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Supplemental Information

Formation and Maintenance of Functional Spines in the Absence of Presynaptic Glutamate Release

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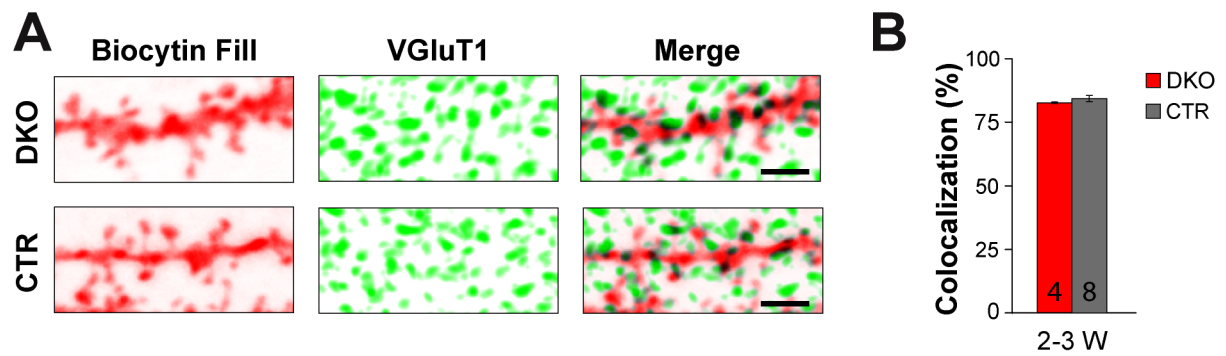


Figure S1. Presynaptic Innervation of Spines in M13-DKO and CTR CA1-PNs (Related to Figure 3)

(A) Representative images of dendrite segments in M13-DKO (top) and CTR CA1-PNs (bottom) filled with biocytin and co-stained with Alexa-Fluor-555-labeled streptavidin (red) and an antibody to VGluT1 (green), a marker for glutamatergic presynapses. The VGluT1-staining was Gaussian filtered, so that a streptavidin-positive spine with a presynaptic glutamatergic bouton should exhibit overlapping staining (black) for VGluT1. Scale bars, 2 μ m.

(B) Quantification of the fraction of spines with a presynaptic VGluT1-positive bouton (mean $\pm$ SEM) in M13-DKO (red; n=4 cells, 267 spines analyzed) and CTR CA1-PNs (grey; n=8 cells, 318 spines analyzed) at WIV2-3.

Table S1. Functional Inputs to M13-DKO and CTR CA1-PNs (Related to Figure 1)

	sPSC Frequency	sPSC Amplitude		
CTR WIV1	1.03±0.21 Hz (n=11)	17.34±1.19 pA (n=11)		
DKO WIV1	0.09±0.04 Hz (n=7)	19.81±4.45 pA (n=7)		
CTR WIV2	1.75±0.32 Hz (n=17)	19.70±0.87 pA (n=17)		
DKO WIV2	0.14±0.06 Hz (n=18)	15.11±0.77 pA (n=18)		
CTR WIV3	4.84±0.82 Hz (n=15)	24.47±1.43 pA (n=15)		
DKO WIV3	0.17±0.06 Hz (n=13)	16.02±1.00 pA (n=13)		
	mEPSC Frequency	mEPSC Amplitude	mIPSC Frequency	mIPSC Amplitude
CTR WIV1	1.20±0.31 Hz (n=9)	23.10±0.89 pA (n=9)	0.57±0.09 Hz (n=9)	43.3±3.1 pA (n=9)
DKO WIV1	0.09±0.01 Hz (n=8)	25.10±1.45 pA (n=8)	0.02±0.004 Hz (n=7)	41.4±8.7 pA (n=7)
CTR WIV2	1.85±0.07 Hz (n=8)	25.50±4.07 pA (n=8)	1.30±0.58 Hz (n=8)	41.4±8.8 pA (n=8)
DKO WIV2	0.07±0.01 Hz (n=10)	25.50±0.44 pA (n=10)	0.02±0.005 Hz (n=9)	40.2±6.3 pA (n=9)
CTR WIV3	8.40±1.91 Hz (n=8)	23.92±6.53 pA (n=8)	3.27±1.17 Hz (n=8)	38.3±2.3 pA (n=8)
DKO WIV3	0.08±0.02 Hz (n=10)	20.00±4.07 pA (n=10)	0.02±0.003 Hz (n=8)	36.1±4.5 pA (n=8)

sPSC, mEPSC, and mIPSC frequencies and amplitudes in M13-DKO (DKO) and CTR CA1-PNs. Data are shown as mean±SEM. n values indicate numbers of cells tested.

Table S2. HFU-Induced EPSCs in M13-DKO and CTR CA1-PNs (Related to Figure 4)

	Small Spines	Medium Spines	Medium-Large Spines	Large Spines
AMPA-uEPSC				
CTR (22 cells)	3.20±0.47 pA (n=27)	5.15±0.66 pA (n=20)	7.00±0.95 pA (n=12)	10.82±1.37 pA (n=7)
DKO (21 cells)	1.97±0.31 pA (n=22)*	3.20±0.50 pA (n=17)*	4.63±0.47 pA (n=20)*	7.16±0.65 pA (n=17)*
NMDA-uEPSC				
CTR (21 cells)	6.54±0.53 pA (n=66)			
DKO (22 cells)	4.97±0.39 pA (n=76)*			

HFU-induced AMPA receptor and NMDA receptor mediated uEPSCs in M13-DKO (DKO) and CTR CA1-PNs. Data are shown as mean±SEM. n values indicate numbers of spines tested. *p<0.05, Student's t-test.