

doi:10.3969/j.issn.1673-5374.2012.36.013 [http://www.crter.org/nrr-2012-qkquanwen.html]

Chen JJ, Yao M, Zhao YH, Jin XY, Li YB, Huang LH. Use of acupuncture to treat cerebral infarction in the last 10 years: a Scopus-based literature analysis. *Neural Regen Res.* 2012;7(36):2944-2951.

Use of acupuncture to treat cerebral infarction in the last 10 years

A Scopus-based literature analysis[☆]

Jiajun Chen¹, Min Yao¹, Yunhua Zhao¹, Xiya Jin¹, Yuanbing Li¹, Lihong Huang²

¹ Department of Neurology, China-Japan Friendship Hospital of Jilin University, Changchun 130031, Jilin Province, China

² Department of Gerontology, China-Japan Friendship Hospital of Jilin University, Changchun 130031, Jilin Province, China

Abstract

OBJECTIVE: To identify global research trends in the use of acupuncture to treat cerebral infarction.

DATA RETRIEVAL: We performed a bibliometric analysis of studies on the use of acupuncture to treat cerebral infarction published during 2002–2011, retrieved from Scopus, using the key words of acupuncture and cerebral infarction or ischemic stroke.

SELECTION CRITERIA: Inclusion criteria: peer-reviewed articles on the use of acupuncture to treat cerebral infarction indexed in Scopus and published between 2002 and 2011; types of publications were original research articles, reviews, meeting abstracts, proceedings papers, book chapters, editorial material, and news items. Exclusion criteria: articles that required manual searching or telephone access; documents that were not published in the public domain; and corrected papers.

MAIN OUTCOME MEASURES: (a) Annual publication output; (b) language of publication; (c) type of publication; (d) key words of publication; (e) publication by research field; (f) publication by journal; (g) publication by country and institution; (h) publication by author; (i) most-cited papers between 2002 and 2006; and (j) most-cited papers between 2007 and 2011.

RESULTS: A total of 160 publications on the use of acupuncture to treat cerebral infarction from 2002–2011 were retrieved from Scopus. The number of publications increased gradually over the 10-year study period; most were written in Chinese or English. Articles and reviews constituted the major types. The most frequent key word used was acupuncture. The most prolific journals in this area were *Zhongguo Zhen Jiu* and the *Chinese Journal of Clinical Rehabilitation*. Of the 160 publications retrieved, half came from Chinese authors and institutions. Tianjin University of Traditional Chinese Medicine was the most prolific research institute. Two papers were cited 30 times; they were published in 2002 and 2009, respectively.

CONCLUSION: In the field of neuroscience, there is little literature on acupuncture for cerebral infarction. The most-cited papers were cited 30 times in the past 3 years. We believe that, with advances in the study of mechanisms in neurobiology, research on acupuncture will also advance and will become the concern of more scholars.

Key Words

acupuncture; cerebral infarction; ischemic stroke; cerebral ischemia; hemiplegia; collateral circulation; blood flow; glial cell; Scopus; neural regeneration

Research Highlights

(1) We performed a bibliometric analysis of studies published during 2002–2011 retrieved from Scopus on the use of acupuncture to treat cerebral infarction.

(2) We analyzed the publication year, publication language, publication types, key words, research fields, journals, countries, institutions, authors, and most-cited papers in this field.

Jiajun Chen[☆], M.D.,
Professor, Chief physician,
Department of Neurology,
China-Japan Friendship
Hospital of Jilin University,
Changchun 130031, Jilin
Province, China

Corresponding author:
Lihong Huang, Associate
professor, Associate chief
physician, Master's
supervisor, Department of
Gerontology, China-Japan
Friendship Hospital of Jilin
University, Changchun
130031, Jilin Province, China
huangwe68@sina.com

Received: 2012-09-27
Accepted: 2012-11-02
(N20121130002/MWJ)

INTRODUCTION

Cerebral infarction, also known as ischemic stroke, accounts for about 70% of strokes. Cerebral infarction involves limited necrosis or softening of brain tissue resulting from ischemia and hypoxia caused by bottlenecks in the cerebral blood supply. Cerebral infarction includes cerebral thrombosis, lacunar infarction, and cerebral embolism^[1-3]. Cerebral infarction may cause central hemiplegia, hemisensory disorders, movement disorders, or aphasia. Its serious complications may endanger the patient's life. Since ancient times, acupuncture therapy has been used to treat cerebral infarction. Its efficacy has been widely recognized and confirmed^[4-5]. In recent years, researchers have revealed the mechanism of this treatment through clinical research and animal studies, providing a theoretical basis for its use.

The mechanism of treatment of cerebral infarction by acupuncture has two principle aspects. (1) Acupuncture can significantly reduce the infarcted area, accelerate the proliferation and repair of nascent capillaries and glial cells within softened necrotic foci, and reduce edema and inflammatory reactions around the necrotic area^[6-8]. (2) After cerebral ischemia, cerebral blood flow rapidly decreases, K⁺ flows out, and Ca²⁺ flows in. This process causes neuronal cells to die^[9-11]. Thus, the key to protecting against cerebral ischemic injury is increasing oxygen and blood supply to the brain tissue. Acupuncture is beneficial in the establishment of collateral circulation, alleviating the shortage of blood supply to the ischemic area. As the number of open blood vessels increases, the flow pattern of blood cells improves, thereby accelerating the recovery of ischemic brain tissue.

In this study, we analyzed research trends in the use of acupuncture to treat cerebral infarction, based on a bibliometric analysis of papers indexed in Scopus and published from 2002 to 2011.

DATA SOURCES AND METHODOLOGY

Data retrieval

This study used bibliometric analysis to quantitatively and qualitatively investigate research trends in studies of acupuncture to treat cerebral infarction. We searched Scopus using the key words acupuncture and cerebral infarction or ischemic stroke. We limited the period of publication to 2002–2011 and compiled a bibliography of all

articles related to the use of acupuncture to treat cerebral infarction. We downloaded the data on August 10, 2012.

Inclusion criteria

The inclusion criteria were: (1) published peer-reviewed articles on the use of acupuncture to treat cerebral infarction, including original research articles, reviews, meeting abstracts, proceedings papers, book chapters, editorial material, and news items, indexed in Scopus; (2) year of publication was between 2002 and 2011; and (3) citation database was Scopus.

Exclusion criteria

We excluded articles that required manual searching or telephone access, documents that were not published in the public domain, and several corrected papers.

The articles were assessed using the following criteria: (a) annual publication output; (b) language of publication; (c) type of publication; (d) key words of publication; (e) publication by research field; (f) publication by journal; (g) publication by country and institution; (h) publication by author; (i) most-cited papers published between 2002 and 2006; and (j) most-cited papers published between 2007 and 2011.

RESULTS

Output by year of publications relating to acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

A total of 160 publications on acupuncture for cerebral infarction published in 2002–2011 were retrieved from Scopus. The number of relevant publications increased gradually over the 10-year study period, with four papers in 2002 increasing to 26 in 2011. The number of papers published decreased slightly in 2007, 2008, and 2010 (Figure 1).

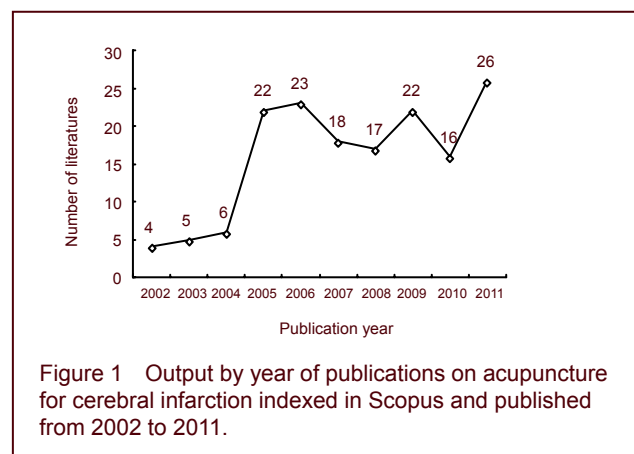


Figure 1 Output by year of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011.

Language of publications relating to acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Chinese and English constituted the major languages of publications related to acupuncture for cerebral infarction over this period (Figure 2), with 86 papers and 72 papers, respectively.

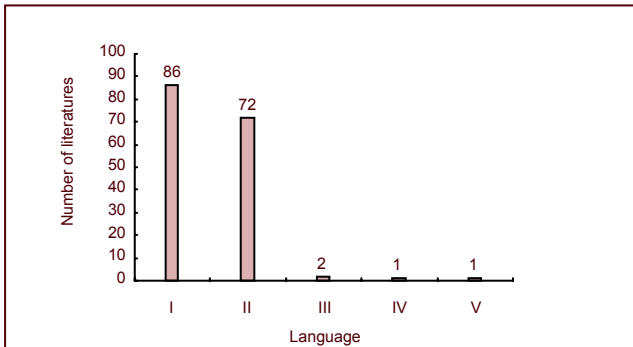


Figure 2 Output by language of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011.

I: Chinese; II: English; III: German; IV: Portuguese; V: Russian.

Type of publications relating to acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Articles and reviews constituted the major types of publication (Figure 3), with 138 articles and 14 reviews. The other types were conference papers, letters, articles in press, and short surveys.

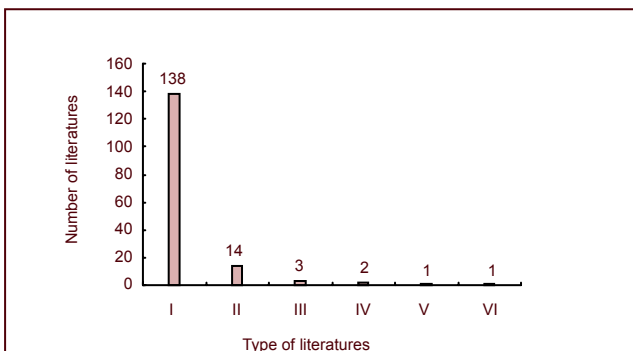


Figure 3 Type of publications on acupuncture for cerebral infarction included indexed in Scopus and published from 2002 to 2011

I: Article; II: Review; III: Conference Paper; IV: Letter; V: Article in Press; VI: Short Survey.

Key words for publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

From Table 1, it can be seen that the most frequently

used key words for publications on acupuncture for cerebral infarction in Scopus were acupuncture, article, and human. Words referring to or describing people were widely used (i.e. human, male, female, and aged) (Table 1).

Table 1 Key words for publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Key word	No. of papers
Acupuncture	125
Article	121
Human	113
Male	102
Controlled study	88
Female	83
Brain infarction	78
Aged	77
Humans	71
Acupuncture therapy	65

Research field of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Among the research fields represented in publications relating to the use of acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011, 135 papers were in the field of medicine. The second best-represented field, with 18 papers, was neuroscience (Table 2).

Table 2 Research field of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Research field	No. of papers
Medicine	135
Neuroscience	18
Biochemistry, Genetics and Molecular Biology	5
Engineering	4
Computer Science	2
Health Professions	2
Nursing	2
Chemical Engineering	1
Mathematics	1
Psychology	1
Social Sciences	1

Output by journal of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

In the period of interest, *Zhongguo Zhen Jiu* published 28 papers, followed by the *Chinese Journal of Clinical Rehabilitation*, which published 27 papers. Other prolific journals were the *Journal of Acupuncture and Tuina Science*, the *Journal of Traditional Chinese Medicine*, and *Acupuncture Research* (Table 3).

Table 3 Top 10 journals for publications on acupuncture for cerebral infarction between 2002 and 2011

Journal	No. of papers
<i>Zhongguo Zhen Jiu</i>	28
<i>Chinese Journal of Clinical Rehabilitation</i>	27
<i>Journal of Acupuncture and Tuina Science</i>	12
<i>Journal of Traditional Chinese Medicine</i>	12
<i>Acupuncture Research</i>	12
<i>Neural Regeneration Research</i>	9
<i>Chinese Journal of Rehabilitation Medicine</i>	7
<i>Chinese Journal of Integrated Traditional and Western Medicine</i>	6
<i>Journal of Chinese Integrative Medicine</i>	4
<i>Neurological Research</i>	3

Output by country and institution of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Analysis of the contributions of different countries/states to publications was based on journal articles in which the address and affiliation of at least one author were provided. A total of 160 articles were analyzed by country and institution. Most papers on acupuncture for cerebral infarction were published in China (88 papers), followed by South Korea (six papers) and the USA (six papers) (Figure 4). Tianjin University of Traditional Chinese Medicine was the most prolific research institute, publishing 13 papers (Table 4). Twelve of the top 13 research institutes publishing in this field were in China; one was in South Korea.

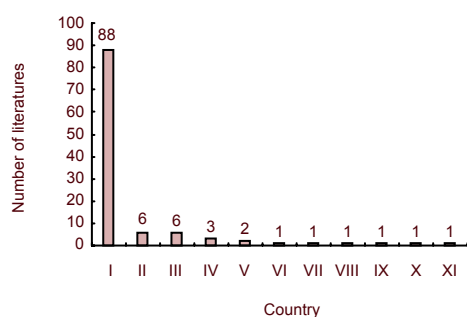


Figure 4 The top 11 countries publishing papers on acupuncture for cerebral infarction, 2002–2011.

I: China; II: South Korea; III: USA; IV: Japan; V: Germany; VI: Denmark; VII: Finland; VIII: Italy; IX: Sweden; X: Thailand; XI: UK.

Authors of publications on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Hongxing Zhang published five papers on acupuncture for cerebral infarction—more than any other author (Table 5). SeokKeun Choi, Ming Liu, Samjin Choi,

Xuemin Shi, and Jie Xiong ranked second with four papers. Of these six authors, two were from Kyung Hee University, two from Tianjin University of Traditional Chinese Medicine, and one each from China Agricultural University and Sichuan University.

Table 4 The top 13 institutes publishing papers on acupuncture for cerebral infarction, 2002–2011

Institute	No. of papers
Tianjin University of Traditional Chinese Medicine	13
Tianjin University	7
Wuhan Chinese and Western Medicine Hospital	5
Kyung Hee University	5
Guangdong Provincial Hospital of Traditional Chinese Medicine	5
Shanghai University of Traditional Chinese Medicine	4
Sichuan University	4
Heilongjiang University of Traditional Chinese Medicine	4
Jinan University	3
Guangzhou University of Traditional Chinese Medicine	3
Shanghai University	3
Shenzhen People's Hospital	3
Medical College of Chinese People's Armed Police Forces	3

Table 5 The top six authors publishing papers on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2011

Author	Institute	No. of papers
Hongxing Zhang	China Agricultural University	5
SeokKeun Choi	Kyung Hee University	4
Ming Liu	Sichuan University	4
Samjin Choi	Kyung Hee University	4
Xuemin Shi	Tianjin University of Traditional Chinese Medicine	4
Jie Xiong	Tianjin University of Traditional Chinese Medicine	4

Highly cited papers on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2006 (Table 6)

Of the 60 papers on acupuncture for cerebral infarction cited in Scopus during 2002–2006, the 2002 paper “Intracranial dural arteriovenous fistulas: Analysis of 60 patients”^[12] was cited 30 times, more than any other paper. It was published in *Cerebrovascular Diseases*. Of the 11 most-cited papers, two were published in *Zhongguo Zhen Jiu* and the remaining nine were published in nine different journals; of these 11 papers, four were published in 2006, three in 2005, and two each in 2002 and 2003.

Table 6 The 11 top-cited papers on acupuncture for cerebral infarction indexed in Scopus and published from 2002 to 2006

Title	Author	Journal	Publication year	Total citation
Intracranial dural arteriovenous fistulas: analysis of 60 patients ^[12]	Chung SJ, Kim JS, Kim JC, et al.	<i>Cerebrovascular Diseases</i>	2002	30
Acupuncture prevents cognitive deficits and oxidative stress in cerebral multi-infarction rats ^[13]	Liu CZ, Yu JC, Zhang XZ, et al.	<i>Neuroscience Letters</i>	2006	19
Acupuncture for acute stroke ^[14]	Zhang SH, Liu M, Asplund K, et al.	<i>Cochrane Database of Systematic Reviews</i>	2005	11
Medical treatments and cares for geriatric syndrome: New strategies learned from frail elderly ^[15]	Kubo H, Nakayama K, Ebihara S, et al.	<i>Tohoku Journal of Experimental Medicine</i>	2005	7
Single-needle acupuncture alleviates gag reflex during transesophageal echocardiography: a blinded, randomized, controlled pilot trial ^[16]	Rösler A, Otto B, Schreiber-Dietrich D, et al.	<i>Journal of Alternative and Complementary Medicine</i>	2003	6
Randomized controlled study on ginger-salt-partitioned moxibustion at shenque (CV 8) on urination disorders poststroke ^[17]	Liu HL, Wang LP	<i>Zhongguo Zhen Jiu</i>	2006	4
Effects of acupuncture on the cortical functional areas activated by index finger motion in the patient with ischemic stroke ^[18]	He YZ, Wang LN, Huang L, et al.	<i>Zhongguo Zhen Jiu</i>	2006	4
Acupuncture treatment of geriatric patients with ischemic stroke: A randomized, double-controlled, single-blind study ^[19]	Schuler MS, Durdak C, Höl NM, et al.	<i>Journal of the American Geriatrics Society</i>	2005	4
Assessing the reporting quality of randomized controlled trials on acupuncture for acute ischemic stroke using the CONSORT statement and STRICTA ^[20]	Zhang XL, Li J, Zhang MM, et al.	<i>Zhongguo Xunzheng Yixue Zazhi</i>	2006	3
Electroacupuncture at Ciliao and Huiyang for treating neuropathic incontinence of defecation and urination in 30 cases ^[21]	Yang T, Liu Z, Liu Y	<i>Journal of Traditional Chinese Medicine</i>	2003	3
Study on influence of acupunctural signal on energy metabolism of human brain by positron emission tomography ^[22]	Jia SW, Wang QS, Xu WG	<i>Chinese Journal of Integrated Traditional and Western Medicine</i>	2002	3

Highly cited papers on acupuncture for cerebral infarction indexed in Scopus and published from 2007 to 2011

Of the 100 papers on acupuncture for cerebral infarction cited in Scopus, 2007–2011, the 2009 paper “Pretreatment with electroacupuncture induces rapid tolerance to focal cerebral ischemia through regulation of endocannabinoid system”^[23] was cited 30 times, more than any other paper. It was published in *Stroke*. Of the 11 most-cited papers, two were published in *Neurological Research* and the remaining nine were published in nine different journals; of these 11 papers, four were published in 2008, three in 2009, and two each in 2007 and 2010 (Table 7).

DISCUSSION

This bibliometric analysis, based on Scopus, identified several research trends over the past 10 years in studies of the use of acupuncture to treat cerebral infarction. The number of publications increased gradually over the 10-year study period, but the number was still very little in 2011. Most papers were written in Chinese or English.

Articles and reviews constituted the major types. The most frequently used key word was acupuncture. Most papers were in the field of medicine. The most prolific journals in this area were *Zhongguo Zhen Jiu* and the *Chinese Journal of Clinical Rehabilitation*. Of the 160 publications retrieved from Scopus from 2002–2011, half came from Chinese authors and institutions. Tianjin University of Traditional Chinese Medicine was the most prolific research institute. Hongxing Zhang from China Agricultural University published five papers—more than any other author. Two papers were cited 30 times; they were published in 2002 and 2009, respectively.

As a traditional Chinese medicine therapy, acupuncture has been used in the treatment of stroke since ancient times^[34]. Experiments have proved that acupuncture has a positive impact on the morphology, energy metabolism, and nerve function recovery of rat brain tissue^[35-38]. Researchers have investigated the biochemical and morphological mechanisms in recent years^[39-41], though the biological basis of these mechanisms is not yet entirely clear. The pathological changes involved in cerebral infarction are extremely complex and our current knowledge is only preliminary and superficial.

Table 7 The 11 top-cited papers on acupuncture for cerebral infarction indexed in Scopus and published from 2007 to 2011

Title	Author	Journal	Publication year	Total citation
Pretreatment with electroacupuncture induces rapid tolerance to focal cerebral ischemia through regulation of endocannabinoid system ^[23]	Wang Q, Peng Y, Chen S, et al.	<i>Stroke</i>	2009	30
Evidence-based stroke rehabilitation: an expanded guidance document from the European Stroke Organisation (ESO) guidelines for management of ischaemic stroke and transient ischaemic attack 2008 ^[24]	Quinn TJ, Paolucci S, Sunnerhagen KS, et al.	<i>Journal of Rehabilitation Medicine</i>	2009	25
Acupuncture stimulation at <i>Baihui</i> acupoint reduced cerebral infarct and increased dopamine levels in chronic cerebral hypoperfusion and ischemia-reperfusion injured Sprague-Dawley rats ^[25]	Chuang CM, Hsieh CL, Li TC, et al.	<i>American Journal of Chinese Medicine</i>	2007	20
Optimal risk factor modification and medical management of the patient with peripheral arterial disease ^[26]	Chi YW, Jaff MR	<i>Catheterization and Cardiovascular Interventions</i>	2008	17
Protective effects of acupuncture on brain tissue following ischemia/reperfusion injury ^[27]	Wang M, Ma F, Chen H	<i>Neural Regeneration Research</i>	2008	14
Acupuncture attenuates extracellular glutamate level in global ischemia model of rat ^[28]	Lee GJ, Yin CS, Choi SK, et al.	<i>Neurological Research</i>	2010	8
The influence of electro-acupuncture on neural plasticity in acute cerebral infarction ^[29]	Ren L, Zhang WA, Fang NY, et al.	<i>Neurological Research</i>	2008	7
Potential neuroprotective effects of acupuncture stimulation on diabetes mellitus in a global ischemic rat model ^[30]	Choi S, Lee GJ, Chae SJ, et al.	<i>Physiological Measurement</i>	2010	6
Cortical activation by Yamamoto new scalp acupuncture (YNSA) in the treatment of stroke patients a sham-controlled study aided by functional magnetic resonance imaging (fMRI) ^[31]	Schockert T, Schnitker R, Boroojerdi B, et al.	<i>Deutsche Zeitschrift Fur Akupunktur</i>	2009	6
Clinical study on early acupuncture for acute ischemic stroke ^[32]	Zhang L, Ge LB, Chen LF, et al.	<i>Journal of Acupuncture and Tuina Science</i>	2008	6
PET study of effects of combination of different points on glucose metabolism in the patient of cerebral infarction ^[33]	Zhang XY, Gao S, Zhao JG, et al.	<i>Zhongguo Zhen Jiu</i>	2007	6

Many important components remain to be understood, to strengthen the basis for the use of acupuncture in the prevention and cure of cerebral infarction. Problems in studies of this use of acupuncture include the arbitrariness of the chosen acupoints, the blindness of needling approach, improper application of research methods, and the unilateral of research target, all of which need to be solved in the future^[42-45]. Neurobiology, molecular biology, and other basic disciplines are developing and modern medical technology is increasingly involved. We believe that breakthroughs are bound to be made in our understanding of the mechanisms of acupuncture therapy in cerebral infarction in humans, and will improve patients' recovery.

Author contributions: Jiajun Chen retrieved the references, extracted the data, conceived and designed the study, and wrote the manuscript. Min Yao, Yunhua Zhao, Xiya Jin, and Yuanbing Li retrieved the references, extracted the data, and conceived and designed the study. Lihong Huang contributed to the review, conception and design, paper revision, and study instruction. All authors approved the final version of the paper.

Conflicts of interest: None declared.

Author statements: The manuscript is original, has not been submitted to or is not under consideration by another publication, has not been previously published in any language or any form, including electronic, and contains no disclosure of confidential information or authorship/patent application disputations.

REFERENCES

- [1] Liu H, Li J, Zhang D, et al. The effect of acupuncture on stroke recovery: study protocol for a randomized controlled trial. *BMC Complement Altern Med.* 2012;12(1): 216.
- [2] Fu QH, Pei J, Hui JR, et al. Studies on dynamic changes in traditional Chinese medicine syndrome patterns for stroke using data-driven and model-driven approaches: a review. *Zhong Xi Yi Jie He Xue Bao.* 2011;9(12): 1292-1300.
- [3] Huang Y, Tang C, Wang S, et al. Acupuncture regulates the glucose metabolism in cerebral functional regions in chronic stage ischemic stroke patients---a PET-CT cerebral functional imaging study. *BMC Neurosci.* 2012; 13:75.

- [4] Wang L, Valentini J, Sugimoto K, et al. Biomedical Teleacupuncture between China and Austria Using Heart Rate Variability, Part 1: Poststroke Patients. *Evid Based Complement Alternat Med.* 2011;2011:782489.
- [5] Lin LL, Wang YH, Lai CY, et al. Systems biology of meridians, acupoints, and chinese herbs in disease. *Evid Based Complement Alternat Med.* 2012;2012:372670.
- [6] Wei YC, Sun MF, Chang KC, et al. Pilot scheme of health policy in stroke adjuvant acupuncture therapy for acute and subacute ischemic stroke in taiwan. *Evid Based Complement Alternat Med.* 2011;2011:689813.
- [7] Pan S, Zhan X, Su X, et al. Proteomic analysis of serum proteins in acute ischemic stroke patients treated with acupuncture. *Exp Biol Med (Maywood).* 2011;236(3):325-333.
- [8] Fang Z, Ning J, Xiong C, et al. Effects of Electroacupuncture at Head Points on the Function of Cerebral Motor Areas in Stroke Patients: A PET Study. *Evid Based Complement Alternat Med.* 2012;2012:902413.
- [9] Wang Q, Li X, Chen Y, et al. Activation of epsilon protein kinase C-mediated anti-apoptosis is involved in rapid tolerance induced by electroacupuncture pretreatment through cannabinoid receptor type 1. *Stroke.* 2011;42(2):389-396.
- [10] Lee JA, Park SW, Hwang PW, et al. Acupuncture for shoulder pain after stroke: a systematic review. *J Altern Complement Med.* 2012;18(9):818-823.
- [11] Yao WP, Wang S, Han L, et al. Effects of electro-acupuncture at Shuigou (DU26) point on motor evoked potential in rats with cerebral infarction. *Zhong Xi Yi Jie He Xue Bao.* 2010;8(10):979-984.
- [12] Chung SJ, Kim JS, Kim JC, et al. Intracranial dural arteriovenous fistulas: analysis of 60 patients. *Cerebrovasc Dis.* 2002;13(2):79-88.
- [13] Liu CZ, Yu JC, Zhang XZ, et al. Acupuncture prevents cognitive deficits and oxidative stress in cerebral multi-infarction rats. *Neurosci Lett.* 2006;393(1):45-50.
- [14] Zhang SH, Liu M, Asplund K, et al. Acupuncture for acute stroke. *Cochrane Database Syst Rev.* 2005;(2): CD003317.
- [15] Kubo H, Nakayama K, Ebihara S, et al. Medical treatments and cares for geriatric syndrome: new strategies learned from frail elderly. *Tohoku J Exp Med.* 2005;205(3):205-214.
- [16] Rösler A, Otto B, Schreiber-Dietrich D, et al. Single-needle acupuncture alleviates gag reflex during transesophageal echocardiography: a blinded, randomized, controlled pilot trial. *J Altern Complement Med.* 2003;9(6):847-849.
- [17] Liu HL, Wang LP. Randomized controlled study on ginger-salt-partitioned moxibustion at shenque (CV 8) on urination disorders poststroke. *Zhongguo Zhen Jiu.* 2006;26(9):621-624.
- [18] He YZ, Wang LN, Huang L, et al. Effects of acupuncture on the cortical functional areas activated by index finger motion in the patient with ischemic stroke. *Zhongguo Zhen Jiu.* 2006;26(5):357-361.
- [19] Schuler MS, Durdak C, Höl NM, et al. Acupuncture treatment of geriatric patients with ischemic stroke: a randomized, double-controlled, single-blind study. *J Am Geriatr Soc.* 2005;53(3):549-550.
- [20] Zhang XL, Li J, Zhang MM, et al. Assessing the reporting quality of randomized controlled trials on acupuncture for acute ischemic stroke using the CONSORT statement and STRICTA. *Zhongguo Xunzheng Yixue Zazhi.* 2006;6(8):586-590.
- [21] Yang T, Liu Z, Liu Y. Electroacupuncture at ciliao and huiyang for treating neuropathic incontinence of defecation and urination in 30 cases. *J Tradit Chin Med.* 2003;23(1):53-54.
- [22] Jia SW, Wang QS, Xu WG. Study on influence of acupunctural signal on energy metabolism of human brain by positron emission tomography. *Zhongguo Zhong Xi Yi Jie He Za Zhi.* 2002;22(7):508-511.
- [23] Wang Q, Peng Y, Chen S, et al. Pretreatment with electroacupuncture induces rapid tolerance to focal cerebral ischemia through regulation of endocannabinoid system. *Stroke.* 2009;40(6):2157-2164.
- [24] Quinn TJ, Paolucci S, Sunnerhagen KS, et al. Evidence-based stroke rehabilitation: an expanded guidance document from the European Stroke Organisation (ESO) guidelines for management of ischaemic stroke and transient ischaemic attack 2008. *J Rehabil Med.* 2009;41(2):99-111.
- [25] Chuang CM, Hsieh CL, Li TC, et al. Acupuncture stimulation at Baihui acupoint reduced cerebral infarct and increased dopamine levels in chronic cerebral hypoperfusion and ischemia-reperfusion injured sprague-dawley rats. *Am J Chin Med.* 2007;35(5):779-791.
- [26] Chi YW, Jaff MR. Optimal risk factor modification and medical management of the patient with peripheral arterial disease. *Catheter Cardiovasc Interv.* 2008;71(4):475-489.
- [27] Wang M, Ma F, Chen H. Protective effects of acupuncture on brain tissue following ischemia/reperfusion injury. *Neural Regen Res.* 2008;3(3):309-312.
- [28] Lee GJ, Yin CS, Choi SK, et al. Acupuncture attenuates extracellular glutamate level in global ischemia model of rat. *Neurol Res.* 2010;32 Suppl 1:79-83.
- [29] Ren L, Zhang WA, Fang NY, et al. The influence of electro-acupuncture on neural plasticity in acute cerebral infarction. *Neurol Res.* 2008;30(9):985-989.
- [30] Choi S, Lee GJ, Chae SJ, et al. Potential neuroprotective effects of acupuncture stimulation on diabetes mellitus in a global ischemic rat model. *Physiol Meas.* 2010;31(5):633-647.
- [31] Schockert T, Schnitker R, Boroojerdi B, et al. Cortical Activation by Yamamoto New Scalp Acupuncture (YNSA) in the treatment of stroke patients a sham-controlled study aided by Functional Magnetic Resonance Imaging (fMRI). *Deutsche Zeitschrift Fur Akupunktur.* 2009;52(1):21-29.
- [32] Zhang L, Ge LB, Chen LF, et al. Clinical study on early acupuncture for acute ischemic stroke. *Journal of Acupuncture and Tuina Science.* 2008;6(4):222-226.

- [33] Zhang XY, Gao S, Zhao JG, et al. PET study of effects of combination of different points on glucose metabolism in the patient of cerebral infarction. *Zhongguo Zhen Jiu*. 2007;27(1):26-30.
- [34] Fu QH, Pei J, Jia Q, et al. Acupuncture treatment programs for post-stroke motor rehabilitation in community hospitals: study protocol of a multicenter, randomized, controlled trial. *Zhong Xi Yi Jie He Xue Bao*. 2012;10(5):516-524.
- [35] Chang FY, Lu CL. Hiccup: mystery, nature and treatment. *J Neurogastroenterol Motil*. 2012;18(2):123-130.
- [36] Wang Q, Wang F, Li X, et al. Electroacupuncture pretreatment attenuates cerebral ischemic injury through $\alpha 7$ nicotinic acetylcholine receptor-mediated inhibition of high-mobility group box 1 release in rats. *J Neuroinflammation*. 2012;9:24.
- [37] Fragoso AP, Ferreira AS. Immediate effects of acupuncture on biceps brachii muscle function in healthy and post-stroke subjects. *Chin Med*. 2012;7:7.
- [38] Kim DH, Kim SC, Youn HC. Surgical treatment for intra-thoracic migration of acupuncture needles. *J Korean Med Sci*. 2012;27(3):281-284.
- [39] Fragoso AP, Ferreira Ade S. Evaluation of the immediate effects of manual acupuncture on brachial bicep muscle function in healthy individuals and poststroke patients: a study protocol of a parallel-group randomized clinical trial. *Zhong Xi Yi Jie He Xue Bao*. 2012;10(3):303-309.
- [40] Kong JC, Lee MS, Shin BC, et al. Acupuncture for functional recovery after stroke: a systematic review of sham-controlled randomized clinical trials. *CMAJ*. 2010;182(16):1723-1729.
- [41] Wu H. Acupuncture and stroke rehabilitation. *CMAJ*. 2010;182(16):1711-1712.
- [42] Kim MK, Choi TY, Lee MS, et al. Contralateral acupuncture versus ipsilateral acupuncture in the rehabilitation of post-stroke hemiplegic patients: a systematic review. *BMC Complement Altern Med*. 2010;10:41.
- [43] Ernst E, Lee MS. Acupuncture during stroke rehabilitation. *Stroke*. 2010;41(8):e549-550.
- [44] Wang P, Yang HY, Wang YQ. Impedance characteristics of ear acupoints in identifying excess or deficiency syndrome of stroke. *Zhong Xi Yi Jie He Xue Bao*. 2010;8(6):525-529.
- [45] Wu P, Mills E, Moher D, et al. Acupuncture in poststroke rehabilitation: a systematic review and meta-analysis of randomized trials. *Stroke*. 2010;41(4):e171-179.

(Edited by Mu WJ/Wang L)