between additional frontal study employed were more of learning inverse when subjects eral "the task found and performance. They before initial learning, advanced learning, and during skilled performance. They found activation of the supplementary motor area during initial learning as well as during skilled performance and for a specific movement of the supplementary motor area in motor learning. Grafton et al employed a pursuit rotor task. Activation in the posterior part of the supplementary motor area was found to increase with the level of skilled performance. There was no indication of a role of the supplementary motor area in motor learning. Furthermore, the task of Grafton et al corresponded to the control task of Ackermann et al in which the patient's performance was not impaired. Indeed, the two PET studies indicate "the supplementary motor area to be part of circuits mediating visuomotor skill acquisition" (Ackermann et al) seems not to be clear.

There are studies on visuomotor learning in which Ackermann et al do not refer. Lang et al have studied brain potentials when subjects learned to track a visual target in a mirror reversed way. Brain potentials were more negative in frontalateral and frontomedial recordings with the learning task than with a control task (non-inverse visual tracking). The functional relevance of this finding was shown by demonstrating intersubject correlations between additional frontal negativity and the success of motor learning. This result was confirmed in subsequent studies. The later study employed two independent techniques of functional brain imaging, brain potentials and regional cerebral blood flow (rCBF) measurements by SPECT. With motor learning (compared with the control task) there was a significant increase of rCBF in the middle frontal gyrus (of either hemisphere), basal ganglia, and cerebellum. More recently, Ackermann et al have studied visuomotor learning in 53 patients with chronic frontal lobe lesions. These patients performed a mirror reversed tracking task with non-inverted tracking as a control. Out of 53 patients 16 showed impaired motor learning. The critical region of differentiation was between the supplementary motor area and the anterior portion of the cingulate gyrus of both hemispheres.

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1 Ackermann H, Daum I, Schugens MM, Grodd W. Impaired procedural learning after damage to the left supplementary motor area (SMA). J Neurosurg Psychiatry 1996; 94-7.

The pathway possibly responsible for the occurrence of isolated lateropulsion of the trunk

Bertholot et al recently described a patient with a lesion in the medial part of the cerebellum peduncle presenting with isolated lateropulsion to the side of the lesion. I had previously reported a case with a similar clinical picture and reviewed the medical literature. The lesion in my patient involved the white matter in the inferior portion of the ipsilateral cerebellar hemisphere, possibly in the territory of the lateral branch of the posterior inferior cerebellar artery (IPICA). Spinocerebellar, cuneocerebellar, reticulocerebellar, and olivocerebellar fibres run in the inferior cerebellar peduncle. The topographical localization of the specific system within the inferior cerebellar peduncle has not been fully clarified. I assume that the fibres in the lesions of both the patient of Bertholot et al and my patient may be the areas involved in representing the trunk including standing, stance, and gait, and the destination of these fibres may be the neurons located in the paravermal region of the inferior cerebellar hemisphere.

Lesions involving other parts of the cerebellum or brainstem may produce signs of lateropulsion; however, they are usually associated with additional neurological deficits. Amarenco et al reported several patients with lesions in the medial branch of the PICA (mIPICA); most of the patients with lateropulsion were associated with vertigo. However, in their patients, lateropulsion of the trunk persisted longer than other signs and eventually became "isolated". Together with the findings in my patient, this suggests that fibres mediating balance may pass through the territory of the mIPICA and reach the territory of the IPCA. Separation between the fibres mediating balance and the more medially placed fibres mediating vestibular function should occur so that an "isolated" neurological deficit becomes possible. Indeed, in the cat, primary vestibular fibres end mainly in the flocculus and nodulus, whereas fibres in the dorsal spinocerebellar tract end more laterally, in the intermediate zone. The assumption that selective lesion of the dorsal spinocerebellar tract produces signs of "isolated lateropulsion of the trunk" in humans awaits proof.

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3 Iwata M, Hirano A. Localization of olivo-
MATTERS ARISING: Ackermann et al reply:

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