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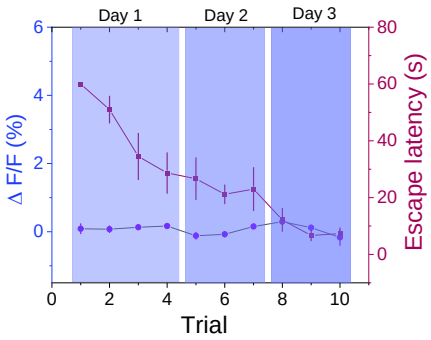

Figure S1. Neural dynamics of CA3-SC afferents during spatial learning.

A. Double Y curves depict the escape latency and Ca^{2+} responses of GFP-expressing mice during the spatial learning.

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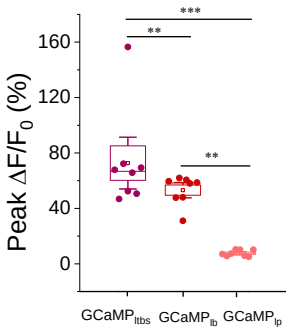


Figure S2. PP input activation potentiates CA3-SC afferent responses.

A. Statistic comparisons of the peak values of Ca^{2+} responses in three groups.

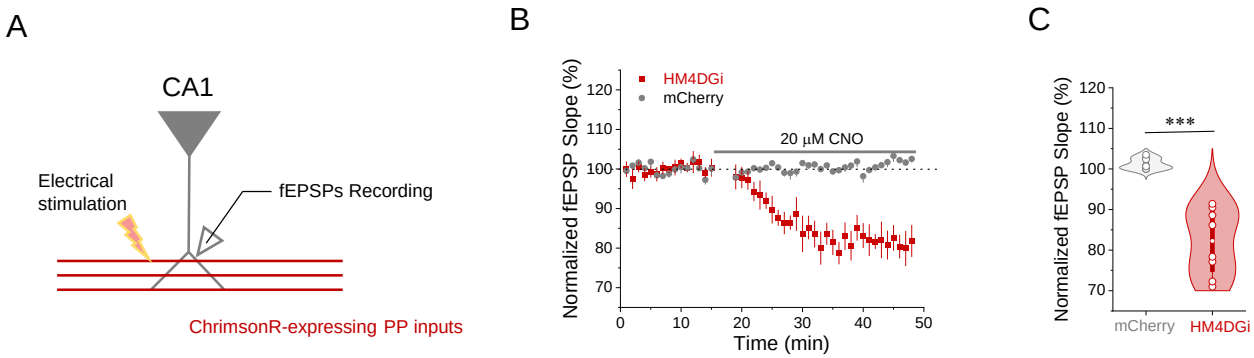
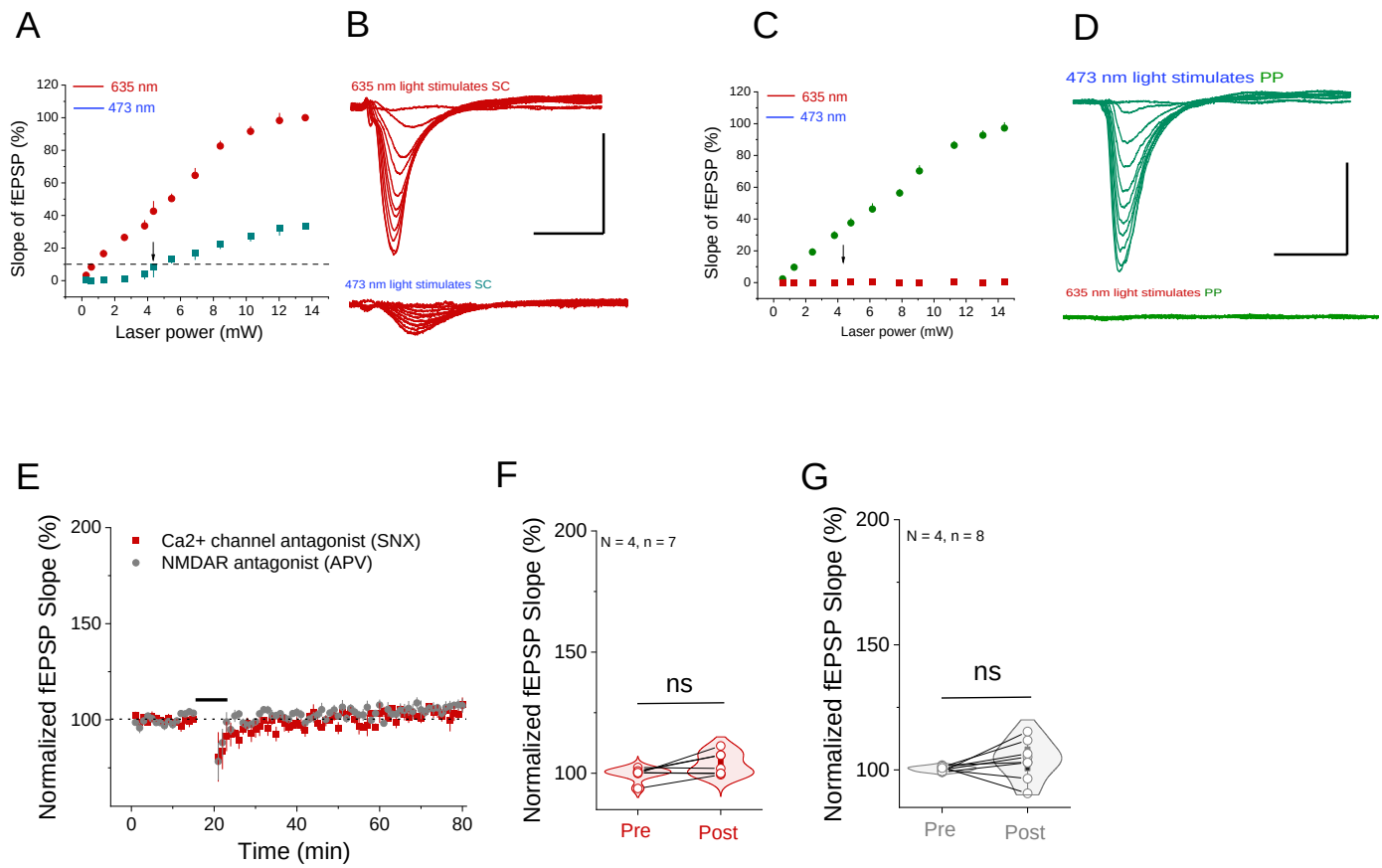


Figure S3. PP input inhibition attenuates CA3-SC afferent responses.

A. Schematic drawing depicts the experimental setup for recording the fEPSPs by electrical stimulation.
B. The fEPSPs was significantly decreased by CNO in HM4DG(i) group compared to the control.
C. Statistic comparison of the fEPSPs after perfusing with CNO in two groups.



SFigure 4. Co-activation of CA3-SC and PP pathways induces heterosynaptic LTP in DHP.

A. Various light intensity of 473 nm (green dots) /635 nm (red dots) light stimulates the ChrimsonR-expressing CA3-SC afferents in DHP.

B. Representative L- fEPSPs evoked by 473 nm (lower) /635 nm (upper) light, respectively. Scale bar: 0.5 mv/20 ms.

C. Various light intensity of 473 nm (green dots) /635 nm (red dots) light stimulates the Chronos-expressing PP terminals in DHP.

D. Representative L- fEPSPs evoked by 473 nm (upper) /635 nm (lower) light, respectively. Scale bar: 0.5 mv/20 ms.

E. Hetero-synaptic LTP was almost blocked by the NMDAR antagonist and Ca^{2+} channel antagonist.

F. Statistic comparison of the L-fEPSPs before and after the L-TBS in brain sections with Ca^{2+} channel antagonist (SNX).

G. Statistic comparison of the L-fEPSPs before and after the L-TBS in brain sections with NMDAR antagonist (APV).