Extended Data

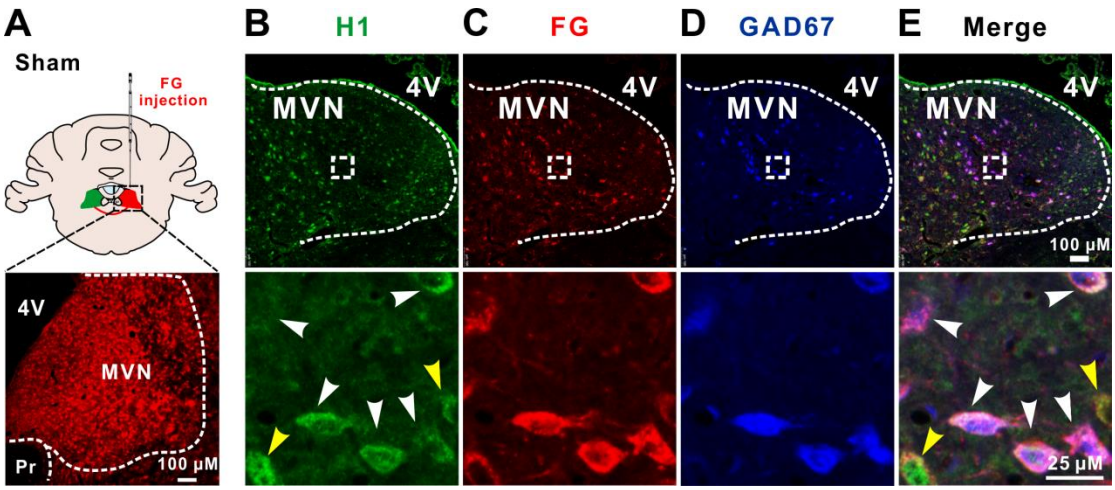

Figure 2-1. The expression of H1 receptor on the GABAergic vestibular commissural neurons in sham rats. Related to Figure 2. ***A***, Diagram and a brain section of sham-operated rat showing the injection site of FG in MVN. ***B-E***, Triple immunostainings for H1 receptor (*green*; **B**), FG (*red*; **C**) and GAD67 (*blue*; **D**) in the MVN contralateral to the FG injection side. White arrowheads in the merged image (**B** and **E** lower panel) indicate the H1/FG/GAD67 triple-labelled GABAergic MVN commissural neurons, whereas yellow arrowheads in the in the merged image (**B** and **E** lower panel) indicate H1/FG double-labelled non-GABAergic (glutamatergic) commissural neurons.

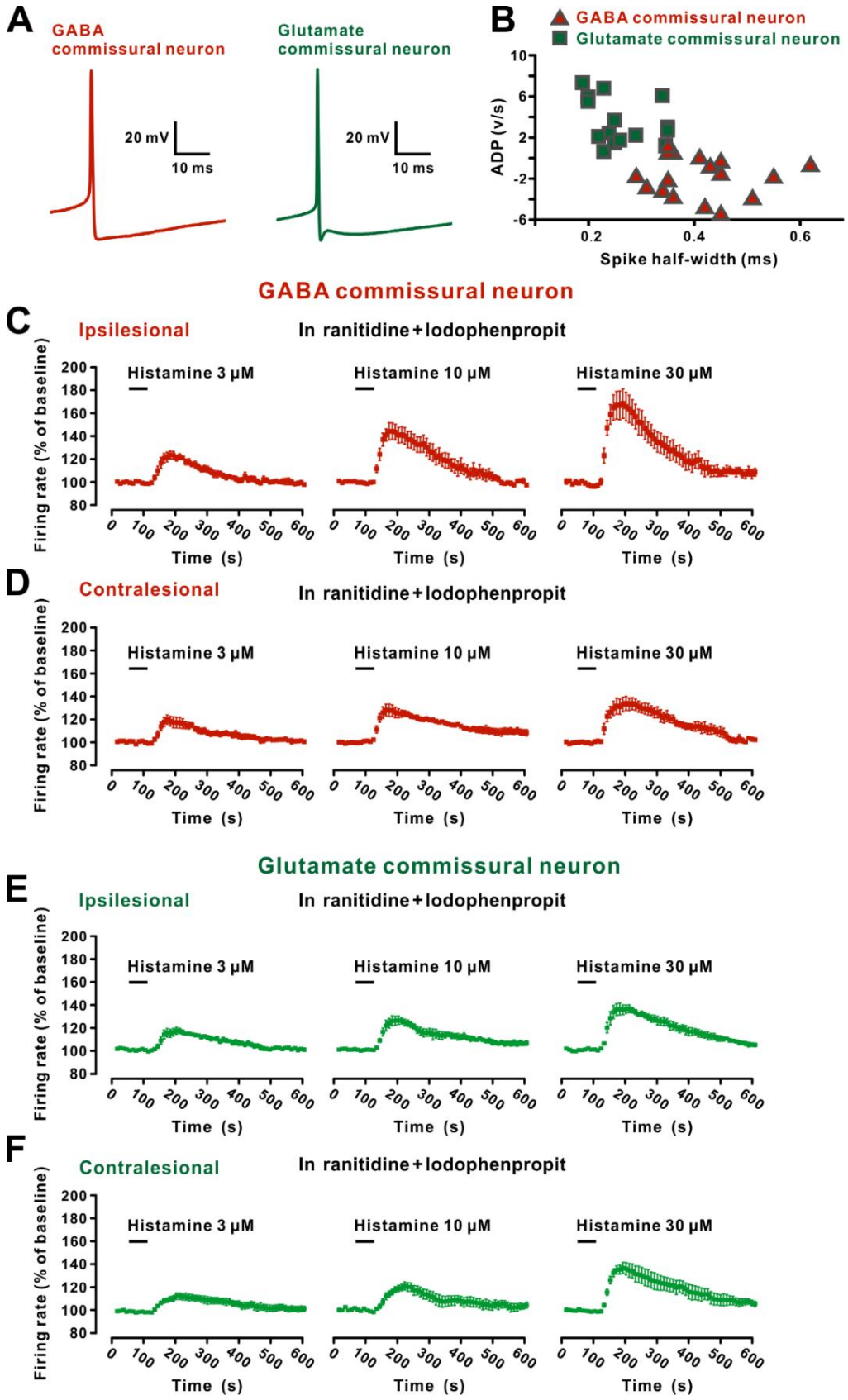

Figure 3-1. The excitation induced by H1 receptor activation in the MVN

commissural neurons after UL. Related to Figure 3. ***A***, Action potentials from a GABA commissural neuron (left panel, *red*) and a glutamate commissural neuron (right panel, *green*). **B**, Relationship between ADP after spike repolarization and action potential width at half-height. ***C***,***D***, PSTHs of group data show that activation of H1 receptor by application of histamine in the presence of ranitidine (H2 receptor antagonist) and iodophenpropit (H3 receptor antagonist) induced a concentration-dependent excitation on the ipsilesional (**C**) and contralesional (**D**) GABAergic MVN commissural neurons with different amplitudes. ***E***,***F***, PSTHs of group data show that activation of H1 receptor by application of histamine in the presence of ranitidine and iodophenpropit induced a concentration-dependent excitation on the ipsilesional **(E)** and contralesional **(F)** glutamatergic MVN commissural neurons with similar amplitudes.

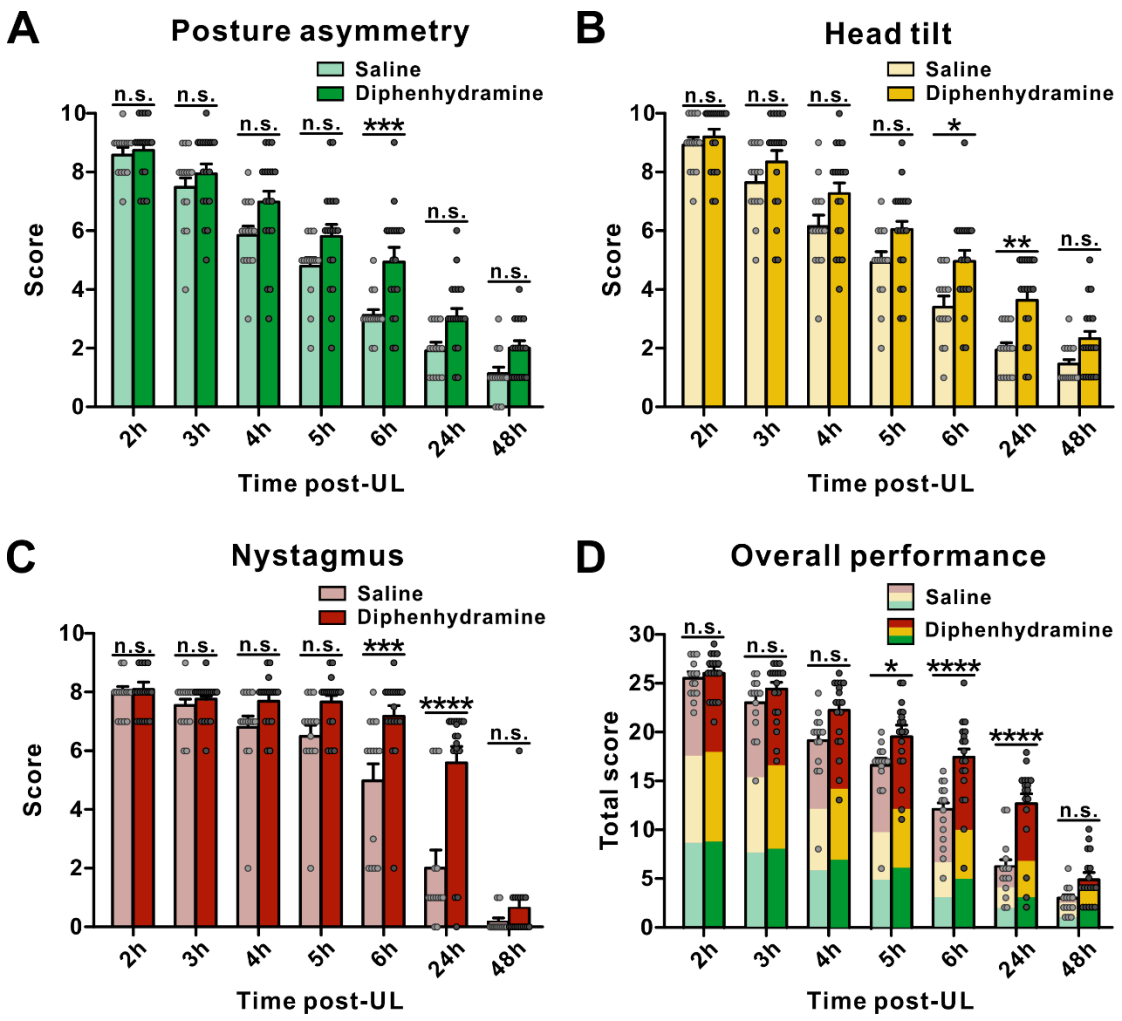

Figure 5-1. Intraperitoneal administration of selective histamine H1 receptor antagonist diphenhydramine aggravates static symptoms in UL rats. Related to Figure 5. ***A-C,*** Histograms illustrating the time course of recovery from posture asymmetry (**A**), head tilt (**B**) and nystagmus (**C**) in two groups injected with diphenhydramine and saline, respectively. ***D***, Histogram showing the time course of overall performance of two groups microinjected with mepyramine and saline, respectively. Data shown are means ± SEM; **P* < 0.05, ***P* < 0.01, ****P* < 0.001, *****P* < 0.0001, n.s. no significant difference, by repeated-measures ANOVA followed by Bonferroni's test.

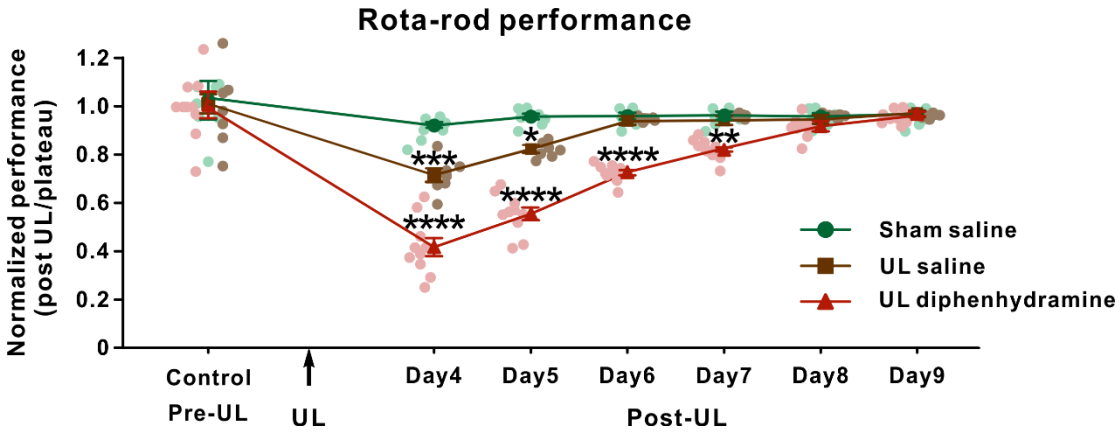

Figure 7-1. Intraperitoneal administration of diphenhydramine retard recovery of motor balance and coordination in UL rats. Rats were trained consecutively for 4 days pre-UL. Related to Figure 7. The test began on day 4 post-UL. Curves illustrating the time course of the recovery of motor balance and coordination in rota-rod test after UL in the sham group microinjected with saline (*green* dots), the UL group microinjected with saline (*brown* squares) and the UL group microinjected with diphenhydramine (*red* triangles). Data represent mean ± SEM; **P* < 0.05, ***P* < 0.01, ****P* < 0.001, *****P* < 0.0001, by repeated-measures ANOVA followed by Bonferroni's test.