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Supplemental Information

Phenotypic Reprogramming of Striatal Neurons into Dopaminergic Neuron-like Cells in the Adult Mouse Brain

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Inventory of Supplemental Information:

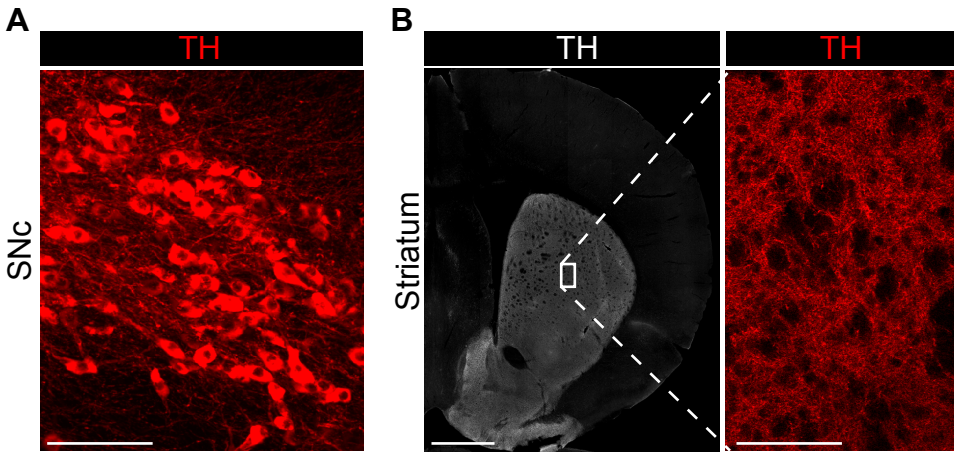

Figure S1. Antibody specificity for TH staining in the adult mouse brain, related to Figure 1.
(A) A representative image of TH^+ neurons in the substantia nigra pars compacta (SNc). Neuronal somas and processes are clearly stained with the TH antibody. Scale bar: 100 μm.
(B) TH^+ neuronal processes in the striatum. No somas were stained with TH in the core striatum. Scale bars: 1.0 mm (in lower magnification view) and 100 μm (in higher magnification view).

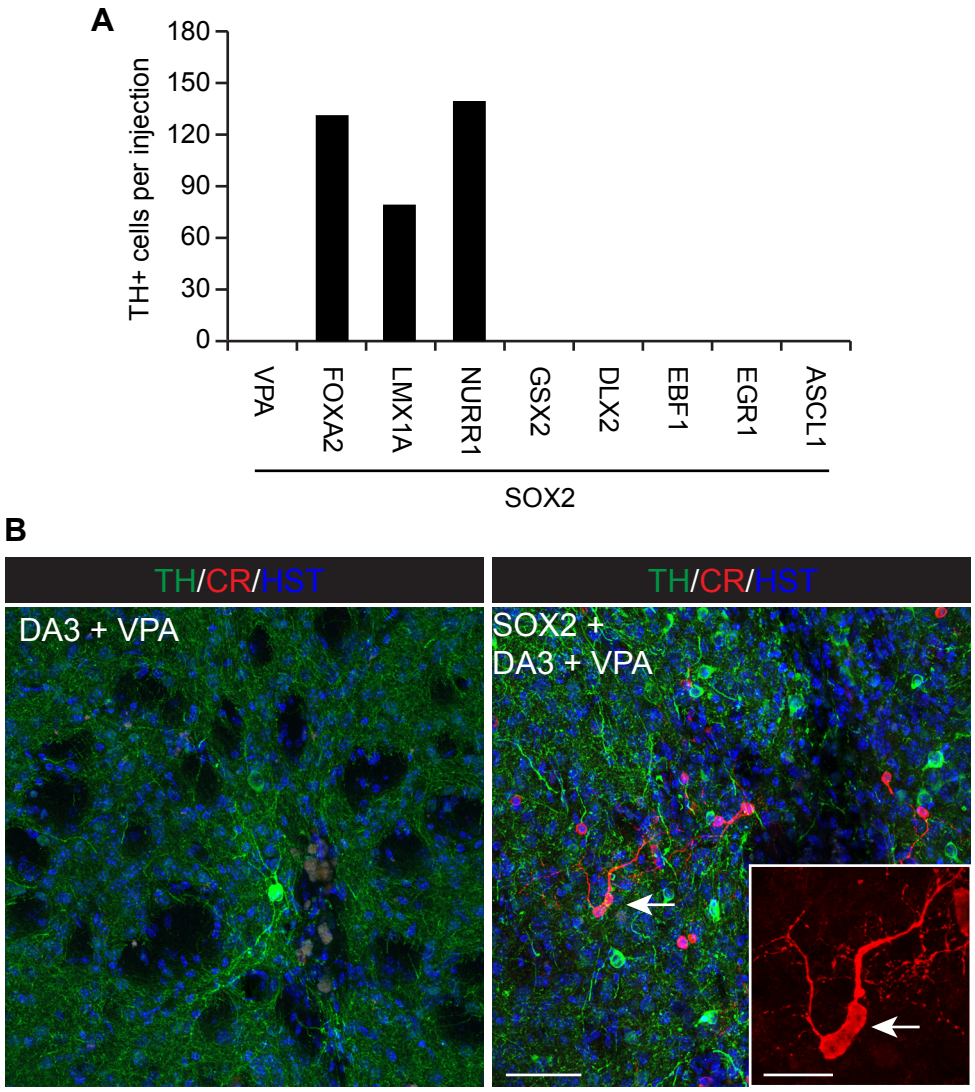

Figure S2. An in vivo screen to identify factors for inducing TH^+ cells in the adult mouse striatum, related to Figure 1.
(A) TH^+ somas were quantified at 8 weeks post virus injections in the adult mouse striatum (n=3-4 mice).
(B) Calretinin $(CR)^+$ cells in the virus-injected striatal region. Scale bar: 20 µm

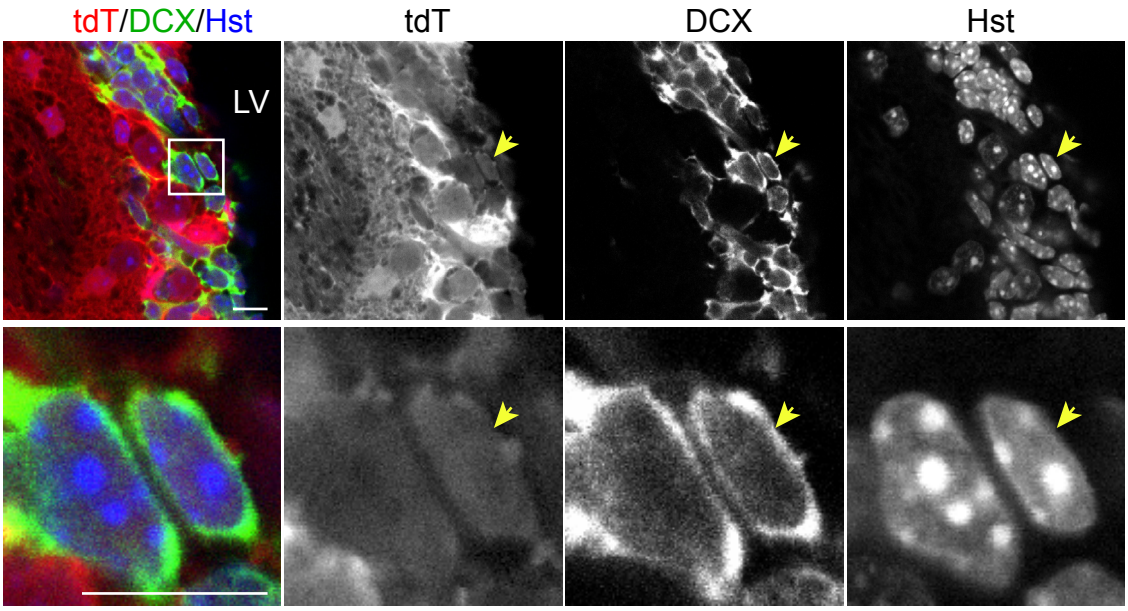

Figure S3. Genetic tracing of neuroblasts in the subventricular zone of adult *mGfap-Cre;Rosa-tdT* mice, related to Figure 3.

Neuroblasts in the subventricular zone were identified by DCX expression. Single-plane confocal images at 1-μm thickness are shown. Lower panel images are the enlarged views of the boxed region in the upper panel. The arrow indicates a typical tdT-traced neuroblast. LV, lateral ventricle. Scale bars: 10 μm

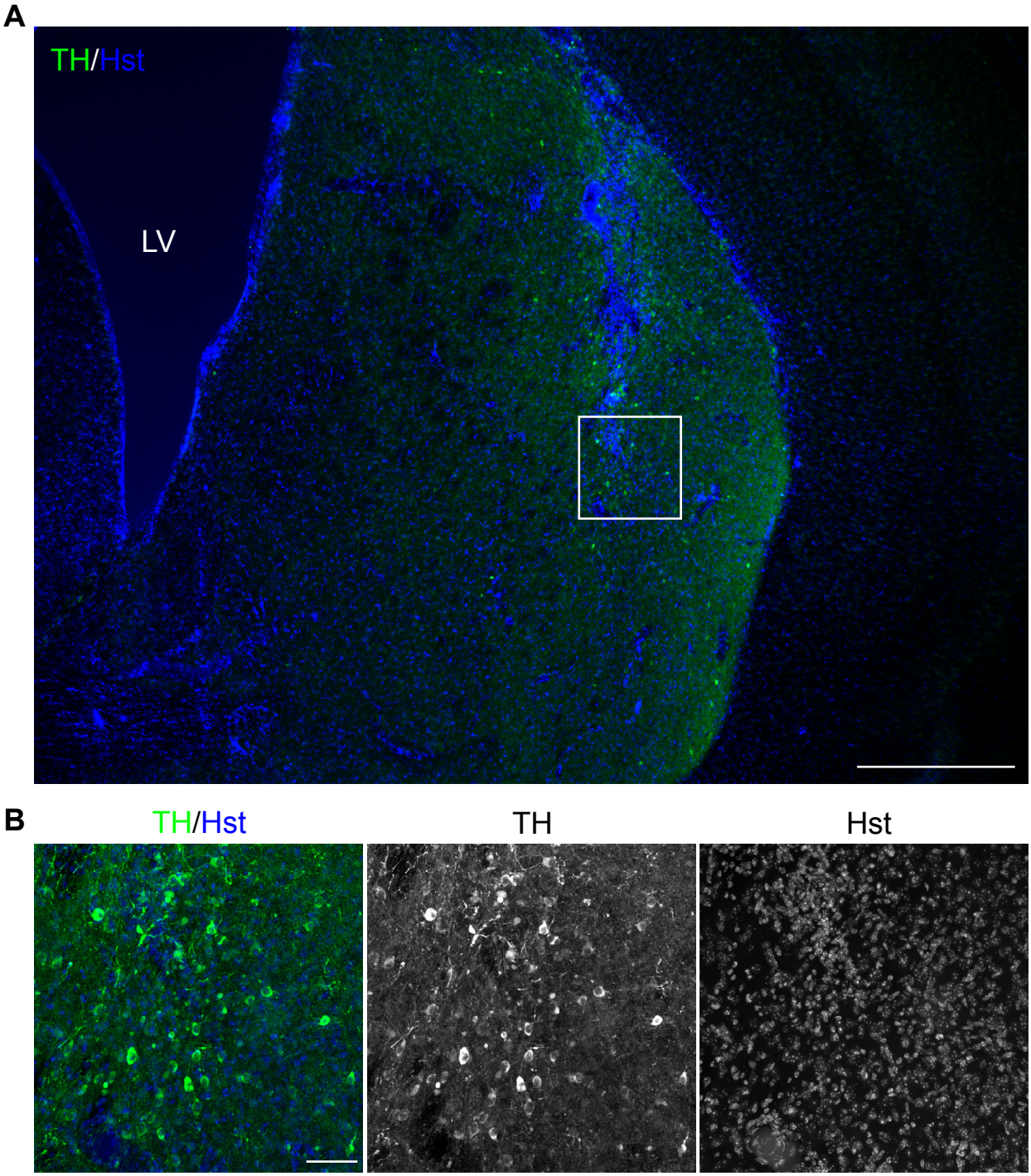

Figure S4. iDALs in injected striatal region far away from the lateral ventricle, related to Figure 3.
(A) A low magnification image of TH^+ iDALs in the adult mouse striatum. These cells are detected in the virus-injected region far away from the lateral ventricle (LV). Scale bar: 1.0 mm.
(B) Zoomed-in confocal images of TH^+ iDALs in the boxed region of panel A. Scale bar: 50 μm.

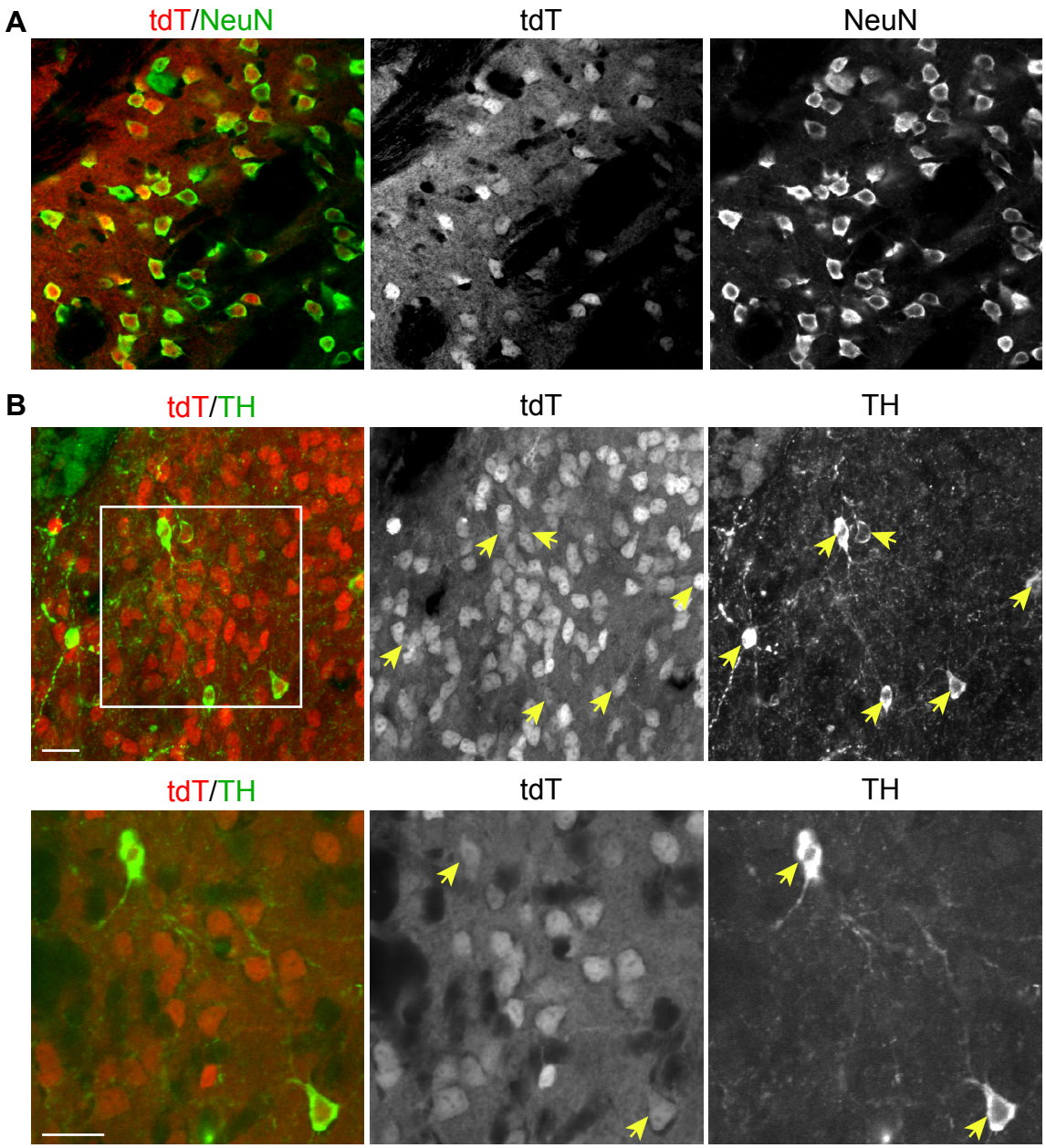

Figure S5. Tracing iDALs in the striatum of *Prp-CreER^{T};Rosa-tdT* mice, related to Figure 4.
(A) Confocal images showing a majority of striatal neurons can be traced by tdT. Scale bar: 20 μm.
(B) Additional confocal images showing tdT^{+} iDALs in the adult striatum. Single-plane confocal images at 1-μm thickness of the boxed region in A are shown in the bottom panel. Scale bars: 20 μm.

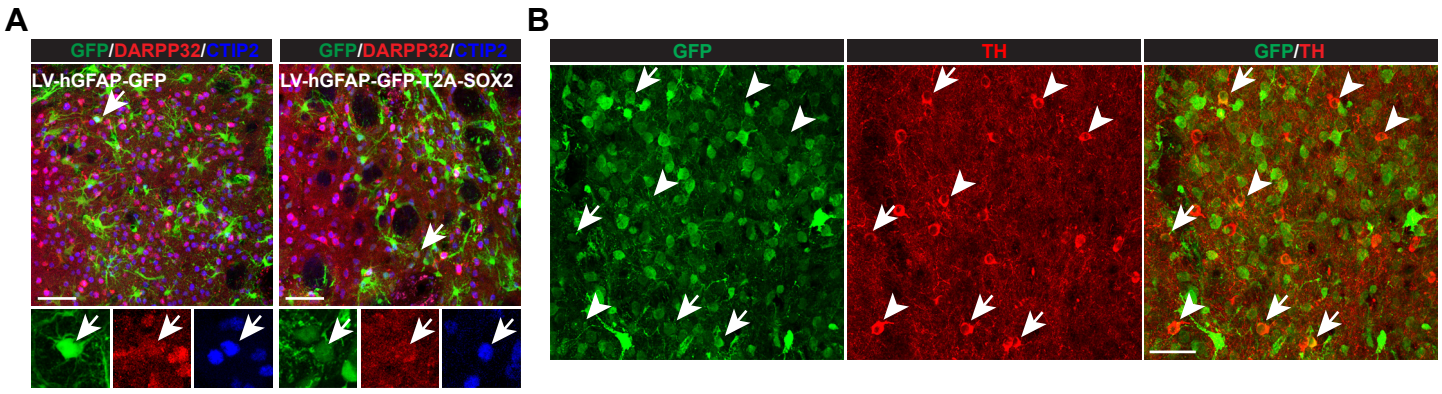

Figure S6. Expression of viral SOX2 in striatal neurons and iDALs, related to Figure 4.
(A) Lentiviral transduction of striatal neurons examined at 1 week post injection of virus. A representative neuron is indicated by an arrow.
(B) Expression of GFP-SOX2 in iDALs examined at 8 weeks post injection of viruses expressing GFP-SOX2, NURR1, FOXA2, and LMX1A. The mice were also treated with VPA in drinking water. Representative GFP^+ iDALs are indicated by arrows, whereas GFP^- iDALs are shown by arrowheads. It should be noted that more neurons express the reporter GFP at this later time point.
Scale bars: 40 μm.

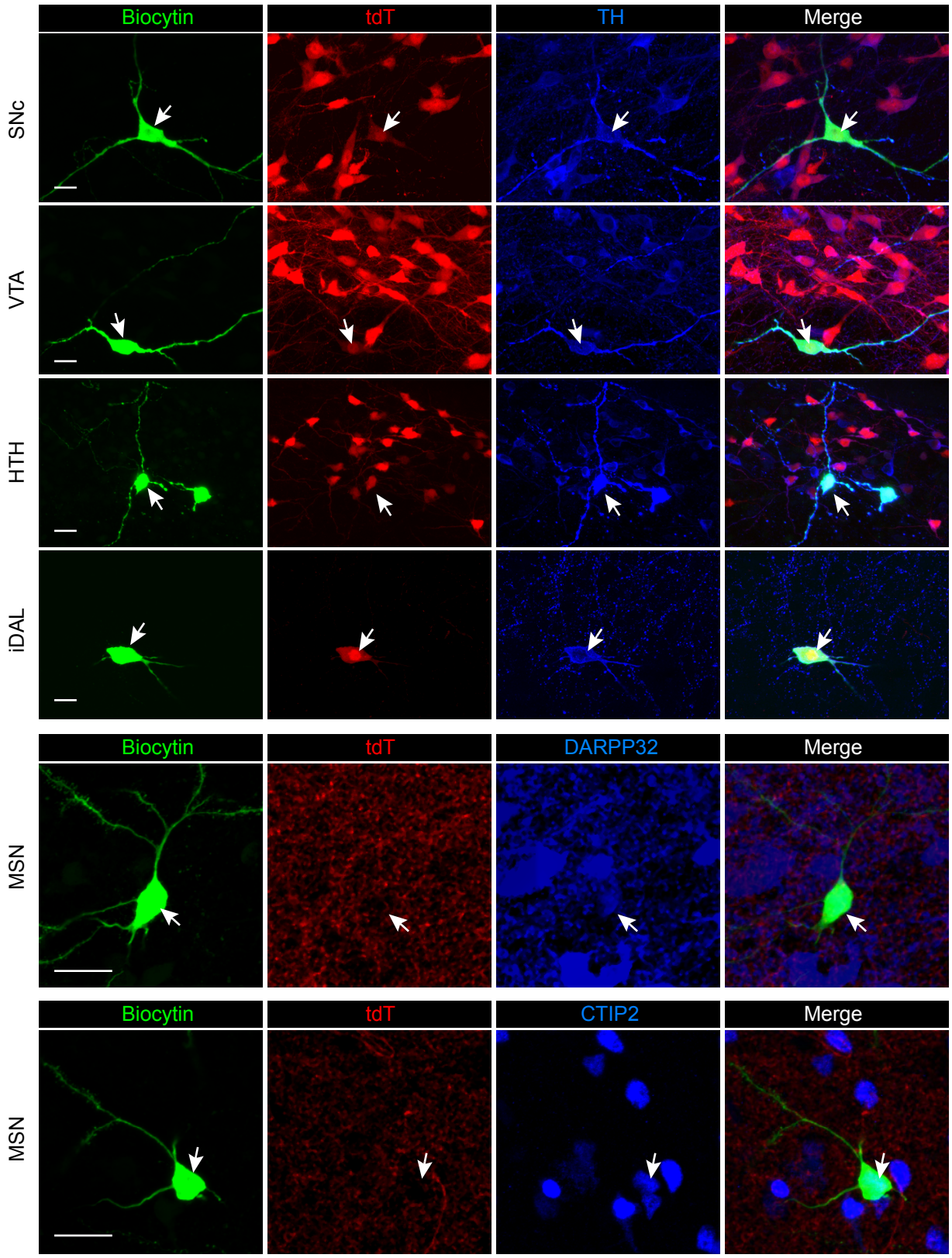

Figure S7. Verification of cell identity after patch-clamp recording, related to Figures 6 and 7.
Some of the recorded neurons were infused with biocytin during recordings. iDALs in the striatum and endogenous DA neurons in the SNc, VTA, and HTH were traced in *Dat-Cre;Rosa-tdT* mice. Striatal MSNs are tdT-negative. Cell identities were further analyzed by immunohistochemistry with the indicated markers. Scale bars: 20 μm.