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ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

Acupuncture at ST36 exerts neuroprotective effects via inhibition of reactive astrogliosis in infantile rats with hydrocephalus.

https://www.ncbi.nlm.nih.gov/pubmed/30143513
Acupunct Med. 2018 Aug 24. pii: acupmed-2017-011515.
By Tida JA, Catalão CHR, Garcia CAB, Dos Santos AC, Salmon CEG, Lopes LDS

Abstract

BACKGROUND:

Acupuncture has been associated with improved cerebral circulation, analgesia, neuromodulatory function and neurogenesis. In particular, acupuncture at ST36 has been widely used in several central nervous system (CNS) disorders, including neurodegenerative diseases. However, its effects on hydrocephalus have not been studied. Our aim was to evaluate the effects of acupuncture at ST36 on behaviour, motor development and reactive astrogliosis in infantile rats with hydrocephalus.

METHODS:

Hydrocephalus was induced in sixteen 7-day-old pup rats by injection of 20% kaolin into the cisterna magna. One day after hydrocephalus induction, acupuncture was applied once daily (for 30 min) for a total of 21 days in eight randomly selected animals (HAc group) while the remaining eight remained untreated (H group). An additional eight healthy animals were included as controls (C group). All animals were weighed daily and, from the fifth day after hydrocephalus induction, underwent MRI to determine the ventricular ratio (VR). Rats were also exposed to modified open-field tests every 3 days until the end of the experiment. After 21 days all the animals were euthanased and their brains removed for histology and immunohistochemistry.

RESULTS:

Hydrocephalic rats showed an increase in VR when compared with control rats ($P<0.01$). In addition, these animals exhibited delayed weight gain, which was attenuated with acupuncture treatment. Hydrocephalic animals treated with acupuncture performed better in open field tests ($P<0.05$), and had a reduction in reactive astrocyte cell density in the corpus callosum and external capsule, as assessed by GFAP (glial fibrillary acidic protein) immunohistochemistry ($P<0.05$).

CONCLUSIONS:

These findings indicate that acupuncture at ST36 has a neuroprotective potential mediated, in part, by inhibition of astrogliosis.

Manual Acupuncture Stimulation Regulates Expression of Receptor Activity-modifying Protein 1 and 5-HT 1 D Receptor Proteins and Genes in Migraine Rats.

https://www.ncbi.nlm.nih.gov/pubmed/30094981

Zhen Ci Yan Jiu. 2018 Jul 25;43(7):440-4.
By Wang MM, Yu XH, Geng W, Cui HF, Wang CC, Han J, Yang DH.

Abstract

OBJECTIVE:

To observe the effect of liver-soothing and mental-activity-regulating (LSMAR) needling on the expression of receptor activity-modifying protein 1 (RAMP 1, receptor of calcitonin gene-related peptide), 5-hydroxytryptamine 1 D receptor(5-HT 1 DR) in the spinal trigeminal nucleus (STN) and midbrain in migraine rats, so as to explore its underlying mechanism in relieving migraine.

METHODS:

A total of 40 male Wistar rats were randomly divided into control, model, LSMAR and conventional needling groups (*n*=10 rats in each). The migraine model was established by subcutaneous injection of nitroglycerin at the posterior neck. LSMAR was applied to "Baihui" (GV 20), bilateral "Fengchi" (GB 20), "Neiguan" (PC 6) and "Taichong" (LR 3) in the LSMAR group and conventional needling was applied to "Baihui" (GV 20) and bilateral "Fengchi" (GB 20) in the conventional acupuncture group for 30 min, once a day for 8 days before modeling. The expression levels of RAMP 1 and 5-HT 1 DR proteins and mRNAs in the STN and mesencephalon were detected by real-time fluorescent quantitative PCR and Western blot, separately.

RESULTS:

Compared with the control group, the expression levels of RAMP 1 protein and mRNA in STN and mesencephalon were significantly increased ($P<0.05$) and those of 5-HT 1 DR protein and mRNA considerably decreased ($P<0.05$) in the model group. After the acupuncture treatment, the increased levels of RAMP 1 protein and mRNA and the decreased levels of 5-HT 1 DR protein and mRNA in the STN and

ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

midbrain were obviously reversed in the LSMAR and conventional needling groups relevant to the model group (P<0.05). The effect of LSMAR needling was significantly superior to that of conventional needling in down-regulating the expression levels of RAMP 1 mRNA and protein in the STN and mesencephalon (P<0.05) and in up-regulating the expression levels of 5-HT 1 DR mRNA and protein in the two brain regions (P<0.05).

CONCLUSION:

Manual acupuncture stimulation of GV 20, GB 20, etc. can inhibit the expression of RAMP 1 protein and mRNA in the STN and midbrain, and up-regulate the expression of 5-HT 1 DR in the two brain regions of migraine rats, which may be related to its effect in relieving migraine.

High-frequency (50 Hz) electroacupuncture ameliorates cognitive impairment in rats with amyloid beta 1-42-induced Alzheimer's disease.

https://www.ncbi.nlm.nih.gov/pubmed/30136700

Neural Regen Res. 2018 Oct;13(10):1833-1841.

By Yu CC, Wang Y, Shen F, Kong LH, Wang YW, Zhou H, Tang L

Abstract

Acupuncture has been shown to ameliorate cognitive impairment of Alzheimer's disease. Acupoints and stimulation frequency influence the therapeutic effect of electroacupuncture. Rat models of Alzheimer's disease were established by injecting amyloid beta 1-42 ($A\beta_{1-42}$) into the bilateral lateral ventricles. Electroacupuncture at 2, 30, and 50 Hz was carried out at Baihui (GV20; 15° obliquely to a depth of 2 mm) and Shenshu (BL23; perpendicularly to 4-6 mm depth), once a day for 20 minutes (each), for 15 days, taking a break every 7 days. The Morris water maze test was conducted to assess the learning and memory. The expression levels of glycogen synthase kinase-3β (GSK-3β), pSer9-GSK-3β, pTyr216-GSK-3β, amyloid precursor protein and $A\beta_{1-40}$ in the hippocampus were determined by western blot assay. Results demonstrated that electroacupuncture treatment at different frequencies markedly improved learning and memory ability, increased synaptic curvatures, decreased the width of synaptic clefts, thickened postsynaptic densities, and downregulated the expression of GSK-3β, amyloid

precursor protein, and $A\beta_{1-40}$. pSer9-GSK-3β expression markedly decreased, while pTyr216-GSK-3β expression increased. High-frequency (50 Hz) electroacupuncture was more effective than low (2 Hz) or medium-frequency (30 Hz) electroacupuncture. In conclusion, electroacupuncture treatment exerts a protective effect against $A\beta_{1-42}$-induced learning and memory deficits and synapse-ultrastructure impairment via inhibition of GSK-3β activity. Moreover, high-frequency electroacupuncture was the most effective therapy.

Electrically stimulated acupuncture increases renal blood flow through exosomes-carried miR-181.

https://www.ncbi.nlm.nih.gov/pubmed/30132347

Am J Physiol Renal Physiol. 2018 Aug 22. doi: 10.1152/ajprenal.00259.2018.
By Su Z, Yuan Y, Yu M, Liu Y, Klein JD, Wang XH.

Abstract

Acupuncture with low frequency electrical stimulation (Acu/LFES) can prevent muscle atrophy by increasing muscle protein anabolism in mouse models of chronic kidney disease. During the treatment of muscle wasting, we found that Acu/LFES on the gastrocnemius muscle of the leg enhances renal blood flow. We also found that Acu/LFES increases exosome abundance and alters exosome-associated microRNA expression in the circulation. When exosome secretion was blocked using GW4869 the Acu/LFES-induced increase in renal blood flow was limited. This provided evidence that the increased renal blood flow is exosome mediated. To identify how exosomes regulate renal blood flow, we performed microRNA deep sequencing in exosomes isolated from treated and untreated mouse serum and found that the 34 microRNAs are altered by Acu/LFES. In particular, miR-181d-5p is increased in the serum exosome of Acu/LFES treated mice. In silico searching suggested that miR-181d-5p could target angiotensinogen. Using a luciferase reporter assay, we demonstrated that miR-181 directly inhibits angiotensinogen. When Acu/LFES treated muscle was excised and incubated in culture medium, we found that the amount of exosomes and miR-181d-5p were increased in the

ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

medium providing evidence that Acu/LFES can increase miR-181 secretion. We conclude that Acu/LFES on leg hindlimb increases miR-181 in serum exosome leading to increased renal blood flow. This study provides important new insights about the mechanism(s) by which acupuncture may regulation of muscle-organ cross talk through exosome-derived microRNA.

Subcutaneous Metabolites Involving Acupoint Sensitization Induced by Myocardial Ischemia and Acupuncture Stimulation in Rabbits.

https://www.ncbi.nlm.nih.gov/pubmed/30094980

Zhen Ci Yan Jiu. 2018 Jul 25;43(7):433-9.
By Xing BB, Huang M, Zhang D, Ding GH.

Abstract

OBJECTIVE:

The present study aimed at observing the profile of metabolites in sensitized acupoints induced by myocardial ischemia (MI) and the effect of acupuncture intervention on the changes of the metabolites so as to explore the material basis of acupoint sensitization.

METHODS:

A total of 20 New Zealand rabbits were randomly and equally divided into a control group and a model group. The MI model was established by occlusion of the anterior descending branch of the left coronary artery with a controllable air balloon inflation method for 5 min/time, twice a day (4-hours' interval) for continuous 5 days (the first stage of MI). After one day's rest, another 5 days' occlusion was conducted again (the second stage of MI) in the same way. The rabbits of the control group were treated with the same procedures but without occlusion. Subcutaneous microdialysis fluid samples were collected from "Neiguan" (PC 6), "Shenmen" (HT 7), "Xinshu" (BL 15), and "Taixi" (KI 3) regions on day 8(after recovery from operation), 14 (the first stage of MI), and 20 (the second stage of MI), as well as collected from PC 6 region during and post-acupuncture stimulation of PC 6, respectively.
Manual acupuncture stimulation was applied to the right PC 6 for 30 min. Partial least squares -linear discriminant analysis (PLS-DA) was used to identify

ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

different metabolism patterns of the microdialysis fluid sample between groups and at different time-points in the same one group, and the distinct metabolites as the potential markers between groups were weighted via the values of variable importance in the projection (VIP) in combination with t-test analysis. An area under the curve (AUC) >1.0 indicated a test exhibiting good discrimination between groups.

RESULTS:

Six metabolites identified to be significantly different between the control and model groups were L-glutamic acid, phenylalanine and 3-hydroxyisobutyric acid (which were significantly increased relevant to the control group), and L-histidine, octadecanedioic acid and 9-keto palmitic acid (significantly decreased relevant to the control group) in the microdialysate of PC 6, HT 7 and BL 15 regions. In the microdialysate of PC 6, 4 metabolites including L-glutamic acid, octadecanedioic acid and 8-isohydroxy PGF 2 α (significantly increased), as well as L-histidine (markedly decreased) were identified to be considerably different between the model and control groups. After acupuncture for 30 min, the AUC level of L-glutamic acid was further significantly increased (P<0.05), that of L-histidine obviously decreased, and those of octadecanedioic acid and 8-isohydroxy PGF 2 α turned back nearly to the level of pre-MI.

CONCLUSION:

L-glutamic acid, phenylalanine, 3-hydroxyisobutyric acid, L-histidine, octadecanedioic acid and 9-keto palmitic acid from PC 6, HT 7 and BL 15 regions may be used as the material biomarker for MI-induced sensitization of these acupoints.

Manual acupuncture intervention of PC 6 induces a significant change of L-histidine and L-glutamic acid in the local subcutaneous tissues.

Electroacupuncture modulates the activity of the hippocampus-nucleus tractus solitarius-vagus nerve pathway to reduce myocardial ischemic injury.

https://www.ncbi.nlm.nih.gov/pubmed/30127122

Neural Regen Res. 2018 Sep;13(9):1609-1618.
By Cui S, Wang K, Wu SB, Zhu GQ, Cao J, Zhou YP, Zhou MQ.

Abstract

ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

The hippocampus is involved in the regulation of the autonomic nervous system, together with the hypothalamus and brainstem nuclei, such as the paraventricular nucleus and nucleus tractus solitarius. The vagus nerve-nucleus tractus solitarius pathway has an important role in cardiovascular reflex regulation. Myocardial ischemia has been shown to cause changes in the autonomic nervous system, affecting the dynamic equilibrium of the sympathetic and vagal nerves. However, it remains poorly understood how the hippocampus communicates with brainstem nuclei to regulate the autonomic nervous system and alleviate myocardial ischemic tissue damage. A rat model of acute myocardial ischemia (AMI) was made by ligating the left anterior descending branch of the coronary artery. Three days before ischemia, the hippocampal CA1 region was damaged. Then, 3 days after ischemia, electroacupuncture (EA) at Shenmen (HT7)-Tongli (HT5) was performed (continuous wave, 1 mA, 2 Hz, duration of 30 minutes). Cluster analysis of firing patterns showed that one type of neuron was found in rats in the sham and AMI groups. Three types of neurons were observed in the AMI + EA group. Six types of neurons were found in the AMI + EA + Lesion group. Correlation analysis showed that the frequency of vagus nerve discharge in each group was negatively correlated with heart rate (HR) ($P < 0.05$, $r = -0.424$), and positively correlated with mean arterial pressure (MAP) ($P < 0.05$, $r = 0.40987$) and the rate-pressure product (RPP) ($P < 0.05$, $r = 0.4252$). The total frequency of the nucleus tractus solitarius discharge in each group was positively correlated with vagus nerve discharge ($P < 0.01$, $r = 0.7021$), but not with hemodynamic index (HR: $P > 0.05$, $r = -0.03263$; MAP: $P > 0.05$, $r = -0.08993$; RPP: $P > 0.05$, $r = -0.03263$). Some neurons (Neuron C) were negatively correlated with vagus nerve discharge, HR, MAP and RPP in the AMI + EA group (vagus nerve discharge: $P < 0.05$, $r = -0.87749$; HR: $P < 0.01$, $r = -0.91902$; MAP: $P < 0.05$, $r = -0.85691$; RPP: $P < 0.01$, $r = -0.91902$). Some neurons (Neurons C, D and E) were positively correlated with vagus nerve discharge, HR, MAP and RPP in the AMI + EA + Lesion group (vagus nerve discharge: $P < 0.01$, $r = 0.8905$, $P < 0.01$, $r = 0.9725$, $P < 0.01$, $r = 0.9054$; HR: $P < 0.01$, $r = 0.9347$, $P < 0.01$, $r = 0.9089$, $P < 0.05$, $r = 0.8247$; MAP: $P < 0.05$, $r = 0.8474$, $P < 0.01$, $r = 0.9691$, $P < 0.01$, $r = 0.9027$; RPP: $P < 0.05$, $r = 0.8637$, $P < 0.01$, $r = 0.9407$, $P < 0.01$, r

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Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

= 0.9027). These findings show that the hippocampus-nucleus tractus solitarius-vagus nerve pathway is involved in the cardioprotective effect of EA at the heart meridian. Some interneurons in the nucleus tractus solitarius may play a particularly important role in the cardiomodulatory process.

Acupuncture Rescues Cognitive Impairment and Upregulates Dopamine-*β*-Hydroxylase Expression in Chronic Cerebral Hypoperfusion Rats.

https://www.ncbi.nlm.nih.gov/pubmed/30112399

Biomed Res Int. 2018 Jul 12;2018:5423961. doi: 10.1155/2018/5423961.
By Xiao LY, Yang JW, Wang XR, Ye Y, Yang NN, Yan CQ, Liu CZ.

Abstract

Alteration of dopamine (DA) and noradrenaline (NA) contributes to cognitive function. Acupuncture has been shown to affect DA and NA in chronic cerebral hypoperfusion (CCH) rats. However, the effect of acupunctureon DA-*β*-hydroxylase (DBH), the biosynthetic enzyme of NA, remains unknown. In CCH rats we established chronic hypoperfusion by bilateral common carotid artery occlusion (two-vessel occlusion, 2VO) and treated them with acupuncture. Acupuncture displaye d beneficial effects on hippocampus-dependent memory impairments, including nonspatial and spatial memory. That is also reflected in hippocampus long-term-potentiation (LTP). Moreover, DBH expression in the hippocampus and DBH activity in cerebrospinal fluid were upregulated after acupuncture treatment. In conclusion, these in vivo findings suggest that acupuncture exerts a therapeutic effect on hippocampus-dependent memory and hippocampus LTP in CCH rats, which may be partially related to the modulation of DBH in the hippocampus.

Protective effect of electro-acupuncture on liver ischemia-reperfusion injury in rats.

https://www.ncbi.nlm.nih.gov/pubmed/30116387

Exp Ther Med. 2018 Aug;16(2):1373-1380.
By Li Y, Chen Y, Zhang X, Geng L, Dai B, Lv X, et al.,

ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

Abstract

Liver ischemia-reperfusion injury is an important clinical complication in which excessive inflammation is a key factor; however, few studies have provided effective means of its regulation. As previous studies suggested that electro-acupuncture (EA) is able control excessive inflammation, the present study aimed to explore its effects on liver ischemia-reperfusion injury in experimental rats. The animals were randomly divided into surgery and sham groups, which were further divided into four sub-groups, including a non-treatment (NT), a non-point acupuncture (NPA), the non-selective nicotinic acetylcholine receptor (AChR) agonist 1,1-dimethyl-4-phenyl L-pioperazinium iodide (DMPPI) and an EA group. The alanine aminotransferase (ALT), serum cytokine and myeloperoxidase (MP) levels and the tissue pathology were evaluated after 90 min of ischemia followed by a 4, 8 or 24 h reperfusion. The results demonstrated that EA and DMPPI suppressed serum ALT elevation at 4 and 8 h reperfusion, whereas NPA did not. I/R induced hepatocellular necrosis, and cytoplasmic vacuolization and sinusoidal congestion was ameliorated by EA treatment after an 8 and 24 h reperfusion. In addition, EA also inhibited liver neutrophil accumulation, evidenced by a decreased MPO level at 8 h reperfusion. EA also suppressed the release of serum inflammatory factors TNF-α and IL-6 for the duration of reperfusion. However, little influence on IL-10 was observed. Mechanistically, vagus block by subphrenic vagotomy or mecamylamine hydrochloride abolished EA effect on liver damage, neutrophil accumulation and inflammatory factor release. In conclusion, it was demonstrated that EA protects the liver against I/R induced injury by inhibiting the inflammatory response, which is associated with the vagus.

Acupuncture improves dendritic structure and spatial learning and memory ability of Alzheimer's disease mice.

https://www.ncbi.nlm.nih.gov/pubmed/30106051

Neural Regen Res. 2018 Aug;13(8):1390-1395.
By Kan BH, Yu JC, Zhao L, Zhao J, Li Z, Suo YR, Han JX.

ATCM Suite 10, Brentano House, Unit 5 The Exchange, Brent Cross Gardens, NW4 3RJ
Tel: 020 84572560, Email: info@atcm.co.uk, Website: www.atcm.co.uk

Abstract

Acupuncture can improve the cognitive state of Alzheimer's disease, but its mechanism is not clear. Dendritic atrophy and synaptic loss in Alzheimer's disease brain are positively correlated with cognitive damage. Therefore, we speculated that the effect of acupuncture on improving cognitive function may be associated with reduced dendritic damage in the brain. Acupuncture at Qihai (CV6), Zhongwan (CV12), Danzhong (CV17), bilateral Zusanli (ST36), and bilateral Xuehai (SP10) acupoints was performed once a day (1-day rest after 6-day treatment) for 14 consecutive days. Senescence-accelerated mouse prone 8 (SAMP8) mice without acupuncture and senescence-accelerated mouse resistant 1 (SAMR1) mice were used as normal controls. After 14 days of treatment, spatial learning and memory ability of mice was assessed in each group using the Morris water maze. Dendritic changes of pyramidal cells in the hippocampal CA1 region were analyzed by quantitative Golgi staining. Our results showed that acupuncture shortened escape latency and lengthened retention time of the former platform quadrant in SAMP8 mice. Further, SAMP8 mice exhibited a significant increase in the number of apical and basal dendritic branches and total length of apical and basal dendrites after acupuncture. These results suggest that acupuncture improves spatial learning and memory ability of middle-aged SAMP8 mice by ameliorating dendritic structure.

Electroacupuncture Could Influence the Expression of IL-1*β* and NLRP3 Inflammasome in Hippocampus of Alzheimer's Disease Animal Model.

https://www.ncbi.nlm.nih.gov/pubmed/30105072

Evid Based Complement Alternat Med. 2018 Jul 12;2018:8296824.
By Jiang J, Ding N, Wang K[2] Li Z.

Abstract

BACKGROUND:

Effective therapies for Alzheimer's disease (AD) are still being explored. Electroacupuncture with traditional Chinese medicine theory may improve spatial learning and memory abilities and glucose metabolism rates in an animal model of AD. However, the

mechanism of electroacupuncture in intervention of AD is still unclear. According to recent studies of AD mechanisms, the NLRP3 inflammasome regulated the expression of IL-1*β* in the brain which may mediate AD related processes. Therefore, in our study, we intend to explore the possible relation between electroacupuncture and the expression of NLRP 3 inflammasome in the hippocampus of an AD animal model.

METHOD:

In this study, 7.5-month-old male senescence-accelerated mouse prone 8 (SAMP8) mice were used as an AD animal model, which were randomly divided into two groups: Alzheimer's disease model group (AD group) and electroacupuncture group (EA group). In the control paradigm, 7.5-month-old male SAMR1 mice were used as the normal control group (N group). DU20, DU26, and EX-HN3 were selected as the acupuncture points, and after a 15-day treatment of electroacupuncture, we used immunohistochemistry and Western blotting to examine the expression of IL-1*β* and NLRP3, ASC, and Caspase-1 in the hippocampus of the AD animal model.

RESULTS:

Compared with N group, IL-1*β*, NLRP3, ASC, and Caspase-1 positive cells in AD group were increased, and the relative expression of all above proteins significantly increased ($P < 0.01$). Compared with AD group, the expression of IL-1*β*, NLRP3, ASC, and Caspase-1 in EA group was significantly decreased ($P < 0.01$).

CONCLUSION:

Electroacupuncture treatment could inhibit the inflammation reaction in the hippocampus of SAMP8 mice. What is more, the possible mechanism of electroacupuncture reduced the expression of IL-1*β*and NLRP3 inflammasome relative protein.

Acupuncture modulates stress response by the mTOR signaling pathway in a rat post-traumatic stress disorder model.

https://www.ncbi.nlm.nih.gov/pubmed/30089868

Sci Rep. 2018 Aug 8;8(1):11864. doi: 10.1038/s41598-018-30337-5.
By Oh JY, Kim YK, Kim SN, Lee B, Jang JH, Kwon S, Park HJ.

Abstract

Post-traumatic stress disorder (PTSD) is a psychiatric disease that can form following exposure to a traumatic event. Acupuncture has been proposed as a beneficial treatment for PTSD, but the underlying mechanisms remain unclear. The present study investigated whether acupuncture improves depression- and anxiety-like behaviors induced using a single prolonged stress (SPS) as a PTSD rat model. In addition, we investigated whether the effects were mediated by increased mTOR activity and its downstream signaling components, which contribute to protein synthesis required for synaptic plasticity in the hippocampus. We found that acupuncture at HT8 significantly alleviated both depression- and anxiety-like behaviors induced by SPS in rats, as assessed by the forced swimming, elevated plus maze, and open field tests; this alleviation was blocked by rapamycin. The effects of acupuncture were equivalent to those exerted by fluoxetine. Acupunctureregulated protein translation in the mTOR signaling pathway and enhanced the activation of synaptic proteins, PSD95, Syn1, and GluR1 in the hippocampus. These results suggest that acupuncture exerts antidepressant and anxiolytic effects on PTSD-related symptoms by increasing protein synthesis required for synaptic plasticity via the mTOR pathway in the hippocampus. Acupuncture may be a promising treatment for patients with PTSD and play a role as an alternative PTSD treatment.

Electroacupuncture Improves Limb Locomotor Function Possibly by Suppressing Rho-ROCK Ⅱ Pathway Related Factors in Anterior Horns of Spinal Cord in Rats with Acute Spinal Cord Injury.

https://www.ncbi.nlm.nih.gov/m/pubmed/30094982/

Zhen Ci Yan Jiu. 2018 Jul 25;43(7):445-9.
By Li XN, Liang XS, Wu L, Shan XC, Fu H, Mei JL, Li N.

Abstract

OBJECTIVE:

To observe the effect of electroacupuncture (EA) of "Jiaji" (EX-B 2) on limb locomotor function and expression of Ras homolog gene family member A (RhoA), Rho-associated kinase Ⅱ (ROCK Ⅱ) and myosin light chain (MLC) proteins in the anterior horn of spinal cord in acute spinal cord injury (ASCI) rats, so as to explore its

mechanisms under-lying improvement of SCI-induced limb locomotor dysfunction.

METHODS:

Forty-eight female Wistar rats were randomly divided into sham operation (sham), ASCI model (model), EA EX-B 2 (EA) and ROCK inhibitor (Fasudil) groups which were further divided into 14 d and 28 d subgroups (*n*=6 in each). The ASCI model was made by using weight drop striking method. Three hours after modeling, EA (100 Hz, 0.4, 0.6 mA) was applied to EX-B 2 (T 9, T 11) for 30 min, once daily for 14 d and 28 d, respectively. The ROCK inhibitor (hydrochloride Fasudil, 10 mg/kg) was administrated by intraperitoneal injection immediately after modeling, once a day, continuously for 14 d or 28 d. The expression of RhoA, ROCK Ⅱ and MLC proteins in the spinal cord anterior horn tissue (T 10) was detected by immunohistochemistry. The rats' hindlimb locomotor function was assessed according to Basso, Beattie and Bresnahan (BBB) locomotor rating scale (21-points).

RESULTS:

After ASCI, the BBB scores were significantly lower in the model group than in the sham group on day 14 and 28 (P<0.05), and obviously higher in the EA and inhibitor groups than in the model group (P<0.05), suggesting an improvement of the hindlimb locomotor function after EA intervention or suppression of ROCK. Immunohistochemical results indicated that the numbers of RhoA, ROCK Ⅱ and MLC immune-reaction positive cells in the anterior horn of spinal cord were significantly more in the model group than in the sham group (P<0.05), and remarkably decreased in both EA and inhibitor groups on day 14 and 28 relevant to the model group (P<0.05). The therapeutic effects of EA were markedly weaker than those of inhibitor Fasudil in up-regulating BBB score and down-regulating the number of RhoA, ROCK Ⅱ and MLC positive cells (P<0.05).

CONCLUSION:

EA of EX-B 2 can improve the hindlimb locomotor function in ASCI rats, which may be associated with its effect in down-regulating the expression of RhoA, ROCK Ⅱ and MLC proteins (i.e., inhibiting the RhoA/ROCK signaling pathway) in the anterior horn of spinal cord.