Before pairing

A
1. Before pairing -65 mV
2. Before pairing +30 mV
3. After pairing -65 mV

B
postsynaptic

presynaptic

C

D

Average EPSC amplitude (pA)

Time (minutes)

Average EPSC amplitude (pA)

Time (minutes)

Johanna M. Montgomery, Paul Pavlidis,† and Daniel V. Madison* 2001

After pairing (LTP)
Synaptic insertion of AMPA receptors

LTP Expression

Shi et al. Science 284, 1811 (1999)
Blocking CaMKII with KN-62

[Graph showing the effect of KN-62 on EPSP amplitude over time with two panels labeled a and b.]

ITO ET AL. 1991
NEUROSCI. LET. 121, 119
LTP expression

Routes for the expression of LTP in CA1.

1. Ca\(^{2+}\) entering through the NMDA receptor activates protein kinases. This can cause LTP by changing the effectiveness of existing postsynaptic AMPA receptors.

2. Stimulating the insertion of new AMPA receptors.
Lledo et al. 1995
Action Potentials Back-Propagate into the Dendrites

Stuart & Sakmann 1994
Pairing a Synaptic Input with a Back-Propagating Spike

Markram et al. Science 275, 213 (1997)
LTP Expression

New spine formation

Enger & Bonhoeffer 1999