastrulation. These lithium-treated embryos developed deformities in eye, nervous system, heart, gut, ear, somites and skeletal structures causing defects in body axes. Most embryos did not develop eyes and had curved tails. This study indicates that teratogenic effects of lithium during *B. splendens* embryonic development are possibly through its effects on the canonical Wnt signaling pathway.

Keywords: *Betta splendens*, Canonical Wnt signaling, Embryogenesis, Lithium