Exploratory Studies of Qigong Therapy for Cancer in China

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The authors reviewed more than 50 studies of qigong therapy for cancer in China, in 3 categories: clinical studies on cancer patients, in vitro studies on laboratory-prepared cancer cells, and in vivo studies on cancer-infected animals. Most of the clinical studies involved observation of cancer patients' self-practice of qigong. Although no double-blind clinical trials were found among patient studies, many had a control. The qigong groups showed more improvement or had a better survival rate than conventional methods alone. In vitro studies report the inhibitory effect of qi emission on cancer growth, and in vivo studies find that qigong-treated groups have significantly reduced tumor growth or longer survival among cancer-infected animals. However, there is much room for improvement in these studies, and some require replication to verify the findings. Qigong therapy is an area that is often neglected by mainstream medicine and research, but our review strongly suggests that qigong deserves further study as a supplement to conventional cancer treatment.

Introduction

Qigong (pronounced "chē gông") is a general term for a large variety of traditional Chinese energy exercises and therapies. There is no consistent definition for qigong in the academic field due to its broad coverage. Generally, qigong is considered to be the self-training method or process through qi (vital energy) and yi (consciousness or intention) cultivation to achieve the optimal state of both body and mind.[1] Traditional Chinese medicine (TCM) posits the existence of a subtle energy (*qi*) circulating throughout the entire human body. When strengthened or balanced, it can improve health and ward off or slow the progress of disease. TCM considers sickness or pain a result of qi blockage or unbalanced qi energy in the body. All TCM therapies—herbs, acupuncture, massage, diet, and qigong—are based on this philosophy and perspective on human health.

It is generally known that qigong practice is beneficial to human health and can prevent disease. However, it is less known, even in China, that qigong may be an effective way to treat various diseases, including cancer. It is very common for people with no qigong experience to consider all qigong the same. In fact, there are thousands of different forms of qigong in China, and most of them were designed not to heal existing diseases but, rather, to be used as a prophylactic and/or a meditative exercise. Although most qigong styles bring health benefits, medical qigong is a small, specialized area of qigong that has been specifically developed for the treatment and cure of disease.

Medical qigong refers to the qigong forms used by TCM practitioners with emphasis on using vital energy (qi) to diagnose and take control of or eliminate illnesses, as well as prevent their onset. Qigong is mainly a self-training method that includes qi emission or external qigong therapy (EQT). EQT has always been part of the medical qigong practice as an element in the effort to help others regain their health. There are also differences between internal qigong training and EQT in the history and development of medical qigong. Internal qigong training refers to qigong practice or cultivation by oneself to achieve optimal health for both mind and body. This is a major component in medical qigong practice. EQT refers to the process by which a qigong practitioner directs his intention, or emits his qi energy, to help others break qi blockages and induce the sick qi to leave the body so as to alleviate pain, abate disease, and balance the flow of qi. Most research on qigong therapy for cancer patients has involved teaching patients to practice qigong (internal qigong training), whereas most research on qigong therapy for cancer in animals or culture cells has involved EQT.

Qigong and Cancer Treatment

Although there might be some cases of cancer recovery reported in many qigong forms, most qigong schools or clinics in China generally do not openly

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DOI: 10.1177/1534735402238187

take patients with cancer due to their high mortality rate. For example, it has been reported that the largest medical qigong facility in China—Huaxia Zhi-Neng Qigong Center—has chosen not to admit any more patients with cancer after a cancer patient died in their facility. However, 2 qigong forms in China have publicly challenged cancer: Guo-Lin New Qigong and Chinese Taiji Five-Element Qigong.

A late-stage cancer patient, Guo Lin, who attributes her recovery from cancer to her practice of qigong in the 1970s, created Guo-Lin New Qigong. Guo started to teach this form of qigong to a number of cancer patients around the country. It has been said that many of them achieved complete remission from cancer after practicing Guo-Lin qigong. However, most practitioners of Guo-Lin qigong have used qigong mainly as a supplementary therapy to conventional treatments or other therapies.[2] Therefore, its therapeutic efficacy has not been sufficiently established as a stand-alone therapy, and it has not been fully recognized by Western medical doctors.

Taiji Five-Element Qigong was founded by Binhui He in response to the fact that modern medicine failed to provide a cure for many chronic diseases, and that many of the drugs used to treat these diseases have negative long-term side effects. The Chinese Society of Qigong Science appointed He as the director of the Qigong Anti-Cancer Research Center in 1993 after discovering from media reports that late-stage cancer patients had recovered completely by practicing this form of qigong alone without any other therapy. He then started formal clinical exploration of qigong anticancer therapy in his qigong training center. Many patients with late-stage cancer (most of whom were turned away by hospitals due to the lack of any existent medical treatment available at such a late stage) participated in He's intensive medical qigong training. Most of these patients achieved significant short-term improvement in their health and/or a recovery from cancer through qigong practice alone. Furthermore, a large proportion of these patients became cancer-free in the last 5 to 9 years.[3,4] In an official assessment meeting held in 1996 by the Chinese government, Chinese scholars and experts in medicine and science examined a number of cancer cases and the results of scientific research with Taiji Five-Element Qigong. They affirmed the positive effect of the five-element qigong and concluded in their evaluation that it was "an effective way to treat cancer."[5-7]

Research on Qigong Therapy for Cancer

Media reports on cancer recovery by qigong have caught the attention of many scientists in China. Can qigong practice really have a therapeutic effect on cancer? It is well known that some cancer patients may experience spontaneous remissions without any therapy. How do we discern spontaneous remissions from qigong-induced remissions? Does qigong treatment provide merely a placebo, or does it truly provide a therapeutic effect?

Due to considerations of psychological effects and other limitations, most systematic research on qigong therapy for cancer has been focused on in vitro study of different cancer cells or in vivo study where cancer cells were injected into a live animal to observe the inhibitory effect of qigong therapy. Most clinical studies of patients have been case observations by medical professionals; no double-blind clinical trials could be found in the literature. In an attempt to understand how qigong therapy affects cancer treatment, this study reviewed more than 50 research studies (excluding case reports) that have a focus on qigong therapy for treating cancer. All of these studies were performed in the past 20 years and were published in China. These studies fall into 3 different categories: clinical study on human cancer patients, in vitro study of cancer cells with EQT, and in vivo (animal) study of cancer cells with EQT. It is hoped that such a review will interest more scientists in this ancient therapy and that, as a result, more well-designed research on the therapeutic effect of qigong therapy for cancer and other chronic diseases will be implemented.

Methods

This preliminary review uses 2 major sources of literature: (1) the Qigong Database of the Qigong Institute,[8] which has more than 1600 abstracts and papers from various conference proceedings and publications; and (2) the accessible publications in Chinese, including some conference proceedings in Chinese. Although there is no academic journal devoted specifically to qigong research, there are many collected research works (edited volumes), as well as specific magazines and journals, that publish qigong-related research studies. Most of this literature has never been published in English.

Although there are numerous publications on qigong and cancer in Chinese, few truly adhere to Western academic standards with regard to research design and reporting format. Some were not written for academic exchanges or documentation. Consequently, incomplete data reports were a problem in this review. To fully take advantage of the published literature for future research in this area, we used the following 3 criteria for selecting studies to be included in this review: (1) it must be a research study with systematic data collection for the purpose of understanding the clinical improvement or significant differences between a qigong and a nonqigong group, not

simply case reports or patient testimonies on cancer recovery; (2) it must involve specific cancer or carcinoma cells with quantifiable results, not simply an exploration on the mechanism of qigong therapy with biological means or general assumptions of qigong therapy for cancer; or (3) it must be clinical research with an identifiable baseline tumor description or cancer identification and compatible results, not simply an obscure outcome study.

Major Research Findings

Clinical Studies of Human Patients

A number of clinical studies have been done on qigong therapy for cancer patients. Most published research articles in China on cancer patients have been based on observational studies, some without a compatible control. A total of 21 clinical studies were reviewed, with the number of observations ranging from 42 to 1883. A large proportion of the publications were based on clinical studies that used Guo-Lin New Qigong with a combination of other therapies. Although no double-blind clinical trial in conventional medicine was found in the qigong literature, many of the studies did have a control group. Table 1 presents the summary of these studies. Following are more detailed summary descriptions of some of these studies.

Quite possibly the largest clinical observation of qigong therapy for cancer treatment was conducted at Beijing Miyun Capital Tumor Hospital by Zhang and colleagues,[9] who combined self-control qigong therapy (a modified form of Guo-Lin qigong) with other conventional methods in the treatment of 1648 patients with various cancers over a period of 8 years. This study documented significant improvement for 32.4% of patients and some effectiveness for 59.2% of patients; only 8.4% reported no effect. More than 500 of the cancer patients survived 5 years or longer (> 30%). This is a much better result than other tumor hospitals in China that have not combined qigong therapy in their treatment plans. Although Zhang et al also collected many data on the patients' physical health, improvement in immune functions, and other biological indicators, no control was used or collected in this hospital-based observation, which makes it less possible to discern how well qigong therapy benefits cancer patients in comparison to other therapies. Table 2 presents the results of major immune indicators among 30 cancer patients before and after the qigong therapy.[10] These data provide some insight into how qigong works for cancer patients.

Sun and Zhao[11] of Guang-An-Men Hospital at the Academy of TCM conducted a clinical study on various advanced cancers. Among the 123 patients with a mean age of 47 years, 60 were men and 63 women; all were diagnosed pathologically with malignant tumor, 70 in stage III and 53 in stage IV. The qigong group (n = 97) was treated with conventional drugs plus qigong exercise (2 hours daily for 3 months), whereas the control group (n = 30) was treated with the same drugs alone. At the end of the treatment, the researchers found that among the qigong-plus-drug group, 82% regained strength, 63% improved appetite, and 33% were free of diarrhea or irregular defecation, whereas the rates for control group were 10%, 10%, and 6%, respectively ($P < .01$). They also found that 50.5% in the qigong group gained 3+ kg in body weight as compared to 13.3% in the control group; only 5.4% in the qigong group lost 3+ kg whereas 30% lost weight in the control group ($P < .01$). The blood tests of the 2 groups indicated that in the qigong-treated group, the mean phagocytic rate of macrophages increased from the previously tested result of 34.7% ± 8.9% to 47.0% ± 8.2% after the treatment (a 35% increase); the phagocytic indices were 0.45 ± 0.11 and 0.63 ± 0.13, respectively, before and after the therapy. The mean phagocytic rate in the control group did not elevate, but decreased by 7.8%; the phagocytic indices changed from 0.63 ± 0.18 before therapy to 0.50 ± 0.14 after therapy. In addition, 24% of patients in the qigong group had normal erythrocyte sedimentation and 21% had normal hepatic function; however, those with normal sedimentation and hepatic function constituted only 10% and 6.7% in the control group, respectively. In sum, the results suggest that qigong therapy has some beneficial effect in ameliorating the symptoms, improving the appetite, strengthening the constitution, and increasing self-healing ability.

Fu et al[12] of Henan Medical University observed 186 postsurgery patients of cardiac adenocarcinoma (155 men and 31 women; mean age = 59.8 ± 8.8 years) over a period of 3 years. Among them, 7.5% were in stage I, 24.7% in stage II, and 67.8% in stage III of various cardiac adenocarcinoma; 44.5% had lymph metastasis. The patients were randomly assigned into 4 treatment groups: surgery only (control; n = 48), chemotherapy only (n = 42), Chinese herbal therapy only (n = 46), and qigong plus herb therapy (n = 50). This last required the patients to practice specific qigong every day for a specific period of time. The postsurgery chemotherapy was the standard etoposide, doxorubicin and cisplatin (EAP) protocol, 2 courses in the first year, 2 courses in the second year, and 1 course in the third year. After more than 5 years of follow-up study, Fu et al found that the 1-, 3-, and 5-year survival rates for the control group (surgical only) were 80.1%, 36.5%, and 20.8%; for chemotherapy group were 85.7%, 45.2%, and 25.1%; for herbal group were 84.5%,

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Table 1. Reviews of Clinical Studies of Qigong Therapy for Cancer Patients*

Author, Year	N	Control	Type of Cancer	Method	Results	Note
Cai et al 2001 [20]	1883	N	Various types and stages of cancer	After practicing Guo-Lin qigong for 2 months, blood sample drawn on each patient for analysis, such as RBC and WBC count, IgG, IgA and IgM levels, NK cells and different CD cells counts were measured.	Most patients showed remarkable improvements in these categories: immune function improved after qigong practice, especially WBC, CD20, IL-2 and NK activities ($P < .01$); 40.8% patients reported improvement in sleep; and 36.8% reported improvement in appetite.	
Cong et al 1997 [61]	120	N	Late-stage esopharyngeal cancer	Chinese herbal compound (Tian-xian capsule), chemotherapy and radiotherapy, plus Guo-Lin style qigong were combined to treat cancer patients. A number of physical symptoms were checked before and after treatment.	After the combination therapy, significant reduction in physical symptoms ($P < .01$). The 5-year survival rate is 37.5%, and medium survival period 2-3 years; compared to only 16-20% survival rate in 5 years, 17 months for the med. survival period previously.	
Feng, 1994 [21]	202	N	Various cancers, eg esophageal, brain tumor, and others	Patients receive qigong treatment from qigong master, 1-2 hours per treatment, treated between 15-30 times. Before treatment the patients were led by qigong master to practice qigong for 30 min.	The number of patients with improved symptoms were 123, 60.9% of the total, 78 patients show no improvement (38.6%) and only 1 patients showed worsened symptoms (0.5%).	No qigong form specified.
Fu et al 1996 [12]	186	Y	Cardiac adeno-carcinoma	Patients were randomly assigned into 4 treatment group: surgical only (control), post-surgical chemotherapy (EAP); herbal, and herbal + qigong. Mean age = 59.8 ± 8.8 yr.	Survival rates in year 1, 3 & 5 were: Surgical only: 80.1%, 37.5%, 20.8%; Chemo: 85.7%, 45.2%, & 25.1%; Herbal: 84.5%, 43.5% & 26.1%; qigong + herbal: 86%, 64% & 36%; $P < 0.01$ b/n group 1 & 4 in year 3 and 5.	The herbs and their combination not explained.
Huang 1996 [2]	136	N	Various types of cancer patients	Guo-Lin qigong was used to improve the cancer patients' lung function and microcirculation. Spirometer was used to measure the tidal volume of the lung, and nail-fold microcirculation was also studied.	After qigong practice, the spirometer showed increase in the tidal capacity of the lung. Respiration rate increased 36.79% and "minute ventilatory volume" increased 128.1%. The number of capillary loops in nail-fold increased and length of loops prolonged.	
Kui et al 1996 [62]	42 (31f 11m)	N	Various types of tumors and cancer	Practicing "Lotus Qigong" (by master Xian Ming Zeng) for 3 months, with periodical external qi adjustment. The sizes of tumor were compared after treatment.	27 cases (65%) of tumor elimination, 15 cases (35%) of tumor reduction have been reported. An overall of 100% effective rate was claimed on all patients studied.	Only a short-term result was reported.
Luo et al 1988 [15]	80 (48m 32f)	Y	Various types of cancer patients	Patients randomly assigned to qigong (1) chemo (2) and qigong + chemo groups (3). Compared the level of RBC, WBC, serum hemoglobin and T-	After 60 days group 1 had a significant rise in WBC, RBC and serum hemoglobin after treatment ($P < .01$), while group 2 had significant lowering ($P < .01$). Group 3 had elevation of serum	

				lymphocyte in pre- and post treatment. "Vital Gate" qigong was used.	hemoglobin, RBC and platelet count ($P < .01$), WBC levels remained the same.	
Sun & Zhao 1988 [11]	123	Y	Various cancers	Drug + qigong (n = 97) vs. drug only (control, n = 30) group. Similar drugs in both groups. All patients in stage III or IV. Symptoms, signs, body weight and immune indices were recorded before and after treatment.	After 3 months, 82% patients in qigong group regained strength, 63% improved appetite and 33.3% free from diarrhea or defection, compared with control 10%, 10%, & 6% ($P < .001$). 50.5% in qigong group gained body weight by 3+ kg, 5.4% lost 3+ kg, compared to 13.3% and 30% respectively in control. Qigong group reported increased immune indices while control decreased.	Well-controlled study.
Wang et al 1993 [16]	62	Y	Various cancers	Middle to advanced-stage cancer patients were randomly assigned to two groups: Chemo + qigong (32) and chemo only (30, control). The chemo + qigong group practiced qigong in addition to the chemotherapy.	29 of 32 in chemo + qigong group had improved health with stable WBC count. 12 cases in chemo only group reported worse health with more symptoms and declined WBC (less than 4×10^9/L). Curative effect of +chemo.+ qigong group, compared with the chemo. only group, is much better ($P < .05$).	Incomplete conclusion, and unspecified amount of time for treatment.
Wang 1988 [17]	104	Y	Various cancers (esophagus, stomach, lung cancer etc.)	46 patients were studied for protein levels (AAG, AAT and CER) before/after qigong (6 to 24 months). 58 patients for studying cell immune function (LAI and ANAE) before and after qigong.	Some sugar protein (AAT & AAG) showed a dramatic drop after qigong ($P < .001$). But CER increased after treatment ($P > .05$). LAI decreased ($P < .01$) while ANAE increased after qigong practice ($P < .05$)	
Wong 1988 [63]	345	N	Breast, lung, colon and naso-pharyngeal cancer	Guolin qigong practitioners were studied for effects after qigong practice. The effect was measured by body strength (increased appetite, improved sleep, less health problem); normalized blood counts; less side effects of chemo or radiotherapy and character of lump/tumors	After qigong practice, the effective rate for breast cancer (n = 93) is 83.6%; lung cancer (n = 115) 75.1%; colon cancer (N = 72) 68.2%; and nasopharyngeal cancer, 64.4%. Most practitioners also reported fewer symptoms or even remission of other health-related problems.	No control for comparison.
Xu et al 1990 [19]	229	Y	Various cancers	Measured the Cu-Zn SOD activities and levels in the RBC in 229 patients (124 in qigong, 105 in control group) with cancer by color immunological plate reaction with enzyme.	After qigong practice, the Cu-Zn SOD activity in RBC is 399.7" 48.3 μg/gHb vs. 356.8 ± 22.3 μg/gHb without practicing qigong ($P < .001$). Qigong practice raised the Cu-Zn SOD activity.	Form of qigong was not explained.
Xu et al 1988 [18]	272	Y	Various cancers	Five groups: 1. healthy people with qigong (72); 2. healthy people w/o qigong (50); 3. people who keep bees (50); 4. Cancer patients with qigong (50); 5. cancer patients w/o qigong. All cancer confirmed by pathological biopsy. Blood sample drawn from each person to test T-lymphoctyte level by ANAE (alpha-napthyl acetate esterase staining).	The value of mean ± SD of ANAE determination of the 1st group was 74.9 ±11.6%, vs. 65.6 ± 8.9% for 2nd group ($P < .01$). The 4th group was 69.2 ± 12.8% vs. 42.8 ±7.1% for 5th group ($P < .01$). The 3rd group (a special control) was 76.8 ± 11.1%.	The effect of qigong on T-lymphocyte levels both in normal people and cancer patients.

(continued)

Table 1. (continued)

Xu 1989 et al [64]	80	N	Various cancers	A randomized trial to study humoral immunity; serum IgG, IgA and IgM cellular immunity; LAI; active E rosette formation and ANAE before and after qigong.	The value of ANAE in normal individuals doing qigong was 74.9%, vs. only 65.5% for those not doing qigong ($P < .001$). The avg. value of LAI for cancer patients before qigong 72.6%, vs. 52.2% after qigong. ($P < .01$). Active E rosette also improved from before qigong 24.1% to 29.7% after qigong.	No control to compare.
Ye et al 1992[14]	98	Y	Various cancers	A randomized trial with 3 groups: normal control (34), chemo. group (32) and Guo Lin qigong (33). The rate of unscheduled DNA synthesis (UDS, excision repair) was measured before and after the treatment.	UDS rate after 3-month treatment: Normal pre: 76.9± 14.0, post 76.6 ± 14.6; Cancer control, pre 27.5 ± 17.4*; Post: 7.1 ± 17.6*; Cancer with qigong, pre 27.5 ± 15.8*; post: 42.1 ± 18.5**; (*$P < .001$ compared to normal **$P < .01$ compared ± to cancer control).	Relatively small group.
Yu et al 1993[10]	30	N	Various cancer cells from human patients	Chemotactic movement, phagocytic rate, bacteriocidal function of neutrophils measured by nbt positive rate, lymphocyte transformation rate of the patient's immune system were measured before and after qigong practice (A = before and P = after). Chemotaxis of neutrophils measured by agar plate method.	Chemotactic movement (distance) A=1.75 ± 0.53mm vs P = 2.35± 00.77mm ($P < .01$).Chemotactic inex: A = 2.09 ± 0.55 vs. P = 2.83 ± 0.95 ($P < .01$). Phagocytic rate A = 32.5 ± 9.2%, P = 51.3 ± 12.2% ($P < .01$). Bacteriocidal function-nbt positive rate: A= 23.1 ± 6.9%, P = 40.2 ± 10.8% ($P < .001$). Lymphocyte transformation rate: A = 5 4.4% ± 14.9% vs P = 64.5 ± 10.3% ($P < .01$)	
Zhang 1995[9]	1,648	N	Various cancers	Self-control qigong + conventional therapies to treat advanced cancer patients for 8 years. Comprehensive physical health and immune functions were measured for improvement.	32.4% achieved significant improvement, 59.2% showed some effectiveness, only 8.4% no effect. Some late-stage patients reported complete tumor remission, 5 yr survival rate more than 30%. Patients' C_3b rate of red blood cells, the lymphocyte transformation and phagocytic function all had significant improvement ($P < .01$).	The largest reported tumor hospital study with qigong without control.
Zhang et al 1996[65]	106	N	Various cancer cases	A self-control qigong treatment (modified Guo-Lin qigong) for all cancer patients assessed by pre and post measures of immune indicators and physical health.	Red blood cell, prior: X ± SD = 8.4 ± 4.68; post 12.4 ± 3.93 ($P < .001$). Red blood cell immune mixture floral loop rate: prior: 10.9 ± 4.6, post: 6.4 ± 2.7 ($P < .001$). Reversion of lymphocyte rate: Pre 54.3 ± 14.9; post: 64.5 ± 10.3 ($P < .01$). Also, patients' symptoms were relieved after practice and size of tumors decreased.	Small study group.
Zhang et al 1995[66]	48	N	Various cancers	Practice of Guo Lin Qigong, immune functions and the symptoms associated with cancer are measured.	After practicing qigong, majority had increased immune functions, less symptoms, better health, more energy, and some weight gain, etc.	No control to compare.
Zhao & Bian 1993[67]	122	Y	Various cancers	Hospital cancer patients treated by Intelligence Qigong (IQG) practice—22 days of training class,	After 22 days of treatment, many patients showed curative effect in reducing symptoms and pain associated with cancers, whether	

				plus external qi treatment. Among them 71 patients had benign tumors, 51 malignant cancers, among those with cancer 25 never took other therapy (qigong alone).	benign or malignant. No statistical difference in curative effect between qigong alone and qigong plus other comprehensive therapies.	
Zheng et al 1990 [13]	100	Y	Various cancers, including liver, lung and stomach	100 various late-stage cancer patients participated in qigong therapy and their 1 and 5 year survival rate compared with the control group (no qigong treatment).	After qigong treatment, the 1- and 5-year survival rates were 83% and 17% for lung cancer patients (7% for control in 5 years); 83% and 23% for stomach cancer patients (control was 7% in 5 years). Median survival period for liver cancer patients was 20.7 months in qigong group, in comparison with 3.5 months in control group ($P < .01$)	

*Randomization was not mentioned in most studies unless otherwise specified.

Table 2. Changes of Immune Indicators Among 30 Cancer Patients After Qigong Therapy

Immune Indicator	*Before*	*After*	P *Value*
Chemotactic movement (distance) by agar plate method	1.75 ± 0.53 mm	2.35 ± 0.77 mm	< .01
Phagocytosis of neutrophils by India ink phagocytic test–phagocytic rate	32.5% ± 9.2%	51.3% ± 12.2%	< .01
Nbt-positive rate (bactericidal function of neutrophils)	23.1% ± 6.9%	40.2% ± 10.8%	< .001
Lymphocyte transformation rate	54.3% ± 14.9%	64.5% ± 10.3%	< .01
C_3b rosette rate of red blood cells	8.4% ± 4.7%	12.4% ± 3.9%	< .001

43.5%, and 26.1%; and for the qigong-plus-herb group were 86.0%, 64.0%, and 36.0%, respectively. The differences between the qigong-plus-herb group and the control group were statistically significant (P< .01) (Figure 1). The median survival period was 30 months for the control group, 36 and 36.5 months for chemotherapy and herbal groups, and 48 months for qigong-plus-herb group. Unfortunately, the herbs and their combination were not specified in the report.

Zheng et al[13] of the Shanghai Qigong Institute applied a comprehensive qigong therapy (qigong technique not specified) to 100 various late-stage cancer patients and compared their survival rate with those who had other therapies but no qigong therapy in the same hospital. They found that 1- and 5-year survival rates were 83% and 17% for lung cancer patients (the control was 7% in 5 years) and 83% and 23% for stomach cancer patients (the control was 12% in 5 years). The median survival period for liver cancer patients was 20.7 months in qigong group compared to with 3.5 months in the control group (P < .01). Huang[5] reports that a study at Jiangxi Medical School also applied qigong with conventional therapy to 20 cancer patients and reported much better 3- and 5-year survival rates among these patients (80% and 45%) compared to the average of similar patients in that hospital (65% and 34%).

Ye et al[14] of the Shanghai Qigong Institute studied the effect of qigong exercise on unscheduled DNA synthesis (UDS) of peripheral blood lymphocytes in a clinical trial of 65 various cancer patients, plus a normal control. The cancer patients were randomly assigned into either qigong (n = 33) or chemotherapy (control) group (n = 32) after surgery. After baseline measures were taken, the qigong group practiced Guo-Lin qigong for 3 months before the follow-up measurements were taken. Table 3 presents the results of UDS rates before and after the treatment. The qigong group had significant improvement in their DNA repair rate (P < .001), whereas the control (chemo) group had no change. Although both cancer groups had a lower UDS rate than a normal group, the UDS rate of the qigong group was significantly higher than that of the control group after the 3-month treatment period (P< .01).

Luo et al[15] of the Zhejiang Institute of TCM conducted a clinical trial with 80 cancer patients who were

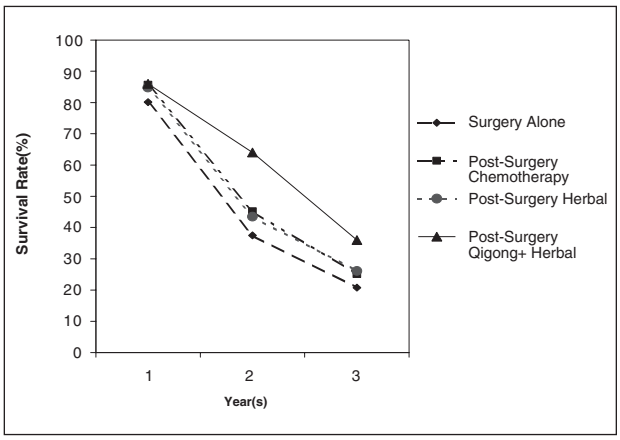

Figure 1 One, 3-, and 5-year survival rates under various types of cancer treatment. Data from Fu et al.[12]

at stage I or stage II of the disease and who had previously received radiation or chemotherapy. The patients were randomly assigned to qigong (n = 30), chemo (n = 25), or qigong-plus-chemo (n = 25) groups. The counts of red blood cells (RBCs), white blood cells (WBCs), serum hemoglobin and T-lymphocytes were measured pre- and posttreatment. Vital gate qigong was used in this study. After 60 days of treatment, only the qigong group had a significant rise in WBCs, RBCs, and serum hemoglobin (P < .01), whereas the results of the control group were significantly reduced (P < .01). In the qigong-plus-chemo group, the patients had an elevation in serum hemoglobin, RBCs, and platelet count (P< .01), but WBC levels **remained** the same. A similar finding was reported by Wang et al[16] in their trial of 60 late-stage cancer patients: 29 of the 32 patients in the chemo-plus-qigong group had improved health and a stable WBC count, whereas 12 of 30 patients in the chemo-only group reported worse health with more symptoms, and all controls reported a decline in WBCs (less than 4×10^9/L) (P< .05).

At the Teaching Hospital of Nanjing College of TCM, Wang[17] explored the antitumor mechanism of qigong therapy in a study of 104 different cancer patients (mainly comprising esophageal, stomach, rectal, and lung cancer). These patients were taught to practice qigong during their inpatient care, and continued doing so after surgery and leaving the hospital. The duration of qigong practice ranged from 6 to 24

Table 3. Effect of Qigong Therapy on the Unscheduled DNA Synthesis (UDS) of Cancer Patients

			UDS Rate (%)	
Group	*n*	*Mean Age*	*Before*	*3 Months Later*
Normal control	34	36.3 ± 10.6	76.9 ± 14.1	76.6 ± 14.6
Cancer control	32	48.5 ± 12.0	27.5 ± 17.4*	27.1 ± 17.7*
Cancer with qigong	33	48.2 ± 9.4	27.5 ± 15.6*	42.1 ± 18.5†

*$P < .001$ compared to normal control.
†$P < .01$ compared to cancer group and before treatment.

months before the follow-up exam. The levels of the proteins α_1-acid glycoprotein (AAG), α_1-antitrypsin (AAT), and ceruplasmin (CER) were studied among 46 patients, and the cell immune function (leukocyte adherence inhibition [LAI] and α-napthyl acetate esterase [ANAE]) was studied among 58 patients before and after qigong. Results are summarized in Table 4. The study showed that the proteins (AAT and AAG) dropped dramatically after qigong ($P < .01$) but that CER increased after qigong treatment ($P > .05$). As to immune indicators, LAI decreased ($P < .01$) whereas ANAE increased after qigong practice ($P < .05$). In general, the qigong practice improved the cancer patients' immune function toward the direction of normal levels.

Xu and colleagues[18] at the Jiangsu Provincial Institute of TCM conducted a series of studies to explore the mechanism of qigong antitumor therapy. In one of the studies, subjects were divided into 5 groups: (1) healthy people using qigong (n = 72), (2) healthy people not using qigong (n = 50), (3) beekeepers (n = 50), (4) cancer patients using qigong (n = 50), and (5) cancer patients not using qigong. All of the malignant tumors were identified and confirmed by pathological biopsy. A blood sample was drawn from each person to test his or her T-lymphocyte level by ANAE staining. The ANAE determination ($\bar{x} \pm$ SD) in the first group was 74.9% ± 11.6% versus 65.6% ± 8.9% in the second group ($P < .01$), and in the fourth group was 69.2% ± 12.8% versus 42.8% ± 7.1% for the fifth group ($P < .01$). The third group (a special control group) was 76.8% ± 11.1%. The people who had practiced qigong (whether they were healthy or a cancer patient) had significantly higher levels of ANAE than those who did not. In another study, Xu et al[19] measured the copper-zinc superoxide dismutase (Cu-Zn SOD) activities in RBCs among 229 cancer patients (124 in qigong, 105 in control group) by color immunological plate reaction to the enzyme. They reported that qigong practice raised the Cu-Zn SOD activity: after practicing qigong, the Cu-Zn SOD activity in RBCs is 399.758 ± .3 μg/gHb versus 356.82 ± 2.3 μg/gHb without practicing qigong ($P < .001$).

Recently, Cai et al[20] of Shanghai Fangyi Hospital reported changes in the immune indicators and physical health among 1883 cancer patients after practicing Guo-Lin qigong. After practicing Guo-Lin qigong for 2 months, a blood sample was drawn from each patient; the RBC and WBC count, immune protein IgG, IgA, and IgM levels, natural killer (NK) cells, and different cluster designation (CD) cell counts were measured. Cai et al reported that most patients showed remarkable improvements in these categories and that their immunity levels were raised after qigong practice, especially WBC, CD20, interleukin-2 (IL-2), and NK activities ($P < .01$). In addition, 40.8% patients reported improvement in sleep and 36.8% reported improvement in appetite.

Among the clinical studies reviewed, although some lacked a valid control group, it seems that there is a consistent tendency that the group treated with qigong therapy in combination with conventional methods had more significant improvement and/or a better survival rate than the group treated with conventional methods alone. Some studies reported complete remission from late-stage cancer or metastasized cancer, which is considered an impossible result through the use of conventional medicine alone. More extensive reviews of in vitro and in vivo studies of qigong therapy for cancer may change our stereotype of this ancient energy therapy.

In Vitro Studies With EQT

To effectively exclude the potential psychological effect of qigong therapy in cancer treatment, scientists in China have paid special attention to the in vitro study of various cancer cells with the application of external qigong therapy in order to understand how qigong treats various cancers. The typical in vitro study has involved randomly dividing the laboratory-prepared cancer cells or other cultures into different groups with at least 1 group being treated with external qi by a qigong healer, plus 1 or 2 control groups. Sometimes, 1 group was treated by sham qigong (person without qigong training but simulating qigong movement) for the same amount of time. The cancer cells being studied varied tremendously, including human breast cancer (BC) cell lines, erythroleukemia (K562), promyelocytic leukemia, nasopharynglioma, nasopharyngeal carcinoma (CNE-2), SGC-7901 gas-

Table 4. Comparison of Cellular Immune Function in Cancer Patients Before and After Qigong Therapy

Indicator	*Normal Reference*	*Pretreatment*	*Posttreatment*	*Improvement*
Protein content (n = 46)				
AAG	40.7 ± 10.6 mg	48.9 ± 8.5 mg	36.6 ± 15.4 mg	$P < .01$
AAT	187.6 ± 15.9 mg	204.4 ± 61.4 mg	179.3 ± 47.7 mg	$P < .01$
CER	21.6 ± 2.98 mg	29.3 ± 7.7 mg	34.4 ± 12.4 mg	$P > .05$
T-cell function (n = 58)				
LAI	42.0% ± 9.8%	75.3% ± 12.3%	62.4% ± 9.5%	$P < .01$
ANAE	68.8% ± 10.3%	39.4% ± 2.9%	47.1% ± 4.4%	$P < .01$

AAG = α_1-acid glycoprotein, AAT = α_1-antitrypsin, CER = ceruplasmin, LAI = leukocyte adherence inhibition, ANAE = α-napthyl acetate esterase.

tric adenocarcinoma, spleen cells of mice, lung tumor cell line (LA-795), and so on. Table 5 presents some major findings of these studies.

Feng and colleagues[21-23] at the Chinese Immunology Research Center (Beijing) is one of the first research groups to conduct studies on the effects of the emitted qi by qigong on human carcinoma cells. They used the techniques of tissue culture, cytogenetics, and electron microscope to study the effect of external qi on HeLa cells and SGC-7901 human gastric adenocarcinoma cells. They repeated the same HeLa cell experiment 20 times under identical conditions (treatment sample exposed to external qi for 20 minutes) and found that the survival rate of the HeLa cells in the qigong cultures was on average 69.3% of that of control cultures; that is, 30.7% of the cells were killed in the 20-minute exposure to external qi. The electron microscope showed that degeneration and swelling took place in some of the cells exposed to emitted qi. The experiment with human gastric adenocarcinoma cells was repeated 41 times under the same condition (1-hour exposure to external qi by a qigong master), in which the average survival rate of the SGC-7901 cells was 74.9% of that of controls; that is, the average destruction rate was 25.02% ($P < .01$). The total abnormality rate of the chromosomes in the qigong cultures (5.39%) was significantly higher than that in the control cultures (1.40%).

Chen and colleagues[24] of the Zhongshan University of Medicine have been involved in many studies in this area. In one of their studies, a qigong practitioner was invited to emit external qi toward the human CNE-2 cell line to observe the cell growth inhibition and (3H)-thymidine ([^{3}H]-TdR) incorporation inhibition. Compared to the nontreatment control, the inhibitory rates for CNE-2 growth in 4 separate qigong experiments were 43%, 33%, 60%, and 36% ($P < .05$) (Figure 2). The [^{3}H]-TdR incorporation inhibitory rates in 6 different experiments of external qi ranged from 22% to 53% ($P < .01$). Chen et al subsequently repeated this line of both in vitro and in vivo research and had similar findings.[25,26] These data suggest that external qi can inhibit the cell growth and DNA synthesis of the CNE-2 cells. Cao et al[27] of the Cancer Institute at Sun Yat-Sen University of Medicine replicated Chen et al's findings on the inhibitory effect of EQT on CNE-2 growth. They compared the number of CNE-2 cells cloned after 3 types of treatment—EQT only, gamma (G) ray only, and EQ + G ray—and found that the number of cells cloned in the G ray + EQT cultures was 9.2 ± 2.5, significantly lower than the G ray cultures (15.8 ± 2.4; $P < .001$). The kinetic study showed that the number of cells cloned in the EQT cultures was 16.5 ± 2.2, close to the level of G ray cultures, but that it had started to increase after 48 hours, whereas the G ray cultures continued to decline after 48 to 96 hours of cultivation.

Guan et al[28] of the Guangzhou College of TCM used similar techniques—[^{3}H]-TdR incorporation and tissue culture—to study the effect of EQT on the growth of human lymphocytes and tumor cells (erythroleukemia, K_{562}). They found that the same external qi had different effects on the 2 kinds of cells. The EQT promoted the growth of normal human lymphocytes (counts per minute [cpm] = 6032.4 4 ± 937.0 in the qigong-treated cultures and 3970.4 ± 3722.7 in the control cultures; $P < .05$) but inhibited the growth of K_{562} cells (cpm = 9340.8 in the qigong group vs 10760.2 in the control group; $P < .01$). Yu et al[29] of the First Central Hospital of Tianjing also used [^{3}H]-TdR incorporation and tissue culture methods to study a malignant mouse lung tumor cell line (LA-795) and normal cells (L-929) in mice and found that the malignant cells were markedly destroyed or killed after exposure to EQT. Compared to the control group, the kill rates in 2 EQT groups (n = 6 each) are 26% ± 6.9% and 21% ± 8.5% ($P < 0.01$ in both studies), whereas the normal cells that had undergone the same treatment remained intact.

At the Shanghai Institute of TCM, Chen[30] studied the effect of EQT on the human liver cancer cell line (BEL-7402) and lung cancer cells (SPC-A1). Levels of adenosine triphosphate (ATP) and alpha-fetoprotein

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Table 5. Reviews of In Vitro Studies of External Qigong (EQ) Therapy for Cancer*

Author, Year	N	Control	Study subject	Method	Results	Note
Cao et al 1993[27]	96	Y	Human carcinoma cell line (CNE-2)	CNE-2 cells planted in 96-well plates (50 cells each) were divided into 4 groups: control, 2Gy Gamma ray only, EQ only, and EQ+ G-ray. After 2 days of cultivation, the number of cells cloned (> 8 cells under an inverted microscope) was observed and counted.	The mean # cells cloned ($\bar{x} \pm$ SD) in the G-ray + EQ group were 9.2 ± 2.5, much lower than the G-ray alone group (15.8 ± 2.4; $P < .001$). The kinetic study showed that # cells cloned in EQ group were 16.5 ± 2.2, close to the level of G-ray group, but started increasing after 48 hours, while the G-ray group continue declining after 48 to 96 hours of cultivation.	Provide some foundation for combining qigong and radiation as an effective way for inhibiting tumor growth. NBM
Cao et al 1988[32]		Y	IL-2, IFN-r, LT from spleen cells of C57BL mice (6)	The mice in EQ group received qi for 30 min a day on day 1, 3, 5, 7. On day 10, mice were killed to make spleen cell suspensions for inducing lymphokines by incubation to determine the IL-2, titer of IFN-r and LT activity.	The IL-2 in control was 71.5 ± 22.3 μml, lower than EQ group (125.6 ± 32.5 μml; $P < .01$). The titer of IFN-r in EQ group was 460 ± 257.4 mml, higher than control (166 ± 61.8 μml; $P < .01$). The LT activity was also enhanced in EQ group (74.2 ± 16.8 μml), as compared to control group (61.1 ± 6.2 μml; $P < .05$).	NBM
Chen et al 1990[24]		Y	Human nasopharynegal carcinoma (NPC) cell line (CNE-2)	The effect of EQ on CNE-2 cell line growth inhibition rate and [^{3}H]-TdR incorporation inhibition was observed by comparing the results before and after EQ treatment.	The growth inhibition rates in 4 experiments yielded 43% ($P < .05$), 33% ($P < .05$), 60 % ($P < .01$) and 36% ($P < .05$) respectively. The [^{3}H]-TdR incorporation inhibition rates in 6 experiments yielded 30% ($P < .01$), 22% ($P < .01$), 35% ($P < .001$), 30% ($P < .001$), 53% ($P < .001$), and 39% ($P < .01$), respectively.	Length of study and qigong type not specified. NBM
Chen et al 1996[30]		Y	Human liver cancer cell line (BEL-7402) and adenocarcinoma (SPC-A1) cell line	Level of ATP and AFP of the cancer cells (BEL-7402 and SPC-A1) were measured 24 hours after EQ treatment to determine the activity of the cancer cell lines in comparison with before and control group.	Compared with control, the level of ATP in EQ group increased after qigong treatment. Also, the AFP level in EQ group decreased. Repeated experiments confirmed the similar results for EQ effect: AFP levels decreased.	This study suggests that EQ may reverse the formation and growth of cancer cells. NBM
Chen et al 1996[26]		Y	CNE-2 cell line	CNE-2 cell lines were randomly divided into 3 groups: control, EQ and sham groups (blinded). Indices include trypan-blue staining resistance, [^{3}H]-TdR, culturing in soft-agar and agglutination by PHA techniques. The effects	EQ showed inhibition of cell proliferation. The inhibitory rates in treatment group and imitation group were 46% and 9% in the first exp., 48.1% and 7.6% in the 2nd exp. respectively. Also comparing the control group with the treatment group, there is a significant	Studied various rate such as growth rate, DNA synthesis, cell anchorage, etc. Like others, qigong mechanism not illustrated.

(continued)

Table 5. (continued)

				of EQ on growth rate, DNA synthesis, anchorage-independent growth and agglutination of cells were assessed.	difference ($P < .01$), but the control group compared with the imitation showed no significant differences ($P > .05$)	
Chen 1992[63]		Y	Human pulmonary adenocarcinoma (SPC-A-1) cell line	SPC-A-1 cell lines were inoculated in soft agar culture test. After 3 days of EQ at 3 cm away for 20 min each time, 2 times a day for 11 times. Cell lines were examined under electron microscope in comparison with sham treated groups	Compared with the control, EQ group showed some changes, such as the vacuolated cytoplasm increased, some light points cytoplasm and nucleus, cell membrane broke down, cell nucleus disappeared, and many cells swelled and died. The SPC-A-1 in EQ group lost the characteristics of cancer cell.	Provides strong foundation for the application of qigong in clinical therapy for lung cancer. NBM
Chen 1992[31]		Y	Human liver cancer (BEL-7402) and lung adenocarcinoma cell (SPC-A1)	EQ was applied to BEL-7402 and SPC-A1 cancer cells to demonstrate the occurrence of cancer cell reversibility.	The cancer cell-specific label factor AFP showed increase after EQ. ADH activity increased and ALD activity decreased. ATP content in cancer cell also raised while conA-mediated cancer cell agglutination degree decreased after EQ treatment.	NBM
Feng et al 1988[22]		Y	SGC-7901 gastric adenocarcinoma cells and Hale cells	SGC-7901 cancer cells were treated by EQ for 20 to 60 min. to examine the kill rates of EQ and to measure survival rates. Experiments were repeated 20 to 41 times under identical conditions.	The survival rate of the Hale cells after EQ was 100%, compared with the survival rate of control, 69.3%. The survival rate of cancer cells in EQ was 75% that in the control ($P < .01$). The abnormality rate of number of chromosomes in cancer cells was 5.4% in EQ, compared to 1.4% in control ($P < .01$)	Detailed graphs and data in the paper. NBM
Feng et al 1990[23]		Y	Human stomach adenocarcinoma cells	Isolated NK cells from blood and NK cells combined with EQ were used to kill adenocarcinoma cells of stomach cultivated out of the body using density gradient method	Killing rate of adenocarcinoma cell: EQ only 36.6%, NK cell 39.8%, EQ + NK cell 81.6% ($P < .01$).	Qigong type not specified. NBM
Guan et al 1989[28]		Y	Normal human lymphocytes and erythroleukemia (K562) cells	The effect of EQ on the growth condition in vitro of normal human lymphocytes and K562 tumor cells was studied by measurement of [^{3}H]-TdR and tissue culture technique is used.	External qi helped to promote growth of normal human lymphocytes (66% more than control, $P < .05$) while inhibited the K562 tumor cells (less growth in EQ).	NBM
Hu et al 1989[33]	12	Y	Human promyelocytic leukemia cell line, (HL-60)	6 bottles with 5 ml liquid 2x10^7/ml HL-60 cells received EQ treatment 2 times/day for 3 days. The other 6 control bottles incubated the same way without EQ.	The mean of terminal granulocytic differentiation of promyelocytic leukemia cell in EQ group is 57.3 compared with control mean = 31.2. ($n = 10$, $t = 4.5$; $P < .01$). Further details given.	Form of qigong not mentioned. NBM
Shen et al 1990[34]	22	Y	Human liver cancer cell (BEL-7402)	ICR nude mice were used to measure the NK cell activity and tumor inhibition rate. The mice were divided randomly into 2 groups:	The mean weight of tumor: control 1.55 ± 0.44 g vs EQ 0.43 ± 0.1g. Inhibitory rate 72.3%. NK cell activity: control 39.7 ± 14.7%, vs 64.1 ± 21.7% for EQ. The NK	Form of qigong not mentioned. NBM

				EQ and control. All mice were injected with BEL-7402 cancer cell line into the axilla. EQ group received qi 30 min a day for 24 days. All mice were autopsied after 4 weeks.	cell activity for EQ group increased 1.61 fold. Repeat experiment shows the tumor inhibition rate 65.5% and NK cell activity increased by 2.32 fold, respectively.	
Xu & Xin 1992[69]	20	Y	S-180 cells	20 mice were divided into 2 groups: exp. (10) and control group (10). All mice injected with 0.2 ml of S-180 tumors (10^6 cells/ml) and exp. group received EQ twice a day, 20 min each for 20 days. Mice were then autopsied and the tumor weight is measured.	The avg. tumor weight for the exp. group is 1.3 ± 0.11g, vs 2.54 ± 0.14g for control ($P < .01$). The tumor size for exp. group 1.97 ± 0.16 cm^2 vs 3.86 ± 0.18 cm^2, $P < .01$. The appearance of the tumor for the exp. group looks "healthier" than the control. The color is more reddish and the tumor size is smaller than the control.	Form of qigong not mentioned. NBM
Ye et al 1988[50]	10x 50	Y	Human peripheral blood lymphocytes	A comparison trial: qigong master, qigong exercisers and non-qigong persons were tested for their potential of emitting qi for either "nourishing" or "killing" the lymphocytes cells. The changing function of lymphocytes, coincident rate of thinking "nourishing" or "killing" rate in two group were measured.	EQ by qigong practitioners caused significant changes in surface markers of lymphocytes, 41/50 (82%) and 35/50 (70%) respectively ($P < .05$); and coincident rate of thinking "nourishing" or "killing" in these two groups were 34/50 (68%) and 22/50 (44%) ($P < .01$). Non-qigong persons caused little change of the above indicators, 2/50 (4%); $P < .001$ compared to qi group.	NBM
Yu et al 1990[29]	24	Y	Malignant mouse lung tumor cell line (LA-795) and normal cell (L-929)	Cell culture were prepared and divided into the EQ and control group. EQ applied to the cell culture at 4 cm away for 5 or 8 sec. for 2 times. The killing rate is then measured by various methods (electron microscopy, [^{3}H]-TdR etc) after 48 and 65 hours.	After EQ exposure the malignant cells were markedly destroyed or killed. Compared with control, the killing rates in 2 EQ groups (n = 6 each) are $26\% \pm 6.9$ and $21\% \pm 8.5$ (both with $P < .01$). The normal cell undergone the same treatment remained intact.	Qigong affects and kills malignant cells without harming the normal cells. NBM

*Randomization not mentioned in most studies unless otherwise specified. NBM = no blinding mentioned.

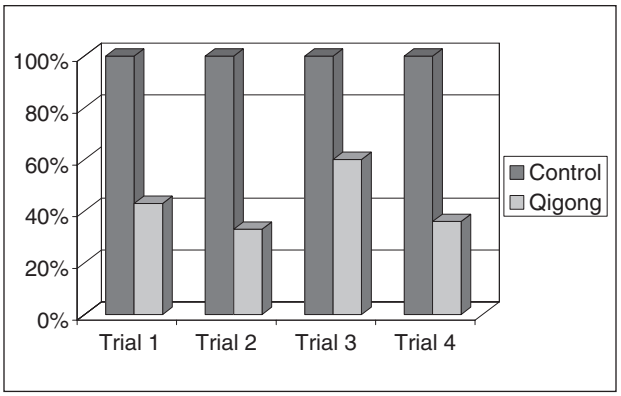

Figure 2 Inhibitory effect of external qigong therapy on nasopharyngeal carcinoma-2 cells. Data from Chen et al.[24]

(AFP) of the cancer cells were measured 24 hours after EQT (40 minutes in 2 treatments) to determine the activity of the cancer cell lines as compared to their activity after sham treatment. Compared to the sham-treated control group, the level of ATP in the EQT group increased significantly after EQT. Meanwhile, the AFP levels in the EQT group decreased. Repeated experiments confirmed similar results for EQT effect: AFP levels decreased.[32] Examination under the electron microscope found that compared to the sham control, the EQT group had some visible changes, such as increase in cytoplasmic vacuolation, some light points in the cytoplasm and the nucleus, cell membrane broke degeneration, disappearance of cell nucleus, and cell swelling and death. In general, the SPC-A1 in the EQT group lost the characteristics of a cancer cell.[30,31]

Recently, we conducted a pilot study to explore the effects of EQT on the expression of preprotachykinin-I (PPT-I, an immune/hematopoietic modulator gene) expression in 4 types of BC cells by inviting a Chinese qigong healer to work with us. In our study, 4 BC cell lines (BC-123, BC 125, BC-HT-20, and BC-T47D) were grown to confluence in four 6-well plates, 1 plate for each treatment condition: external qigong treatment, sham treatment, incubator control, and room temperature control. The Chinese qigong healer emitted qi directly to the cell culture plates for 10 minutes. The incubator control plate was kept in an incubator in the lab, and the room temperature plate was left on a lab bench in the same lab. The sham treatment was performed by an individual who had no training in qigong but, rather, imitated the movements of the qigong healer. After the designed treatment, all plates were reincubated for 16 hours. Total RNA was extracted by using the standard procedure and used in quantitative reverse transcriptase-polymerase chain reaction (RT-PCR) to determine the levels of β-PPT-I. The technician who did the extraction and counted the cell growth was blinded to the plate identity. The results showed no significant difference between the controls (the sham-treated, incubator, and room temperature plates). However, there was a consistent and obvious downward trend among the BC cells treated by qigong. Except for the BC-T47D cells, qigong-treated cells have a consistently lower cell growth rate than any other groups. Compared to sham-treated cells, the closest control in this design, in all 8 observations (4 different BC cells in 2 separate trials), the qigong-treated cells had the slowest growth. This could have occurred by chance only at $P = .0038$ in a cumulative binomial probability distribution. Figure 3 presents the result of 4 treatments for BC-HT-20 cells in 2 separate trials. Unfortunately, a follow-up study 5 months later with the same qigong healer did not replicate these results due to laboratory contamination.

Other similar in vitro studies of EQT on cancer cells include that of Cao et al[32] on the effect of EQT on IL-2, interferon-r (IFN-r), and lymphocyte transformation from spleen cells of C57BL mice; Hu et al[33] on the effect of EQT on human promyelocytic leukemia cell line (HL-60); and Ye et al[42] on EQT killing rate of human peripheral blood lymphocytes. Due to limitations in space, we will not discuss these in vitro studies in detail. In short, most of the published in vitro studies have used a design similar to that reported above, and demonstrated a significant inhibitory effect of external qigong on the growth of the studied cancer cells in comparison to control and sham-treated cells. This strongly suggests that the effect of qigong therapy for cancer is not purely psychological.

In Vivo Studies of Qigong Therapy for Cancer

The in vivo studies of qigong therapy for cancer treatment are more sophisticated and more closely resemble those of human application. The typical study of this type involved the injection of tumors or cancerous cells into mice or rats, then randomly dividing the experimental animals into various groups with 1 group being treated by qigong for a set period of time. The control group could be either nontreatment or sham treatment. The major results of these studies were concentrated on the survival rate of the animals themselves or the rate of tumor size reduction. The summary findings from 18 published in vivo studies are presented in Table 6. In general, most studies reported that the qigong-treated group had significantly reduced tumor growth and/or longer survival lives among the cancer-infected animals.

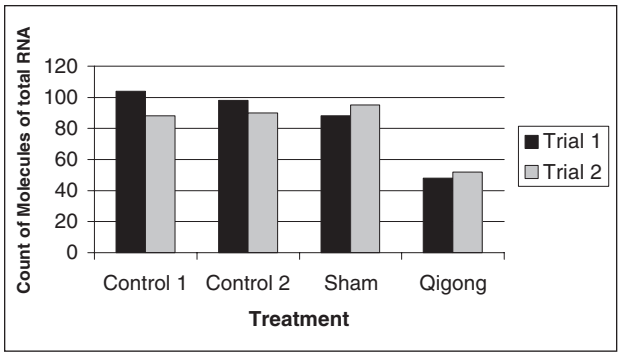

Figure 3 Effect of external qigong therapy on preprotachykinin-I expression of BC-HT-20 cells (10-minute exposure).

One of the largest studies of this type was conducted at Xuanwu Hospital of Capital Medical College by Zhao and colleagues,[35] who chose gliomas in mice (G_{422}, a very stable and malignant tumor model) as the experimental model and conducted a total of 25 trials or studies. Each trial had a treatment and a control group. Zhao et al used 11 qigong healers, 2 nonqigong practitioners, and 494 mice with induced gliomas. In most trials, the mice were transplanted with gliomas before they were randomly assigned into either qigong treatment or a control group. The mice were sacrificed around 12 days after the transplantation in order to remove the tumors for various examinations. Among the 25 separate studies, they observed an inhibitory effect on the qigong group in 16 (64%). Of these, 11 had an inhibitory rate greater than 20% whereas 4 had an inhibitory rate greater than 40%. However, in 8 of the 25 studies, the qigong-treated group had a larger tumor than the nontreatment control, including 5 studies with qigong healers and 3 with nonqigong practitioners. The studies with increased tumor growth usually had a shorter period of time being exposed to external qi (3 to 10 minute a day instead of 60 minutes a day in other studies) and a different style of qigong (different healers or nonpractitioners). This result suggests that not all qigong can produce the same inhibitory effect on tumors and that the amount of time exposed to qigong may play a significant role in the healing (dosage effect).

Using funds from the Chinese National Science Foundation, Li and colleagues[36] of the Xiyuan Hospital of the China Academy of TCM examined the effect of EQT on the gliomas in mice (G_{422}) treated with EQT. In their studies, tumor-implanted mice were divided into 4 groups: normal control, tumor control (no treatment), EQ 1 (once a day), and EQ 2 (once every other day). Eight different qigong healers emitted EQT to different mice 10 minutes daily or every other day. After 11 days of qigong treatment, mice were sacrificed in order to weigh the lymph nodes and spleens. Blood samples were obtained, lymphocyte suspensions were prepared, and the activities of NK cells and killer (K) cells were measured. Li et al found that the tumor growth in EQT groups was significantly slower than that in the control ($P < .05$); the NK cell and K cell activities in the normal control and the EQT groups were significantly higher than in the tumor control group (see Table 7).

Qian et al[37] examined the effect of external qi on cancer growth, metastasis, and survival time of the host. Tumor models were formed in 114 mice by transplantation of U27 or MO_4 cells into their subcutaneous tissues. The tumor-infected mice were randomly divided into 2 treatment groups for 3 separate studies: qigong group (exposed to external qi 10 to 30 minutes daily for a period of time) and control group (no treatment). In study 1, mice in both groups were sacrificed on day 20 after the transplantation. The average tumor volume in the qigong group was significantly lower than that in the control group (2.25 ± 5.35 vs 6.32 ± 10.02 cm^3; $P < .001$). In study 2, the mice were sacrificed on day 23 and all axillary lymph nodes and the lungs were taken out individually to be examined histopathologically for metastasis. The metastatic rate in the qigong group was significantly lower than that in the control group (1/16 vs 6/15; $P < .05$). In study 3, the mice were allowed to live out their lives and the time of death was recorded for each. The average survival time in the qigong groups (n = 10) was significantly longer than that in the control group (35.4 vs 30.5 days; $P < .01$). The same authors performed similar studies in different settings, and all reached the same conclusion.[38,39]

To explore the effect of external qigong emission on transplanted hepatic cancer in mice, Chen and colleagues[40] at the Zhongshan University of Medicine investigated the anticancer efficacy of external qi from a master of Chinese Taiji Five-Element Qigong on transplanted liver cancer in mice. Thirty mice that had been injected with hepatocarcinoma were randomly assigned to 3 groups: control (no treatment), sham (a nonqigong person imitating the qigong master's movement), or qigong (treated by a qigong master). The qigong treatment involved the qigong master emitting EQT toward the mice at a distance of 10 to 15 cm for 10 minutes from day 3 of transplantation, every other day, for a total of 4 sessions. The mice were then sacrificed on day 10 or 11. The liver cancer was separated out, measured, and weighed in a blind fashion. The results of 3 repeated experiments of this description are presented in Figure 4. Compared to the control group, the tumor growth inhibitory rates of the qigong-treated group were 70.3%, 79.7%, and 78.7%, respectively ($P < .0001$). The inhibitory rates of the

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Table 6. Reviews of In Vivo Studies of External Qigong (EQ) Therapy for Cancer in Animals*

Author, Year	N	control	Type of Cancer	Method	Results	Note
Cao et al 1988 [43]	12	Y	C57BL mice inoculated with B16 melanoma tumor cells	After injecting melanoma cells into C57BL mice tails, the exp. group received qigong to observe the rate of inhibition and survival time. Lungs were later harvested to measure the number of metastatic tumor nodules on the lung surfaces.	Emitted qi decreased B16 melanoma pulmonary metastases nodules in the exp. group (40.18 ± 11.93), compared to control (87.4 ±15.53) ($P < .01$). The survival period of the qigong mice (31.4 ± 5.27 days) was much longer than control (21.4 ± 2.7 days) ($P < .01$) Tumor nodule sizes also reduced.	NBM
Chen et al 1997 [40]	90	Y	Human hepatocarcin-oma trans-planted in mice	30 mice injected with hepatocarcinoma were randomly assigned in 3 groups: control, sham and real EQ. EQ group exposed to qi 10 mins a day for 4 days. Mice were sacrificed 72 hrs after treatment to isolated the tumor. Tumor growth inhibitory (TGI) rate was estimated in comparison with the tumor weight of control group. The same design was repeated 3 times.	The TGI rates of EQ group were 70.3%, 79.7%, and 78.7% respectively ($P < .0001$) in 3 studies with the same design. The TGI rates of sham group were 9.5%, 2.6%, and 2.5% respectively ($P > .05$). Electron microscopy showed the morphological changes in tumor cells among EQ groups: decreased cell volume, nuclear condensation, nuclear fragmentation, decreased ratio of nucleus and cytoplasm.	The study won a national scientific research award in 1996.
Chu & Jiang 1989 [44]	88	Y	C57BL mice with lung tumor	After induction with urethane (1 mg/g of body weight), mice were randomly divided into 2 groups: control (48) and exp. group (40; exposed to qigong music for 2 hr/day, 6 day/week for 4 months). The tumor induction and mean tumor number were measured before and after treatment.	The lung tumor induction: experimental group 87.5%, vs control group 100% ($P < .05$). The mean lung tumor number in the exp. group was 2.73 ± 2.18 per mouse; control number was 4.35 ± 2.61 per mouse ($P < .01$).	NBM
Feng Zhao 1988 [45]	?	Y	DBA mice with L1210 cells of leukemia	After injection with L1210 cells (0.2 mL, 4.7-31 million cells/mL) into the abdominal area, the mice were randomly divided into 2 groups: Qigong and control. In a period of 10 days, the qigong group received external qigong for 10-40 min. daily before sacrifice. The number of L1210 cells was counted.	The avg. value of L1210 cells in the control group is 200×0.5 million cells, while in the exp. group is 66.5×0.5 million cells ($P < .01$). The number of L1210 cells injected into mice was remarkably reduced after external qi, and qi could inhibit L1210 cells in mice.	NBM
Feng et al 1996 [46]	20	Y	Sarcoma cells in Kunming species mice	Mice divided into control, EQ only and EQ + herb groups. 3.8×10^6 sarcoma cells were injected in the inguinal regions of the mice. After 14 days of EQ and herb treatment mice were autopsied. The tumor size, tumor suppression rate, and phagocytic rate are	Compared to the control, the tumor suppression rate for the qigong + herb is 37.6%, and 28.6% for qigong only group. The % of phagocytosis in the control is 11.5 ± 4.3, compared with 19.0 ± 6.4 in the qigong only group and	Herbal combination and the form of qigong are not specified. NBM

				determined.	19.0 ± 7.3 in the qi + herbs. ($P < .01$).	
Lei et al 1991[41]	32 + 30	Y	Ascitic Sarcoma-180 and Ehrlich ascites carcinoma in NIH mice	To examine the anti-tumor effect of external qi (EQ) and cyclophosphomide (CY), and their effect on the NK activity, macrophage mediated tumor cytolysis (MTC) activity and interleukin-2 (IL-2) production level. Mice were injected with 0.1ml (3×10^7 cells/mL) tumor cells into the right axillary region, and then divided randomly into CY group (injection of CY daily at 40mg/kg), control group, qigong only group (EQ twice a day), and CY + EQ group.	After EQ or CY treatment, the average tumor weight of EAC was 1.79g for control, but 0.91g for EQ, 0.47g for CY, and 0.35g for CY+EQ ($P < .01$). The tumor growth inhibitory rate of S-180 TBM was 65.7% for EQ group and 90.3% for CY+EQ ($P < .01$). The NK activity for EQ only is 17.4 ± 7.1; 20.1 ± 5.7 for CY+EQ, vs 8.4 ± 3.7% for control ($P < .01$). MTC activity for CY+EQ is 11.0 ± 5.6%, vs 23.1 ± 7.33% for control. IL-2 levels were 0.34 ± 0.03 vs 0.30 ± 0.02% for control ($P < .01$).	Medical school study published in academic journal. NBM
Li et al 1990[36]	24 + 29	Y	Mice implanted with G-422 neuroglioma cells	Tumor-implanted mice were divided into 4 groups: normal control, tumor control, EQ 1, and EQ 2. Eight different qigong healers emitted qi to different mice once a day. After 11 days of qigong treatment, mice were sacrificed to weigh the lymph-node and spleen. Blood samples obtained, lymphocytes suspension prepared, and activities of NK and K cells measured.	The tumor growth in EQ groups was significant slower than control ($P < .05$). The NK cell activities in normal control, tumor control and EQ 1 + 2 groups were ($\bar{x}$ ± SD): 62.1 ± 23.3, 54.8 ± 17.0, 66.0 ± 14.2 and 68.8 ± 21.6 respectively. NK cell activities for 4 groups are 18.1 ± 5.7, 12.2 ± 10.8, 47.5 ± 21.9 and 19.7 ± 16.5 respectively.	EQ may have anti-tumor immunological surveillance in organism. NBM
Lin et al 1989[47]	?	Y	Mammary (MA37) & lung adenocarcinoma of mice	Tumor tissue and cell suspensions are inoculated into mice subcutaneously. Inbred mice TA2, T739, and T615 are used. Treatment group received EQ for 15 to 20 days, 30 min. per day. Control group received no EQ treatment.	The inhibitory rates of tumor weight related to three exp. results of the mice mammary adenocarcinoma are 58.1%, 51%, and 44 %, respectively. The inhibitory rates for lung adenocarcinoma in 2 experiments are 34.7% and 23.8%, respectively.	NBM
Lu et al 1996[70]	16, 8/8	Y	Mice with H22 ascites liver cancer	Mice with tumor strain were divided into EQ and control group: exp group treated with EQ for 7-10 days, then measured the difference in tumor size. The body weight, abdominal width, ascites volume, and liver weight of the group were measured. Also measured: the death rate, tumor inhibition rate.	Body weight, abdominal width, ascites volume and liver weight in EQ decreased by 43.5% ($P < .05$), 15.7% ($P < 0.02$), 38.4% ($P < .05$) and 24.6% ($P < .01$). Death rate of ascites cancer cells of mice treated with EQ was 2.47 ± 0.56, and those not treated by EQ was 1.85 ± 0.74, and the inhibition rate was 33.5%. Mice treated by EQ lived 3.5 days longer.	Detailed measures on liver size, weight and tumor inhibition rate. but relatively small study group. NBM
Lu et al 1990[71]	?	N	Tumor-erythrocyte rosette	Mice of ICR strain were exposed to qigong field (group qigong lecture) for 7 days, and then analyzed for their body weight and tumor formation rate. Tumor cells were pretreated with fresh serum. A comparison of before and after the exposure.	After exposure to qi field, the tumor cells in mice were adhered by red cells, and the % of rosette-forming were increased from 5.67 ± 3.75 to 11.06 ± 5.25 in day 2, and to 27.8 ± 3.6 in day 7 ($P < .01$). The weights of the mice were reduced. The % of tumor cells not pretreated with serum	Similar findings in human study as well. NBM

(continued)

Table 6. (continued)

					was decreased from 63.2% to 27.6% ($P < .01$).	
Qian & Shen 1993[38]	17, 17, and 20	Y	Mice with MO_4 tumor cells.	Mice with MO_4 were randomly divided into the EQ and control group. Three experiments were done by injecting mice with the MO4 cells in all groups; the length of survival time was measured.	In exp. 1 and 2, the volume of the intra-abdominal tumors were different between EQ and control group ($P < .01$), but the survival period and the volumes of the body ascites did not differ significantly. In exp. 3, the survival period and avg. tumor volume per day had a significant diff. between EQ and control ($P = .02$ for survival, $P = .01$ for tumor volume). But the end volume of the tumor did not differ significantly ($P = .15$).	Detailed data not provided. NBM
Qian et al 1993[37]	114	Y	Mice implanted with U27 or MO4 tumor cells	Mice were implanted U27 or MO4 tumor cells into armpit, then divided randomly into treatment group-treated with EQ everyday (20 or 33 days) or no treatment (control). In exp. 1, the mice were examined for their tumor volumes. In exp. 2, on 33rd day the mice were killed and axillary nodes and lungs were taken out and examined histopathologically. In exp. 3 the mice of both groups died, and their survival time after transplantation was calculated.	In exp. 1, the avg. tumor volume of EQ group was significantly lower than control (2.25 ± 5.4 cm^3 vs 6.32 ± 10.0 cm^3; $P < .001$). In exp. 2, the metastatic rate of the lymph nodes in EQ group (1/16) was significantly lower than the control (6/15) ($P < .05$). In exp. 3, the avg. survival time (35.4 days) of mice in EQ group was longer than the control (30.5 days) ($P = .002$).	Qi may inhibit the tumor growth and prolong survival time. NBM
Qian et al 1998[39]	31	Y	U27 cancer in mice	Mice with transplanted U27 cancer were divided into EQ and control group. EQ group received qigong 10-30 min. per day; and both groups were then autopsied for analysis on day 23 or day 33.	EQ group had only 1 lymph node metastasis (1/16), 2 lung metastasis (2/16), and the avg. tumor volume 1.82 cm^3. In control group, 6 had lymph node metastasis (6/15) and 3 had lung metastasis (3/15), and the avg. tumor volume 6.75 cm^3 ($P < .01$).	NBM
Shao et al 1990[48]	30	Y	S180 sarcoma cells implanted into mice	Light and electronic microscopy used to observe mice with implanted S180 sarcoma treated with qigong. Changes in the number of nucleolus organizing regions (NOR) in the sarcoma were investigated using the argyrophil (Ag-NOR) technique.	In the EQ-treated mice sarcoma, the avg. diameters of cells and nuclei, the ratio of nucleus to cytoplasm and the number of tumor cells division phase and Ag-NOR counts in the nuclei all were much less than those in the control group ($P < .001$).	Length of qigong application was not given. NBM
Zhang et al 1990[42]		Y	Anti-tumor lymphokines in immuno-suppressed mice	The immunosuppressed mice induced by cyclopho-sphamide (CY) were randomly divided into 3 groups: CY group, CY+EQ and control group. CY + EQ group received qigong for 20-25min a day for 8 days. On day 8, splenocyte suspensions (5×10^6/mL) were made into several parallel portions for inducing IL-2, IFN-r, and LT. Thymus index and splenocyte	After the treatment, the thymus index of CY group was 2.30 ± 0.42, the control 3.91 ± 0.57 and the CY + EQ 2.97 ± 0.54. The splenocyte spontaneous proliferation rate in control and CY group is low, the cpm values were 3062.5 and 3294.0 respectively; the CY + EQ group was higher, 7261.7 ± 3744.2 ($P < .05$). IL-2 activity of CY group	CY suppressed immune function of mice, but qigong appeared to alleviate the suppression. NBM

				natural proliferation rate were observed.	was lower than control ($P < .025$), but CY+ EQ group is higher than CY or control group ($P < .001$).	
Zhao et al 1991[35]	494	Y	Gliomas of mice	Mice induced with gliomas were divided randomly into EQ and control group. A total of 25 trials were run with 13 qigong masters applying their EQ to reduce the size of gliomata. The immune functions of mice were examined and compared.	After applying EQ by 13 masters, 64% (16 groups, 160) of the mice shrank in gliomata size, but 32% (8 groups) actually had bigger gliomata than the control group. In EQ group the WBC count, lymphocyte count, the weight of spleen, and function of lymphocytes all had positive changes (statistically significant – see text for details).	Not all qigong masters can produce the same result on tumor. NBM
Zhao et al 1988[72]	20	Y	Ascitic cancer cells (EAC) injected in mice with ascitic cancer fluids	In exp. 1, ascitic fluid was aspirated from mice that had been transplanted with EAC for 7 days. Then the fluid was divided into control and EQ group (qigong 1 hr a day). The remaining cells were stained in trypan blue (after 12 and 24 hrs) so as to count survival. In exp. 2, 20 mice injected with EAC fluid (27×10^6 cells/mL) and divided into 4 groups. 3 EQ groups received qi for 20 min/day for 7 days. Mice were then sacrificed for ascitic fluid cell count.	In exp. 1, the control group's survival rate of cancer cells is higher than the EQ group. The number of cancer cells diminished in the EQ was about 20%, 6.6 times as high as that in the control ($P < .01$). In exp. 2, EQ group showed significant drop in cancer cell concentration number, 1612.2×10^8, compared to 2639.9×10^8 in the control group ($P < .01$).	Both cellular and animal study is done to verify the qigong results. NBM
Zhou et al 1990[25]	80	Y	The EAC tumor cells	Mice were divided randomly into 6 groups and separated into 3 exps. The effect of EQ (1) on survival time of EAC tumor model in mice, (2) on peripheral T lymphocyte cell quantities and (3) on SOD level in mice. All 3 exps. have control groups. Mice were injected with tumor cells and EQ was administered 50 ft away from the mice.	Qigong prolonged the survival time (89%) of the mice with EAC tumor. It also increased the number of peripheral T-lymphocyte mice with EAC tumor. SOD level in mice with EAC tumor increased markedly ($318.4 \pm 41\mu$/mL) as compared to control ($249.0 \pm 31\mu$/mL).	Qigong may increase the levels of SOD and number of T lymphocyte cells in mouse blood. NBM

*Randomization not mentioned in most studies unless otherwise specified. NBM = no binding mentioned.

Table 7. Natural Killer Cell and Killer Cell Activities Among 4 Groups of Mice With Gliomas, Measured by Hemoglobin-Enzyme Release Assay Method

Group	*n*	*Natural Killer Cell Activities*	*Killer Cell Activities*
Normal control	6	62.1 ± 23.2	18.2 ± 5.7
Tumor control	6	54.8 ± 17.0	12.2 ± 10.8
Qigong 1	6	66.0 ± 14.2	47.5 ± 21.9*
Qigong 2	6	68.9 ± 21.6	19.7 ± 16.5

*$P < .01$ compared to tumor control group.

sham-treated group were 9.5%, 2.6%, and 2.5%, respectively ($P > .05$). Morphological alterations in qigong-treated mice include decreased cell volume of most cancer cells; nuclear condensation; nuclear fragmentation; decreased ratio of nucleus and cytoplasm; swollen mitochondria with poorly organized mitochondrial cristae, some vacuolated; and many apoptotic bodies in extracellular space. These results indicate that Chinese Taiji Five-Element Qigong inhibited the growth of transplanted hepatocarcinoma in mice.

In addition to the consideration of psychological effect in qigong therapy, a major problem in the previous qigong research has been reproducibility. Many qigong healers could not effectively repeat what they did in a prior study, which raised concern about the reliability, and sometimes the validity, of the effects or differences observed in qigong research. The Chen et al[40] study achieved very good stability and reproducibility. The 3 separate experiments showed very similar results, which demonstrated the inhibitory potential of qigong therapy on cancer.

Lei and colleagues[41] at Tongji Medical University examined the in vivo antitumor effect of EQT on the immunologic functions of tumor-bearing mice (TBM). They investigated the effects of both EQT and cyclophosphamide (CY) on splenic NK activities, macrophage-mediated tumor cytolysis (MTC) activity, and IL-2 production level of different groups of TBM. The TBM inoculated with Ehrlich ascites tumor (EAC) or sarcoma-180 (S-180) were randomly divided into 4 groups: tumor control, qigong only, CY only, and CY plus qigong. The qigong group was exposed to EQT twice a day for 2 weeks, and the CY group was injected with CY daily at 40 mg/kg. The results show that EQT had significant tumor growth inhibition rate in both models (Table 8). The NK activity was 17.4% ± 7.1% for EQT only, 20.1% ± 5.7% for CY plus EQT, and 8.4% ± 3.7% for control ($P < .01$). The MTC activity for CY plus EQ was 11.0% ± 5.6% versus 23.1% ± 7.3% for control ($P < .01$). IL-2 levels were 0.34% ± 0.03% for EQT versus 0.30% ± 0.02% for control ($P < .01$).

A similar in vivo study of the effects of EQT and chemotherapy on antitumor lymphokines was done by Zhang et al[42] at the Beijing College of TCM. In this

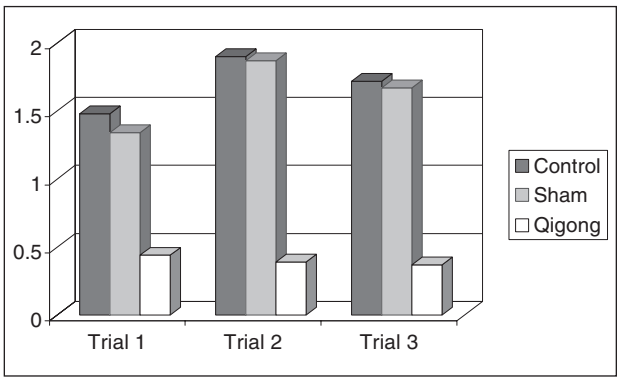

Figure 4 Inhibitory effects of external qigong therapy on hepatocarcinoma in mice. Data from Chen et al.[40]

study, CY-induced immunosuppressed mice were randomly divided into CY, CY + EQT, and control groups. The CY + EQT group received qigong for 20 minutes a day for 8 days. Splenocyte suspensions (5×10^6/mL) were then made into several parallel portions for inducing IL-2, IFN-r, and lymphocyte transformation. After the treatment, the thymus index of the CY group was 2.30 ± 0.42, of the control group was 3.91 ± 0.57, and of the CY + EQT group was 2.97 ± 0.54. The splenocyte spontaneous proliferation rate in the control and CY groups was low (3062.5 and 3294.0, respectively), but the CY + EQT group was as high as 7261.7 ($P < .05$). IL-2 activity of the CY group was lower than that of the control group ($P < .025$), but of the CY + EQT group was higher than that of the CY and control groups ($P < .001$).

There are many similar in vivo studies in the literature. For example, Feng and colleagues investigated the inhibitory effects of EQT on L1210 cells of leukemia and sarcoma cells in mice. Cao et al at Second Military Medical College and Chu et al at the Shanghai Cancer Institute examined the effect of EQT on B16 melanoma tumor cells and lung cancer cells in C57BL mice. Lin et al at Tianjin Medical College explored the effect of EQT on mammary (MA37) and lung adenocarcinoma in mice. Shao et al at Nanjing Navy Medical School studied the effect of EQT on S-180 cells implanted in mice. Zhou et al at First Military Medical College examined the effect of EQT on EAC

Table 8. Inhibitory Effects of External Qigong Therapy (EQT) and/or Cyclophosphamide (CY) on the Tumor Growth of Ehrlich Ascites Carcinoma (EAC) or Ascitic Sarcoma-180 (S-180) in Tumor-Bearing Mice

	EAC			S-180		
Treatment Group	*n*	*Average Tumor Weight (g)*	*Tumor Growth Inhibition Rate (%)*	*n*	*Average Tumor Weight (g)*	*Tumor Growth Inhibition Rate (%)*
I. Control	8	1.79		8	3.50	
II. Qigong only	8	0.91	49.2	8	1.20	65.7
III. CY	8	0.47	73.7	7	0.65	81.4
IV. CY + qigong	8	0.35	80.4	7	0.34	90.3

I vs II, $P < .01$; III vs IV, $P < .05$.

tumor model in mice in 3 separate trials. All were well-designed in vivo studies with valid controls, and each reported a significant inhibitory effect or prolonged survival time from EQT among tumor-bearing mice.

Discussion and Conclusion

Cancer is the second leading cause of death in the United States. Half of all men and one third of all women in the United States will develop cancer during their lifetimes. Most current treatments for cancer are effective in controlling the symptoms or prolonging patients' lives to varying degrees, but all come with significant drawbacks, including toxicity, costs, and potential harm to both mental and immune function. Therefore, an effective nonpharmacological therapy for cancer with less cost and no side effects could have a major impact on cancer treatment. Qigong therapy from TCM shows promise in treating cancer, and preliminary studies report immediate improvement without side effects, even recording complete remission in patients who engaged in ongoing practice of qigong.[7,49] This form of medicine involving energy has the potential to become a powerful alternative to, or complementary therapy for, the conventional treatment of cancer. However, there is a need for better-designed clinical trials that systematically apply this therapy in human patients to determine its efficacy and applicability so that more people can benefit from it.

It is true that there is room for improvement in these preliminary studies, and the studies in general need to be replicated by more laboratories and clinics in order to verify their findings. Nonetheless, it is not hard to draw a general picture that qigong therapy for cancer treatment deserves further study. Unfortunately, this is an area that is often neglected by mainstream medicine and research. A deeper understanding of this mode of therapy is required for it to become more widely accepted in the medical community.

Possible Mechanisms

Most of the studies we reviewed have simply attempted to prove a principle: that qigong therapy for cancer could be effective, and that it is more than just a psychological effect. This is an important first step to get more research scientists interested in this area. However, some studies have also offered scientific explanation for the results that touch on some of the mechanisms of qigong therapy for cancer. We are planning a separate review specifically on this topic, especially on how qigong therapy might affect the human immune system. The following is an outline of the major scientific findings on the possible mechanisms of qigong therapy for cancer.

Qigong therapy may improve immune functions. The human body has a powerful immune system, but most cancer patients experience some form of immune deficiency that makes it possible for cancer cells to outlive normal cells, and that leads to numerous clinical problems and reduces quality of life. Many research studies suggest that qigong therapy and/or qigong practice may help cancer patients improve their immune function. For example, Feng et al[22] found that external qi from the qigong healer could enhance the phagocytosis of peritoneal macrophages and increase the activity of acid phosphatase. From their clinical studies of cancer patients, Zhang[9] reported that qigong practice significantly increased cancer patients' C_3b rate of red blood cells, the rate of lymphocyte transformation, and phagocytosis. Studies showed that increases in NK cells and many other components of the immune system can significantly reduce the chances of infection or tumor growth.[20,23] Some studies also reported the rise in the level of T lymphocytes with enhanced immune function after qigong.[17,18,50,51] Other components of the immune system, such as the activity of macrophages and bactericidal functions of neutrophils, also improved as the patients practiced qigong and/or received qi from a qigong master.[52] Given the fact that most conventional cancer therapies tend to damage or destroy the patient's immune functions, which in turn reduces overall capability of self-recovery, the indication of improvement in the immune system from qigong therapy warrants further in-depth research.

Qigong therapy may increase the microcirculation functions. Microcirculation refers to the blood circulation

between microartery and microvein (capillary). Qigong practice has been reported to improve the practitioner's microcirculation, changing the viscosity of blood, increasing elasticity of blood vessels, and controlling the concentration of platelet. One study in this area measured the skin temperature before and during qigong practice and found an increase in back surface temperature and greater infrared radiation from the palm.[53] Another study reported significant increase in microcirculation of nail wrinkles among 19 subjects, from a mean of 8.2 lines/mm prior to qigong to 12.6 lines/mm after qigong ($P < .001$).[53] It was concluded that qigong therapy could adjust the microcirculation function to an optimal state by accelerating blood flow, raising the skin temperature, and increasing the number of micro blood vessels, which in turn increases the oxygen and blood supplies to the tissues and cells, strengthens the metabolism, and changes the pathological state to a normal physiological state to achieve the antitumor effect or maximize the efficacy of chemotherapy. Huang[2] also reported increased microcirculation of lung among cancer patients who practiced Guo-Lin qigong.

Qigong therapy may raise the pain threshold. In the early 1980s, psychologists in China started to explore the possibility of qigong therapy raising the pain threshold, and they achieved some positive findings. For example, Wang et al[54] at the China Academy of Science tested the pain threshold of different locations on the body among 59 cancer patients and found that the pain threshold at the right inner joint increased from 122.2 g before to 164.07 g during qigong practice ($P < .01$) and the pain threshold at the left inner joint increased from 100.0 g to 125.76 g during qigong practice. Zhang and colleagues[55] at Zhong Shan Medical University also reported the analgesic effect of external qi in a placebo-controlled study and found that EQT could increase human skin pain threshold, measured by the method of potassium-mediated pain. Yang et al[56] reported the analgesic effect of emitted qi on rats, decreasing the probability of a purely psychological effect on pain.

Many other explanations with regard to the interaction between the qi (vital energy) and the physical body have not been completely verified by research. Qigong's therapeutic properties may also lie in its regulation of the respiratory system, the metabolic system, activity of the cerebral cortex, the central nervous system, and the cardiovascular system, as well as its effect in correcting abnormal reactions of the organs, the massaging effect on the organs of the abdominal cavity, and its effect on self-control over the physical functions of one's body.[51] There is not yet enough research or data to sufficiently document these effects. According to TCM, qigong may work to benefit the practitioners through 3 different channels. (1) Increased qi flow strikes against the location of illness such as a tumor. According to TCM, good health is the result of a free-flowing, well-balanced qi (energy) system, whereas sickness and pain are the results of qi blockage or unbalanced energy in certain areas of the body. Once the supply of qi to the cells becomes blocked, blood flow to that area will change, the cells or related organs might start to malfunction, and disease or pain may occur. One possible mechanism of qigong therapy for pain relief and symptom reduction is through motivating qi and energy within the body, breaking the qi blockage, and balancing the energy system. From a research perspective, the in vitro studies suggest that qi energy may have a direct inhibitory effect on tumor growth, or even kill cancer cells. (2) Cultivation of Yi (consciousness and intention) and the emphasis of "empty mind without desire" in qigong practice may help the practitioners to strengthen the power of their intention and to release suppressed emotions and/or mental disturbances. It is said that qigong training of the mind (or intention) helps practitioners to release themselves from the "socialized self" (the source of all stress) and return them to the "original self." The source of cancers could be related to some mental/emotional disturbances and social pressures (such as ongoing stress) that over time lead to a malfunction of the immune system. Qigong practice may lead to the release of these mental/emotional disturbances or twists, which may be the real source of the cancer in the first place. This may also help patients tolerate the ongoing stress related to their disease or its conventional treatments. (3) Qigong may rapidly reveal or uncover the body's potential self-healing capability, including the increased immune functions (as described above), the self-repair capability, and the self-regeneration capability. For example, the relaxed and tranquil state achieved during qigong practice can relieve stress, build up vital energy, and rapidly increase the body's immune function. We have observed some patients of qigong therapy who have completely recovered from multiple, complicated diseases or symptoms in a short period of time without any medications. There are reports of regenerated lost physical parts, such as new hair growth and new tooth growth among adults and seniors. In this sense, qigong therapy has challenged the current medical practice's tendency to depend on the use of pharmaceutical drugs that treat a specific symptom only with many known and unknown side effects.

Problems and Limitations

Although qigong may be one of the most powerful alternatives for traditional Western medicine and therapy on cancer treatment, current research geared toward qigong and its therapeutic effect may have many deficiencies and limitations. To recognize these problems is a necessary step of more in-depth investigation into qigong therapy.

Lack of a sophisticated research design and compatible control groups undermines the results of many clinical studies. Observational studies are a good first step to interest more doctors and scientists to focus on this therapy, but they are not enough to determine the actual effectiveness of qigong therapy for different types of cancer. Although traditional double-blind clinical trials may be difficult to apply to qigong study due to a lack of a compatible sham qigong, in reality a reasonably large sample size with a compatible control is crucial for examining such an alternative therapy.

For any scientific study of a new therapy or treatment, a large amount of time and resources are needed for an accurate account of effectiveness, dose response, and side effects. However, most studies of qigong therapy have been done by Chinese scientists who were confronted with the problems that come with a lack of support and resources. Some studies were actually conducted by qigong practitioners or amateurs, and some studies were simple minded and very preliminary due to lack of experience and/or support from health care professionals. Although well intentioned, these studies have often attracted criticism with regard to their quality and reliability.

Qigong therapy is a practice that uses qi, the vital energy of the body, to treat diseases and maintain one's health. Although the physical existence of qi is still under debate in Western medicine, like acupuncture, it is widely accepted by qigong practitioners that qi is a form of energy that circulates through the "meridian" and that any blockage of the qi flow in a particular area of the body is considered the point where the disease has originated. The qigong practitioner may use his qigong to break the qi blockage so as to relieve the pain or disease. However, the mechanism of how qi works and its interactions with the body remain mostly unknown. Although some research has explored its mechanism, there is no general consensus on qi and how qigong works, which is a major obstacle for health professionals to make use of this seemingly effective therapy.

As previously pointed out, qigong comes in many forms, and not all qigong forms are effective in treating cancer; nor can all "qigong masters" effectively emit external qi for cancer study. As reported in Zhao et al,[35] some qigong healers produced more tumor growth in the treatment group compared to the control group, possibly due to their lack of proper technique in the emission of qi. To add to this complexity, many "qigong masters" claim their form of qigong is superior to others in terms of the therapeutic effect. Without any physical or biological measurement of qi and its effects, and the lack of general interest in understanding the qigong effect from the research community, it is extremely difficult to measure effectiveness or success of one type of qigong over another. Many studies of qigong therapy for cancer did not specify what forms of qigong were used and how they differed from each other, making the reviews and evaluations even more problematic. Therefore, it is necessary to pay more attention to what type and format of qigong is used during the treatment and explore the common and/or various mechanisms for different kinds of qigong.

If one plans to conduct research on external qigong therapy for cancer, one should be prepared to experience some failures in the beginning. Not all researchers have had positive findings in their qigong explorations. First, it is hard to locate a qualified qigong healer to collaborate in research, as there are many more well-meaning but ineffective "masters" or unqualified qigong practitioners than practitioners with real and testable ability. Even if one obtains some positive findings with the right healer(s), it may not be possible to repeat the same result even with the same healer, as the results of each study are highly related to a variety of factors such as the presence of others, the environment, the healer's subjective feeling, and physical and psychological well-being. When discussing external qi therapy, we are talking about the effect of concentrating human intention and subtle energy, which may vary tremendously as different elements come into play. Many of the published studies were the result of perseverance after a number of failures or insignificant effects in the previous (unpublished) studies. We found some reports on the absence of an effect from external qigong therapy in the literature.[57] It is a great challenge to conduct high-quality research on qigong therapy, especially without support in funding and resources.

Conclusions

The very existence of human subtle energy has been a challenge for modern medicine and modern science in general, since we have no effective means to measure it and we know nothing more than simple observations of various phenomena so far. Therefore, the general tendency of the scientific community has been to ignore its existence, sometimes labeling it as placebo effect and avoiding any study of it. However,

the therapeutic effect of this subtle energy on cancer may change this tendency. Much evidence suggests that qigong therapy for cancer is more than just a psychological effect. Studies on qigong and its curative effect on cancer have demonstrated consistent results for its inhibitory effect on cancer growth and metastasis in both in vitro and in vivo studies, as well as in clinical observation. It is possible to reach a general conclusion that qigong therapy for cancer treatment may be a powerful alternative to what we are using today in treating cancer.

There is much room for improvement in these studies, and some need to be replicated by more laboratories and clinics in order to verify the findings. Additionally, qigong therapy is an area that is often neglected by mainstream medicine and research. Our review suggests that this therapy be seriously examined and be considered as an important supplement to the conventional treatment of cancer and other chronic diseases.

Chinese scientists are not alone in proving the therapeutic effect of human subtle energy in cancer treatment. Fahrion and Norris,[58] Bengston and Krinsley[59] in the United States, and Sherstnev and Gruden[60] in Russia have all independently verified the inhibitory effect of human subtle energy on tumor growth. Hopefully, more scientists around the world will follow their steps and put their efforts together in this challenging area.

Although qigong research poses difficulties and problems in explanation and replication, qigong therapy can provide an invaluable alternative to modern Western medicine. Unlike other alternative medicines, which are only able to cope with symptoms, qigong therapy focuses on the entire body and its health system. Our review suggests that qigong therapy may actually stop and prevent cancer growth, and help patients recover from many different diseases at the same time. We hope that more studies and research will be done in this area and that this review will serve as an introduction to the world of qi and qigong research.

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