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Measuring Quality on the Fringes of Healthcare

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Roya Mirhosseini

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## **Abstract**

Acupuncture as a therapeutic intervention is widely practiced in the United States. While there have been many studies of its potential usefulness, its grounds are scientifically weak. The situation is further complicated with the use of control, such as placebo effect and sham acupuncture. Although promising results have emerged and further research is likely to uncover additional areas where acupuncture can be useful, most healthcare providers take a relatively cautious approach to alternative care. While it costs less than conventional treatment and two out of three Americans now uses alternative medicine, the pharmaceutical and insurance industries are among the very top political contributors who resist getting alternative medical therapies covered by insurance.

# 1 Introduction

The distrust in practitioners of traditional medicine in the western world has delayed the growth process of healing therapy in the United States. Centuries of observed trials are dismissed by western style clinicians mainly because of different mindsets and dispute over the science behind these theories. Acceptance of such theoretical assumptions is difficult since vocabularies used are very different than that of twentieth century western science. The main barrier preventing healing practices is the lack of credible scientific evidence.

Criticisms have been made about insufficient methodology in acupuncture clinical trials, the low probability of replicating studies, the fact that most clinical trials are too short and without adequate follow-up, and the unfeasibility of performing a true double-blind acupuncture study. When attempting to create a placebo for acupuncture, severe problems occur. Another major objection is the lack of adequate numbers of clinical trial subjects to validate general conclusions regarding the effectiveness of acupuncture and Oriental medicine.

Currently, many insurance companies pay for acupuncture only if it is performed by a physician acupuncturist. This is unfortunate, considering the low number of physician acupuncturists and the extensive training that a licensed acupuncturist obtains. In order to receive an acupuncturist license, not only an average of 2,600 hours of master's level training must be completed at nationally accredited schools, but also a national certification exam must be passed. On the other hand, physician acupuncturists complete 300 hours of acupuncture training, with no educational standards or qualifying examination (Acupuncture Society of New York).

A motivating factor behind this study is a result of the increasing interest in alternative medical treatments (CAM), its lower costs than conventional medicine, and its positive outcome. My purpose is to review the economic side of data collected and confirm it with the related collected information from insurance companies. I will also examine cost-benefit analysis and patient satisfaction studies. Based on these, I will argue that alternative medicine, mainly acupuncture, needs to be taken seriously by employing companies. Moreover, the opponents of acupuncture, i.e. pharmaceutical and insurance companies, need to accept this change for the better (NIH Consensus).

In a crowd of licensed physicians and dentists, a very small portion has acupuncture certification; out of which only a few actually practice acupuncture. To restrict patients' access to quality care acupuncture by limiting their choices of physician acupuncturists, while over 1,600 highly trained licensed acupuncturists are available, is inappropriate (National Center for Complementary and Alternative Medicine). The proposed solution requires insurance companies to cover acupuncture care whether performed by a licensed or certified acupuncturist. The unnecessary restrictions on patient access to care need to be removed for the benefit of the healthcare consumers.

### **3 Methodology**

Many acupuncture patients, disappointed with conventional Western biomedicine, try acupuncture as an alternative, long-term health care approach. To illustrate the insurance coverage potential for acupuncture, I will discuss the science behind acupuncture by using a detailed study on pain dynamics and exploring the source behind pain perception. My philosophy behind this approach is to portray to readers how pain is initially generated and how after using acupuncture it is ceased. This particular analysis was reviewed and approved by the University of California-Irvine Institutional Review Board and also supported in part by an NIH-NCCAM (National Institute of Health - National Center for Complementary and Alternative Medicine) grant and concludes that the anterior cingulate cortex and thalamic areas are activated as a result of pain stimulation, but activation in those areas are decreased through the use of meridian acupuncture and sham acupuncture.

This study was done by using brain imaging tools such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI), which made it possible to directly visualize brain functions and observe changes in cortical activation due to pain stimulation with and without acupuncture administration. The concluded results make it clear that acupuncture helps to ease or cease pain.

Another issue that further complicates healthcare coverage is due to difficulties in the use of appropriate controls, such as placebo and sham acupuncture. Introduction of placebo effect has begun a forceful debate to challenge the medical outcome of acupuncture. Therefore it is important to determine whether any confounding variables, such as placebo effect, patient expectations, client-practitioner relationships, and other general factors such as demographic issues may affect patients' perceived outcomes. Since these factors shape healthcare providers' decision on covering acupuncture it was important to me to share that information with readers. In an attempt to do so, I used a research study that was published in American Journal of Public Health, which explored how health and acupuncture treatment goals and outcomes may be affected by a patient's degree of hopefulness, treatment expectations, health locus of control (i.e., attributions of health status), beliefs about mind-body dualism, health maintenance behaviors, and other relationship factors in treatment.

Alternative treatment costs less than conventional treatment. It is a tragedy that people spend more money out of their pockets for such therapies. The lack of evidence supporting significant cost saving, among other factors has led many healthcare providers to take a relatively cautious approach to alternative care. On the employer front in 1990s, a booming economy and tight labor market, especially in the competitive high-tech sector, compelled many companies to find new ways to attract highly sought-after workers. Coverage for alternative medicine was just one of the many incentives offered by these start-up employers. Unlike the insurer, the employer may be concerned with productivity, absenteeism and the costs of rehiring, all of which benefit from better preventive healthcare and popular health offerings.

While healthcare providers are certainly providing more alternative medicine offerings than ever before, the benefits often come with heavy conditions or in the form of discounts, rather than health coverage. In many cases, acupuncturists, chiropractors, and massage therapists will offer their services at a reduced rate under a referral agreement with healthcare providers.

Although the perception of the validity of alternative medicine is definitely increasing in the medical community, hard data supporting its ability to lower costs is still somewhat insufficient. Paradoxically, hard facts are difficult to accumulate when healthcare companies send subscribers to alternative providers outside their own networks. However, even if cost-saving findings become more conclusive, and many in the alternative care field are convinced they will, companies may be slow to adopt alternative healthcare coverage because high turnover rates make long-term health investments a moot point for many employers.

Insurance companies make their money as a percentage of their gross revenues. From a business point of view, insurance companies would be most profitable insuring lots of sick people employing ineffective, expensive medicines. Pharmaceutical companies would be the biggest losers; expensive patented drugs that only suppress symptoms and have toxic side effects would only be used in the rarest circumstances in alternative medicine. The monetary stakes are huge. Conventional medicine in this country is an industry with annual revenues of hundreds of billions of dollars.



## 2 Literature Review

### 2.1 *What is Acupuncture?*

An important concept of Chinese medicine is that of natural balance. From this arises the fundamental theory of yin and yang. Yin-Yang is a convenient label used to describe how things function in relationship to each other and to the universe. They also represent a way of thinking. In this system of thought, everything is seen as part of a whole; no entity can ever be isolated from its relationship to other entities. In other words, nothing can exist in and of itself (Effective Health Care).

The character of Yin originally meant the shady side of a slope. It is associated with such qualities as cold, rest, responsiveness, passivity, darkness, interiority, downwardness, inwardness, and decrease. The original meaning of Yang was the sunny side of a slope. The term implies brightness and is part of once common Chinese expression for the sun. Yang is associated with qualities such as heat, stimulation, movement, activity, excitement, vigor, light, exteriority, upwardness, outwardness, and increase. All things have two aspects: a Yin aspect and a Yang aspect. Hence, time can be divided into night and day, place into earth and heaven, season into inactive periods (fall and winter) and active periods (spring and summer), species into female and male, temperature into cold and hot, weight into light and heavy, and so on. Although these are contradictory qualities, they describe relative aspects of the same phenomenon (Kaptchuk 25).

Furthermore, the well-known symbol of the yin-yang displays that nothing is pure Yin or pure Yang; black and white embrace and intertwine in perfect symmetry, each side containing a small seed of its opposite (please refer to Figure 1). The notion drawn from this theory is that good health demands the balance and harmony of all yin and all yang within the body (Effective Health Care).

When this true balance of forces takes place, the body achieves a healthy circulation of the life force called 'Qi' (pronounced chee). Qi flows between the organs along channels called meridians (Kaptchuk 55). In order to retain health, this energy must circulate in an acceptable range of strength and quality through each of these meridians and organs. Acupuncture involves stimulation of specific points of the skin, usually by

the insertion of needles. In its original form, acupuncture was based on the principles of traditional Chinese medicine. The acupuncture points are located along the meridians and provide one technique of changing the flow of Qi (Effective Health Care).

It is often implied that a clear distinction exists between traditional and western acupuncture, yet the two styles overlap significantly. In addition, traditional acupuncture is not a single established therapy; there is considerable variation in acupuncture practice between different schools. Two acupuncturists treating the same patients may vary in their choice of points, the depth and period of needling, the method and intensity of needle stimulation, and the use of additional skills such as massage or herbal medicines. Diagnosis involves observation of the body through looking, touching, smelling and listening (Kaptchuk 56).

The present proposed explanation behind the acupuncture concept is that acupuncture stimulates near the surface nerves in muscles to send impulses to the central nervous system. Three separate centers, spinal cord, midbrain and hypothalamus/pituitary are activated and release endorphins and enkephalins, which block pain perception (Pomeranz B. Acupuncture analgesia. In: Stux G, Hammerschlag R. editors. *Clinical acupuncture: scientific basis.*)

Acupuncture has been shown to reduce reproducible patterns of neural activity in a wide variety of brainstem, midbrain and cerebral cortical structures. For example, stimulation of an acupuncture point traditionally used to treat eye disorders to a similar pattern of activity in the visual cortex as a visual stimulus as imaged by functional magnetic resonance image (fMRI). Stimulation of a non-acupuncture point or a point non-specific to vision has no effect. The following section explains this concept in greater details (Medical Acupuncture).

## 2.2 *Statistics*

As the future of public health develops, it is important to recognize the potential contribution of complementary and alternative medical (CAM) treatments such as acupuncture (Levy BS. Creating the future of public health: values, vision, and leadership. *Am J Public Health*. 1998). The World Health Organization has provided guidelines for safe administration of acupuncture and effective training of practitioners (*Guidelines on Basic Training and Safety in Acupuncture*. World Health Organization/Dept of Essential Drugs and Medicines Policy: Geneva, Switzerland; 1999. WHO/EDM/TRM/99.1). The US Food and Drug Administration estimated that 9 to 12 million acupuncture treatments by Chinese medicine practitioners took place annually in the United States in the early 1990's (Parson A. Acupuncture: getting the point. *Harvard Health Letter*. August 1993). A 1994 approximation indicated that the number of US medical doctors and osteopaths who used acupuncture increased six times, from 500 to 3000, in the preceding decade, and that about 7,000 non-physicians nationally used acupuncture in conjunction with herbs, massage, and other traditional Eastern techniques to treat a broad range of illnesses (Consumers Union. Acupuncture: can this ancient treatment help to control problems like pain and addiction? *Consumer Reports*. January 1994).

Many Americans who seek Chinese medicine for relief of biological, musculoskeletal, and psychosomatic symptoms that are commonly managed by family physicians, chiropractors, or mental health professionals do so because they are dissatisfied with medical treatment (55.7%) or need a last resort (9.2%). Others (33.5%) are curious, pushed by friends, or attracted to holistic treatment (*American Journal of Public Health*). A survey of 200 first-time users of Chinese medicine in San Francisco indicated that only about 9% of the patient–subjects were referred to an acupuncturist by a medical doctor (1%) or non-medical health care professional (8%); most (91%) of these users were referred by acupuncture student practitioners (28%), people in their lives (41%), or published advertisements and articles (15%), or were self-referrals (8%) (Anderson R. An American clinic for traditional Chinese medicine: comparisons to family medicine and chiropractic. *J Manipulative Physiol Ther*. 1991;14:462–466).

### 2.3 *Overview of Upcoming Analysis*

There are two parts to the following section: (1) patients' cooperation with service providers, their understanding level of acupuncture treatment and thus the potential contribution it might have on treatment results and (2) the legitimacy of the science behind acupuncture. In the former case, I discuss how patients' positive or negative outlook on acupuncture has an affect on their treatment's outcome and in the latter case I provide evidence on how acupuncture decreases or ceases pain.

High-quality anecdotal reports of acupuncture outcomes are now required, and a forceful debate has begun to challenge the total reliance on randomized clinical trials to control placebo effects (Cassidy CM. Social science theory and methods in the study of alternative and complementary medicine. *J Altern Complement Med.* 1995). It is important to determine whether any confounding variables, such as placebo effects, patient expectations, client–practitioner relationships, and other general factors such as demographics and sociopolitical issues, may affect patients' perceived outcomes (American Journal of Public Health). This first analysis (to be followed) attempts to explore how health and acupuncture treatment goals and outcomes may be affected by a patient's degree of hopefulness, treatment expectations, health locus of control (i.e., attributions of health status), beliefs about mind–body dualism, health maintenance behaviors, and other relationship factors in treatment (American Journal of Public Health).

Although acupuncture has been used for many centuries, the scientific evidence for the physiology of its effective pain treatment has not been established, and many scientists suspect it to be a placebo effect. Possible mechanisms for pain relief in acupuncture have been studied in the West since 1965, beginning with the pioneering work of Melzack and Wall (Medical Acupuncture). Thorough scientific explanations are rare and mostly anecdotal; however, acupuncture is reported to treat some classes of diseases and to manage pain. Of many studies in acupuncture pain control, most have been theories and hypotheses attained using animal models, while some were obtained by using human subjects. In the past two decades, brain imaging tools such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) have made it possible to directly visualize brain function (Medical Acupuncture). With the

development of these functional brain imaging techniques, especially fMRI, observations have been made of cortical correlation using a few specific acupuncture points (Medical Acupuncture). With the new dynamic data processing, it is now possible to directly observe physiologically modulated cortical activation due to pain stimulation as well as pain stimulation after the administration of acupuncture. (Medical Acupuncture)

In the second analysis (to be followed) I will explain changes in cortical activation due to pain stimulation with and without acupuncture administration. Special attention is paid to the areas related to pain signal relaying, attention focusing or riveting, perception, and modulation or control of pain signals (Medical Acupuncture). The efficacy of acupuncture in pain relief and the biological bases of acupuncture analgesia are indicated in this paper (Medical Acupuncture). Also, this analysis may clarify the point specificity of acupuncture, especially for the pain-specific acupoints. In order to execute this experiment, acupuncture was divided into two categories: traditional meridian acupuncture and sham acupuncture. The latter is defined as an arbitrary point on the body surface where no traditional meridian lines and points pass (Medical Acupuncture). Based on my research, traditional acupuncture points indicated for pain control are more effective than sham points since the meridian acupuncture points appear effective with less stimulation than the sham points (please refer to Figure 5) (Medical Acupuncture).

The purpose of this particular analysis is to report the findings that may reveal important clues in understanding the mechanisms underlying pain perception and pain relief. This may lead to an understanding of the mechanism of acupuncture pain control since these two may share the same pain-related cortical areas. Therefore, the concluded hypothesis is that the pain control effect of acupuncture stimulation is related to the same cortical areas as pain perception (Medical Acupuncture). This particular study was reviewed and approved by the University of California-Irvine Institutional Review Board.

## **3 Result**

### **3.1 *Acupuncture Evaluation***

To better understand how acupuncture might have resulted in perceived improvements, correlational analyses were conducted to examine the relationship between goal attainment and two acupuncture treatment variables. The first variable was the number of needling sessions a patient received before he or she agreed to participate in the study (American Journal of Public Health). Depending on the patient's cooperation with the service provider and understanding level, it might take more or fewer sessions before he consented to participate in the study. Forty-three percent of the sample received three acupuncture sessions before the initial research interview, 23% to 25% received one or two treatments, and the rest received none. The average number of sessions before the initial interview was 2.09; a correlation analysis showed no association between the number of pre-enrollment sessions and perceived outcome because the number of sessions before the initial interview did not influence a patient's acupuncture goal attainment (American Journal of Public Health). In other words, a patient's prompt agreement to participate in the study did not enhance the perception of positive outcomes.

The second acupuncture treatment variable was patients' regularity of treatments. This variable's contribution was examined because it is implied that additional therapy means more severe condition. Seventy-four percent of participants anticipated weekly sessions in the first two months of treatment. The average anticipated frequency was 3.77 sessions per month. However, there was no association between anticipated treatment frequency and goal attainment, which implies that patients' chances of attaining their treatment goals did not depend on the severity of their conditions (American Journal of Public Health).

#### **3.1.1 *Client-Practitioner Relationship***

Another series of analyses was conducted to examine the determinants of patients' perceived positive outcomes. The two client-practitioner relationship variables which influence patients' perceptions of positive acupuncture outcomes are (1) patients' willingness to tell their physicians that they are receiving acupuncture treatment and (2)

physician's gender. For instance, in the context of the first variable, physicians refer to the physicians whom patients consulted about the same health issues (American Journal of Public Health).

Many acupuncture patients, disappointed with conventional Western biomedicine, try acupuncture as an alternative, long-term health care approach (American Journal of Public Health). As previously mentioned, only about 1% of acupuncture patients are referred to an acupuncturist by their physicians. Although at the start of this study some patients reported that they had minimal contact with their physicians, most (77%) reported that they had already told or would tell their physicians that they were receiving acupuncture treatment. Patients' willingness to tell their physicians about such treatment depends at least partly on their confidence in their health care providers (both physicians and acupuncturists). This analysis did not find any association between goal attainment and patients' willingness to inform their physicians about their acupuncture treatment, which indicates that patients who were willing to inform their physicians of their acupuncture treatment were *not* more likely to perceive positive outcomes from acupuncture (American Journal of Public Health).

### **3.1.2 Use of CAM Treatments**

Patients' use of CAM treatments was also examined. Among the 24 types of CAM interventions and self-care activities on this study's list, only 12 were used by more than 10% of the patients: chiropractic (19%), exercise (68%), dietary/nutrition therapy (26%), herbs (23%), homeopathy (14%), medical care with medical doctor (59%), psychotherapy (23%), prayer/meditation (48%), support group/12-step program (15%), tai chi/yoga/qigong (14%), therapeutic massage (31%), and vitamins/minerals (57%) (American Journal of Public Health). Forty-one percent of participants had used four or fewer different types of health care services in addition to acupuncture in the previous year, and 59% had used at least five different types of such services. A test of association conducted indicates that high goal attainment correlates with high use of different CAM treatments in a year (American Journal of Public Health). This predictive utility of prior use of CAM interventions raises the question of whether acupuncture patients' goal attainment depends on current acupuncture treatment or past CAM interventions. One

possible explanation for the associations observed is the presence of a false correlation between goal attainment and number of CAM treatments used in the previous year.

There exists a linear relationship between the patients' goal attainment and the predictor and control variables combined (American Journal of Public Health). The  $\beta$  weights of all 8 variables in Table 3 indicate that (1) patients' expectations from acupuncture and physicians significantly determined goal attainment; (2) the first control variable, number of different types of CAM interventions used in the 12 months preceding the study, showed significant associations with goal attainment, and (3) the second control variable, homeopathy use, was not significant with regard to patients' self-perceived goal attainment (American Journal of Public Health).

### **3.1.3 *Summary of Results***

A patient's expectations from acupuncture treatment and practitioners' health locus of control level are predictors of his or her goal attainment (American Journal of Public Health). The negative signs of the patient's  $\beta$  weight indicate that the lower a patient's expectations from acupuncture and the weaker his or her practitioner health locus of control, the higher that patient's goal attainment. By contrast, a patient's beliefs about mind-body dualism, degree of hopefulness, and use of homeopathy in the 12 months preceding the study are not related to goal attainment (American Journal of Public Health).

### **3.1.4 *Conclusion of These Findings***

Participants' reports of goal attainment levels indicated positive outcomes from acupuncture treatment. This finding coincides with the anecdotal clinical literature on acupuncture effectiveness, including a multi-site, large-scale research project that studied patients from two of the same clinics accessed in this study and found that the overwhelming majority of patients felt very or extremely satisfied (American Journal of Public Health). This finding illustrates the importance of examining outcome from the patient's perspective. Patients' beliefs and perceptions determine their satisfaction with



their quality of life and health status, satisfaction with treatment, and future health-promoting behavior.

This study also indicates that acupuncture patients' perceived positive outcomes were consistent across socio-demographic subgroups. Patients' reports of improvement were influenced by only a few of the treatment variables, patient variables, and practitioner variables. Nonetheless, the fact that number of CAM interventions used in the past year correlated with goal attainment raises the question of which variable was most important in determining acupuncture goal attainment: current acupuncture treatment, previous use of CAM interventions, or other confounding factors (American Journal of Public Health). The more control a patient assigns to the treatment provider, the less likely that patient is to achieve his treatment goals. Again, by speculation that is because of the collaborative emphasis in Five Elements Traditional Acupuncture the treatment would not be as effective for a patient who believes that the acupuncturist has sole responsibility for improving the patient's health (American Journal of Public Health). The implication for health promotion is that if patients want to reach their health-related goals, they should not *passively expect* from health care providers but instead *actively cooperate* with them. Therefore, health care providers and educators should emphasize provider-patient collaboration and promote patients' self-care health behavior (American Journal of Public Health).

## 3.2 *Science behind Acupuncture*

Is the acupuncture effect real or simply a placebo effect? If it is real, is acupuncture in reality point specific? By using functional brain imaging, some of these questions have been answered. Acupuncture stimulation clearly reduces activation in the cortical areas that are believed to be involved with pain signal processing, thereby lessening pain perception. Acupuncture analgesia is a central process involved with higher cortical and sub-cortical areas, such as the cerebral cortex (prefrontal cortex), the diencephalon (midline nuclei), and the cingulate cortex, where pain perception, attention/riveting, pain signal modulation, and relay are regulated. (Medical Acupuncture) In the following sections, I will be discussing the science behind acupuncture. This will be done by introducing a detailed study on pain dynamics and exploring the source behind pain perception. Acupuncture is mainly used to ease or cease pain; therefore it is important to understand how pain is originally generated.

### 3.2.1 **Mechanisms Underlying Pain Perception and Pain Control**

A few illustrations of the anatomical images and cortical areas that are stimulated during pain stimulation are shown in Figure 2. In Figure 3a, those experimentally observed activation areas due to pain stimulation are marked for illustration of pain alone. Possible functional roles of each area are shown In Figure 3b. In Figure 4, time-dependent activation images due to pain stimulation demonstrate the pain dynamics of the fMRI data processed. Pain stimulation is achieved by immersing the index finger into a hot bath of water with a temperature of 52°C for 30 seconds.

From Figure 4, the sequentially varying cortical activation pattern of pain signal processing can be seen. This particular set is one of typical sets of images of a single subject that represents the typical pain dynamic data (Medical Acupuncture). This pain dynamic data set demonstrates a much-suspected, time-dependent activation pattern due to pain as detailed below.

As noted in Figure 2, Figure 3, and Figure 4, three sub-cortices of the cingulate cortex (dACC, cACC, and rACC), together with the thalamus, are involved in pain signal relay, perception, and possibly modulation or control (Medical Acupuncture). In the

subject of pain alone, a number of studies have been reported using brain imaging such as PET and fMRI techniques. However, because the reported results vary, conclusive findings have not yet been made. Despite these individual variations and other environmental factors, pain perception appears involved with several cortical areas related to pain signal relay (switching), attention riveting (selection), perception (emotional aspect), and control or modulation.” (Medical Acupuncture)

### **3.2.2 Pain Measurement**

After discussing pain dynamics above, attention needs to be directed to acupuncture pain control by extending the study to include acupuncture administration. To do this, a major acupuncture point in the foot, named LR3, was chosen. It is more convenient to access LR3 for fMRI scanning techniques, because placing needle in the foot does not involve moving the subject’s head. For pain stimulation study, thermal stimulation was conducted by placing the subject’s index finger under hot bath of water at a temperature of 52°C for 30 seconds. This results in several steps of different sensations from feeling heat to unpleasantness to extreme pain. To maximize contact to hot temperature (pain), the finger was pre-warmed with 43°C water (Medical Acupuncture).

Acupuncture stimulation at LR3 was accomplished by (a) manually rotating the needle for 30 seconds, needling 30 seconds without twirling, and finally, removing the needle, and (b) repeating the same method five times without removing the needle, after which the needle was removed for the remainder of the data acquisition period. (Medical Acupuncture) Three experiments were performed on each subject: (1) pain stimulation only, (2) meridian acupuncture followed by pain stimulation, and (3) sham acupuncture followed by pain stimulation (Medical Acupuncture). Among this immense quantity of activation data, a data set of three were selected and displayed (pain, meridian acupuncture and pain, sham acupuncture and pain) (Medical Acupuncture). Their corresponding stimulation models are shown in Figure 5a and Figure 5b.

For the first part of study with the meridian acupuncture, a single set of twirling was applied (Figure 5b[i], the weak stimulation). In the latter part of the experiments with

sham acupuncture, they applied strong stimulation, as shown in Figure 5b(ii) (Medical Acupuncture). Data were collected for both intrapersonal as well as interpersonal averages to obtain statistically reliable data (Medical Acupuncture). Summary data presented here are mixed with intrapersonal and interpersonal averages of 9 to 12 experiments that illustrate a similar pattern of pain perception as well as the acupuncture pain control effect. Many variables are inherent in acupuncture, including uncertainty of localization of the acupuncture point, the differences in nerve distributions for different subjects, needling methods, responses of the individual as a responder or non-responder, the individual's mental status and health condition, and pain perception pattern or differences in pain tolerance (Medical Acupuncture). Due to variability and technical difficulties such as the movement associated with painful stimuli (both the pain stimulus itself and acupuncture needling), data sets with non-responders were excluded. Out of 50 experimental sets, average 9 to 12 data sets of similar patterns were selected for each mode.

### **3.2.3 Final Results**

In Figure 6a, Figure 6b, and Figure 6c, a set of pain responses (axial, coronal, and sagittal views) were obtained by fMRI to demonstrate pain-stimulation-dependent cortical activation as a function of time. (Medical Acupuncture) The ACC and the thalamic areas were activated as a result of pain stimulation (please refer to Figure 2 and Figure 3 for anatomical correlation).

In Figure 7, activation patterns of the meridian acupuncture and pain experiment seen by axial, coronal, and sagittal views are shown. In order to obtain this data set, pain stimulation was applied nine minutes after the acupuncture stimulation (Figure 5b[i]) (Medical Acupuncture). As a result, notably decreased activations were seen in the ACC and the thalamic areas. Further detailed observation demonstrated that most of the activation seen in the cingulate cortex and the thalamic nuclei with the pain study were deactivated (Medical Acupuncture). Specifically, the significantly decreased activation in dACC and cACC as well as rACC suggests that the pain signal attention riveting center (dACC) and the perception center (cACC), as well as the modulation or control center (rACC), were in a deactivated state. In Figure 4, activation of dACC precedes cACC and

coincides with pain sensations perceived by the subjects, suggesting that cACC probably is the perception center of pain, especially the emotional component of pain. The rACC, which is always activated last, is one of those pain-modulating or controlling centers. Another notable decrease in activation was in the mid-line thalamic area which includes the dorsomedial nucleus, anterior nucleus, dorsal superficial nucleus, intralaminar nuclei, and centromedian nucleus, most of which are connected either directly or indirectly to the cingulate cortex. Activation and deactivation of these thalamic nuclei in close correlation with dACC suggest that these thalamic nuclei are the relay center of the upstream pain signals from the brainstem and spinal cord to the upper brain, including the cingulate cortex (Medical Acupuncture).

Finally, decreased pain-dependent activation by the administration of acupuncture clearly contrasts with pain stimulation alone, thereby showing the evidence of the acupuncture effect on cortical centers, and especially the pain-related cortical areas such as the cingulate cortex and thalamus (please refer to Figure 6 and Figure 7 and compare the two models). In Figure 7, with meridian acupuncture and pain data, most of the activation simply disappeared, the only remaining activation sites were the supplementary motor area and a small area in the motor cortex. In the thalamic area, much reduced activity was again seen. In the tectal area, the activity previously seen with pain stimulation alone also decreased significantly (Medical Acupuncture).

In Figure 8, activation patterns of the sham acupuncture and pain were observed after using the stimulation model shown in Figure 5b[ii]. Images are displayed in axial, coronal, and sagittal views, similar to the previous two activation data sets. To obtain this data set, pain stimulation was again applied nine minutes after the initiation of sham acupuncture stimulation, which lasted five minutes for this paradigm. Significantly decreased activation similar to meridian acupuncture was seen both in the ACCs and the thalamic areas. This sham result is the most surprising new observation since it suggests that the traditionally believed point specificity of acupuncture may not be entirely true (Medical Acupuncture). These findings require further study and may have far-reaching impact on acupuncture research in general, including target-specific as well as target-non-specific acupuncture studies. To further clarify the new findings, a direct comparison of the results of meridian acupuncture and pain and sham acupuncture and pain is shown in

Figure 9. Overall activation results of pain, meridian acupuncture and pain, and sham acupuncture and pain are displayed in Figure 10 for better comparison of the three models (Medical Acupuncture).

### ***3.3 Getting Alternative Treatments Covered***

Alternative treatment costs less than conventional treatment. It is a tragedy that people spend more money out of their pockets for such therapies. According to CNNMoney, “the number of Americans who subscribe to alternative medicine has skyrocketed in the past decade, with an estimated \$27 billion spent annually on acupuncture, chiropractic, massage, yoga, homeopathy and other non-traditional therapies” (Nicole Jacoby).

Different factors have led many healthcare providers to take a relatively cautious approach to alternative care. In a study by Sacramento, California-based Landmark Healthcare, more than a third of the HMOs surveyed said member and employer demand were the primary catalysts behind alternative benefit offering. Legal requirements were also a strong compelling factor.

On the employer front, a booming economy and tight labor market, especially in the competitive high-tech sector, have compelled many companies to find new ways to attract highly sought-after workers (Covering Alternative Care 1999). Coverage for alternative medicine has been just one of the many incentives offered by these start-up employers. “These companies are not expecting to cut costs, they’re offering these benefits just to cut down on turnover, attract people and keep them,” said Stephen Rosenberg, M.D., director at the consulting firm PricewaterhouseCoopers (Covering Alternative Care 1999). But many employees and consumers are beginning to realize that these benefits are rarely as extensive and consequently, as useful as they might have hoped.

While healthcare providers are certainly providing more alternative medicine offerings than ever before, the benefits often come with heavy conditions or in the form of discounts, rather than health coverage. In many cases, acupuncturists, chiropractors, and massage therapists will offer their services at a reduced rate under a referral agreement with healthcare providers. Oxford Health Plans, Aetna U.S. Healthcare and Blue Cross Blue Shield are among the companies that offer such discount plans. Other providers limit alternative care by placing strict limits on its use. Acupuncture, for instance, might only be covered for migraine headaches eight times a year, and only upon

the referral of your primary care physician. Today 25 insurance companies and HMOs offer some kind of alternative medicine coverage, according to consultants Coopers & Lybrand. That is up from just four in 1994. Most let patients choose from networks of approved alternative providers without a primary care physician's referral. The resistance to more comprehensive coverage stems in part from an inability thus far to link alternative care to cost savings (Covering Alternative Care 1999).

Two out of three Americans now use acupuncture, herbal medicine, chiropractic and other complementary and alternative medicine (CAM), according to a 1998 survey by American Specialty Health (the nation's largest alternative managed-care company) and the Stanford University School of Medicine. And they pay dearly; Americans spent \$27 billion out of pocket for CAM treatments, reported a 1998 study by Dr. David Eisenberg of Harvard Medical School. Respondents in the American Specialty Health/Stanford study reported paying, on average, \$270 a year for acupuncture, \$157 for chiropractic and \$111 for herbal medicine (Covering Alternative Care 1999).

Today 42 states require private insurers to cover chiropractic treatments, and two states (Washington and Wisconsin) require insurers to offer coverage at an extra charge; six states mandate acupuncture coverage, and California requires insurers to offer an acupuncture rider; two states require massage coverage, and four naturopathy (herbal and natural medicine). Medicare covers chiropractic treatment under certain circumstances. And the tight labor market of the 1990s pressured employers to please workers by including CAM in the plans they offer their employees (Covering Alternative Care 1999).

Although the perception of the validity of alternative medicine is definitely increasing in the medical community, hard data supporting its ability to lower costs is still somewhat insufficient. Paradoxically, hard facts are difficult to accumulate when healthcare companies send subscribers to alternative providers outside their own networks. "It is almost impossible for them to figure out how much alternative care substitutes for conventional care," said Rosenberg (Covering Alternative Care 1999). "Are people who use these therapies seeing their physicians for the same disorder? Are they seeing them less? Are they getting fewer tests?"

Furthermore, the majority of patients who seek out alternative care rarely share this information with their medical doctors, making data accumulation even more



difficult. However, even if cost-saving findings become more conclusive, and many in the alternative care field are convinced they will, companies may be slow to adopt alternative healthcare coverage because high turnover rates make long-term health investments a moot point for many employers (Covering Alternative Care 1999). Rosenberg said, “We have a very fragmented (healthcare) system. The money may be spent out of one pocket, but the savings could go into a different pocket.” (Covering Alternative Care 1999) In other words, insurance and pharmaceutical companies are the ones who save the most. Because U.S. workers change jobs so frequently, many employers see slight advantage to invest in the long-term health of their staff. “It’s hard to convince employers and HMOs that they ought to invest in these benefits when the savings may be realized by the next employer (or next healthcare provider),” Rosenberg said. Appropriately, industries with traditionally lower turnover, automakers, for instance, have been much quicker to provide alternative care. In fact, the track record of employers generally has been somewhat better than that of HMOs, in part because the perspective of the employers tends to be more macroeconomic (Covering Alternative Care 1999). John Weeks, healthcare consultant and publisher of the Integrator for the Business of Alternative Medicine, said “An employer views health decisions in terms of global costs, whereas an HMO is more likely just to look at medical costs.” (Covering Alternative Care 1999) Unlike the insurer, the employer may be concerned with productivity, absenteeism and the costs of rehiring, all of which benefit from better preventive healthcare and popular health offerings (Covering Alternative Care 1999).

Those industries and occupations that have the most to lose include insurance carriers and conventional doctors. According to the federal government’s General Accounting Office, less than 10% of bypass operations are necessary and studies in mainstream medical literature show no significant difference in the death rates between heart attack victims who receive bypass surgery and those who do not. Yet, approximately \$4 billion dollars is spent on bypass surgery every year. Here is where the difficulty lies; the people to whom these billions of dollars are being paid do not want a change in the status quo. Insurance companies make their money as a percentage of their gross revenues. From a business point of view, insurance companies would be most profitable insuring lots of sick people employing ineffective, expensive medicines

(Getting Alternative Medicine Covered by Medical Insurance). Pharmaceutical companies would be the biggest losers; expensive patented drugs that only suppress symptoms and have toxic side effects would only be used in the rarest circumstances in alternative medicine (Covering Alternative Care 1999).

There is alarming resistance to getting alternative medical therapies covered by insurance; the pharmaceutical and insurance industries are among the very top political contributors on the national and state levels, with physicians' trade organizations major players, also. The monetary stakes are huge: \$37 billion dollars are spent annually on direct medical costs for cancer treatment and an equivalent amount is spent treating heart disease. Conventional medicine in this country is an industry with annual revenues of hundreds of billions of dollars (Getting Alternative Medicine Covered by Medical Insurance).

On the other hand, much of the public and many doctors, do want more access to alternative medicine. The following statistics were compiled and documented by health activist (Moica Miller):

- 80% of medical students want training in complementary and alternative therapies (CAM)
- 70% of family physicians want training in CAM
- 69% of Americans use non-conventional medical therapies
- 67% of HMOs offer at least one form of CAM care
- 64% of U.S. medical school offer courses in CAM
- 60% of physicians have referred patients to CAM practitioners
- 56% of Americans surveyed believe their health plans should cover alternative therapies

In 1993, Washington passed a state law requiring insurance policies to provide coverage for treatments and services by every category of licensed health care providers, starting in 1996. Washington currently licenses naturopathic doctors, acupuncturists, chiropractors, certified dietitians and nutritionists, massage therapists and midwives. A coalition of insurance providers immediately initiated a legal challenge to the legislation, but the law was upheld in a ruling earlier this year by the Washington Supreme Court (Getting Alternative Medicine Covered by Medical Insurance).

Washington is the exception, however. Before we can get medical coverage for alternative therapies, we have to make alternative therapies themselves available.

Presently, only eleven states have laws that protect patient access to alternative therapies from licensed physicians: Alaska, Colorado, Georgia, Massachusetts, New York, North Carolina, Ohio, Oklahoma, Oregon, Texas and Washington. Further, individual states vary widely in the licensing of health care practitioners other than M.D.s. Providers such as naturopaths, acupuncturists, homeopaths, etc., must also be recognized and their services included in insurance coverage ([Getting Alternative Medicine Covered by Medical Insurance](#)). In addition, wording in insurance law and policies has to be defined by statute, for example, medical necessity is something determined by the physician on a case-by-case basis, instead of by an insurance underwriter.

Despite these problems, the outlook for coverage of alternative care remains bright. As more research supports the effectiveness of alternative medicine, healthcare providers may become more willing to offer less traditional choices to their customers, especially as cost-savings become more apparent ([Getting Alternative Medicine Covered by Medical Insurance](#)). Pharmaceuticals are especially well-positioned for this type of change, contends Weeks, “as vitamins and other natural agents often offer the same benefits as those products manufactured by a drug company and at a lower cost.” The natural agent “may be the preferred option for a certain subset of patients and it saves the HMO money,” said Weeks ([Getting Alternative Medicine Covered by Medical Insurance](#)). Treatments for high cholesterol have already reached this stage, with widely researched alternative fish-oil products significantly less expensive than traditional artificial medications, for instance.

Legal pressures are also likely to expand alternative health coverage, as lobbyists continue to push the issue onto the agenda of state lawmakers throughout the country. According to the [Getting Alternative Medicine Covered by Medical Insurance](#) article, for alternative healthcare to become a true benefit that can be easily accessed by its subscribers, “the cost concerns of healthcare providers will have to be legitimately addressed.” Rosenberg said, “If the evidence mounts about the effectiveness of these therapies, it will add to the momentum, but somebody needs to resolve the turnover problem and more companies need to see actual savings.” However, as a new generation gains control, initiatives in this direction are likely to increase. “It’s the baby boomers who truly created this movement,” said Weeks. “As they take over decision-making roles

at HMOs, the likelihood that they or their family members have actually used these services and benefited from them is pretty good.”

### ***3.4 Patient Satisfaction Study***

Despite the increasing demand for acupuncture, little is known about the positive affects of this treatment. The following patient satisfaction studies indicate the positive affects of CAM and its considerable low costs. For instance, in a research study conducted in Oakland University a comparison was made between health-care costs for chiropractic and medical patients. The database used came from the records of MEDSTAT Systems, Inc., a health benefits management consulting firm which processes insurance claims for many of the country's largest corporations. The database was comprised of 395,641 patients, 42,215 of which were Michigan patients. (Getting Alternative Medicine Covered by Medical Insurance) After reviewing claims paid over a two-year period, it was concluded that patients who received chiropractic care, either solely or in conjunction with medical care, experienced significantly lower health-care costs...on the order of \$1,000 each over the two-year period than those who received only medical care. Specifically, total insurance payments were \$1,138 (30% higher) for those who elected medical care only. The lower costs for chiropractic patients were attributed both to lower in-patient and out-patient costs, and indicated that chiropractic treatment substitutes for other forms of out-patient care. (Getting Alternative Medicine Covered by Medical Insurance)

Moreover, based on British Medical Research Council Study conducted in 1990, a two year study of 22 medical back pain clinics involving 17,142 patients under Chiropractic care, showed Chiropractic's effectiveness, improved quality of life and its preventative and rehabilitative functions. Patients receiving care for two years had their absence from work reduced by 75.5% and their hospitalizations reduced by 87.6% (British Medical Research Council Study, England, 1990).

The third study that I would like to discuss is based on the Role of the Consumer in Coverage Decisions, Washington Health Policy Forum, held in Washington in 1997, which conducted a survey (n=492) with Group Health Cooperative of Puget Sound on all members that had used acupuncture, naturopathic or massage benefits offered by the HMO in the month of May of that year. Sixty two percent (62%) responded to the survey. The results indicated high member satisfaction with alternative methods. 85% indicated

that they would return to the same CAM provider with the same condition if they had to do it all over again ([Getting Alternative Medicine Covered by Medical Insurance](#)). Laura Paton, MD, who presented the study indicated that the data is only suggestive, and must be viewed over a longer term.

Another study that caught my attention was a report published by Group Health Cooperative of Puget Sound based on 1992 Age Adjusted Data, which derived the mean costs per specific chronic conditions for its conventional care of its HMO members. The mean annual cost of care per patient for the HMO was \$2,006. For those with two or more chronic conditions, the rate was \$7,019 (“Chronic Care Costs Are Analyzed at Major HMO” Digest of Managed Care, Vol.1, No2, November 1997). In addition to the above studies, in 1998, researchers at Kaiser Permanente in Northern California found that nearly 90 percent of the health plan’s primary care doctors had recommended alternative therapies or used them on adult members during the previous 12 months, primarily for pain management. ([Getting Alternative Medicine Covered by Medical Insurance](#))

According to one final study, doctors and members at Kaiser Permanente in Northern California revealed that nearly 50 percent of the members had at some point tried alternative medicine, with younger and middle-aged adults more likely to have done so than people age 65 and older. The study, published in the September 1998 issue of the Western Journal of Medicine, indicated the alternative therapies most frequently used by members were chiropractic, acupuncture, massage therapy and relaxation techniques. ([Getting Alternative Medicine Covered by Medical Insurance](#)) These therapies, along with acupressure, were also the ones members most frequently said they wanted the health plan to offer as covered benefits. Less than 10 percent of the respondents had used herbal or homeopathic medicines, and relatively few indicated those therapies should be covered benefits. This is the first published study to examine the alternative therapies that health plan members and physicians would like to see incorporated into a traditional HMO, said Nancy Gordon, ScD, an investigator at Kaiser Permanente’s Division of Research and the study’s lead author ([Getting Alternative Medicine Covered by Medical Insurance](#)). If health plans are going to be serious about looking at what alternative therapies they’re going to provide, they need to understand what their members are using,

what their doctors are recommending and for what types of problems, and where the two overlap (Getting Alternative Medicine Covered by Medical Insurance).

## 4 Conclusion

As more and more people are being attracted to alternative medicine, the willingness to consider alternative therapies is also beginning to spread to the health insurance industry. A few large carriers have started to experiment with covering alternative treatments. Eleven states have laws that protect patient access to alternative therapies from licensed physicians, which means that patients are legally entitled to receive chiropractic care and be reimbursed by their healthcare provider. However, most insurance companies' policies require acupuncture to be "medically necessary" and at conventional medical doctors' recommendation. In other words, physicians decide whether a licensed chiropractic doctor should be treating their patients. In the language of the trade, the conventional doctor is the "gatekeeper" who decides which procedures warrant reimbursement.

Since many M.D.'s do not appreciate the viability and effectiveness of the acupuncture paradigm, the process of determining "medical necessity" is generally biased against many chiropractic medical claims. In many cases, conventional doctors decide that such treatment is not "medically necessary." There are even documented cases of insurance companies stating that they will pay for expensive pain-relieving drugs or surgery from an orthopedic surgeon rather than pay for a much less expensive series of chiropractic adjustments to treat the same problem. Some insurance companies have made this choice even though competent research has shown the chiropractic approach to be an effective treatment for the same condition.

I believe that acupuncture is an effective therapeutic treatment and insurance companies need to cover the costs of acupuncture and chiropractic medical claims. Complementary Alternative Medicine has revealed amazing results for certain conditions and citizens of United States should have the right to use such privilege in their daily lives.



## **Appendix: Directions in the Future**

In recent years, people have come to recognize that a healthy lifestyle can promote wellness and prevent illness and disease, allowing them to enjoy a long, high-quality life. To achieve this goal, many people have used various approaches, including complementary and alternative medicine (CAM). Wellness is defined in many different ways, but all agree that it is more than the absence of disease. For some it is the achievement of one's fullest potential, for others it is an integration of body, mind, and spirit (Proposal for a Pilot Integrated Medical System).

The most recent Federal government report on the health status of the nation, Healthy People 2010, is designed to further extend two goals: (1) increasing the quality and years of healthy life and (2) eliminating disparities in health. These goals and objectives are the blueprint for the nation's health promotion and disease prevention activities, and they influence data collection, national health policy, and program development and implementation (Proposal for a Pilot Integrated Medical System). Healthy People 2010 addresses clinical, behavioral, environmental and health system issues that affect health; it also emphasizes health education and changing the health related behaviors of individuals and communities. The principles that underlie CAM practices are consistent with the above two goals of Healthy People 2010.

In the course of Commission meetings, it became clear that a wide cross-section of the population wants the Federal government to take the lead in integrating safe and effective complementary and alternative health care practices and products into the nation's health care system (Proposal for a Pilot Integrated Medical System). Consumers, complementary and alternative medicine (CAM) and conventional practitioners, and product manufacturers testified about the need for a coordinated Federal effort to achieve this goal. This view is consistent with the findings of other groups as well. At the Second Annual Integrative Medicine Industry Leadership Summit, held in May 2001, a major recommendation was the establishment of a Federal office of CAM and integrative health care and the selection of an advisory committee to the office. Similarly, the creation of a Federal CAM/integrated health care office was a key recommendation of the National Policy Dialogue to Advance Integrated Health Care: Finding Common Ground held at Georgetown University in late 2001. Proper integration of safe and effective CAM

practices and products into the nation's health care system will require an ongoing, coordinated Federal presence. And the most effective way of achieving this goal is to launch a centralized office that would include the full range of CAM perspectives in the dialogues that guide policy formulation and implementation. Several possible locations of the office have been proposed, each of which has advantages and disadvantages.

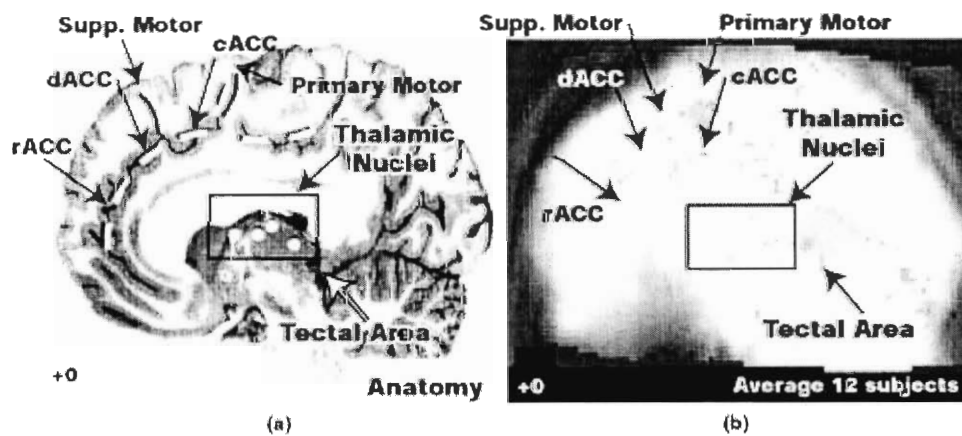
The National Center for Complementary and Alternative Medicine (NCCAM) is an example of effective Federal coordination of CAM research that evolved from an office established within Department of Health and Human Services. It began as the Office of Alternative Medicine in the National Institutes of Health with a \$2 million budget in fiscal year 1992 and White House Commission on Complementary and Alternative Medicine Policy, in March 2002, became a national research-coordinating center with a \$104.6 million budget in fiscal year 2002 (Proposal for a Pilot Integrated Medical System). The presence and focus of NCCAM in the Federal government has stimulated research well beyond the reach of its budget, with private and public organizations also contributing to increased efforts in CAM research, education, and practice in the United States and around the world (Proposal for a Pilot Integrated Medical System).

If located in the White House, the new office could be either a freestanding entity in the Executive Office of the President, following the precedent of the Office of National AIDS Policy and the Office of Faith-Based and Community Initiatives, or it could be placed in an existing office, such as the Office of Domestic Policy. (Proposal for a Pilot Integrated Medical System) A White House location would provide an opportunity to influence Federal policy, but it would not provide a permanent presence in the Federal sector. If located in the DHHS, the office could be created in the Secretary's Office of Public Health and Science (OPHS), following the lead of the Office of Minority Health and the Office on Women's Health, or it could be placed within one of the 13 existing program offices that make up the OPHS-in particular, the Office of the Surgeon General. Locating it under the Surgeon General could provide links to other important public health activities, such as Healthy People 2010. While a DHHS location would provide a permanent Federal presence, it would limit the office's influence mainly to DHHS policy.

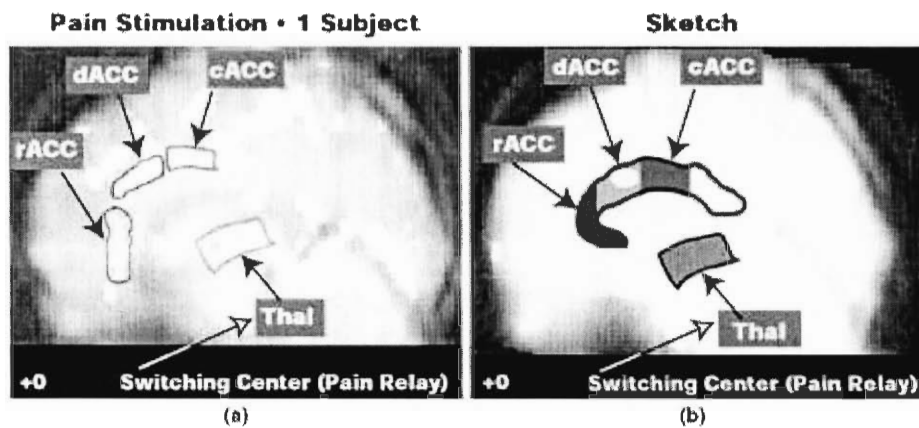
## Figures



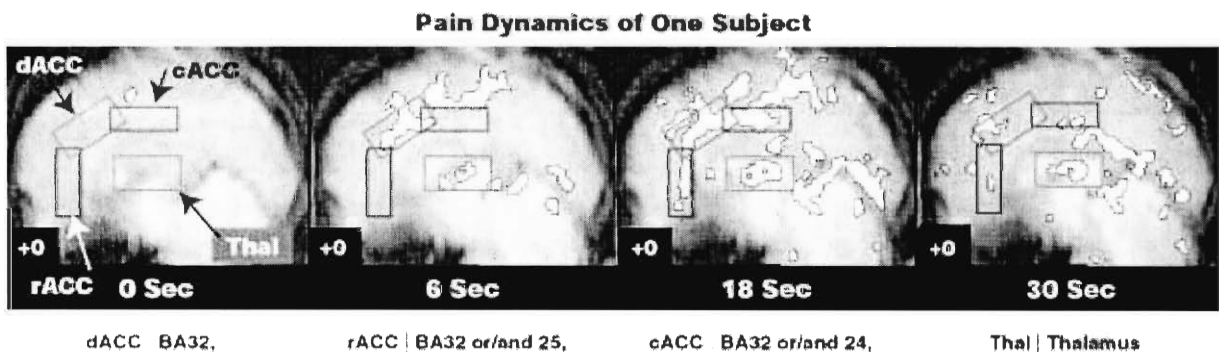
Figure 1: Yin and Yang sign



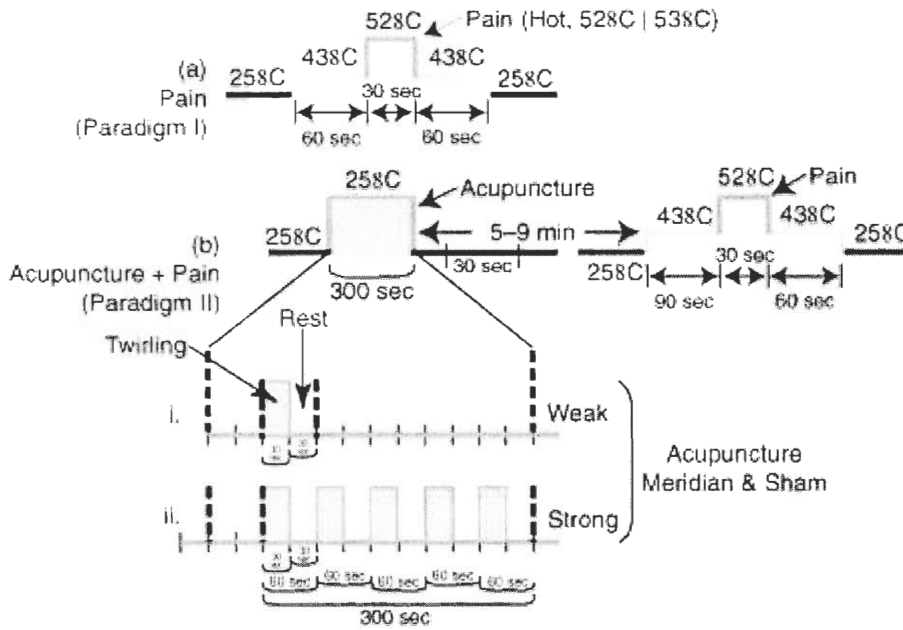
**Figure 2:** “A typical anatomical image and corresponding functional magnetic resonance imaging (fMRI) data of the mid-sagittal view obtained by pain stimulation. Locations of the various pain-related brain areas are also shown: (a) An anatomical image showing the anterior cingulate cortex (ACC) (dACC [dorsal], rACC [rostral], and cACC [caudal]), the supplementary and primary motor areas, and the thalamic nuclei overlaid on a mid-sagittal view of an anatomical image of a human brain. (b) Averaged fMRI data obtained by pain stimulation overlaid on a mid-sagittal view image (average of 12 subjects).”



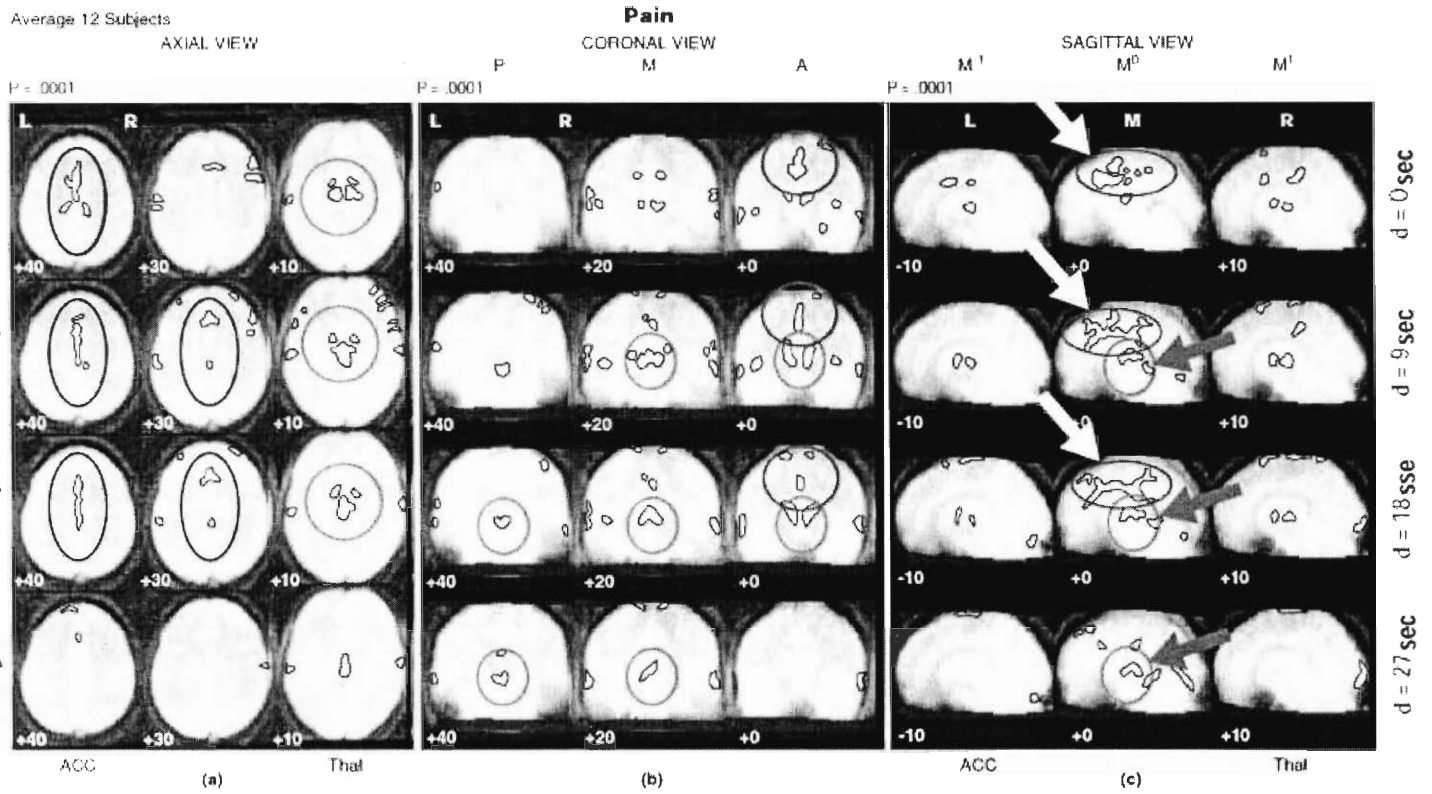
**Figure 3:** “Illustration of the major cortical areas believed to be involved in pain signal “relay,” attention “riveting,” and emotional pain “perception.” (a) The approximate areas of the subcingulate cortices (dACC, rACC, and cACC) and the thalamus overlaid on an activation image obtained by pain stimulation. (b) A sketch of those subcingulate cortices and the thalamus with possible functional roles of each component.”



**Figure 4:** “These pain dynamic data show how various cortical areas are sequentially activated as a function of time. The dynamic fMRI data are obtained by use of the time-varying differential correlation function (DCF) technique that uses a set of discretely delayed correlation functions rather than a fixed correlation function. This DCF technique is an essential component for the extraction of the pain signals as well as the pain signals affected by acupuncture since these stimuli invariably result in physiologically complex and delayed activations.”



**Figure 5:** “Stimulation paradigms used in the pain and acupuncture + pain experiments **(a)** Paradigm I: Pain is achieved by immersing the index finger into a hot bath of water (52°C) for 30 seconds. **(b)** Paradigm II: Acupuncture + pain stimulation is further divided into: (i) a weak stimulation for the meridian acupuncture + pain experiment while (ii) a strong stimulation was used for the sham acupuncture + pain experiment. This paradigm consists of pain stimulation after 9 minutes from the initial start of acupuncture stimulation.”



**Figure 6:** “Cortical activation by pain stimulation observed by fMRI. The marked areas are the activated areas of the anterior cingulate gyrus (blue circles) and the thalamic areas (red circles). (This data set is an intra-inter average of 12 subjects). M0 = center of mid-sagittal view slice, M1 or M-1= right or left side lateral slices of mid-sagittal view, L= left, R= right, P = posterior, M = middle, and A = anterior.”

Average 9 Subjects

**Meridian Acupuncture + Pain**

AXIAL VIEW

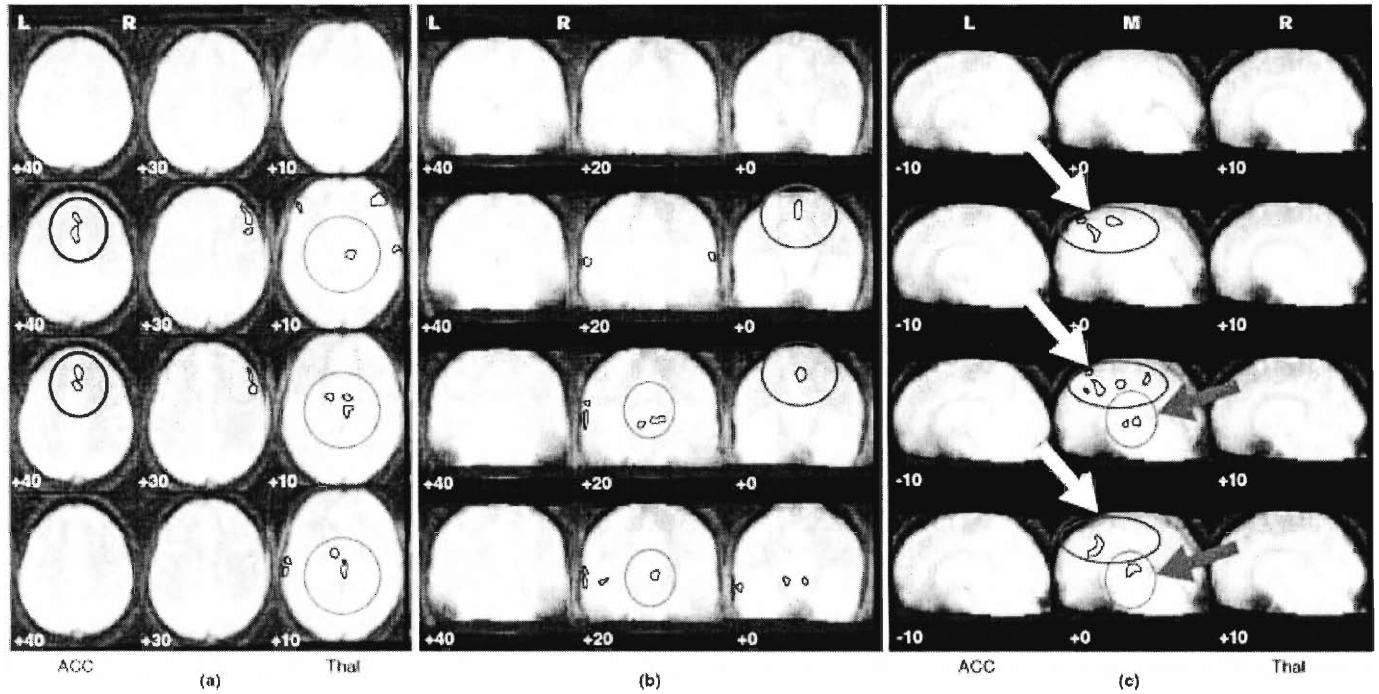
CORONAL VIEW

SAGITTAL VIEW

P = .0001

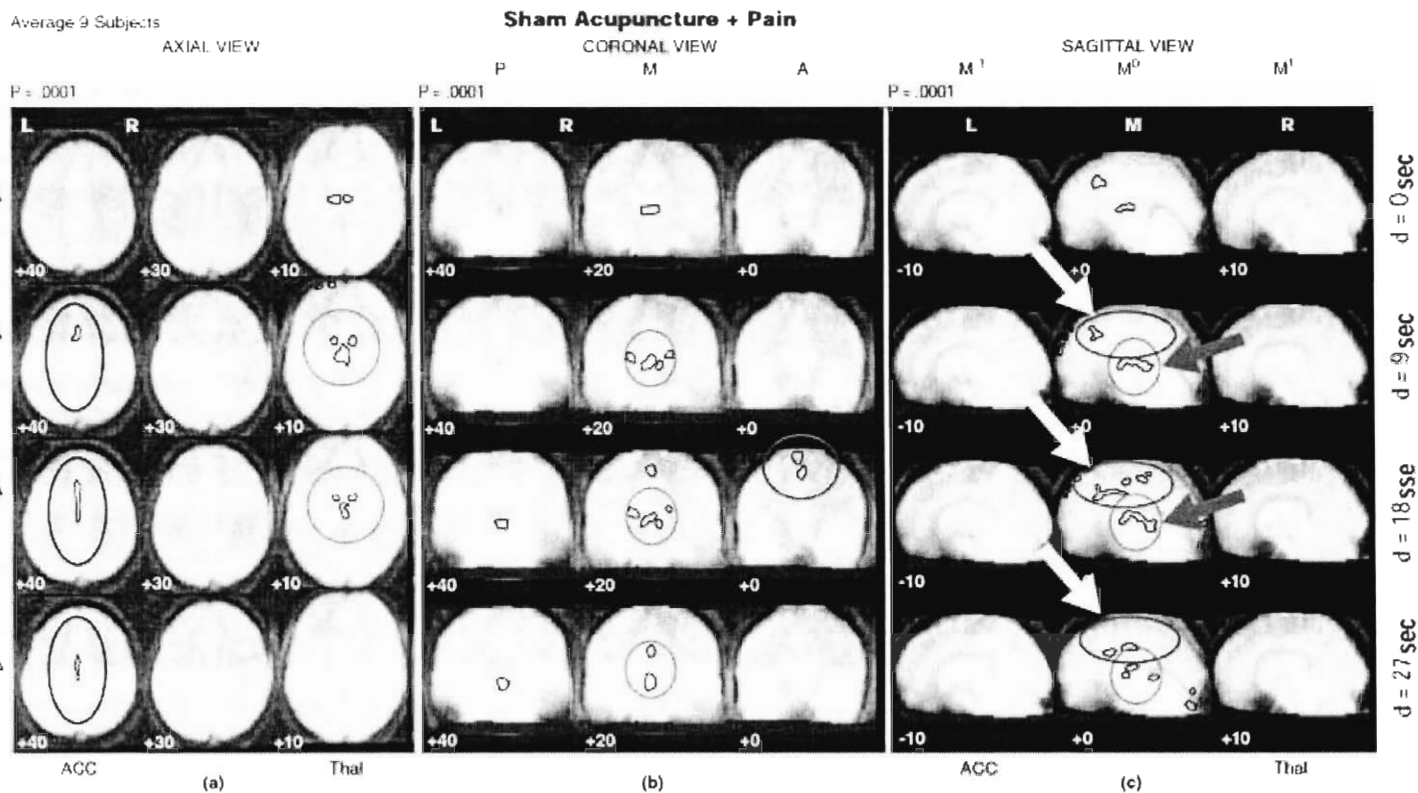
P = .0001

P = .0001



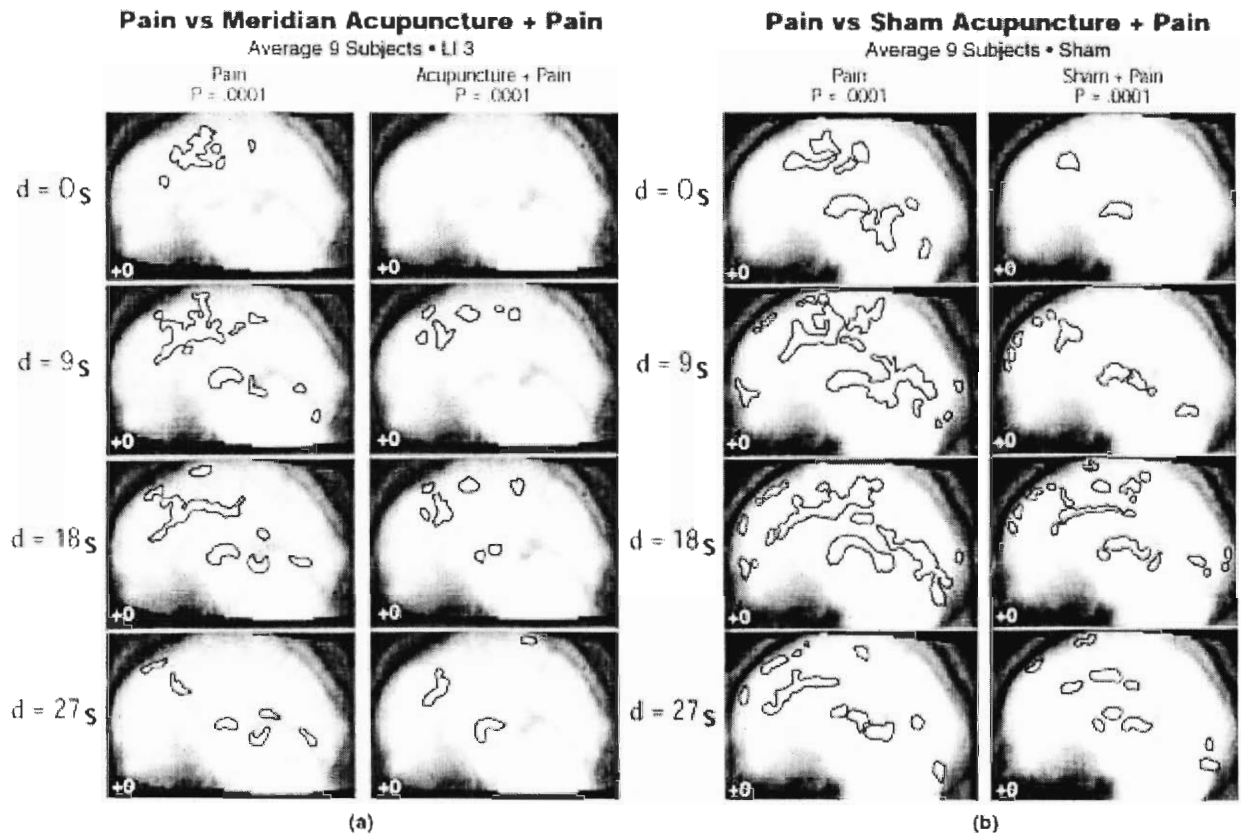
**Figure 7:** “Cortical activation by traditional meridian acupuncture + pain stimulation observed by fMRI. Note the markedly decreased activation in both the entire ACC as well as the thalamic areas. In the upper cortical areas, the only regions that showed activation were the supplementary and primary motor areas as shown in mid-line sagittal view images (M0 column). Similarly, only a small area in the thalamus remained activated in the center slice at the mid-sagittal view (M0 column). The nuclei involved in decreased activation appeared to be the midline nuclei. (This data set is an average of 9 subjects.) M0 = center of mid-sagittal view slice, M1 or M-1= right or left side lateral slices of mid-sagittal view, P = posterior, M = middle, and A = anterior.”



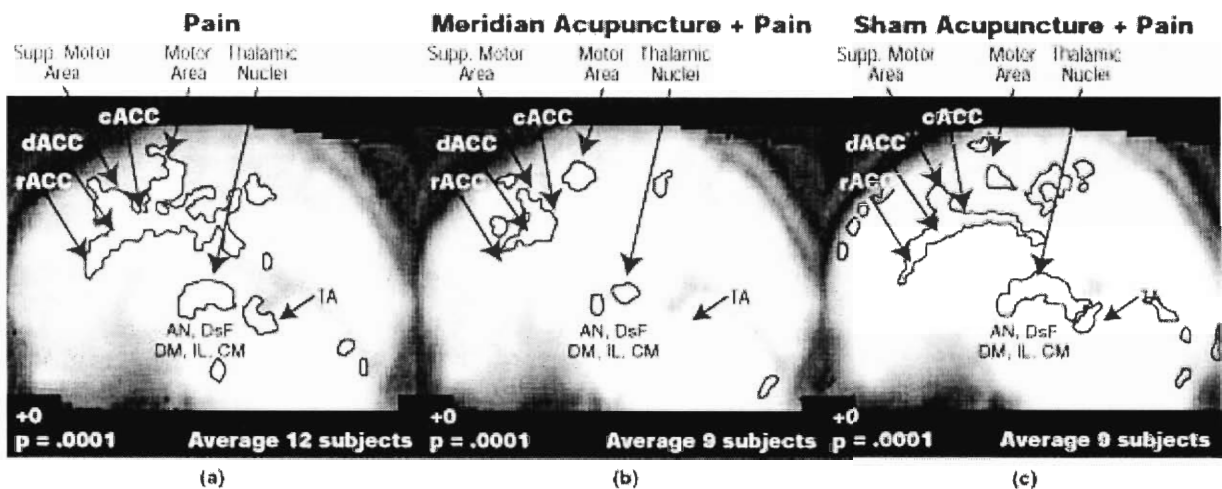


**Figure 8:** “Sham acupuncture + pain stimulation. Similar decreases were noted in activation in the major pain perception and relay areas. (This data set is an average of 9 subjects.)”





**Figure 9:** “Side-by-side comparison of 2 cortical activations seen at the mid-line sagittal view due to: (a) pain vs meridian acupuncture (LI 3) + pain stimulation and (b) pain vs sham acupuncture + pain stimulation, respectively. Decreases in activation of the 2 appear similar, suggesting that they are based on similar neural mechanisms.”



**Figure 10:** “Comparison of the cortical activation in 3 experiments, namely the activations observed due to (a) pain stimulation (alone), (b) meridian acupuncture + pain stimulation, and (c) sham acupuncture + pain stimulation, respectively. Note the markedly decreased activation in (b) and (c) compared with (a), especially in the dACC, rACC, and cACC and thalamic areas. This result implies that both centers are involved in pain perception, attention riveting, and relay. In both (b) and (c), the only areas that remained activated were the supplementary motor and primary motor areas. In addition, activation in the tectal area (TA) also decreased markedly and was no longer visible. AN indicates anterior nucleus; DsF, dorsal superficial nucleus; DM, dorsomedial nucleus; IL, intralaminar nuclei; and CM, centromedian nucleus.”

## Tables

Table 1: "Correlation Matrix for Goal Attainment Score, 6 Dependent Variables, and 2 Control Variables (n = 62)."

	GAS	Belief in mind–body dualism	Hopefulness	Treatment expectations	IHLC	CHLC	PHLC	Use of homeopathy	No. of CAM treatments used
GAS	...	0.03	0.20	–0.36**	0.17	–0.07	–0.18	0.31**	0.36**
Belief in mind–body Dualism		...		0.19	–0.17	0.16	0.04	0.01	–0.03.21
Hopefulness			...	–0.18	0.17	–0.29*	–0.11	0.03	0.06
Treatment Expectations				...	–0.19	0.10	–0.23*	–0.25*	–0.09
IHLC					...	–0.60**	–0.16	0.13	0.19
CHLC						...	0.33**	–0.09	0.07
PHLC							...	–0.11	0.10
Use of homeopathy								...	0.12
No. of CAM treatments used									...

*Note.* GAS = Goal Attainment Score; IHLC = Internal Health Locus of Control; CHLC = Chance Health Locus of Control; PHLC = Powerful Others Health Locus of Control; CAM = complementary and alternative medicine.

Multiple $R$	0.61
$R^2$	0.37
Adjusted $R^2$	0.28
SE	2.38
<i>Note.</i> $R$ = multiple correlation coefficient; $R^2$ = coefficient of multiple determination; SE = standard error.	

Table 2: "Simultaneous Regression Analysis for 6 Dependent Variables and 2 Control Variables Predicting Goal Attainment Score (n = 62)."

<b>Predictor Variables</b>	<b>B</b>	<b>SE B</b>	<b>β</b>	<b>T</b>	<b>Sig T</b>	<b>Tolerance</b>	<b>VIF</b>
Belief in mind–body dualism	–0.03	0.03	–0.14	–1.15	0.26	0.86	1.16
Hopefulness	0.07	0.06	0.13	1.43	0.26	0.85	1.17
Treatment expectations	–1.64	0.55	–0.37	–2.98	0.004**	0.78	1.28
IHLC	0.03	0.10	0.04	0.28	0.78	0.56	1.78
CHLC	0.07	0.09	0.12	0.80	0.43	0.52	1.94
PHLC	–0.21	0.08	–0.30	–2.44	0.02*	0.79	1.27
Use of homeopathy	1.17	0.96	0.14	1.22	0.23	0.88	1.14
No. of CAM treatments used	1.95	0.66	0.34	2.96	0.00**	0.87	1.15
Constant	44.72	5.02		9.6 align="right"1	0.00**		
<p>“<i>Note.</i> B = un-standardized coefficient; SE B = standard error of unstandardized coefficient; β = standardized coefficient; T = coefficient; Sig T = significance of T coefficients; VIF = variance inflation factor; IHLC = Internal Health Locus of Control; CHLC = Chance Health Locus of Control; PHLC = Powerful Others Health Locus of Control; CAM = Complementary and Alternative Medicine.”</p>							
<p>*<i>P</i> &lt; 0.05; **<i>P</i> &lt; 0.01.</p>							

Table 3: Summary of Regression Coefficients From Simultaneous Regression Analysis for 6 Dependent Variables and 2 Control Variables Predicting Goal Attainment Score (n = 62).

Variance Proportions											
Index	Eigenvalue	Condition Index	Constant	Belief in Mind- Body Dualism	Hopefulness	Treatment Expectations	IHLC	CHLC	PHLC	Use of Homeopathy	No. of CAM Treatments Used
1	7.72	1.00	.00	.00	.00	.00	.00	.00	.00	.82	.00
2	.88	2.95	.00	.00	.00	.01	.00	.00	.00	.82	.00
3	.21	6.13	.00	.00	.00	.69	.00	.00	.03	.08	.00
4	.10	8.61	.00	.00	.01	.00	.02	.25	.06	.03	.00
5	.05	12.88	.00	.02	.01	.14	.00	.22	.82	.03	.00
6	.02	21.83	.00	.01	.64	.01	.22	.02	.01	.00	.03
7	.01	25.62	.00	.95	.05	.04	.11	.11	.04	.02	.04
8	.01	30.31	.00	.00	.02	.00	.36	.19	.00	.01	.84
9	.00	50.54	.99	.02	.27	.11	.29	.21	.04	.00	.09
<i>Note.</i> IHLC = Internal Health Locus of Control; CHLC = Chance Health of Locus; PHLC = Powerful Others Health Locus of Control.											

**Table 4:** Collinearity Diagnostics for  $\beta$  Weights of Variables Predicting Goal Attainment Score

Table 5: Acupuncture Points for Basic Training

<b>Meridians, Vessels And Extra Points</b>	<b>Standard International Acupuncture Nomenclature</b>	<b>Selected Points For Basic Training</b>
Lung	11	6
Large Intestine	20	12
Stomach	45	25
Spleen	21	11
Heart	9	5
Small Intestine	19	13
Bladder	67	34
Kidney	27	8
Pericardium	9	7
Triple Energizer	23	12
Gallbladder	44	20
Liver	14	8
Governor Vessel	28	13
Conception Vessel	24	13
<b>Sub-Total</b>	<b>361</b>	<b>187</b>
<b>Extra Points</b>	<b>48</b>	<b>14</b>
<b>Total Points</b>	<b>409</b>	<b>201</b>

Table 6: NIH's List of Conditions That Respond to Acupuncture

<b>Upper Respiratory Tract</b>
Acute sinusitis
Acute rhinitis
Common Cold
Acute tonsillitis
<b>Respiratory System</b>
Acute bronchitis
Bronchial asthma (most effective in children and in patients without complicating diseases)
<b>Disorders of the Eye</b>
Acute conjunctivitis
Central retinitis
Myopia (in children)
Cataract (without complications)
<b>Disorders of the Mouth</b>
Toothache, post-extraction pain
Gingivitis
Acute and chronic pharyngitis
<b>Gastro-Intestinal Disorders</b>
Spasms of esophagus and cardia
Hiccough
Gastroptosis
Acute and chronic gastritis
Gastric hyperacidity
Chronic duodenal ulcer (pain relief)
Acute duodenal ulcer (without complications)
Acute and chronic colitis
Acute bacillary dysentery
Constipation
Diarrhea
Paralytic ileus
<b>Neurological and Musculo-Skeletal Disorders</b>
Headache and migraine
Trigeminal neuralgia
Facial palsy (early stage, i.e., within three to six months)
Pareses following a stroke
Peripheral neuropathies
Sequelae of poliomyelitis (early stage, i.e., within six months)
Meniere's disease
Neurogenic bladder dysfunction
Nocturnal enuresis
Intercostal neuralgia
Cervicobrachial syndrome
"Frozen shoulder," "tennis elbow"
Sciatica
Low back pain
Osteoarthritis

Table 7: Common Conditions Treated Effectively by Acupuncturists

<b>Chronic Pain</b>
Neck and back pain
Migraine headaches
<b>Acute Injury-Related Pain</b>
Sprains
Strains
<b>Gastrointestinal Problems</b>
Indigestion
Ulcers
Constipation
Diarrhea
<b>Cardiovascular Conditions</b>
High and low blood pressure
<b>Genitourinary Problems</b>
Menstrual irregularity
Infertility
Impotence
<b>Muscle and Nerve Conditions</b>
Paralysis
Deafness
<b>Addictive Behaviors</b>
Substance abuse
Overeating
Drug dependence
Smoking
<b>Surgery</b>
Anesthesia



Table 8: Basic Training in Acupuncture

Category Of Personnel	Level of Training	Acupuncture (ACU)			Modern Western Medicine (MED) Theory + Clinical	Official Examination	Certificate
		Core Syllabus					
		Theory	Clinical Supervised Practice				
Acupuncture practitioners (non-medical)	Full course of training	1000 hours	500 hours	500 hours	500 hours	ACU + MED	ACU
Qualified physicians	Full course of training	500 hours	500 hours	500 hours		ACU	
Qualified physicians	Limited training in ACU as a technique for their clinical work	Not less than 200 hours				ACU	
Other health personnel	Limited training in ACU for use in primary health care	Varies according to application envisaged				ACU	

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