Brain activation associated with evaluative process of moxibustion stimulation: An fMRI preliminary study

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Introduction:

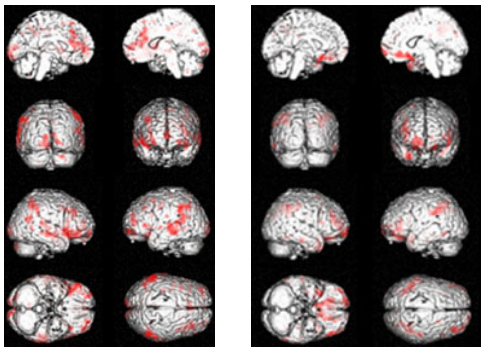
Moxibustion is a traditional Chinese medicine technique that involves the burning of mugwort, a small, spongy herb, to facilitate healing. Like acupuncture, moxibustion has been used for more than 2500 years to treat disease in oriental countries. However, acupuncture is widely accepted as a highly effective therapy in the western countries, while moxibustion is less popular partially due to the paucity of its scientific studies. The aim of this study was to investigate the brain activation associated with evaluative process of moxibustion stimulation.

Materials and Methods:

Thirteen healthy right-handed volunteers (21-27 years, 7 males, 6 females) were enrolled in the current study. Both real moxibustion and mock moxibustion (same point with minimal intensity) were performed at *Zusanli* (ST. 36). The experimental design was R_{90}-S_{90}-R_{180}-S_{90}-R_{90}, in which two stimulation periods (S_{90}, moxibustion stimulation for 90 seconds) were interposed within three rest periods (R_{90}, R_{180}, no moxibustion for 90, 180 seconds). fMRI was performed on a 3.0 Tesla Siemens Trio scanner (Siemens, Erlangen, Germany) using EPI-BOLD imaging methods with TR/TE=3000/30ms. 36 slices were acquired axially, covering the entire brain with the following resolution parameters: matrix=64 x 64, FOV = 22 cm, slice thickness = 3 mm. T1-weighted anatomic images were acquired for Talairach transformation and functional mapping. Analysis of the imaging data was performed in SPM02.

Results:

Areas activated by moxibustion stimulation were demonstrated in Figures 1, and summarized in Table 1. The real moxibustion stimulation activated bilateral SI/SII/Ins, premotor cortex (PMC), parietal BA7/BA40, temporal BA22, puteman, pons and contralateral anterior cingulated. It also deactivated bilateral amygdale and hippocampus. The activated areas of mock moxibustion were found in bilateral SI/SII, PMC, ACC etc, while no deactivations were found in amygdale and hippocampus. It was interesting that the fMRI signal of anterior cingulate BA31 increased in the ipsilateral while decreased in the contralateral.



A B

Figure 1: A is the activated area of real moxibustion; B is the activated area of mock moxibustion.

Table 1: Brain areas activated by Real/mock moxibustion

Brain areas	Real	Mock
B-PMC	+	+
B-SI	+	+
B-SII/insula	+	+
B-Parietal BA7	+	+
B-Parietal BA40	+	
C-ACC BA31	+	+
I-ACC BA31	-	+
Thalamus		
B-Amygdala	-	
B-Hippocampus	-	
B-pons	+	
B-putamen	-	+
B-temporal BA22	+	

+/-, activation/deactivation; B, bilateraral; C, contralateral; I, ipsilateral; SI, primary somatosensory area; SII, secondary somatosensory area; PMC, premotor cortex; ACC, anterior cingulate cortex; BA, Brodmann area.

Conclusion:

To the best of our knowledge, it was the first time that fMRI was used to investigate the brain activation and evaluative process of moxibustion stimulation. The preliminary results suggested that moxibustion modulate the activity of the limbic system and subcortical structures, which may explain the mechanism of moxibustion effects. It provided the evidence that moxibustion has analgesic effect like acupuncture. Further studies are needed to verify our findings.

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