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Supplemental information

**Optogenetic targeting of All amacrine
cells restores retinal computations
performed by the inner retina**

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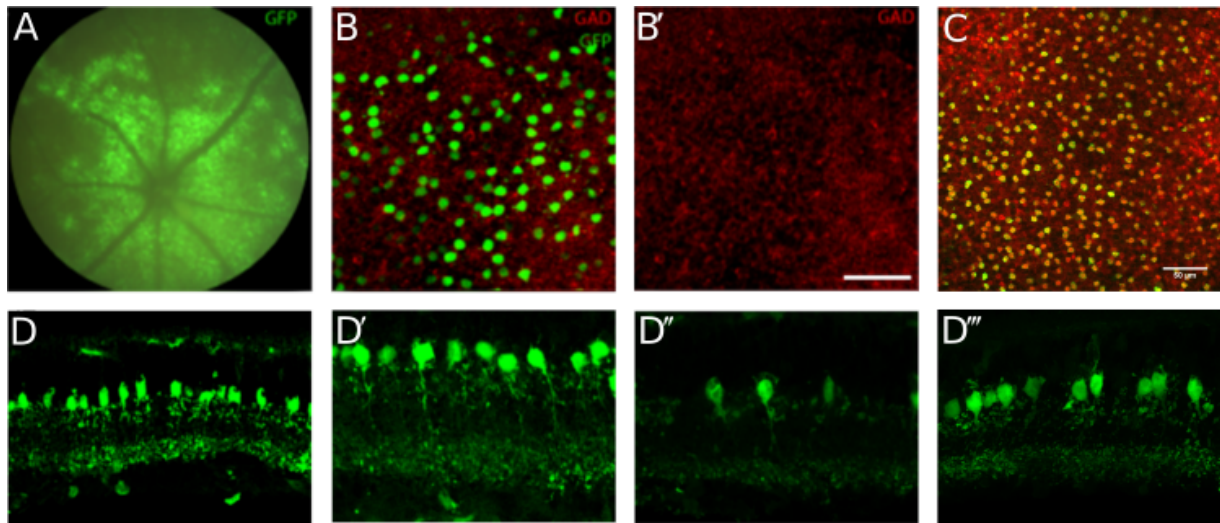


Figure S1: Investigation of expression pattern upon intravitreal delivery of AAV2-7m8-HKamac-eGFP.

A. Representative eye fundus image of a wild type mouse eye treated with AAV2-7m8-HKamac/GNAT2-GFP. **B, B'.** Post mortem retinal flat mount with endogenous eGFP fluorescence and immunostaining against GAD to visualize GABAergic cells. Scale bar is 50um. **C.** Whole mount view of the co-localization of Prox1 (red) and GFP (green). Scale bar is 50um. **D, D', D'', D'''**: Retinal cryosections showing eGFP expression (green). D''' shows the lobular appendages at the end of the dendritic processes.

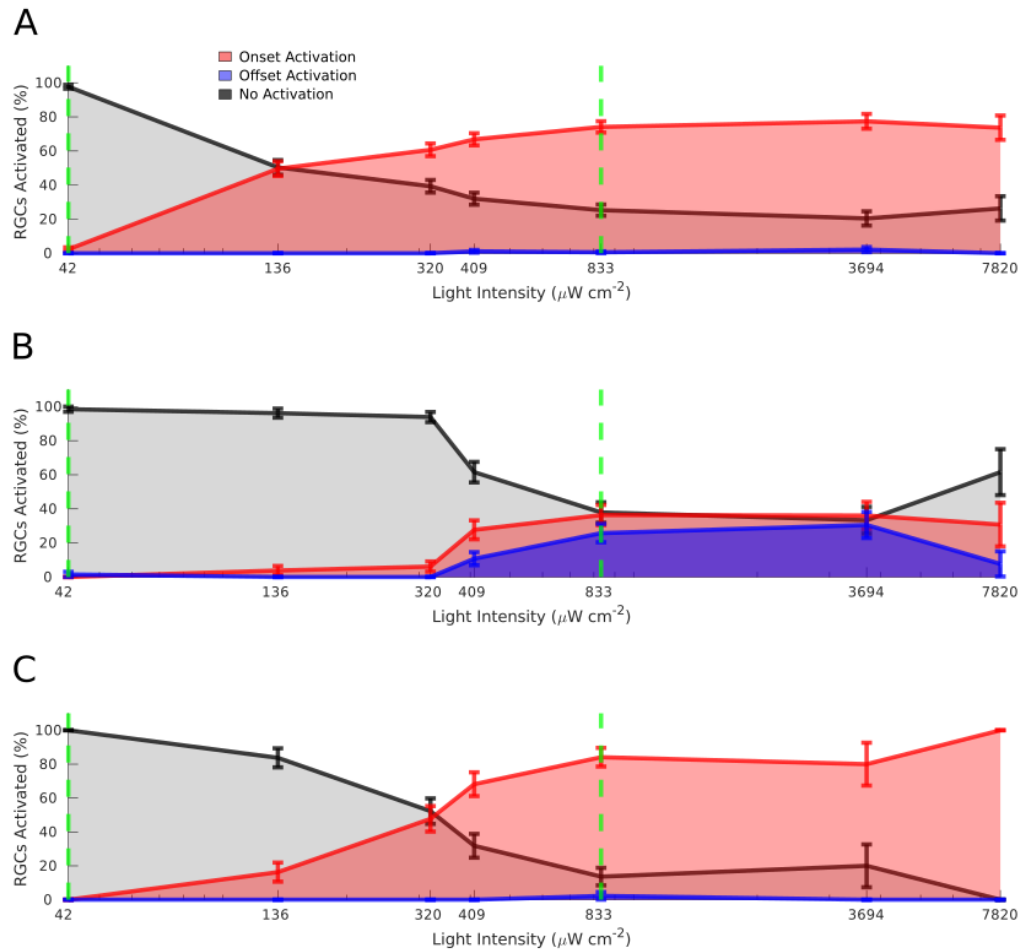


Figure S2: The optogenetic activation of RGCs (mediated by ReaChR-expressing All amacrine cells) varies with the stimulus light intensity.

A. Activation of ON RGCs with optogenetic stimulation (mediated by ReaChR-expressing All amacrine cells) at different light intensities. The X axis (logarithmic scale) represents the light intensity of the stimulus (a white flash). For each of seven luminance levels we show the percentage of RGCs that responded to the stimulation with ON (red), OFF (blue), and no responses (black). The two green dashed lines represent the two light levels - low intensity and high intensity, respectively - chosen for our study. **B.** Activation of OFF RGCs with optogenetic stimulation (mediated by ReaChR-expressing All amacrine cells) at different light intensities. Same plot as in A. **C.** Activation of ON-OFF RGCs with optogenetic stimulation (mediated by ReaChR-expressing All amacrine cells) at different light intensities. Same plot as in A.

Video S1: GFP expression in the retina under the control of the HKamac promoter.

Z-stack showing the GFP expression in the retina under the control of the HKamac promoter.

Note that, in this z-stack, the laser power was adapted at each z to maximize the signal.

Table S1: HKamac regulatory sequence details preceding transgene sequences.

GGTACCGGCCCAGGCTTCCCAGCAGGGCTAAGGATATGCAAGGAGTGCATTCATCCGGAGGTGTT
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CCTTTACTTCTAGACCGGT

Sequences highlighted:

IRPB enhancer, GNAT2 enhancer, SV40 SD/SA, Restriction enzymes sites inserted for cloning purposes (underlined)

Table S2: Sequence of cloning vector containing HKamac-eGFP AAV sequences

TTGCTCACATGTCCTGCAGGCAGCTGCGCGCTCGCTCGCTCACTGAGGCCGCCCGGGCGTCGGGCGACCTTTGGTCGCCCCGGC
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Table S3: Sequence of cloning vector containing HKamac-ReachR-TS-eYFP-ER-WPRE

AAV sequences

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Table S4: Sequence of cloning vector containing HKamac-GtACR1-TS-eYFP-ER-WPRE

AAV sequences

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