Silverb, a gene expressed in the zebrafish retinal pigment epithelium, is required for normal retinal lamination and differentiation

Abstract

The retinal pigment epithelium (RPE) is a pigmented monolayer of cells which lies behind the retina. The RPE is essential for proper eye functioning and development, and defects in the RPE, can lead to retinal degeneration and blindness. Despite the importance of the RPE, its interactions with the retina during early development are poorly understood. In the first genomic study of early RPE development, Leung et al. (2007) identified 74 genes which are differentially expressed in the zebrafish RPE at 52 hours post-fertilization (hpf). Seven of these genes were selected for further study based on their potential significance in retinal and RPE development. In situ hybridizations revealed robust expression of five of the seven genes at 52 hpf in the RPE. Research was then focused on the gene silverb (silvb) given its robust and specific expression in the RPE. Furthermore, previous research linked the Silver protein to retinal development (Schonthaler et al. 2005) Additional in situ hybridizations demonstrated silvb expression at 24 and 36 hpf. Silvb expression was perturbed with injections of antisense oligonucleotide morpholino (MO) at the one-cell stage. Injected embryos lacked pigmentation in the ventral RPE, a phenotype first observed at 24 hpf. Histological analysis of injected embryos revealed reduced retinal cell density at 36 hpf and perturbed retinal lamination at 60 hpf. By 72 hpf, retinal lamination was recovered in injected embryos, although cell density and eye size were still reduced. Thus, perturbation of expression of silvb, a gene expressed exclusively in the RPE during early eye development, delayed retinal lamination and differentiation. This demonstrates the importance of an RPE-specific gene in proper retinal development and could have implications for our understanding of retina-RPE developmental interactions.