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Role of PlexinA1 in Visual System Development of *Danio rerio*

Abstract (239 words)

Semaphorins and plexins are a repellent ligand/receptor pair that have been known to be involved in nervous system development and neuronal axon guidance for many years. Together, they mediate axon growth in the visual system by facilitating actin cytoskeletal rearrangements and initiating growth cone collapse through intracellular signaling mechanisms. A proposed model for the development of the early eye involves the interaction of sema6A and plexinA2. However, this model is not fully explained by previous data; we propose that plexinA1 also plays a role. This project aims to use in situ hybridization and antisense morpholino gene knockdown to identify the expression and function of the plexinA1a and A1b receptors in early zebrafish eye development, both of which have yet to be characterized. Interestingly, our limited preliminary data imply that two homologs of the plexinA1 receptor share early expression patterns, however, later in development, they have divergent expression patterns, suggesting a divergence of function. Studies of the mechanisms of zebrafish eye development have important implications for the generation of therapy techniques for many human diseases of the eye. For example, micropthalmia is a condition that arises before birth and results in an abnormally small size of one or both eyeballs, which causes significant loss of vision (Genetics Home Reference, 2014). An understanding of the process by which the early eye is formed through guidance and cell proliferation is crucial to development of therapies that address common problems in this process.

Genetics Home Reference (2014). Microphthalmia. Retrieved from http://ghr.nlm.nih.gov/condition/microphthalmia