Chapter 12

Acupuncture in Cardiology

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Additional information is available at the end of the chapter

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1. Introduction

Acupuncture combines the Latin *acus* (needle) and *punctum* (a prick) [1]. From the historical record of Huangdi Neijin (the Yellow Emperor's Classic), acupuncture has been used in China as a therapeutic tool for at least 2000 years [2]. In ancient China, soldiers noted, after being wounded by arrows, that their pain often eased for quite a while [3]. Therefore, a cause-and-effect relationship was assumed between the arrow wound and the unexpected diminution of pain. However, acupuncture has been little known in the Western world until 1970s after U.S. President Nixon's historic visit to China in 1972 [4]. Following the initial excitement engendered by the press reports [5], acupuncture becomes one of the most popular treatments in alternative medicine (Figure 1), and accounts for more than 10 million treatments given annually in the United States [6]. Much interest was further engendered by tales by subsequent visitors to China who witnessed surgical operations being successfully performed on conscious patients under acupunctural anesthesia [7-15]. Scientific studies using modern technology on acupuncture actually began in China in the late 1950s with further progress being made since the discovery of endogenous opioids in 1975 [2,16]. Much more advances have been made in more recent years in further understanding of the basic mechanisms underlying this millennium old medical treatment and its various clinical applications in the 21st century. This chapter reviews the current role of acupuncture in cardiology.

2. Hypercholesterolemia

Electro-acupuncture at "Fenglong" (ST 40) has some therapeutic effect on decreasing the content of total cholesterol and low-density-lipoprotein cholesterol in hyperlipidemic rats and improving the gene expression of ATP-binding cassette transporter A1, peroxisome proliferator-activated receptor alpha, liver X receptor alpha and retinoid X receptor-alpha mRNA, so

(A) (B)

Figure 1. A) An acupuncture manikin showing the location of the various acupoints along the meridians; (B) a complete set of acupuncture needles.

as to promote reverse cholesterol transport [17]. Furthermore, real-time PCR and western blot indicate that electroacupuncture at ST 40 induces the expression of nNOS and Mt1, two genes involved in NO signal transduction [18]. Acupuncture treatment for hypercholesterolemia thus involves the modulation of several biological pathways and provides a physiological link between NO signal transduction and the cholesterol-lowering effect of acupuncture [18].

3. Coronary artery disease

The effectiveness of acupuncture in treatment of angina has been well documented [19-21]. Its antianginal effect has been shown to be secondary to an antiischemic effect, which in turn is due to a decrease in heart rate and blood pressure and reduction in left ventricular afterload [22], a reduction in myocardial oxygen consumption, and a redistribution of coronary blood flow [23], myocardial release of β-endorphin [24], coronary vasodilatation [25], and increase in coronary collateral circulation [26]. Acupoint pressing has been shown to alleviate angina faster (2.45 +/- 1.67 min) than sublingual nitroglycerin (2.89 +/- 2.64 min) [27]. Transmyocardial acupuncture has also been used as a novel approach to myocardial revascularization [28,29], although its rationale has been questioned [30].

Acupuncture has been successfully used to improve microcirculation and left ventricular function in acute myocardial infarction [31-33]. Animal studies demonstrated that electroacupuncture could decrease the ST-segment elevation in ECG and reduce the infarct size following coronary ligation [34], although a recent study on rats failed to show a cardioprotective effect of electroacupuncture in terms of reduction of either infarct size or ventricular

arrhythmias [35]. Acupuncture has also been successfully employed to terminate nausea and vomiting [36] and intractable hiccup [37] complicating acute myocardial infarction.

4. Cardiac arrhythmias

Acupuncture has been employed to treat both experimental [38-40] and clinical arrhythmias. The latter included ventricular extrasystoles [41,42], sinus bradycardia [43], atrial fibrillation [44,45], decreased heart rate variability [46,47,48,49,50] and sudden death [51]. In the treatment of paroxysmal atrial fibrillation and atrial flutter, acupuncture at Neiguan, Shenmen, and Danzhong is more effective than intravenous amiodarone (conversion rate: 85% vs 67%, $p<0.01$; conversion time:39.6+/-13.7 min vs 50.1+/-14.8 min, $p<0.01$)[52]. Acupuncture at Neiguan, Shenmen and Xinshu also can prevent recurrences of atrial fibrillation after cardioversion in patients with persistent atrial fibrillation [53]. The advantage of acupuncture in treating atrial fibrillation is obvious, because it does not have any of the untoward effect of pharmacotherapy or ablation. Atrial fibrillation is the most common cardiac arrhythmia, and anxiety plays a significant role in either its initiation or its perpetuation [54]. Because acupuncture is very effective in treating anxiety, this therapeutic modality warrants further investigation as a promising therapeutic option.

A recently published systematic review of randomized controlled trials failed to provide conclusive evidence in support of acupuncture treatment for cardiac arrhythmias [55]. Furthermore, electro-acupuncture may interfere with demand pacemakers [56], although one recent case report from Greece indicated its safety [57]. Electo-acupuncture may also trigger inappropriate ICD discharges [58,59]. Therefore, extreme caution should be employed when electro-acupuncture is prescribed for patients with pacemakers and/or ICDs, and each patient should be considered individually with great care.

5. Congestive heart failure

In a Chinese echocardiographic study of patients with congestive heart failure due to dilated cardiomyopathy under maintenance doses of conventional drugs, including digitalis, diuretics and potassium supplements, acupuncture resulted in an increase in stroke volume [60]. Because patients with heart failure have increased sympathetic activity and acupuncture produces release of endogenous opioids in the central nervous system which would inhibit central sympathetic outflow, sympathetic activation during acute mental stress was markedly attenuated [61] or virtually eliminated [62] after acupuncture. This may explain why ear acupuncture has been used in treating chronic heart failure, because one of the acupuncture points stimulated by the needle in the ear corresponds to the closest position of the vagus nerve to the cutaneous surface (vide infra), and electrical vagus nerve stimulation has been advocated for patients with advanced heart failure [63].

Acupuncture may become an additional therapeutic strategy to improve the exercise tolerance of patients with chronic heart failure, potentially by improving skeletal muscle function [64].

The German researchers from the University Hospital of Heidelberg found a remarkable increase in 6-minute walk distance, improvement in ventilatory efficiency and post-exercise recovery, and increase in heart rate variability, despite a lack of improvement of the cardiac ejection fraction and peak oxygen uptake [64]. They recommended that further research be carried out to understand the beneficial mechanisms of acupuncture – in particular, its effects on neurohormonal balance and production of inflammatory cytokines [64].

In patients with chronic heart failure, acupuncture may reduce digitoxicity by regulating intracellular Ca^{++}, improving the function of Ca^{++}-ATPase in the sarcoplasmic reticulum, and increasing the calcium sensitivity of cardiac troponin [65]. These considerations may provide a novel clue for attenuating the toxicity of digitalis preparations given to patients with chronic heart failure.

6. Hypertension

Experimental studies have shown that acupuncture inhibits the reflex-induced hypertension by modulating the activity of cardiovascular parasympathetic neurons in the rostral ventrolateral medulla [66]. Activation of neurons in the arcuate nucleus of the hypothalamus, ventrolateral periaqueductal gray in the midbrain, and medullary nucleus raphé pallidus in the medulla by acupuncture can inhibit the activity of premotor sympathetic neurons in the rostral ventrolateral medulla. Glutamate, acetylcholine, opioids, gamma-aminobutyric acid, nociceptin, serotonin, nitric oxide and endocannabinoids in the brain all appear to participate in the antihypertensive response of acupuncture (Figure 2)[66]. Other possible mechanisms include decreases in plasma renin [67, 68], plasma neuropeptide Y [69], aldosterone [70] and angiotensin II activity [71,72]; increased excretion of sodium [73,74]; changes in plasma norepinephrine [75], serotonin [75] and endorphin levels [76,77]; and lowering of blood viscosity [75,78].

However, the Stop Hypertension with the Acupuncture Research Program (SHARP) pilot trial concluded that acupuncture provided no greater benefit than invasive sham acupuncture in controlling moderate hypertension [79]. Further research is obviously required to determine whether acupuncture can enhance clinical management of hypertension if used in combination with antihypertensive agents, over longer periods, or among specific subgroups of patients.

7. Stroke

Stroke should be considered as a coronary artery disease risk equivalent [80]. Acupuncture has useful applications in both the acute and chronic phases of a stroke. In ischemic stroke, acupuncture increases local cerebral blood flow as determined by single photon emission computed tomography [81] and near-infrared spectroscopy [82]. In rats with ischemic stroke, acupuncture has been shown to promote angiogenesis [83]. Acupuncture at Baihui and Fengchi is more effective than nimopidine in relieving cerebral vasospasm after embolization

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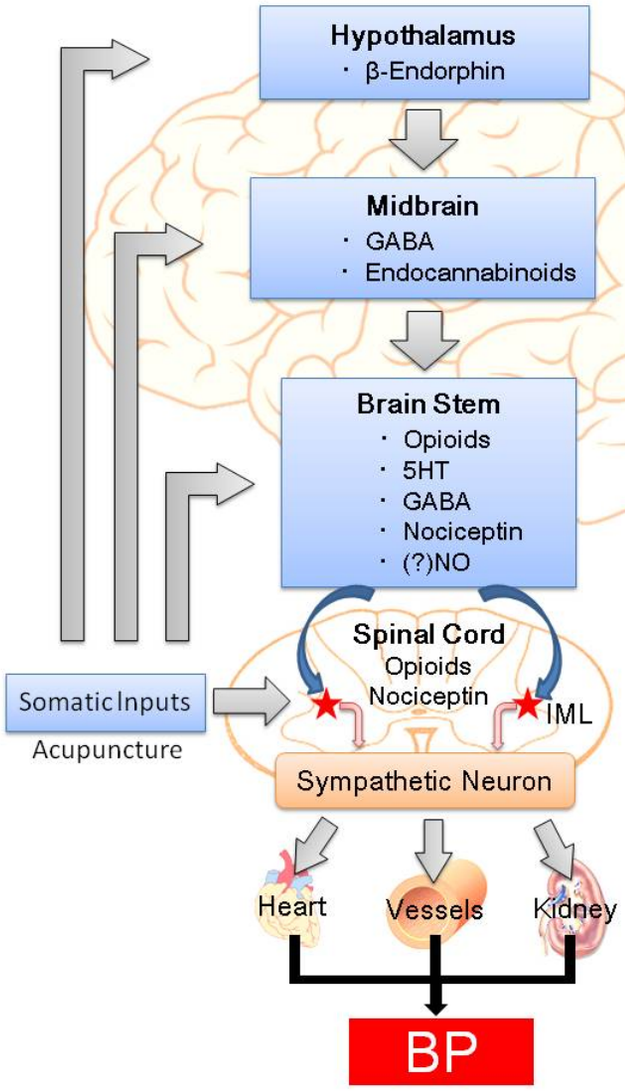

Figure 2. Neuroendocrine modulation of blood pressure by acupuncture. Abbreviations: GABA, γ-aminobutyric acid; 5HT, 5-hydroxytryptamine or serotonin; NO, nitric oxide; IML, intermediolateral column of the spinal cord. From Ref 66, courtesy W. Zhou.

of ruptured aneurysms in subarachnoid hemorrhage [84]. In a recent publication from Shanghai [85], the authors reviewed the progress of researches on the mechanism of acupuncture underlying improvement of acute cerebral hemorrhage from experimental studies and research methods. The effects of acupuncture mainly involve (1) lessening inflammatory reactions, (2) reducing impairment of free radicals and excitatory amino acids on cerebral neurons, (3) balancing release of vascular bioactive substances to increase regional cerebral blood flow, and (4) promoting repair and regeneration of the neural tissue. In regard to the research methods, many new biological techniques such as biological molecular approaches, neuro-cellular chemical methods, reverse transcription-polymerase chain reaction (RT-PCR) or quantitative real-time PCR, situ hybridization, western blotting, and electron microscopy

have been extensively applied to researches on the underlying mechanisms of acupuncture therapy for cerebral infarction. In addition, the authors also pointed out that, in spite of achieving some greater progresses in experimental studies, most of the results basically reflect static, isolated and regional changes rather than dynamic and whole body changes. For these reasons, the authors recommended more in vivo research techniques and noninvasive research methods in the investigation of the underlying mechanisms of acupuncture therapy for acute cerebral ischemia [85].

Acupuncture has also been used successfully for post-stroke motor rehabilitation [86], behavioral recovery [87], aphasia [88], dysphasia [89], dysphagia [90], cognition disorders [91], depression [92], and urinary incontinence and urinary tract infection [93].

8. Smoking cessation

Cigarette smoking is prevalent in China; 67% of men [94] and 40% of male physicians [95] are smokers. It is a major cause of death in China and a principal cause of coronary heart disease in China [96]. In addition, secondhand smoke exposure (52% of nonsmokers in China are exposed to tobacco smoke for at least 15 minutes daily for >1 day per week [97]) was responsible for increased mortality due to coronary heart disease, ischemic stroke, lung cancer and chronic obstructive pulmonary disease in a recently published 17-year cohort study in China [98]. Another recently completed Chinese population study, the Kailuan community study, showed smoking cessation to be one of the seven key components of an essential population-wide strategy to reduce cardiovascular disease [99]. Although a 2012-15 blueprint on chronic disease prevention and control released by the Chinese Ministry of Health on May 21, 2012 set goals of reducing the adult smoking rate to below 25% among other goals [100], I have serious doubts as to how successful the Chinese Health Ministry's effort will be [101]. Nevertheless, any effective measure in curtailing cigarette smoking should be actively and urgently pursued.

Acupuncture has been found in a recently published review of smoking cessation intervention studies in China to yield a much higher abstinence rate than pharmacotherapy or counseling [102]. This observation was confirmed by two recently published meta-analyses of randomized controlled trials [103,104]. It has been postulated that, by increasing the levels of endorphin, enkephalin, epinephrine, norepinephrine, serotonin, and dopamine in the central nervous system and plasma, acupuncture provides the smoker with a deterioration in the taste of smoking, a decrease in the desire of smoking, and the obstruction of psychological symptoms resulting from smoking cessation [105]. The latest theory is that one of the acupuncture points stimulated by the acupuncture needle in the ear corresponds to the closest position of the vagus nerve to the cutaneous surface. Therefore, by stimulating this point, the acupuncturist blocks the outflow of withdrawal symptoms coming from the parasympathetic nervous system through the vagus nerve. However, more studies are needed to determine whether acupuncture is as efficacious as, or even more so than, pharmacotherapies.

9. Diabetes

Diabetes is associated with a marked increase in the risk of coronary artery disease, so much so that patients with diabetes shuld be treated as if they have existing coronary artery disease [106,107,108,109]. As a matter of fact, diabetes should be considered as a coronary artery disease equivalent [95,110]. The prevalence of diabetes is rising [108]. The main reasons for the rising prevalence of diabetes are smoking and obesity, which are certainly true for China [111,112]. A recent study from the University of North Carolina School of Global Public Health, using data from the China Health and Nutrition Survey, the longest ongoing study of its kind in China, reported that Chinese teenagers have a rate of diabetes nearly four to five times greater than their counterparts in the United States (1.9% vs 0.5% for boys and 0.4% for girls) [113]. Although acupuncture has been advocated for treatment of obesity (vide infra), a recent review of the literature questioned its validity owing to small sample size and low methodology quality of the studies [114].

On the other hand, acupuncture has been found to be effective in the management of patients with diabetes, by causing the release of endogenous opioid peptides such as β-endorphin from adrenal gland and thereby enhancing insulin secretion [115]. A recent literature review showed acupuncture to be effective in lowering blood glucose in both humans and rats [115]. Ear acupuncture in 45 diabetics in Peking University of Shenzhen Hospital, Shenzhen, Guangdong Province, China resulted in significant improvement in fasting plasma glucose, blood glucose load after 2-hour 75 gm oral glucose tolerance test and glycosylated hemoglobin [116]. Two recent studies from Beijing, China on patients with impaired glucose tolerance reported similar improvement in these parameters following electro-acupuncture, thus confirming its effectiveness in the prevention and treatment of diabetes at the early stage [117,118]. Another study from Nanjing, China reported acupuncture to be effective in lowering fasting blood leptin level, which may contribute to its clinical effect in improving diabetes [119]. Electro-acupuncture has also been used successfully for the treatment of diabetic peripheral neuropathy in rats [120] as well as in patients [121], although the quality of reports about randomized controlled trials is moderate to low [122]. Finally, acupuncture has been used in treating urinary tract infection in diabetic patients [123].

10. Obesity

Obesity is another risk factor for coronary artery disease, hypertension, chronic heart failure, stroke and diabetes [124]. It is increasing in prevalence worldwide, especially in developing countries like China [95,125,126]. Two recent systematic reviews, one published in 2009 [127] and the other in 2012 [114], both suggested that acupuncture is an effective treatment for obesity, with fewer adverse effects of the various dieting plans and Western anti-obesity drugs. A recent study in obese rats showed that electro-acupuncture led to a reduction of body weight, decrease in the plasma leptin levels, and an increase in leptin receptor expression in the hypothalamus, suggesting that regulating the expression of leptin and the leptin receptor

might be one of the molecular mechanisms underlying the reduction of body weight in diet-induced obese rats by electro-acupuncture treatment [128]. Another human study reported in 2010 found that laser acupuncture exerted a therapeutic effect on simple obesity by reducing both body weight and body mass index [129]. However, the amount of evidence is not fully convincing, because of the small sample size and poor methodological quality of all the reported trials to date.

11. Acupunctural anesthesia for cardiac surgery

The most amazing application of acupuncture is acupunctural anesthesia. Skeptics who deny that acupunctural anesthesia can work have suggested that acupuncture is nothing more than an effective use of hypnosis or autosuggestion. I was also a skeptic until I witnessed with my own eyes several operative procedures performed on conscious patients under acupunctural anesthesia including those with acquired valvular and congenital heart diseases (Figures 3 and 4). Being a native-born Chinese, I was able to communicate directly with the patients, without going through any interpreters, who may either inadvertently or deliberately omit or distort any actual expressions from the patients, to find out what discomfort they might experience during the procedures. Of course, I was not the only physician who was impressed by cardiac surgery under acupunctural anesthesia. Other well-known surgeons around the world, such as DeBakey from the United States [130], Hollinger et al from Germany [131], and Caracausi from Italy [132] were too.

Acupuncture also has a cardioprotective effect as a pretreatment on patients undergoing heart valve replacement. Cardiac ischemia-reperfusion injury after cardiopulmonary bypass often contributes to postoperative morbidity and mortality in patients undergoing heart valve replacement. A randomized controlled trial, which was reported from Xi'an, China in 2010, showed that electro-acupuncture pretreatment significantly reduced overall serum troponin I release at 6 hours, 12 hours and 24 hours after aortic cross-clamping removal [133]. Meanwhile, electroacupuncture pretreatment also reduced the inotrope score at 12 hours, 24 hours, and 48 hours after the intensive care unit arrival and shortened intensive care unit stay time ($p<0.05$)[133]. The cardioprotective effect of transcutaneous electric acupoint stimulation was further confirmed recently in the pediatric cardiac patients with congenital heart disease [134].

After its initial enthusiasm in China in the 1970s, in the subequent years acupunctural anesthesia for open heart surgery gradually became less and less frequently used throughout China, because of its limitations and disadvantages [3,135]. Fortunately, with recent modification of the technique by combining acupuncture with conscious sedation, Zhou et al [135] were able to demonstrate its effectiveness again. This modification, which will be discussed bodes well for the future of acupunctural anesthesia for cardiac surgery, not only because of its sound physiological principles, simplicity in clinical application, significant benefit to the patient and favorable cost effectiveness, but also for its positive impact on healthcare cost.

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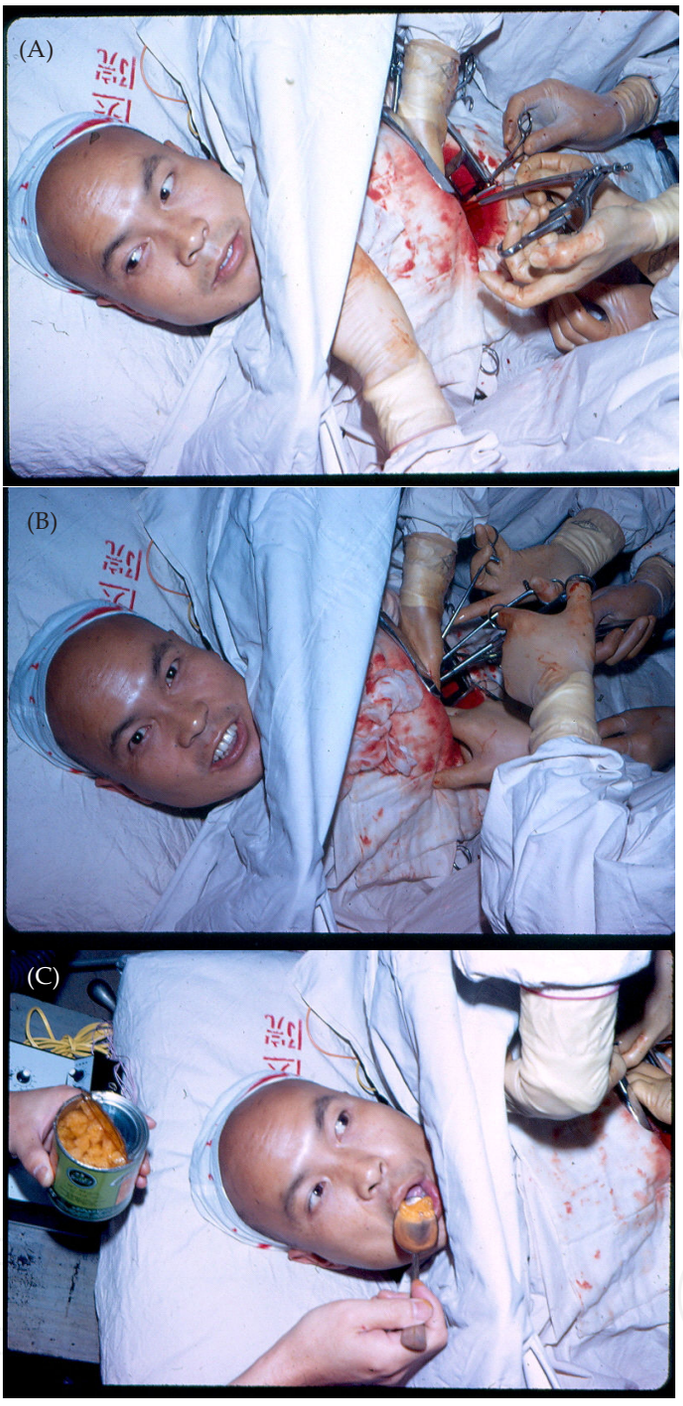

Figure 3. A man undergoing a closed transventricular mitral commissurotomy under acupunctural anesthesia in a hospital in Shanghai. (A) Patient fully awake and comfortable; (B) Patient smiling during the procedure; (C) Patient eating oranges during the operation. All photographs taken by the author during his 1972 visit to China.

12. Adverse effects and complications

Although acupuncture is extremely safe, adverse effects and sometimes serious complications have been reported. These include infective endocarditis [136,137,138], pericardial effusion

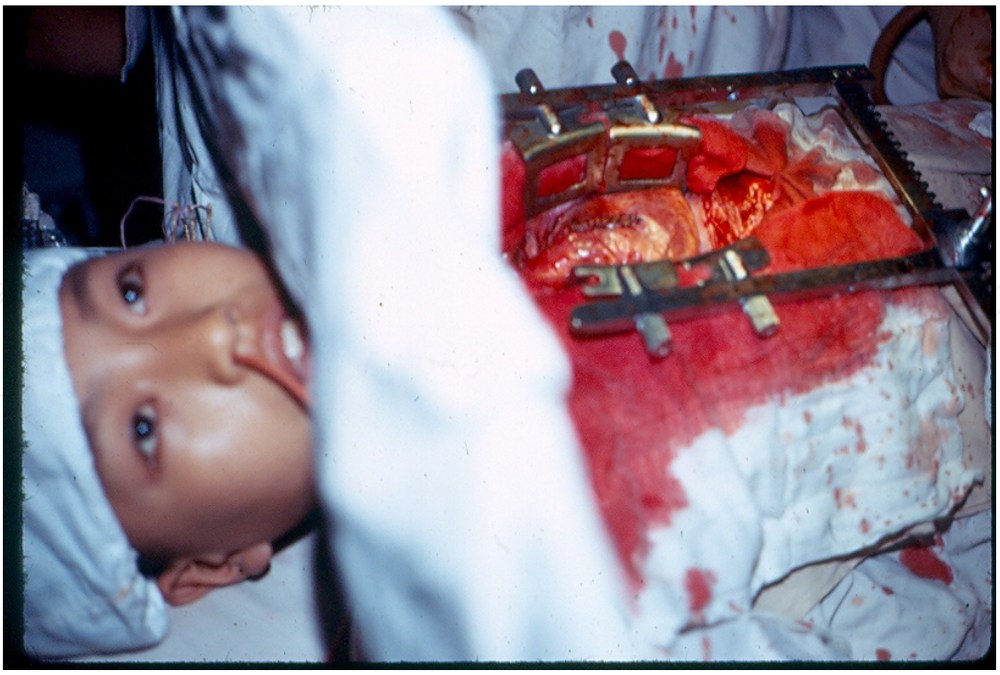

Figure 4. A child fully awake and comfortable while undergoing open heart surgical closure of a ventricular septal defect under acupunctural anesthesia. Photograph taken by the author during his 1972 visit to China.

[139], cardiac tamponade [138,140], pneumothorax [141] and AIDS [138,142]. However, infective endocarditis and AIDS are not due to acupuncture per se, but to the unsterile technique that was employed during acupuncture. Hundreds of thousands of acupuncturists worldwide perform millions of acupuncture procedures per year [143]. Considering the small number of reported complications in the literature, acupuncture is very safe indeed [143,144,145,146,147]. As a matter of fact, the recent report of the successful use of electro-acupuncture for treatment of arthritis in a patient with a total artificial heart is further testimonial to its safety [148].

13. Conclusion

Acupuncture has a definite place in cardiology. When performed by trained acupuncturists, it is safe, effective, cost-effective, and widely available. As more research evidence for acupuncture efficacy, including the application of functional magnetic resonance imaging technique in recent years [149], becomes available, it will be possible to increase physician knowledge and change attitudes towards acupuncture [150,151], as it was so predicted by the NIH Consensus Development Panel on Acupuncture convened a decade and a half ago [152]. When incorporated into conventional health care as an integrated approach, the future of this ancient Chinese therapeutic modality is bright. As a matter of fact, acupuncture should prove to be an attractive alternative to Western medicine in the current era of cost containment in healthcare [153]. Although Western medicine may be preferred in the management of some acute cardiac conditions, such as acute myocardial infarction or malignant arrhythmias,

traditional Chinese medicine, of which acupuncture is an essential component, has a definite place in the management of various subacute and chronic cardiovascular disorders and risk factors. However, a recent systematic review showed that, in acute low back pain, acupuncture appears to be actually more effective than drugs for symptomatic improvement [154]. Therefore, more registered high-quality clinical trials need to be continued worldwide on this 2,000+-year-old ancient Chinese therapy [155].

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References

[1] Haubrich WS: Medical Meanings. A Glossary of Word Origins. Philadelphia: American College of Physicians 1997:4.

[2] Han JS: Physiologic and neurochemical basis of acupuncture anesthesia. In: The International Textbook of Cardiology (Cheng TO, ed) New York/Oxford: Pergamon Press 1987:1124-1132.

[3] Cheng TO: Acupuncture anesthesia for open heart surgery: Past, present and future. Int J Cardiol 2011; 150:1-3.

[4] Cheng TO: Changes in China. N Engl J Med 1972; 287:259.

[5] Cheng TO: The evolution of cardiology in China. In: Cardiothoracic Surgery in China. Past, Present and Future (Wan S, Yim APC, eds). Hong Kong: The Chinese University Press, 2007: 204-305.

[6] Cheng TO: Acupuncture in cardiology. InCirculation.net February 7, 2007. http://www.incirculation.net/24174_84428.aspx Accessed February 7, 2007.

[7] Cheng TO: Acupuncture anesthesia. Science 1973; 179:521.

[8] Cheng TO: Medicine in China. J Am Geriatr Soc 1973; 21:289-313.

[9] Cheng TO: A view of modern Chinese medicine. Observations by a Shanghai-born physician during his recent visit after 22 years of absence. Ann Intern med 1973;78:285-290.

[10] Cheng TO: Future development of Chinese medical journals. Ann Intern Med 1973; 79:897-898.

[11] Cheng TO: China's "barefoot doctors". Prism (AMA) 1973; 1:16-18.

[12] Cheng TO: Cardiovascular diseases. In: China Medicine As We Saw It (Quinn JR, ed). Bethesda, Maryland: US Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, DHEW Publication No. (NIH) 75-684. 1974:261-288.

[13] Cheng TO: Cardiology in the People's Republic of China. In: New Horizons in Cardi ovascular Practice (Russek HI, ed). Baltimore: University Park Press, 1975:1-27.

[14] Cheng TO: Acupuncture anesthesia for open heart surgery. Am J Cardiol 1975; 36:411.

[15] Cheng TO: Stamps in cardiology. Acupuncture anaesthesia for open heart surgery. Heart 2000; 83:256.

[16] Han JS: Acupuncture and endorphins. Neurosci Letters 2004; 361:258-261.

[17] Zhang HX, Wang Q, Huang H, Yue W, Qin PF: Effect of electroacupuncture at "Fenglong" (ST 40) on rats with hyperlipidemia and its mechanism. Zhongguo Zhen Jiu 2012; 32:241-5.

[18] Li L, Tan GH, Zhang YZ: Modulated expression of genes associated with NO signal transduction contributes to the cholesterol-lowering effect of electro-acupuncture. Biotechnol Lett 2012 Mar 16 [Epub ahead of print]

[19] Cheng TO: Acupuncture treatment for angina. Cardiology 1998; 90:152.

[20] Cheng TO: Acupuncture for relief of angina. Circulation 1998; 98:2357-2358.

[21] Bueno EA, Mamtani R, Frishman WH: Alternative approaches to the medical management of angina pectoris: acupuncture, electric nerve stimulation, and spinal cord stimulation. Heart Disease 2001; 3:236-241.

[22] Diao LH, Yang ZB, Zhou GX, Chen Y, Fan LY, Zhang YY, Liu H, Liu ST: Observation on therapeutic effects of electroacupuncture at Neiguan (PC 6) on silent myocardial ischemia. Zhongguo Zhen Jiu 2011; 31:591-4.

[23] Mannheimer C, Eliasson T, Augustinsson L-E, Blomstrand C, Emanuelsson H, Larsson S, Norrsell H, Hjalmarsson A: Electrical stimulation versus coronary artery bypass surgery in severe angina pectoris. The ESBY study. Circulation 1998; 97:1157-1163.

[24] Eliasson T, Mannheimer C, Waagstein F, Andersson B, Bergh C-H, Augustinsson L-E, Hedner T, Larson G: Myocardial turnover of endogenous opioids and calcitonin-gene-related peptide in the human heart and the effects of spinal cord stimulation on pacing-induced angina pectoris. Cardiology 1998; 89:170-177.

[25] Kurono Y, Egawa M, Yano T, Shimoo K: The effect of acupuncture on the coronary arteries as evaluated by coronary angiography: a preliminary report. Am J Chin Med 2002; 30:387-396.

[26] Meng JB, Zhu GY, Fu WX, Song LM: Effect of acupuncture on the coronary collateral circulation of dogs suffering from experimental myocardial infarction. Zhen Ci Yan Jiu 1986; 11(3):196-197.

[27] Wang YM, Wang QY, Zhang J, Guo YL: Comparative study on acupoint pressing and medication for angina pectoris due to coronary heart disease. Zhongguo Zhen Jiu 2011; 31:595-8.

[28] Sen PK, Udwadia TE, Kinare SG, Parulkar GB: Transmyocardial acupuncture: a new approach to myocardial revascularization. J Thorac Cardiovasc Surg 1965; 50:181-189.

[29] Sen PK, Daulatram J, Kinare SG, Udwadia TE, Parulkar MS: Further studies in multiple transmyocardial acupuncture as a method of myocardial revascularization. Surgery 1968; 64:861-870.

[30] Pifarre R, Jasuja ML, Lynch RD, Neville WE: Myocardial revascularization by transmyocardial acupuncture. A physiologic impossibility. J Thorac Cardiovasc Surg 1969; 58:424-431.

[31] Zhu BJ, Bi L, Liang SY, Pang L, Wang SL, Liu JF, Jiang AP, Li CJ, Ye ZJ, Yang: Effect of acupuncture on left ventricular function, microcirculation, blood rheology and cyclic nucleotides in patients with acute myocardial infarction. J Tradit Chin Med 1989; 9:63-68.

[32] Zhu BJ, Liang SY: Effects of acupuncture on microcirculation of acute myocardial infarction patients. Zhen Ci Yan Jiu 1988;13:267-271.

[33] Li CJ, Bi LG, Zhu BJ, Qi MZ, Zhao CX, Xu YF, Yao ZL, Lu ZS, Sun SM, Dong H, et al: Effects of acupuncture on left ventricular function, microcirculation, cAMP and cGMP of acute myocardial infarction patients. J Tradit Chin Med 1986; 6:157-161.

[34] Meng J: The effects of acupuncture in treatment of coronary heart diseases. J Tradit Chin Med 2004;24:16-19.

[35] Dow J, Painovich J, Hale SL, Tien-A-Looi S, Longhurst JC, Kloner RA: Absence of actions of commonly used Chinese herbal medicines and electroacupuncture on myocardial infarct size. J Cardiovasc Pharmacol Ther 2012;17:403-411.

[36] Dent HE, Dewhurst NG, Mills SY, Willoughby M: Continuous PC6 wristband acupressure for relief of nausea and vomiting associated with acute myocardial infarction: a partially randomised, placebo-controlled trial. Complement Ther Med 2003; 11:72-77.

[37] Liu FC, Chen CA, Yang SS, Lin SH: Acupuncture therapy rapidly terminates intractable hiccups complicating acute myocardial infarction. South Med J 2005; 98:385-387.

[38] Xia Y, Guo XQ, Zhang AZ, Cao XD, Li P: Inhibitory effect of analogous electro-acupuncture on experimental arrhythmia. Acupunct Electrother Res 1985; 10:13-34.

[39] Fan W, Wu N, Fang C: Effect of acupuncture on ischemic ventricular tachyarrhythmia in experimental electrophysiology study. Zhonghua Xin Xue Guan Bing Za Zhi 1987; 15:285-288, 311.

[40] Zhang Y, Guo Y, Wang X, Shi L, Miao W, Xu T, Zhang C: Influence of changing Ca^{++} concentration in neiguan (PC6) on the effect of acupuncture treating experimental arrhythmia of rabbits. Zhen Ci Yan Jiu 1995; 20:63-67.

[41] Liptak V, Habeler G, Egger J: Influence of acupuncture and electroacupuncture on heart rate and extrasystoles. Wien Med Wochenschr 1980; 130:668-670.

[42] Zhang J, Xu W: Frequent ventricular extrasystoles treated by needling neiguan (PC6) plus oral administration of mexiletine – a report of 30 cases. J Tradit Chin Med 2004; 24:40-41.

[43] Gao ZW, Yu XY, Shen AX, Bao LE, Lin XC, Qiu JH, Wang ZL, Hu ZG, Zhang SH: Acupuncture treatment of 54 cases of sinus bradycardia. J Tradit Chin Med 1987; 7:185-187.

[44] Berman RH: Acupuncture for cardioversion. Ann Intern Med 1973; 79:285.

[45] Lombardi F, Belletti S, Battezzati PM, Lomuscio A: Acupuncture for paroxysmal and persistent atrial fibrillation: An effective non-pharmacological tool? World J Cardiol 2012; 4(3):60-5.

[46] Shi X, Wang ZP, Liu KX: Effect of acupuncture on heart rate variability in coronary heart disease patients. Zhongguo Zhong Xi Yi Jie He Za Zhi 1995; 15:536-538.

[47] Litscher G, Cheng G, Cheng W, Wang L, Niu Q, Feng X, Gaischek I, Kuang H: Sino-European transcontinental basic and clinical high-tech acupuncture studies-part 2: acute stimulation effects on heart rate and its variability in patients with insomnia. Evid Based Complement Alternat Med 2012;2012:916085. Epub 2012 Mar 4.

[48] Litscher G, Cheng G, Wang L, Cheng W, Su H, Niu Q, Zou T, Wang Y, Feng X, Gaischek I, Sheng Z, Kuang H: Biomedical teleacupuncture between China and Austria using heart rate variability-Part 2: Patients with depression. Evid Based Complement Alternat Med 2012;2012:145904. Epub 2012 Apr 17.

[49] Anderson B, Nielsen A, McKee D, Jeffres A, Kligler B: Acupuncture and heart rate variability: a systems level approach to understanding mechanism. Explore (NY) 2012; 8(2):99-106.

[50] Gao XY, Liu K, Zhu B, Litscher G: Sino-European transcontinental basic and clinical high-tech acupuncture studies-part 1: auricular acupuncture increases heart rate var-

iability in anesthetized rats. Evid Based Complement Alternat Med 2012;2012:817378. Epub 2012 Feb 21.

[51] Tang ZL, Song XG, Zhou YP: A preliminary study on the prevention and cure of sudden death caused by coronary heart disease by acupuncture. Zhen Ci Yan Jiu 1985; 10:148-151,147.

[52] Xu HK, Zhang YF: Comparison between therapeutic effects of acupuncture and intravenous injection of amiodarone in the treatment of paroxysmal atrial fibrillation and atrial flutter. Zhongguo Zhen Jiu 2007; 27:96-8.

[53] Lomuscio A, Belletti S, Battezzati PM, Lombardi F: Efficacy of acupuncture in preventing atrial fibrillation recurrences after electrical cardioversion. J Cardiovasc Electrophysiol 2011; 22(3):241-7.

[54] Pozuelo L: Fine-tuning a heart-brain connection. Anxiety in atrial fibrillation. Circ Heart Fail 2012; 5:307-8.

[55] Kim TH, Choi TY, Lee MS, Ernst E: Acupuncture treatment for cardiac arrhythmias: A systematic review of randomized controlled trials. Int J Cardiol 2011; 149:263-5.

[56] Fujiwara H, Taniguchi K, Takeuchi J, Ikezono E: The influence of low frequency acupuncture on a demand pacemaker. Chest 1980; 78:96-97.

[57] Vasilakos DG, Fyntanidou BP: Electroacupuncture on a patient with pacemaker: a case report. Acupunct Med 2011; 29(2):152-3.

[58] Vlay SC: Electromagnetic interference and ICD discharge related to chiropractic treatment. Pacing Clin Electrophysiol 1998; 21:2009.

[59] Lau EW, Birnie DH, Lemery R, Tang AS, Green MS: Acupuncture triggering inappropriate ICD shocks. Europace 2005; 7:85-86.

[60] Huang DJ, Cheng DT, Das SK, Pitt, B: Effect of acupuncture on left ventricular size and function assessed by echocardiography in patients with stable dilated cardiomyopathy. J Tradit Chin Med 1985; 5:243-245.

[61] Middlekauff HR, Hui K, Yu JL, Hamilton MA, Fonarow GC, Moriguchi J, Maclellan WR, Hage A: Acupuncture inhibits sympathetic activation during mental stress in advanced heart failure patients. J Card Fail 2002; 8:399-406.

[62] Middlekauff HR: Acupuncture in the treatment of heart failure. Cardiol Rev 2004; 12(3):171-3.

[63] Sabbah HN: Electrical vagus nerve stimulation for the treatment of chronic heart failure. Cleveland Clin J Med 2011; 78 (Suppl 1):S24-S29.

[64] Kristen AV, Schuhmacher B, Strych K, Lossnitzer D, Friederich HC, Hilbel T, Haass M, Katus HA, Schneider A, Streitberger KM, Backs J: Acupuncture improves exercise

tolerance of patients with heart failure: a placebo-controlled pilot study. Heart 2010; 96:1396-400.

[65] Ma SH, Gao JH, Wang YM, Zhang M, Ma YY, Hu JJ, Fu WX, Cui HF, Yu XC: Considerations about study on mechanisms of acupuncture underlying efficacy-enhancement and toxicity-attenuation of digitalis drugs for heart failure. Zhen Ci Yan Jiu 2011; 36(3):225-9.

[66] Zhou W, Longhurst JC: Neuroendocrine mechanisms of acupuncture in the treatment of hypertension. Evid Based Complement Alternat Med 2012;878673. Epub 2011 Dec 18.

[67] Lee HS, Kim JY: Effects of acupuncture on blood pressure and plasma renin activity in two-kidney one clip Goldblatt hypertensive rats. Am J Chin Med 1994; 22:215-219.

[68] Chiu YJ, Chi A, Reid IA: Cardiovascular and endocrine effects of acupuncture in hypertensive patients. Clin Exp Hypertens 1997; 19:1047-1063.

[69] Zhang YL, Li CP, Peng M, Yang HS: Effect of acupuncture combined with medicine on neuropeptide Y in the patient of hypertension. Zhongguo Zhen Jiu 2005; 25:155-157.

[70] Anshelevich IuV, Merson MA, Afanas'eva GA: Serum aldosterone level in patients with hypertension during treatment by acupuncture. Ter Arkh 1985; 57(10):42-45

[71] Shen S, Li J, Wang XM, Han JS: Angiotensin II release and anti-electroacupuncture analgesia in spinal cord. Sheng Li Xue Bao 1996; 48:543-550.

[72] Huang H, Liang S: Acupuncture at otoacupoint heart for treatment of vascular hypertension. J Tradit Chin Med 1992; 12:133-136.

[73] Yao T: Acupuncture and somatic nerve stimulation: mechanism underlying effects on cardiovascular and renal activities. Scan J Rehabil Med Suppl 1993; 29:7-18.

[74] Lin MZ, Wei ZY: Effect of elctroacupuncture on the urine flow, sodium excretion and potassium excretion in the conscious dog. Zhen Ci Yan Jiu 1989; 143:365-369.

[75] Zhou Y, Wang Y, Fang Z, Xia C, Liu B, Chen Q, Zhang F: Influence of acupuncture on blood pressure, contents of NE, DA and 5-HT of SHR and the interrelation between blood pressure and whole blood viscosity. Zhen Ci Yan Jiu 1995; 20:55-61.

[76] Ulett GA, Han S, Han JS: Electroacupuncture: mechanisms and clinical application. Biol Psychiatry 1998; 44:129-138.

[77] Han JS: Acupuncture and endorphins. Neurosci Lett 2004; 361:258-261.

[78] Jin YX, Fu Q, Guo XQ: Effects of electroacupuncture of "zusanli" acupoint on high blood pressure and blood hyperviscosity in stress rats. J Tongji Med Univ 1992; 12:209-215.

[79] Macklin EA, Wayne PM, Kalish LA, Valaskatgis P, Thompson J, Pian-Smith MMC, Zhang Q, Stevens S, Goertz C, Prineas RJ, Buczynski B, Zusman RM: Stop Hyperten-

sion with the Acupuncture Research Program (SHARP): results of a randomized controlled clinical trial. Hypertension 2006; 48:838-845.

[80] Lackland DT, Elkind MSV, D'Agostino R Sr, Dhamoon MS, Goff DC Jr, Higashida RT, McClure LA, Nitchell PH, Sacco RL, Sila CA, Smith SC Jr, Tanne D, Tirschwell DL, Touzé E, Wechsler LR, on behalf of the American Heart Association Stroke Council, Council on Epidemiology and Prevention, Council on Cardiovascular Radiology and Intervention, Council on Cardiovascular Nursing, Council on Peripheral Vascular Disease, and Council on Quality of Care and Outcomes Research: Inclusion of stroke in cardiovascular risk prediction instruments: A statement for healthcare professionals From the American Heart Association/American Stroke Association. Stroke 2012; 43:1998-2027.

[81] Zhou HF, Wang J, Cao TJ, Ju QB, Huang CY, Feng Y, Li YM, Li XN, Qu F, Dou WB: Effects of eye acupuncture on SPECT-determined cerebral blood flow in patients with cerebral infarction. Zhongguo Zhen Jiu 2011; 31:391-4.

[82] Li H, Hou ZW, Bai YL, Gu SZ: Comparative study on curative effects of stroke treated with acupuncture by NIRS. Zhongguo Zhen Jiu 2011; 31:998-1002.

[83] Du Y, Shi L, Li J, Xiong J, Li B, Fan X: Angiogenesis and improved cerebral blood flow in the ischemic boundary area were detected after electroacupuncture treatment to rats with ischemic stroke. Neurol Res 2011; 33;101-7.

[84] Jiang YZ, Li C, Xu JY, Lu YZ, Xu R, Han B, Lu WH: Observation of clinical efficacy of acupuncture for cerebral vasospasm after embolization of ruptured aneurysms. Zhongguo Zhen Jiu 2012; 32:193-7.

[85] Wang F, Wang HQ, Dong GR: Progress of researches on mechanism of acupuncture therapy underlying improvement of acute cerebral hemorrhage. Zhen Ci Yan Jiu 2011; 36(2):145-9.

[86] Fu QH, Pei J, Jia Q, Song Y, Gu YH, You XX: 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):516-24.

[87] Lu T, Luo Y, Sun H, Qin W, Li Y: Electroacupuncture improves behavioral recovery and increases SCF/c-kit expression in a rat model of focal cerebral ischemia/reperfusion. Neurol Sci 2012 Apr 13 [Epub ahead of print].

[88] Li G, Yang ES: An fMRI study of acupuncture-induced brain activation of aphasia stroke patients. Complement Ther Med 2011; 19 Suppl 1:S49-59.

[89] Zheng H, Zhu SW, Yang F, Huang XM, Wang Z, Cui FF, Zhang DB: Efficacy observation of Thoroughfare Vessel theory in acupuncture for post-stroke dysphasia. Zhongguo Zhen Jiu 2011; 31:1067-70.

[90] Sun XR, Fan GQ, Dai XZ: Primary optimization of acupuncture program for dysphagia after cerebral infarction. Zhongguo Zhen Jiu 2011; 31:879-82.

[91] Li W, Cheng YH, Yu XG: Observation on therapeutic effect of acupuncture combined with medicine on mild cognition disorders in patients with post-stroke. Zhongguo Zhen Jiu 2012; 32:3-7.

[92] Zhang GC, Fu WB, Xu NG, Liu JH, Zhu XP, Liang ZH, Huang YF, Chen YF: Meta analysis of the curative effect of acupuncture on post-stroke depression. J Tradit Chin Med 2012; 32:6-11.

[93] Chu JM, Bao YH, Zou C, Zhao HL, Gong Y, Wang CM: Randomized controlled clinical trials for electroacupuncture treatment of urinary incontinence in stroke patients. Zhen Ci Yan Jiu 2011; 36(6):428-32.

[94] Cheng TO: The current state of cardiology in China. Int J Cardiol 2004; 96:425-439.

[95] Cheng TO: Cardiovascular health, risks and diseases in contemporary China. Int J Cardiol 2012; 154:233-242.

[96] Cheng TO: Prevention of cardiovascular disease in modern China: Utile or futile? CVD Prevention and Control 2009; 4:1-7.

[97] Jiang Y, Elton-Marshall T, Fong GT, Li Q: Quitting smoking in China: findings from the ITC China survey. Tobacco Control 2010; 19(Suppl 2):i12-i17.

[98] He Y, Jiang B, Li LS, Li LS, Ko L, Wu L. Sun DL, He SF, Liang BQ, Hu FB, Lam TH: Secondhand smoke exposure predicted chronic obstructive pulmonary disease and other tobacco related mortality in a 17-year cohort study in China. Chest 2012 May 24. [Epub ahead of print]

[99] Wu S, Huang Z, Yang X, Zhou Y, Wang A, Chen L, Zhao H, Ruan C, Wu Y, Xin A, Li K, Jin C, Cai J: Prevalence of ideal cardiovascular health and its relationship with the 4-year cardiovascular events in a northern Chinese industrial city. Circ Cardiovasc Qual Outcomes 2012; 5:487-493.

[100] Anonymous: Chronic disease challenge. Beijing Review May 31, 2012; 55(22):5.

[101] Cheng TO: Is China finally going to ban cigarette smoking? Int J Cardiol 2010; 145:1-2.

[102] Kim SS, Chen W, Kolodziej M, Wang X, Wang VJ, Ziedonis D: A systematic review of smoking cessation intervention studies in China. Nicotine Tob Res 2012;14:891-

[103] Tahiri M, Mottillo S, Joseph L, Pilotee L, Eisenberg MJ: Alternative smoking cessation aids: a meta-analysis of randomized controlled trials. Am J Med 2012;125:576-584

[104] Cheng HM, Chung YC, Chen HH, Chang YH, Yeh ML: Systematic review and meta-analysis of the effects of acupoint stimulation on smoking cessation. Am J Chin Med 2012; 40(3):429-442.

[105] Cabioglu MT, Ergene N, Tan U: Smoking cessation after acupuncture treatment. Int J Neurosci 2007; 117(5):571-8.

[106] Kannel WB, McGee DL: Diabetes and cardiovascular disease. The Framingham study. JAMA 1979; 241:2035-2038.

[107] Haffner SM, Lehto S, Ronnemaa T, Pyörälä K, Laakso M: Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. N Engl J Med 1998; 339:229-34.

[108] Gregg EW, Cheng YJ, Saydah S, Cowie C, Garfield S, Geiss L, Barker L: Trends in death rates among U.S. adults with and without diabetes between 1997 and 2006: findings from the national health interview survey. Diabetes Care 2012; 35:1252-7.

[109] Benn M, Tybjærg-Hansen A, McCarthy MI, Jensen GB, Grande P, Nordestgaard BG: Nonfasting glucose, ischemic heart disease, and myocardial infarction. A Mendelian randomization study. J Am Coll Cardiol 2012; 59:2356-65.

[110] Hu DY, Pan CY, Yu JM, for the China Heart Survey Group: The relationship between coronary artery disease and abnormal glucose regulation in China: the China Heart Survey. Eur Heart J 2006; 27: 2573-79.

[111] Cheng TO: Smoking and diabetes in Chinese men. Postgrad Med J 2001; 77:551.

[112] Cheng TO: Diabetes epidemic in China and its economic impact. Int J Cardiol 2011; 149:1-3.

[113] Yan S, Li J, Li S, Zhang B, Du S, Gordon-Larsen P, Adair L, Popkin B: The expanding burden of cardiometabolic risk in China: the China Health and Nutrition Survey. Obes Rev 2012;13:810-821

[114] Sui Y, Zhao HL, Wong VCW, Brown N, Li XL, Kwan AKL, Hui HLW, Ziea ETC, Chan JCN: A systematic review on use of Chinese medicine and acupuncture for treatment of obesity. Obes Rev 2012; 13(5):409-30.

[115] Peplow PV, Baxter GD: Electroacupuncture for control of blood glucose in diabetes: literature review. J Acupunct Meridian Stud 2012; 5:1-10.

[116] Ju YL, Chen ML, Wang L, Lan W, Chi X, Liu JX, Zhang HL: Effects of stimulating in the cavum concha on glucometabolism in patients with diabetes. Zhongguo Zhen Jiu 2012; 32:198-200.

[117] Meng H, Zhai X, Hao JD, Wang HC: Intervention of electroacupuncture for patients with impaired glucose tolerance. Zhongguo Zhen Jiu 2011; 31:971-3.

[118] Meng H, Hao JD, Wang HC, Zhao JY, Zhao CL, Zhai X: Effects of different frequencies of electroacupuncture on blood glucose level in impaired glucose tolerance patients. Zhen Ci Yan Jiu 2011; 36(3):220-3.

[119] Cai H, Zhao LJ, Zhao ZM, Guo JH, Yuan AH: Effect of acupuncture on serum leptin level in patients with type II diabetes mellitus. Zhen Ci Yan Jiu 2011; 36(4):288-91.

[120] Hwang HS, Yang EJ, Lee SM, Lee SC, Choi SM: Antiallodynic effects of electroacupuncture combined with MK-801 treatment through the regulation of p35/p25 in experimental diabetic neuropathy. Exp Neurobiol 2011; 20(3):144-52.

[121] Jin Z, Zhang BF, Shang LX, Wang LN, Wang YL, Chen J, Jiang SS: Clinical observation on diabetic peripheral neuropathy treated with electroacupuncture and acupoint injection. Zhongguo Zhen Jiu 2011; 31:613-6.

[122] Bo C, Xue Z, Yi G, Zelin C, Yang B, Zixu W, Yajun W: Assessing the quality of reports about randomized controlled trials of acupuncture treatment on diabetic peripheral neuropathy. PLoS One 2012; 7(7):e38461.

[123] Luo YX: Acupuncture for 62 cases of urinary infection of diabetes. Zhongguo Zhen Jiu 2011; 31:702.

[124] Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, Bravata DM, Dai S, Ford ES, Fox CS, Fullerton HJ, Gillespie C, Hailpern SM, Heit JA, Howard VJ, Kissela BM, Kittner SJ, Lackland DT, Lichtman JH, Lisabeth LD, Makuc DM, Marcus GM, Marelli A, Matchar DB, Moy CS, Mozaffarian D, Mussolino ME, Nichol G, Paynter NP, Soliman EZ, Sorlie PD, Sotoodehnia N, Turan TN, Virani SS, Wong ND, Woo D, Turner MB; American Heart Association Statistics Committee and Stroke Statistics Subcommittee: Heart disease and stroke statistics—2012 update: a report from the American Heart Association. Circulation 2012; 125:e2-e220.

[125] Xu H, Li Y, Liu A, Zhang Q, Hu X, Fang H, Li T, Guo H, Li Y, Xu G, Ma J, Du L, Ma G: Prevalence of the metabolic syndrome among children from six cities of China. BMC Public Health 2012; 12:13. http://www.biomedcentral.com/1471-2458/12/13

[126] Cheng TO: Childhood obesity in modern China. Int J Cardiol 2012; 157:315-7.

[127] Cho S-H, Lee J-S, Thabane L, Lee J: Acupuncture for obesity: a systematic review and meta-analysis. Int J Obesity 2009; 33:183-196.

[128] Gong M, Wang X, Mao Z, Shao Q, Xiang X, Xu B: Effect of electroacupuncture on leptin resistance in rats with diet-induced obesity. Am J Chin Med 2012; 40:511-20.

[129] Hu WL, Chang CH, Hung YC: Clinical observations on laser acupuncture in simple obesity therapy. Am J Chin Med 2010; 38(5):861-7.

[130] DeBakey ME: A Surgeon's Diary of a Visit to China. Phoenix, Arizona: Phoenix Newspapers, Inc. 1974:31-33.

[131] Hollinger I, Richter JA, Pongratz W, Baum M: Acupuncture anesthesia for open heart surgery: a report of 800 cases. Am J Chin Med 1979; 7:77-90.

[132] Caracausi SR: Electro-acupuncture in thoracic and cardiovascular surgery. Minerva Med 1979; 70:3857-3860.

[133] Yang L, Yang J, Wang Q, Chen M, Lu Z, Chen S, Xiong L: Cardioprotective effects of electroacupuncture pretreatment on patients undergoing heart valve replacement surgery: a randomized controlled trial. Ann Thorac Surg 2010; 89:781-6.

[134] Ni X, Xie Y, Wang Q, Zhong H, Chen M, Wang F, Xiong L: Cardioprotective effect of transcutaneous electric acupoint stimulation in the pediatric cardiac patients: a randomized controlled clinical trial. Paediatr Anaesth 2012;22:805-811.

[135] Zhou J, Chi H, Cheng TO, Chen TY, Wu YY, Zhou WX, Shen WD, Yuan L: Acupuncture anesthesia for open heart surgery in contemporary China. Int J Cardiol 2011; 150:12-16.

[136] Cheng TO: Acupuncture needles as a cause of bacterial endocarditis. Br Med J 1983; 287:689.

[137] Cheng TO: Subacute bacterial endocarditis following ear acupuncture. Int J Cardiol 1985; 8:97.

[138] Cheng TO: Infective endocarditis, cardiac tamponade, and AIDS as serious complications of acupuncture. Arch Intern Med 2004; 164:1464.

[139] Cheng TO: Pericardial effusion from self-inserted needle in the heart. Eur Heart J 1991; 12:958.

[140] Cheng TO: Cardiac tamponade following acupuncture. Chest 2000; 118:1836-1837.

[141] Andersen SA: Bilateral pneumothorax associated to acupuncture. Uqeskr Laeger 2011; 173:2724-5.

[142] Cheng TO: acupuncture and acquired immunodeficiency syndrome. Am J Med 1989; 87:489.

[143] Ernst E, White A: Life-threatening adverse reactions after acupuncture? A systematic review. Pain 1997; 71:123-126.

[144] Ernst E, White AR: Prospective studies of the safety of acupuncture: a systematic review. Am J Med 2001; 110:481-5.

[145] Melchart D, Weidenhammer W, Streng A, Reitmayr S, Hoppe A, Ernst E, Linde K: Prospective investigation of adverse effects of acupuncture in 97733 patients. Arch Intern Med 2004; 164:104-105.

[146] Endres HG, Molsberger A, Trampisch HJ: Adverse events in acupuncture: a prospective survey of adverse events after acupuncture treatment of 190,000 chronic pain patients. J Alternative Complementary Med 2004; 10:212.

[147] MacPherson H, Scullion T, Thomas K, Walters S: Patient reports of adverse events associated with acupuncture: a large scale prospective survey. J Alternative Complementary Med 2004; 10:215.

[148] Gopalan R, Scott R, Arabia F, Chandrasekaran K: Electro-acupuncture therapy in a patient with a total artificial heart. Acupunct Med 2011; 29:302-3.

[149] Zhong HZ, Chang JL, Zhu D, Gao Y: An overview of researches on underlying mechanisms of acupuncture therapy by functional magnetic resonance imaging in recent 5 years. Zhen Ci Yan Jiu 2012; 37(2):161-7.

[150] Hewson MG, Copeland HL, Mascha E, Arrigain S, Topol E, Fox JE: Integrative medicine: implementation and evaluation of a professional development program using experiential learning and conceptual change teaching approaches. Patient Educ Couns 2006; 62:5-12.

[151] Park JJ, Beckman-Harned S, Cho G, Kim D, Kim H: The current acceptance, accessibility and recognition of Chinese and Ayurvedic medicine in the United States in the public, governmental, and industrial sectors. Chin J Integr Med 2012; 18:405-8.

[152] NIH Consensus Development Panel on Acupuncture. NIH Consensus Conference. Acupuncture. JAMA 1998; 280:1518-1524.

[153] 2007 national health interview survey. http://nccam.nih.gov/about/plans/2011/introduction.htm.

[154] Lee JH. Choi TY, Lee MS, Lee H, Shin BC, Lee H: Acupuncture for acute low back pain: a systematic review. Clin J Pain 2013;29:172-185.

[155] Li ZJ, Liu ML, Wang JN, Liang FR: Method and current situations on acupuncture clinical trial registration in the world. Zhen Ci Yan Jiu 2012; 37:86, inside back cover.