Supplemental Figure Legends

Supplemental Figure 1. MGEs dissection from *Dlx5/6* $^{-/-}$ mutant brains (A, B) A lateral view of normal brain and *Dlx5/6*$^{-/-}$ mutant brain. Dotted lines indicated coronal planes of the brains. (C, D) A dorsal view of normal brain and *Dlx5/6* $^{-/-}$ mutant brain. Dotted line indicated the subpallium of *Dlx5/6*$^{-/-}$ brain. (E, F) GFP immunohistochemistry staining viewed on coronal sections of wild type control and *Dlx5/6* $^{-/-}$ mutant carrying *Lhx6*-GFP+ transgene at E13.5. (G) A ventral view of the subpallium from *Dlx5/6* $^{-/-}$; *Lhx6*-GFP+ mutant at E13.5. Dotted lines indicated the cuts that were made to dissect the whole MGE. The dense GFP region was designated as the MGE mantle zone / ventral subpallium as referred to GFP expression in the wild type control (boxed areas in E & F). The VZ/SVZ regions (dotted line in E & F) was dissected out and processed for cell culture and transplantation.

Supplemental Figure 2. Exencephaly with normal telencephalic regionalization in *Dlx5/6*$^{-/-}$ mutants. (A) Schematic representation of pallial and subpallial organization in *Dlx5/6*$^{-/-}$ mutants, viewed in a coronal section. (B-M) Adjacent coronal sections through the telencephalon of E14.5 *Dlx5/6*$^{+/+}$ (B, D, F, H, J and L) or *Dlx5/6*$^{-/-}$ (C, E, G, I, K and M) embryos after immunostained with antibodies against β-3-Tubulin (B & C), or Map2 (H & I) or radioactive *in situ* hybridization with probes against *Dlx2* (D & E), *GAD67* (F & G), *Substance P* (J & K) or *Tbr1* (L and M). Abbreviations: Cx: cortex; LGE: lateral ganglionic eminence; MGE: medial ganglionic eminence.

Supplemental Figure 3. Regional expression of *Lhx6* appears unperturbed in *Dlx5/6*$^{-/-}$ mutant at E15.5.Coronal sections through rostral to caudal levels were labeled by *in situ* hybridization from *Dlx5/6*$^{+/+}$ (A~D) and *Dlx5/6*$^{-/-}$ (B~H). The neocortex-paleocortex boundary (arrowheads) and deep migratory stream (black double-headed arrows) can be detected in both *Dlx5/6*$^{+/+}$ and *Dlx5/6*$^{-/-}$ mutants. Asterisk: Striatal region.

Supplemental Figure 4. Accumulation of Lhx6-GFP positive cells in the SVZ of the LGE of *Dlx5/6*$^{-/-}$ mutants at E12.5, E13.5 and E14.5. Immunohistochemistry for GFP was carried out on coronal sections from E12.5 (A, B), E13.5 (C, D) and E14.5 (E, F) *Dlx5/6*$^{+/+}$ and *Dlx5/6*$^{-/-}$ mutants. *Dlx5/6*$^{-/-}$ mutants show an accumulation of Lhx6-GFP cells in the SVZ of the LGE (Double arrows). Abbreviations: VZ: ventricular zone; SVZ: subventricular zone. Scale bars: 200μm

Supplemental Figure 5. *SMDF and NRG-1* expression are preserved in *Dlx5/6*$^{-/-}$ mutants at E13.5. Coronal sections from *Dlx5/6*$^{+/+}$ (A, C) and *Dlx5/6*$^{-/-}$ (B, D) were labeled by in situ hybridization. Scale bars: 500μm.

Supplemental Figure 6. Serial coronal sections from transplanted mice two months after MGE cell transplantation. The transplanted MGE cells from E13.5 *Dlx5/6*$^{-/-}$ (B) migrate away from the injection site (arrows). The migratory distance appears identical to that of *Dlx5/6*$^{+/+}$ transplantation in rostral –caudal axis (A). Area a, b and c are shown at high magnification in each side. Scale bars: A, B 200μm; Insets: 50 μm.

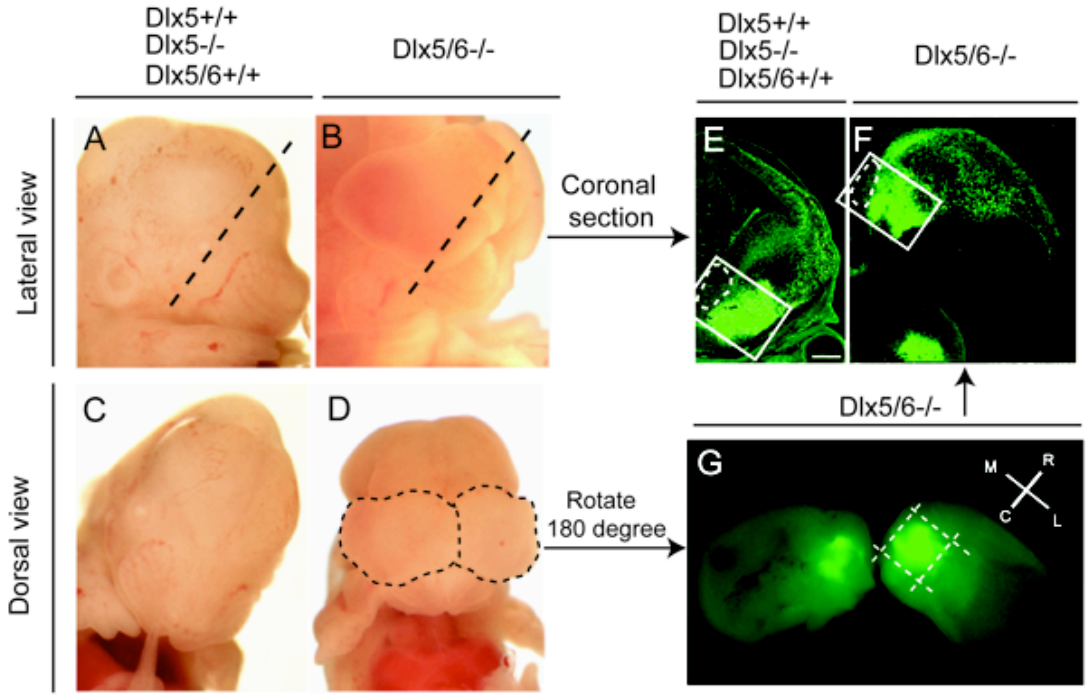
Supplemental Figure 7: Cultures of *Dlx5/6*$^{-/-}$ mutant MGE cells survive for up to 40 days *in vitro***.** Lhx6-GFP positive *Dlx5*/*6*$^{+/}$ or *Dlx5/6*$^{-/-}$ MGE cells (E15.5) were grown on GFP-negative CD1 neonate cortical feeder layers. At 5 Days *In Vitro* (DIV), 10 DIV, and 40 DIV, cells were fixed, processed for GFP immunohistochemistry, and counted. The graph depicts the changes in the number of GFP-positive cells (y axis, "% Survival") versus time (x axis, "Length of Culture"). Cultures of *Dlx5*/*6*$^{+/}$ and *Dlx5/6*$^{-/-}$ MGE -derived cells exhibit similar changes of cell number over time at 10 DIV (x axis, 10 DIV) or 40 DIV (x axis, 40 DIV) to that at 5 DIV.

Supplemental Figure 8: Cell death in *Dlx5/6*$^{-/-}$ mutants at E13.5. We found no major increase in apoptosis (activated Caspase-3 expression) in the *Dlx5/6*$^{-/-}$ mutants. One activated Caspase-3^{+} cell is detected in *Dlx5/6*$^{-/-}$ mutants (arrow) Scale bars: 500μm.

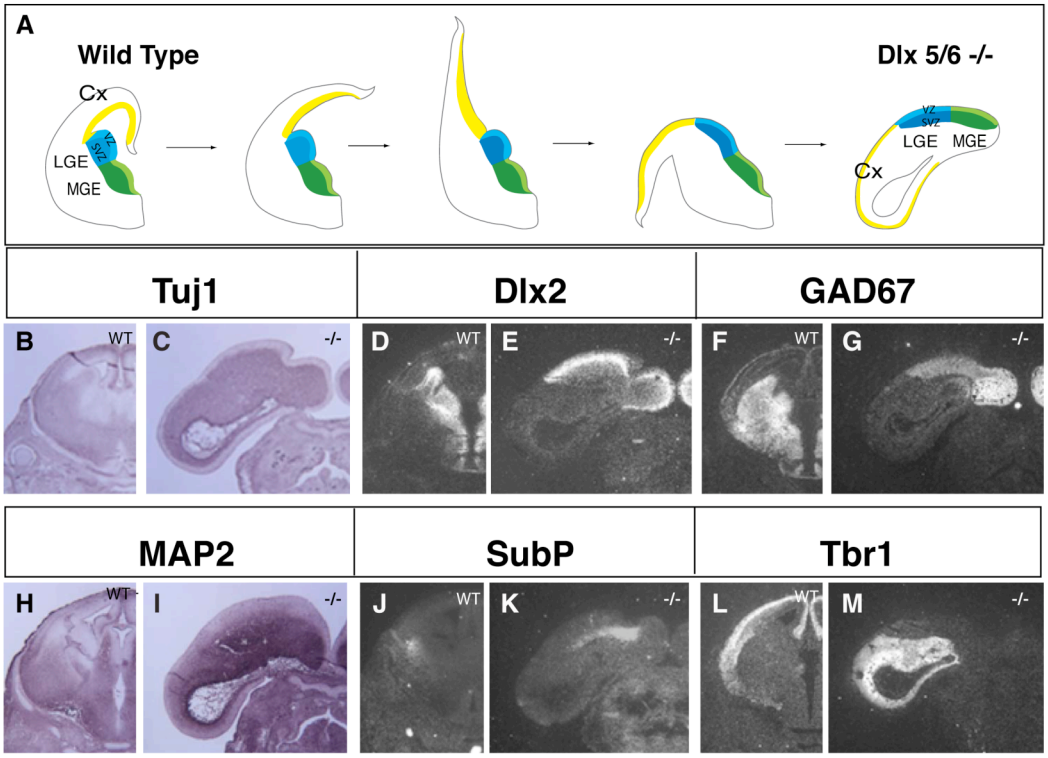
Supplemental Figure 9: Cell proliferation in *Dlx5/6*$^{-/-}$ mutants. Coronal sections (E13.5) were immunostained with antibody against phospho-Histone 3 (H3) from *Dlx5*/*6*$^{+/+}$ (A) and *Dlx5/6*$^{-/-}$ (B). Comparable numbers of phospho-H3-positive cells were detected in GE (ganglionic eminences) of *Dlx5/6*$^{-/-}$. Adjacent sections were labeled with antibody against Tbr1 and calbindin to refer to the cortex and GE area in *Dlx5/6*$^{-/-}$ mutants (C, D, E, F). Scale bars: 500μm.

Supplemental Figure 10. Characterization of E15.5 cortical interneurons from a *Dlx5* BAC-GFP transgenic mouse line. (A) Double immunoflourescence confocal image is labeled with anti-GFP (green) and anti-DLX2 (red) antibodies. (B) Percentage of the co-localization between *Dlx5-GFP* and DLX2 in marginal zone (MZ), cortical plate (CP) and intermediate/subventricular zone (IZ/SVZ). (C~E) High magnification views of cortex, the boxed area (A), with MZ, CP and IZ/SVZ labeled. Abbreviations: CP: cortical plate; IZ: intermediate zone; MZ: marginal zone; SVZ: subventricular zone. Scale bars: A 500μm; C, D, E, 200μm.

Supplemental Figure 11. Expression of *Dlx5/6i*-Cre: Rosa-YFP reporter in postnatal cortex at 2 months of age. (A) GFP immnoflurescence in coronal sections through somatosensory cortex. (B~E) Double immnoflurescence confocal images with anti-GFP and either anti-PV, anti-SST, anti-NPY or anti-CR antibodies. Quantification of the percentage of GFP^{+} cells that express each of the different interneuron markers (green bar) and the percentage of PV, SST, NPY or CR cells that express GFP (red bar) in layer II-IV (F) and layer V-VI (G).



Supplemental figure 1



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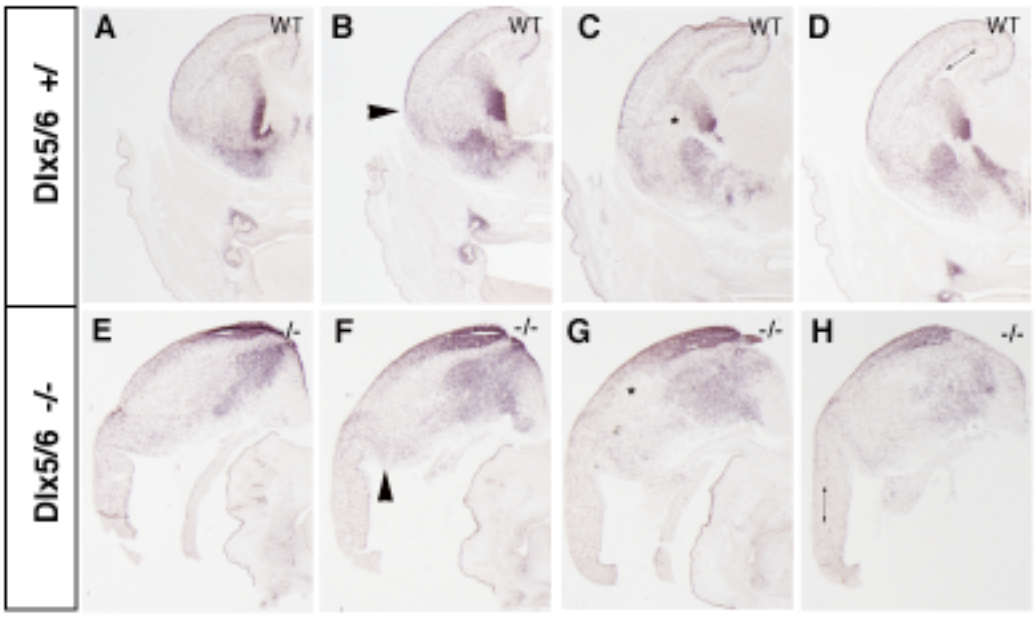

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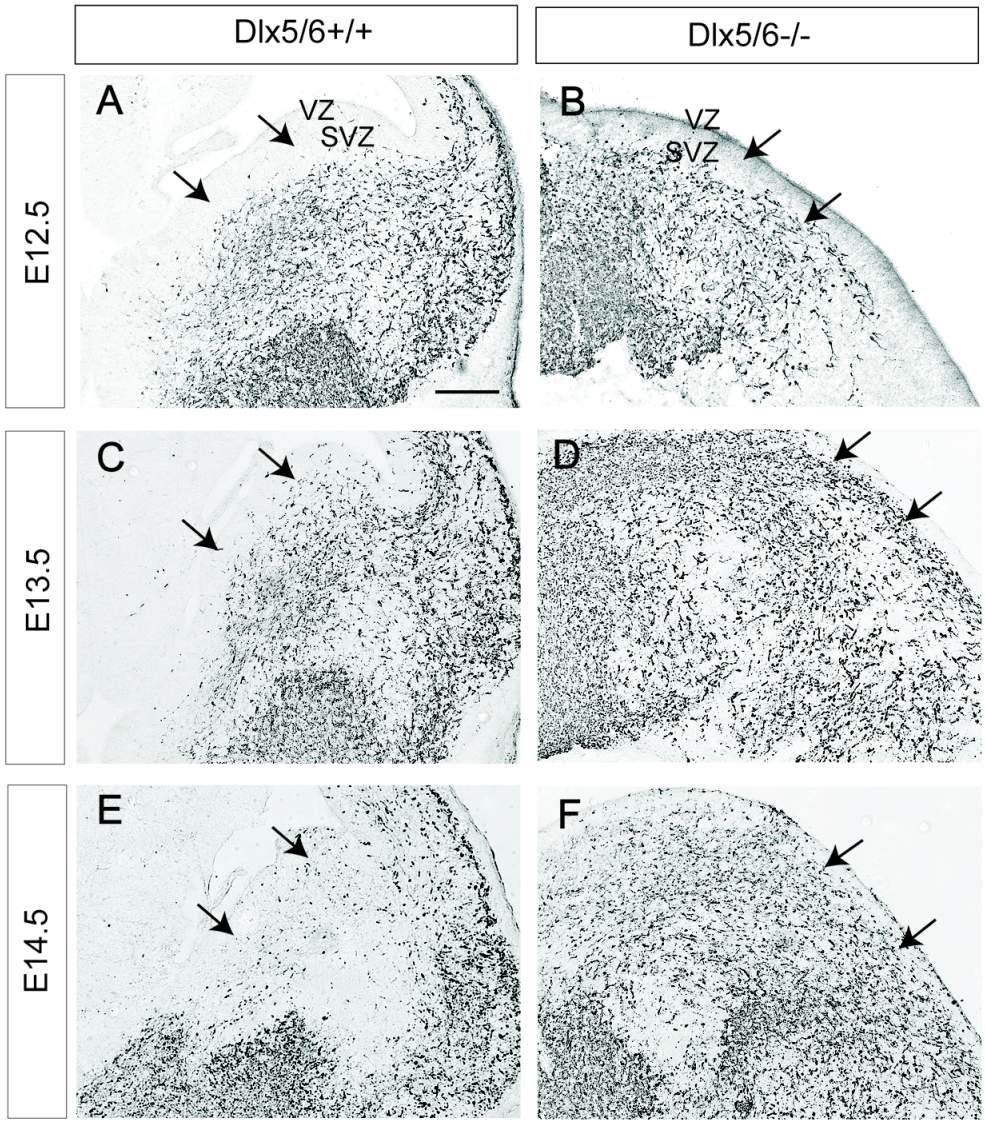

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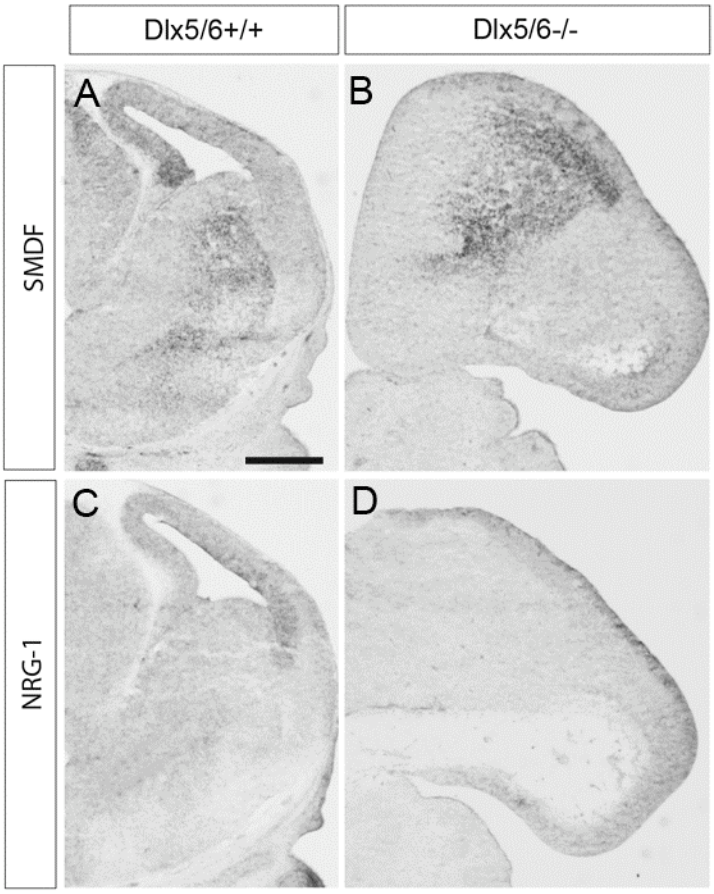

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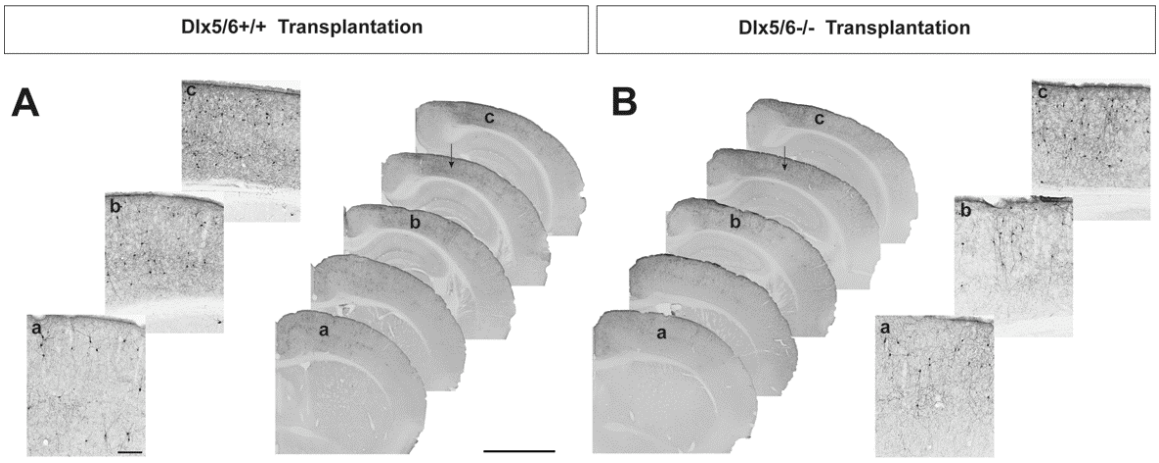

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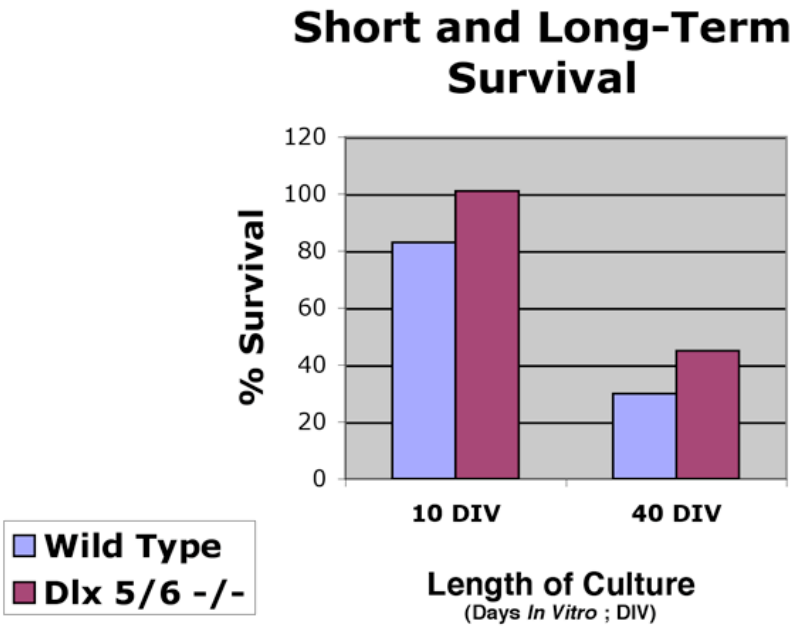

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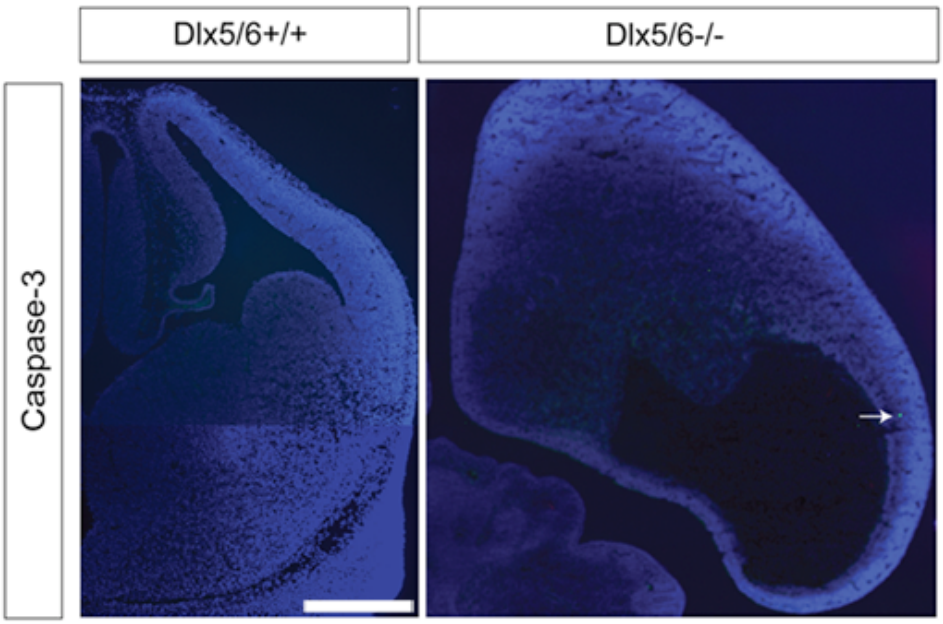

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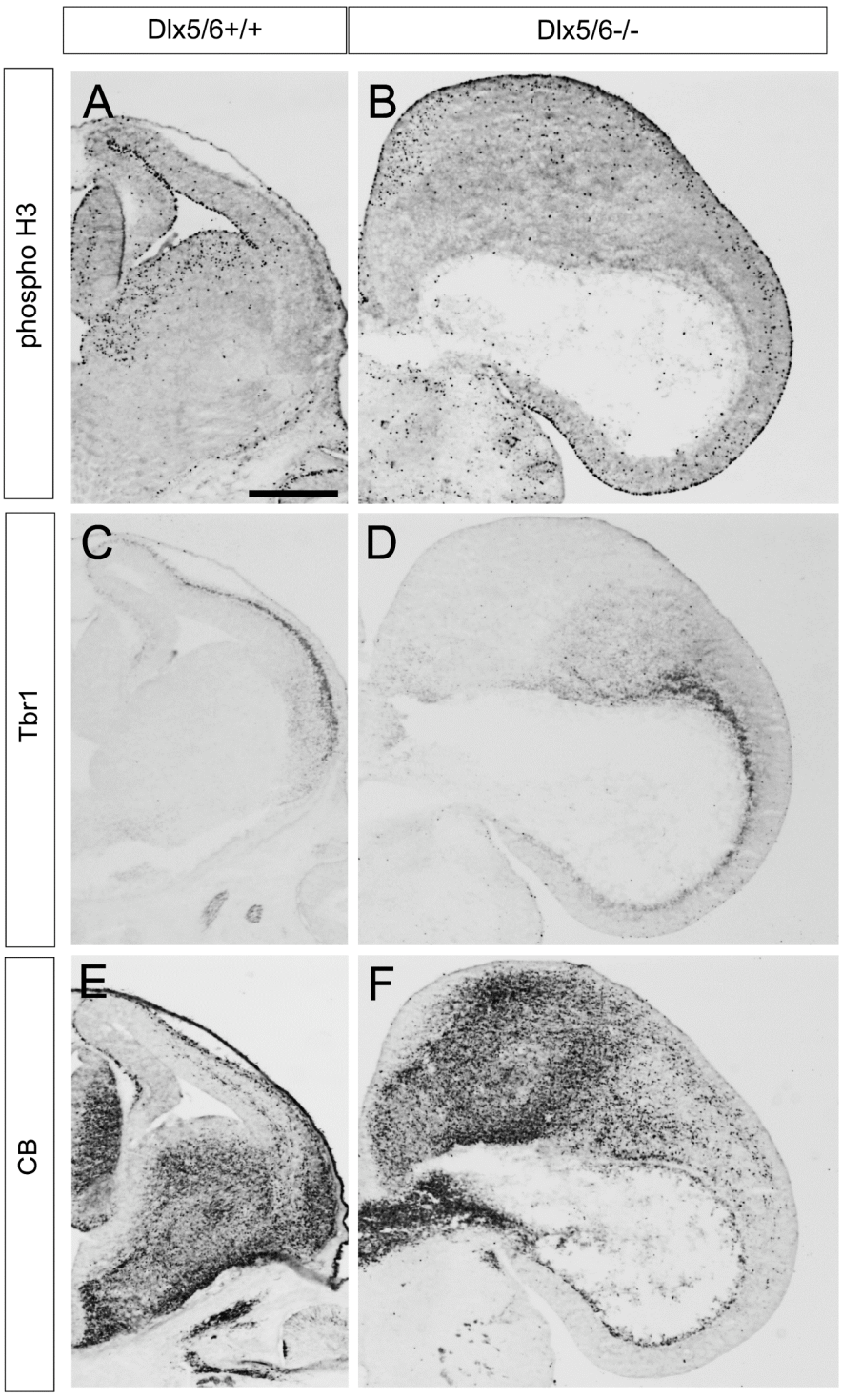

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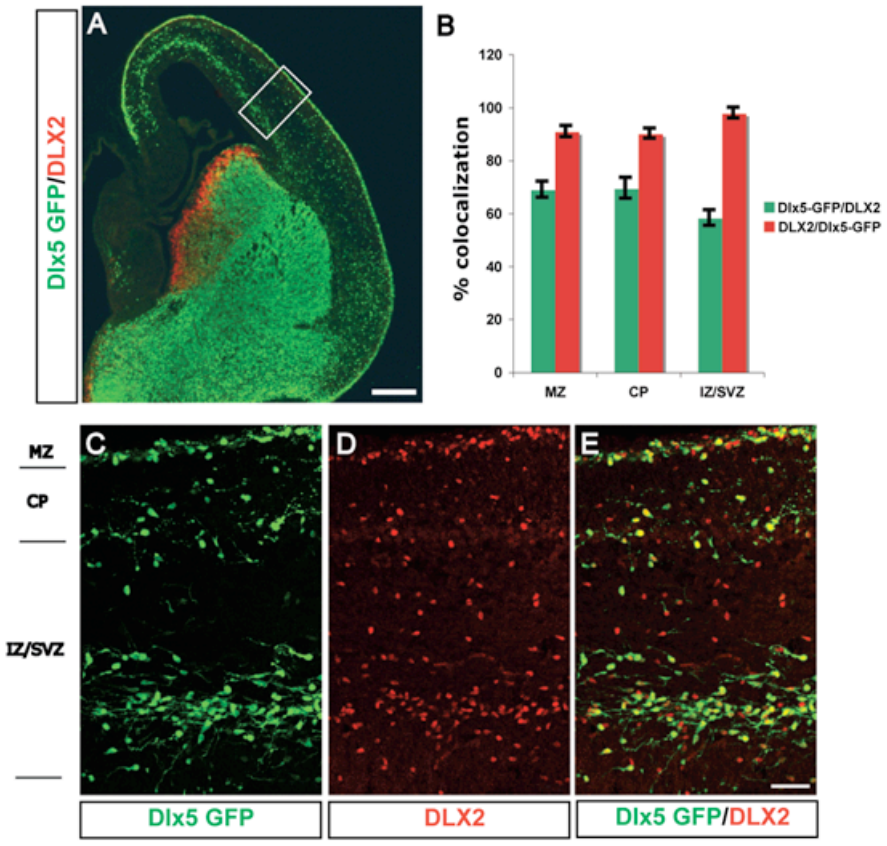

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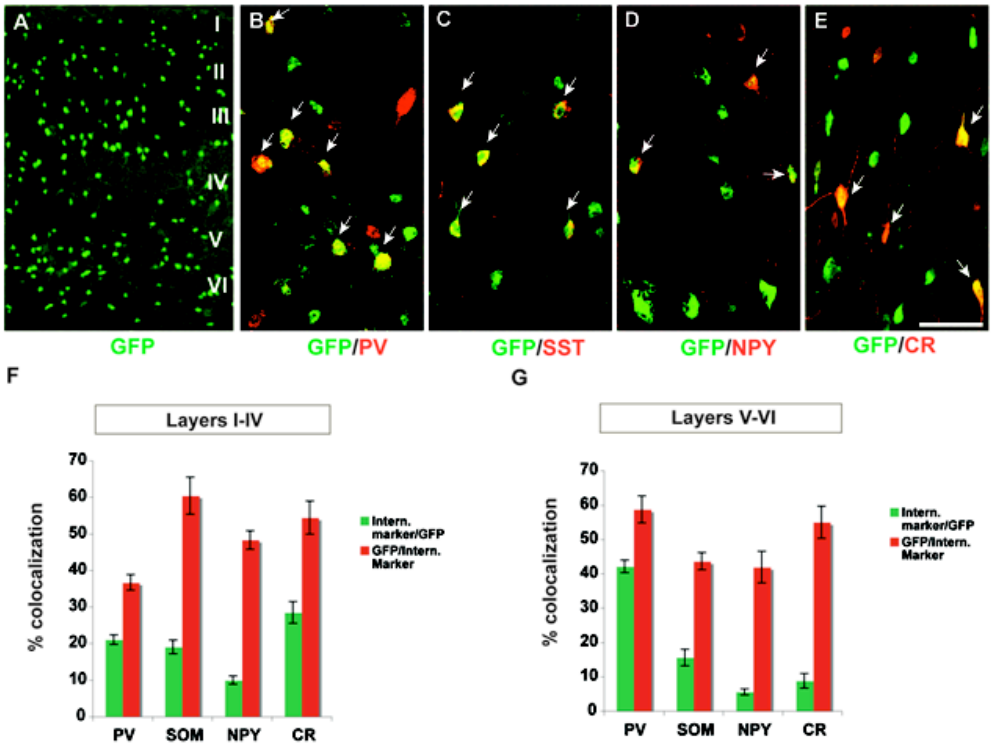

Supplemental figure 11