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fMRI Evaluation for Acupuncture Treatment on Patients with Depression

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Purpose: Acupuncture has effects on multiple physiological systems. It is a promising complementary therapy for affective and psychosomatic disorders such as anxiety, depression, substance abuse, pain and visceral dysfunctions. We used fMRI to monitor acupunctural effect on human brain, with the focus on the limbic system and subcortical gray structures that are intimately involved in the regulation of emotions, autonomic and endocrine functions.

Materials and Methods: Scanning was performed on 13 normal human volunteers and patients with depression in a 1.5 T GE Signa MRI System. A sagittal localizer scan with 60 slices was acquired by T1 weighted spoiled echo-gradient sequence for Talairach transformation. fMRIs were acquired by GE T2--WT with TE 50 msec, TR 4.8 sec. Acupuncture was performed at LI. 4. The subjects received acupuncture stimulation twice, each lasting 2 minutes. The needle was twirled gently 120 times per minute using a balanced tonifying and reducing technique. The periods with needle in place (2 min before, 4 min between, 2 min after needle manipulations) served as baseline.

Results: Whole brain imaging was performed on one subject with deqi and one subject with pain response more than 1 year later. Acupuncture evoked deqi in both subjects. The former demonstrated signal decreases in the limbic and subcortical gray structures as before. The latter showed a reverse in the direction of signal changes, from signal increases with pain before to signal decreases with deqi in the repeat study. Whole brain imaging revealed prominent signal decreases with deqi sensation in additional brain regions that are closely linked to the limbic system, such as the frontal pole, prefrontal cortex and cerebellar vermis.

Discussions: The study provides evidence that supports a coordinated effect of acupuncture on a network of cortical and subcortical limbic and paralimbic structures including the frontal pole, the prefrontal cortex and cerebellar regions that are connected to the limbic system. Modulation of this neuronal network could initiate a sequence of effects by which acupuncture regulates multisystem functions. The effects on the limbic system could well contribute to its efficacy for the treatment of diverse affective and psychosomatic disorders.

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