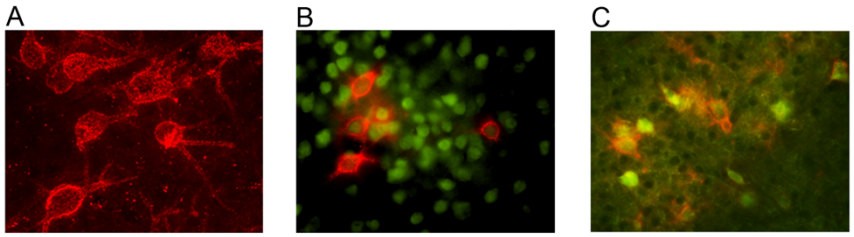
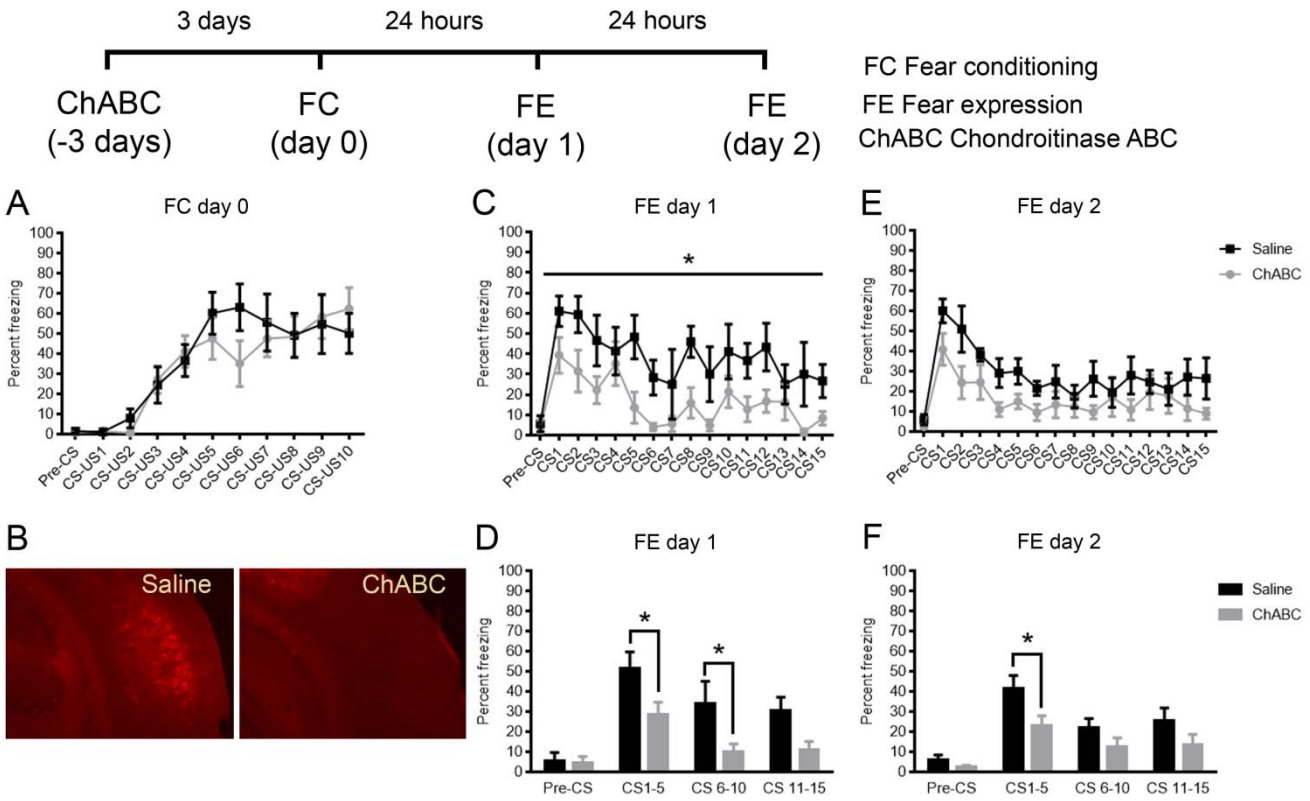


<u>Figure S1. Related to Figures 5 and 6</u>. PNN expression in the auditory cortex of control mice

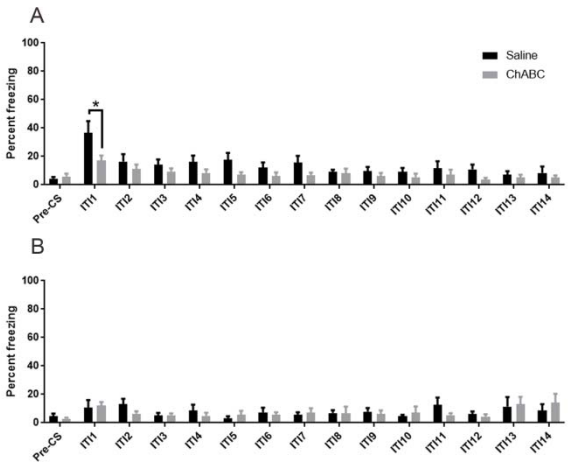
PNNs can be visualized by fluorescently tagged Wisteria floribinda agglutinin immunohistochemistry (A). PNNs colocalize with neuronal marker NeuN (B) and with Parvalbumin expressing neurons (C).



<u>Figure S2. related to Figure 5</u>. Removal of PNNs in the auditory cortex using ChABC before auditory fear conditioning decreased fear expression observed 24 and 48 hours later.

ChABC or saline was injected into the auditory cortex of mice 72 hours prior to Pavlovian auditory fear conditioning, with no differences observed in fear acquisition (A). ChABC resulted in the degradation of PNNs (B) as shown by WFA immunofluorescence. Fear expression was significantly lower in ChABC treated subjects 24 hours after fear conditioning (C). Significant differences were observed between control and ChABC during CS1-5 and CS6-10 (D). 48 hours after fear conditioning (E) fear expression in ChABC and control groups was significantly different during CS1-5 (F).

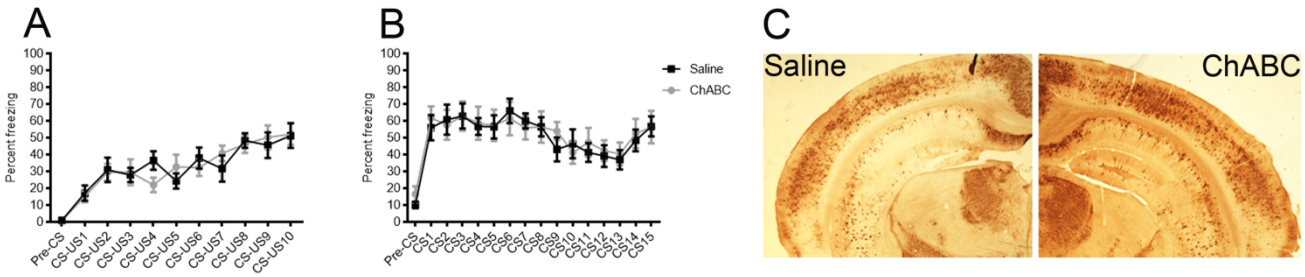
*$P < 0.05$ vs. vehicle. All values are means ±SEM.



<u>Figure S3. Related to Figure 6.</u> Inter-trial Intervals (ITIs) for Experiment 7

Freezing during the inter-trial-interval between playbacks of the tone were not different between treatment groups. Specifically, there was no significant main effect of treatment (saline versus ChABC) either one (A) or two (B) days after fear-conditioning ($P>0.05$). On day 1, there was a significant interaction between ITI number and treatment driven by the first ITI, wherein saline-treated animals, that have consolidated the fear memory of the tone, showed significantly greater freezing during the first between-tone period (ITI1) than the ChABC animals. No significant differences were observed during any of the other ITIs.

*$P < 0.05$ vs. vehicle. All values are means ±SEM



<u>Figure S4. Related to Figure 5.</u> After regrowth of PNNs 3 months after ChABC treatment no differences in fear expression are observed between saline and ChABC groups

Mice were retrained to a 11kHz tone 3 months after the ChABC/saline treatment. There were no differences in either fear conditioning (A) or fear expression 24 hours after fear conditioning (B) between saline and ChABC groups and PNN expression was similar to saline controls (C).

*$P < 0.05$ vs. vehicle. All values are means ±SEM