

Inhibitory Effects of Bio-Energy Therapies on Cancer Growth

-- An overview of recent laboratory studies in the U.S. and its implications in cancer treatment

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Background: Bioenergy therapies (such as Qigong, Reiki, Yoga, Pranic healing, and Therapeutic touch) have reported benefits for cancer patients, but few randomized control trials were done to verify their efficacy. It is believed that laboratory study of inhibitory effects of bio-energy therapies on cancer growth may lead to an understanding of the true efficacy of bio-energy and create a foundation for future clinical trials. **Methods:** Typical in-vitro study involved randomly dividing lab-prepared cancer cells into different groups with one being treated by bio-energy therapy and one or more as control groups. Sometimes, controls were treated by a sham healer. Typical in vivo study involved injecting or implanting cancerous cells into mice, then randomly dividing them into various groups. The control could be either non-treatment or sham treatment; the outcomes include tumor size or survival time. **Results:** Most studies demonstrated some inhibitory effects of bioenergy therapies on the growth of cancer cells in comparison with control. The in vivo studies reported that the bio-energy treated group had significantly slower tumor growth or longer survival lives than those in the control. One study reported survival with a normal life cycle instead of dying in 3 weeks, and cancer-infected mice developed immune response to the same breast cancer. However, researchers are confronted with methodological challenges in choosing appropriate controls, minimizing contamination, and replicating study outcomes. **Conclusion:** Encouraging evidence suggests bioenergy may have inhibitory effects on cancer growth, or prolong the life of cancer-infected animals, although improvement is needed in research design and replication of the findings. Bioenergy for cancer treatment is an area that is often neglected by mainstream medicine and research, and it should be seriously examined and considered as an important supplement to conventional cancer treatment.

Keywords: Bioenergy therapy, biofield, cancer, in-vivo, in-vitro, inhibitory effect, review.

INTRODUCTION

There are increased uses of "bioenergy" or "biofield" therapies in recent studies of complementary and alternative medicine (CAM) approaches for cancer [1-2], but no agreement has been reached on what bioenergy therapies are. The National Center for Complementary and Alternative Medicine (NCCAM) at NIH refers "energy medicine" as one of four domains of CAM approaches, which involve either biofield therapies or bio-electromagnetic-based therapies. According to NCCAM classification "biofield therapies are intended to affect energy fields that purportedly surround and penetrate the human body. The existence of such fields has not yet been scientifically

proven. Some forms of energy therapy manipulate biofields by applying pressure and/or manipulating the body by placing the hands in, or through, these fields. Examples include Qigong, Reiki, and Therapeutic Touch" [3]. The application of this biofield in cancer treatment will be the focus of this paper.

One of the significant contributions of the NCCAM classification of CAM approaches to the field is their acknowledging the possibility of bioenergy fields and suggesting its potential effect on health and healing. However, this classification separates the externally applied treatment approach from its root in the self-practice of bioenergy. Since most so-called biofield therapies, such as qigong, Reiki, Yoga, Pranic healing and therapeutic touch, are based on the results of therapists' long-term self practice to build up the skills and energies needed to perform the healing (NCCAM refers to the self practice as

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"mind-body medicine"). It is important to keep in mind that bio-energy therapies refer to both self practice and external healing process, as both healing forms involve the same or similar concept of bioenergy that has been the foundation for the entire tradition of oriental medicine^[4-5]. Here we will use Qigong from Chinese medicine as an example to explain this concept further.

Traditional Chinese medicine (TCM) posits the existence of some subtle energy (qi) circulating throughout the body and making a person alive. According to TCM, good health is the result of a free-flowing, well-balanced qi (bioenergy) system, while sickness, pain or tumor is the result of qi blockage or unbalanced qi in the body. All TCM therapies, including herbs, acupuncture, massage, and qigong, are based on this philosophy or perspective^[5]. The same concept of bioenergy can be found in other cultures as well, for example, "Ki" in Japan, "Prana" in India, and "Mana" in Philippines/Hawaii. Qigong as part of TCM practice is based on the same principles of qi flow and qi balance as acupuncture. Chinese textbooks of qigong study define qigong as the "psychosomatic operational skills or process that adjust body, mind and breathing into oneness."^[4] Although the key of successful qigong healing lies in self-practice or self-care (movement forms or meditation), scientists have long been interested in the external application of bioenergy healing, or measuring the effect of qi. On one hand, the external bioenergy healing can be measured and studied under laboratory settings without the high cost of research; on the other hand, results of laboratory studies may be the best way to confirm that bioenergy therapy may not just be a psychological effect as some criticism claimed^[6]. The underline assumption has been that the bioenergy or biofield measured in laboratory settings should have the similar characteristics of the bioenergy motivated in the body during qigong self practice or meditation without the complicated suggestive or expectation effects.

What is qi or the bioenergy we are talking about here? There is simply no direct answer to this question at this moment. Historically TCM has used the concept of qi to describe all the invisible forces that affect human health and healing. Chen^[7] reviewed more than 80 studies in China that attempted to measure qi or the effects of qi through different detectors. The author found that, although there were many methodological weaknesses, most of these studies reported detectable signals with various physical, chemical or biological detectors. Researchers have not reached an agreement on what qi is based on these studies, but most researchers agreed that qi or bioenergy might include three characteristics or components in its action of healing^[7-8]—the

matter (such as mm micro-wave, low-frequency electromagnetic field, photon and measurable particles), the energy (such as Gamma ray, far-infrared) and the information (the consciousness or intent of the healer). The bidirectional effects of the same external qi or bioenergy on bacteria growth^[9-10] made researchers realize the critical role of intention or mind in the process of external qi healing.

Application of bioenergy therapies in the treatment of cancer was documented in Chinese literature. Chen and Yueng^[11] reviewed 20 clinical studies of qigong therapy for cancer treatment in China (Ns ranged from 42 to 1883), and reported that groups treated with qigong therapy had significantly more improvement and/or a better survival rate than those without qigong. Some case studies reported even complete remission from late-stage cancer or metastasized cancer among patients who engaged in serious qigong practice^[12-13]. However, due to lack of randomized control trials (RCT) with creditable control, these studies did not catch the attention of mainstream oncology. A recent review of qigong therapy for cancer^[14] examined nine controlled trials (4 RCTs), and reached the similar conclusion that most studies reported positive findings, especially when combining qigong with conventional therapies in comparison with conventional therapy alone, but it is inconclusive due to a lack of creditable control and small samples.

Recent studies in the U.S. reported the use of bioenergy therapies (both self practice and external healing) or mind-body medicine in the recovery of cancer patients^[1-15]. The bioenergy therapies frequently used in the clinics and studies include medical qigong^[16-17], Yoga^[18-19], Reiki^[20], Therapeutic Touch^[21] and Mindfulness Meditation^[22-23]. All these studies have reported some form of positive and encouraging outcomes, but there is a general lack of vigorous studies of RCT with credible control. None of the clinical studies have successfully taken the placebo or expectation effect into consideration. In other words, most people acknowledge the beneficial effects of bioenergy or meditative therapies on stress management, reducing fatigue and anxiety, and increasing the quality of life and immune system among cancer patients^[1, 19, 24], but we are not sure whether these therapies may actually have direct inhibitory effect on the tumor growth or not. Here we will review some recent laboratory studies of bioenergy therapies in the U.S, including our own experiments with qigong healers, in an attempt to answer the question on inhibitory effects of bioenergy therapy on cancer growth, and to understand the underlying mechanism of bioenergy therapy in cancer treatment.

METHODS

This is not a systematic review of the literature since the number of studies are relatively small, the healers and bioenergy therapies themselves vary tremendously, and the amount of evidence for each healing tradition has not reached an appropriate level for such a review. Some studies included here have not even been formally published yet. More importantly, we are not trying to evaluate the general efficacy or effectiveness of the bioenergy therapies for cancer, but to examine the evidence and the reliability of the possibility of bioenergy therapies and/or human intent to inhibit cancer growth in a laboratory situation. We searched the most comprehensive medical databases, Medline and Pubmed, with keywords like "Bioenergy", "Biofield", "Qigong" or "Chi Kung", "Reiki", "Yoga", "Therapeutic Touch", "Pranic Healing" or "Healing with intent" in combination with "Cancer" or "Tumor", in the last ten years (from 1998 to 2008). We carefully screened the returned literature for laboratory studies, and selected those relevant to be included in this analytic review to gain an overview of the key findings in the field.

The typical in-vitro study involved randomly dividing lab-prepared tumor cells into different groups with one group being treated by designated bioenergy therapy and one or more groups as control. Sometimes, the controls are treated by a sham healer. The typical in vivo study involved injecting or implanting tumors or cancerous cells into mice, then randomly dividing the cancer-infected mice into various treatment groups. The control group could be either non-treatment or sham treatment. The primary outcomes would include tumor size or survival time. More details on research designs can be obtained from each of the original reports.

MAJOR FINDINGS

1. In-Vitro Studies with Bioenergy Therapies

To exclude the potential psychological effects in the study of self-practice bioenergy therapies for cancer treatment, scientists have paid special attention to in-vitro study of various cancer cells with external bioenergy or biofield therapies. The types of cancer cells being studied varied, including breast cancers, brain tumors, prostate cancer (PC3), lymphoma, and liver carcinoma cells (HepG2), etc. Most in-vitro studies were designed to verify the measurable effects from bioenergy therapies, but not to explore the mechanism of such a therapy.

Ohnishi et al.^[25] examined objective and scientific evidence

as to whether or not the "Ki-energy" from a Japanese Ki expert could inhibit the growth of cultured liver carcinoma cells (HepG2). The specially prepared liver carcinoma cells were placed in different dishes; two of them were exposed to ki-energy for 5 or 10 minutes (in two separate trials). After culturing for 24 hours, cell numbers, protein concentration per cell and certain mRNA expression and the synthesis of regucalcin were measured for all dishes. They found that the number of cells in the Ki-exposed groups were significantly less than those in the non-treatment control by 30.3% and 40.6% with 5 and 10 min Ki-exposure, respectively. The protein content per cell in the Ki-exposure groups was higher than that in the control by 38.8% (5 min) and 62.9% (10 min). The further analysis and lab testing indicated that the Ki-effects involved some form of infrared radiation from the human body. They suggested the possibility that Ki-energy may be beneficial for cancer patients because it suppressed cancer cell growth and sometimes, it stimulated immune functions of the patients. Although we have not seen a good replication of this study yet, the same research team published another study recently to verify the significant effect of Ki-energy by the same practitioner to stimulate osteoblastic cells and inhibit formation of osteoclast-like cells in bone cell culture models^[26].

Yu and colleagues reported their in-vitro study of Zen meditation for cancer in American Journal of Chinese Medicine^[27]. Human prostate cancer PC3 cells were seeded in 96-well culture plates and treated with bioenergy emitted by a Buddhist-Zen master with hands-on about 30 cm over the plate for one minute, while the control cultures were placed at 3 m away from the treated cultures in the same room. Mitochondrial metabolism was measured by MTT assay. Figure 1 presents the results of spectrophotometric analysis carried out at 570 nm and expressed as mean \pm SD of 16 determinations from both the control and treated samples at 24, 48, 72 and 96 hours after the treatment ($p < 0.01$). The growth of PC3 cells exposed to the bioenergy of the Zen master was significantly slower than those in the non-treatment control, and the difference continued to increase as the time lapsed. Forty-eight hours after the exposure, the treated cells also had two to three-fold higher levels of prostatic acid phosphatase (PAP) activity (a prostate tissue-specific differentiation antigen) than the untreated control ($p = 0.003$). In addition, the treated cells formed fewer and smaller colonies in soft agar as compared with control cells. The authors concluded that these observations provide insight into the suppressive effects of healing power through the practice of Zen medi-

tation on tumor progression.

(Figure 1 about here)

One of the highly respected and well published groups in the laboratory study of qigong therapy is Dr. Yan Xin (a renowned Qigong master and a TCM doctor) and his scientist followers. They published studies which claimed significant effects of external qi of Yan Xin Qigong (YXQG) on structural changes in water and aqueous solutions, alteration of the phase behavior of dipalmitoyl phosphatidyl choline liposomes, and the growth of Fab protein crystals^[28], as well as the protective effects of hydrogen peroxide induced cell death in cultured retinal neurons^[29], which enhance or repress phosphatidylinositol 3-kinase (PI3K) activities in vitro and in vivo^[30-31]. Recently they applied YXQG to experiments with cancer cells. Their 2006 study^[32] examined the cytotoxic effect of YXQG on BxPC3 pancreatic cancer cells and its effects on the Akt and extracellular signal-regulated kinase pathways. The study setting could be briefed as follows: BxPC3 cells and human fibroblast cells (normal control) were prepared before the study, and randomly assigned to treatment or control group. The cells cultured to near confluency were transferred to the treatment room, treated by Dr. Yan for 5 minutes, and then harvested for Western blot analysis 10 min after the treatment. The same procedure was repeated three to four times to gain the average effects. They found that compared to no-treatment control, the phosphorylation levels of both Akt and ERK 1/2 in BxPC3 cells were reduced by ~80% after qi treatment ($p < 0.01$) and remained low 16 h after the treatment. In addition, the constitutive NF- κ B activity was detected in BxPC3 cells under normal growth conditions, but decreased by ~75% after the YXQG treatment ($p < 0.01$ vs. control). However, this inhibitory effect was not observed among fibroblasts (normal) cells. The authors suggested that external qi of YXQG may differentially regulate these survival pathways in cancer vs. normal cells and preferentially exert cytotoxic effects on cancer cells.

In a more recent study^[33], the same group of scientists applied a similar technique and design to examine the effect of YXQG on growth and apoptosis in androgen-independent prostate cancer PC3 cells. They found that exposure to YXQG lead to G2/M arrest associated with reduced cyclin B1 expression and apoptosis in PC3 cells, but had no cytotoxic effect on either HUVEC or peripheral blood mononuclear cells (normal control). In this study, all study cells were exposed to YXQG for 5 min, and the survival fraction was determined at 3, 6, and 24 h after the treatment using the Trypan Blue exclusion assay

(See Figure 2). A significant difference in cell viability was detected 6 h after treatment ($p < .01$), and by 24 hours after treatment, there were almost no visible PC3 cells while little effect could be viewed among HUVEC cells (Figure 2b). The microscopic examination of PC3 cells and HUVEC cells before and after the treatment confirmed this finding - YXQG killed almost all PC3 cells but did not affect much of the growth in HUVEC cells (Figure 2c). The authors concluded that YXQG has profound effects on growth and apoptosis of prostate cancer cells by targeting survival pathways including the Akt and NF- κ B pathways.

(Figure 2 about here)

Our lab invited a qigong healer from China to explore the in-vitro effects of external qi on Preprotachykinin-I (PPT-I) expression in four types of breast cancer cells. The four breast cancer cell lines (BC-123; BC 125; BC-HT-20; BC-T47D) were grown to confluence in four 6-well plates, and treated with the following conditions: external qigong treatment, sham treatment, incubator control, and room temperature control. The qigong healer emitted qi directly to the cell culture plates for 10 min (with or without hands over the plate). The "room temperature" plate was left on a lab bench in the same lab as the other treatment; while the sham treatment was performed by a lab technician who had no qigong training, but imitated the qigong healer's movements for 10 min. After treatment all plates were re-incubated for 16 hours. Total RNA was extracted by using the

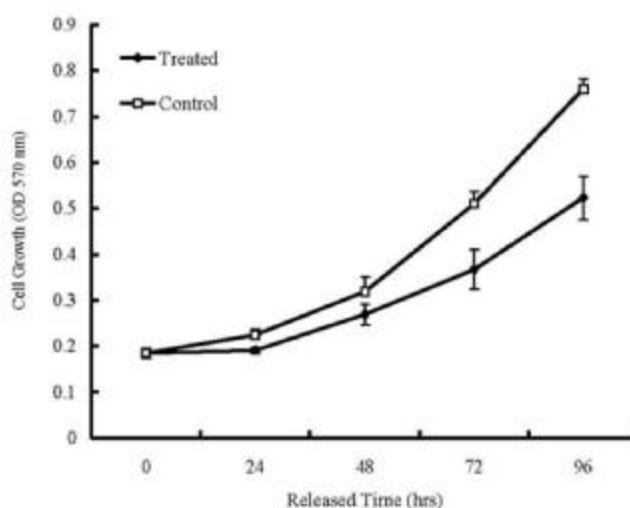


Figure 1 The results of spectrophotometric analyses of PC3 cancer cells at 570 nm and expressed as mean \pm SD of 16 determinations from both the control and treated samples ($p < 0.01$)

standard procedure and then it was used in quantitative RT-PCR to determine the levels of beta-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 three control groups, whether the sham treated cells or the other control groups. However, there was a consistent and obvious downward trend among the BC cells treated by qigong.

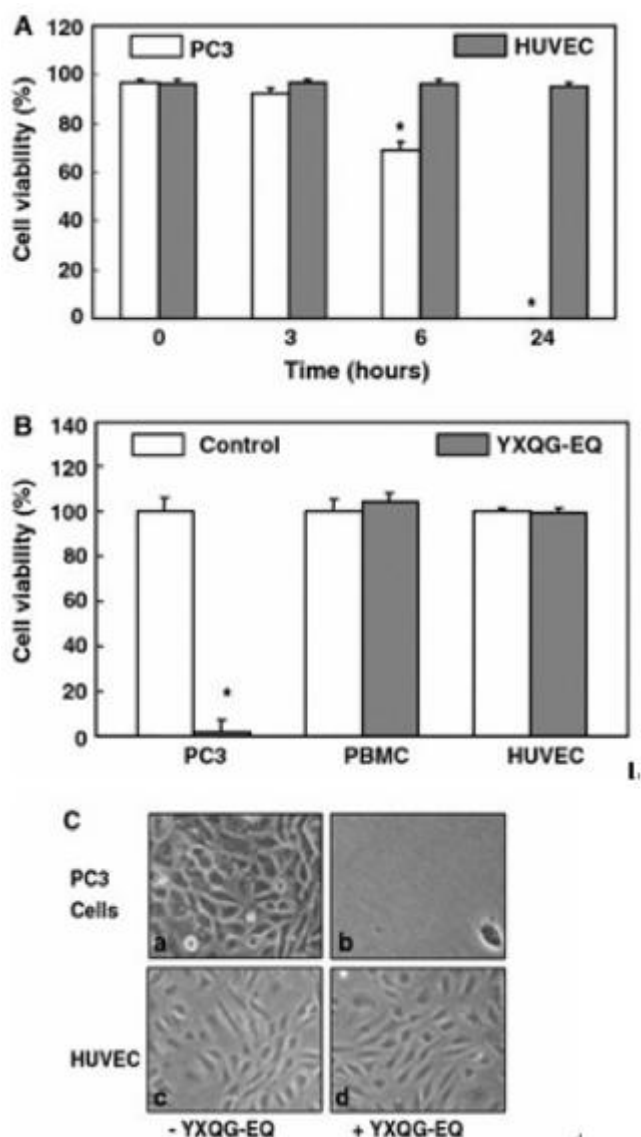


Figure 2. A) survival fraction 3, 6, & 24 h after treatment; B) Cell viability was measured using MTS assay 10 min after the 3rd treatment. C) Microscopic exam of PC3 or HUVEC cells before & after treatment.

Except for the BC-T47D cells, qigong treated cells had consistently lower cell growth rates than control groups. Compared to sham-treated cells (the closest control in this design) in all 8 observations (4 different BC cells in two separate trials), the qigong-treated cells had the slowest growth. This could have occurred by chance only at $p = 0.0038$. Figure 3 presents the results of the four treatments for BC-HT-20 cells in two separate trials^[11]. We were very much excited by this result. To be cautious before publishing this study, we invited the same qigong healer to the U.S. 6 months later to replicate the previous findings with the similar design. We tried 10, 20 and 30 min, three treatment conditions twice on each, in an attempt to examine the dosage effect. However, none of the replicating trials had significant differences between real and sham treated groups due to the laboratory contamination and healer's concentration problem (who tried to quit smoking on the second trip to the U.S.).

(Figure 3 about here)

Jones from the University of California-Irvine used a different in-vitro model to critically evaluate the meditation effect of Pranic healing (PH) (a therapy similar to external qigong) and external qigong, on HeLa cells in a culture subjected to gamma radiation^[34]. HeLa cell is an immortal cell line derived from cervical cancer cells in the 1950s, and mainly used in medical research. In this study HeLa cells in a culture were exposed to gamma radiation and radiation survival rates with and without PH were measured. The laboratory model is well established and characterized by 50% death rate of HeLa cells 24 h after exposure to Gamma radiation. In each experiment 10 near identical Petri dishes with HeLa cells were prepared, and randomly assigned into 5 groups (2 dishes each): non-treatment control, radiation-only control, healing after radiation, healing before radiation, and healing before and after radiation (time of healing

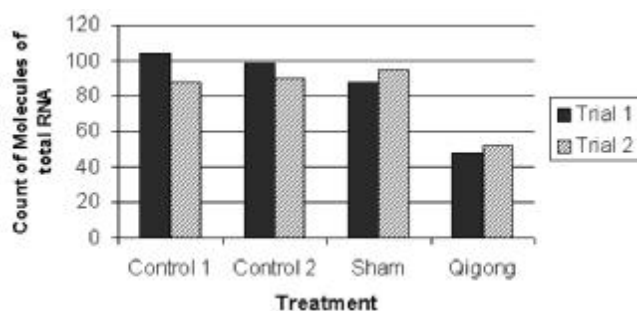


Figure 3. Effect of External Qi on PPT-1 expression of BC-HT-20 Cells (10 min)

was not specified, but mostly likely varied from healer to healer. After some pilot trials in 1997, from 1998 to 2008 they conducted more than 1000 different trials with a similar design, including 854 trials using 10 different Pranic Healers. Four trials used 4 groups of Pranic Healers, 350 trials tested the conditioning of laboratory space, 80 trials used 3 Qigong Masters, and 150 trials used 8 other individual "energy healers." The typical (average) results, measured by survival rate 24 h after Gamma radiation were as follows: non-treatment control ~ 100%; radiation only ~ 50%; healing after radiation ~ 70%; healing before radiation ~ 80+%; and healing before and after radiation ~ 90+%. The differences are statistically very significant even though 12% of these trials produced no effect. From these trials with various settings researchers learned the following: distance between cells and healer was not important; shielding of cells from EMF and gamma radiation had no effect; experience of healer slightly important (but even a beginning student could produce a result); effects enhanced by group healing; conditioning of lab space (lab "energy field" ethereally dirty or cleaned perceived by the healers) seems essential for experiment success. Other important contributions of these studies to the field of bioenergy therapies include: (1) all energy healers are not the same, results may vary by individual healers and (2) bioenergy healing does not automatically inhibit cancer growth, but probably worked with the healer's intent. Bioenergy used in this study actually appeared to protect Hela cells from being killed by radiation once the healer applied that protective intention.

Yount from California Pacific Medical Center is one of the few investigators who received NIH funding to conduct in-vitro studies of the bioenergy effects on cancer growth. In his studies of external qigong for inhibiting brain tumor growth, specially prepared U-87 MG cells were randomly assigned to either a Qigong treatment group or a no-treatment control group. The lab technician was completely blinded to the treatment assignment. The practitioner delivered external Qi for 20 mins with hands approximately 6 inches from the culture plates. One of the unique designs in Yount's study was that they used negative control to compare non-treatment with non-treatment groups after randomization, and then calculate the ratio of positive versus negative control. During the pilot trial they observed some significantly slower growth among the cells treated by qigong in comparison with the non-treatment control ($p < 0.01$). However, in their attempt to replicate the previous finding, the significant differences observed earlier demolished, and eventually disappeared (see Figure 4) [35]. In a larger scale replication study, with similar de-

sign but different cell culture (normal brain astrocytes) they observed a similar trend of diminishing effect as the study continued to utilize more qigong healers with more trials [36].

(Figure 4 about here)

In our literature search we found two negative studies that reported no effect in the in-vitro studies of bioenergy therapies for the growth of normal cells (not cancer cells). Both studies were done in the same institution. Hall et al. [37] examined the effect of Johrei (a Japanese bioenergy healing technique) on radiation response of cultured brain cells. They invited two experienced Johrei healers to direct healing intention toward the cells for 30 min from a distance of 20 cm. Radiation exposure decreased the rate of cell division (cell cycle arrest) in a dose-dependent manner, and division rates were estimated for each 30 min and averaged over 8 independent experiments (4 control and 4 with Johrei treatment) for each of 4 dose of X-rays. Analysis of variance did not reveal any significant differences between the two treatment groups. Mager et al. [38] evaluated the effects of biofield therapy in a cell culture model of oxidant stress with six highly experienced biofield practitioners. In this study cultured human brain cells were exposed to increasing concentrations of hydrogen peroxide and cell death was quantified by computerized time-lapse microscopy. Biofield treatments were delivered to cells from a short distance before and after cells exposed to hydrogen peroxide for a total of 30 min. They found no significant difference in cell death rates between

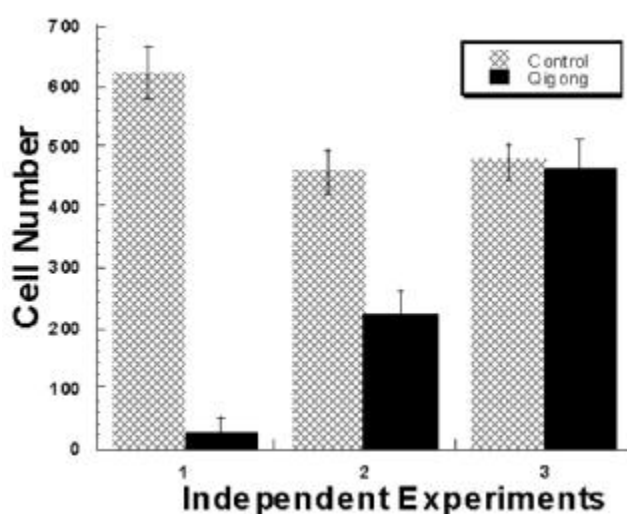


Figure 4 Results of Brain Tumor Cells Growth
($n = 18$ for each group; bar = standard deviation)

the treatment and control groups.

2. In-Vivo Studies with Bioenergy Therapies

The in-vivo studies of bioenergy therapies for cancer more closely resemble those of human application. There were not many in-vivo studies in the literature. A typical study of this type involved the injection of cancerous cells into mice, then randomly dividing the cancer-infected animals into various groups with one group being treated by bioenergy therapy. The control group could be either non-treatment or sham treatment. The outcomes of these studies were concentrated on the survival rate of the animals themselves or the rate reduction in tumor size in comparison with the control.

Chen et al.^[39] examined the inhibitory effects of external qigong on lymphoma growth in mice in two separate studies. In each study 60 SJL/J mice were injected i.v. with lymphoma cells, and then the tumor-injected mice were randomly divided into 3 groups (20 each): Qigong-treated, sham-treated, and no-treatment control. An experienced qigong healer from China was invited to perform external qi healing toward the mice cages (two cages or 10 mice each time) 10 min daily for 9 to 13 days. The sham control group received the same amount of healing attention from someone without qigong training. In study 1 half of the mice were sacrificed on day 9 and the other half on day 11. In study 2, six months after study 1, the mice were sacrificed on day 10 and day 13. The primary outcomes were the weight of the cancer-infected lymph-node (LN) and spleen. In study 1, LN from mice in the qigong-treated group were significantly smaller than LN from mice in either the control or sham-treated group ($p < 0.05$); as were the spleens, suggesting that there was less tumor growth in the qigong-treated mice. In study 2, the same pattern of difference in study 1 emerged, but the results did not reach statistical significance, partially as a result of larger variances in all groups in this study.

Bengston & Krinsley^[40] tried to apprentice a "laying on of hands" technique on transplanted breast cancer in mice to see if the bioenergy therapy could prolong the lives of cancer-infected mice. They started with 5 mice on each group, all injected with mummery adenocarcinoma (H2712). The host strain was C3H/HeJ, which had a predicted 100% fatality in 14 to 27 days. Bengston also acted as the healer himself after he failed to persuade his teacher to do it. The bioenergy treatment was "laying on of hands" 1 hour a day for 30 days. During the treatment tumors developed a "blackened area", then ulcerated, imploded, and closed. To his surprise, the treated mice survived 100% on the first trial, and lived a normal life cycle. The result seemed

too good to be true; and they performed three replications using skeptical volunteers in different labs, which produced an overall cure rate of 87.9% in 33 mice. An additional test by Krinsley at a different lab resulted in the same pattern. Histological studies indicated viable cancer cells through all stages of remission. Reinjection of the same breast cancer into the mice in remission did not take animals' lives, suggesting a stimulated immunological response to the prior treatment. More interestingly, the C3H/HeJ strain has a predicted 100% fatality in regular mice from 14 to 27 days, but some mice in the on-site control group without treatment did not die, but lived a normal life cycle along with those in treatment. The same results were replicated in repeated trials, Bengston called it "resonant phenomenon" or "placebo effect" of bioenergy healing in lab study^[41], which may partially explain why it was so difficult to replicate previous results because the treatment site and resonant effect was never considered. Overall, the mice in the experimental group ($n=48$) had a survival rate of 91.7%, while mice in the on-site control (same order of mice in the same lab without treatment, $N=41$) had a survival rate of 80.5%, and mice in off-site control ($N=8$) had a 0% survival rate.

DISCUSSION

The laboratory studies tried to examine and verify the reported effects of bioenergy therapies on cancer growth that significantly differed from the control, with results far beyond the possible explanation by any Newtonian physics or western medicine theories. Are these findings promising? Definitely, yes. Are these findings real and reliable? Probably, given the fact that so many labs reported similar results. We need more rigorous studies and data to confirm this. Are most scientists and oncologists excited about these findings? No, they seem very skeptical or indifferent to these findings because most of them did not even hear about these studies. Researchers in bioenergy study are confronted with the prejudice and disbelief from the main-stream scientific community in conducting and publishing their studies.

In summary, research on biofield and bioenergy therapies has collectively produced some promising data and evidence that suggest therapeutic effects of bioenergy on cancer growth. In spite of the fact that many questions in the studies are not answered, further theoretical and experimental research to explore this concept is warranted. The evidence that human bioenergy or intent may have an inhibitory effect on cancer growth, or prolong the life of cancer-infected animals, is very encouraging, al-

though there is plenty of room for improvement in research design and most studies require replication to verify the findings.

The laboratory study of bioenergy is confronted with methodology challenges in replication. Very few labs could successfully replicate their own findings in this field, as Dunne et al.^[42] observed in the "declining effect" of parapsychology studies, "there are statistically significant tendencies for operators to produce better scores over their first series, then fall off in performance in their second and third series,..." It seems that the phenomenon of difficulty to replicate itself has become a common observation being well replicated in many labs. Bengston's observation of "resonance" phenomenon^[41] should get more serious examination in the future, and be taken into consideration for research design. Increased rigor is required, including replication, use of multiple healers, evaluation of effect size, and alternative explanations.

These laboratory studies potentially have such deep implications for our understanding of human health and healing that we are forced to ask why the medical research community has not been more interested in verifying them. Each year billions of dollars are spent exploring the causes of cancer at a biochemical and genetic level, while ignoring the capacity of human intent and bioenergy field to influence these domains. The studies we reviewed suggest that these effects are not trivial, but substantial. It seems that we have created an unbalanced science, in which we have become virtually blind to consciousness-related factors and the bioenergy field in the deep origins of illness and cancer.

It is true that these findings challenge the commonly accepted concepts of the life biology and its relation to the physical brain - that is, the idea that human intention and the related bioenergy field is not capable of functioning causally on its own, and can affect other biological subjects in the body. This assumption unfortunately condemns studies such as those we have reviewed to the periphery of medical science where they can be safely ignored. Or can they? It is highly unlikely that our notions about the nature of human intention and the bioenergy field will remain fixed. Just as our concepts of space, time, and matter have evolved, so, too, we suggest, our beliefs about the nature of consciousness and related bioenergy field will change, perhaps dramatically. Ultimately, it may not matter whether one, ten, or a hundred studies such as those we have reviewed are valid, or whether the significance level is at $p < 0.01$ or $p < 0.000001$. If even a single such study is replicated according to the accepted tenets of research, the consensus view of the nature

of human intention and the related biofield, and its role in health and illness, will be forever changed.

In general, bioenergy therapy for cancer treatment is an area that is often neglected by mainstream medicine and research, and it should be seriously examined and considered as an important supplement to conventional cancer treatment. Considering that there are no side effects in the bioenergy healings, and so much evidence exists on the benefits of bioenergy therapies for stress management and boosting immune system, the future of bio-energy therapy for cancer treatment is very bright. The laboratory findings reviewed here offer additional legitimacy for offering patients the side-effect-free bioenergy therapy as it does help cancer patients both physically and emotionally.

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