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Supplemental Information

Inhibitory Control of Feature Selectivity in an Object Motion Sensitive Circuit of the Retina

Tahnbee Kim and Daniel Kerschensteiner

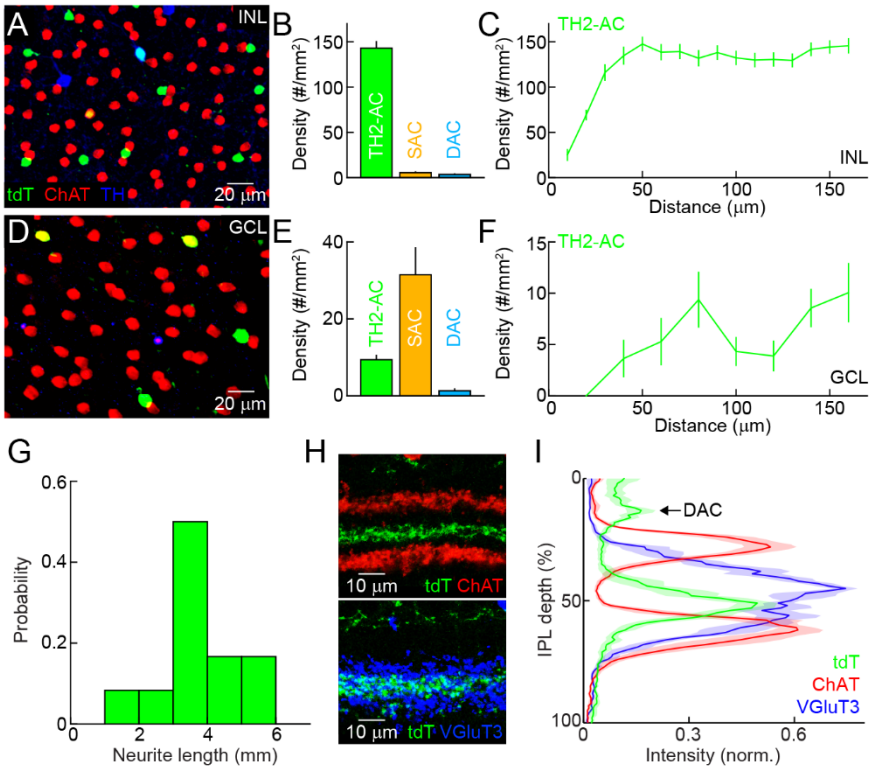

Figure S1. Labeling and morphology of TH2-ACs in *TH-Cre* transgenic mice (related to Figure 1)

(A) Representative image of the INL of a flat-mounted *TH-Cre Ai9* retina stained for tdT (*green*), ChAT (*red*) and TH (*blue*). (B) Density of TH2-ACs (tdT positive, TH negative, and ChAT negative), tdT-positive starburst amacrine cells (*SACs*; ChAT positive, TH negative) and tdT-positive dopaminergic amacrine cells (*DACs*; ChAT negative, TH positive) in the INL. (C) Density recovery profile of TH2-ACs shows exclusion zone characteristic of labeling of a single cell type. (D - F) Analogous to (A - C), but for cells in GCL rather than INL. Cre-expressing SACs are a small subset of all SACs in the GCL (3.2 ± 0.8 %, n = 25 regions, n = 4 retinas). (G) Distribution of neurite lengths of TH2-ACs (n = 12) filled with a fluorescent dye during patch clamp recordings. (H) Representative images of vibratome sections of *TH-Cre Ai9* retinas stained for tdT and ChAT (*top panel*) or TH (*bottom panel*), respectively. (I) Summary data (mean ± SEM, n = 9 retinas) of stratification patterns of ACs labeled in *TH-Cre Ai9* retinas and of immunolabeling for ChAT and VGluT3. TH2-ACs co-stratify with VG3-ACs in the middle of the IPL. The *arrow* indicates the stratification depths of DACs, which are sparsely labeled in *TH-Cre Ai9* retinas.

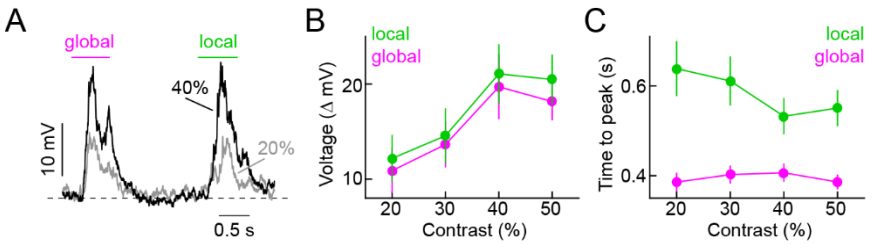

Figure S2. TH2-AC responses to motion stimuli of different contrasts (related to Figure 1)

(A) Representative traces of TH2-AC voltage responses to global and local motion stimuli at 20 % (*gray*) and 40 % (*black*) contrast. (B and C) Summary data (mean ± SEM) of response amplitude (B) and time to peak (C) during global (*magenta*) and local (*green*) motion. Whereas response amplitudes were not significantly different ($n = 5$, $p > 0.05$ for all contrasts), responses to local motion were consistently slower than responses to global motion ($p < 0.05$ for all contrasts).

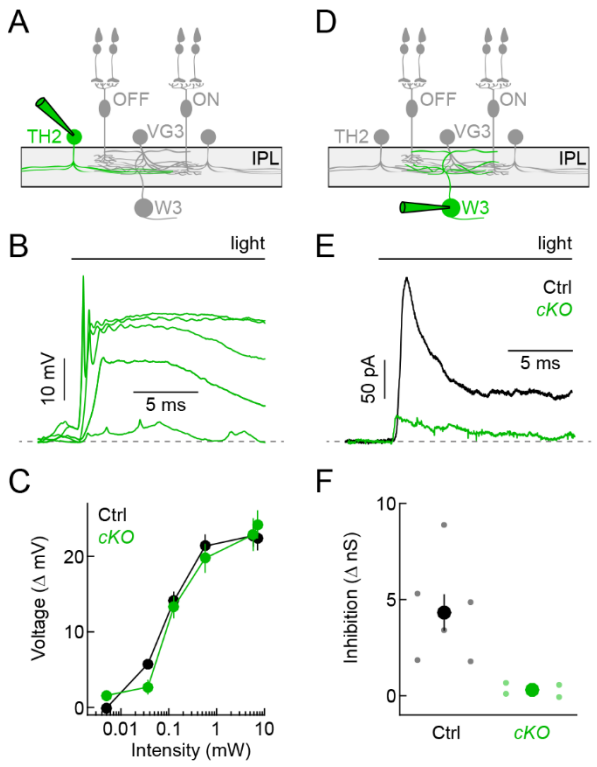

Figure S3. Cell-type-specific silencing of transmitter release from TH2-ACs (related to Figure 3)

(A and D) Schematics illustrating the W3-RGC circuit with cell type recorded in the *panels below* highlighted (*green*). (B and C) Representative traces (B, *TH-Cre VGATcKO Ai32*) and summary data (C, mean ± SEM, *TH-Cre Ai32*, *Ctrl*, *black*, n = 6; *TH-Cre VGATcKO Ai32*, *cKO*, *green*, n = 7) of TH2-AC voltage responses to increasing optogenetic stimulus intensities in a 2-mm diameter spot (*TH-Cre Ai32*). (E and F) Representative traces (E) and summary data (F) of IPSCs (V_{hold} = 0 mV) recorded in W3-RGCs during optogenetic stimulation of TH-ACs with (*TH-Cre Ai32*, *Ctrl*, *black*, n = 7) and without VGAT (*TH-Cre VGATcKO Ai32*, *cKO*, *green*, n = 6, p = 0.0012). In (F), each dot represents data from individual cells and the larger circles (*errorbars*) indicate the mean (± SEM) of the respective populations.

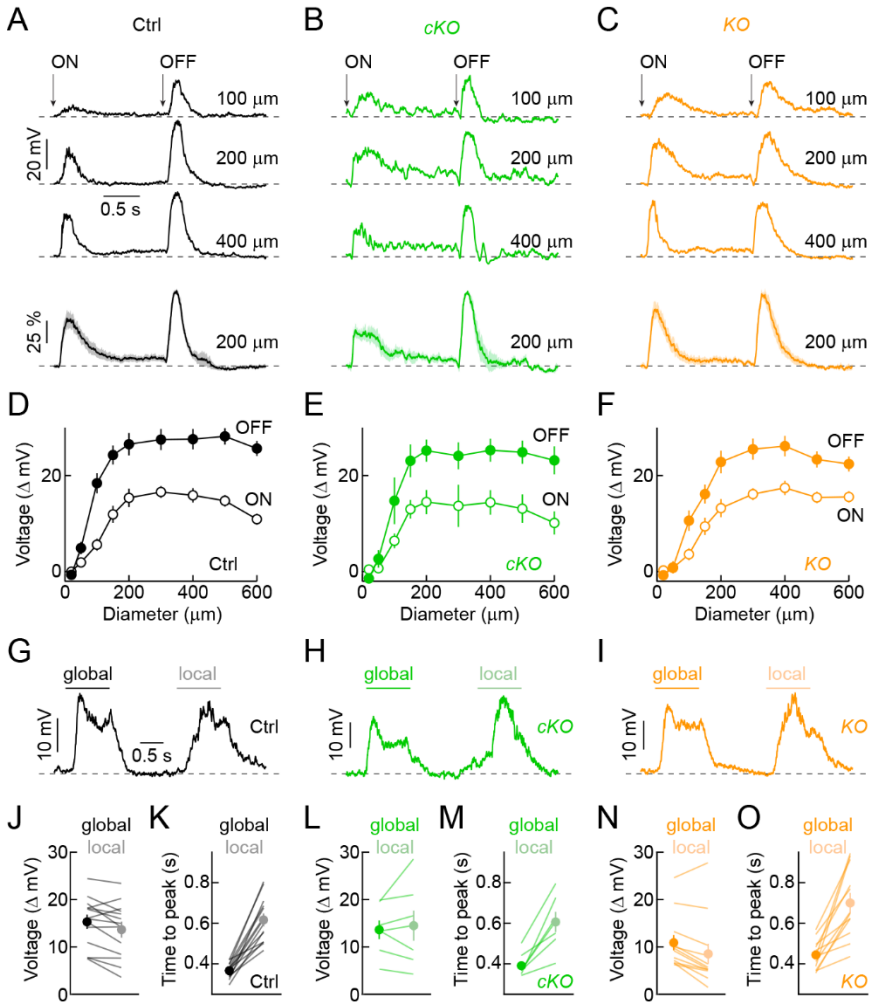

Figure S4. TH2-AC light responses in transmitter knockout mice (related to Figure 3)

(A - F) Representative (*top three*) and average (± SEM, *bottom*) traces (A - C) plus summary data (D - F, mean ± SEM) of TH2-AC voltage responses to stimuli in which intensity in spots of varying diameters was square-wave-modulated (1.5 s ON, 1.5 s OFF) in control (A, D, *TH-Cre Ai9*, *Ctrl*, *black*, n = 12) mice, in mice in which VGAT was removed from TH2-ACs (B, E, *TH-Cre VGATcKO Ai9*, *cKO*, *green*, n = 5), and in VGluT3 knockout mice (C, F, *TH-Cre VGluT3KO Ai9*, *KO*, *orange*, n = 8). (G - O) Representative traces (G - I) and summary data (J - O, mean ± SEM) of TH2-AC voltage responses to global and local motion stimuli in control mice (G, J, K, *TH-Cre Ai9*, *Ctrl*, *black*, n = 14), in mice in which VGAT was removed from TH2-ACs (H, L, M *TH-Cre VGATcKO Ai9*, *cKO*, *green*, n = 7), and in VGluT3 knockout mice. (I, N, O, *TH-Cre VGluT3KO Ai9*, *KO*, *orange*, n = 12). Consistently, responses of TH2-ACs to local motion were slower than to responses to global motion ($p < 0.01$ for all genotypes).