

The Clinical Efficacy, Evaluation and Central Mechanism Study on Acupuncture for Treating Functional Dyspepsia

China

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Summary

Using two randomized, controlled clinical trials and two neuroimaging studies, we found that, compared with fictitious acupoints, acupoints on the gallbladder meridians, and non-specific acupoints on the stomach meridian, the specific acupoints on the stomach meridian significantly improved the symptoms and quality of life of functional dyspepsia patients, and elicited more significant cerebral responses, especially in the symptom-related brain regions, the anterior cingulate cortex (ACC), insula, thalamus and cerebellum.

The results indicated that acupuncture is effective and safe for functional dyspepsia, and puncturing at acupoints provided better efficacy than fictitious ones.

The results also demonstrated the existence of acupoint specificity for the specific acupoints at the stomach meridian for treating functional gastrointestinal disorders.

Finally, the results suggested that dynamics and targeting are the important characteristics of the central mechanism of acupoint specificity. Targeting implies the central mechanism of acupoint specificity is disease-oriented, exhibiting more significant modulation on the disease-associated brain regions. The dynamics imply the central mechanism of acupoint specificity is one of dynamic variability depending upon the various physical states, treatment duration and acupoint combination.

Background and Justification

Functional dyspepsia (FD), a major gastrointestinal disorder, is characterized by persistent and recurrent postprandial upper abdominal discomfort after meals, early satiety, abdominal distension or burning without any organic or biochemical abnormality and although FD is not life-threatening, it has long been an important health issue and social problem for its high prevalence, uncertain pathogenesis, low response rate and great influence on quality of life. Therefore, effective complementary and alternative therapies are needed.

Acupuncture has been used effectively to treat FD, but lacks high quality clinical evidence to support it.

According to acupuncture theory and clinical experience, acupoints on the stomach meridian are the most commonly used points in FD treatment, but the mechanism of acupoint specificity remains unclear.

Description

We carried out a systematic review to evaluate the quality of clinical evidence and conducted two randomized control trials to verify the clinical efficacy and acupoint specificity, plus two neuroimaging studies to investigate the mechanism on acupoint specificity in FD treatment.

The clinical efficacy evaluation included three steps: a systematic database review; a randomized controlled trial with 700 participants that tested at different acupoints for FD (Fig. 1); and another randomized controlled trial for acupuncture at acupoints selected according to the meridian distribution and syndrome differentiation for FD with 200 participants (Fig. 2).

Two neuroimaging studies attempted to determine the central mechanism of acupoint specificity and the factors that influence acupoint specificity in FD treatment, respectively (Figs. 3 and 4).

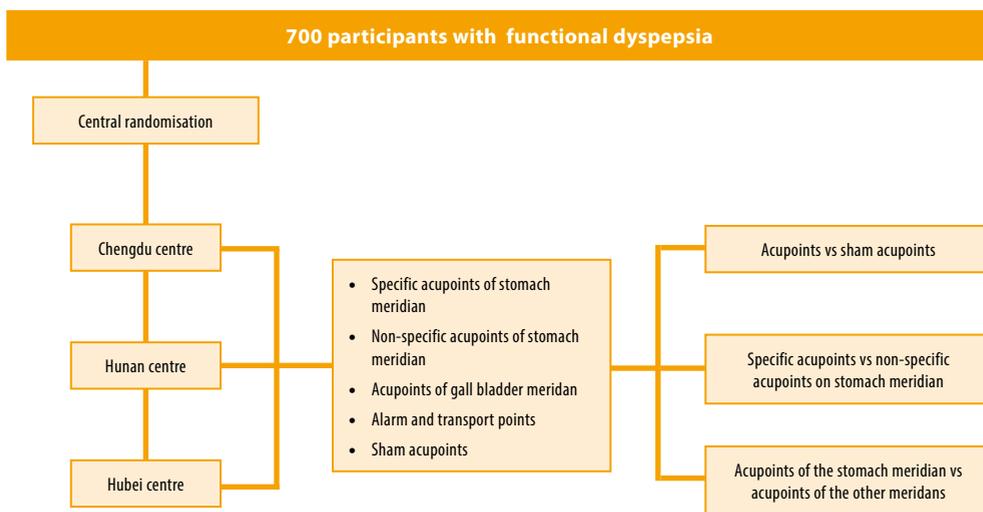


Figure 1: Flow chart of a randomized controlled trial: Acupuncture at different acupoints for functional dyspepsia (FD).

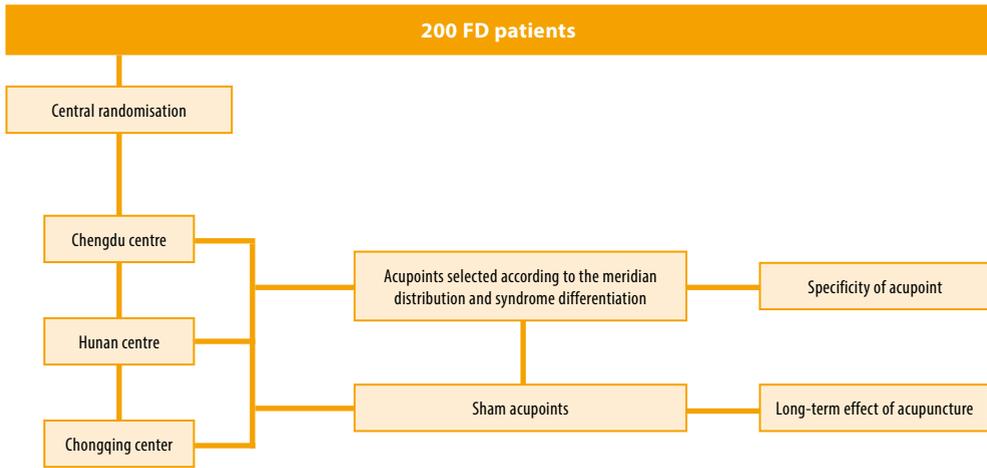


Figure 2: Flow chart of a randomized controlled trial: Acupuncture at acupoints selected according to the meridian distribution and syndrome differentiation for functional dyspepsia (FD).

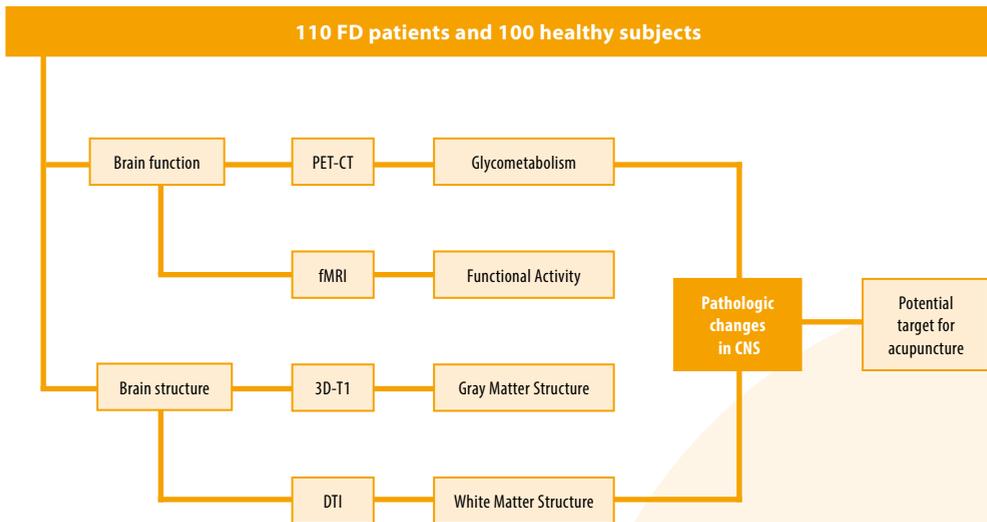


Figure 3: Flow chart of first neuroimaging study: cerebral structural and functional alterations of functional dyspepsia (FD). CNS: central nervous system.

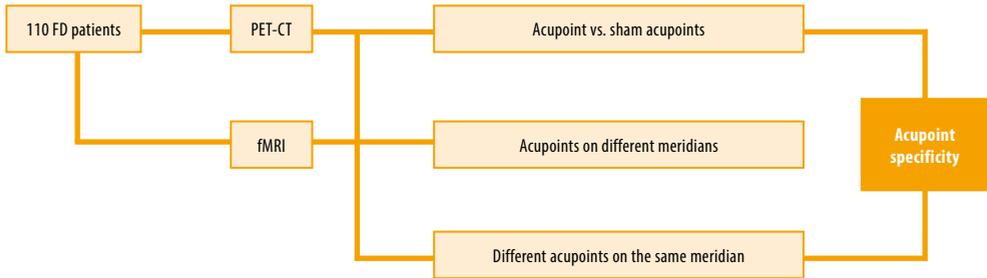


Figure 4: Flow chart of second neuroimaging study: cerebral mechanism of acupuncture for treating functional dyspepsia (FD).

Results

The evidence from the literature review provided limited information on how to improve the benefit and safety of acupuncture for treating FD. Better-designed clinical trials with larger sample sizes were therefore needed.

The trials reported here showed that acupuncture was effective for treating FD. Specific acupoints on the Stomach meridian gave superior results compared to sham acupoints, acupoints on the gallbladder meridians, and non-specific acupoints on the stomach meridian, alarm and transport points in improving the symptoms and quality of life of FD patients (Figs. 5 and 6).

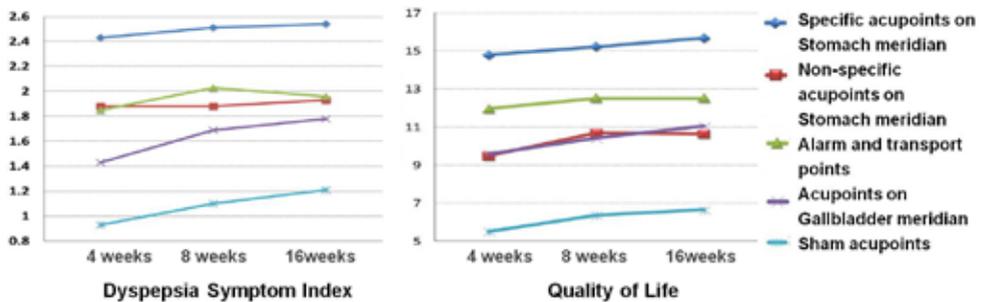


Figure 5: Improvement of Dyspepsia Symptom Index (left), and quality of life score (right) after acupuncture interventions.

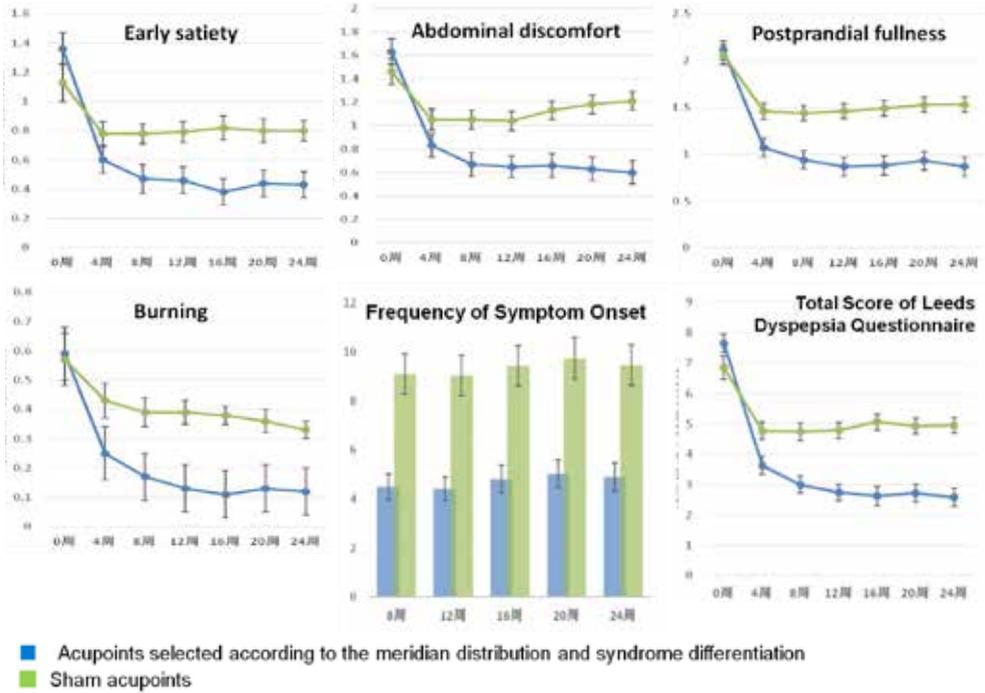


Figure 6: Change in Leeds dyspepsia questionnaire scores after interventions.

The neuroimaging studies showed that FD patients exhibited functional and structural abnormality in the central nervous system. The specific acupoints on the stomach meridian elicited more significant cerebral responses, especially in symptom-related brain regions. The central integrated mechanism of acupoint specificity is dynamically variable according to different physical states, duration of treatment and compatibility of acupoints (Figs. 7, 8 and 9).

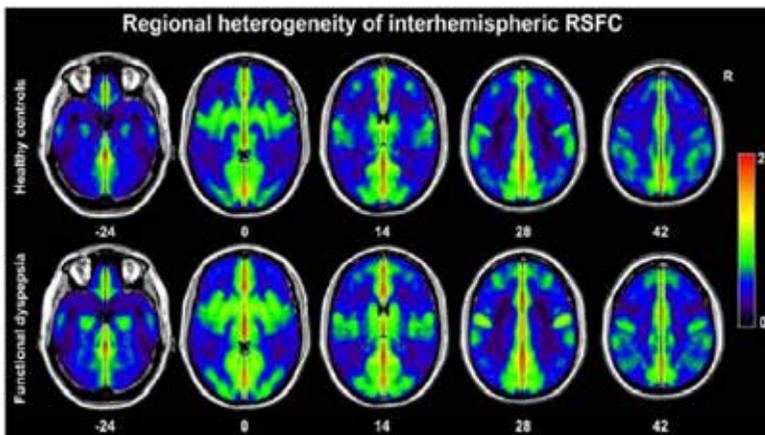


Figure 7. Cerebral structural and functional alterations of FD patients and healthy subjects.

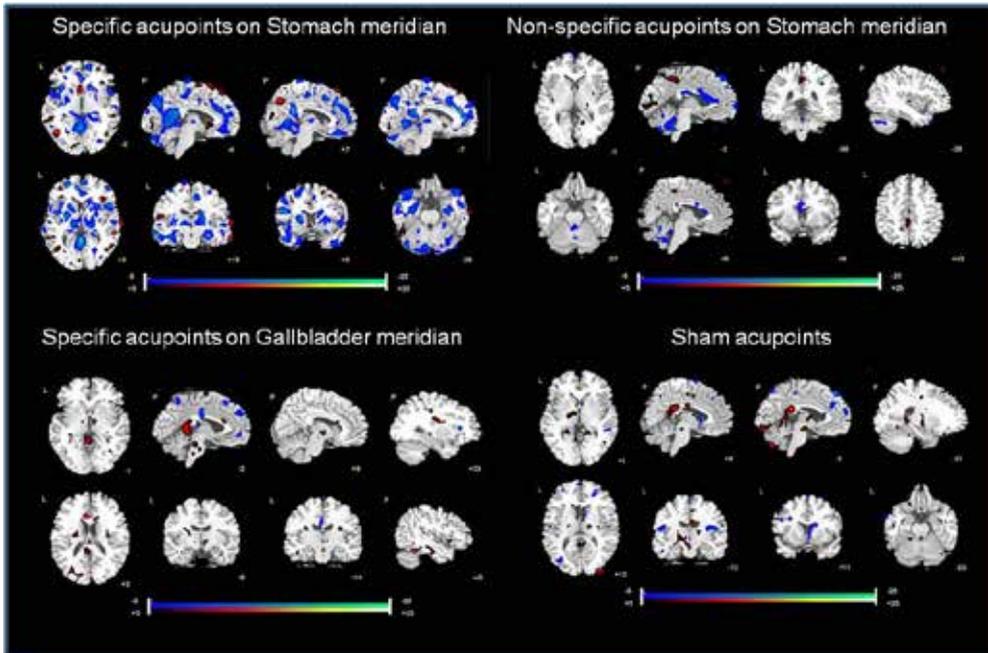


Figure 8: Cerebral responses on puncturing at the specific acupoints on stomach meridian (top left) were significantly different from those at sham acupoints (bottom right), acupoints on other meridians (bottom left) or non-specific acupoints on the stomach meridian (top right).

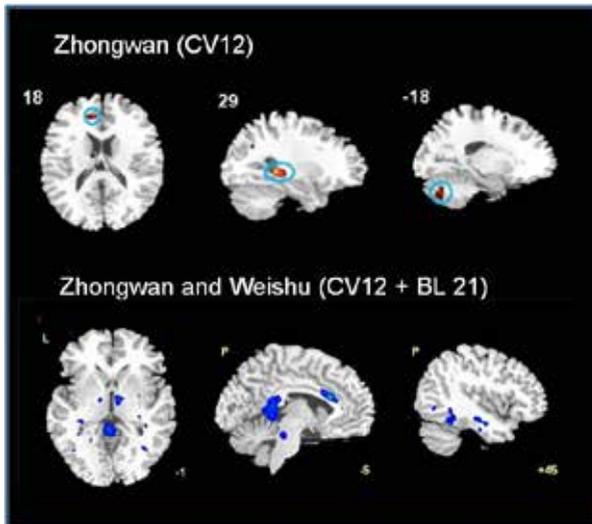


Figure 9: Demonstration that 20 acupuncture treatment sessions gave improved results compared to 5 sessions with regard to regulating brain function and improving clinical manifestations.

In addition, qualitative assessments of patients' quality of life before and after the acupuncture treatments demonstrated improvements (Fig. 10).

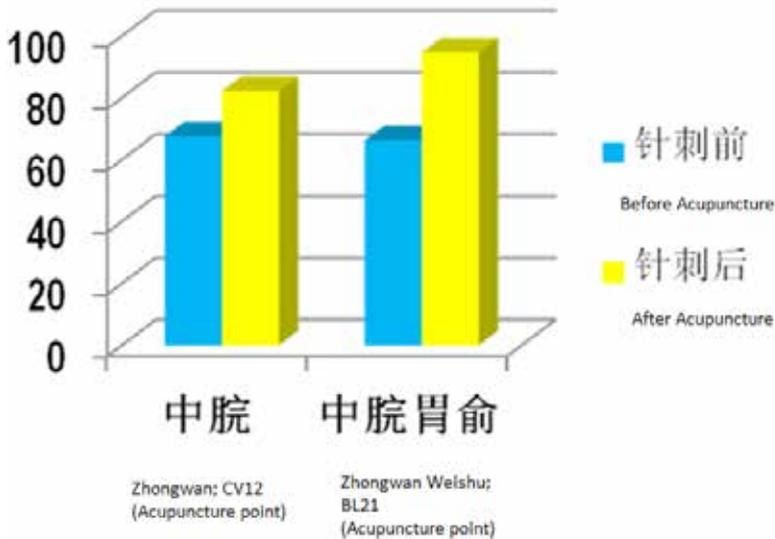


Figure 10: Improvement of quality of life before and after acupuncture treatment for functional dyspepsia (FD).

Partnerships

Among the partners involved in these studies were:

- Hunan University of Traditional Chinese Medicine,
- Hubei University of Traditional Chinese Medicine,
- School of Life Sciences and Technology, Xidian University,
- Huaxi MR Research Centre at the West China Hospital of Sichuan University,
- Sichuan Academy of Medical Sciences, and
- Sichuan Provincial People's Hospital.

Impact

- In total, 45 research papers have been published in Science Citation Index (SCI) journals.
- Following these reports, methods of neuroimaging studies proposed in this project have been adopted in eleven scientific research institutions nationwide, and accepted by 37 organizations outside China.

The research presented here was awarded the 2012 National Science and Technology Progress Second Prize, and the 2014 Sichuan province scientific and technological progress award.

Future Plans

We intend to investigate the mechanism of acupoint specificity using connectomics, i.e. comprehensive maps of the connections within the nervous system.

Publications

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