

Microinjection Induction of Cataracts in Zebrafish (*Danio rerio*)

Michelle Nguyen (The King's University), Dr. Heather Prior* (The King's University)

The King's University

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The zebrafish (*Danio rerio*) is a small, freshwater teleost that has been used as a model organism for the study of vertebrate morphology, development, and genetics for over 25 years. Zebrafish have many characteristics that have contributed to their success as model organisms, including low cost, rapid development, and similar anatomical features to other vertebrates. One area of particular interest is zebrafish as a model organism for ocular disorders. One ocular disorder that has been studied in zebrafish is cataracts. Cataracts are defined as any opacification of the lens that results in light scattering and visual impairment. Often, cataracts are characterized by increased insoluble crystallin protein in the lens. Zebrafish make good models for cataracts because, like humans, 90% of their lens is composed of three types of crystallin protein, α -, β -, and γ -crystallin. One cause of protein damage leading to cataracts is oxidative stress, due to excess levels of free radicals and reactive oxygen species (i.e. H_2O_2) in the eye. This study tests a method of inducing cataracts in zebrafish eyes, by injecting H_2O_2 into the eye with a microinjector. The efficacy of this method was demonstrated through optomotor response testing conducted pre- and post-injection. The effects of H_2O_2 concentration and volume were also examined. Additionally, cryosections of normal zebrafish eyes and zebrafish eyes with cataracts induced by this method were compared. These investigations have demonstrated quantifiable differences in normal compared to cataractous zebrafish eyes, and provide a useful method with which to pursue further studies in understanding cataracts.