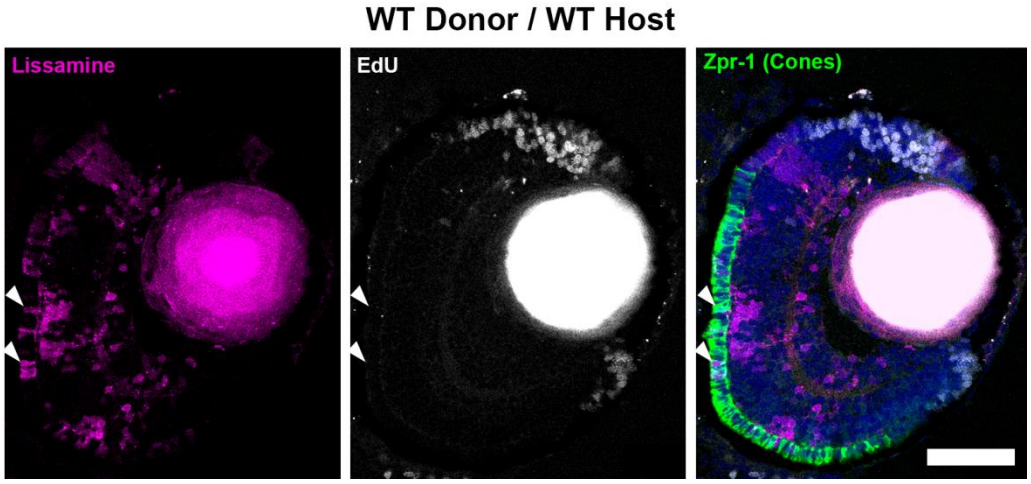

Figure S1. WT to WT reciprocal transplant does not affect cell cycle exit or photoreceptor differentiation. When lissamine-labeled wild type (WT) donor cells are transplanted into WT host embryos, donor cells exit the cell cycle (are EdU negative) and differentiate normally into cone photoreceptors (Zpr-1 positive) (arrowheads). Scale bar = 50 μm.

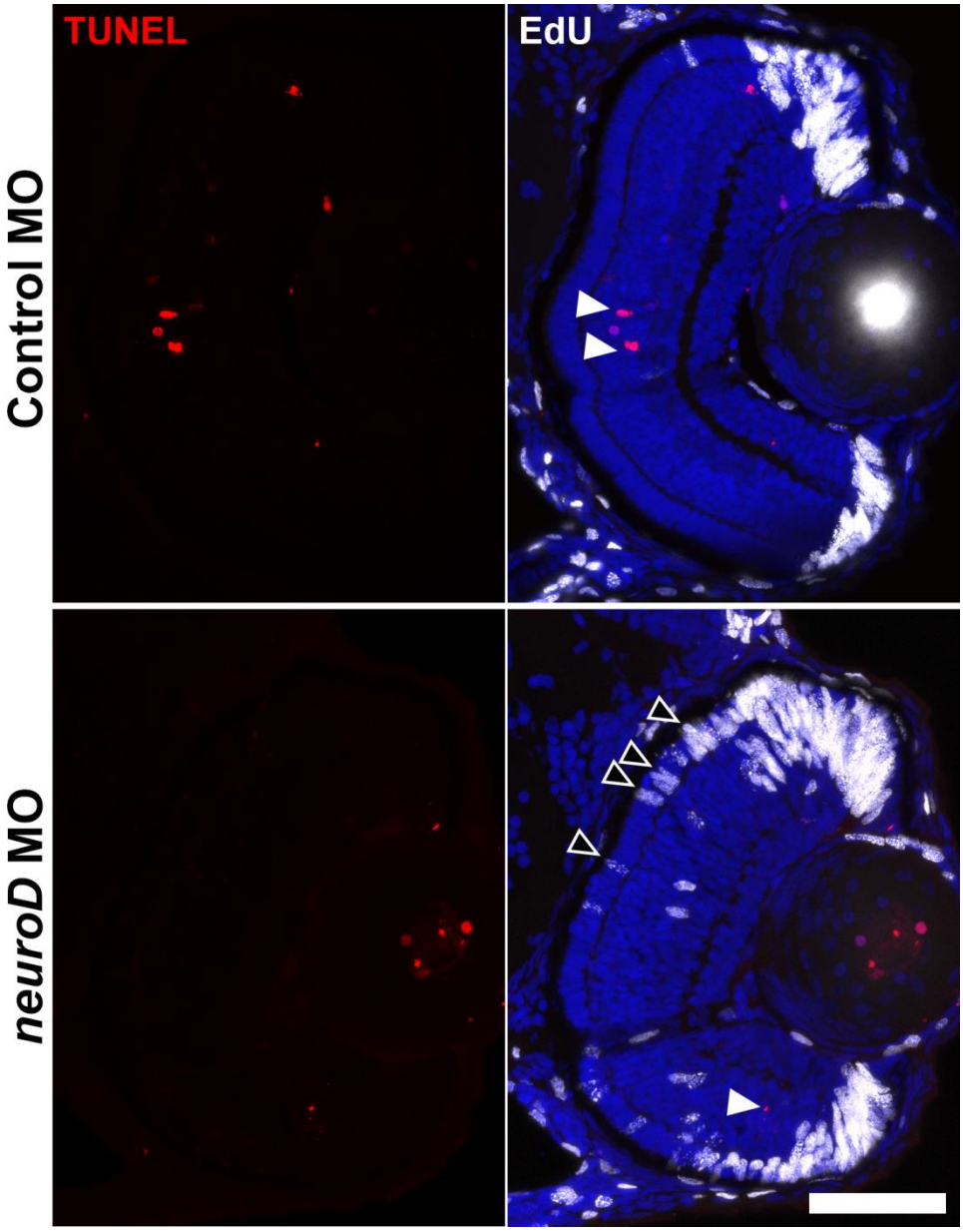

Figure S2. NeuroD knockdown does not result in increased apoptosis. Compared with control retinas (top row) NeuroD knockdown (bottom row) results in a greater number of EdU+ cells in the ONL (black arrowheads) but does not result in an increased number of TUNEL labeled apoptotic cells in the retina (white arrowheads). Scale bar = 50 μm.

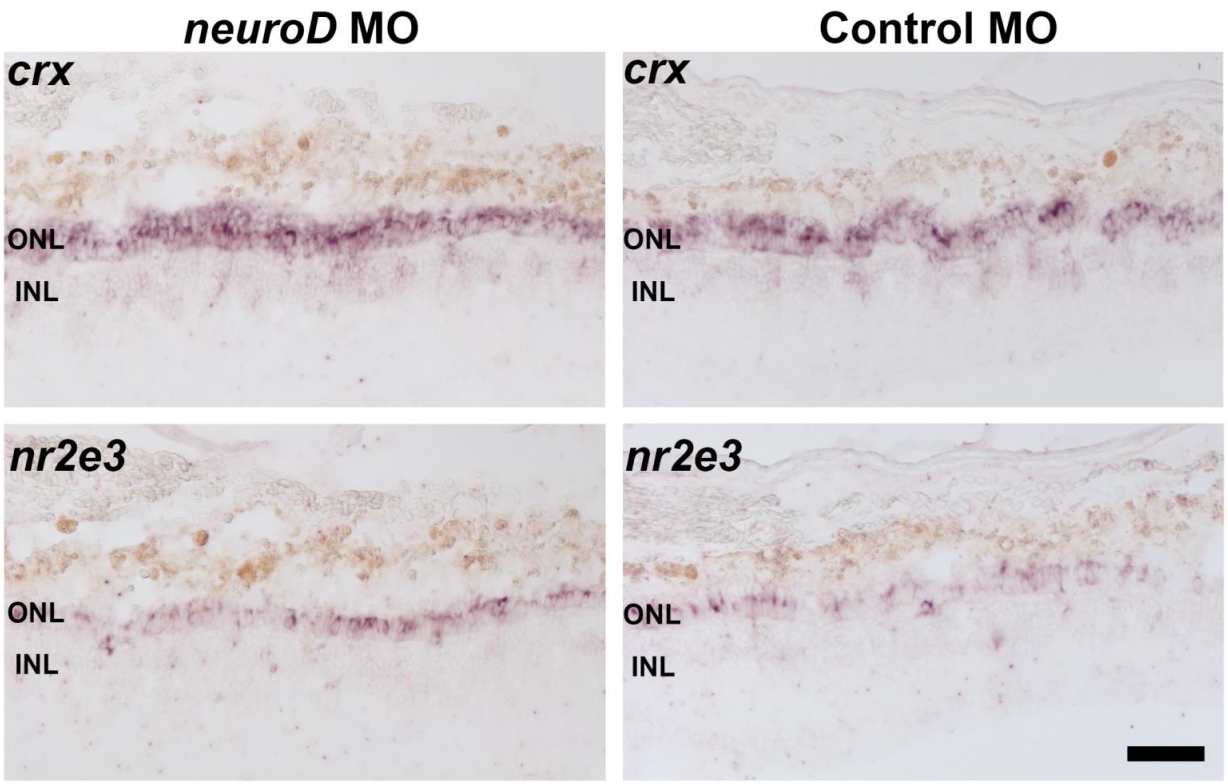

Figure S3. During photoreceptor regeneration, NeuroD knockdown does not prevent expression of the photoreceptor lineage markers *crx* and *nr2e3*. At 6 dpl, compared with controls, NeuroD knockdown (*neurod* MO) does not affect expression of *crx* (top) or *nr2e3* (bottom) in the inner (INL) or outer nuclear layer (ONL). Scale bar = 50 μm.

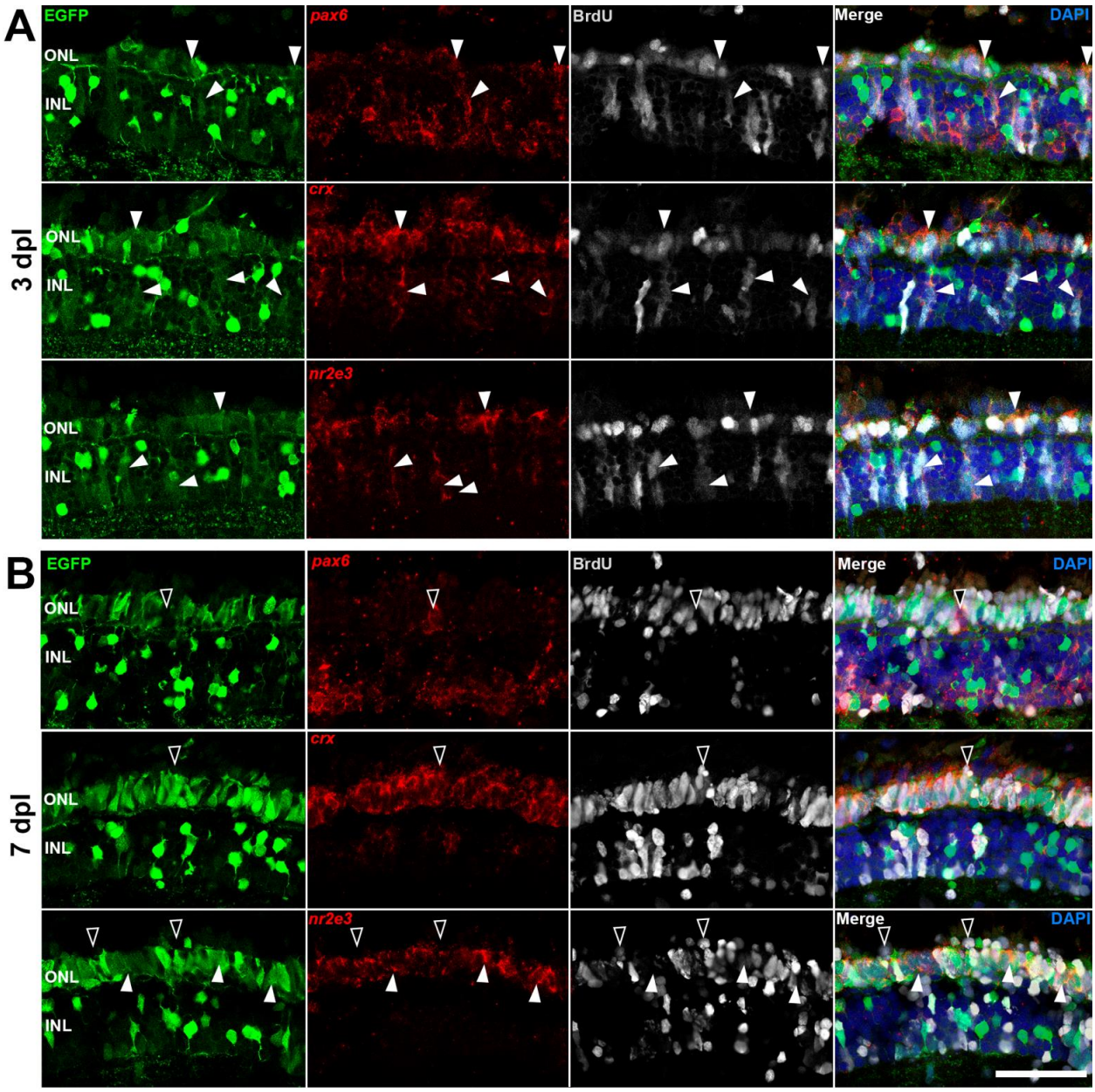

Figure S4. Characterization of *neurod* expression relative to the progenitor marker *pax6* and the photoreceptor lineage markers *nr2e3* and *crx*. (**A**) At 72 hpl, in Tg(*neurod*:*egfp*) fish, EGFP immunolabeling co-localizes with *pax6*, *crx* and *nr2e3* (red) in all BrdU+ (white) progenitors; white arrowheads show examples of co-localization. (**B**) At 7 dpl, EGFP no longer co-localizes with *pax6* (black arrowheads); EGFP co-localizes with *crx* in basal ONL cells (rods- white arrowheads) but not in the *crx*+ apical ONL (cones- black arrowheads); EGFP and *nr2e3*

co-localize in the basal (rods) ONL but they are not present in the apical ONL (cones- black arrowheads). Proliferating cells were pulse-labeled with BrdU at 3 dpl (white), showing the fates of these progenitors at 7 dpl. Scale bar = 50 μm.

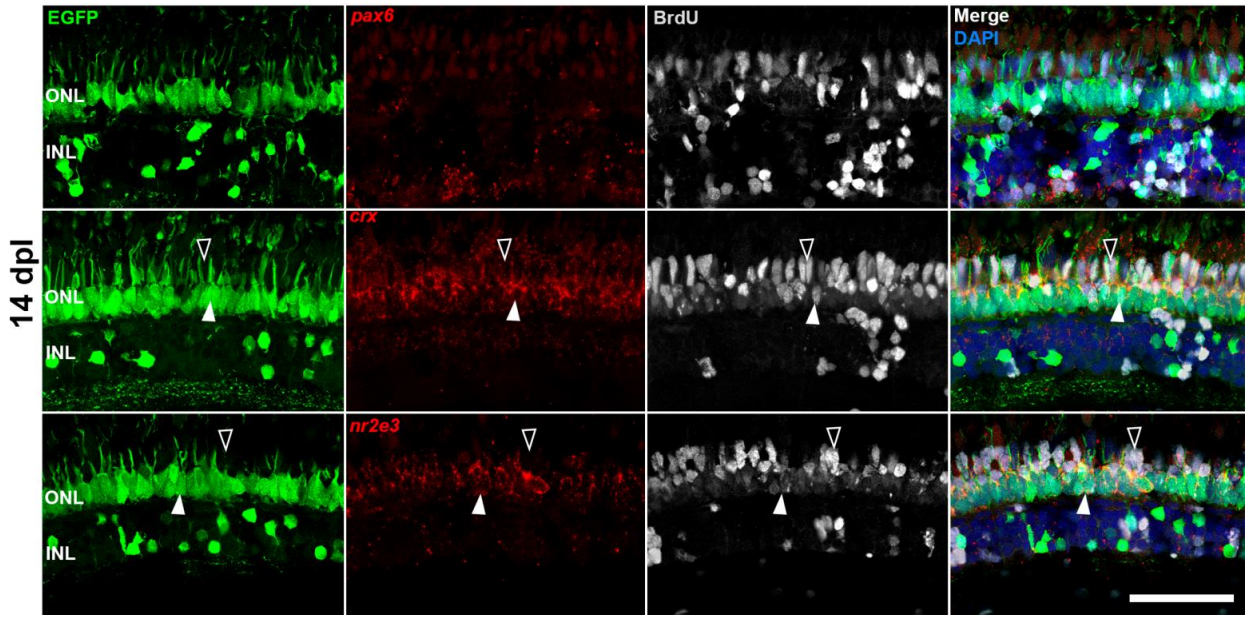

Figure S5. Characterization of *neurod* expression relative to *pax6*, *nr2e3* and *crx* at 14 dpl in the fully regenerated retina. At 14 dpl, when photoreceptors are fully regenerated, in Tg(*neurod*:*egfp*) fish, EGFP immunolabeling and *nr2e3* continue to co-localize in rods (white arrowheads), but not cones (black arrowheads), while *crx* is expressed in all photoreceptors. Proliferating cells were pulse-labeled with BrdU at 3 dpl (white), showing the fates of these progenitors at 14 dpl. Scale bar = 50 μm.

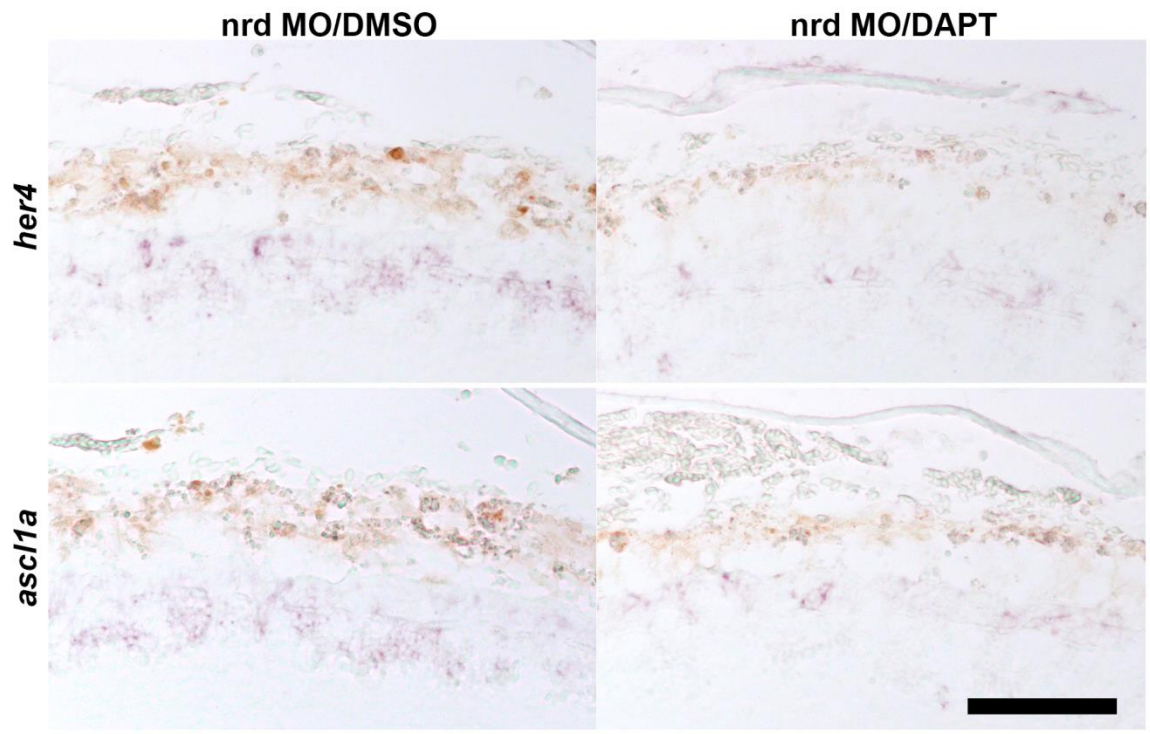

Figure S6. Following photoreceptor ablation and NeuroD knockdown, DAPT treatment effectively inhibits Notch signaling. Compared with DMSO treated controls (left), DAPT treatment (right) reduces expression of the Notch pathway targets *her4* and *ascl1a*. Scale bar = 50 μm.