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Mast cell deficiency attenuates acupuncture analgesia for mechanical pain using c-kit gene mutant rats.

<https://www.ncbi.nlm.nih.gov/pubmed/29551908>

J Pain Res. 2018 Mar 5;11:483-495. doi: 10.2147/JPR.S152015.

By Cui X, Liu K, Xu D, Zhang Y, He X, Liu H, Gao X, Zhu B.

Abstract**BACKGROUND:**

Acupuncture therapy plays a pivotal role in pain relief, and increasing evidence demonstrates that mast cells (MCs) may mediate acupuncture analgesia. The present study aims to investigate the role of MCs in acupuncture analgesia using *c-kit* gene mutant-induced MC-deficient rats.

MATERIALS AND METHODS:

WsRC-Ws/Ws rats and their wild-type (WT) littermates (WsRC-+/+) were used. The number of MCs in skin of ST36 area was compared in two rats after immunofluorescence labeling. Mechanical withdrawal latency (MWL), mechanical withdrawal threshold (MWT), and thermal withdrawal latency (TWL) were measured on bilateral plantar for pain threshold evaluation before and after each stimulus. Acupuncture- and moxibustion-like stimuli (43°C, 46°C heat, 1 mA electroacupuncture [EA], 3 mA EA, and manual acupuncture [MA]) were applied randomly on different days.

RESULTS:

Fewer MCs were observed in the skin of ST36 in mutant rats compared to WT rats ($P<0.001$). For pain thresholds, MWL and MWT were higher in WsRC-Ws/Ws compared to WsRC-+/+ on bilateral paws ($P<0.05$), but TWL was not different between the two rats ($P>0.05$). Bilateral MWL and MWT in WsRC-+/+ rats increased significantly after each stimulus compared to baseline ($P<0.01$, $P<0.001$). In WsRC-Ws/Ws rats, only noxious stimuli could produce anti-nociceptive effects for mechanical pain (46°C, 3 mA EA, MA) ($P<0.01$, $P<0.001$). Additionally, the net increases in MWL and MWT induced by most stimuli were greater in WT than in mutant rats ($P<0.05$). For thermal nociception, either high- or low-intensity stimuli could significantly augment TWL in two rats ($P<0.001$), and the net increases of TWL evoked by most stimuli were to the same extent in two genetic variants.

CONCLUSION:

MCs influence the basic mechanical but not thermal pain threshold. MCs participate in acupuncture analgesia in

mechanical but not in thermal nociception, in that MC deficiency may attenuate the mechanical analgesia

evoked by high-intensity stimuli and eliminate analgesia provoked by low-intensity stimuli.

Findings and methodological quality of systematic reviews focusing on acupuncture for pregnancy-related acute conditions.

<http://aim.bmj.com/content/early/2018/03/19/acupmed-2017-011436.citation-tools>

Acupunct Med. 2018 Mar 20. pii: acupmed-2017-011436.

By Bergamo TR, Latorraca COC, Pachito DV, Martimbianco ALC, Riera R.

Abstract

INTRODUCTION:

Major concerns regarding the use of medication during pregnancy justify the need for safer interventions. Acupuncture is an emerging alternative for several clinical conditions during this period. The objective of this study is to summarise evidence derived from systematic reviews (SRs) focusing on acupuncture for pregnancy-related acute conditions.

METHODS:

Review of SRs. A systematic literature search was carried out in several electronic databases, aiming to include all SRs assessing the effects of acupuncture for acute conditions during pregnancy. Methodological quality and quality of the publication/reporting of each SR were assessed by the application of AMSTAR (Assessing the Methodological Quality

of Systematic Reviews) and PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), respectively.

RESULTS:

The initial search retrieved 11 492 records, of which 16 SRs met our inclusion criteria. The average AMSTAR score was 7.3, the lowest score being 3 and the highest 11. The lowest PRISMA score was 12, the highest 25, and the average PRISMA score was 19.9. The results support the proposal that acupuncture might be considered an option for alleviating pain during labour, for correcting breech presentation, and for managing pelvic and back pain during pregnancy. There is insufficient evidence to recommend acupuncture for inducing labour, managing nausea and vomiting in early pregnancy, improving sleep quality, controlling nausea and vomiting

associated with Caesarean delivery, and managing urinary infection.

CONCLUSIONS:

Acupuncture might be an option for alleviating pain during labour, for correcting breech presentation, and for

managing pelvic and back pain during pregnancy. More studies are needed to confirm the effects of acupuncture for other pregnancy-related acute conditions.

Effect of acupuncture on the TLR2/4-NF- κ B signaling pathway in a rat model of traumatic brain injury.

<https://www.ncbi.nlm.nih.gov/pubmed/29550760>

Acupunct Med. 2018 Mar 17. pii: acupmed-2017-011472.

By Lin SJ, Cao LX, Cheng SB, Dai QF, Lin JH, Pu L,

Abstract**OBJECTIVE:**

To study the effect of acupuncture on the TLR2/4-NF- κ B signalling pathway in the cortex of Sprague-Dawley rats following traumatic brain injury (TBI), and investigate the possible mechanism underlying the effects of acupuncture on scar repair.

METHODS:

TBI was established using Feeney's free-falling epidural percussion model. In total, 108 rats were randomly divided into a normal group (n=18), untreated TBI model group (TBI group, n=36) and manual acupuncture-treated TBI group (TBI+MA, n=36). Each group of rats was subdivided into three time groups: 3-day (3d), 7-day (7d) and 14-day (14d). No treatment was given to rats in the normal and TBI groups. The

TBI+MA group received manual acupuncture at GV20, GV26, GV16 through GV15, and bilateral LI4. mRNA expression of TLR2, TLR4, NF- κ B and protein in the rat cortices was quantified using real-time fluorescence quantitative polymerase chain reaction (qPCR) and Western blot analyses.

RESULTS:

The modified neurological severity score (mNSS) scores of the TBI+MA group were improved compared with baseline scores 12 hours after modelling, and improved at 7d and 14d compared with the TBI group ($P<0.05$), while the score of the TBI group did not improve until 14d compared to baseline. mRNA and protein expression of TLR2, TLR4 and NF- κ B in the TBI group were higher than the normal group at 3d ($P<0.05$),

reached a peak at 7d, then began to decrease at 14d. mRNA and protein expression of TLR2, TLR4 and NF- κ B were higher in the TBI+MA group compared with the TBI group at 3d ($P<0.05$), were significantly down-regulated at 7d ($P<0.01$), and decreased to normal levels at 14d.

CONCLUSIONS:

Acupuncture has a bidirectional regulatory effect on the TLR2/4-NF- κ B signalling pathway-related genes TLR2, TLR4 and NF- κ B in the TBI rat cortex, promoting their expression in the early stage and inhibiting it in the later stage.

Parameter-specific analgesic effects of electroacupuncture mediated by degree of regulation TRPV1 and P2X3 in inflammatory pain in rats.

<https://www.sciencedirect.com/science/article/pii/S0024320518301243>

Life Sci. 2018 Mar 14. pii: S0024-3205(18)30124-3. doi: 10.1016/j.lfs.2018.03.028.

By Fang JQ, Du JY, Fang JF, Xiao T, Le XQ, Pan NF, Yu J, Liu BY.

Abstract

AIMS:

Observing the parameter-specific anti-hyperalgesic effects of EA with different stimulation times and frequencies on painful hyperalgesia mediated by the level of TRPV1 and P2X3 expression in DRG after CFA injection.

MAIN METHODS:

The model was induced by the injection of CFA in each rat's right hind paw. EA treatment was applied to the bilateral ST36 and BL60. Paw withdrawal threshold (PWT) and paw withdrawal latency (PWL) were tested with Von Frey filaments and the radiant heat source of the test instrument, respectively. TRPV1 and P2X3 expressions were measured by

immunofluorescence and western blot. $\alpha\beta$ -meATP and capsaicine combined with EA were further utilized to investigate the change in PWL.

KEY FINDINGS:

Different stimulation times (20, 30, 45 min) combined with different frequencies (2 Hz, 100 Hz, 2/100 Hz) of EA have analgesic effects on the PWT and PWL; however, the level of the hypoalgesic efficacy of EA was primarily associated with EA frequency. The analgesic effect of EA was better at 100 Hz than at 2 Hz. The level of regulation of 100 Hz EA on TRPV1 and P2X3 in DRG was greater than that of 2 Hz. Furthermore, both TRPV1 agonist

and P2X3 agonist may impair the level of EA analgesia.

SIGNIFICANCE:

EA has a parameter-specific effect on chronic inflammatory pain relief, which primarily depend on the stimulation frequency and not on the stimulation

time at a certain stimulation time. The parameter-specific analgesic effect of EA is at least partially related to mediation of the protein level of TRPV1 and P2X3 expression in DRG of CFA rats.

Electroacupuncture restores hippocampal synaptic plasticity via modulation of 5-HT receptors in a rat model of depression.

<https://www.sciencedirect.com/science/article/pii/S0361923018300431>

Brain Res Bull. 2018 Mar 7;139:256-262. doi: 10.1016/j.brainresbull.2018.03.004.

By Han X, Wu H, Yin P, Chen Z, Cao X, Duan Y, et al.,

Abstract**OBJECTIVE:**

The study aimed to determine the effect of electroacupuncture (EA) on Wistar Kyoto (WKY) depressive model rats and explore the possible mechanism of EA on hippocampal CA1 region neuronal synaptic plasticity.

METHODS:

The male WKY rats were randomized to three experimental groups (EA, Sham EA, and Model group, n = 8/group), and Wistar rats as the normal control group (n = 8). EA treatment was administered once daily for 3 weeks at acupuncture points Baihui (GV20) and Yintang (EX-HN3). In the Sham EA group, acupuncture needles were inserted superficially into the acupoints without electrical stimulation. On day 21,

the forced swimming test (FST), open field test (OFT) and sucrose preference test (SPT) were conducted. After the behavioral tests, long-term potentiation (LTP) was evoked at Schaffer collateral-CA1 synapses in hippocampal slices in vitro by electrophysiological recording, 5-HTT, 5-HT1A and 5-HT1 B protein levels in the hippocampus CA1 region were examined by using Western blot.

RESULT:

EA significantly decreased immobility in FST and improved sucrose intake compared with the Sham EA and Model groups. The center time and total move time in OFT were significantly increased in the EA group compared to the Model group. Compared with those of the Sham EA and Model groups, the fEPSP

slope of the EA group increased significantly, and the LTP induction was successful. EA significantly decreased 5-HTT protein expression in the hippocampus CA1 region in comparison to the Sham EA and Model groups. Additionally, EA down regulated the 5-HT1A protein expression in the

hippocampus CA1 region in comparison to the Sham EA group.

CONCLUSION:

EA could ameliorate depressive-like behaviors by restoring hippocampus CA1 synaptic plasticity, which might be mainly mediated by regulating 5-HT receptor levels.

Effects of electroacupuncture combined with stem cell transplantation on anal sphincter injury-induced faecal incontinence in a rat model.

<https://www.ncbi.nlm.nih.gov/pubmed/29519860>

Acupunct Med. 2018 Mar 8. pii: acupmed-2016-011262.

Li X, Guo X, Jin W, Lu J.

Abstract**BACKGROUND:**

Bone marrow mesenchymal stem cells (BMSCs) and acupuncture are known to mitigate tissue damage. This study aimed to investigate the therapeutic effects of combined electroacupuncture (EA) stimulation and BMSC injection in a rat model of anal sphincter injury-induced faecal incontinence (FI).

METHODS:

60 Sprague-Dawley rats were randomly divided into five groups: sham-operated control, FI, FI+EA, FI+BMSC, and FI+BMSC+EA. The anorectal tissues were collected on days 1, 3, 7 and 14. Repair of the injured anal sphincter was compared using haematoxylin and eosin (HE) and immunocytochemical

analyses with sarcomeric α actinin. The expression of stromal cell derived factor-1 (SDF-1) and monocyte chemoattractant protein-3 (MCP-3) was detected by quantitative reverse transcription PCR to evaluate the effects of EA on the homing of BMSCs.

RESULTS:

The therapeutic effect of combined EA+BMSCs on damaged tissue was the strongest among all the groups as indicated by HE and immunohistochemical staining. The expression of SDF-1 and MCP-3 was significantly increased by combined EA and BMSC treatment when compared with the other groups ($P=0.01$ to

$P < 0.05$), suggesting promotive effects of EA on the homing of BMSCs.

CONCLUSION:

The combination of EA and BMSC transplantation effectively repaired the impaired anal sphincters. The underlying

mechanism might be associated with apparent promotive effects of EA on the homing of BMSCs. Our study provides a theoretical basis for the development of a non-surgical treatment method for FI secondary to muscle impairment.

Clinical analysis of electroacupuncture and multiple acupoint stimulation in relieving cancer pain in patients with advanced hepatocellular carcinoma.

<https://www.ncbi.nlm.nih.gov/pubmed/29516968>

J Cancer Res Ther. 2018 Jan;14(1):99-102. doi: 10.4103/jcrt.JCRT_736_17.

By Xu L, Wan Y, Huang J, Xu F.

Abstract

OBJECTIVE:

The objective of this study is to investigate the clinical efficacy and safety of electroacupuncture and multiple acupoint stimulation in relieving cancer pain in patients with advanced hepatocellular carcinoma.

METHODS:

Sixty-five cases of advanced hepatocellular carcinoma with cancer pain were selected in our hospital and were divided into electroacupuncture multiple acupoint stimulation group (electroacupuncture group) ($n = 32$) and fentanyl transdermal patch analgesia group (control group) ($n = 33$) according to analgesic methods and intentions. In the electroacupuncture group, electric acupuncture treatment was administered at different acupoints,

including Baihui, Quchi, Neiguan, Xuehai, Zusanli, and Sanyinjiao acupoint, once a day for 7 days. In the control group, a fentanyl transdermal patch was placed on the upper left arm every 3 days and replaced with a continuous external paste once for 7 days. Pain scores in the two groups before and during the treatment were evaluated with a visual analog scale (VAS), and adverse reactions during the treatment were recorded.

RESULTS:

The VAS pain score of the electroacupuncture group was significantly decreased on day 3 ($P < 0.05$), but the pain scores were not significantly different ($P > 0.05$) between the two groups 4 days after treatment. For treatment-related side effects, there

were 3 cases of subcutaneous hemorrhage in the electroacupuncture group; 1 case of skin rashes and 3 cases of nausea and vomiting in the control group. The incidences of adverse reactions in the two groups were 9.4% and 12.1%, respectively, without significant difference ($P > 0.05$).

CONCLUSION:

Cancer pain in patients with advanced hepatocellular carcinoma can be alleviated with electroacupuncture and multiple acupoint stimulation, but the onset pain relief was slow. To improve the analgesic effects of this technique, the combination of various analgesic methods should be necessary in early stage of the treatment.

Mast cells are important regulator of acupoint sensitization via the secretion of tryptase, 5-hydroxytryptamine, and histamine.

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0194022>

PLoS One. 2018 Mar 7;13(3):e0194022. doi: 10.1371/journal.pone.0194022.

By Ding N, Jiang J, Qin P, Wang Q, Hu J, Li Z.

Abstract

Mast cells (MCs) play a crucial role in mediating the establishment of networks among the circulatory, nervous and immune system at acupoints. However, the changes which occur in MCs during acupoint sensitization, i.e. the dynamic transformation of an acupoint from a "silenced" to an "activated" status, remain uncharacterized. To investigate the morphological and functional changes of MCs as an aid to understanding the cellular mechanism underlying acupoint sensitization, a rat model of knee osteoarthritis (OA) was induced by an injection of mono-iodoacetate (MIA) on day 0. On day 14, toluidine blue and immunofluorescence

staining were used to observe the recruitment and degranulation of MCs and the release of mast cell co-expressed mediators: tryptase, 5-hydroxytryptamine (5-HT) and histamine (HA) at the acupoints Yanglingquan (GB34), Hedong (EX-LE2) and Weizhong (BL40). Results showed that the number of MCs as well as the percentages of degranulated and extensively degranulated MCs at the acupoints GB34 and EX-LE2 in the light (A), mild (B), heavy (C) osteoarthritis groups were larger than those in the normal control (N) and normal saline (NS) groups ($p < 0.01$). Comparisons among the A, B and C groups suggested that the number

and the degranulation extent of the MCs at the acupoints GB34 and EX-LE2 were positively correlated with the severity of the disease. Some MCs in the A, B and C group showed the release of 5-HT, HA, and tryptase in degranulation at the acupoints GB34 and EX-LE2. Such changes in MCs were not observed at the acupoint BL40. In conclusion, this study confirmed that acupoint

sensitization is associated with the increase in recruitment and degranulation levels of MCs on a acupoint-specific and disease severity-dependent manner. The release of tryptase, 5-HT, and HA during MC degranulation is likely to be one of the cellular mechanisms occurring during acupoint sensitization.

Electroacupuncture mitigates endothelial dysfunction via effects on the PI3K/Akt signalling pathway in high fat diet-induced insulin-resistant rats.

<https://www.ncbi.nlm.nih.gov/pubmed/29502072>

Acupunct Med. 2018 Mar 3. pii: acupmed-2016-011253.

By Lan D, Xu N, Sun J, Li Z, Liao R, Zhang H, Liang X, Yi W.

Abstract

OBJECTIVE:

To investigate the effect of electroacupuncture (EA) on endothelial dysfunction related to high fat diet (HFD)-induced insulin resistance through the phosphatidylinositol 3-kinase (PI3K)-protein kinase B (Akt) signalling pathway.

METHODS:

Twenty-four male Sprague-Dawley rats were fed a regular diet (Control group, n=8) or a HFD (n=16) for 12 weeks to induce an insulin resistance model. HFD-fed rats were divided into two groups that remained untreated (HFD group, n=8) or received

electroacupuncture (HFD+EA group, n=8). EA was applied at PC6, ST36, SP6 and BL23. At the end of the experiment, fasting blood glucose (FBG), serum insulin (FINS), serum C-peptide (C-P) and homeostatic model assessment of insulin resistance (HOMA-IR) indices were determined. Pancreatic islet samples were subjected to histopathological examination. The thoracic aorta was immunostained with anti-rat insulin receptor substrate (IRS)-1, Akt and endothelial nitric oxide synthase (eNOS) antibodies. mRNA and protein expression of IRS-1, PI3K, Akt2 and eNOS in the vascular endothelium

were determined by real-time PCR and Western blot analysis, respectively.

RESULTS:

The bodyweight increase of the HFD+EA group was smaller than that of the untreated HFD group. Compared with the HFD group, the levels of FBG, FINS, C-P and HOMA-IR in the HFD+EA group decreased significantly ($P<0.01$). Histopathological evaluation indicated that EA improved pancreatic islet inflammation. The expression of endothelial markers, such as IRS-1,

PI3K, Akt2 and eNOS, decreased in the HFD group, while EA treatment appeared to ameliorate the negative impact of diet.

CONCLUSION:

EA may improve insulin resistance and attenuate endothelial dysfunction, and therefore could play a potential role in the prevention or treatment of diabetic complications and cardiovascular disease through the PI3K/Akt signalling pathway.

Immediate Effect of Acupuncture on Electromyographic Activity of the Upper Trapezius Muscle and Pain in Patients With Nonspecific Neck Pain: A Randomized, Single-Blinded, Sham-Controlled, Crossover Study.

<https://www.ncbi.nlm.nih.gov/pubmed/29549891>

J Manipulative Physiol Ther. 2018 Mar - Apr;41(3):208-217.

By Calamita SAP, Biasotto-Gonzalez DA, De Melo NC, Fumagalli MA, Amorim CF,

Abstract

OBJECTIVE:

The objective of this study was to assess changes in upper trapezius myoelectric activity and pain in patients with nonspecific neck pain after a single session of acupuncture (ACP).

METHODS:

A blinded randomized clinical trial was conducted. Fifteen patients with nonspecific neck pain and 15 healthy participants were enrolled in a randomized, single-blinded, crossover

study. Each participant was subjected to a single session of ACP and sham acupuncture (SACP). The electromyography (EMG) signal of the upper trapezius muscle was recorded during different step contractions of shoulder elevation force (15%-30% maximal voluntary contraction) before and after ACP treatment.

RESULTS:

Significant effects were confirmed after the treatment (ACP and SACP) for

Numeric Rating Scale scores ($F_{1,28} = 51.61$; $P < .0001$) and pain area ($F_{1,2} = 32.03$; $P < .0001$). Significant decreases in the EMG amplitude were identified for the nonspecific neck pain group (NPG) ($F_{1,112} = 26.82$; $P < .0001$) and the healthy participant group (HPG) ($F_{1,112} = 21.69$; $P < .0001$) after ACP treatment. No differences were identified between the ACP and SACP treatment protocols for Numeric Rating Scale score (NPG: $F_{1,28} = 0.95$; $P = .33$), pain area (NPG: $F_{1,28} = 1.97$; $P = .17$), or EMG amplitude

(NPG: $F_{1,112} = 0.47$; $P = .49$; HPG: $F_{1,112} = 0.75$; $P = .38$).

CONCLUSION:

The effect of ACP at acupoints triple energizer 5 and large intestine 11 triple energizer 5, or in close proximity, contributes to pain relief among patients with nonspecific neck pain. The electromyographic analysis indicated a greater resistance to muscle fatigue and decrease of activity of the upper trapezius muscle among healthy participants and patients with nonspecific neck pain.

Different mechanisms of contralateral- or ipsilateral-acupuncture to modulate the brain activity in patients with unilateral chronic shoulder pain: a pilot fMRI study.

<https://www.ncbi.nlm.nih.gov/pubmed/29563830>

J Pain Res. 2018 Mar 7;11:505-514. doi: 10.2147/JPR.S152550.

By Zhang S, Wang X, Yan CQ, Hu SQ, Huo JW, Wang ZY et al.,

Abstract

BACKGROUND:

Chronic shoulder pain (CSP) is a common disease causing pain and functional limitation, which is highly prevalent and has substantial negative effects on the quality of life. Acupuncture has gained popularity and has been accepted gradually by many countries because it can successfully treat patients with chronic pain, but the specific brain mechanisms under acupuncture treatment for CSP

remain unclear. Therefore, in this study, we aimed to 1) compare the clinical effects between acupuncture at the contralateral and ipsilateral Tiaokou (ST 38) point in patients with unilateral shoulder pain and 2) explore how contralateral- and ipsilateral-acupuncture modulates the regional homogeneity (ReHo) of patients with CSP.

PATIENTS AND METHODS:

This was a pilot functional magnetic resonance imaging (fMRI) trial. Twenty-four patients with CSP were recruited and randomized to the contralateral acupuncture group (contra-group) and the ipsilateral acupuncture group (ipsi-group). All patients completed resting-state functional magnetic resonance imaging (fMRI) scans before and after acupuncture treatment. Shoulder pain intensity (visual analog scale [VAS]) and shoulder joint function (Constant-Murley score [CMS]) were used to evaluate clinical efficiency of treatment. ReHo was used to assess resting-state brain activity.

RESULTS:

We found clinical improvement in decreasing pain intensity and increasing shoulder function in both groups, and the mean objective shoulder functional improvement in contra-group was better than that in ipsi-group ($p = 0.010$).

Interestingly, the brain mechanism of contra-acupuncture at ST 38 was distinguishable from ipsi-acupuncture regarding ReHo values.

CONCLUSION:

Anterior cingulate cortex (ACC) may play a direct role in the regulation of brain by the contralateral acupuncture at ST 38 in patients with shoulder pain. On the contrary, the pathway of brainstem-thalamus-cortex may be likely to work in mechanism of acupuncture at ipsilateral ST 38.

SIGNIFICANCE:

Our results indicate that the clinical effects and brain mechanisms are different between the stimulation given at contralateral and ipsilateral acupoints in patients with CSP and imply that the selection of either contralateral or ipsilateral acupuncture therapy to treat some chronic pain conditions is necessary.

Effect of Electroacupuncture Stimulation of Heart and Lung Meridians on Expression of Myocardial HCN 2 in Acute Myocardial Ischemia Rats

<https://www.ncbi.nlm.nih.gov/pubmed/29560633>

Zhen Ci Yan Jiu. 2018 Mar 25;43(3):175-9. doi: 10.13702/j.1000-0607.170121. By Wu ZJ, Wang J, Duan WX, Gong CP, Hu L.

Abstract

OBJECTIVE:

To observe the effect of electroacupuncture (EA) stimulation of

Heart and Lung meridians on the expression of hyperpolarization-activated cyclic nucleotide gated

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potassium channel 2 (HCN 2) mRNA and protein in the myocardium of the left ventricle in acute myocardial ischemia (AMI) rats, so as to underlying its mechanism in improving ischemic myocardial injury.

METHODS:

A total of 120 male SD rats were randomly divided into normal control, model, EA-Heart Meridian (HT) and EA-Lung Meridian (LU) groups ($n=30$ rats in each group). The AMI model was established by occlusion of the anterior descending branch of coronary artery. EA (1 mA, 10 Hz) was applied to bilateral "Shenmen" (HT 7) or "Taiyuan" (LU 9) and the spot about 1 mm apart from the HT 7 or LU 9 on the axopetal end for 15 min on the second day after modeling, once a day for 7 days. The left ventricular myocardium tissue was sampled for determining the expression levels of HCN 2 mRNA and protein with qPCR and Western blot, separately.

RESULTS:

After AMI, both HCN 2 mRNA and protein expression levels in the model group were significantly decreased in comparison with the normal control group ($P<0.01$). Following EA intervention, the expression levels of HCN 2 mRNA and protein expressions were significantly up-regulated relevant to the model group ($P<0.01$). The effects were more obvious in the EA-HT group than in the EA-LU group, and the expression levels were higher in the left ventricular myocardium tissue sampled on the next day after the treatment than those in the tissue sampled immediately after the treatment ($P<0.01$).

CONCLUSION:

Both EA stimulation of Heart Meridian and Lung Meridian can improve the expression of HCN 2 mRNA and protein in the myocardium in AMI rats, which existing a delayed effect and meridian specificity