

## Abstract

Any injury to retina leads to irreparable damage in mammals. Unlike higher vertebrates, zebrafish possess remarkable regenerative response in retina, driven by Müller Glia (MG), the only glial cell type in retina. Upon retinal injury, the Müller Glia cells undergo de-differentiation and cell division to give rise to a population of MGPCs (Müller Glia derived Progenitor cells), which migrate to damaged layers of retina to differentiate and restore cell population. But the exact mechanism of molecular interplay that orchestrates de-differentiation, proliferation and re-differentiation still remains elusive. Although many signaling cascades and regulatory pathways have been identified to play roles at different stages of retina regeneration, TGF- $\beta$  signaling pathway remains under-explored. In this study, we analysed the role of a developmentally important signaling pathway *i.e.* TGF- $\beta$  signaling in the retina regeneration. Also, we explored the communication that TGF- $\beta$  pathway has with other signaling pathways. We found that TGF- $\beta$  signaling and Notch signaling interplay is important for retina regeneration. Another signaling that we explored is Shh(Sonic Hedgehog), which is one of the major networks that regulates the key events during developmental processes. We tried to understand how TGF- $\beta$  signaling is communicating with Notch and Shh signaling to help restore the structural and functional integrity of the retina.