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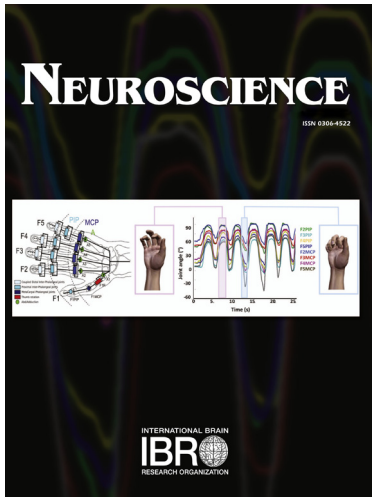


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# Convergence of Primary Sensory Cortex and Cerebellar Nuclei Pathways in the Whisker System

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Abstract

To safely maneuver through the environment the brain needs to compare active sensory information with ongoing motor programs. This process occurs at various levels in the brain: at the lower level, i.e. in the spinal cord, reflexes are generated for the most primitive motor responses; at the intermediate level, i.e., in the brainstem, various nuclei co-process sensory- and motor-related inputs; and, at the higher level cerebellum and thalamo-cortical networks individually compute suitable commands for fine-tuned motor output. For sensorimotor processes the integrative capacities of the cerebral cortex and the cerebellum have been the topic of detailed analysis. Here, we use higher order sensorimotor integration in the whisker system as a model to evaluate the convergence pattern of primary sensory cortex projections and the cerebellar output nuclei throughout several brain nuclei. This prospective review focuses not only on the thalamus, but also incorporates extra-thalamic structures that could function as comparators of cerebellar output and sensory cortex output. Based on the literature on anatomical and physiological studies in the rodent brain and our qualitative data on the convergence of cerebellar sensory cortical projections we identify the superior colliculus as well as the zona incerta and the anterior pretectal nucleus as suitable candidates for cerebello-cortical convergence. Including these putative comparators we discuss the potential routes for sensorimotor information flow between the cerebellum and cerebral sensory

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