Different Temporal Patterns of Activation in Sensorimotor Cortex, SMA, and Putamen Secondary to a Motor Task

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**Purpose**

In a sustained motor task, the activation of the subcortical structures may be shorter than the activation in the sensorimotor cortex. The purpose of this study was to characterize the activation in the sensorimotor cortex (SMC), supplementary motor area (SMA), dentate nucleus of cerebellum (DOC), and putamen (P) to a toe or finger movement task.

**Materials & Methods**

Echo planar images were collected for functional MR images in 8 subjects performing a toe movement task and a finger tapping task. Functional images were processed with a conventional student t mapping technique. Time course plots from each area were examined for the sensorimotor cortex, supplemental motor area, putamen, and cerebellum. The regions of short and sustained activation were mapped. Independent component analysis was applied and components specific to the SMC, SMA, DOC, and P were analyzed in terms of their temporal characteristics.

**Results**

In the data analyzed to date, activation secondary to toe tapping was detected in the SMC, SMA, putamen, and DOC. Activation detected in the putamen and DOC was less sustained than activation in the SMA and Sensorimotor cortex.

**Conclusion**

The hemodynamic response to motor functions differs between the SMA and the putamen. Activation in the putamen has a shorter duration. Detection of activation in the putamen or other subcortical regions secondary to motor tasks may require a modified reference function or ICA analysis.

**References**