Supporting Information

Fourcaudot *et al.* 10.1073/pnas.0806938105

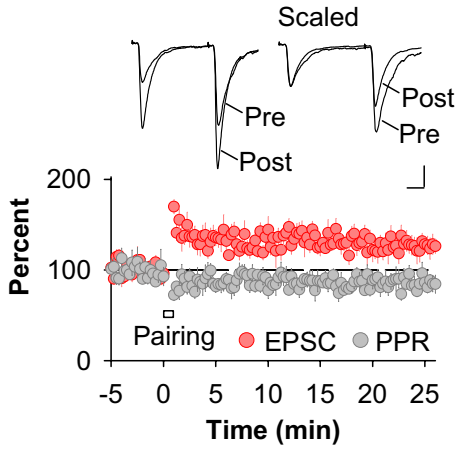

Fig. S1. Cortico–LA LTP is associated with a persistent decrease in the paired-pulse ratio (PPR) ($n = 11$). (Scale bars: 50 pA and 10 ms.)

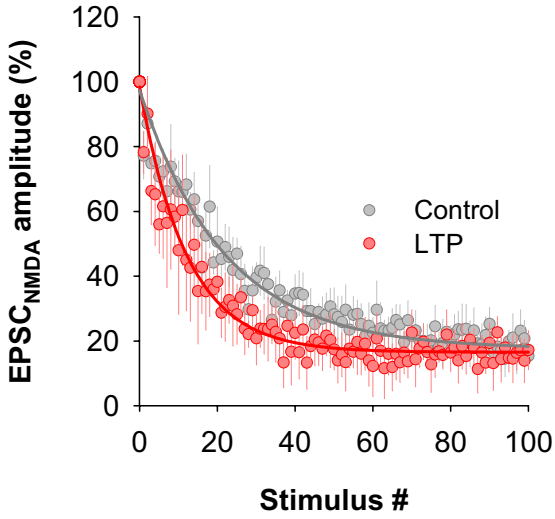

Fig. S2. After LTP induction, bath application of the use-dependent NMDA receptor antagonist MK-801 (40 μM; $n = 3$) results in a faster decay of NMDA receptor-mediated EPSCs compared with naïve slices ($n = 4$).

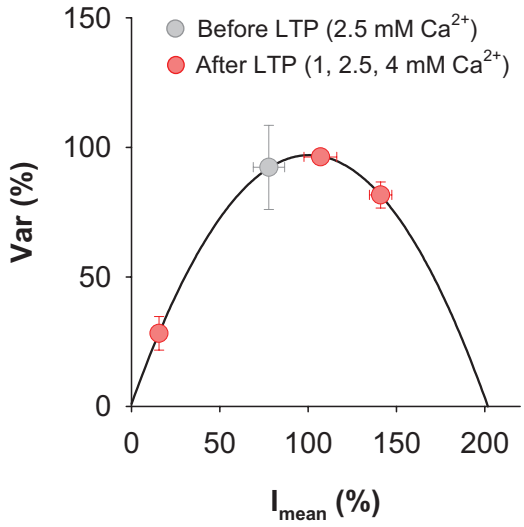

Fig. S3. Variance–mean analysis before and after induction of LTP_{HA} confirms that LTP expression involves an increase in *P*. Averaged EPSC variances obtained from the same cells before (at 2.5 mM external Ca^{2+}; gray symbol) and after LTP induction (at 1, 2.5, and 4 mM external Ca^{2+}; red symbols) fall on a same parabola, revealing an increase in *P* after LTP induction ($P_{baseline\ -\ 2.5\ mM\ Ca^{2+}} = 0.38 \pm 0.04$; $P_{LTP\ -\ 2.5\ mM\ Ca^{2+}} = 0.53 \pm 0.05$; $P_{LTP\ -\ 1\ mM\ Ca^{2+}} = 0.08 \pm 0.02$; $P_{LTP\ -\ 4\ mM\ Ca^{2+}} = 0.70 \pm 0.03$; $n = 6$; $P < 0.05$ for all conditions). Error bars, ±SEM.

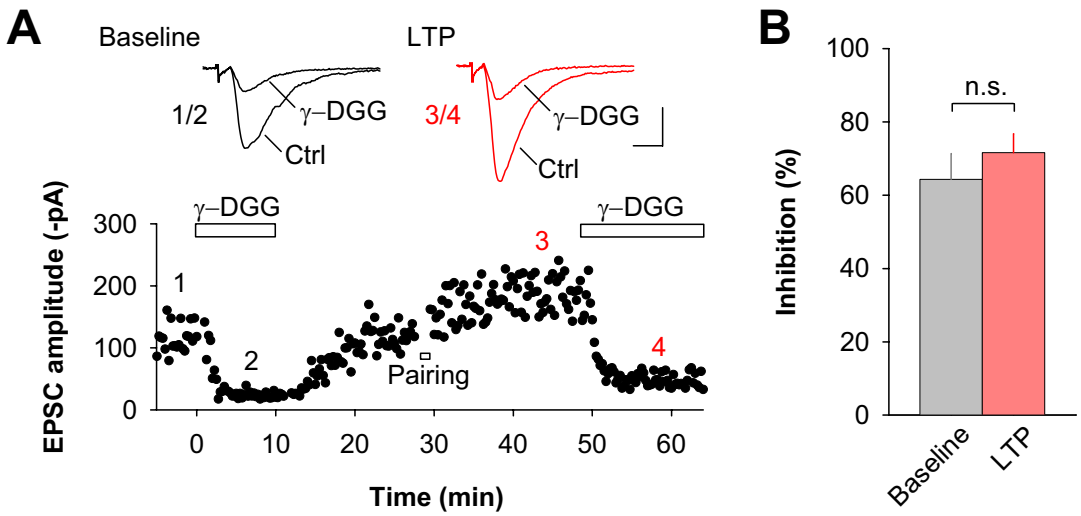

Fig. S4. Presynaptic LTP does not involve increased multivesicular release. (*A*) Time course of an example experiment illustrating γ-DGG-mediated inhibition of synaptic transmission before and after induction of LTP (pairing). Depicted traces were taken at the time points indicated by the numbers. (Scale bars: 50 pA and 5 ms.) (*B*) There is no difference in the fractional block of synaptic transmission induced by γ-DGG (2.5 mM) before and after LTP induction ($n = 8$). Error bars, ±SEM.

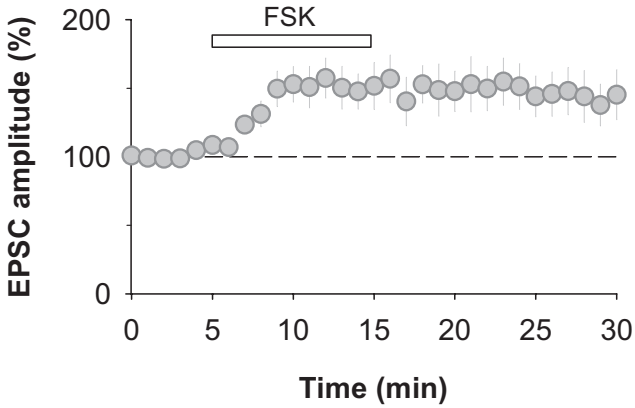

Fig. S5. Persistent enhancement of synaptic transmission by transient FSK application. Time course of synaptic transmission before and after a 10-min pulse application of FSK (50 μM) reveals a potentiation of synaptic transmission that persists during washout of FSK ($n = 9$). Error bars, $\pm$SEM.

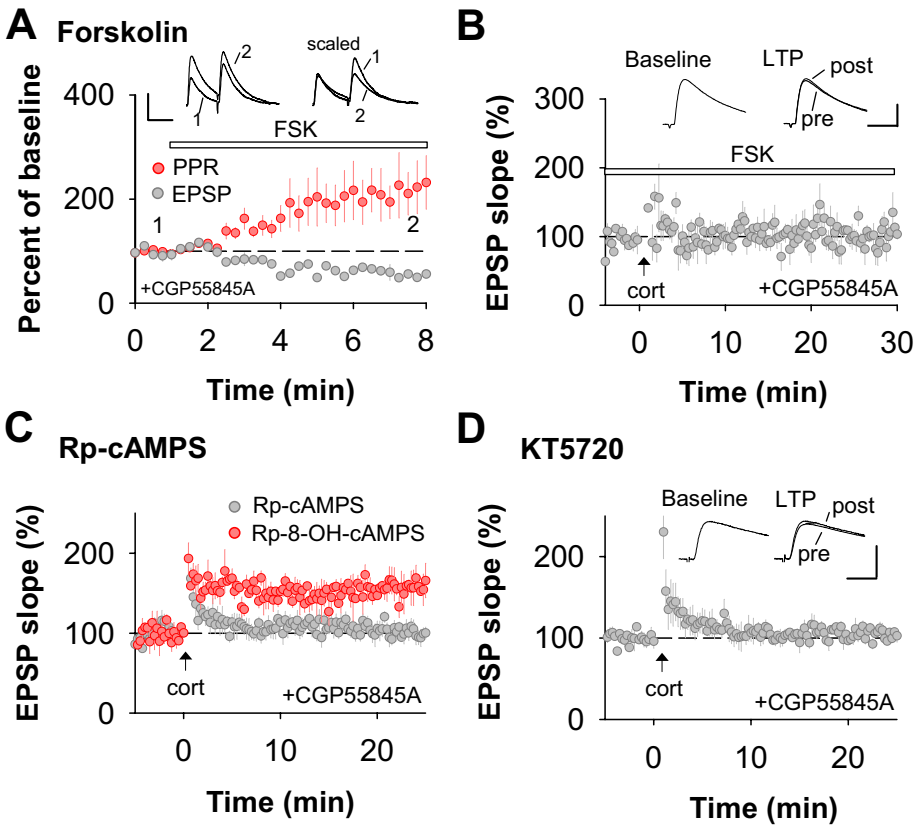

Fig. S6. Homosynaptic LTP depends on presynaptic cAMP/PKA signaling. (*A*) Forskolin (50 μM) application leads to an increase in synaptic transmission associated with a decreased PPR ($n = 6$; $P < 0.05$). (Scale bars: 4 mV/40 ms.) (*B*) Forskolin application occludes further induction of homosynaptic LTP ($n = 6$). (Scale bars: 4 mV/20 ms.) (*C*) Blockade of homosynaptic LTP by the nonhydrolyzable cAMP analog Rp-cAMPS (100 μM; $n = 7$). Postsynaptic perfusion with the membrane-impermeant form Rp-8-OH-cAMPS (4 mM) does not interfere with LTP induction ($n = 6$; $P < 0.05$). (*D*) LTP induction is blocked in the presence of the PKA antagonist KT5720 (2 μM, $n = 8$; Tocris Bioscience). (Scale bars: 4 mV/20 ms.) All experiments were performed in the presence of the selective $GABA_B$ receptor antagonist CGP55845A (10 μM; Novartis). Error bars, ±SEM.

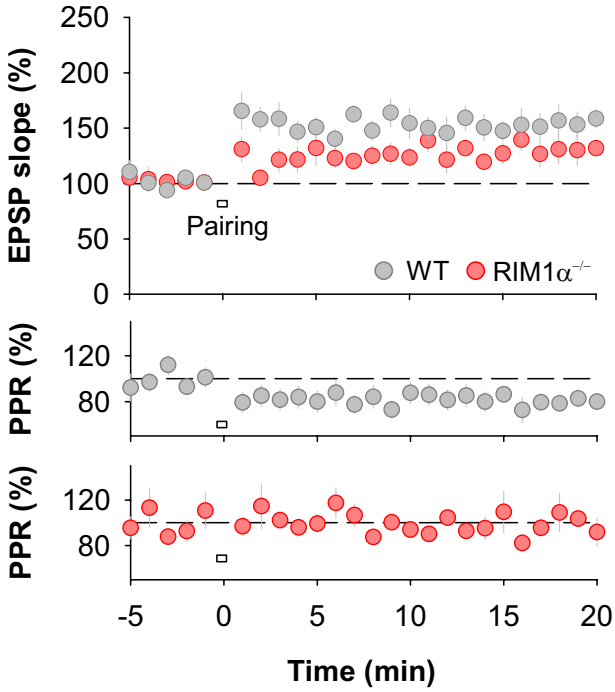

Fig. S7. Pairing pre- and postsynaptic activity induces postsynaptic cortico–LA LTP in *RIM1*$\alpha^{-/-}$ mice. LTP was induced by pairing brief bursts of presynaptic stimulation (3 stimuli at 30 Hz) with postsynaptic depolarization to about −20 mV (repeated five times at 15-s intervals). (*Top*) Pairing-induced cortico–LA LTP is reduced in *RIM1*$\alpha^{-/-}$ mice compared with wild-type littermates (WT: 154.6 ± 11.2% of baseline, $n = 8$, $P < 0.01$ vs. baseline; *RIM1*$\alpha^{-/-}$: 131.8 ± 9.2% of baseline, $n = 4$, $P < 0.05$ vs. baseline). (*Middle*) In wild-type littermates, pairing-induced cortico–LA LTP is associated with a persistent decrease in PPR (78.7 ± 6.3% of baseline, $n = 8$, $P < 0.05$). (*Bottom*) In *RIM1*$\alpha^{-/-}$ mice, pairing-induced cortico–LA LTP does not alter PPR (104.9 ± 3.6% of baseline, $n = 4$, not significant). Error bars, ±SEM.