

# An Analytic Review of Studies on Measuring Effects of External Qi in China \*

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## ABSTRACT

Scientists have long been interested in measuring external qi (EQ or wai qi) during qigong healing, and have produced a large body of literature over the past 20 years. This paper reviews the major research on measuring EQ in China and tries to help other researchers to get a picture on what has been done so as to eliminate the simple replication of already verified results. Starting with the historical background of EQ studies in China, this paper analytically reviews the major studies of EQ effects from five different categories of detectors: 1) physical signal detectors; 2) chemical dynamics methods; 3) detectors using biological materials; 4) detectors using life sensors; and 5) detectors using the human body. The focus is on the pros and cons of each detector. These studies documented some important correlates of EQ process or qi healing, which cannot be explained by psychological effect or the known biological processes. Even though the extant literature suggests that intent plays a critical role in the effect or characteristics of EQ, we know little about its role in EQ effect and its relationship with qigong healing from these experiments. These studies have confirmed the existence of measurable EQ effects from various perspectives; however, none has really revealed the primary nature of EQ or how EQ healing works. Given the fact that qigong therapy is based on the dialectic view of two interdependent spheres, while modern science and medicine is based on the reductionist view of one material world, it is recommended that future studies should use more biological or life-sensor detectors to increase our understanding of the healing potentials of qigong, instead of stay at the level of verification of signals. New methodologies, new theories, and new perspectives are urgently needed for further understanding what qigong is and how EQ healing works. (*Altern Ther Health Med.* 2004; 10(4):38-50)

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*Qigong* is a general term for a large variety of traditional Chinese energy exercises, cultivation and therapies. Written records of "qigong" exercise and philosophy can be traced back to "Yi Jing" (Book of Changes, about 1000 B.C.) and "Dao De Jing" (Book of Dao and Virtue, around 500 B.C.). However, qigong did not become a popular term of health

practice in China until the 1950s, when it gained public acceptance over other traditional and more abstruse terms, such as "dao yin" (leading and guiding the energy), "tu na" (taking out stale energy and drawing in fresh one), "xiou nian" (cultivation and practice), "xing qi" (moving the qi), or "yang sheng" (nourishing health). Traditional Chinese Medicine (TCM) posits the existence of a subtle energy (*qi*) that circulates throughout the entire human body. TCM considers pain and disease to be the result of qi blockage or imbalance, and strengthening and balancing qi flow can improve health and ward off disease. All TCM therapies, including herb, acupuncture, massage and qigong, are based on this perspective.

Qigong has not been concretely defined in academia. In general, qigong is considered the self-training method or process through which cultivation of *qi* (vital energy) and *yi* (intent and consciousness) achieves an optimal state of both mind and body<sup>1</sup>. Although the emphasis of qigong therapy is on self-training and self-cultivation, the emission of qi or external qi therapy (EQT) has always been part of the medical qigong tradition in helping patients to regain health. EQT was called "bu qi" in the early literature. Therefore, it is important to differentiate internal qigong practice from external qi therapy in the study of medical qigong. Self-practice of qigong consists of three major forms: guided movement (dynamic form), standing pile, and static meditation; while the advanced realm of qigong practice is considered empty-mind or nothingness state. With constant and unrelenting qigong practice, practitioners are said to be able to develop an awareness of *qi*, and use their mind or intent to guide the *qi* toward desired place(s). Some skillful *qigong* healers can direct their *qi* outward to help unhealthy individuals to break the qi blockage or balance the qi system. This is what we refer to as EQT. EQT can be practiced by use of *qi emission* or "yi" (consciousness or intent), or a combination of the two in most cases. Many schools of medical qigong will teach both techniques.

Chinese scientists have been interested in studying and measuring the external qi (EQ) effects that occur during external qi healing. As a result, a large body of literature has been generated on this subject during the past two decades. Today, many western scientists have expressed an interest in measuring the EQ effects, and in understanding the mechanisms by which EQ is transmitted. An analytic review of prior scientific research on the exploratory studies of EQ effects should help

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interested researchers to reduce unnecessary replication and to advance the efficacy of future studies.

This paper tries to analytically review some of the major studies measuring EQ effects in China, and to explore what we know of EQ and the pros and cons of these studies. We hope this will help other researchers to eliminate the simple replication of already verified results, and to promote further scientific exploration of qigong applications.

### The Origin of Exploratory Studies on External Qi

Exploratory studies of the EQ effect of qigong were originated in a specific historical period in China. By the end of the 1970s, China finally awoke from the nightmare of the Cultural Revolution (1966-1976), a period during which qigong was considered “pseudo-science” or “idealism,” and was a forbidden practice. From 1978 on, many scientists and health practitioners with considerable vision hoped to reestablish qigong as one of many effective healing methods utilized in health care. They tried to use advanced scientific technology to prove that qi is an objective life phenomenon and measurable process. At the same time, other earnest scientists involved themselves in the study of EQ because they did not accept the existence of *qi* in the human body and considered most observed effects of qigong therapy to be purely psychological. The latter tried to use their scientific equipment and methods to prove their point, but soon found that their initial assumptions were wrong, and after completing their scientific studies, they acknowledged the existence of *qi* and the efficacy of qigong<sup>2</sup>.

Starting at the Shanghai Academy of Chinese Medicine, and then at many other institutes in China, a series of exploratory studies on the objective existence of EQ effects were carried out during 1978-1980. Among the first series of projects was the observation of physical effects of EQ produced by well-trained qigong practitioners in their qigong state\*. There were about 16 formal research projects on exploratory studies of EQ effect nationwide. In July 1979, three of the 16 projects were selected for presentation at the “National Conference on the Demonstration and Verification of Qigong Phenomenon.” The three studies of EQ effect involved magnetism, far-infrared, and particle flow<sup>3</sup>. Many important government officials and senior scientists participated in the conference. These studies had simple and straightforward designs, and the conclusions were reached objectively and without exaggeration. Therefore, the demonstration achieved positive responses and played an important role in restoring acceptance of qigong in the scientific community and in general society as an authentic form of healthcare. From then on, many more institutions and researchers got involved in the exploratory studies of EQ effects.

Most of the early 16 projects on EQ effects were presented at the First Academic Exchange of Qigong Science in 1981. By 1984, the Second Academic Exchange of Qigong Science accepted more than 50 research papers exploring ef-

fects of EQ out of 200 submissions. In subsequent nationwide and international conferences on qigong, reports related to the effects of EQ have represented more than 40% of the submissions.

With researchers coming from different fields using a variety of measurement methods, confusion on what EQ was existed from the beginning of EQ studies. From 1979-1982, the Chinese Society of Qigong Science (preparation committee) used the following definition for EQ in their documents and research projects: “*The distant and directional effects produced by a well trained qigong practitioner under the qigong state.*”<sup>3</sup> This definition might lead to further confusion in understanding EQ. By trying to define EQ through physically observable effects, the essence of EQ (e.g. involvement of yi) has been lost by limiting its definition to current view of the world and available technology. Nonetheless, this definition identifies the three major characteristics of EQ: 1) EQ exists only when a well-trained qigong practitioner enters into the qigong state of mind (see footnote \*). It does not exist among ordinary people or in an ordinary state of mind. 2) EQ can travel a distance from the practitioner, and affect the distant objects to produce measurable signals. 3) EQ is directional and can be applied to a specific target far away, while not affecting the objects nearby or very close to the practitioner where his intention is not focused. Despite the shortcomings of this definition, there has been no new definition acceptable to all in the field. We decided to use it as the criteria for selecting the relevant studies that are discussed in this paper.

Although thousands of Chinese scientists and researchers were involved in the exploratory studies of EQ effect in China, the research itself was neither well funded nor fully supported by the government or any foundations. The official government policy about research on qigong has long been known as “three No’s” – no debate, no criticism, and no promotion, but to allow a small group of scientists to conduct exploratory research. A small amount of funding was given to the Shanghai Academy of Chinese Medicine by the government, and some private funds were available through Tongji Medical University (Wuhan) and Weifang Medical College (Shandong) for qigong research.

### THE METHOD

This review will not try to cover all Chinese publications on EQ effects; instead, we plan to conduct a brief analytical review of the major studies only. A full review will not be undertaken here because: (1) the quantity of all published studies or experimental reports on EQ effects is too great; in addition, researchers in China have been doing this kind of review almost continuously<sup>4-8</sup> for almost 20 years. (2) Some highly valuable studies were never published for various reasons, and we will give them appropriate attention in this review. There are elements of “experience exchange” rather than “literature review” in this sense. (3) In general, an article of review emphasizes the summary of study methods and results, including the rationale for using specific equipment. Unfortunately, most published studies did not provide background information about design rationale and equipment specificity. Calling this a pure literature review would mislead the readers. We will focus on analysis of some influential studies with evaluation of their pros and cons.

\* However, what the qigong state is, is still under debate without an agreeable definition (Huo et al. 1989). Usually it refers to a state of mind or a state of tranquility during qigong practice or qi emission, in which the practitioner may make a special connection between yin and yang spheres (or worlds), and manipulate the both worlds.

The preliminary sources for the literature used in our review include: (1) Qigong Database by the Qigong Institute<sup>9</sup>, which collected more than 2,000 abstracts and publications from various conference proceedings and journals. A search with key words of “external qi,” “wai qi” or “emitted qi” generated 355 entries, 90% of which were studies done in China. (2) The accessible publications in Chinese included some conference proceedings and edited documents or books (not formal publications). Although there is no academic journal specifically for qigong research, there are many collected research works (edited volumes), as well as specific magazines and medical journals, which publish qigong-related research studies.

Even though there are numerous publications on measuring the effect of EQ in Chinese, few of them truly adhere to western academic standards regarding research design and reporting; and some were not written for academic exchanges or documentation. Consequently, incomplete data reports have been a persistent problem in our review. To fully take advantage of the published literature for future research in this area, we used the following three criteria for selecting studies to be included in this review: 1) The study subject or measured signals should meet the definition of EQ proposed by Chinese Society of Qigong Science (see above). 2) The study should have systematic data collection for understanding the significant differences between an EQ healer and a non-practitioner, not simply case report or personal observation. 3) The findings can be reliably generalized in the field to evoke new perspectives, signals, characteristics or dimensions of EQ effects, and are not just repetition of other’s findings.

With this background and these limitations in mind, we now present some of the major findings in the Chinese literature on the exploratory studies that measured the effects of EQ in the past two decades.

## FIVE MAJOR METHODS OF MEASURING EQ EFFECTS

The primary purpose of many exploratory studies on EQ effect was to objectively verify the existence of qi. A review of the literature shows that the major methods for measuring or evaluating EQ effects can be classified into the following five categories of detector: 1) physical signal detectors; 2) chemical dynamics methods; 3) using biological materials as detectors; 4) using life sensors as detectors; and 5) using the human body as a detector.

### 1. Physical Signal Detectors

Physical signal detectors are the primary tools that most researchers used at the beginning of EQ research. Many primary studies tried to measure the effect of EQ in terms of its physical aspects such as light<sup>10,11</sup>, electricity<sup>12</sup>, heat<sup>13</sup>, sound<sup>14</sup>, and magnetism<sup>15</sup>.

The first report of this type utilized a far-infrared detector (8-14  $\mu\text{m}$ ) and was published by Gu & Lin in 1978<sup>13</sup>. A modified far-infrared radiation was detected at a distance of 50 cm from the palm of a qigong practitioner, with variations in intensity as high as 80% at a frequency of 0.3 Hz. This contrasted with the control group (non-practitioner) that showed almost no difference in intensity of the infrared radiation. The frequency was unchanged, but the intensity was modified. The results of similar tests by Mrs. Gu with another qigong healer showed that there was no modification of the amplitude

(intensity), but a modification in frequency. These different modifications reflect the different characteristics of EQ effects emitted by practitioners trained in different qigong methods<sup>16</sup>. Lin et al.<sup>17</sup> of Shanghai Academy of Chinese Medicine reported that when the qigong healer emitted *qi* to a patient, an AGA thermogram could display the entire procedure of qi emission by reading the thermal flow moving from his arm to his palm and finally to his finger tips. Then, the surface temperature of the patient’s afflicted area, although one meter away from the healer, was raised by 3°C<sup>17</sup>. Furthermore, using the same equipment, the Joint Research Group of Somatic Science at Shanghai University<sup>3</sup> has found that infrared radiation can be delivered additively through multiple practitioners – the total infrared radiation is approximately equal to the sum of multiple qi emitters. Chen<sup>18</sup> of Beijing Society of Qigong Research also observed the temperature change on the body surface with infrared detectors during the qigong practice of a qigong healer, and found that the consciousness of a qigong healer could act like a “switch” in this body temperature change.

Gu and Zhao<sup>10</sup> of Shanghai Academy of Chinese Medicine conducted more than 900 experiments in order to verify the element of particle flow in EQ. In their experiments, Ge (germanium) micro-pressure detectors were placed at the distances of 0.5, 1.0, 1.5, and 2.0 meters from the qigong practitioner. The practitioner (Zhao) emitted *qi* toward the target (Ge detector) through two of his fingers. At the beginning, there was no recorded signal and the qigong healer reported some mental difficulty in pinpointing the target for *qi* emission. However, after some practice, he could pinpoint the target and repeatedly produced signals on the micro-pressure detectors. They recorded many micro-pressure signals from the Ge detector at all four distances with a little time lag. They explained the signal as the reflection of the unspecified particle flow from EQ. Some scientists could not completely agree with their conclusion, and argued that the signal might be the result of airwaves<sup>2</sup>. During repeated studies of particle flow, they suggested that qigong healer might get tired after a number of *qi* emissions because the signals became weaker and weaker in this situation. Supporting this idea was the fact that after the qigong healer ate something substantial, the signal would again be strong.

Wu of the Beijing Institute of Technology conducted many tests using a mm-wave radiation meter to detect the effect of EQ<sup>19</sup>. With an 8 mm microwave radiation meter, they used the near field (20-40 cm to antenna) to test the EQ effect and the far field (4 to 5 meters to antenna) as the points of reference. They conducted 50 trials, 28 of which had formal records of radiation curves. Twenty-two of these trials had significant increases in wavelength to above 10 mm during the period of *qi* emission. Under normal conditions or during the non-qigong period for the same qigong healer, the wavelengths were quite stable and always below 5 mm. The control group in similar situations reported no change and stayed below 5 mm wavelength all the time.

The application of magnetic field is a widely used ancient healing technique around the world. Compared to electronic or radiation fields, the effect of magnetic field on the human body seems to be more subtle and complicated. Since the human body and organs have some weak, permanent magnetism and variable magnetism, it is much more difficult to

accurately examine the magnetic effect of external qi than any of the other physical effects. Shen and Sun<sup>20</sup> of Chinese Geology University detected strong magnetic spots in some acupoints on the body of practitioners in the special qigong state. Wu and Xu of Beijing Medical University, Liu of the Institute of Earth Physics, Wang of Chinese Society of Somatic Science, and Qiao of China Academy of Measurement Science used the only zero-magnetism laboratory in China. Using this advanced equipment to detect magnetism, they tested the entire process of qi emission by different qigong practitioners and ordinary persons to explore the measurable effect of EQ<sup>15</sup>.

The zero-magnetism laboratory consists of 26 sides of multi-level magnetic-block layers within a space of eight cubic meters. The laboratory can reduce the direct Earth magnetic field from  $5 \times 10^4$  nT to less than 20 nT, and weaken the low-frequency signal of 0.01-2 Hz by 160 to 1400 times. The residual magnetism at any point within the lab is less than 0.3 nT. The recording equipment was a YEW-3056 three-channel signal recorder with sensitivity of 1 V/cm. A total of 26 subjects, 20 qigong practitioners (mean age of 45.3 with practice experience ranging from 1 to 30 years), and 6 non-practitioners (control group, mean age of 46.7) participated in the test. Subjects would take off all of the possible magnetic objects in their possession before entering the lab. A baseline magnetic signal was recorded for each subject before s/he entered the lab. No radical movement was allowed in the lab. The procedure included the following steps: When each subject walked into the lab, the door would be closed. The subject would stand at the door area for 3 minutes, then move closer to the magnetic detector, and stand for another 3 minutes. At this point, the subject would use the *Lao gong* acupuncture point located on his palm to direct EQ toward the magnetic detector (no touching was allowed) until he felt that he had reached his maximum strength. After the conclusion of qi emission, the subject would stay close to, but still not touching, the magnetic detector for an additional 3 minutes, then move to the door area and stand there for 3 minutes before he walked out of the lab. After the subject left the lab, the magnetic signal of the empty lab was again recorded. The results showed that, in 32 tests utilizing 20 qigong practitioners, 21 tests detected significant magnetic signals (65.7%), while 11 tests detected no significant magnetic signals (34.3%). The strongest magnetic signal detected was 105 nT. More specifically, the detected direct magnetic signals ranged  $2-6 \times 10^3$  nT, duration ranged 0.55 to 14 minutes; the alternative magnetic signals ranged 2 to  $2.6 \times 10^3$  nT, the frequencies were around 0.16 to 0.5 Hz; pulse signals ranged  $3 - 1.3 \times 10^5$  nT with frequencies of 1-2 Hz. There was a significant difference between the typical curves of magnetic signals during qi emission by qigong practitioners, than during simulated qi emission by non-practitioners. The curves of magnetic signals detected during simulated qi emission by non-practitioners had no change during the entire process. Through 17 repeated tests of 8 qigong practitioners, 5 practitioners repeated the positive results in 11 different tests, in addition the type and range of signal had some changes. Eighty percent of the tests detected residual magnetic signals after the qigong practitioners believed that they stopped emitting qi.

Kokubo et al.<sup>21</sup> of Japan conducted similar studies on measurements of anomalous bio-magnetic fields from the

qigong healers, and confirmed the Chinese scientists' findings of increased magnetic fields during the EQ process.

Hou of the Chinese Institute of Space Medical Engineering conducted a series of studies to detect infrasonic sound (the sound frequency lower than 16 Hz) from qigong healers at different acupuncture points<sup>14</sup>. The subjects included 10 qigong healers (aged 28-61) and 10 controls (non-practitioners, aged 17-41). The test was performed in a soundproof lab with baseline noise less than 40 dB. The testing equipment was Denmark B-K Corp's Infrasonic Sound Detector, which has a special wave filter to detect infrasonic sound at frequencies of 2 – 20 Hz. During the test, each subject was required to sit in a comfortable position, relax, lightly close his/her eyes. The distance between the sound sensor and the testing point was at 1, 3, 5, 6, 10, and 40 cm. The tested acupoints included "*Lao gong*" (on the palm), "*Bai hui*" (on the top of the head), and "*Ming men*" (at center of the back near the waist). The subject was instructed to focus his attention on the tested acupoints during the examination. The test results were derived from testing each point at all of the specific distances. Significantly higher infrasonic sound pressure was recorded from the qigong healer group than from the control group ( $p < .001$ ). The range of infrasonic sound pressure detected for the control group was between 40.6 and 43.6 dB decreasing as the distance increased, while the range of infrasonic sound pressure detected for qigong group was between 48.8 and 54.7 dB, and was not effected by the distance to sensor in the range measured. This study provided some support to the qigong theory of "Where the intent goes, the qi goes." Infrasonic sound may exist at the acupuncture points of ordinary people. The difference between qigong practitioners and the control group was the strength and the wave-shape of the infrasonic sound<sup>14</sup>. Furthermore, the direction of infrasonic sound was not controlled by the qigong practitioner, but was emitted in all directions.

Many other exploratory studies of EQ effects have used various physical detectors, including Gamma ray, microwave, high-frequency X-ray and so on, and also achieved some positive results. Since some of the signals were difficult to measure or repeat in the laboratory, their reliability became questionable. Due to the limitations of the space, we are unable to discuss all of them here. In general, we may safely say that almost any physical detector that can measure some weak signal emission could be applied to detect or measure an effect of EQ.

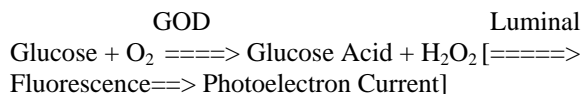
Physical signal detectors have been able to measure a wide variety of signals, positively confirming multiple correlates or effects of the EQ process in numerous and replicated studies. However, there are serious limitations with these physical signal studies because they cannot tell us exactly what EQ is or how qigong healing works. The physical signals detected in these studies ranged from sound to light to magnetism, sometimes modification of the signal differed from practitioner to practitioner. The far infrared study is an example of this phenomenon. In an experiment with one practitioner the intensity of the far infrared was modified, in another experiment with a different practitioner, the intensity was unaffected but the frequency was modified. It is easy to mistake these correlates of EQ as EQ itself. There are other misleading conclusions based on physical signals. For instance, infrasonic sound (9-13Hz) was detected during qigong practice, but in-

frasonic sound could be detected from subjects who had never practiced qigong also<sup>14</sup>. It is likely that infrasonic sound is only a correlate of the EQ effect and not the EQ itself. However, if this is not clearly stated, i.e., the numerous detectable signals might only be correlates of EQ, one might conclude from these studies that the nature of qi is far infrared radiation, infrasonic sound or magnetism.

Because the role of *yi* (intent or consciousness) during EQ process was not accounted for in the study of physical signals, some of the conclusions based on physical signals might be erroneous. Studying the role of *yi* during qi emission may be very complicated from the research perspective, but the use of *yi* in the EQ process could be relatively simple or automatic. This example brings up the weakness of physical signal detectors of EQ in general -- the specificity of physical detector is usually very poor. A slightly wrong measurement can easily lead to erroneous conclusions. For example, Lu of Qinghua University reported the effect of EQ on the radioactive decay rate of <sup>241</sup>Am. He recorded some significant changes in readings during qi emission, and then concluded that EQ could change the half-life of the targeted <sup>241</sup>Am<sup>2</sup>. Most scientists cannot agree with his conclusion. If the half-life of a substance really changed (regardless of how, where or when), while measuring it with the same technique, the result is supposed to be constant and should not vary after the EQ emission has ended. The fact that the half-life change correlated with the timing of EQ suggests that the temporary change most likely occurred either in the relative location of the targeted <sup>241</sup>Am within the container or in the equipment reading, but not within the matter itself. The qigong healer did not have to know exactly how to change the half-life of <sup>241</sup>Am, but focus his intent to change of equipment reading of the half-life. This example brings up the weakness of physical signal detectors of EQ in general -- the specificity of physical detector is usually very poor. A slightly wrong concept or measure can easily lead to erroneous conclusions. In general, the more complicated or more sensitive the equipment used to detect weak physical signals, the more likely it can be interfered with by the EQ process; therefore, there is a greater chance of an error occurring in the related conclusion.

## 2. Chemical Dynamic Methods

By the end of the 1980s, researchers noticed that the EQ could affect the dynamic process of some chemical reactions, for example, by accelerating the reaction process. Using the principle of chemical reaction, researchers designed chemical detectors to explore EQ effect. The best-known chemical reaction that has been used for this purpose was the experiment designed by professor Ren of Tongji Medical University. The basic reaction is as follows<sup>22</sup>:



(GOD = Glucose Oxidase)

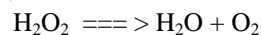
In this reaction, under the action of glucose oxidase (GOD), glucose is oxygenated and becomes glucose acid plus hydrogen peroxide; while Luminal mixed with hydrogen peroxide produces fluorescence. Through a photoelectron amplifier, we can obtain the strength of the photoelectron current

from fluorescence. In a certain range, the strength of fluorescence has a linear relationship with the reaction speed. Therefore, from the magnitude of photoelectron current we could indirectly read the speed of the reaction. Some qigong healers can use their EQ (energy or intent) to affect the activity of GOD and can significantly accelerate the reaction speed. After more than 500 experiments, researchers reported the following findings:

- (a) Qigong healers can speed up the reaction time by 400%, while the regular standard deviation for the reaction under the same conditions is less than 5%.
- (b) Distance: the effect of EQ is detectable at a distance of 2 to 10 meters. The shorter the distance between the qigong healer and the object, the stronger the effect. The effect was undetectable at more than 12 meters.
- (c) Repeatability: Regardless of the qigong healer (three tested), they all produced similar results. The results were highly repeatable (500 experiments produced similar results).
- (d) Directional: whether the detector (target) was behind or in front of the qigong healer, the results were the same as long as the qigong healer focused intent on the reaction target.
- (e) Simplicity: The experiment can be set up easily with little equipment.

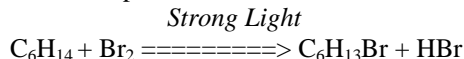
In addition, the "chemical detector" has the characteristics of "uniqueness." It is unlikely that something other than EQ effect that might have accelerated the reaction because there was no accelerated reaction in the control experiment or in the no-exposure condition.

The key to a good "chemical detector" is the selection of an appropriate reaction to detect the EQ effect. Under normal conditions, the activity of an enzyme may vary a great deal due to external influence. Few chemical reactions like the one discussed above have a standard deviation for the rate of reaction that can be controlled below 5%. Another chemical reaction that has been used frequently to detect EQ effect is the following<sup>6</sup>:



Under normal conditions, hydrogen peroxide will gradually decompose into water and oxygen. However, under the influence of EQ, the decomposition reaction may be much faster. We can easily judge if EQ has any effect on the decomposition process by collecting and measuring the oxygen volume.

The following chemical reaction used to detect EQ is more difficult to perform:



Normal hexane (n-C<sub>6</sub>H<sub>14</sub>) and bromine, under strong light, will produce bromohexane and hydrogen bromide. The reaction does not occur under normal indoor lighting conditions. However, under the influence of EQ, the reaction will occur without strong light, and the distinct brown color of Br<sub>2</sub> fades away<sup>2, 23</sup>. This result suggests that EQ may have a component of light. Additionally, the recorded infrared spectrum for the same compound showed significant changes before and after the *qi* emission, but no change was recorded in the control experiment. This study, which is much more difficult to

perform, contains strong characteristics of “uniqueness,” and suggests the existence of EQ effect.

There may be other useful chemical dynamic reactions to detect the effect of EQ. These methods using chemical dynamics can easily and uniquely identify the presence of EQ effects. Unfortunately, they usually cannot tell us very much about either the mechanism of the effect or the essence of EQ.

### 3. *Detector Using Biological Materials*

Because biological material, such as individual cells and tissues (in vitro), and biological molecules such as proteins and antibiotics are assumed to possess qi (vital energy) themselves, and they may be especially sensitive to the EQ emitted by qigong practitioners; the concept of a biological detector has existed for a long time.

A number of reports show that biological detectors produce more comprehensive results than physical detectors. Chu of Peking University reported significant effects of EQ on the change of conformation in various bio-molecular materials<sup>24</sup>. Chen of Shanghai Academy of Chinese Medicine<sup>25</sup> revealed the effects of qigong on liver cancer cells (BEL-7402) and lung cancer cell cultures (SPC-A). Zhou<sup>26</sup> showed the effect of EQ on the cells of living organisms. Cheng<sup>27</sup> reported the effect of EQ on the blood plasma cAMP. Guo<sup>28</sup> reported an effect of EQ on the structure and pharmaceutical characteristics of Vitamin C. Li and her colleague<sup>29</sup> at Chinese Academy of Medical Science recorded effect of EQ on the DNA synthesis and living cycles of liver cancer cells. Yan et al. of Congqigong College of Chinese Medicine<sup>30</sup> reported that EQ could alter the phase behavior of dipalmitoyl phosphatidyl choline (DPPC) liposomes, enables the growth of Fab protein crystals. Feng et al. of Navel General Hospital<sup>31</sup> reported the significant effects of EQ on the microstructure of E-coli bacteria and tumor cells in mice. Yin et al<sup>32</sup> reported the inhibitory effect of EQ on the growth of hepatitis B virus in vitro. Zhang and colleagues<sup>33</sup> in Chinese Academy of Medical Science uncovered the inhibitory effect of EQ on the growth of human liver cancer cells (BEL-7402). All these studies have demonstrated the simplicity, practicality, accuracy and uniqueness of using biological detectors as a means to measure the EQ effect. A few examples are presented below

In 1980, Xu and Zhao of the High Energy Physics Institute of Shanghai used tree leaves to detect the effect of EQ, which is one of the classic, well-known studies in biological detectors<sup>34</sup>. The research protocol is very simple. It used a fresh tree leaf as the sensor, with two extra-fine probes inserted into different veins of the selected leaf, and connected them to an electronic signal amplifier to adjust the amplification. During these experiments, they were able to detect field potentials from the tree leaves before any external intervention. When the qigong healer emitted qi to the leaves at the distance of 50 cm, the observable field potential was several times stronger. When the qi emission was stopped, the signal strength returned to its baseline. In the control group, where a 35°C heating device was used at the same distance, the leaves showed no response (to exclude the possibility that the detected change was due to the body temperature of the qigong healer). When a qigong non-practitioner treated the leaves, there was no effect. These “tree leaf sensors” can be used continuously for eight hours, and then they need to be replaced with new leaves. From the viewpoint of traditional science,

these “tree leaf sensors” do not truly meet the conventional standard of a detector, nor do they have perfect reliability of performance; however, they became a classic biological detector in the study of EQ.

Related to the use of plants as detectors of EQ effect, many researchers have reported that effects of EQ could significantly accelerate the germination and growth of various plant seeds, including rice, wheat, peas, beans, peanuts, various flowers and many others<sup>35-40</sup>. These findings also support the existence of EQ effect based on the unusual biological response to the qi energy.

Feng and her colleagues at the Center for Immunological Research in Beijing conducted a series of studies on the possible bi-directional effects of EQ with healer Bao Guiwen on the growth of bacteria (E-coli) -- inhibition or acceleration -- depending upon the intent of qigong practitioner<sup>41</sup>. When the intent of the qigong healer was to destroy the bacteria, the inhibitory rate of the E-coli growth in comparison with the control group ranged from 45% to 91%. Under the same conditions, when the intent of qigong healer was to accelerate the growth of the bacteria, the rate of E-coli growth in the qigong group was 2.3 to 6.9 times faster than that of the control group. She repeated the studies 20 times before publishing the results. Studies such as this formally introduced the concept of intent or directionality into the exploration of EQ effect. After Feng's report, more people realized that the EQ of qigong practitioners does not necessarily have the same effect all the time, as does physical material or medical equipment. The effect of EQ may change with the consciousness (intent) of the healer. Some scientists then started to design research on the possibility of using EQ to change the characteristics of antibiotics or to select certain desired qualities of the antibacterial products by human intent.

Among the studies of this type, positive results have been achieved through the cooperation between Gu of the Chinese Pharmaceutical University (Nanjing) and the North China Pharmaceutical Company. Gu applied EQ or intent of qigong healer to select “directionally” the proper bacteria producing antibiotics<sup>42</sup>, and achieved wide application in pharmaceutical development with a high economic return – the pharmaceutical company paid for their research continuously in this area. In their early studies, EQ from qigong healers worked as physico-mutagen in industrial production of antibiotics. They investigated the effect of mutation to mydecamycin producing strain (streptomyces mycarofarieus nov. S.10204) by EQ or the healer's intent in comparison with the uv method. In the attempt to select mutants with high productivity of MDM, the mutants of EQ0002 and EQ0022 were isolated from parent strain (S.10204) by the qigong healer. They found that production of MDM from the mutant strain was greatly increased by 45.6% and 49.5% respectively. Unfortunately, the detailed characteristics of these new antibiotics were not reported in the literature.

From 1990 on, Chu of Peking University has tested more than 20 qigong healers in controlled studies to explore the effects of EQ on the conformation of bio-molecules<sup>24</sup>. In her study, a circular dichroism (CD) spectrum was used to monitor the conformation of various bio-molecules. Among various testing materials were poly-glutamic acid, poly-lysine, metallothionein, and some RNAs. After a hundred trials were repeated by different qigong healers and control groups, they

found that the CD spectra of bio-molecule samples were changed significantly after exposure to EQ in comparison with both controls and the baseline. In general, the changes of the CD characteristic ellipticity were over the range of  $1-10 \times 10^3 \text{ dgr}\cdot\text{cm}^2\cdot\text{dmol}^{-1}$ , and the maximum was  $93.9 \times 10^4 \text{ dgr}\cdot\text{cm}^2\cdot\text{dmol}^{-1}$ . The change of ellipticity could be positive or negative depending on the intent of the qigong healer when he emitted EQ. Here again, the bi-directional effects of EQ were reported in biological detectors. No significant changes were observed for the control groups. Her results indicated that the EQ of qigong healers might change the conformation of bio-molecules by making them more orderly or converting them into greater disorder. The National Science Foundation in China formally funded the continuation of this project in 1999. In addition, the study was repeated in the U. S. when professor Chu visited the U.S. in 2000 and it yielded similar findings<sup>43</sup>.

Another direction of EQ study with biological materials uses various cancer cells or tissue culture to detect the healing effect of EQ. After numerous reports of advanced cancer patients recovering with qigong practice, scientists have paid special attention to the *in-vitro* studies of EQ effect on various cancer cells to effectively exclude the potential psychological effect of qigong therapy in cancer treatment. The typical *in-vitro* study involved randomly dividing laboratory-prepared cancer cells or other cultures into different groups with at least one group being treated with EQ by qigong healer, plus one or two control groups. Sometimes, one group was treated by sham qigong (person without qigong training but simulating qigong movement) for the same amount of time. The cancer cells that were studied varied, including human breast cancer cell lines, lung cancer cells (SPC-A1), liver cancer cell line (BEL-7402), erythroleukemia (K562), promyelocytic leukemia, nasopharynglioma, nasopharyngeal carcinoma (CNE-2), SGC-7901 gastric adenocarcinoma, spleen cells of mice, lung tumor cell line (LA-795), etc. Most studies reported an inhibitory effect of EQ on cancer growth (See Chen & Yueng<sup>44</sup> for a review). For example, Chen and her colleagues at Zhongshan University of Medicine have been involved in many studies in this area<sup>45</sup>. In one of their studies, a qigong practitioner was invited to emit EQ toward the human Nasopharyngeal carcinoma cell line (CNE-2) to observe the cell growth inhibition and inhibition of  $\text{H}^3\text{-TdR}$  incorporation. Compared with the non-treatment control, the inhibitory rates for CNE-2 growth in four separate qigong experiments were 43%, 33%, 60% and 36% ( $p < .05$ ). The  $\text{H}^3\text{-TdR}$  incorporation inhibitory rates in 6 different experiments of EQ ranged from 22% to 53% ( $p < .01$ ). They have subsequently repeated this line of both *in vitro* and *in vivo* research and have had similar findings<sup>46,47</sup>. These data suggest that EQ can inhibit the cell growth and DNA synthesis of the CNE-2 cells. Cao et al.<sup>48</sup> from Cancer Institute of Sun Yat-Sen University of Medicine replicated Chen's findings on inhibitory effect of EQ on CNE-2 growth. They compared the number of CNE-2 cells cloned after three types of treatment: EQ only, Gamma (G) ray only, and EQ + G ray; and found that the number of cells cloned in the G-ray plus EQ group were 9.2, significantly lower than the G-ray alone group (15.8;  $p < .001$ ). The kinetic study showed that a number of cells cloned in the EQ group were 16.5, close to the level of G-ray group, but it had started to increase after 48 hours, while the G-ray group continued to decline after 48 to 96 hours of cultivation.

In short, hundreds of research projects have been conducted to explore the effects of EQ on plants, bacteria, human cancer cells, and other biological materials, and most of them had some positive findings, although not all had a sound design with appropriate controls, and few of them were implemented on a double-blind basis. Using detectors made of biological materials makes it easier for researchers to confirm the uniqueness and specificity of EQ effect.

Biological detectors added a new level to our understanding of EQ effect. These studies added support to an idea hinted at by the physical detector studies. EQ or its effect might be controlled or modified by the intent of the qigong healer. Results of some of the biological detector experiments showed that the healer could determine the direction of the effect. This substantiates the need to address the role of yi (intent) in the study of EQ effect.

#### 4. Detectors Using Living Sensors

There has long been skepticism about the therapeutic effects of qigong, and the effects of qigong are often attributed to psychological suggestion. Researchers shifted their focus of qigong study to living organisms that closely resemble the bio-characteristics of humans. Almost all conventional animal or biological models used for research could become suitable biological sensors for detecting EQ. In vivo study of EQ effect on tumor-bearing mice showed the significant inhibitory effect of EQ on the cells of cancer in different studies<sup>32, 47</sup>. With the same principle of life detector, Kong et al.<sup>49</sup> showed the effects of EQ to prolong the lives of laboratory flies, and Zhang et al of South China Normal University<sup>50</sup> reported the effects of EQ exposure on the rapid recovery of fish after being frozen for 10 minutes. There are many recorded successes in using infected mice or laboratory animals as life sensors to detect the EQ emitted by qigong healers. In addition, there has been some significant progress, as reported in the preliminary results, in the application of qigong on "the animal model of hypertension" and on "the animal model of diabetes"<sup>32</sup>.

In the studies by Qian et al.<sup>51, 52</sup> examining the effect of EQ on cancer growth, metastasis and survival time of the host, tumor models were formed in 114 mice by transplantation of U27 or  $\text{MO}_4$  cells into their subcutaneous tissues. The tumor-infected mice were randomly divided into two treatment groups for three separate studies – qigong group (exposed to EQ 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 ( $2.2 \text{ vs. } 6.3 \text{ cm}^3$ ;  $p < .001$ ). 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 histo-pathologically for metastasis. The metastatic rate in the EQ group was significantly lower than in the control group ( $1/16 \text{ vs. } 6/15$ ;  $p < .05$ ). In study 3, the mice were not sacrificed but were allowed to live out their lives and the time of death was recorded for each. The average survival time in qigong groups ( $n=10$ ) was significantly longer than that of the control group ( $35.4 \text{ vs. } 30.5 \text{ days}$ ;  $p < .01$ ). The same authors performed similar studies in different settings and they each reached the same conclusion<sup>52, 53</sup>.

To understand the effects of qigong anti-cancer therapy, Chen et al.<sup>47</sup> of Zhong Shan University of Medicine investigated the anti-tumor efficacy of EQ emission from a qigong healer on transplanted hepatic cancer in mice. In this study, 30 nude mice that had been injected with transplanted hepatic cancer cells were randomly assigned into one of three groups: (1) the control group (no-treatment); (2) the imitation group (sham healer imitated qigong healer's movement); and (3) the qigong group (treated by a qigong healer). The qigong or sham treatment included emission of EQ towards the mouse cage at a distance of 8-10cm for 10 minutes every other day for a total of four sessions or 40 minutes. The results from three repeated experiments were similar: compared with the control group, the tumor growth-inhibitory rates of the qigong treated group were 70.3%, 79.7%, and 78.7%, respectively ( $p < 0.0001$ ). The inhibitory rates of the imitation treated group were 9.5%, 2.6%, and 2.5%, respectively ( $p > 0.05$ ). An electron microscope showed that the morphological alterations in the qigong-treated mice included 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; many apoptotic bodies in extra-cellular space. These results indicated that EQ of a well-trained qigong healer could inhibit the growth of transplanted hepatocarcinoma in mice.

Lei and colleagues<sup>54</sup> at Tongji Medical University examined the *in vivo* anti-tumor effect of EQ on the immunologic functions of tumor-bearing mice (TBM). They investigated the effects of both EQ and cyclophosphamide (CY), and their influence on splenic NK activities, macrophage-mediated tumor cytolysis (MTC) activity and interleukin-2 (IL-2) production level of different groups of TBM. TBM inoculated with EAC or S-180 were randomly divided into 4 groups: tumor control, qigong only, CY only, and CY plus qigong. While the qigong group was exposed to EQT twice a day for two weeks, the CY group were injected with 40mg/kg CY daily. Their results show that EQT had significant tumor growth inhibition rate (TGIR) in both models. The NK activity is 17.4% for EQ only; 20.1% for CY plus EQT, versus 8.4% for control ( $p < .01$ ); the MTC activity for CY+EQ is 11.0%, vs. 23.1% for the control ( $p < .01$ ).

Several investigators independently reported similar findings of positive effects of EQ on inhibiting tumor growth, affecting organ activity, increasing the immune function (NK cells and white blood cells), or reducing blood sugar levels in mice or rats when compared with appropriate controls. For example, Feng of the Navy General Hospital<sup>32</sup>, Li et al. of Chinese Institute of Biology<sup>55</sup>, Chen of Shanghai Academy of Chinese Medicine<sup>56</sup>, Zhao et al. of Guiyang Medical College<sup>57</sup>, Gu and Yan of Beijing College of Traditional Chinese Medicine<sup>28</sup>, Guan and Liang of Guangzhou College of TCM<sup>58</sup>, Liu and Ou of the First Military Medical University<sup>59</sup>, and Qian of Chinese Center for Rehabilitation Research<sup>51</sup>. This is probably the best-replicated area in qigong studies. These studies with high-quality controls provided good scientific bases for explaining the mechanism of qigong therapy in cancer treatment.

In addition to mice and rats, the most frequently used animals in the laboratory, other animals, such as flies<sup>49</sup>, rabbits<sup>60</sup>, fish<sup>34</sup>, dogs<sup>61</sup>, toads<sup>62</sup> and pigs<sup>63</sup> have also been used to detect the therapeutic effects of EQ. Most studies with ani-

mals were designed to respond to the criticism that the therapeutic effects of qigong were mainly due to the patients' psychological effect or the therapists' suggestion. Since we usually do not consider animals susceptible to suggestion from therapists, these experiments remove that possibility from the outset. For instance, a study examined the effect of qigong on spinal cord injuries of experimental pigs<sup>63</sup>. Eighteen experimental pigs (weighing 8.5 to 12.5 kg) were induced with deliberate injury by cutting off their T-vertebrae, removing external fat and damaging their spinal cords with Allen's method of direct injury to produce the standard model of spinal paralysis. Then the injured pigs were randomly assigned into three groups: Group A (n=6) was treated by EQ 12 hours after the injury, then 3 treatments a day for the first week, then 2 treatments daily for 84 days. Group B (n=6) started the qigong treatment 7 days after the injury, with 2 treatments a day for 84 days. Group C (n=6) was the control without any treatment, and was observed for a total of 90 days. All pigs received the same food during the period of the study. At the end of 90 days of treatment, all pigs in group A could walk around freely, and two of them could run and jump, implying different degrees of recovery of their nervous functions. In group B, all except one pig could stand by themselves, and one could run around. In group C (the control), none of the pigs could stand up, and only two had some avoidance response to stimulation. When the same experiment was conducted with dogs using the same design and same qigong form, similar findings were reported<sup>61</sup>. Although these studies did not add much to reveal the mechanism of qigong therapy (except for confirming that the therapeutic effect of EQ are not psychological), they have all raised the issue that this kind of healing effect appears to be more complex than the physical signals detected in the early studies of EQ.

### 5. Measuring the Effects of EQ on Human Bodies

EQT has been used to treat various kinds of illness and disease in human patients even though most qigong healers promote self healing or self-training to maximize the benefit of qigong therapy. The therapeutic effects of EQ have been reported extensively in literature<sup>6,8,64</sup>. Among some of the frequently reported and well-documented successes are the complete remission of degenerative disc diseases such as protrusion of lumbar intervertebral disc<sup>65-69</sup>; and rheumatoid arthritis<sup>70-72</sup>. Also reported are instances of complete recovery from myoma of the uterus<sup>73</sup>; cataracts<sup>74</sup>; asthma<sup>75</sup>; and shoulder peripheral neuritis<sup>76-79</sup>. Also documented are reports of significant improvement for fractures<sup>80</sup>; cardiovascular diseases<sup>81-83</sup>; irregular pulse<sup>84</sup>; and hemi-paralysis<sup>85-87</sup>; and many more too numerous to list here. Although most of these publications were based on observational clinical studies, instead of double-blinded clinical trials, many studies actually had a control group. One of the common characteristics of these diseases is that they are all considered incurable by western medicine, but achieved surprising therapeutic results from qigong therapy. Therefore, the patients who used conventional therapy were the control group. Although we cannot eliminate the placebo effect, the reported remedial effectiveness of EQ has been much better than any recorded placebo effect. However, it is not the scope of this study to discuss them in detail here. The effect of qigong therapy on humans was the very reason for many exploratory studies of EQ in the first place.

While it is still questionable as to how much of the effect was due to qigong itself and how much was due to expectation or psychological suggestion (placebo).

Studying the effects of EQ on the human body is much more complicated than just measuring the EQ effect itself since the subject who accepts the EQ also has some form of *qi*, vital energy, within himself or herself. Additionally, it is impossible to rule out some psychological expectations (both positive and negative) when working with human subjects. Therefore, using a human body as the detector of EQ usually lacks true uniqueness and implies the intervention of many other possible explanations. The impetus to explore the existence of EQ originated from multitudinous instances of EQ emission by a qigong practitioner having a healing effect upon another human being, usually in extraordinary circumstances, such as cancer remission.

It is important to mention here that almost every qigong practitioner who participated in scientific research may testify that it is much easier for him/her to work with a human patient than to work with non-living objects or other biological subjects. Although this may be difficult to test in a controlled study, it points out a potential problem in the studies of EQ with non-human subjects. There is a classic Chinese saying: "similar *qi* goes together." That is, it is easier to communicate and coordinate the interaction between humans because of their innate similarities than it is to communicate between a human and animals. Most qigong healers can detect the sick *qi* field from the patients before they conduct EQ healing<sup>1, 31</sup>. This subjective feeling of connectedness poses new challenges to the future scientific exploration of qigong therapy.

## DISCUSSION

We have presented a summary of the progress and development of major exploratory studies of measuring EQ effect in China in the past two decades, and briefly analyzed the five types of detectors used for measuring EQ effect. All of these detectors support the objective existence of measurable EQ effect, but cannot explain how qigong healing works. In Cohen's terminology, these studies revealed many important correlates of EQ<sup>88</sup>, but not enough to define what exactly qigong is. Although there are still critics who continue to deny the existence of EQ<sup>89</sup>, most scientists involved in exploratory studies of EQ effect consider it a verified finding. They accept the fact that a well-trained practitioner can emit EQ or some form of bioenergy<sup>90</sup>, which has the ability to influence other objects physically, chemically or biologically from a distance. However, current scientific development has not found the right tools or methods to evaluate qigong healing properly.

### *Problems and Limitations*

When we reviewed the literature, we were confronted with many deficiencies and limitations; as in any area of study, no research can be validated without replication and collective effort. To recognize these problems is a necessary step to begin a more in-depth investigation into qigong therapy and EQ effect.

None of the studies was designed to answer the questions what is *qi* or how EQ healing works. The study of physical effects of EQ cannot tell us this. Due to technological or conceptual limitations, most researchers tended to label EQ

as whatever they could measure. Professor Lin's definition of qigong offers us some direction as we contemplate future EQ studies. "Qigong is a method or process in which cultivation of *qi* (vital energy) and *yi* (consciousness or intent) achieves the optimal state of both body and mind"<sup>1</sup>. According to this definition, *yi*, the intent or mental process of the practitioner, is integral to the qigong process. Although exploratory study of EQ could focus on the *qi* (vital energy) part only, *qi* itself cannot be truly defined without including *yi*, or intent. After all, *qi* emission is a process of bio-physiological activity coordinated by human intent or consciousness. Therefore, *yi*, or the intent during *qi* emission, played a more important role than *qi* (bioenergy) in EQ effect, while the observed or measured physical or chemical signals might just be correlates of the EQ process. Clearly effective study of EQ effect requires new methodology and new scientific framework.

Secondly, lack of sophisticated research design and compatible control groups undermined the results of many studies. Few double-blind randomization methods were used in these exploratory studies, which may greatly discount the results or conclusions, because experimenter effect and measurement bias might all become part of the observed results, especially when the specific qigong schools sponsored the research and tried to prove their own styles of qigong to be most effective.

Thirdly, there were reported problems of deliberate deception by qigong healers and in the research conducted by special interest groups that are determined to find positive outcomes. In general, many researchers tended to report only the positive results, but considered the failed experiments or negative outcomes not publishable. The same problem exists in other disciplines of research, like psychology, statistically significant results get much more chance to be published than those non-significant findings, which makes it very difficult to objectively evaluate the overall quality of research in the field.

Then, most EQ studies did not include or mention many potential covariates that may affect the results in their studies, such as the social support, co-intervention, and psychological profile of the healers. As the healer's mood, perception of the researcher and environment, and even the personality may directly affect the results of measurements; addition of the information will greatly enhance our understanding of the contextual effect of the EQ studies.

Finally, EQ studies in China lack integrated theoretical guidance and necessary resources. Since none of the existent scientific theories can explain qigong phenomenon well, the study of EQ has long been lacking basic support from the scientific community. For any scientific study of a new phenomenon, a large amount of time and resources are needed for an accurate account of existence, effectiveness, dose response and limitations. However, most studies of EQ effect have been done by Chinese scientists who were confronted with the problems that come with a lack of support and resources. Our review suggests that EQ phenomenon should be seriously examined and be considered as an important subject of scientific exploration.

### *Lessons to Be Learned.*

More scientists around the world are getting involved in the exploration of EQ or bioenergy effects in qigong healing, especially in the United States (e.g.,<sup>90, 91</sup>) and Japan (<sup>21, 92, 93</sup>).

It is very important to learn from the experience of Chinese scientists in their intensive exploration so that we may become more informed and efficient in the study of EQ effects. Following is a summary of the major lessons that Chinese researchers have learned in previous studies of EQ. These are either from our personal experience or from reading others' research discussion.

1) Not all qigong "healers" can effectively emit EQ. It is very important to find an experienced qigong healer and have clear communication with him/her in the study of EQ. Some qigong practitioners may be good at healing themselves with qigong, but unable to heal others efficiently; some are good at healing others, but not at *qi* emission in the laboratory. Therefore, a researcher should not be surprised by failure in replicating the previous findings with a different qigong practitioner. It is a known fact that not every qigong healer in every study can successfully emit *qi*, and even a good qigong healer cannot emit *qi* successfully every time as he intends to do so.

2) Emission of EQ is a complicated technique or skill that is usually developed over a length of time. To achieve the effective emission of *qi* in a study, the practitioner may need some practice and understanding of the sensors or methods used for measurement, or they may have some special requirement for the environment or control conditions, such as lack of extraneous sound and skeptical personnel. Therefore, it is important to have open communication with the qigong practitioner, and to allow him/her to practice and familiarize himself with the setting before the studies commence. Sometimes it may be necessary to invite the practitioner to participate in the research design since there are many basic laws of qigong practice and *qi* emission that are not known by non-practice scientists. Given the fact that we do not fully understand the role consciousness or intent plays in *qi* emission, and that many qigong healers have produced some unexpected effects on high-tech equipment or the control group if they knew where or what they were. It would be best in the control study that the qigong practitioner does not know where the control is or how the equipment works before the study so that s/he can concentrate only on the designated receptor object.

3) Reliable results must be based on repeated studies with valid designs. Conclusions should not be made prematurely after only one or two trials. Some critics have tended to deny the positive results of all qigong research after they failed to duplicate the findings in their own, usually limited, studies (e.g. Lin et al. 2000<sup>89</sup>). When designing studies that use a human being as the central "stimulus" (EQ emitter), many variables must be considered. Even with the same qigong practitioner, different settings, timing or physical conditions, different investigators or even a different mood (psychological status), can sometimes directly affect the results of the study. It is common for a qigong practitioner to achieve some effects in one study, but not in other studies because s/he may forget what type of consciousness or spontaneous intent was used in the previous study. The researchers should make allowances for mistakes and failures by the qigong practitioners during the study. After all, qigong was not created for physical, chemical, or biological detectors, but rather for human health. Unfortunately, due to limited resources or other reasons, many researchers have been unable to conduct repeated studies with improved designs and, perhaps, different qigong healers.

4) Exploratory studies of EQ effect suggest that EQ might consist of one or more of the following: matter, bio-energy and information. It is relatively easy to detect some measurable effects of EQ (although none of these measured signals could be labeled as EQ itself); it will be much harder to explain how qigong healing really works and what qigong can do. If we define EQ based on the findings of these empirical studies only, then we may recognize many correlates of *qi* but still miss the big picture of qigong. We have noticed that researchers are obsessed with the traditional idea of "signal" -- some form of subtle energy passing between point A and point B, between healer and subject<sup>94</sup>. When Chinese scientists used the term "emitted *qi*," they implied that some actual form of energy was flowing from the qigong healer, which could be detected by sensitive instruments. However, if the healing involves *yi* (intent) therapy only, these physical signals may not show up at all but the healing intent still works well non-locally. Some studies suggest that bio-information and intent play important roles in *qi* emission process<sup>1,5,31</sup>, which determines the direction of EQ effect. The bi-directional feature of intent or consciousness in EQ effect was also supported by the two-decade laboratory studies in Princeton University<sup>95</sup> (PEAR Lab). While many scientists try to verify the measurable effect of EQ, the focus of our research should really on understanding the healing process of internal qigong (self-practice) and EQ emission, as well as their applications. The understanding of qigong therapy and its medical applications will generate great challenges and opportunities to modern science and medicine.

#### ***Suggestions for Future Studies.***

Given the fact that qigong therapy is based on the TCM dialectic view of two interdependent spheres or worlds, while modern science and technology is based on our view of one physical world (the reductionism), it is problematic to explain qigong healing or EQ effect within the current scientific framework using modern technology. It is recommended that future studies to measure EQ effects should be conducted at the levels of biological detectors and life detectors since they offer more information, and hence, can demonstrate the EQ effects more comprehensively and accurately. As discussed above, the physical signal detectors are most sensitive in detecting known physical energy; however, the results of these experiments are easily misinterpreted and have confused what EQ really is. In addition, these physical signal detectors may not further the understanding of how qigong healing works. The chemical detectors can uniquely reflect the existence and potential bioenergy of EQ indirectly, but still lack utility to explain what *qi* really is. In contrast, the biological detectors and life detectors are sensitive to both *qi* and *yi*, bioenergy and intent with good specificity in terms of healing effects; they can detect the effects of EQ not only on accelerating the growth or death process, but also on producing the structural changes that cannot be explained by any physical or chemical signals. Although biological or life detectors are still considered indirect measures of EQ, they can be designed as bi-directional detectors to further our knowledge on *yi*, the less known component in EQ. Therefore, this type of detector is useful not only to measure EQ, but also has significant implications for investigating the healing effects of qigong. The human body detector is more than a tool to measure EQ. The

healing process of qigong therapy on the human body is complex and involves more than the effects of qi, especially with the presence of psychological suggestion and other subjective explanations of the healing effects.

In order to effectively evaluate the role of intent or consciousness during EQT and qigong healing, we need to design research protocols with bi-directional intent. It is very important to remind qigong researchers that the effects of intent or consciousness may be nonlocal events that are not signal-dependent. In nonlocality, nothing is sent or emitted<sup>96</sup>. Those who try to measure "bioenergy" frequently fall into this trap, and fail to identify the role of intent or consciousness in health and healing<sup>94</sup>.

The primary objective of further EQ studies should be not only to verify the measurable *qi* effects (existence of EQ), but also to confirm the health benefits and medical applications of qigong. Previous studies have emphasized the effects of EQ emission on physical detectors and repeated verification of measurable EQ effects, but have not explored thoroughly the applications of qigong therapy as a whole mind-body medicine. Self-practice of qigong is the ultimate key to qigong therapy. Qigong was originally created as a form of self-cultivation and a method to condition mind and body to an optimal state, working best in preventive medicine. In this traditional model of health, responsibility is placed upon the individual with occasional intervention of a "healer" when dire circumstances arise. In the reviewed EQ studies, the health of the individual (who may not yet practice qigong) or laboratory animals has been disrupted creating an unusual circumstance. In these instances, the intervention of a qigong healer who can successfully emit EQ is helpful and required. However, it is not considered a good health practice for people to always depend on the qigong healer's EQ for health and healing.

Study of EQ effect or qigong phenomenon may be more complicated than any physical or biological questions we have encountered so far because it involves both bioenergy and human consciousness (intent). It could be more difficult to study the physiological basis of EQ than it has been to determine the physiological basis of human consciousness<sup>97</sup>. Because an important aspect of qigong is consciousness, we cannot study the effect of EQ without taking healer's intent or consciousness into consideration. Traditional western methods and theories in science and medicine might be insufficient to answer all questions in qigong therapy; we need new perspectives and new methodologies for the study of life phenomenon like qigong.

Verification of the measurable EQ effect had its historical significance, which helped us to recognize that qigong is not simply idealism but a profound science. We believe that the exploratory studies of EQ verified an effect, and it is time to move on to the next stage of scientific research on qigong. There is a new category of scientific study that is being established in China and Japan based on the research findings in qigong -- the science of the human body, which is considered parallel to the natural sciences and social sciences, and requires multiple disciplines of scientific knowledge and collaborations<sup>5</sup>. Exploratory studies measuring EQ effect have played an important role in this new discipline of science, and will continue this role in the future.

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