Abstracts and Commentaries on Key Articles in the Literature

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A sensitive acupuncture needle microsensor for real-time monitoring of nitric oxide in acupoints of rats.

Tang L, Li Y, Xie H, et al. *Sci Rep.* 2017;7(1):6446.

THIS ANIMAL EXPERIMENTAL STUDY was conducted by 10 scientists from Wuhan, China. The researchers report on an acupuncture needle modified with an iron–porphyrin functionalized graphene composite (FGPC) for real-time monitoring of nitric oxide (NO) release in acupoints of rats. A gold film was first deposited on the needle surface to enhance its conductivity. The FGPC was prepared via hydrothermal synthesis and was subsequently applied to the tip surface of the acupuncture needle by an electrochemical deposition method. The functionalized needle enabled a specific and sensitive detection of NO based on the favorably catalytic properties of iron–porphyrin and the excellent conductivity of graphene. Amperometric data showed that the needle achieved not only a low-detection limit down to 3.2 nM in phosphate-buffered saline solution but also satisfactory selectivity. Interestingly, the functionalized needle could be inserted into the acupoints of rats for real-time monitoring of NO in vivo. It was found that a remarkable response to NO was obtained in different acupoints when stimulated by L-arginine, revealing that the release of NO was detectable in acupoints. It is expected that this work will showcase the applications of the acupuncture needles for detecting some important signaling molecules in vivo and for exploring the mechanism of acupuncture treatment.

Changes in esophageal motility after acupuncture.

Vieira FM, Herbella FAM, Habib DH, Patti MG. *J Gastrointest Surg.* 2017;21(8):1206–1211.

THIS STUDY was mainly conducted in Brazil. Acupuncture has been increasingly used and recognized as a complementary medical treatment. Some studies on gastrointestinal motility are available; however, acupuncture's effect on esophageal motility is still elusive due to the lack of studies

with adequate methodologies. This study aimed to evaluate acupuncture's effect on esophageal motility. The researchers studied 16 (50% females, mean age 26 years) volunteers. No individuals had received acupuncture previously. All subjects underwent high-resolution manometry. The test was performed in three phases: (1) basal measurements, (2) 20 minutes after acupuncture stimulation of the gastrointestinal point (ST 36), or (3) 20 minutes after acupuncture stimulation of a sham point (5 cm medial to ST 36; crossover). ST 36 or sham points were alternated in order based on randomization. Lower esophageal sphincter (LES) resting and residual pressure, distal latency (DL), and distal contractility integral were recorded. All tests were reviewed by 2 experienced investigators who were blinded to the acupuncture point used.

LES resting pressure was significantly reduced after acupuncture ($P=0.015$; Wilcoxon signed-rank test). DL was significantly increased after acupuncture (either sham or ST 36), compared to basal measurement. The results showed that acupuncture on the digestive point decreases LES basal pressure. Acupuncture could be an alternative treatment to spastic disorders of the LES.

Protective effects of acupuncture in cardiopulmonary bypass-induced lung injury in rats.

Ma W, Li Z, Lu Z, et al. *Inflammation.* 2017;40(4):1275–1284.

THE RESEARCHERS in this study are from different research institutions in China. Acute lung injury caused by cardiopulmonary bypass (CPB) increases mortality after cardiac surgery. A previous clinical study suggested that electroacupuncture (EA) has a protective effect during CPB, but the mechanism was unclear. Thus, the researchers designed this study to investigate the effects of EA on CPB-induced lung injury and the underlying mechanism. Male Sprague-Dawley rats were randomly divided into control, CPB, and CPB + EA groups. A lung injury model was created by CPB surgery to serve as the CPB group, and EA (2/100 Hz) was used before CPB in the CPB + EA group. Lung tissue was collected at 0.5, 1, and 2 hours after CPB. Pulmonary malondialdehyde (MDA) concentrations as well as superoxide

dismutase (SOD), myeloperoxidase (MPO), and caspase-3 activity were determined. c-Jun N-terminal kinase (JNK), ERK, p38, and cleaved caspase 3 in the lung were analyzed by Western blotting. A549 cells were treated with rat serum from the CPB and CPB + EA groups, and cleaved caspase-3 activity was detected by fluorescent immunohistochemistry.

CPB significantly increased MPO activity, MDA content, apoptosis, caspase-3 activity, and phosphorylated p38, but decreased SOD activity, compared with the control group. EA increased SOD activity significantly at 0.5 and 2 hours ($P < 0.01$ versus CPB) and reduced CPB-induced histologic changes and MPO activity at 1 and 2 hours ($P < 0.05$ versus CPB), MDA content at 2 hours ($P < 0.05$ versus CPB), caspase-3 activity at 1 hour ($P < 0.05$ versus CPB), and phosphorylated p38 and JNK at 0.5 hour after CPB. The serum from the CPB group increased more positive-staining cells of cleaved caspase-3 than that from the CPB + EA group. EA reversed the CPB-induced lung inflammation, oxidative damage, and apoptosis; the mechanism could involve decreased phosphorylation of p38 along with caspase-3 activity and activation.

A case of shingles following auricular acupuncture.

Kewish SA. *J Am Board Fam Med.* 2017;30(4):552–555.

A RESEARCHER from the Naval Hospital in Bremerton wrote this case report of an occurrence of shingles (herpes zoster [HZ]) following auricular acupuncture. The patient developed acute reactivation HZ in the V1 distribution of the right trigeminal nerve involving the forehead, scalp, and medial upper eyelid, 13 days after being treated with auricular acupuncture for chronic low-back pain. The lesions were initially painless, but they clustered and became painful within 2 days. The patient was treated with 1000 mg of oral valacyclovir, 3 times per day, for 7 days, and ibuprofen as needed. The lesions resolved without sequelae.

Influence of the patient–practitioner interaction context on acupuncture outcomes in functional dyspepsia: study protocol for a multicenter randomized controlled trial.

Ko SJ, Park JW, Leem J, et al. *BMC Complement Altern Med.* 2017;17(1):363.

THIS STUDY will be performed with cooperation between the United States and the Republic of Korea. In the treatment of functional dyspepsia, the placebo effect has been reported to be high, and the influence of the patient–practitioner relationship could be a major component of this effect. The specific and nonspecific effects of acupuncture cannot be distinguished easily, and the patient–practitioner relationship can influence the total therapeutic effect in clinical practice. There have been no studies to investigate the influence of the patient–practitioner relationship on acupuncture treatment for patients with functional dyspepsia.

Patients with postprandial distress syndrome—a functional dyspepsia subtype—will be recruited at three hospitals (two in the Republic of Korea and one in the United States) for an international, multicenter, randomized, patient/assessor-blinded clinical trial. The total anticipated sample size is 88. The participants will be allocated randomly into 2 groups: (1) an augmented interaction group and (2) a limited interaction group. Acupuncture, with total 12 acupoints, will be performed twice weekly, for 4 weeks, in both groups. Trained practitioners will provide an “augmented” or “limited” interaction context, as determined by random allocation. The primary outcome measure will be the proportion of responders and the proportion of participants who answer “yes” to more than half of the adequate relief questions during the study. Secondary outcome measures will include questionnaires for quality of life and symptoms of dyspepsia, and a maximum tolerable volume of nutrient drink test. Data will be collected at baseline and following 4 weeks of acupuncture. The researchers will evaluate the influence of the patient–practitioner interaction on the clinical effects of acupuncture in patients with functional dyspepsia.

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