

Cerebral cortex plasticity by rehabilitation treatment "Cpreliminary active and passive clenching task fMRI study in ischemic stroke

X. Liu¹, L. Li², P-L. Westesson¹

¹Division of Diagnostic & Interventional Neuroradiology, University of Rochester School of Medicine & Dentistry, Rochester, NY, United States, ²Department of Neurology, Beijing Tiantan Hospital, Beijing, Beijing, China, People's Republic of

Purpose: To analyze cerebral cortex compensation after ischemic stroke, by combining analysis of passive and active clenching task fMRI in 3T.

Method and materials: 11 patients(10 males, 1 female), who recovered to Twitchell-Brunstorm stage □ or □ after MCA territory ischemic stroke and 16 volunteers(9 males and 7 females) were analyzed. Active and passive clenching task fMRI(multi phase EPI, TR/TE =3000/30) was performed in GE Signa 3T. The fMRI data were analyzed by SPM99, p<0.05.

Results: The patient passive clenching fMRI result shows not only activation in Brodmann1,2,3 area of primary sensory cortex, but also activation in Brodmann4,6 of first somatic motor area.

The patient active clenching fMRI result shows more activation in the2,3 than the primary motor cortex.

Comparing with the active task result of volunteers by SPM group analysis, there are difference in bilateral Brodmann 3, 5 and 40 area of patient(Figure 1 active clenching activation difference between patient and volunteer group).

Conclusions: The passive clenching task could cause motor cortex activation, which may be the mechanism about why passive rehabilitation treatment is useful for patient motor function recovery. The result that more activation in the Brodmann 2, 3, 5 and 40 area during active clenching task of patient, suggest that both sensory cortex and post-parietal cortex compensate motor function. These two area are important for the cerebral cortex plasticity after ischemic stroke.

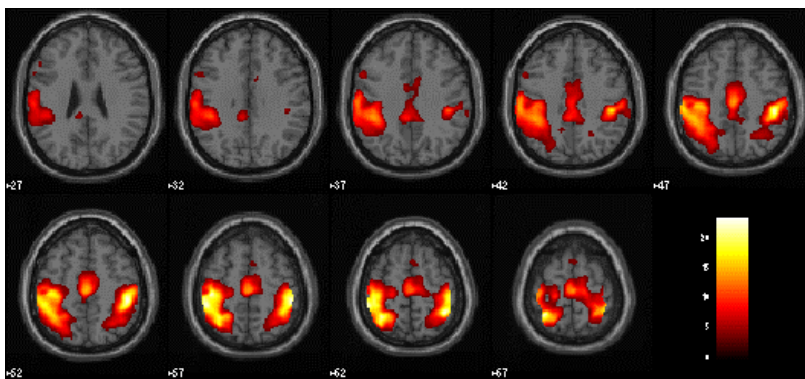


Figure 1

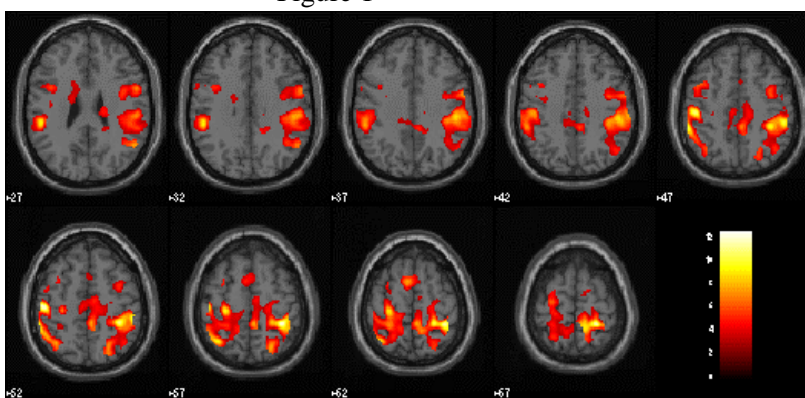


Figure 2

Figure 1, passive clenching fMRI of patients shows that both primary sensory and motor cortex are activated. Figure 2, Group comparison of active clenching fMRI between patient and volunteer group shows more activation of bilateral Brodmann 3, 5 and 40 area in patient group, which suggests cortex compensation of sensory cortex and post-parietal cortex.