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Supplementary Material

Basal Forebrain-Dorsal Hippocampus Cholinergic Circuit Regulates Olfactory Associative Learning

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Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/ijms23158472/s1, **Figure S1**: Proportion of hippocampal outputs from cholinergic neurons in the different subpopulations of basal forebrain; **Figure S2**. The proportion of cholinergic neurons labeled by RV in three subregions of the basal forebrain; **Figure S3.** Ca^{2+} signal of mice cholinergic neurons changed in control and GCaMP6 groups during lick-ing behavior; **Figure S4.** Ca^{2+} signal of mice cholinergic neurons changed in control groups in the initial and final stage of go/no-go learning; Appendix Table: Abbreviations.

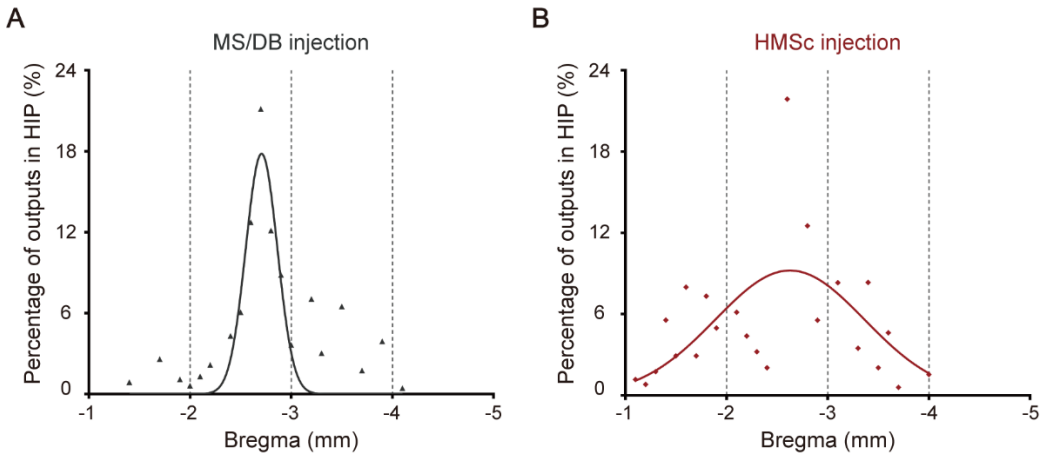
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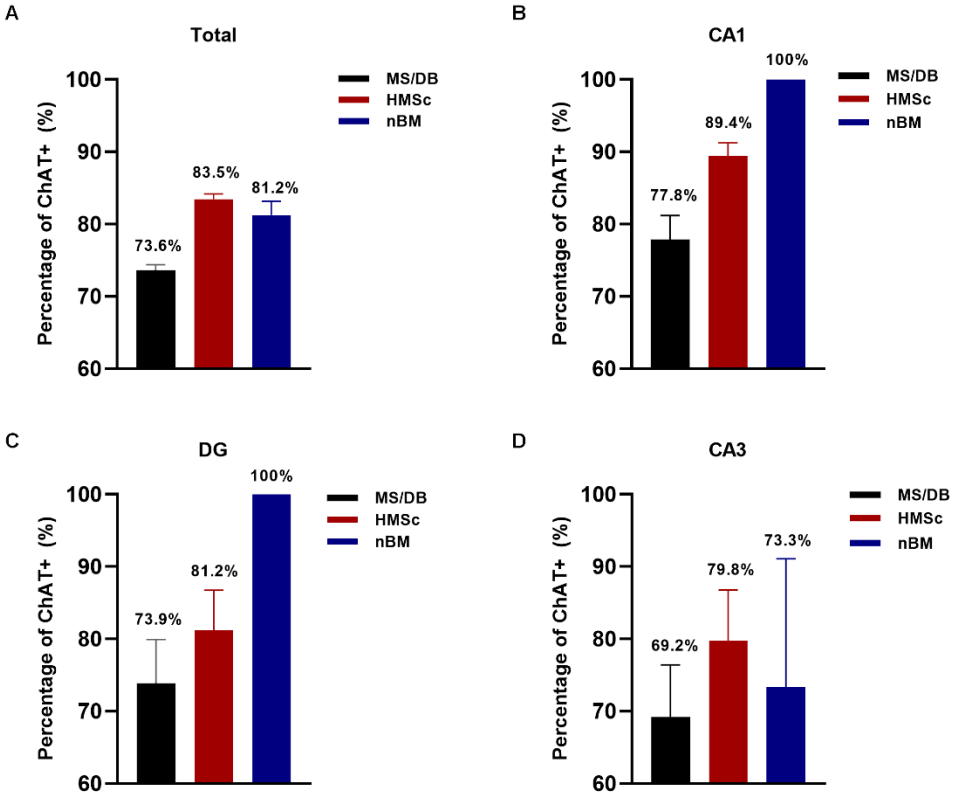
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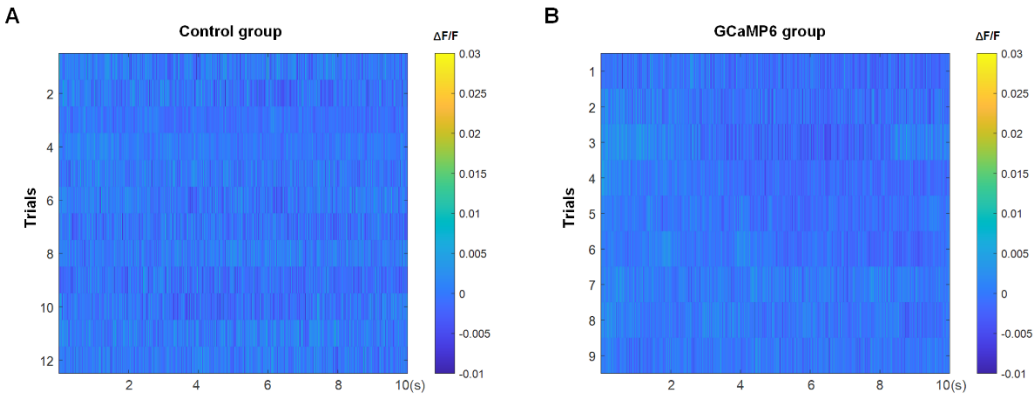
Supplementary Figure S1. Proportion of hippocampal outputs from cholinergic neurons in the different subpopulations of the basal forebrain.

(A) The anterior-posterior distribution of hippocampal neurons labeled with HSV in the MS/DB injection group. (B) The anterior-posterior distribution of hippocampal neurons labeled with HSV in the HMSc injection group. The percentage of signals in each coronal slice was calculated and fitted to a Gaussian curve.



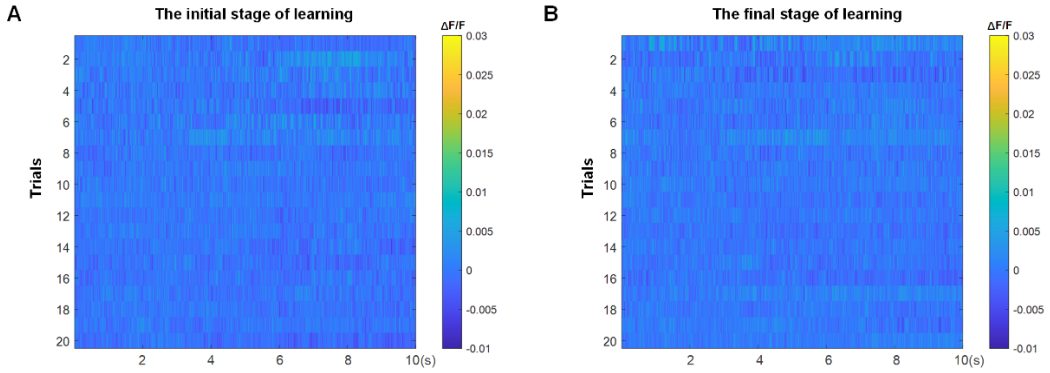
Supplementary Figure S2. The proportion of cholinergic neurons labeled by RV in three subregions of the basal forebrain.

(A) Percent of ChAT+ neurons labeled by RV in three subregions of the basal forebrain. (B) Percent of cholinergic neurons projecting to CA1 in three subregions of the basal forebrain. (C) Percent of cholinergic neurons projecting to DG in three subregions of the basal forebrain. (D) Percent of cholinergic neurons projecting to CA3 in three subregions of the basal forebrain. Three subregions of the basal forebrain included MSDB, HMSc and nBm.



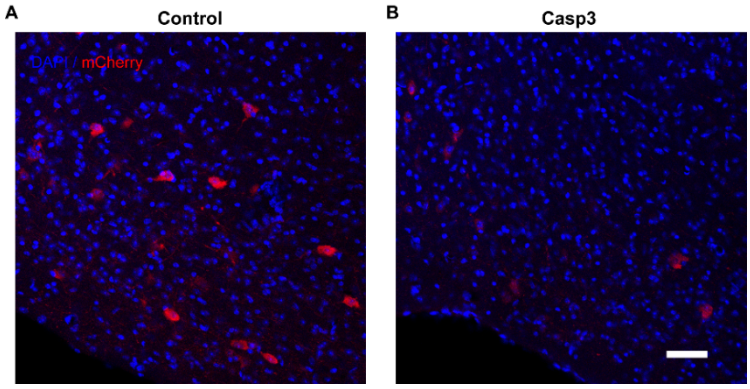
Supplementary Figure S3. Ca^{2+} signal of mice cholinergic neurons changed in control and GCaMP6 groups during licking behavior.

(A) Ca^{2+} signal of mice cholinergic neurons changed in the control group during licking behavior. Twelve responsive recordings were from five mice (B) Ca^{2+} signals of mice cholinergic neurons changed in the GCaMP6 group during licking behavior. Nine responsive recordings were from five mice. Y: trial number; X: time; colorbar unit, ΔF/F.



Supplementary Figure S4. Ca^{2+} signal of mice cholinergic neurons changed in control groups in the initial and final stage of go/no-go learning.

(A) Ca^{2+} signal of mice cholinergic neurons changed in control groups in the initial stage of go/no-go learning. (B) Ca^{2+} signal of mice cholinergic neurons changed in control groups in the final stage of go/no-go learning. Twenty responsive recordings were from five mice. Y: trial number; X: time; colorbar unit, ΔF/F.



Supplementary Figure S5. Representative images of $ChAT^{+}$ neurons in HMSc brain area separately from the control group and Casp3 group in the go/no-go tasks.

(A) mCherry signals of mice in control group. (B) mCherry signals of mice in Casp3 group.