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REORGANIZATION OF BRAIN FUNCTION DURING FORCE PRODUCTION AFTER STROKE: A SYSTEMATIC REVIEW OF THE LITERATURE

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ABSTRACT

Damage to motor areas of the brain, caused by stroke, can produce devastating motor deficits, including aberrant control of force. Reorganization of brain function has been identified as one of the fundamental mechanisms involved in recovery of motor control after stroke, and recent advances in neuroimaging have enabled study of this brain reorganization. This review focuses on neuroimaging studies that have examined reorganization of brain function during force production and force modulation after stroke. Type and extent of reorganization after stroke was characterized via three factors: severity of injury, time after stroke and the impact of therapeutic interventions on brain activation during force production. Twenty-six studies meeting the inclusion criteria could be identified in MEDLINE (1980 to 2007). Relevant characteristics of studies (lesion location, chronicity of stroke, motor task) and mapping techniques varied widely. During force production, increased activation in secondary motor areas occurred in persons with more severe strokes. Also, reduced recruitment of secondary motor areas during force production was found as a function of increased time since stroke. During force modulation, increased activation in motor areas occurred with greater force generation. In addition, persons with more severe stroke showed relatively greater activation with rising force as compared to persons with less severe stroke. Lastly, alteration of brain activation during and after rehabilitative interventions in persons with stroke occurred in some studies. This systematic review establishes that reorganization of brain function during force production and force modulation can occur after stroke. These findings imply that therapeutic strategies that may be able to target brain reorganization to improve force control and functional recovery after stroke.

KEYWORDS: *Stroke, Brain Function, Force Production*

Article History

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