

MEDICAL APPLICATIONS OF QIGONG

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This article reviews selected studies of medical applications of Chinese qigong. The review centers on clinical and experimental studies to show that qigong exercise can beneficially affect many functions of the body and improve health. The studies, some conducted in depth, were selected to illustrate that medical applications of qigong are diverse and that many applications could improve Western health-care. (Alternative Therapies in Health and Medicine, 1995;2(1):—)

Traditional Chinese Medicine (TCM) is a holistic system for promoting health and for healing that includes several therapies such as acupuncture and moxibustion, herbal medicine, acupressure massage, nutrition, and qigong (pronounced *chee gong*). These therapies are often used in combination. The underlying theory of TCM is based on balancing qi, the vital energy in the body, according to the theory of yin-yang and the five elements, which have been used for more than 3000 years. In practice, the flow of qi is regulated, and blockage of the flow of qi is removed. Energy blocks or excess or deficient qi may result from disease, injury, or stress.

Qigong has a history of thousands of years, and it is unique among TCM therapies because almost anyone can learn and practice it. However, it is best to study qigong with a qualified teacher to avoid side effects. An estimated 60 million people in China practice qigong daily, primarily to maintain health and achieve long life.

The word qigong is a combination of two ideas. Qi is the vital energy of the body, and gong is the skill of working with the qi. Medical qigong for health and healing consists primarily of meditation, physical movements, and breathing exercises. Qigong practitioners develop an awareness of qi sensations in their bodies and use their mind, or intention, to guide the qi. The benefits of qigong are said to extend beyond health and healing to enhance spiritual life and even special abilities such as psychic powers. Qigong is also used in martial arts to develop physical and mental powers for self-defense and healing.

Medical qigong is divided into two parts: internal and external. Internal qi is developed by individual practice of qigong exercises. When qigong practitioners become sufficiently skilled, they can use external qi (*waiqi* in Chinese) to "emit" qi

for the purpose of healing another person. This therapy has limited application on a large scale, because the number of skilled qigong masters is limited. This article focuses on internal qi, because almost everyone can learn qigong exercises for maintaining health and self-healing.

In the early 1980s scientists in China began investigating the many medical benefits claimed for qigong. Since then, research on hundreds of medical applications of qigong has been reported in Chinese medical literature. A wealth of material is also published in English in the proceedings of international conferences. Since 1986, 837 abstracts have been published, more than half in English. These English abstracts have been entered into a database (note 1) to enable searches using any key word and to develop bibliographies.

EXAMPLES OF MEDICAL APPLICATIONS OF QIGONG

Some examples of the medical applications of qigong and emitted qi on humans, animals, cell cultures, and plants have been reviewed.¹ Clinical and experimental evidence showing that qigong exercise and external qi affect various functions and organs of the body have been discussed.² Some of the functions and organs affected by qigong, and the measurement techniques employed, include the brain (electroencephalogram [EEG] and magnetometer), blood flow (thermography, sphygmography, and rheoencephalography), heart functions (blood pressure, electrocardiogram, and ultrasonic cardiogram), kidney (urinary albumin assay), biophysical (enzyme activity, immune function, sex hormone levels), eyesight, and tumor size in mice.

In the following discussion, some clinical and experimental research studies will be discussed to illustrate the scope of research on medical applications of qigong. The studies have been selected because they contain scientific information on chronic medical conditions such as hypertension and aging. In most of these studies investigators used controls and statistical analysis.

Therapeutic Balancing of the Meridians and Functions of the Body

The effects of qigong practice on therapeutic balancing of the meridian system, the TCM organs, and body functions³ can be monitored by electroacupuncture according to Voll (EAV). In EAV the electrical conductance of the skin above individual acupuncture points is measured using low voltage and low current. Diagnosis depends on the relative electrical conductance and its time dependence. An important diagnostic criterion of

degeneration of an organ is an "indicator drop" that may occur during the measurement, when the conductance reaches an apparent maximum value but then decreases before leveling off.

Measurements were made by the same operator and equipment at 24 acupuncture points at the ends of the meridians of subjects' fingers and toes. The subjects were asked to perform a qigong exercise of their choosing, for example, sitting or standing meditation or moving qigong. Two series of EAV measurements were made before and after healthy subjects practiced qigong. In the first series four subjects were examined by EAV before and after they practiced qigong for 10 to 15 minutes. Qigong exercise decreased the average of the EAV measured values by 19% to 31% ($P < .004$; note 2) for the four subjects. Qigong essentially eliminated the indicator drops. In the second series each of seven subjects was examined by EAV three times in a blind protocol so that the operator did not know whether a subject had practiced qigong before the second or third examination. Qigong exercise decreased the average EAV measured values by 17% to 35% for four subjects and increased it by 4% to 15% for three subjects. Indicator drops again were decreased.

These preliminary results show that qigong can make significant changes in the therapeutic balancing of the meridian and organ systems, the goal of TCM.

Hypertension

Several groups in China have investigated the effects of qigong on hypertension.^{4,13} Research on the short- and long-term effects of qigong practice on hypertensive patients has been carried out at the Shanghai Institute of Hypertension by Wang et al.⁴ Their research serves as a model of the effects of qigong on many functions of the body. For these studies, the patients practiced "Yan Jing Yi Shen Gong" for 30 minutes twice a day. This qigong exercise, claimed to be especially valuable for therapeutic purposes and delaying senility,⁴ consists of a combination of sitting meditation and gentle physical movements that emphasizes a calm mind, relaxed body, and regular respiration.

Stroke and Mortality

In 1991 the researchers reported a 20-year controlled study of the antiaging effects of qigong on 204 hypertensive patients.⁵ Recently, the researchers performed a 30-year follow-up study on 242 hypertensive patients who were divided randomly into a qigong group ($n=122$) and a control group ($n=120$).¹⁴ All patients were given drug therapy to control blood pressure, but only the experimental group practiced qigong 30 minutes twice a day. The results show that the accumulated mortality rate was 25.41% in the qigong group and 40.8% in the control group ($P < .001$). The incidence of stroke was 20.5% and 40.7% ($P < .01$), respectively, and the death rate due to stroke was 15.6% and 32.5%, respectively (Figure 1).

The researchers also reported that over the 20-year period, blood pressure of the qigong group stabilized, whereas that of the control group increased. Remarkably, during this period the drug dosage for the qigong group could be decreased and for

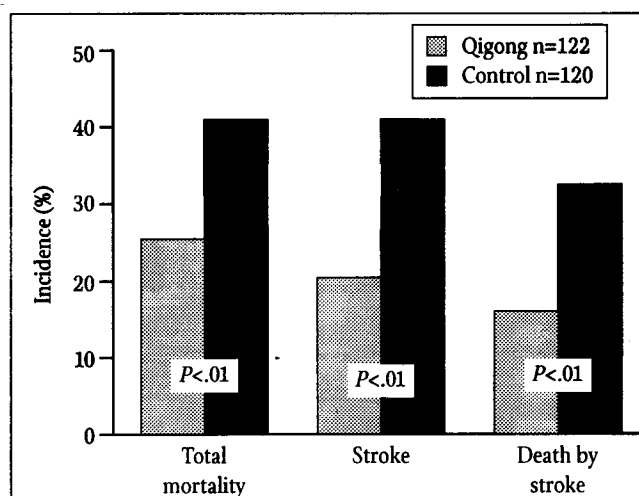


FIGURE 1 A 30-year follow-up of the effect of qigong on mortality and stroke in 242 hypertensive patients. Both groups received drug therapy.¹⁴

30% of the patients, could be eliminated. However, the drug dosage for the control group had to be increased.

Heart Function and Microcirculation

Older hypertensive patients usually have a deficiency of Heart energy, which often leads to a weakened function of the left ventricle and a disturbance of microcirculation. In a study of 120 male subjects 55 to 75 years of age, researchers evaluated the effects of qigong by using ultrasonic cardiography and indices of microcirculation (note 3). The subjects were divided into three groups consisting of 46 hypertensive subjects with Heart-energy deficiency, 34 without Heart-energy deficiency, and 40 with normal blood pressure. Patients whose blood pressure measured more than 160/95 mm Hg were accepted as subjects after regulation with antihypertensive drugs for 4 weeks.

The results showed that subjects with Heart-energy deficiency experienced several improvements: increases in cardiac output, ejection fraction, mitral valve diastolic closing velocity, and mean velocity of circumferential fiber shortening, while the total peripheral resistance decreased ($P < .05-.01$). Significant changes did not occur in the group without Heart-energy deficiency.

Multiple quantitative evaluation of nail fold disturbance in microcirculation was made on the above three groups by observing 10 indices of abnormal conditions: configuration of micrangium, micrangium tension, condition of blood flow, slowing of blood flow, thinner afferent limb, efferent and afferent limb ratio, color of blood, hemorrhage, and petechiae. At the beginning of the study, the incidence of microcirculation obstruction for the above three groups was 73.9%, 26.5%, and 17.5%, respectively. After practicing qigong for 1 year, the group with Heart-energy deficiency showed a decrease in nail fold

microcirculation obstruction from 73.9% to 39.3% ($P < .05$). Significant changes did not occur in the group without Heart-energy deficiency. The investigators emphasized that the type of qigong exercise must be selected according to the patient's condition.

Sex Hormone Levels

One consequence of aging is that levels of sex hormones change in unfavorable directions. For example, the female hormone (estrogen) level tends to increase in men and decrease in women.⁵ Studies indicate that this trend can be reversed by qigong exercise.^{5,15,16}

In a study of the effect of qigong exercise on plasma sex hormone levels for hypertensive men and women, the sex hormone levels were measured before and after qigong practice for 1 year.⁵ The 70 male patients with essential hypertension (aged 40 to 69; disease stage II) were divided into two groups. In the qigong group ($n=42$) the estradiol level decreased from 70 to 47.7 pg/mL, a decrease of 32% ($P < .01$), whereas no significant change occurred in the control group ($n=20$). The testosterone level in both groups decreased about 7%. The value of estradiol for the qigong group (47.7 pg/mL) approached that of healthy men (42.2 ± 5.8 pg/mL) of the same age but without hypertension or cardiovascular, pulmonary, hepatic, renal, or endocrine disease ($P < .05$). For women (aged 51 to 67; number of subjects not available), the aging process was associated with failure of ovarian function manifested by decreased estradiol and increased testosterone levels. Qigong resulted in an increase of estradiol from 40.9 ± 3.5 to 51.6 ± 3.5 pg/mL, a value about equal to that of normal menopausal control subjects without hypertension or cardiovascular, pulmonary, hepatic, renal, or endocrine disease (Figure 2). The value of testosterone was also increased by qigong, from 25.5 ± 2.2 to 37.2 ± 2.2 ng/dL.

In an auxiliary study, 24-hour urinary estradiol levels were determined in 30 men aged 50 to 69.¹⁵ The practice of qigong for 1 year resulted in a 31% decrease in estradiol and a 54% decrease in the estradiol-testosterone ratio. These changes were accompanied by improvements in symptoms such as soreness, dizziness, insomnia, hair loss, impotence, and incontinence associated with Kidney deficiency hypertension (a TCM diagnosis). The average score for these symptoms was changed by qigong from 5.5 ± 2.3 to 2.8 ± 1.3 ($P < .001$).

Ye and coworkers¹⁶ reported similar favorable changes in the plasma levels of estradiol in 77 male and female qigong exercisers after 2 months of qigong exercise, compared with 27 control subjects. They did not observe significant changes in testosterone level.

Bone Density

Aging may result in a decrease in bone density, especially in women. As a consequence, bones become more brittle and subject to fracture. Bone density was found to increase in male subjects who practiced qigong for 1 year.¹⁵ For 18 subjects 50 to 59 years of age, bone density increased from 0.627 ± 0.040 to 0.696

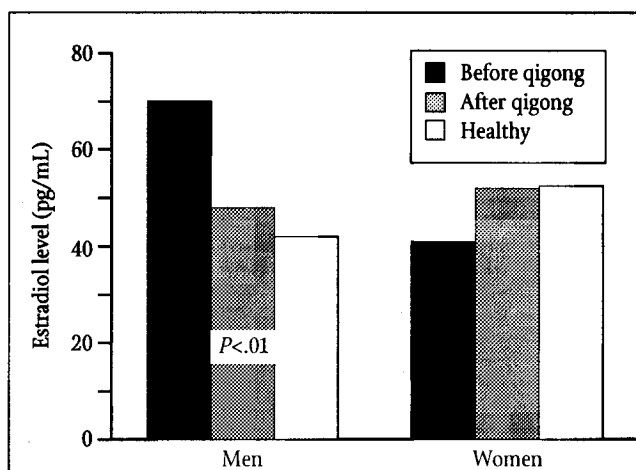


FIGURE 2 Serum estradiol levels of hypertensive men (aged 40-69) and women (aged 51-67) who practiced qigong for 1 year compared with healthy control subjects.⁵ (P value for women not reported.)

± 0.069 g/cm³. For 12 subjects aged 60 to 69 years, the bone density increase was somewhat less: from 0.621 ± 0.039 to 0.672 ± 0.083 g/cm³. For both age groups, the bone density increased to values exceeding those of normal men of the same age, 0.695 ± 0.096 and 0.657 ± 0.102 g/cm³, respectively (Figure 3).

That qigong therapy also would help restore the bone density of women, especially menopausal women, seems likely. If so, hormone replacement therapy and its side effects could be reduced.

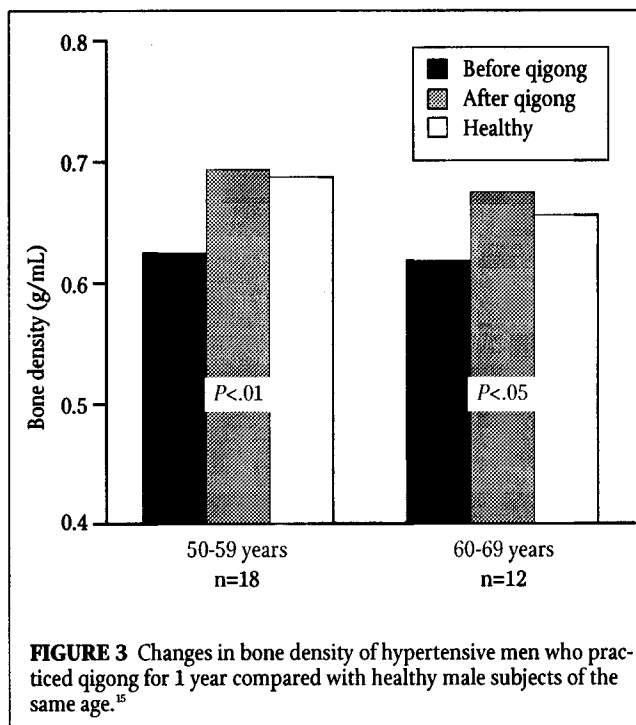


FIGURE 3 Changes in bone density of hypertensive men who practiced qigong for 1 year compared with healthy male subjects of the same age.¹⁵

Changes in Blood Chemistry in Hypertensive Patients

Auxiliary studies by Xu and coworkers on the effects of qigong exercise on the blood chemistry of hypertensive subjects have shown improvements in plasma coagulation fibrinolysis indices, blood viscosity, erythrocyte deformation index, plasma level of tissue-type plasminogen activator, plasminogen activator inhibitor, factor VIII-related antigen, and antithrombin III.¹⁵ In another study they reported that qigong exercise significantly and beneficially changed the activities of two messenger cyclic nucleotides (cyclic adenosine monophosphate and cyclic guanosine monophosphate).¹⁷

Cancer

In the Qigong Database™ the terms cancer, carcinoma, or tumor appear in the titles of 62 abstracts. Feng^{18,19} pioneered research showing that emitted qi from qigong masters produced marked changes in cancer cell cultures from mice. In several studies the effects of emitted qi on tumors in animals have been reported. For example, emitted qi was reported to inhibit the growth of implanted malignant tumors in mice but did not destroy the tumors.^{20,22} Encouraged by the results with animals, researchers carried out clinical research on the effects of qigong on human subjects with cancer.²³⁻³⁰ Detailed results are not available in English for all these clinical studies.

Some results are available for clinical study of qigong as a therapeutic aid for patients with advanced cancer.²³ In this study patients with medically diagnosed malignant cancer were divided into a group of 97 patients who practiced qigong and a control group of 30 patients. All patients received drugs, and the study group practiced qigong for more than 2 hours a day over a period of 3 to 6 months. Both groups improved, but the study group showed improvement in strength, appetite, freedom from diarrhea, and weight gain [3 kg] four to nine times greater than that of the control group. The phagocytic rate, which is a measure of the immune function, increased in the qigong group but decreased in the control group (Figure 4).

Senility

To study the mechanism of keeping fit by qigong, a controlled study was made of 100 subjects classified either as pre-senile or with cerebral function impaired by senility.¹⁵ The subjects were divided into two groups of 50 people each with a mean age of 62.7 years and a similar distribution of age and gender. The qigong group practiced a combination of static and moving qigong. The control group exercised by walking, walking fast, or running slowly. According to the TCM method of classifying the vital energy, more than 80% of the patients in each group were classified as deficient in vital function and vital essence of the Kidney. Criteria for judging outcome were based on measuring clinical signs and symptoms including cerebral function, sexual function, serum lipid levels, and function of endocrine glands.

After 6 months, 8 of the 14 main clinical signs and symptoms in the qigong group had improved more than 80%, whereas none of the symptoms in the control group had improved more than 45%.

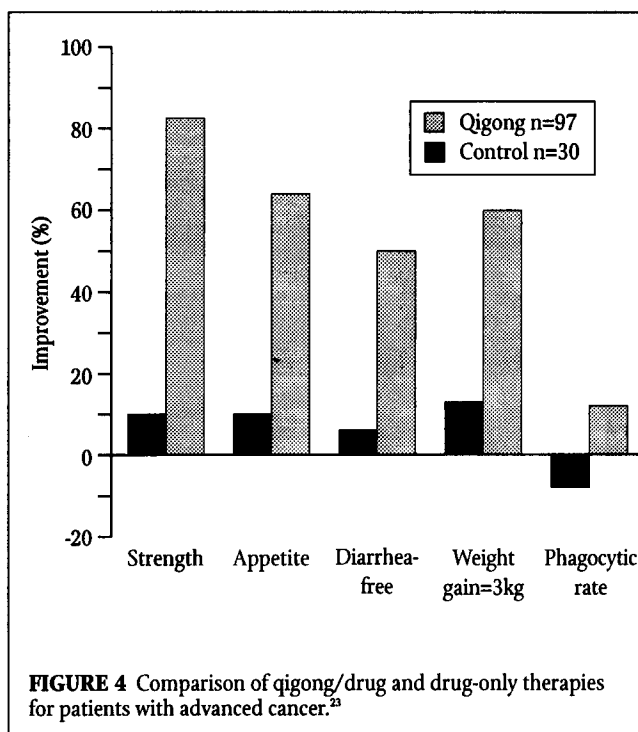


FIGURE 4 Comparison of qigong/drug and drug-only therapies for patients with advanced cancer.²³

Mind-Body Regulation

The main function of qigong is to regulate the mind,³¹ specifically the functions of the brain and related body reactions. A tenet of qigong is that the mind leads the qi, and the qi leads the blood. This somewhat mysterious statement can be interpreted to mean that intention (the mind) can direct the qi within the body. This mechanism is perhaps similar to the role of volition in self-regulation by biofeedback.

Brain Waves

The main focus of research has been on the effects of qigong on brain waves as measured by electroencephalogram (EEG). During static, or sitting, meditation, alpha brain waves dominate beta waves and spread to the frontal areas of the brain.^{32,33} Kawano and Wang³² have found differences in the EEGs of Zen Buddhist priests and qigong masters. During almost all types of qigong training, the frequency of the alpha waves increased from 0.6 to 1.0 Hz. During deep Zen meditation, the frequency decreased from -1.0 to -1.5 Hz, and sometimes theta waves appeared. Also, frontal and occipital alpha waves tended to synchronize with a phase difference that depended on the type of meditation. This phase difference became smaller with qigong meditation (ie, better synchronization) and larger with Zen meditation. According to Kawano and Wang,³² these differences in brain function suggest that internal qigong is a semiconscious process that involves some awareness and activity, whereas Zen meditation is a neutral process that releases the meditator from all concerns. Perhaps because of this difference, qigong is considered a healing art, whereas Zen is generally not.

As mentioned earlier, a qigong master can emit qi to heal a patient. The interaction between qigong masters and subjects has been followed in double-blind tests in which masters and subjects were simultaneously assessed by EEG, polygraph tests, biochemical blood tests, and psychological tests.³⁴ The EEG studies showed that type of brain waves and their location were synchronized in the brains of master and subject. Such synchronism may be required for healing by emitted qi.

Machi³⁵ has compared EEG results with simultaneous measurements of physiological changes in qigong masters. He found that while the qigong master was emitting qi, the alpha-1 waves showed extremely high potential in the right frontal lobe and that blood pressure, heart rate, and skin surface temperature increased. He also detected a far infrared emission with a 1-Hz modulation signal coming from the Laogong point (a major acupuncture point in the palm of the hand).

Bloodflow to the Brain

Qigong exercise has been shown by rheoencephalography to increase bloodflow to the brain.^{31,36} For 158 subjects with cerebral arteriosclerosis who practiced qigong for 1 to 6 months, improvements were noted in symptoms such as memory, dizziness, insomnia, tinnitus, numbness of limbs, and vertigo headache (note 4). During these studies, a decrease in plasma cholesterol was also noted.

Rapid and Large Changes in Altitude

Studies have been conducted to determine whether qigong exercise would protect pilots from altitude stress when they flew rapidly from low altitudes to the Tibetan highlands.

Cardiac function. Before entering the Tibetan highland, 66 young men were divided into two groups: a group of 32, who did Qiyuan qigong exercise for 4 weeks, and a control group of 34, who exercised to radio music.³⁷ The two groups flew suddenly into the highlands from a lower altitude. Before and after entering the highlands, measurements were made of symptoms of altitude sickness and physiological changes. The qigong group suffered less altitude stress than did the control group, as measured by blood pressure, heart rate, oxygen consumption, microcirculation on the apex of the tongue and nail fold, and temperature at the Laogong point (P8) of the left hand ($P < .01$). Also, several investigators have reported the beneficial effects of qigong on cardiovascular diseases.^{34,38-40}

Microcirculation disorders. In a study of microcirculation disorders 40 air force pilots were randomly divided into two groups: a group of 22 subjects who practiced Qiyuan qigong exercise for 8 weeks, and a control group of 18 who did physical exercise for 8 weeks before entering the Tibetan highlands.⁴¹ Microcirculation was measured at tongue apex and nail fold, and also from the temperature at the Laogong point in the palm of the left hand. When the men entered the high altitude, abnormal blood pressure and microcirculation of tongue apex and nail fold occurred in both groups. However, the abnormalities were statistically less in the study group than in the control group

($P < .01$). The temperature at Laogong remained steady in the study group but was reduced in the control group ($P < .05$).

Lung function. In a lung function study 120 young men were divided into three groups of 40 each.⁴² Group 1 practiced Qiyuan qigong for 4 weeks prior to entering the highlands; group 2, the control group, exercised to radio music for 4 weeks prior to entering the highlands; and group 3 was composed of residents living at high altitudes. The results showed that the integral value of symptoms of acute mountain sickness was lower in the qigong group than in the control group ($P < .05-.01$). Pulmonary ventilation of the qigong group was significantly improved compared with that of the control group ($P < .05-.01$), and nearly equal to that of the resident group.

COMBINATION OF QIGONG AND DRUGS VERSUS DRUG THERAPY ALONE

There is ample evidence in the literature that therapy by a combination of self-applied qigong and drugs is superior to that of drug therapy alone. This conclusion is reported in several studies of hypertension (note 5)^{4,5,15,43} and in the treatment of patients with cancer.^{23,25,29,30} The advantages of a combination of qigong and drugs over drugs alone for hypertension and cancer were discussed earlier.

The mechanism of this apparent synergism is not known but undoubtedly relates to the fundamental mechanism of qigong. Qigong is believed to relax the body, promote the flow of qi (energy), blood, oxygen, and nutrients to all cells of the body, and promote removal of waste products from cells. The increases in flow of qi and microcirculation nourished diseased or stressed tissue. We may assume that qigong also promotes drug uptake by tissue and cells by means of increased microcirculation.

DISCUSSION

This review encompasses only a small number of studies from a large collection of research using medical applications of qigong, mainly in China. The main conclusion from many studies is that qigong enables the body to heal itself. Medical practitioners and scientists are encouraged to evaluate the potential value of medical applications of qigong by collecting and evaluating information from original sources.

Several issues should be addressed to enable the introduction of qigong into Western healthcare. Because the support of scientists, medical practitioners, and the public is required, a crucial step is to collect scientific evidence. However, few studies have been published in English, and original scientific reports in Chinese are often difficult to obtain and translate. Furthermore, some otherwise valuable technical research papers are scientifically incomplete. Although some scientific reports have flaws, we must not reject all research on qigong. We must give credit to China for developing the science of qigong and recognize that it is still in development.

On the positive side, the public is rapidly gaining interest in qigong as a means of improving health. Qigong is increasingly addressed by the public press, and increasing numbers of medical

practitioners are becoming active in alternative medical practices. Although only one insurance company (Nationwide Insurance) is known to have paid for qigong therapy, HMOs and state and federally funded medical programs would benefit from paying for this therapy because it is effective and inexpensive. Pharmaceutical companies, which are exploring development of many herbs, could benefit from research into the synergistic effects between qigong and drugs.

The Office of Alternative Medicine of the National Institutes of Health is working to develop a basis for evaluating the merits of alternative therapies. In 1994 it funded a grant involving qigong.⁴⁴ The Japanese Ministry of International Trade and Industry is reported to be taking a pragmatic approach to alternative therapies by encouraging the development of industrial applications of therapies such as acupuncture and qigong.

There are many medical applications of qigong.⁴⁵ Some of the most promising for Western healthcare are for chronic problems such as hypertension, cardiovascular disease, aging, asthma, allergies, neuromuscular problems, and cancer. These areas of public health deserve consideration by Western medical establishments. In this regard, our institute is trying to develop cooperative research on hypertension between groups in the United States and China.

Change does not come easily; it takes curiosity, vision, courage, and determination. The subject of medical applications of qigong is worthy of the challenge.

Notes

1. Qigong Database™. San Francisco, Calif: Qigong Institute, East West Academy of Healing Arts, 450 Sutter Street, Suite 2104, San Francisco, CA 94108.
2. Probability (*P*) value states the probability that a result could have been produced by chance. The smaller the number, the greater the probability that the result was not produced by chance.
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