

Supporting Information

Bromer et al. 10.1073/pnas.1716189115

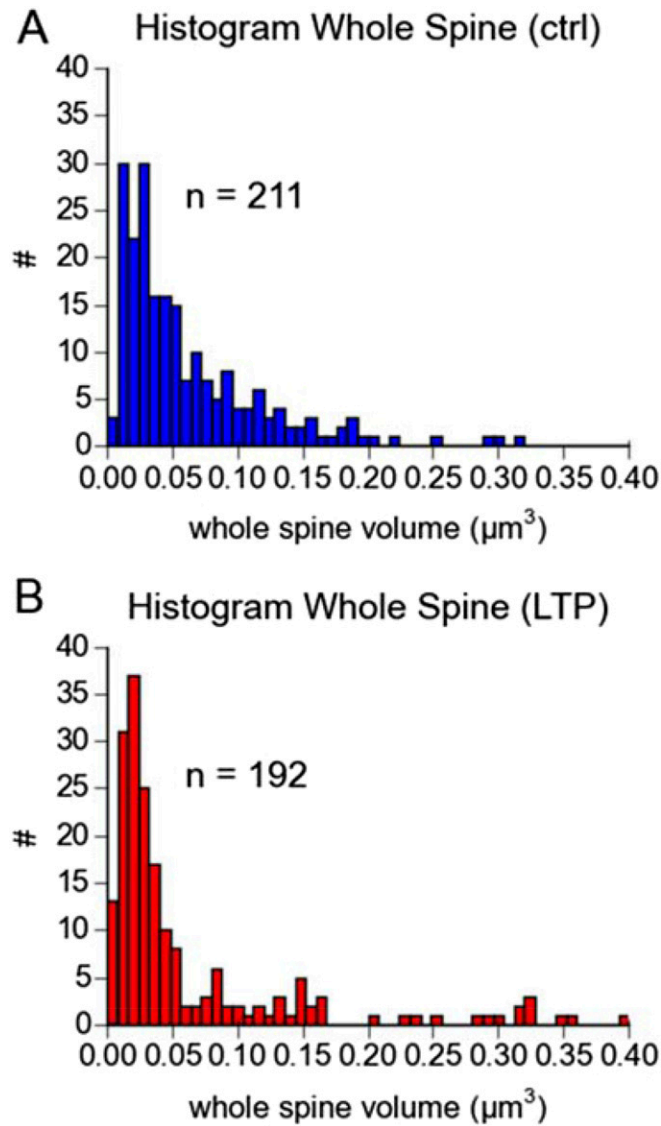


Fig. S1. Distributions of the whole-spine volumes. Histograms from (A) the control hemisphere, and (B) the LTP hemisphere.

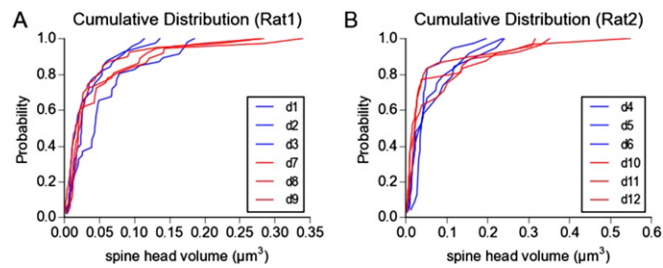


Fig. S2. No significant difference occurred in the distribution of spine head volume between dendrites within animals. Blue and red lines represent the distribution of spine head volumes for three dendrites in the control and LTP condition, respectively, in (A) rat 1 and (B) rat 2.

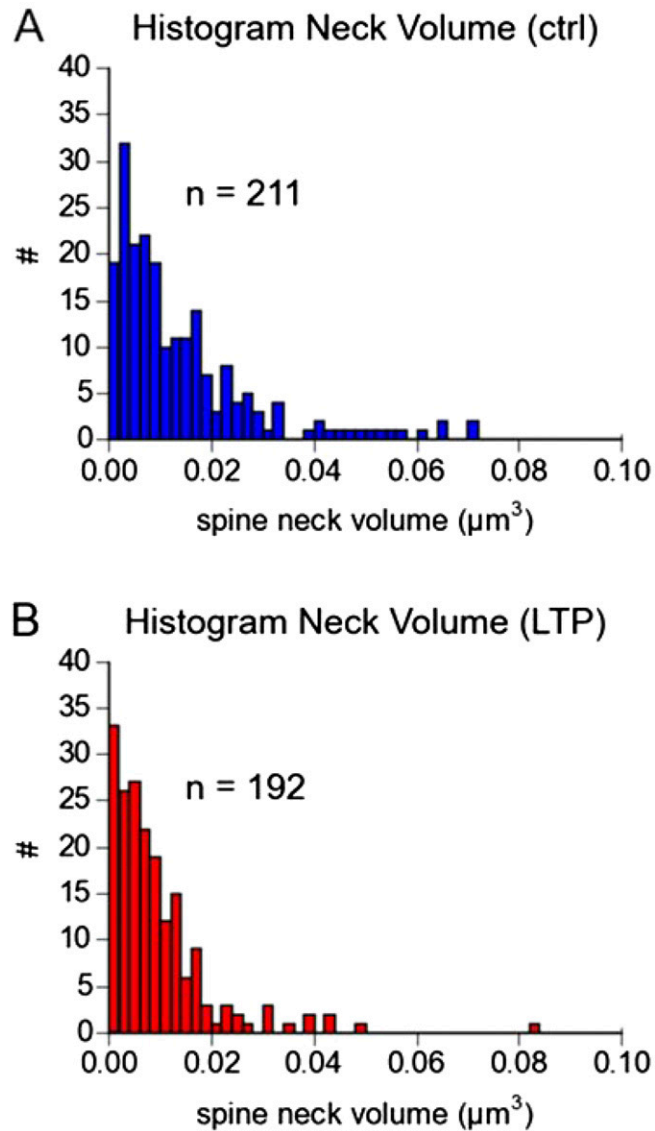


Fig. S3. Distributions of the spine neck volumes. Histograms from (A) the control hemisphere and (B) the LTP hemisphere.

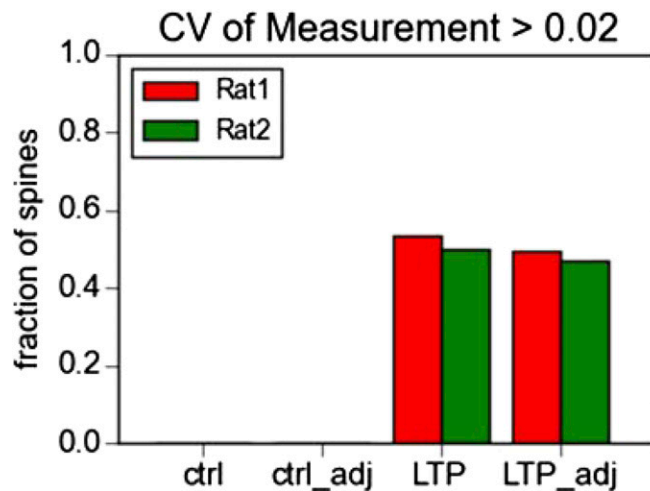


Fig. 54. Testing accuracy of spine head volumes. The measurement error was calculated across four independent 3DEM edits of the head–neck junction to measure the head volume for each spine. In the control condition, the number of spines where the CV across measurements was greater than 0.02 was 0. In contrast, the number of measurements with CV greater than 0.02 was much greater in LTP condition (59 for rat 1 and 55 for rat 2), even after adjustment by a senior expert opinion (39 for rat 1 and 37 for rat 2).

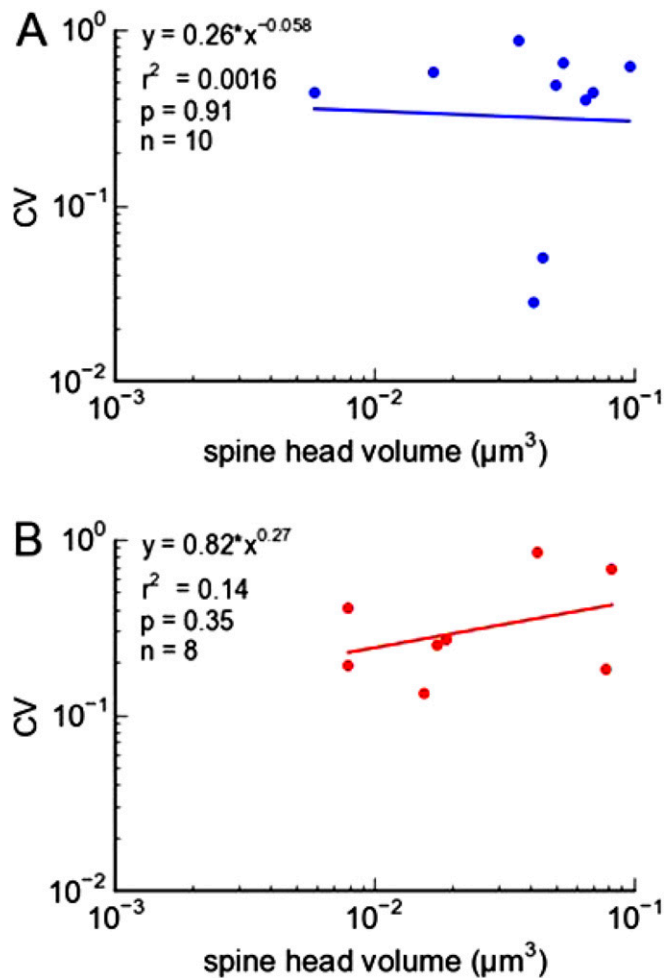


Fig. 55. No significant correlation between CV and SDSA spine head volumes. (A) The CV for control SDSA pairs does not increase with spine head size. (B) The CV for LTP SDSA pairs shows an apparent trend with respect to head dimensions, but it did not reach statistical significance. In both A and B, each data point on the graph is the average spine head volume for the SDSA pair. Slopes, correlation values, P values, and number of pairs are indicated in the upper left corner of each graph.

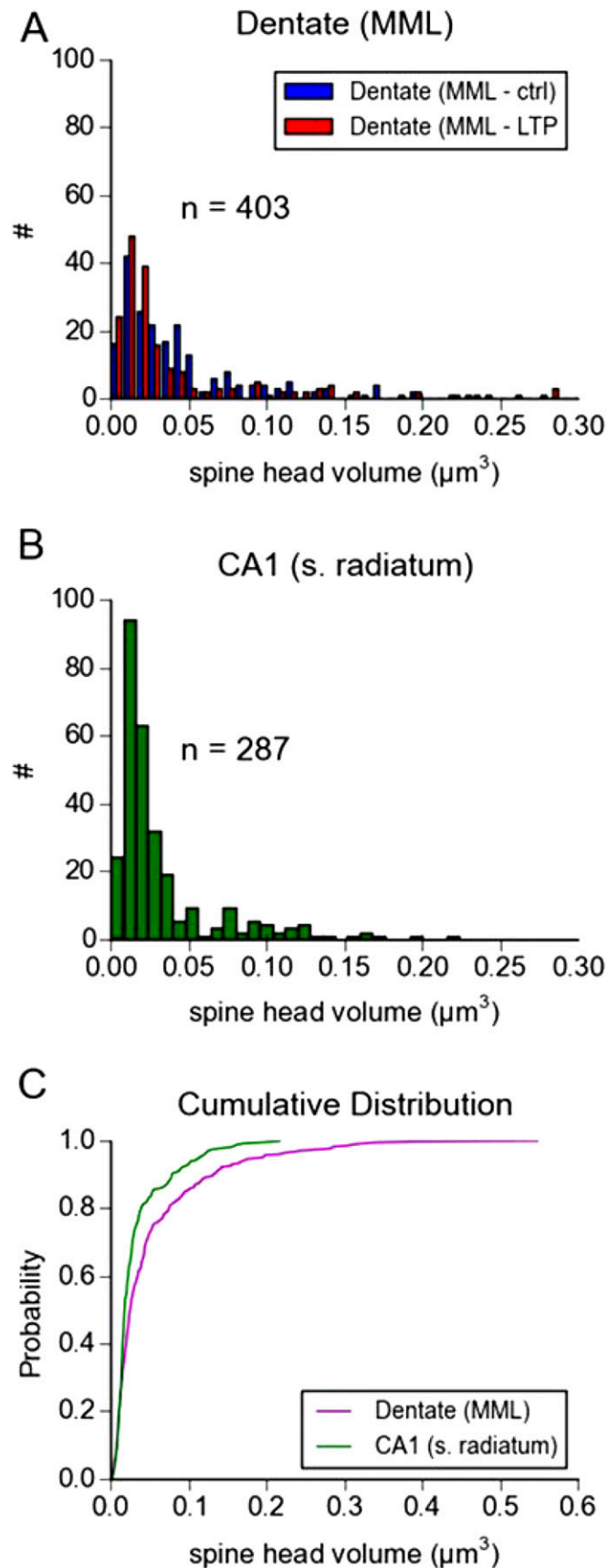
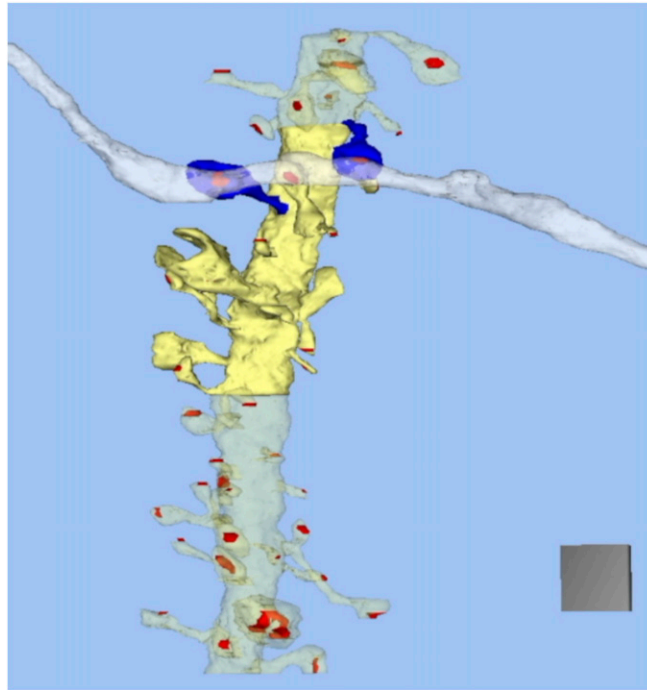
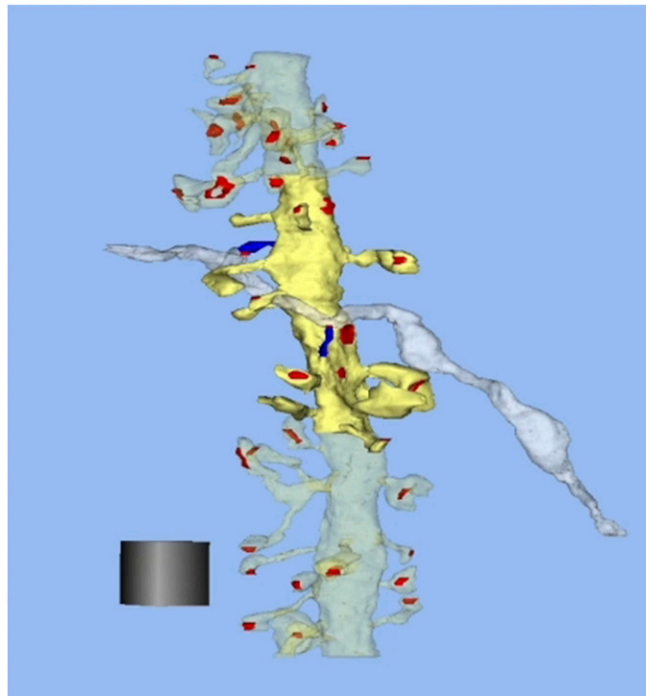


Fig. 56. Distributions of spine head volumes differ across hippocampal regions. (A) Histogram of spine head volumes in dentate gyrus MML ($n = 211$ control, blue, and 192 LTP, red, spines for a total of 403). (B) Histogram of spine head volumes in CA1 stratum radiatum ($n = 287$ spines). (C) Cumulative distribution plot showing that the two spine populations (dentate combined, purple; CA1, green) are significantly different as measured by head volume (KS test value of $P = 5e-05$).



Movie S1. Control dendrite from Fig. 1E is rotated about its longitudinal axis as each component of the scene is added sequentially over this 1-min, 14-s movie clip. The movie opens with the intermediate dendritic segment (solid yellow) with two of the spines that are later shown to be an SDSA pair colored blue. At 18 s, the rest of the reconstructed dendritic segment (translucent yellow), including the spines and synapses (red), is added. At 36 s, the axon (white) participating in the SDSA pair is added. At 55 s, the rest of the axons (green) that formed synapses with one spine head from the intermediate dendritic segment are added. (Scale cube: $1 \mu\text{m}^3$.)

[Movie S1](#)



Movie S2. LTP dendrite from Fig. 1*F* is rotated about its longitudinal axis as each component of the scene is added sequentially over this 1-min, 14-s movie clip. The movie opens with the intermediate dendritic segment (solid yellow) with two of the spines that are later shown to be an SDSA pair colored blue. At 18 s, the rest of the reconstructed dendritic segment (translucent yellow), including the spines and synapses (red), is added. At 36 s, the axon (white) participating in the SDSA pair is added. At 55 s, the rest of the axons (green) that formed synapses with one spine head from the intermediate dendritic segment are added. (Scale cube: $1\ \mu\text{m}^3$.)

[Movie S2](#)