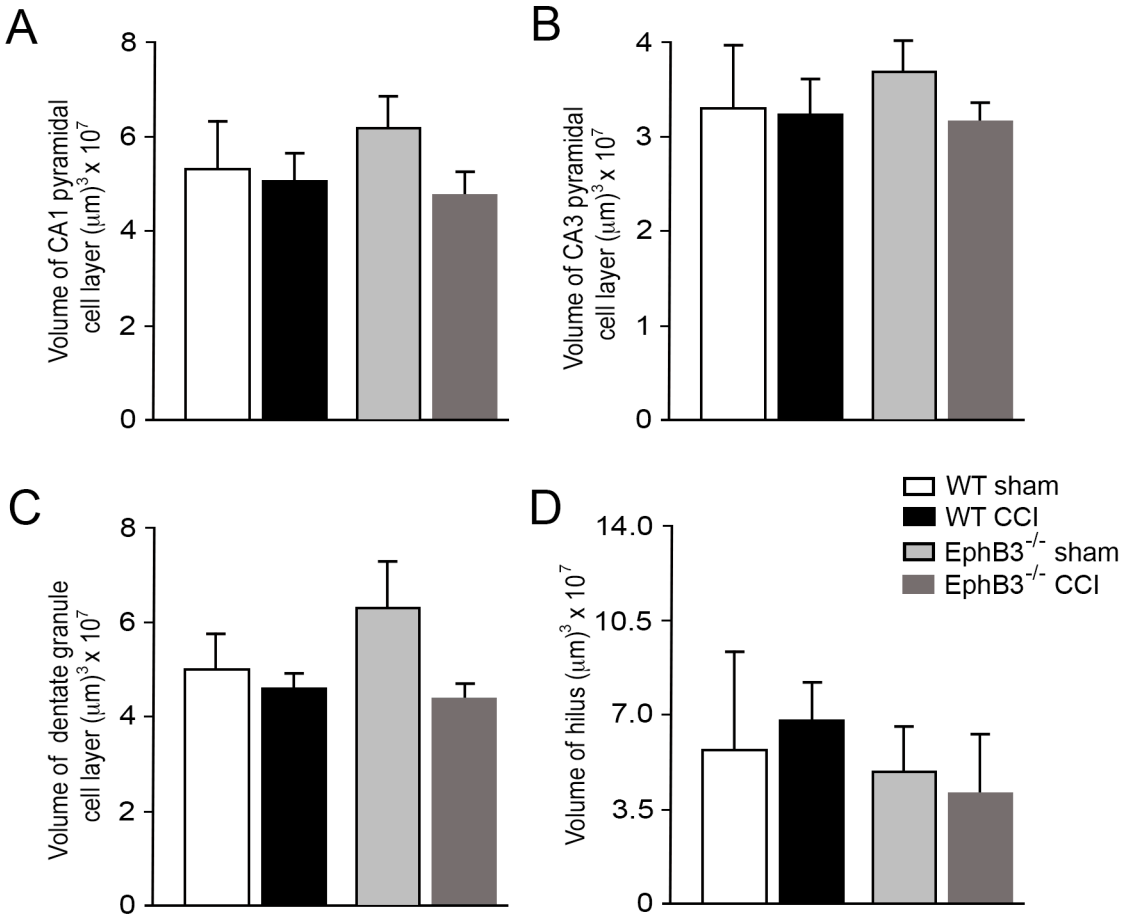
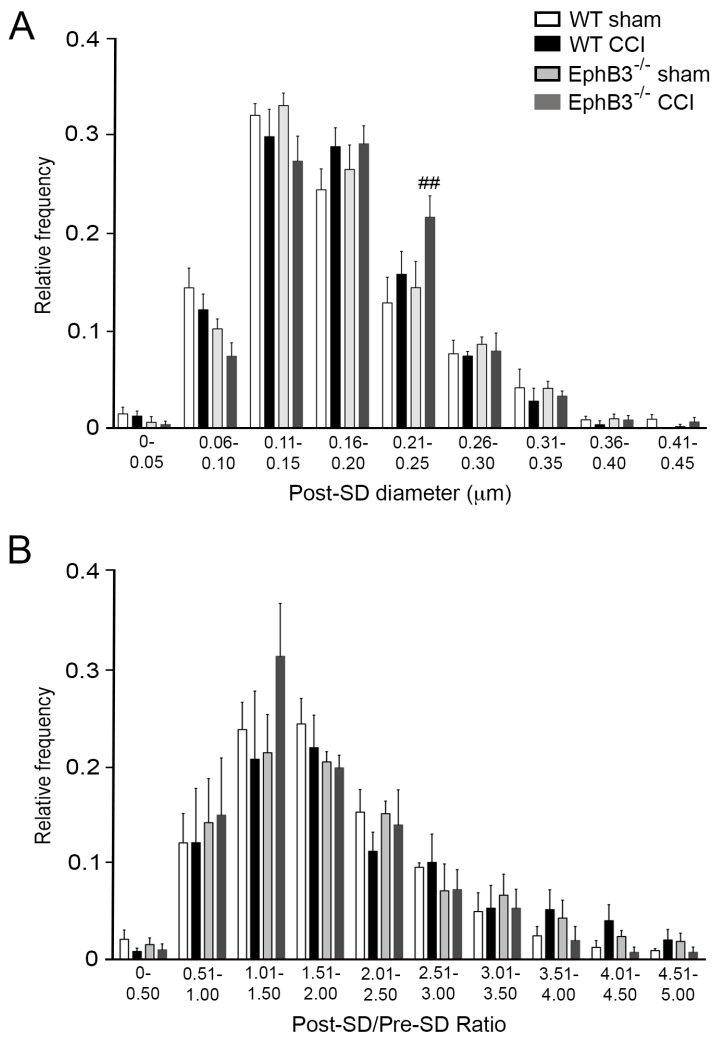
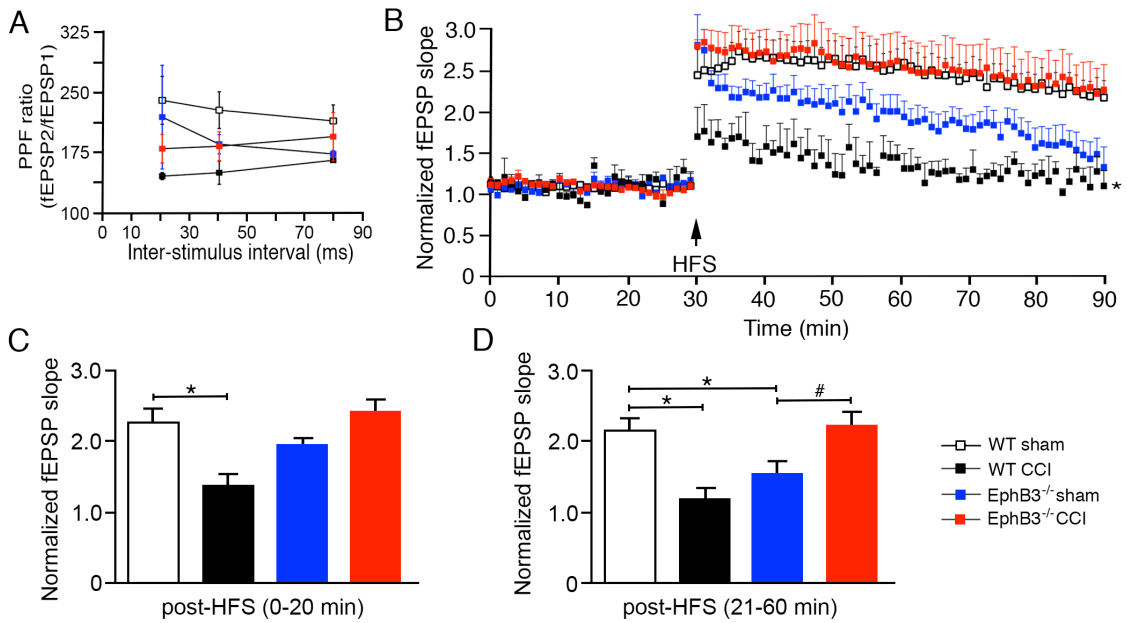
Supplementary findings:



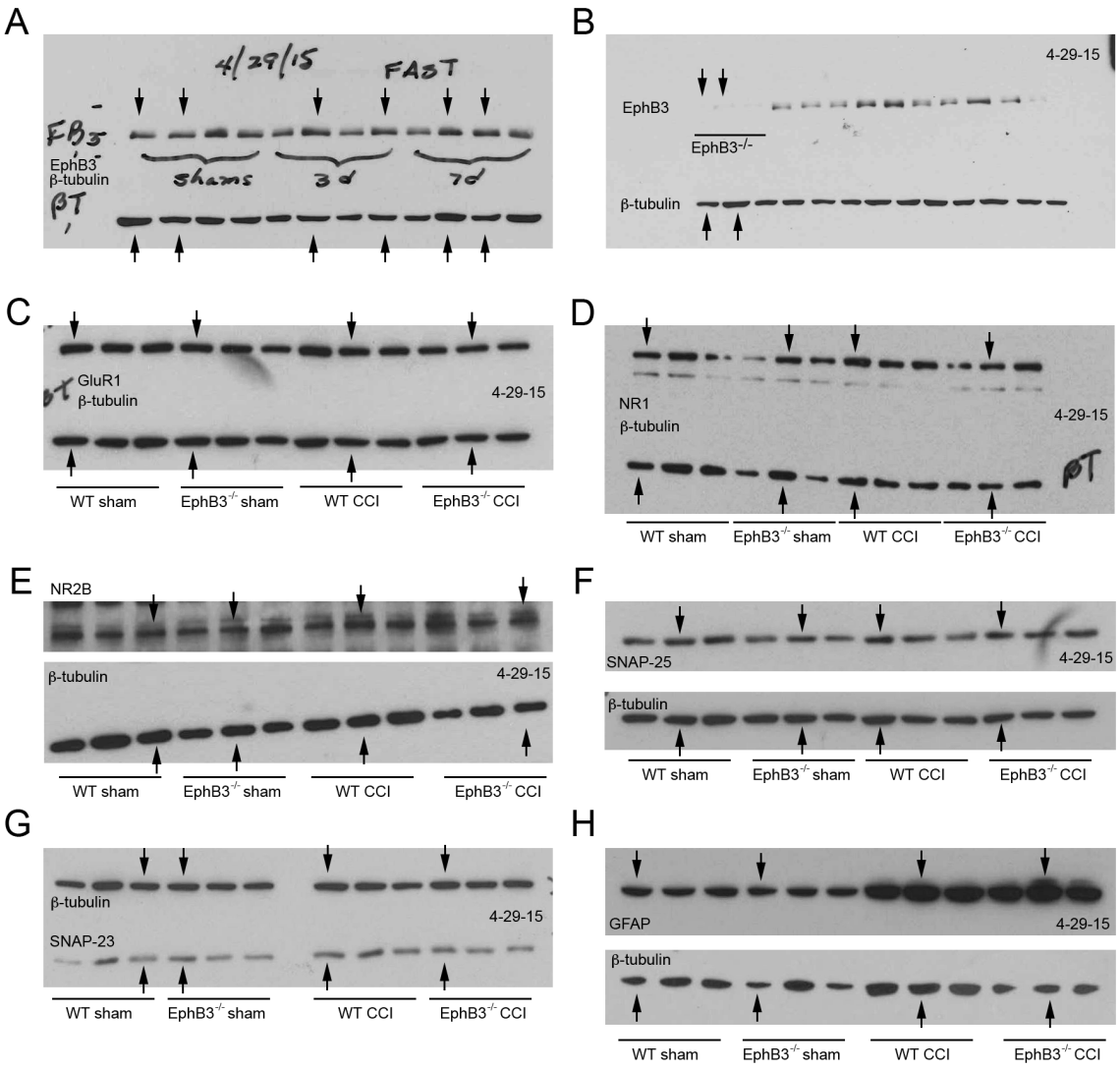
SFigure 1. Absence of regional atrophy within the hippocampus after CCI injury. Non-biased stereology of volumes used for quantitative cell counts from CA1 (A), CA3 (B), DGC (C) and the hilus (D) show no difference across genotypes and between sham and CCI injured tissues (n = 5/group). All data presented as mean ± SEM.



SFigure 2. Differences in cumulative distribution of synaptic unit area are mainly due to changes in post-SD. (A) Examination of cumulative distributions of post-SD diameters showed significant differences between groups using KS test. Specifically, we observed significant difference between EphB3$^{-/-}$ sham versus EphB3$^{-/-}$ CCI injury ($p = 0.0053$) at diameters ranging between 0.21 and 0.25 mm. (B) The cumulative distribution of synaptic ratios (i.e. post-SD to pre-SD) is inversely affected after CCI injury in WT and EphB3$^{-/-}$ mice. Examination of cumulative distributions showed group differences between WT sham versus WT CCI injury (right shift), and EphB3$^{-/-}$ sham versus EphB3$^{-/-}$ CCI injury (left shift). $^{\#\#}p < 0.01$ as compared to EphB3$^{-/-}$ sham.



SFigure 3. Absence of EphB3 signaling results in enhanced synaptic plasticity in hippocampal slices at 7 dpi. (A) No significant differences were observed in PPF between groups. (B) After CCI, WT hippocampal slices showed significantly reduced LTP, while EphB3$^{-/-}$ slices showed no difference when compared to shams. Analysis of mean fEPSP slope after high frequency stimulation (HFS) revealed significant deficits in WT after CCI injury in both early (C) and late (D) phase LTP, while EphB3$^{-/-}$ sham mice had decreased late phase LTP when compared to both WT sham and EphB3$^{-/-}$ CCI mice. All data presented as mean ± SEM; WT sham, n = 8; WT CCI, n = 3; EphB3$^{-/-}$ sham, n = 7; EphB3$^{-/-}$ CCI, n = 5. * $p < 0.05$ as compared to WT sham and $^{\#}p < 0.05$ as compared to EphB3$^{-/-}$ sham.



SFigure 4. Original Western blots used for representative images in figures. (A-B) EphB3 expression in sham, 3 dpi and 7 dpi WT tissues (A) but absent in EphB3$^{-/-}$ mice (B). (C) GluR1, (D) NR1, (E) NR2B, (F) SNAP-25, (G) SNAP-23, (H) GFAP expression in WT and EphB3$^{-/-}$ sham and CCI injured mice as compared to β-tubulin loading controls. Arrows depict representative bands.