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# Dissociating action cancellation and action restraint – Evidence from prefrontal and basal ganglia lesion patients

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## Abstract

Research on inhibitory motor control has implicated several prefrontal as well as sub-cortical and parietal regions in response inhibition. Whether prefrontal regions are critical for inhibition, attention or task-set representation is still under debate. We investigated the critical influence of the lateral PFC on response inhibition by using cognitive electrophysiology in prefrontal lesion patients. Patients and controls did not differ in their inhibitory speed (stop-signal and change-signal reaction time, SSRT and CSRT), but patients made more errors in a Go/Nogo task and showed more variable performance. These data stress the role of the PFC in maintaining inhibitory control but not in actual inhibition supporting a dissociation between action cancellation and PFC dependent action restraint. Laplacian transformed event-related potentials (ERPs) revealed reduced parietal activity in PFC patients in response to the stop-signals, and increased frontal activity over the intact hemisphere. This electrophysiological finding supports altered PFC dependent visual processing of the stop-signal in parietal areas and compensatory activity in the intact frontal cortex. Interestingly, when administering the Go/Nogo and Stop-signal tasks in a group of patients with unilateral basal ganglia lesions, we found evidence for a dissociation in terms of behavioral impairments: PFC lesion patients made more commission errors in the Go/Nogo task but had an average SSRT, whereas basal ganglia patients showed a clearly increased SSRT but not more commission errors than controls. I will discuss implications of these findings for current models of response inhibition.

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