

# Application Note

## Reclusive Chandeliers: Dentate Axo-axonic Cells are Functionally Isolated Early After Status Epilepticus

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The parvalbumin (PV)-containing interneurons in the hippocampal dentate gyrus include fast-spiking basket cells that project to the soma and axo-axonic cells that innervate the axon initial segment of granule cells forming distinctive axonal cartridges. Due to their potential role in regulating network excitability and oscillations, PV interneurons are often proposed as targets for therapeutic intervention to curb ongoing seizure activity. Using in-vivo optogenetic activation of PV interneurons few studies have reported successful seizure termination. However, a large body of in-vitro studies suggests that activation of PV interneurons exacerbates seizures. This ambiguity in outcomes could, in part, arise from differential pathophysiological changes in inhibition mediated by axo-axonic cells from that of basket cells. Therefore, identifying unique changes in basket versus axo-axonic cell mediated inhibition is vital before attempting to develop strategies to target PV neurons for seizure treatment.

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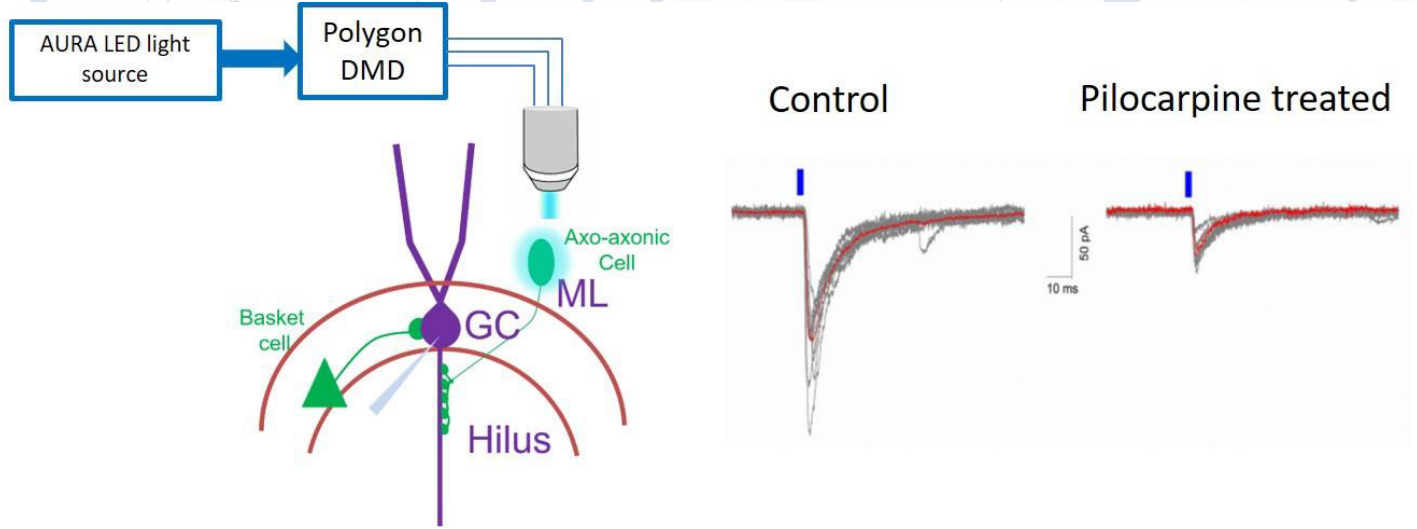


Figure 1. Schematic on left shows optogenetic activation of single axo-axonic cell via DMD and whole-cell voltage-clamp recordings in granule cell (GC). Representative traces on right show uIP-SCs in granule cells evoked by brief stimulation of single presynaptic axo-axonic cell in control and one-week post pilocarpine treatment (average trace is overlaid in red).

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