Title: Zebrafish model to study retinal pigment epithelium phagocytosis on rod photoreceptors

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The rod and cone photoreceptor cells in the retina rely on the retinal pigment epithelium (RPE) for survival, and any disruption in their interaction can result in retinal diseases. Over time, toxic photo-oxidative waste products accumulate in the oldest tips of the photoreceptor outer segments (OSs). RPE cells phagocytize these aged OS tips in small particles and degrade the contents. While this requires close interaction between photoreceptors and the RPE, the possible differences between rods and cones in this interaction are not well understood. Several studies have highlighted that their distinct morphology, development, and function suggest variations in RPE interaction as well. Our previous research focused on cone cell phagocytosis, and our next step is to examine RPE-rod cell interactions.

To study phagocytosis across different photoreceptor cells, zebrafish provides an ideal model due to their four cone types and one type of rods. However, our previous studies have shown how immunohistochemical labeling with opsin antibodies does not provide an accurate way to separate rods from green cones. To overcome this problem, we will use transgenic zebrafish lines and microinject them at 1-cell-stage with plasmid constructs targeting only rod photoreceptors to create fish with endogenously fluorescent protein structures solely in rod photoreceptor cell membrane. After this, we will also include fluorescent proteins in RPE cell membrane to study the RPE phagocytosis on rod OSs. Our method has proven effective in cone cells and holds promise for further studies into the phagocytosis process to rod cells.