**Supporting and Supplemental Information**

**A close-up of a microscope

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**Supplementary Figure 1. SA-gal staining shows lack of TUNEL co-localization.**

After NMDA damage, retinas at 5 dpi were stained with SA-βGal along with TUNEL labeling to identify apoptotic cells. None of the 35 SA-βGal+ cells showed co-localization with TUNEL+ cells.

**A collage of images of a cell

Description automatically generated**

**Supplementary Figure 2. Senescent cell identity.**

After NMDA damage, retinas were stained with SA-βGal and either Zpr1 (photoreceptors), Glutamine Synthase (GS; Müller glia), or HuC/D (retinal ganglion cells). Zpr1 showed little to no overlap with SA-βGal. A small number (~1-3 per section) of GS+ Müller glia or HuC/D+ RGCs co-localized with SA-βGal after NMDA damage (n=5).

A collage of images of a variety of colored objects

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**Supplementary Figure 3. Senolytic treatment does not impair microglia/macrophage dynamics**

Wildtype AB zebrafish were intravitreally injected with 0.5uL of either 100mM NMDA or PBS, and subsequently treated with a combination of Metformin and ABT-263 or vehicle control. (A-B) Retinas were stained with 4c4 to mark microglia/macrophages, and ToPro to label cellular nuclei and images were processed using Imaris 10.1 to created 3D surfaces for 4c4 labeled cells. Images shown are top-down (A) or from the right side (B). (C) Retinas treated with senolytics showed no significant change in immune cell localization compared to vehicle treated controls (D) The sphericity of immune cells after NMDA damage in the presence of senolytic treatment was measured as a marker of activation, with higher values correlating with more activation of immune cells. Senolytic treatment showed a modest decrease, but the effect did not rise to significance (p=0.069) (n=3-5).

A close-up of a graph

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**Supplementary Figure 4. Senolytic treatment increases TUNEL+ cells after NMDA damage**.

Wildtype AB zebrafish were intravitreally injected with 0.5uL of either 100mM NMDA or PBS, and subsequently treated with a combination of Metformin and ABT-263 or vehicle control. (A-B) Retinas that were treated with NMDA damage showed increased numbers of TUNEL+ cells across the whole retina. Combination senolytic treatment further increased the number of TUNEL+ cells in the retina at 5dpi (p<0.05, n=4-7) and 10dpi (p<0.005, n=3).

A black background with a couple of rectangular objects

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**Supplementary Figure 5. Senolytic treatment increased p62 expression after NMDA damage.**

Wildtype AB zebrafish were intravitreally injected with 0.5uL of either 100mM NMDA or PBS, and subsequently treated with a combination of Metformin and ABT-263 or vehicle control. Retinas from treated fish were collected and RNA was isolated followed by qRT/PCR for p62, a common autophagy marker90. Combination senolytic treatment showed an elevated expression of p62, indicative of activation of autophagy at 5dpi (n=3, p<0.05).