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The $GABA_C$ Receptor Is Present in Isolated Cone-Horizontal Cell Axon Terminals From Catfish Retina

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Catfish retina contains cone- and rod-horizontal cells. Only the cone-horizontal cell (cone-HC) has an axon and axon terminal. We compared the distribution of excitatory and inhibitory receptors in axon terminals and somata to begin to learn about the distinct functions of these two structures. Whole cell voltage-clamping recordings were performed on isolated cone-HC axon terminals and somata from catfish retina. Axon terminals had a larger input resistance than the somata. When cells were clamped at -70 mV, the currents induced by glutamate or kainate in the axon terminals were less than 8% of excitatory currents in somata. The currents produced by 300 μM GABA were around 100 pA in axon terminal and 150 pA in soma. From the estimation of surface area on axon terminal and soma, the GABA-induced current densities were around 0.05 pA / μm^2 for both cases. The GABA-activated current in the axon terminal was not blocked by bicuculline or SR95531, but was completely blocked by picrotoxin. Baclofen did not mimic the GABA effect, but TACA (300 μM) and muscimol (1 mM) elicited currents of 100 pA and 40 pA respectively. The GABA EC_{50} was 5.2 μM. These results suggest that the axon terminals of cone-HC possess $GABA_C$ receptors at high density, do not possess $GABA_A$ or $GABA_B$ receptors, and have few glutamate receptors. These properties distinguish the axon terminal from the soma of cone-HC. The $GABA_C$ receptors could function as postsynaptic receptors in the inner plexiform layer or as autoreceptors.
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