Psychoneuroimmunological effects of Qi-therapy: preliminary study on the changes of level of anxiety, mood, cortisol and melatonin and cellular function of neutrophil and natural killer cells

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Summary
This preliminary study investigated the psychoneuroimmunological effects of Korean Qi-therapy (QT) on randomly divided placebo group (N = 10) and QT group (N = 10) via measuring the level of anxiety, mood, cortisol and melatonin, and the cellular function of neutrophil and NK cells. Although the basal levels of anxiety and mood were not different between the two groups, there were significant differences in group by time interaction in the anxiety level (5 min after intervention, Post I: changed by −23 per cent in QT group and −10 per cent in placebo; 1 hour after, Post II: −23 per cent, −8 per cent) and mood score (Post I: −34 per cent, −14 per cent; Post II: −55 per cent, −21 per cent). Melatonin levels also changed differently by intervention. In response to QT, melatonin levels increased after treatment but decreased in the control. For neutrophil response to intervention, superoxide generation was increased by QT but decreased by placebo (group by time interaction, p < 0.0001; changed by 36 per cent in the QT group and 8 per cent in the placebo group). There was a significant change in NK cell cytotoxicity in the QT group. The cytotoxicity increased (27 per cent

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compared to baseline) in the QT group but there were no changes in the placebo group (7 per cent). Our current observations suggest that Korean Qi-therapy may induce psychological stabilization, increase melatonin level and enhance cellular function of neutrophil and NK cell. Therefore Qi-therapy may be an effective complementary method for human health care and in the prevention of disease. Copyright © 2001 John Wiley & Sons, Ltd.

Key Words
Qi-therapy; emitted Qi; anxiety; cortisol; melatonin; neutrophil function; NK cell cytotoxicity

Introduction
Qi-training (Qigong) is an oriental complementary therapy preventing and curing disease, protecting and strengthening health and improving human potentiality through regulation of the body, breathing and mind. In general, the Qi used in Qi-training can be divided into internal-Qi, used to strengthen internal organs and body of the practitioner, and external-Qi, used to physically influence other people or matters external to the Qi-trainee by radiating Qi. When Qi-trainees become sufficiently skilled, they can use external-Qi to emit Qi for the purpose of healing another person.

External-Qi therapy in Korea (Korean Qi-Therapy: QT, called ChunSoo Energy Healing in Korea), a modern version of the laying on of hands, was systematized and widely introduced in Korea, Japan, Paraguay and South America by Dr Heng-Yong Mo and Dr Gui-Dal Park from 1985. ChunSoo Energy Healing is based on the philosophy of ancient Taoism and ChunDo (the way of heaven).

The functional basis of QT lies in the direction of original vital Qi through the hands and eyes of the trainee of ChunDoSunBup Qi-training to the recipient, who may then internalize vital Qi, use it to restore balance, and thereby self-heal. It has been discovered that QT is very effective in recovering health after chronic and serious diseases. More and more people have sought it to cure their diseases and as a result it has become widely accepted for its effectiveness. Despite the clinical effects of QT, no plausible scientific evidence has been available regarding its effectiveness to date. Therefore, the current preliminary investigation examined the association of QT in psychological, physiological and immunological responses and in terms of different physiological systems (pituitary–adrenal, pineal system), neutrophil function and NK cell activity.

Materials and Methods
Participants
This study was reviewed and approved by the institutional review board and written informed consent was obtained in accordance with the Human Subjects Review Board of Wonkwang University Hospital and School of Medicine. Thirty-one healthy male young subjects were recruited on a voluntary basis through a wall-poster at the university. Prior to the study, volunteers completed medical history questionnaires and experience of other complementary therapies. Respondents who had experience of other relaxation training, therapeutic touch, acupuncture or massage therapy and reported a history of medical treatment for neurohormonal and immunological disease were eliminated from consideration. Of the 31 volunteers, 11 were excluded from the study: two because of their medical treatment for disease; seven because of experience other of complementary therapy or current treatment; two because of a higher cortisol level than normal.

The investigations were carried out on 20 healthy male volunteers in Wonkwang University and Chonbuk National University, Republic of Korea. The subjects were randomly assigned to two groups using a random table: the control group received placebo Qi-therapy (10 male subjects; mean age, 25.4 years, SD = 2.17) and the QT group received Qi-therapy (10 male subjects; mean age, 26.7 years, SD = 2.41). The subjects were in good health without a history (remote or recent) of chronic disease, malnutrition, malignancy, or renal disease. None were taking any medications, such as steroid hormones, that might affect physical activity. All subjects completed the study and received 30000 Won (approximately US$25) for their participation.

Psychological measures
State anxiety. State anxiety defined anxiety that was either temporary in nature or specific to a
particular stimulus. To measure the acute effects of Qi-therapy on anxiety, the Korean version of the Spielberger Anxiety Inventory-State was administered before, 10 minutes after and 1 hour after the treatment.

**Mood scale.** Tuchman’s mood thermometer (MT) was used to estimate self-assessment of five mood levels.4 The five mood states measured are tension, confusion, anger, fatigue, and depression. Each thermometer data was used as an index of mood state with scores ranging from 0 to 100.

This five-item instrument quickly and accurately measures subjective feeling at any particular moment. The instrument was developed from the position that mood represents one’s awareness of well-being and ill-health. High MT scores indicate high levels of mood disturbances. The MT has good concurrent validity, correlating with the Profile of Mood Scale.

**Hormone assay**

We used commercial radioimmunoassay (RIA) kits to determine serum cortisol (RIA; kit: Radim, Rome, Italy) and melatonin (RIA; kit: Elias USA inc., WI, USA). In all calculations, we used means of duplicated determinations. Plasma samples were analyzed for cortisol and melatonin using RIA at Chonbuk National University Hospital, Korea.

**Measurement of immunological functions**

Superoxide anion produced by neutrophils was measured by a six-channel Biolumant LB9505 (Berthold, Bad Wildbad, Germany). Methods for PMN isolation and measurement of O$_2^-$ followed those described previously.5

For NK cell activity assay, peripheral blood mononuclear cells (PBMC) were separated by Ficoll-Hypaque gradient sedimentation. Cells from the interface of the gradients were collected and washed three times with phosphate buffered saline (PBS) and resuspended in the RPMI-1640 medium (Sigma Co., St Louis, MO, USA) supplemented with 10 percent fetal calf serum (FCS) and streptomycin (100 mg/ml) and penicillin (100 IU/ml).

The measurement of NK cell activity was determined by the lactate dehydrogenase (LDH) released from the cytosol into the culture medium. Briefly, varying concentrations of viable effector cells ($1 \times 10^3 \sim 8 \times 10^6$ cells) in complete medium were added to duplicate cultures of $1 \times 10^5$ target cells (the human erythroleukemia cell line, K562, CCL-243: American Type Culture Collection, Rockville, MD, USA) in 1 ml volume in a U-bottomed tube (Falcon, USA).

To determine the optimal ratio of effector to target cell, six kinds of ratio were evaluated. Trend analysis of percentage of specific lysis across the effector-to-target ratios revealed a linear trend of increased NK cell activity with increasing effector-to-target ratio in this study. The ratio of 40 to 1, effector to target cell, was used in this experiment.

After centrifugation at 40 g for 5 min, the cells were incubated at 37 °C in a humidified atmosphere of 5 percent CO$_2$ in air for 16 h. Cytotoxicity was measured by taking an aliquot of the medium at various time points over 16 h and measuring the LDH activity by using a kit from Sigma Chemical Co. (Product No. DG1340-K). To assess cell damage, LDH activity was determined by minor modification of the fluorometric technique of Green et al.6 Percent cytotoxicity by the release of LDH was standardized with a cell injury index defined as: percent cytotoxicity = (experimental LDH release – spontaneous LDH release)/(total LDH release – spontaneous LDH release) × 100, where total LDH release represents the activity obtained in an aliquot of $1 \times 10^5$ target cells which were lysed with 1 per cent of Triton X-100 (100 per cent control), and spontaneous LDH activity represents the activity from control tubes containing only $1 \times 10^5$ target cells. Each scavenger or chelator was added to a known quantity of purified LDH, and none altered fluorometric estimates of LDH activity by >5 per cent. All experiments were repeated in duplicate to ensure reproducibility and experiment-specific controls were included in each experiment.

**Korean Qi-therapy (ChunSoo Energy Healing)**

In this experiment, Korean Qi-therapy (ChunSoo Energy Healing) was performed by a ChunDoSunBu Master (male aged 32 years, who had undertaken ChunDoSunBu Qi-training for 8 years). He did not know any of the methods, materials and procedure of the experiment and only emitted Qi with positive thinking.

QT was administered by Uniformed Qi-Master according to methods described in Materials & Methods. The placebo QT was administered by the same Master and involved mimicking the
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Figure 1. The experimental design. Subjects received intervention for 10 min. The arrowheads indicate the times of measurement of anxiety and mood scores, cortisol and melatonin levels, and cellular functions of neutrophil and NK cells.

gestures used in the actual QT without any effort or intention on emitting Qi. To facilitate this, the Qi-Master concentrated on counting numbers throughout the procedure during placebo session.

After subjects had rested for 5 min, while supine on beds in a quiet room under constant conditions, the subjects received QT for 10 min, by the following procedure (Figure 1).

1. The Qi-Master centred himself, making a conscious intent to help the subject, while becoming mentally aware of self as one with the cosmos;
2. He moved his hand about 3–10 cm from the body in a pattern from head to toe, becoming aware of the changes in sensory cues in his hands;
3. He redirected areas of accumulated tension in the subject’s body by movement of the hands;
4. He concentrated attention on specific direction of energy flow (sensory cues), finishing by holding the subject’s feet.

Procedure

A week prior to the beginning of the experiment, all subjects visited the laboratory room in order to be familiar with experimental conditions and to be accustomed to basic experimental procedures. And they were given their experimental date. Subjects were asked to refrain from food, coffee, tea, and smoking for at least 4 h before the assessment and to refrain from alcohol for at least 24 h prior to the experiment. In order to avoid diurnal changes in hormone levels and immunity, all experimental procedures were done between 11 am and 2 pm.

On each day, two QT subjects and two placebo subjects participated in the study. Treatment order was randomly determined and subjects did not know their treatment.

On arriving for the experiment, state-anxiety measure and Tuchman’s mood thermometer (MT) for measuring mood scale were completed. Subjects were taken to the experiment room and seated on beds. About 10 ml of blood was drawn and divided into 3 ml blood specimens for hormone determinations and 7 ml for neutrophil function and NK cell activity. After 5 min rest (Pre), the QT group received vital-Qi whilst in a supine position from the front for 5 min and from the back for 5 min (subjects received treatment for a total of 10 min). Following the QT, the subjects rested for 5 min in a sitting position (Post I). Subjects assigned to the placebo (mimic) condition were treated in all respects as if they were assigned to the QT condition. After that, subjects completed the second STAI-X1 form and MT to estimate changes of anxiety and mood levels and 10 ml blood was drawn. After 1 h rest in another room (Post II), the state-anxiety and MT were done. About 10 ml of blood was drawn, 3 ml blood specimen for hormone determinations and 7 ml for neutrophil function and NK cell activity.

The obtained data were analyzed using a computer program (SPSS 7.5) by a graduate student who did not know the source of the data.

Statistical analysis

The results are presented as mean ±SD. Two by three repeated measure ANOVA was used to
evaluate the statistical differences in the two group conditions and three within-participants factors (Pre, Post I and Post II) for each variable. A computer program (SPSS ver. 7.5., SPSS Inc., Chicago, IL.) was used for all statistical calculations. For all repeated measures analyses reported, the probability value was corrected for inflated degrees of freedom using Hyunh-Feldt epsilon (HF-ε).

Results

Psychological measures

Changes in state anxiety and total mood scores are presented in Table I. There was no main effect for group \(F(1, 18) = 0.853\) in state anxiety level. However, a significant main effect for time \(F(2, 36) = 46.449, p < 0.000, \text{HF}-\epsilon = 0.811\) and more important, a significant group-by-time interaction \(F(2, 36) = 3.936, p < 0.05, \text{HF}-\epsilon = 0.811\) was reported. For total mood score, the analysis revealed no significant group effect \(F(1, 18) = 1.214\). But, a significant time effect \(F(2, 36) = 28.862, p < 0.000\) and a significant group-by-time interaction \(F(2, 36) = 5.897, p < 0.01\) were obtained. The decrease in state anxiety from Pre to Post was somewhat attenuated by placebo; it decreased by 7.8 (Post I) and 9.5 (Post II) with QT, but by 3.2 and 6.3 with placebo. In the case of mood score this decreased by 10 and 16 with QT, but by 4 and 6 with placebo.

Hormonal changes

Table II presented the mean and standard deviation of plasma cortisol and melatonin level. A significant time effect was obtained in cortisol level \(F(2, 36) = 4.924, p < 0.05\). However, there were no significant group \(F(1, 18) = 2.404\) and interaction \(F(2, 36) = 0.555\) effects. The cortisol level had a trend to decrease from Pre to Post in both groups. For melatonin level, there were no main effects of group \(F(1, 18) = 2.986\) and time \(F(2, 36) = 2.312\), but the interaction of group-by-time was significant \(F(2, 36) = 9.238, p < 0.001\). Melatonin concentration increased from Pre to Post I through QT, but decreased during placebo.

Immunological functions

The mean values of neutrophil superoxide generation and NK cell cytotoxicity are shown in Figure 2. For neutrophil function, in addition to group effects \(F(1, 18) = 4.529, p < 0.05\), a significant time effect \(F(2, 36) = 6.499, p < 0.005\) as well as a significant interaction \(F(2, 36) = 17.455, p < 0.000\) was obtained (Figure 2A). The responsiveness to opsonized zymosan was enhanced and the Post I value was increased by 1.36-fold and returned to the baseline at Post II in the QT group. However, superoxide generation of the placebo group remained unchanged. Significant effects for both time and interaction were found \(F(2, 36) = \_

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<th>Table I. Effects of Qi-therapy on state anxiety and mood scores.</th>
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<td><strong>Outcome</strong></td>
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<td>Cortisol (µg/dl)</td>
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(A)

![Graph showing O2 Production (10^15 cpm) for Pre, Post I, and Post II for Control and QT groups.]

(B)

![Graph showing Cytotoxicity (%) for Control and QT groups.]

Figure 2. Immunological responses of Qi-therapy. 
(A) Effects on neutrophils' superoxide generation; 
(B) NK cell's cytotoxicity activity. Values are mean ± SD.

3.987, p < 0.05, HF = 0.681 and F(2, 36) = 11.472, p < 0.001, HF = 0.681, respectively; however, the analysis revealed no significant group effect for NK cells' cytotoxicity [F(1, 18) = 1.813] (Figure 2B).

NK cell cytotoxicity was enhanced more than 1.23 times compared to the Pre value with QT, but remained unchanged with placebo. The increased level of NK activity returned to baseline within an hour (Post II).

Discussion

Although this data is from a small sample size, the results we obtained are consistent with the hypothesis that Korean Qi-therapy may positively improve the psychological, neurohormonal, and immunological functions in the body. Cross-disciplinary approaches using methods from psychology, neuroendocrinology and immunology have greatly enhanced our understanding of how our bodies function and respond to environmental stress. Furthermore, the above approaches have shown the mechanism by which Korean Qi-therapy influences the holistic health state in men. First, the present study shows state anxiety reduction and mood level improvement after treatment QT. State anxiety was changed by QT from Pre to Post I and Post II. The effects were enhanced by QT over the 1 h following the intervention. Statistical analysis showed that QT improves anxiety and mood states differently compared to placebo treatment. All of the subjects who received QT may initially reflect a pattern of relaxation and sensing positive emotional feelings, but not in placebo control. Deeper emotional and mental changes may occur 1 h after QT treatment. This is consistent with research of therapeutic touch (TT), first described by Krieger in 1975 as an act of healing or helping that is akin to the ancient external Qi-therapy, showing reception TT to be useful in anxiety reduction and mood improvement. 9–12

Similarly, many studies of Qigong reported that internal and external Qi reduce anxiety and mood levels. 13–16 Zhang et al. 13 proposed that Qigong meditation could cause primarily functional changes of the cerebral cortex. For psychological effects of Qigong, Tang et al. 14, 15 concluded that the practice of Qigong is useful in relieving symptoms of depression and helps to improve the quality of sleep in older people. Jin 16 reported the positive influence of Tai Chi on mood states and state anxiety. According to a classic Chinese book, 17 many psychological diseases are considered to be a disturbance of the circulation of Qi or disharmony and depletion in the supply of Qi. Invisible life energy called Qi can be modulated by the insertion of vital Qi, Qigong (internal Qi) and Qi-therapy (external Qi), to achieve a more harmonious and normal state. From our unpublished data, QT increased alpha wave intensity significantly compared to placebo and induced relaxation state. QT may change the brain activity to a meditative and relaxation state and then improves anxiety and poor mood states. Hence reduced anxiety and poor mood could be related to relaxation effects of QT.

Secondly, the present study showed that cortisol concentrations could be significantly altered by time in both treatments. But the cortisol level of the QT group decreased more than in the placebo group. The finding that cortisol decreased after QT is consistent with many earlier TT studies and
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our psychological results. Other studies have documented decreased cortisol in response to other techniques designed to induce a calm, positive state of mind, such as meditation, music, transcendental meditation, and Tai Chi. But the effect of QT on stress coping remains to be studied because it is not clear that cortisol levels can represent the level of anti-stress stimuli.

For melatonin, the level rose significantly after receiving Qi, whereas a significant decrease in the control group was observed. Regular practitioners of transcendental meditation had higher daytime levels of the serotonin metabolite 6-hydroxyindole-3-acetic acid (5-HIAA) compared to controls, and the levels increased following meditation. Similarly, Massion et al. reported that the practice of mindfulness meditation increased levels of melatonin compared to controls. This study showed that the pineal gland is psychosensitive and that the practice of meditation is associated with increased levels of melatonin. Hence increased melatonin level after QT could be related to the meditative effects of QT.

From the results obtained for neurohormonal effects, it may be considered that use of 10 min QT had significant effects on the neuroendocrine axis. The QT group showed a different secretion in melatonin and it could be possible to modulate the hypothalamo–hypophyseal axis and hypothalamo–pineal axis by QT. Because basal levels of cortisol and melatonin have a similar level in both groups, these results may be due to a change in the feedback sensitivity caused by QT. As a stress coping method, QT may also affect emotional resources and result in reduction of stress-sensitive physiological systems. But further study is needed to examine how QT may modify the hypothalamic–pituitary–adrenocortical (HPA) system as an acute and long term stress coping tool.

Our third finding is that QT increased the function of neutrophil and NK cell cytotoxicity. Many studies have focused on the role of anxiety and stress on cellular immune functions. Esterling et al. suggested that anxiety may negatively affect NK cell activity in healthy volunteers. Peavey et al. revealed that in a population of normal and healthy volunteers there is a correlation between high stress and low phagocytic capability and that the phagocytic potential can be augmented following relaxation training. The stress-induced changes in immunity, especially those involving NK cell number and function, are thought to be one of the factors for increased susceptibility to infection and malignant disease.

It has been reported that melatonin and cortisol affect immune functions. Priming cells with melatonin and cortisol effectively modulates the production of reactive oxygen intermediates (ROI) in humans. The results of Zhou et al. suggest that cortisol may play a profound role in the regulation of the function of human NK cells. Furthermore, elevated serum cortisol levels have been reported in several conditions including cancer and depression, conditions for which reduced levels of NK activity have also been documented. In vivo treatment of animals with melatonin produces an immune-enhancing effect on both cell-mediated immunity and antibody production.

There is some evidence that external-Qi may modulate immune functions. Lei et al. demonstrate that Qigong-emitted external Qi, which is similar to QT, has inhibitory effects on tumor growth of tumor-bearing mice (TBM) and enhancing effects on the anti-tumor immunological function of the tumor host simultaneously. The results of the present study are consistent with the in vitro QT effect on NK cell activity—QT increases the NK cell cytotoxicity after 3 min of Qi-treatment.

According to the psychoneuroimmunological point of view, it suggests that the increase of ROI production of neutrophil and cytotoxicity induced by QT may be related to the decrease of anxiety level and serum cortisol concentration and the increase of mood state and melatonin levels, and vice versa.

Our current observations suggest that Korean Qi-therapy may induce psychological stabilization, increased melatonin levels and enhanced cellular function of neutrophil and NK cells. Therefore, Qi-therapy may be an effective complementary method for human health care and prevention of disease. Future studies might be needed to explore the exact mechanisms of the psychoneuroimmunological effects of Qi-therapy on the human body.

References

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