Thalamic inhibition regulates critical-period plasticity in visual cortex and thalamus

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Supplementary Figure 1

Expression of GABA\textsubscript{A} receptor \(\alpha_1\) subunit in interneurons subsets.

**a**, Experimental setup. A monitor was positioned at 15 cm distance with the right half of the screen in the mouse’s right monocular visual field. 0.05 cpd drifting gratings appear in each of the quadrants of the screen. Visual stimulation of both eyes in each of the four monitor quadrants decreased reflectance of 700 nm light in different patches of left visual cortex, and response pixels are color coded (middle panel), resulting in a color coded retonotopic representation (right panel). Images are the average of 15 repetitions. A region of interest (ROI) polygon was drawn covering pixels corresponding to the superior binocular visual field. A region of reference (ROR) polygon is drawn in a visually unresponsive area. **b**, Experimental time-line. For assessment of ocular dominance (OD) plasticity during the critical period mice were imaged at P35, and some mice were deprived from P28 to P35. **c**, Upper panel: \(\alpha_1\) expression in cortical interneurons can be visualized in Gabra\textsuperscript{\textsuperscript{fl} hom} Emx1-cre\textsuperscript{*} mice. Lower panels: Expression of \(\alpha_1\) and the interneuron markers reelin, PV, SST and VIP in cortical interneurons in Gabra\textsuperscript{\textsuperscript{fl} hom} Emx1-cre\textsuperscript{*} mice. **d**, Upper panels: \(\alpha_1\) expression on the cell surface of PV+ interneurons is high. Lower panel: high \(\alpha_1\) expression in PV+ interneurons is lost in Gabra\textsuperscript{\textsuperscript{fl} hom} Gad2-cre\textsuperscript{*} mice. **e**, A significant OD shift is induced by 3 days of monocular deprivation of Gabra\textsuperscript{\textsuperscript{fl} hom} Gad2-cre\textsuperscript{*} Emx1-cre\textsuperscript{*} mice. t-test, \(P=0.008\). Scale bars are 20 \(\mu\)m. Values shown as mean ± s.e.m. **\(P<0.01\)
Supplementary Figure 2

Western blots of GABA<sub>A</sub> receptor components in Gabra1<sup>−/−</sup> mice and wild type littermates.

Uncropped gel runs of western blots quantified in Fig. 3. White arrows indicate the signals representing α1, α2, α3, gephyrin and γ2. Red bands are molecular weight markers, representing from top to bottom: 250, 150, 100, 37, 20, 15 and 10 kD. At the top of each lane is indicated whether the sample was from a mouse positive or negative for Gabra1.
Examples and properties of binocular dLGN cells.

a. Examples of linear micro-electrode traces (red) through ipsilateral projection zone of dLGN of non-MD (left) and MD (right) wild type mice. Scale bar=500 µm. b. Top: example of clustering units based on two principal components of spike features. Bottom: waveforms of the corresponding data are represented on the right. Data colored in green belong to a single-unit. Data in blue correspond to other threshold-crossed voltage changes. c. Each row shows firing rates over time of an example cell (SU) recorded in wild type mice, while either the contralateral (red) or ipsilateral (black) eye is exposed to the full screen, 1.5s visual stimulus. The SU shown in the top row has a very sustained response. The unit shown below has a transient response to the ipsilateral eye. The last example has an ON/OFF response to the contralateral eye and only an OFF response to the ipsilateral eye.
Supplementary Figure 4

Recordings in dLGN of Gabra1<sup>fl hom</sup>Olig3-Cre<sup>+</sup> mice.

a. Receptive fields of MUs recorded in non MD (light green) and MD (dark green) Gabra1<sup>fl hom</sup>Olig3-Cre<sup>+</sup> mice (n=41 and 25 MUs, respectively). The position of the nose of the mouse is at horizontal and vertical 0 cm. The red dashed lines indicate -30° and +30° horizontal angles.

b. Examples of linear micro-electrode traces (red) through ipsilateral projection zone of dLGN of non-MD (left) and MD (right panels) Gabra1<sup>fl hom</sup>Olig3-cre<sup>+</sup> mice, stained by DAPI (blue). White line delineates dLGN. Scale bar=500 μm.