ture of the experimental hand in the RHI. These results suggest that the body image in the brain suitably changes according to the perceived information.

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P1-i01 Classification of neocortical inhibitory inputs into the PV-expressing neurons with BAC transgenic mice

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Neocortical GABAergic interneurons are roughly classified into three subgroups and distinguished by chemical markers, such as parvalbumin (PV), somatostatin (SS) and the others. PV-expressing neurons, fast-spiking neurons, are a major component of GABAergic interneurons in the neocortex and have been implicated in higher order functions, such as learning and memory, by generating gamma frequency oscillations. We previously generated BAC transgenic mice expressing dendritic membrane-targeted GFP selectively in PV-expressing neurons, and succeeded in visualizing the somata and dendrites in a Golgi stain-like fashion. By combining the immunofluorescence labeling of GABAergic terminals with the antibody to vesicular GABA transporter, we revealed that GABAergic terminals preferentially apposed to the proximal dendrites and somata. It is, however, unclear which type of GABAergic interneurons innervates the proximal dendrites and somata of PV-expressing neurons. In the present study, we visualize the axon terminals of PV- or SS-expressing neurons by immunofluorescence staining in the transgenic mice, observe the close appositions to PV-expressing neurons under confocal laser-scanning microscope, and analyze the synaptic inputs quantitatively. These experiments would provide new insights into the local circuits composed by neocortical interneurons.

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P1-i02 Moderate warming of mouse scrotum evokes avoidance behavior and phosphorylation of nuclear factor kappa B in a subset of primary sensory neurons

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The cellular and molecular mechanisms of warm sensation are not well understood. We considered that scrotum might be a suitable area to study this issue because scrotum is reportedly more sensitive to innoxious warming than other areas of the body. However, little is known if this is the case in mice, which species is now indispensable for studying the molecular mechanisms of temperature reception. In this study, we first examined if moderate warming of scrotum in conscious mice evokes avoidance behavior. Male adult C57BL6 mice were lightly held in a hammock. Their scrotum was warmed with a peltier device, which temperature was increased from 33 °C to 41 °C at a rate of 3 °C/min. Avoidance behavior was determined by vigorous leg movements and/or vocalization. Avoidance behavior started when scrotum temperature reached at around 36 °C, and became more frequent at higher innoxious temperatures. We then examined if the responses of primary sensory neurons to scrotal warming can be histologically detected using a putative neuronal activity marker, phospho-nuclear factor kappa B (pNFκB). Mice were anesthetized with pentobarbital and their scrotal temperature was kept between 37 °C and 39 °C for 10 min. The dorsal root ganglia (DRG) at the levels of L5, L6 and S1 were examined for nuclear localization of pNFκB immunohistochemically. In the control group, in which scrotum was not thermally stimulated, only a few DRG cells were positive for pNFκB. When scrotum was warmed, the number of pNFκB-positive neurons was significantly increased at L6 but neither L5 nor S1, indicating the spatial specificity of the pNFκB response. About 80% of pNFκB-positive neurons coexpressed transient receptor potential cation channel V1 (TRPV1). These results indicate that sensitivity to innoxious temperature can be behaviorally and histologically studied in mice by scrotal warming.

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P1-i03 Spinal plasticity converting tactile inputs to pain within a few hours after disruption of GDNF-induced low frequency firing in tactile nerves

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Many patients suffer from neuropathic pain that is sometimes induced by nerve injury. However, the trigger mechanisms underlying neuropathic pain are not well understood. Acute reorganization of cortical maps and potentiation of tactile cortical responses mediated by nearby nerves are observed within a few hours after nerve cut, while it is poorly understood how these cortical plasticities are related with neuropathic pain. In the present study, we tested a hypothesis that the acute tactile cortical potentiation may be an initial phase of neuropathic pain. We found that endogenous glial cell line-derive neurotrophic factor (GDNF), found in the Meissner corpuscles, induced basal firing around 0.1 Hz or less in its myelinated tactile afferents, and disruption of the basal firing triggered acute tactile cortical potentiation in mice. These mice with nerve cut exhibited mechanical hyperalgesia 1-2 weeks after nerve cut. Lesion of dorsal column-medial lemniscus pathways, mediating tactile cortical responses in naïve mice, did not abolished the tactile cortical potentiation after nerve cut, indicating that the potentiated responses after nerve cut were mediated by the spinothalamic tract. Our results suggest that disruption of the GDNF-induced basal firing in myelinated tactile fibers induces a spinal plasticity converting tactile inputs to neuropathic pain within a few hours. The initial phase of neuropathic pain, found in the present study, may serve as an assay system evaluating new therapy for neuropathic pain.

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P1-i04 Toe representation in the primary somatosensory cortex

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"Homunculus" is believed to have five toes on each foot in spite of our inability to move individual toes independently. His (i.e., our) physically separated toes may have ambiguous boundary contrary to their appearances. Using functional MRI, midline region in the primary somatosensory cortex (SI) was explored to reveal the neural representations of toes. In the present study, participants (2 males and 2 females) were delivered 40 Hz vibrotactile stimuli for 5 s on each toe separately in pseudorandom order and required to judge whether the stimulated toe was identical to the toe previously stimulated. Behavioral data showed difficulties in discriminating the vibrotactile sensation between middle 3 toes (II, III, and IV). High spatial resolution ($1.25 \times 1.25 \times 2.5\ mm^3$) neuroimaging data showed overlapped toes representations in SI while fingers showed distinct representations. These results are in accordance with electrophysiological data in monkey. Tactile body-image or somatosensory sensation has only 3 or 4 toes. This is the first study elucidating 5 toes representations in human brain.

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P1-i05 Crossing nerve transfer in the brachial plexus produces bilateral somatosensory cortical representation in mice

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Brachial plexus (BP) injury is sometimes repaired by peripheral nerve crossing for bypassing the injured sites. Successful functional recovery after such nerve crossing suggests that neural plasticity may be produced by nerve crossing. To test this hypothesis, we investigated somatosensory cortical responses after nerve crossing between the sectioned medial