α-Synuclein aggregation in the olfactory bulb induces olfactory deficits by perturbing granule cells and granular–mitral synaptic transmission

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Running title: Mechanism of α-synuclein aggregation-induced olfactory deficit

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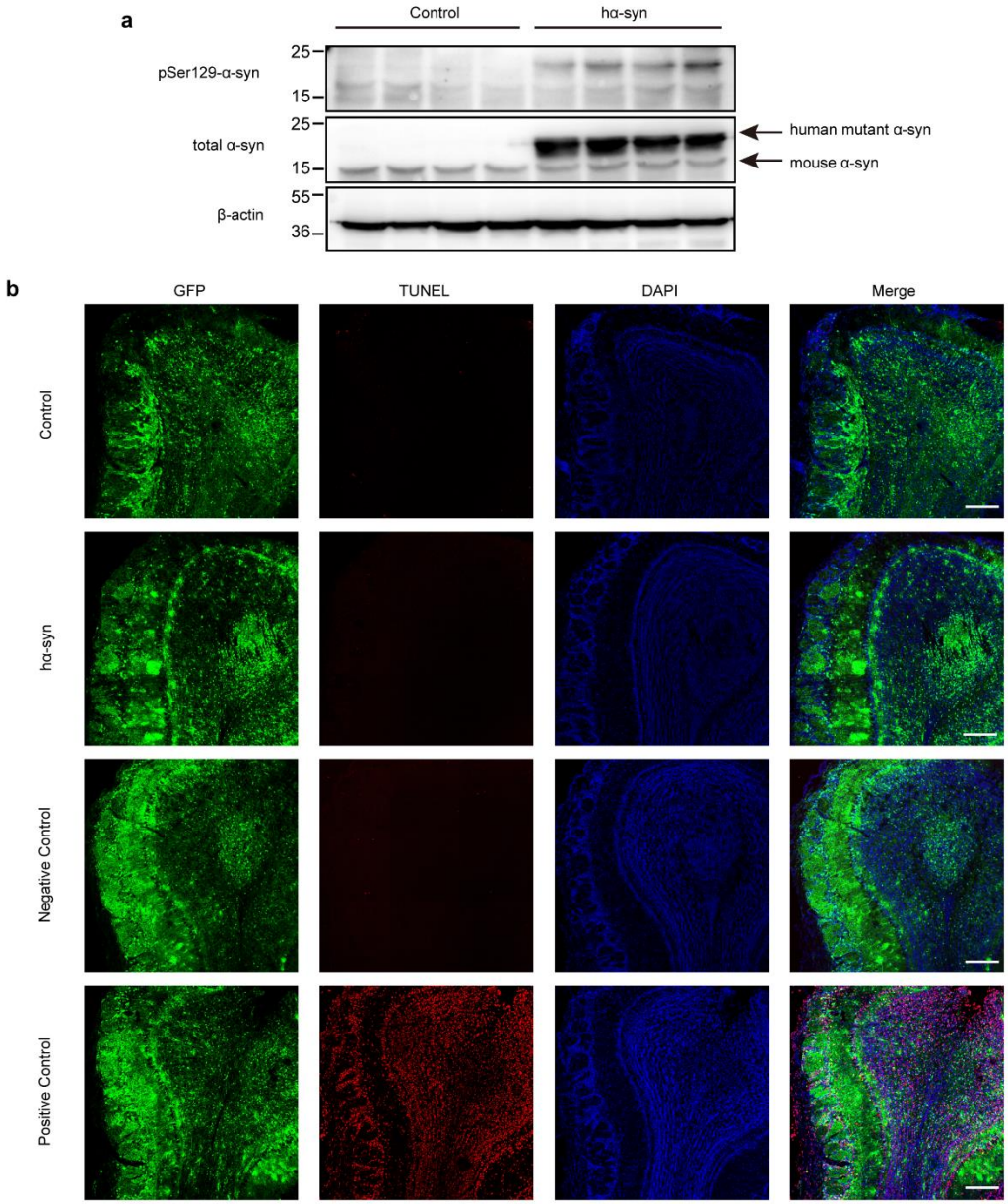
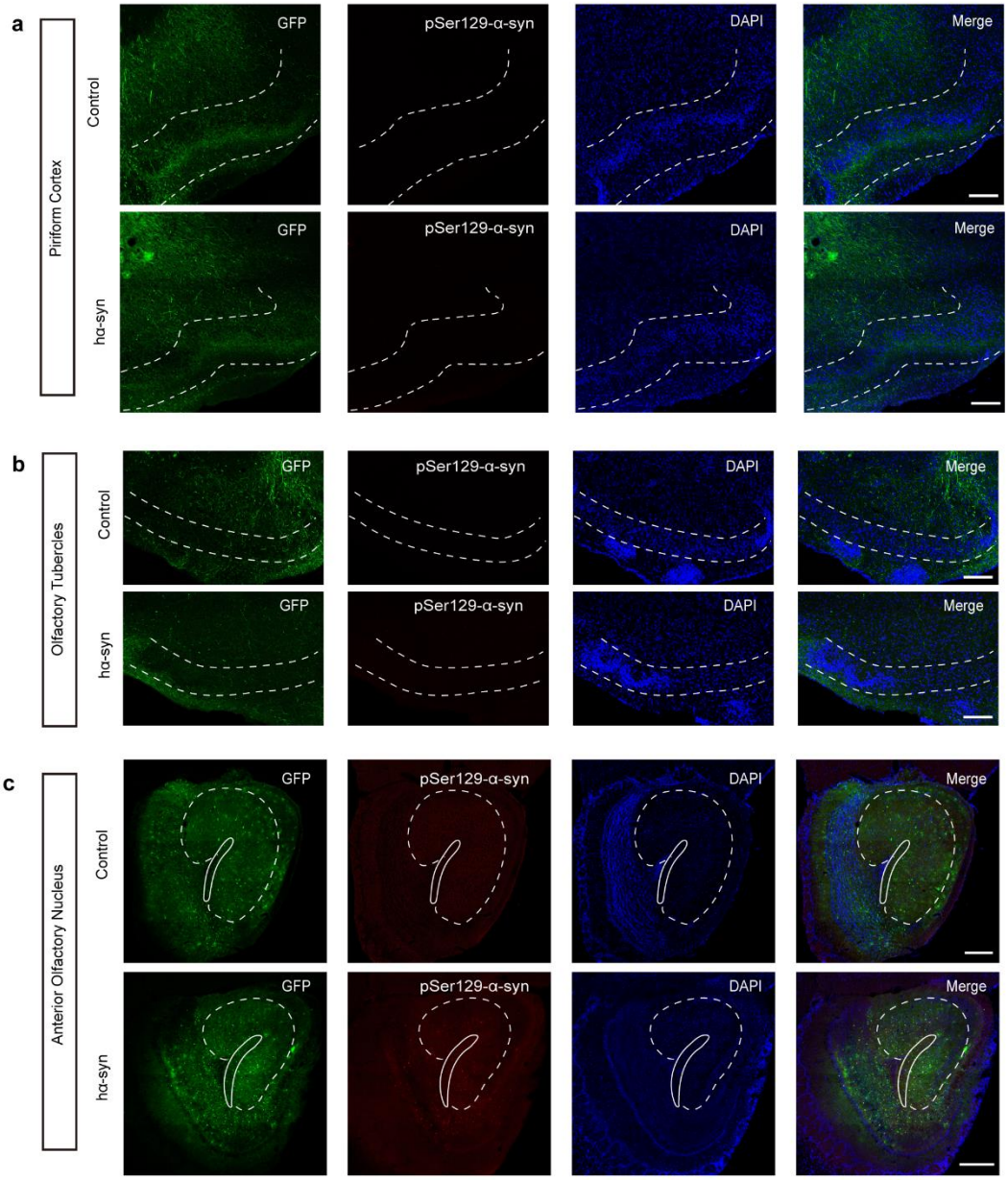
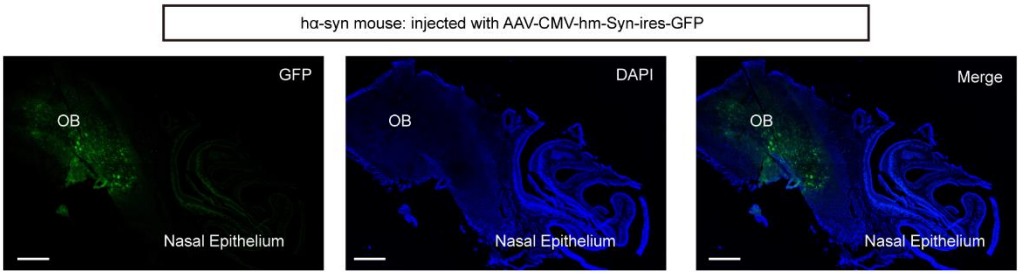


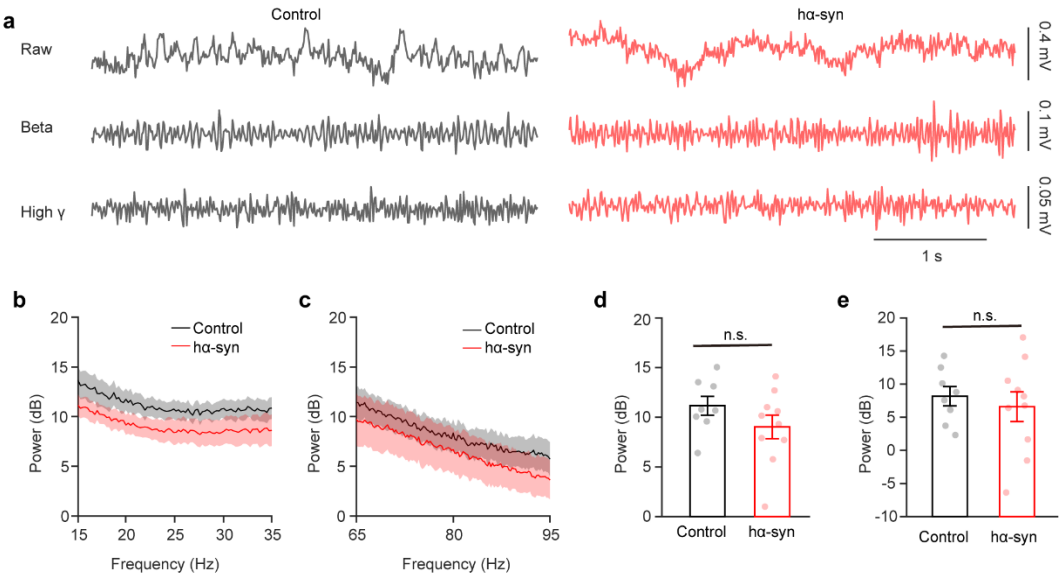
Supplementary Fig. 1 Exogenous human α-synuclein expression does not induce cell apoptosis in the OB. **a** The expression of pSer129-α-syn and total α-syn in OB tissue from all four mice of each group three weeks after viral injection. **b** The representative TUNEL staining images of OB from control and hα-syn mouse three weeks after viral injection. α-syn, α-synuclein. Scale bars = 200 μm.



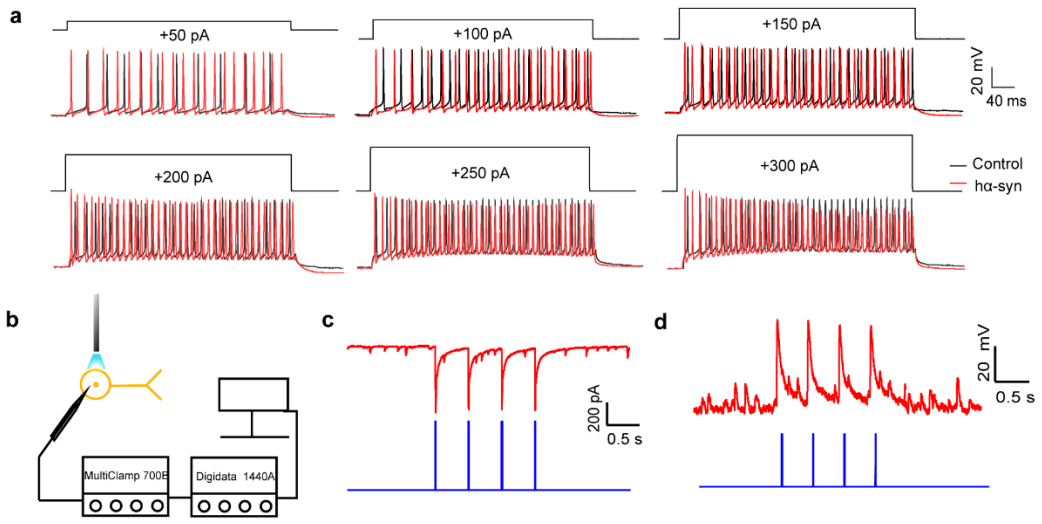
Supplementary Fig. 2 The α-synuclein pathology pattern in the higher olfactory areas. The representative images of piriform cortex (scale bars = 200 μm) (**a**), olfactory tubercles (scale bars = 200 μm) (**b**) and anterior olfactory nucleus (scale bars = 300 μm) (**c**) areas from each group immunostained with anti-pSer129-α-syn antibody three weeks after viral injection. The corresponding olfactory regions were circled by white dashed lines.



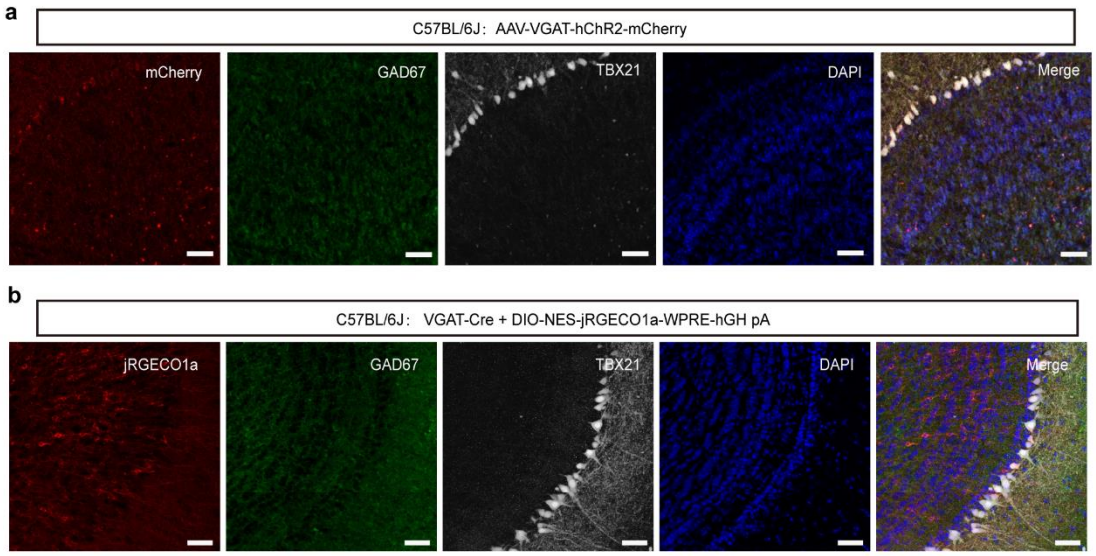
Supplementary Fig. 3 The virus expression pattern in OB and nasal epithelium. The representative images from hα-syn group show that there was no GFP^+ cells in nasal epithelium three weeks after the viral injection. Scale bars = 500 μm.



Supplementary Fig. 4 α-Synuclein aggregates have no significant effect on spontaneous LFP activity in the OB. **a** Raw traces (top) and filtered beta (middle) and high-gamma (bottom) oscillations in the LFP signals recorded from representative mice in the control and hα-syn groups. **b** and **c** The averaged power spectrum of the ongoing beta (**b**) and high-gamma (**c**) LFP signals across each group of mice recorded. **d** and **e** Statistical analysis of the difference in power in the beta (**d**) and high-gamma (**e**) bands between recordings from the control (n = 8) and hα-syn (n = 10) groups. n.s., not significant. Data are presented as the mean ± SEM.



Supplementary Fig. 5 The representative data from patch-clamp recordings. **a** The representative current injection-evoked mitral cell APs recorded with the whole-cell patch-clamping mode. **b** Diagram of optogenetic activation of the granule cells. **c** and **d** The representative light-evoked currents (**c**) and APs (**d**) recorded from a granule cell.



Supplementary Fig. 6 Verification of the expression specificity for the virus with VGAT promoter. The representative immunofluorescence images show that the hChR2-mCherry (**a**) and jRGECO1a (**b**) expressed mainly in granule cell layer. GAD67, a marker for GABAergic neurons; TBX21, a marker for M / T cells in OB. Scale bars = 50 μm.