The Hong Kong Polytechnic University
Department of Rehabilitation Sciences

Effect of Qigong on Physical and Psychosocial Status of Chinese COPD Patients : a Randomized Controlled Trial

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CERTIFICATE OF ORGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text

(Signed)

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22nd Nov 2009 (Date)

ABSTRACT

COPD remains a major health care problem that incurs a heavy cost burden to the community. Despite years of experience in pulmonary rehabilitation, the clinical outcome of exercise as the main classical intervention remains unsatisfactory. Positive findings of our earlier work on Health Qigong (HQG) among older adults with chronic medical conditions suggest that it is also applicable for COPD patients. To continue the study of using HQG as an adjunct exercise, we adapted the earlier version "Baduanjin" to suit the characteristics of COPD patients based on the opinions of a group of carefully selected experts. The safety and applicability of this protocol was tested by a field study among a group of people with COPD. Given that it is a safe and feasible form of intervention, a RCT with adequate concealment in subject allocation, outcome assessment by blind and independent assessors, comparable placebo treatment for control group, large enough sample size based on effect size calculation, and intention-to-treat analyses was implemented. The goal of the RCT was to test the effectiveness of this adapted qigong protocol in improving the functional capacities and quality of life of COPD patients six months after completion of the PRP. Trend of better improvement in functional capacities and the QOL aspects was noted only among HQG subjects over the 6-month follow-up period across various outcome measures. Though not conclusive yet, the findings do provide support for clinical application in terms of safety, cost and potential therapeutic value, and point out areas for improvement in research. In addition, the study stimulate further future direction of research on the potential "anti-inflammatory" action of Health Qigong, which may explain the mechanism of how health qigong work.

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CHAPTER 1

HEALTH QIGONG AS AN ADJUNCT EXERCISE TRAINING TO COPD REHABILITATION

1.1 Chronic Obstructive Pulmonary Diseases

1.1.1. Definition, Prevalence & Impact

Chronic obstructive pulmonary disease (COPD) is defined as ‘‘a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases’’ (Celli & MacNee, 2004). The airflow obstruction is persistent and typically progresses or deteriorates more rapidly with age than the normal condition. As the airflow limitation reduces the effectiveness of expiration, it results in dynamic hyperinflation which is a contributor to dyspnea, a major complaint of patients with COPD (O’ Donnell, 2006). The major pathologic changes contributing to the airflow limitation include failure of the mucociliary system with hyper-production and secretion of mucus, expectorated as sputum, and whose major source is the enlargement and inflammation of submucosal glands present in the large airways; inflammation and structural changes in small airways resulting in narrowed lumens; and an increase of airspaces beyond the terminal bronchioli as the result of emphysematous destruction of the lung parenchyma (Turato, Zuin

& Saetta, 2001). The cause of COPD is attributed to the total burden of toxic gases and particles that individuals inhale during their lifetime, mainly the smoking of tobacco products. The host defense system against this type of insult is provided by the innate and adaptive inflammatory and immune response. However, as not all the smokers developed the disease, some genetic pre-disposition, such as alpha-1 antitrypsin deficiency, may interact with smoking for the development of the disease (Hallberg, Dominicus, Eriksson, Gerhardsson de Verdier, Pedersen, Dahlbäck, Nihlén, Higenbottam & Svartengren, 2008).

COPD remains both a global and local health problem. The WHO Global Burden of Disease Project estimated that COPD was the fifth leading cause of death worldwide in 2001 and will be the third leading cause by 2020 (Lopez, Shibuya, Rao, Mathers, Hansell, Held, Schmid & Buist, 2006). The worldwide population-based prevalence of COPD is estimated to be 11.8% in men and 8.5% in women for age forty and older (Buist, McBurnie, Vollmer, Gillespie, Burney, Mannino, Menezes, Sullivan, Lee, Weiss, Jensen, Marks, Gulsvik & Nizankowska-Mogilnicka, 2007). Further increase in the prevalence is predicted in the coming decade due to the escalating smoking population and severity of air pollution. In Hong Kong the prevalence was estimated to be 139,000 or 3.5% of the total population in year 2000 in Hong Kong (Regional COPD Working Group, 2003). It is a disease group which induces a heavy burden to the public hospital service due to repeated admissions to hospital for exacerbations of symptoms (Yu, Lee & Woo, 2007).

This chronic respiratory disease has a profound impact on the life of those who suffer from it. Patients with COPD are often caught in a downward spiral that goes from expiratory flow limitation, hyperinflation, dyspnea, exercise intolerance, and peripheral muscle impairment to increased disabilities and poor quality of life (Peruzza, Sergi, Vianello, Pisent, Tiozzo, Manzan, Coin, Inelmen, & Enzi, 2003). Especially among patients in the advanced stage of the disease, systemic problems such as nutritional abnormalities, muscle wasting, and coexisting cardiovascular diseases are prominent and relate to mortality (Agusti, 2005). Moreover, anxiety and depression are common among the sufferers (Hill, Geist, Goldstein & Lacasse, 2008)

1.1.2. Limitations of Mainstream Treatment

The current pharmacotherapy, including the long-acting bronchodilators, the corticosteroids, the combined inhalers, etc., in the management of COPD is mainly for symptomatic relief. These drugs do not reduce the progression of COPD or suppress the inflammation in small airways and lung parenchyma (Barnes & Stockley, 2005). Most patients, especially those at the advanced stage of the disease course, suffer frequent exacerbations which cause morbidity, hospital admissions, and mortality, and strongly influence their health-related quality of life. However, these exacerbations cannot be purely explained by further aggravation of airflow limitation or the presence of an infectious agent,

as some patients are more prone to exacerbation while others are not (Wedzicha & Donaldson, 2003). This implies that environmental factors, for instance, weather change, air pollution, or such other host factors as a weaken immune system, may also contribute to the exacerbation. In exploring for improvement in treatment and/or preventive strategies, these areas should also be considered, although to date not much attention has been given to it by the research community.

As their disease progresses and the COPD patients become increasingly disabled, pulmonary rehabilitation program (PRP) is the standard conventional treatment for its management (American Association of Cardiovascular and Pulmonary Rehabilitation, 1998). Evidence supports that PRP relieves dyspnea and fatigue, improves emotional function and enhances patients' control over their condition. But there is to date no compelling evidence to show that PRP attenuates the progressive airflow obstruction and loss of lung function that characterizes and defines COPD (Lacasse, Martin, Lasserson & Goldstein, 2007). In addition, the long-term effects of PRP is bleak. Grosbois (2002) reported that the long-term outcomes (i.e., 6-24 months) of these patients were not promising despite the immediate benefits of pulmonary rehabilitation program. Most patients were unable to maintain the initial gains in exercise performance and symptom relief from PRP at a longer follow-up time (e.g., 6th month).

Among the various modalities of PRP, exercise has had the strongest empirical support

(Lacasse et al., 2007). Exercise training is mostly based on the principles of overload, specificity, and reversibility. The principle of overload reflects the concepts of intensity; in order for the muscle to improve in structure and/or function, it must be taxed beyond the critical level. The principle of specificity illustrates optimal results that occur when training uses the same exercise modality in which the performance enhancement is desired. The principle of reversibility states that the effect of training decreases after training is stopped. There are still issues which remain unresolved in the application of these principles in PRP. First, related to choosing an intensity level, either a high intensity or a low intensity, exercise training is highly contentious. Both high and low intensity would produce the same improvement in fatigue, dyspnea, and other quality of life parameters (Datta & ZuWallack, 2004; Puhan, Schünemann, Frey, Scharplatz, & Bachmann, 2005). On the one side, high intensity training can result in better improvement in muscle or exercise test parameters; but on the other side, it may cause detrimental effects such as inflammatory responses and aggravating muscle wasting especially among muscle-wasted COPD patients (Van Helvoort, Heijdra, Thijs, Viña, Wanten & Dekhuijzen, 2006). Second, there is no evidence as to which modalities (e.g., treadmill walking, incremental cycle ergometer, callisthenic exercise or walking) have superior effects over others in terms of walking tolerance, daily function, and subjective symptoms (Varga, Porszasz, Boda, Casaburi & Somfay, 2007). Third, related to the prevention of “reversibility”, it is an area that requires much improvement as the long-term

adherence to exercise training is always reported to be poor among COPD patients after PRP (Donesky-Cuenco, Janson, Neuhaus, Neilands & Carrieri-Kohlman, 2007). Both the training intensity of appropriate level to the patients and feasibility of the exercise to be conducted at home are associated with the success of improving long-term adherence, and then long-term outcomes. In addition to these, psychosocial factors, such as perceived effectiveness, mood derived from participating in the training, etc., are important areas to be considered (Woodard & Berry, 2001).

Exercise limitation in COPD is multi-factorial. Recognized contributory factors include, ventilatory limitation because of impaired respiratory system mechanics and ventilatory muscle dysfunction, metabolic and gas exchange abnormalities, peripheral muscle dysfunction, cardiac impairment, exertional symptoms, and, any combination of these interdependent factors (Olopade, Beck, Viggiano, & Staats, 1992). The pre-dominant contributory factors to exercise limitation may vary among patients with COPD, or indeed, in a given patient over time. The more advanced the disease, the more of these factors come into play in a complex integrative manner. Thus in training many factors should be considered and adjusted according to the condition of the patients. Moreover, if maintenance of the health condition rather increasing muscle force is the ultimate goal of the training, the key for satisfactory results seems to lie on routine and habitual engagement rather than the training intensity as there are reports indicating that consistent participation in even low level physical

activity produces satisfactory result (Bruunsgaard, 2005; Ramadan & Barac-Nieto, 2001).

Rapid shallow breathing is the characteristic breathing pattern among COPD patients. It is an initial strategy to compensate for inspiratory muscle weakness and the burdensome respiratory mechanics and in COPD patients, but there is a critical threshold where any further increase would be of no additional benefit (Dellweg, Haidl, Siemon, Appelhans, & Kohler, 2008). This breathing pattern would lead to carbon dioxide retention as well as increased senses of dyspnea (Gorini, Misuri, Corrado, Duranti, Iandelli, De Paola, & Scano, 1996). Controlled breathing techniques, such as inspiratory muscle training (IMT), diaphragmatic breathing, pursed-lip breathing, etc. have long been incorporated as treatment components in PRP (Gosselink, 2003). A systemic review on the benefits of IMT identified that results are not conclusive and the gain in inspiratory muscles strength does not transform to other outcome measures (Padula & Yeaw 2006). Diaphragmatic breathing may produce increased asynchronous and paradoxical breathing movements, and sense of dyspnea (Gosselink, Wagenaar, Rijswijk, Sargeant, & Decramer, 1995). Only pursed-lip breathing is widely used which produces satisfactory effect, with a mechanism probably related to prolonging expiration and slowing down of the breathing rate (Nield, Soo Hoo, Roper, & Santiago, 2007; Spahija, de Marchie & Grassino, 2005).

1.1.3. Current Views on the Systemic Effects of COPD Leading to a Paradigm Shift in Management

There is growing recognition that the pathogenesis and clinical manifestations of COPD are not restricted to inflammation and structural remodeling in the lung. Chronic, systemic, and low-level inflammation is ascertained among COPD patients (Agusti, & Soriano, 2008; Van Eeden & Sin, 2008), and is commonly defined as two- to fourfold elevation in circulating levels of proinflammatory and anti-inflammatory cytokines and acute-phase proteins such as C-reactive protein (CRP), as well as minor increases in the counts of neutrophils and natural killer cells. Although the origin of such systemic inflammation remains poorly understood, it may be related to systemic oxidative stress and peripheral vascular endothelial dysfunction in response to smoking, and/or tissue hypoxia which activates the tumor necrosis factor (TNF) response process. What is certain is that its impact is obvious as reflected in the various systemic problems, like cachexia, tissue depletion, muscle wasting, etc., commonly identified in patients with COPD (Wouters, 2005). Muscle dysfunction is gaining more support as a complex situation of “myopathy” rather than an issue of purely disuse atrophy (Couillard & Prefaut, 2005). The evidence also explains the high comorbidities among COPD patients with other chronic conditions, such as cardiac diseases, diabetes mellitus, hypertension, and osteoporosis, which share the same systemic low-grade inflammation in their pathogenesis (Chatila, Thomashow, Minai, Criner & Make, 2008). The severity of these systemic effects

has a direct impact on the prognosis, mortalities, and quality of life among COPD patients. Factors that reinforce such systemic inflammation may include physical stress (e.g., hypoxia, trauma to muscle) induced by strenuous exercise, particularly among those muscle-wasted COPD patients (Van Helvoort et al., 2006; Van Helvoort, Van de Pol, Heijdra & Dekhuijzen, 2005), and psychosocial stress as stipulated from studies in asthma patients (Kullowatz, Rosenfield, Dahme, Magnussen, Kanniess & Ritz, 2008).

A strong association exists between mood problems (e.g., anxiety and/or depression) and chronic respiratory diseases (Di Marco, Verga, Reggente, Maria Casanova, Santus, Blasi, Allegra & Centanni 2006; Hill, Geist, Goldstein & Lacasse 2008). Apart from the traditional view that mood problems are the consequences of the deteriorating course of the COPD disease, they can also be viewed as factors contributing to the systemic inflammation of the disease. It is postulated that the brain is capable of initiating or inhibiting the inflammatory process through the release of neuropeptides or other inflammatory mediators from sensory nerves and the activation of mast cells or other inflammatory cells. These central neuropeptides, particularly corticosteroid releasing factor (CRF), then initiate a systemic stress response by activation of the neuroendocrinological pathways such as the sympathetic nervous system, hypothalamic pituitary axis, and the renin angiotensin system, with the release of the stress hormones in the pathogenesis of chronic conditions (Black, 2002; Vale, 2005).

The current views on the systemic aspects of COPD induce a paradigm shift in the management of the disease from a sole pulmonary aspect to the involvement of other extra-pulmonary aspects. This also prompts us to revisit the role of exercise training on “anti-inflammatory” effect on the body and the potential effect of psychogenic stress in perpetuating chronic inflammation.

1.1.4. Emerging Role of CAM among COPD patients

In the treatment of a particular disease, modern medicine relies on the choice of a medicine against a particular pathogen and/or a specific surgical procedure to the malfunctioning organ. It works as though the organ is independent of the other organs, but this is not true in reality. Like other chronic diseases, COPD has complicated pathology involving multiple organs, pulmonary as well as extra-pulmonary organs. The present medical approach of course has gained some success in controlling the symptoms of these chronic diseases. However, it has not been able to slow down their progression. The practice of complementary and alternative medicine (CAM), including Traditional Chinese Medicine (TCM), on the contrary, is not limited to any particular disorder, symptoms or organs. It is based on the holistic medical system targeting for enhancing homeostasis among the various body systems and reinforcing the innate self-healing and/or immune process. It complements the limitations of modern medicine in the management of chronic diseases. Nowadays most

people suffering from chronic conditions apply CAM. Surveys conducted in U.S.A and Australia reviewed that 60% of adults, especially older adusts, employed at least one form of CAM for managing their chronic conditions as complement to the mainstream Western medical interventions (Barnes, Powell-Griner, McFann, & Nahin, 2004; Zhang, Xue, Lin, & Story, 2007). Qigong is one of the CAM modalities that they usually employ (Chui, Donoghue, & Chenoweth, 2005; Goldstein, Brown, Ballard-Barbash, Morgenstern, Bastani, & Lee, 2005).

In TCM, a more holistic view on the pathology of COPD patients is applied in the management of the disease. COPD is traditionally categorized as fei zhang 〔 肺 漲 〕 or lung distention, a disease category pertaining to many types of chronic respiratory tract disease. The development of COPD is not only related to the invasion by external pathological factors 〔 外 邪 〕, but it also reflects a functional disorder of the lung, spleen, and kidney. Deficiency of the organs allows the external pathological factors to invade the body more easily. The normal function of the organs depends on the natural flowing of “Qi” 〔 氣 〕through the Meridians〔 經 脈 系 統 〕which is composed of channels〔 經 脈 〕 and collaterals〔 絡 脈 〕 connecting different parts of the body. Depending on particular organ(s) which become principally dysfunctional, there are different syndromes such as dysfunction of lung, dysfunction of lung and spleen, and dysfunction of lung, spleen and kidney among COPD patients (Liu, 2006). During the acute phase when the invasion by the

external pathogen is the main cause for the symptoms, the treatment emphasis would be on dispelling the pathogen, and during the remission stage, the treatment emphasis would be shifted to secure the root or normal function of the different organs. Qigong is an exercise that TCM practitioners would prescribe to the COPD patients during the remission stage for strengthening the function of the different organs and restoring a balanced and energetic integrity among them.

1.2. Health Qigong

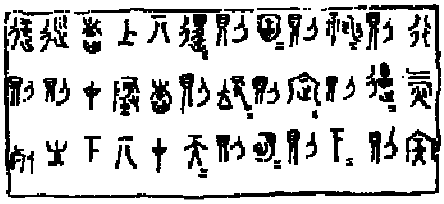
1.2.1. Definition, History and Root in TCM

In the regimen of Traditional Chinese Medicine (TCM), qigong has long been regarded as a form of “mind-body” intervention, which simultaneously exercises the “mind” and the “body” for treating various chronic diseases and promoting healthy life (Tsang, Cheung, & Lak, 2002). In China, it is estimated that over 100 million people are currently practicing qigong (Chen, Mackenzie, & Hou, 2006). Qigong is now regarded as a form of self-training mind-body exercise and a culturally relevant sport activity which is officially known as “Health Qigong” (HQG) and constitutes the focus of our study. It is different from “Medical Qigong” which involves a TCM practitioner to emit “Qi” to heal the patients (Health Qigong Administration Center, 2007). The practice of HQG is based on the principle of integrating and harmonizing one’s mind, breath, posture, and movement. In modern terms, its practice

emphasizes on focusing attention with the use of visualization and/or autosuggestion, coordinating breathing with movement, aligning proper posture, especially the spine, interlacing muscle contraction and relaxation in a rhythmic sequence, and recruiting movements or muscle activities not commonly used in daily activities (Xiang, 2006). The distinctive feature lies in the integration of all these aspects into a single practice which makes it distinctive from other forms of aerobic and/or stretching exercise.

The evolution of qigong can be traced back to the B.C.E. period in China. Two ancient relics unearthed in the 70s, the "Circulating Qi Jade Work" 〔行氣玉佩銘〕 (Figure 1.1) and the "Dao Yin Illustration" 〔導引圖〕(Figure 1.2), illustrate that qigong practice has long been common among the Chinese population for purposes of health promotion and longevity (Lin, Yu, Guo, Shen, Zhang & Zhang, 2000). The "Circulating Qi Jade Work", the earliest known recorded description of Tu Na 〔吐納〕or breathing method of the Warring States Period 〔戰國時代〕 841 - 221 B.C.E., consists of 45 characters carved on a small twelve-sided jade post which describes the breathing method and the related philosophy in complete form. The "Dao Yin Illustration", a colored illustration on silk of the Han Dynasty (250 B.C.E. – 220 C.E.), has 44 figures accompanied with short written descriptions by the side of each figure which illustrates the practice of qigong. The illustrated "Dao Yin" or "Qi Conduction" practice can be grouped into four categories; breathing exercise 〔呼吸運動〕, limb exercise〔肢體運動〕, exercising with

instruments 〔 器 械 運 動 〕, and therapeutic exercise 〔 治 療 功 〕.



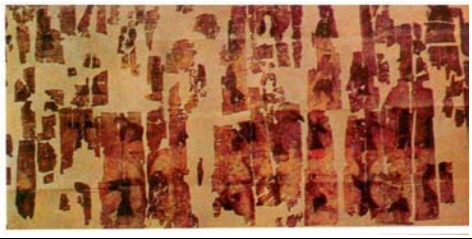
行氣，深則蓄，蓄則伸，伸則下，下則定，定則固，固則萌，萌則長，長則退，退則天，天幾春在上，地幾春在下，順則生，逆則死

Circulating Qi Jade Work

(行 氣 玉 佩 銘)

- the earliest known recorded description of the Tu Na (吐納)method and philosophy in its complete form (the Warring States Period, 841-221 B.C.E.)
- consists of 45 characters carved on a small twelve-sided jade post

Figure 1.1 The "Circulating Qi Jade Work", an ancient relic illustrating qigong practice.



Dao Yin Illustration

(導 引 圖)

- The earliest illustrations of qigong practices (Han Dynasty, 250 B.C.E. – 220 C.E.)
- the colored illustration on silk, 50 cm in height and 100 cm in width, have 44 figures distributed evenly in four layers
- By the side of each figure there are descriptions in words (but only 31 descriptions can be identified
- The illustrated "Dao Yin" methods can be grouped into four categories
  - Breathing Exercise (呼 吸 運 動)
  - Limb Exercise (肢 體 運 動)
  - Exercising with instruments (器 械 運 動)
  - Therapeutic Exercise (治 療 功)

Figure 1.2 The "Dao Yin Illustration", another ancient relic illustrating qigong practice.

The development of qigong and its relationship to health became well known at a later period because of its association with renowned historical figures such as, Hua Tuo 〔 華 佗 〕 (22 – 220 C.E.), a TCM physician; Tao Hongjing〔 陶 弘 景 〕(422 – 589 C.E.), a philosopher on life and health who complied a book titled “On Caring for the Health of the Mind and Prolonging the Life Span”〔 養 性 延 命 錄 〕; and Bodhidharma〔 達 摩 〕 (422 – 589 C.E.), the Indian Buddist monk and originator of Henan’s Shao Lin Monastery 〔 少 林 寺 〕, etc. Qigong has originated from concepts of different disciplines, including Confucius〔 儒 家 〕, Taoist〔 道 家 〕, Buddhist 〔 佛 教 〕, and, TMC 〔中 醫 〕on how to perform exercise for the purposes of health promotion and longevity. This is why different names have been used to describe it. It was only around 50s of this century when a comrade, Mr. Liu Guizhen〔 劉 貴 珍 〕, who first used the term qigong in an official document to the Chinese Government reporting his success in using this kind of training method in the rehabilitation of some chronic conditions (Lin et al., 2000). However, there was a period of chaotic development in the late 70s and 80s when the concept of emitted “Qi” was introduced together with some fraud reports boosting its miraculous healing effects. Challenges and mistrust then arose and the concept of emitted “Qi” continues to be a subject of debate among scientists nowadays which however is not the focus of this study.

The Health Qigong Administration Center of China〔 國 家 體 育 總 局 健 身 氣 功 管 理 中 心〕 under the State Sport General Administration of China 〔 國 家 體 育

總 局 〕 was appointed as the official body for the promotion, training and study of health qigong in 2000. In 2002 the, a series of expert panels were conducted for the standardization of four popular forms of health qigong for their further promotion and scientific study. The four standardized health qigong are: a) Yi Jin Jing 〔易 筋 經〕 or the Tendon-Changing Classic, b) Wu Qin Xi 〔五 禽 戲〕 or the frolics of Five Animal, c) Liu Zi Jue 〔 六 字 訣〕 or the Art of Expiration in Producing Six Different Sounds, and, d) Ba Duan Jin〔八 段 錦〕or the Eight Excellent Movements or the Eight Section Brocades. Now health qigong is recognized as the 97th sport activity in the Mainland (State Board General Administration of China, 1996).

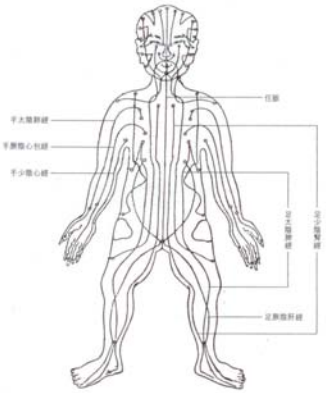
Health qigong has its root in TCM. The Yellow Emperor Internal Classic 〔 黃 帝 內 經 〕, a writings of TCM dated back in pre-Qin dynasty〔先 秦 朝 代 〕before 221 B.C.E., systematically described the practice of qigong as follows: 〔 恬 惔 虛 無 ， 真 氣 從 之 ， 精 神 內 守 ， 病 安 從 來 。 〕.〔 精 神 內 守 〕or “focusing attention to the interiors” is the method. 〔 恬 惔 虛 無 〕 or “getting calm” is the goal. 〔 真 氣 從 之 〕 or “Qi becoming strengthened” is the short term goal. And 〔 病 安 從 來 〕or “diseases being warded off” is the long term goal. In TCM “Qi” is viewed as a type of energy or dynamic force, which nourishes life, and also serves as a medium for communication among the various body organs. Two TCM theories explain and guide the work of health qigong: the Yin and Yang theory 〔 陰 陽 學 說 〕and the Meridians theory

〔 經 絡 學 說 〕(Health Qigong Adiminstration Center, the State Sport General Administration of China, 2007).

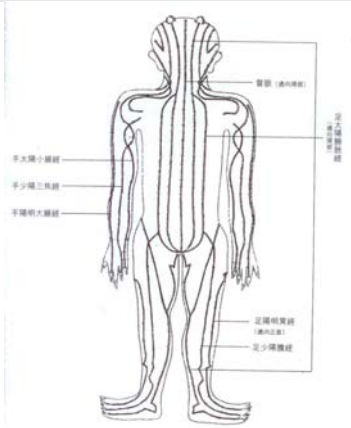
The Yin and Yang theory 〔 陰 陽 學 說 〕 views human as a small replica of the nature. Everything in nature and the humans can be classified as opposites; for example, night and day, cold and hot, female and male, deficiency and excess. The Yin-Yang opposites are not mutually exclusive of each other, but each is moving along a continuum to be in balance with the opposite. There is no absolute Yin or Yang, but within Yin there is Yang and within Yang there is Yin. The dynamic balance between the opposites keeps the nature in equilibrium instead of chaos.

The Meridians theory 〔 經 絡 學 說 〕 states that the human body has a special transportation and communication system that connects the superficial with the interior and the upper with the lower portions of the body and joins all the internal organs. It is neither the circulatory nor the nervous systems, but another system being composed of channel and collaterals. The term “Channel” or Jing 〔 經 〕 has the meaning of route and the term “Collateral” or Luo 〔絡〕 has the meaning of network, which are branches of the channels. Together they form the Meridians system 〔 經 絡 系 統 〕, crisis-crossing the whole body and making the body into an organic unit by joining the various parts (Figure 1.3). “Qi” or vital energy circulates through these channels and collaterals, and so they are called conduits of energy.

Arm/ Leg	Yin/ Yang	Three Yin/ Three Yang	The Twelve Meridians	Flow Sequence	Governing vessel〔督 脈〕	Conception vessel〔任 脈〕
Arm〔手〕	Yin (Interior, 裡)	Tai Yin〔太 陰〕	Lung Meridian〔肺 經〕	1	-	With connection
		Shao Yin〔少 陰〕	Heart Meridian〔心 經〕	5	-	With connection
		Jue Yin〔厥 陰〕	Pericardium Meridian〔心 包 經〕	9	-	With connection
	Yang (Exterior, 表)	Yang Ming〔陽 明〕	Large Intestine Meridian〔大 腸 經〕	2	With connection	-
		Tai Yang〔太 陽〕	Small Intestine Meridian〔小 腸 經〕	6	With connection	-
		Shao Yang〔少 陽〕	Triple Burner Meridian〔三 焦 經〕	10	With connection	-
Leg〔足〕	Yang (Exterior, 表)	Yang Ming〔陽 明〕	Stomach Meridian〔胃 經〕	3	With connection	-
		Tai Yang〔太 陽〕	Bladder Meridian〔膀 胱 經〕	7	With connection	-
		Shao Yang〔少 陽〕	Gall Bladder Meridian〔膽 經〕	11	With connection	-
	Yin (Interior, 裡)	Tai Yin〔太 陰〕	Spleen Meridian〔脾 經〕	4	-	With connection
		Shao Yin〔少 陰〕	Kidney Meridian〔腎 經〕	8	-	With connection
		Jue Yin〔厥 陰〕	Liver Meridian〔肝 經〕	12	-	With connection



The 12 PM illustration (anterior view)



The 12 PM illustration (posterior view)

In addition to the 12 principal meridians, there are eight extra meridians and smaller network-like luo meridians. Among the eight extra meridians〔奇 經 八 脈〕, the Governing Vessel 〔督 脈〕 and the Conception Vessel 〔任 脈〕 are considered the most important channels, because they contain acupuncture points which are independent of the twelve principal meridians.

Figure 1.3 The Meridians system: the Twelve Principle Meridians, and the Governing and Conception vessels

A body organ becomes dysfunctional and gradually manifests as diseases when “Qi” is either in excess or in deficiency states due to obstruction or disruption of “Qi” flow within the channels and collaterals. The underlying causes may be related to extreme emotions, improper eating habits, lack of rest, overworking, lack of exercise, mental exhaustion, and/or drugs. When sick, the channels and collaterals must be dredged through a certain kind of force. The movements and mental regulation in qigong practice are believed to stimulate and maintain stretching to the channels and collaterals, thus exerting a force to dredge the blockage to facilitate the flow of “Qi”. Patent “Qi” flow serves to regulate the Yin and Yang forces by redirecting “Qi” from excessive accumulation to areas of “Qi” deficiency, thereby restoring the body to a balanced state. Although the physical property of “Qi” is still a subject of debate in modern science, Wang (2002) postulated that “Qi” might be a form of vibration energy derived from rhythmic body movements, and usually identified at acupressure points. This form of vibration energy was proposed to work in resonance with the heart beats for the promotion of blood circulation, which was an essence factor for good health. This also explained partially the close relationship between “Qi” and “blood”〔氣 血〕within the TCM context.

The two theories also provide guides in the practice of health qigong. For example, movements are always balanced; “breathing in” representing “Yang” is balanced with “breathing out” representing “Yin”, and “bending down” as “Yin” is balanced with

“straightening up the body” as “Yang”. On the other hand, certain acupressure points along the meridians are the focus of attention during practice. For example, focusing on the Mingmen〔 命 門 〕at lumbar region and Dazhui 〔 大 椎 〕at cervical region serves to prompt us for a proper alignment of the spine. Focusing on the Dantian〔 丹 田 〕serves to prompt us for slow and deep breathing.

1.2.2. Clinical Studies of Health Qigong

Although the application of health qigong during the remission stage of COPD has been cited in TCM text (Liu 2006), clinical studies adhering to the standards of evidence based medicine are scanty. We conducted a recent systematic review and identified twenty six randomized controlled trials (RCTs) pertaining to the use of HQG from various electronic databases from 1997 to 2006 (Ng & Tsang, 2009) (see Appendix I for “Description of the 26 RCTs on Health Qigong). The effect of health qigong training among COPD patients was explored in two prior studies. Lung function as well as the descending and ascending breath of the diaphragm showed better improvement after practicing health qigong for three weeks as compared to external diaphragm pacer therapy (Xu, 2000). The extent of paradoxical thoraco-abdominal motion both at rest and during resistance was abated and the threshold of dyspnea was raised after 16 week of training (Liang et al., 1998). However, data pertinent to the long-term effect of regular health qigong practice on other aspects, such as functional

capacity and quality of life, is scarce. In other aspects it was identified that qigong may have some effects in increasing in the numbers of white blood cells and lymphocytes, stroke volume, peak early transmitral filling velocity, peak late transmitral filling velocity, and conversely, in lowering of total cholesterol, systolic blood pressure, diastolic blood pressure, and depressive mood scores in other chronic conditions. However, major methodological limitations are identified in most of the studies. Twenty out of twenty-six studies had a JADAD score of 2 or less. The major limitations of the recruited subjects included unclear description of the randomization procedures, inadequate description of the blinding procedures, employment of unblinded outcome assessors, poor monitoring of compliance, and high percentage of loss to follow-up. In addition, the number of subjects recruited for individual studies was in general small. A sample size of less than 30 was reported in half of the studies. All these limitations point to the needs for better quality RCTs to show the clinic benefits of this treatment activity in the rehabilitation of COPD.

1.2.3. Health Qigong and Taichi

Most people are more familiar with “Taichi” (TC), as it is well known to the West by the landmark study on “Fall Prevention” (Wolf, Barnhart, Kutner, McNeely, Coogler & Xu, 1996). While many researchers regard TC as a purely physical form of exercise, we view TC as a special kind of Health Qigong, which also has psychosocial and mind components. HQG and

TC originated from different roots; HQG from the Traditional Chinese Medicine (TCM) while and TC from martial arts. However, many concepts and techniques especially those for health promotion interacted and crossed over in recent years. In the “Qigong Study in Chinese Medicine (中 醫 氣 功 學)” , a textbook in TCM school in China, principles of Yang’s style Taichi practice is also included. Wayne and Kaptchuk (2008) described TC as a “Complex Multicomponent Intervention”. HQG also shares these components.

1.3. Aims and objectives

Based on the above review of extant literature, there is an urgent need to test if health qigong is applicable to patients with COPD and to conceptualize possible physiological and psychophysiological mechanisms explaining its clinical benefits.

The aims of this study were to:

1) identify a standardized qigong protocol as an alternative home exercise program for COPD patents, and
2) conduct a RCT to test the effectiveness of this qigong home program

The research questions were:

1) How the Baduanjin (八 段 錦) qigong protocol should be adapted so that,
    - it would be easily practiced by the frail COPD elderly patients,
    - it does no harms to our COPD elderly patients, and

- it has potential therapeutic values to our COPD patients as judged by concerned clinicians.

2) Does this adapted qigong protocol have any real effects in in improving treatment outcomes, functional capacities as well as quality of life, of COPD patients graduated from a from the PRP at a longer term, 6 month after graduation?

1.4. Overview on the study

The project was conducted in two phases. Phase I was to the adapt and standardize the qigong protocol (Tsang et al., 2002) for use as a home program for COPD patients. Semi-structured interview with experts in the field of qigong and pulmonary rehabilitation was conducted to gain further insight about the applicability of the qigong protocol to the rehabilitation of COPD patients. The revised protocol was then tested for safety before putting it forward to the thereafter experiment. Phase II was an experimental study to investigate the effect of this protocol on both physical and psychosocial functions of the COPD patients. A single-blinded randomized controlled trial methodology was adopted for this 2nd phase.

CHAPTER 2

THE APPLICABILITY AND SAFETY OF A HEALTH QIGONG PROTOCOL FOR PATIENTS WITH COPD

2.1. Introduction

As discussed in Chapter 1, health qigong is regarded as a form of mind-body exercise, which has long been used to promote healthy life and treat various diseases (Chen et al., 2006). This kind of "mind-body" exercise is practiced based on the integration of "postural adjustment", "breathing regulation" and "calming the mind" (Dorcas and Yung, 2003; Chinese Health Qigong Association, 2004). The potential benefits include enhancement of cardiopulmonary functions, modulation of autonomic function, boosting of immune responses, and, attenuating negative emotion, which are beneficial to health in general (Ng & Tsang, 2009).

According to TCM, the pathology of COPD reflects not just the invasion by external pathogen, but also a functional disorder of the lung, spleen, and kidney (Liu, 2006). Health qigong is an exercise that the TCM practitioners would prescribe to the COPD patients for strengthening the function of different organs during the remission stage. Improvement on breathing mechanism immediately after health qigong training among COPD patients was reported in two prior studies (Liang et al., 1998; Xu, 2000). Health qigong (HQG) may

therefore be regarded as adjunct exercise training for the COPD patients. However, data pertinent to the long-term effects of regular health qigong practice on the other aspects, such as daily function and quality of life, is scarce.

Apart from the positive side of HQG, there has been concerns among physicians about possible adverse effects.. A case recovering from intracerebral haemorrhage was reported to demonstrate erratic blood pressure response while practicing qigong (Leung, Yan & Li, 2001). The possible cause for such adverse response might be due to repeated practice of isometric exercise together with breath-holding or Valsalva manoeuvre. According to the Good Clinical Practice (GCP), it is necessary to standardize the treatment protocol, ensure its safety of the intervention protocol, and estimate its potential efficacy to the clients before randomized controlled trial (RCT) is conducted (Dixon, 1998). Thus this chapter reports the experts' review to verify the potential efficacy and applicability of the health qigong protocol for COPD patients, and the results of a field test to verify its safety.

The study was conducted in two phases. Phase I collected expert opinions on the potential efficacy and applicability of the health qigong protocol for COPD patients. In Phase II, we conducted a field test to assess the safety of the health qigong protocol by close monitoring of the physiological responses and subjective symptoms reflecting cardiopulmonary stress and other symptoms (e.g., joint pain, etc.) among a group of COPD patients after learning and practicing qigong for three weeks.

2.2. Phase I: Formulation of the HQG Protocol

2.2.1. Participants

A convenient sample of eight experts that consisted of a physician, two nurses, two physiotherapists, two occupational therapists, and a TCM practitioner, was recruited for evaluation on the chosen health qigong protocol. The diverse composition of the sample aimed to ensure a comprehensive review from different perspectives. All experts had over 5 years of clinical experience in the management of COPD patients. Their age ranged from 30 to 50. Two of them were female.

2.2.2. The Health Qigong Protocol

The specific form of health qigong chosen in this study is the “Baduanjin” (BDJ), the protocol which we had used for alleviating depression of elderly with a chronic medical condition (Chinese Health Qigong Association, 2007; Tsang et al., 2002; Tsang, Fung, Chan, Lee & Chan, 2006). The original health qigong protocol consists of eight distinct movement routines, with each movement routine repeating six times. The protocol usually takes 12-15 minutes to complete at the usual pace. To address the special needs of patients with COPD, five adaptations were recommended based on our clinical experience and the input from a Traditional Chinese Medicine (TCM) practitioner (Box 2.1).

1 **2** **3** **4** **5** **6** **7** **8**

The Eight Movement Routines of the Health Qigong Protocol - Baduenjin

Adaptations for patients with COPD

1. Focuses the "Mind" on perceived exertion, perceived dyspnea or perceived pain (not over 4.5 on VAS) in order to control the pace of practice
2. Natural breathing; use movements to guide breathing pattern and incorporate "pursed-lip" breathing if necessary.
3. Movements be performed at a range within the one's comfort zone, but a little sense of stretching is required.
4. Allows pauses for rest, whenever necessary, and,
5. Allows choices of routines that the patients feel competent to practice at the start and gradually upgrade to the full set according to individual progress.

Box 2.1 Five adaptations to the HQG Protocol – Baduenjin for patients with COPD

2.2.3. The Review Questionnaire

We developed a 24-item questionnaire (Appendix II) to help the experts review the potential therapeutic benefits and applicability of the training protocol for COPD patients.

Sixteen items of this questionnaire were to collect views on the potential therapeutic benefits of the qigong protocol for COPD patients (see Table 2.1 under Result section). Examples included “The Qigong Protocol enables the Patients with COPD to develop a sense of control over their breathing, and “The Qigong Protocol is an aerobic activity which is good for cardiopulmonary function”, etc. The remaining eight items collected views on “training issue” of the protocol (e.g., space requirement, supplementary audio-visual learning material, etc.) (see Table 2.2 under Result section). A 3-point scale; “Agree”, “Don’t Know” and “Disagree” were adopted for rating each item. Whenever the experts responded with either “Don’t know” or “Disagree” to any statement, they were prompted to give written comment to elaborate their views.

2.2.4. Procedures

The evaluation by each expert was divided into two parts, which was conducted on two consecutive days for each expert on individual basis. On the 1st day, each of the experts received an orientation briefing on the protocol, which included the training strategies and related training materials. Each individual expert was then requested to review the protocol and give ratings on the 24-item questionnaire described above. On the 2nd day, the first author collected the questionnaire in person and ensured that corresponding comment was

written down for statements with either “Don’t know” or “Disagree” responses. The expert was asked for the missing information when spotted.

2.2.5. Data Analysis

Content validation ratio (CVR) for each statement of the questionnaire was employed to indicate the level of agreement among the eight experts. The CVR for each question was calculated as follows: $(n_{\text{agree}} - n_{\text{disagree}}) / N$, where n_{agree} was the number of experts indicating “Agree”, n_{disagree} was the number of experts indicating “disagree”, and N was the total number of experts. For a group of eight members and a p value set at 0.05, a CVR value larger than 0.75 was needed to indicate “significant agreement” among the eight experts for that statement (Lawche, 1975; Wallace, Blake, Parham & Baldridge, 2003). The biostatistician at the Department of Rehabilitation Sciences of The Hong Kong Polytechnic University was consulted of related analysis.

2.2.6. Results: Comments from Expert Panel

Tables 2.1 and 2.2 summarize the agreement among the experts’ opinion collected in phase I. For exploring the potential therapeutic effects of the health qigong protocol, ten out of the sixteen statements received CVRs ranging from 0.83 to 1.00, which suggested “significant agreement” among the eight experts for these statements. For the other six

statements that were focused on the “functional mobility”, “psychosocial benefits” and “therapeutic effects from TCM aspects”, the CVRs were below 0.75 which suggested “disagreement”. Related to functional mobility, the reasons for disagreement from two experts were that they did not think the protocol would help improve mobility as the movement routines of the protocol did not have many single leg stance, weight transfer movements, etc. For the other two aspects, most experts expressed that they were not sure about the effect because of their background in western medicine. But all were positive to recommend that it should be the purpose of the next stage of the study to test this aspect.

As to the applicability of training protocol, more controversies were received.. Six out of the eight statements received CVRs less than 0.75. The comments from the experts were all constructive with indications for improvement which were listed in the discussion section. Two statements, no.17 and no.24, had CVRs of 0.17. Revisions were made in the light of these comments.

Statement No.	on Therapeutic Values: *The Qigong Protocol …*	CVR
1.	… facilitates patients with COPD to relax and develop “peace of mind”.	0.67
2.	… facilitates patients with COPD to concentrate their mind.	0.83 *
3.	… facilitates patients with COPD to relieve unpleasant feelings, e.g. anxiety, depressed moods.	0.50
4.	… enables the Patients with COPD to develop a sense of control over their breathing.	1.00 *
5.	… facilitates patients with COPD to develop confidence to deal with their disabilities and medical conditions	0.50
6.	… is an aerobic activity which is good for cardiopulmonary function	1.00 *
7.	… enforces “deep and slow” breathing pattern in a natural way.	1.00 *
8.	… enforces coordination between respiration and movements; inspires with trunk extension and expire with trunk bending.	1.00 *
9.	… enforces adequate stretching to muscles and soft tissue of the trunk, neck and upper limbs.	0.83 *
10.	… promote functional mobility and balance	0.67
11.	… promotes good health through the practice of reciprocal movements, e.g. bending versus extending, breathing in versus breathing out, etc. which is essential to the balance of “Ying” (陰) and “Yang” (陽) from the TCM* perspective	0.50
12.	… stimulates trigger points of the body (穴 位) to enforce the flow of “Qi” within the Meridian System (經 脈 系 統), which is essential to good health according to TCM*	0.50
13.	… attracts the interest of patients with COPD of our community as it is culturally relevant	0.67
14.	… promotes both physical and psychological health in general.	0.83 *
15.	… achieves the same effect as the other breathing and relaxation exercises commonly used in pulmonary rehabilitation.	0.83 *
16.	… promote more social contact through practicing together and discussion among peels.	1.00 *

Table 2.1CVRs for Potential Therapeutic Value of the Health Qigong Protocol among the Eight Experts; * indicating statements with consensus agreement among the experts, i.e. with CVR 0.75 – 1.00.

Statement No.	on "Learning": *The patients with COPD should have …*	CVR
17.	… no difficulty in learning the qigong as the contents of the manual and AV material are easily understood.	0.17
18.	… no difficulty in learning the qigong as the design of the self-learning material (the AV material and the manual) are user friendly.	0.50
19.	… no difficulty in learning, as besides the self-learning material, there are at least 3 45-min training sessions under the supervision of a coach.	0.83 *
20.	… no difficulty in learning the qigong as the training sessions emphasized on giving feedback specific to individual performance.	0.50
21.	… adequate confidence to comply to the qigong protocol as the protocol can be adapted to activity tolerance of each individual.	0.50
22.	… adequate confidence to comply with the protocol as there is detailed information related to formulating a daily training schedule.	0.67
23.	… adequate confidence to comply to the protocol as it can be practiced within the home environment; even if the environment is not spacious.	1.00 *
24.	… adequate confidence to comply with the protocol as it covers adequate precautions to guard against any potential harm or injury.	0.17

Table 2.2 CVRs for Training and Applicability aspects of the Health Qigong Protocol among the Eight Experts; * indicating statements with consensus agreement among the experts, i.e. with CVR 0.75 – 1.00.

For statement no.17, the experts contended that "only patients who were mentally sound and able to walk steadily for a few steps would be able to learn the protocol". They recommended that the team should formulate better inclusion criteria to define which patients would be more suitable for this specific kind of intervention. For statement no.24, they recommended that it would be more appropriate to be replaced the term "trauma management" by "emergency access" in the booklet, which appeared to be less threatening to the clients. All the comments were incorporated into the finalized protocol for phase II study.

2.3 Phase II: Field Test on the Safety and Applicability Issues

Upon the advice from the experts in phase I, the protocol was revised before used in the field test described below.

2.3.1. Participants

A convenient sample of eight patients with COPD who had no experience of qigong practice and stable cardiopulmonary conditions were recruited from the out-patient clinic. All subjects were male with an average age of 74.7 (*SD*=5.8), and they had no cardiopulmonary symptoms at rest and in 2-min walk. Informed consent was obtained from each participant before the field test took place.

2.3.2. Procedures

Each subject received three 45-min training sessions on three consecutive weeks and was offered the supplementary training material in form of a booklet and a video CD for review at home. The training was conducted by the PhD candidate who was a health qigong coach certified by the Chinese Health Qigong Association. The participants were then advised to practice it daily for twenty to thirty minutes for the following two weeks.

The field test was scheduled at the sixth week where physiological responses, subjective symptoms reflecting cardiopulmonary stress, and joint pain were assessed during,

immediate after the qigong practice, and at the 2nd minute after the health qigong practice. The assessment was conducted by a research assistant, who was a certified occupational therapist, at the subject's home environment. Eight criteria were chosen to indicate "safe practice" (Box 2.2) (Niemeyer, 1980; American College of Sports Medicine, 2005) which were closely monitored during the evaluation process. The health qigong practice was terminated if any maladaptive signs and symptoms outside the safe criteria were noted. The equipments used for monitoring the cardio-pulmonary physiological signs included: i) "MINOLTA PulseOx-3i" pulse oximeter (with respective software for data analysis), ii) "Polar S810 receiver / T61TM transmitter" heart rate monitor, (with respective Polar Precision Performance TM SW 3 software for data analysis), and, iii) from "OSIM OS-512" blood pressure monitor. Levels of perceived exertion and dyspnea were collected using Borg scales.

2.3.3. Data Analysis

The physiological responses and symptoms of the patients were checked against all of the eight criteria listed as listed in Box 2.2. The overall percentage of compliance to the safe criteria among the eight subjects was calculated for each criterion.

1. No chest pain or dizziness during or after the practice,
2. No observable signs of insufficient blood circulation such as paleness and/or confusion during or after the practice,
3. SpO2 maintained at 90% or above during or after the practice,
4. No palpitation together with irregular pulse pattern during or after the practice,
5. Maximum rise in heart rate be within 70% of heart rate (HR) reserve during or after the practice,
6. Blood pressure (BP) showing no hypertensive nor hypoadaptive responses during or after the practice.
7. Rise in BP normalized within 2 minutes of rest
8. Rating of perceived exertion (RPE) below level 7 on the Borg scale.

Box 2.2 The Eight criteria for judging "safe practice" of the health qigong protocol, adapted from American College of Sports Medicine (2005) & Niemeyer (1980)

2.3.4. Results: Safety & Applicability measures

For phase II, all of the subjects completed the intervention and the assessment session. Only data from seven of them were used for analysis. The data of one subject was contaminated by mistake during the collection procedures. Two subjects required some prompts for the completion of the "Baduanjin", and the average time to complete the qigong protocol was 20.0 (SD=5.7) minutes. The average values for those physiological parameters and the compliance rate to "safe practice" criteria were listed in Table 2.3.

Criteria for "Safe Practice"			Physiological Responses			
		Compliance Rate		Rest	Exercise	Recovery
1.	No chest pain nor dizziness	100%	SpO2	95.66	94.46	95.66
				(1.04)	(1.04)	(1.04)
2.	No signs of insufficient blood	100%	HR	85.29	94.57	86.71
	circulation			(7.89)	(3.05)	(9.76)
3.	SpO2 maintained above 90%	100%	%HR Reserve	-	15%	-
					(11%)	
4.	No palpitation together with irregular	100%	Diastolic BP	74.00	81.43	80.57
	HR pattern			(8.85)	(10.20)	(9.59)
5.	Rise in HR within 70% of HR	100%	Systolic BP	121.00	138.29	127.57
	reserve			(17.53)	(20.52)	(13.19)
6.	No hypertensive nor hypoadaptive	85.7%	RPE	-	0.00	-
	responses in BP				(1.14)	
7.	Rise in BP normalized within 2	100%				
	minutes of rest					
8.	RPE below level 7 on the Borg scale	100%				

Table 2.3 Compliance Rate to "Safe Practice" Criteria and Average Physiological and Symptom Responses among the Seven Participants

In general SpO_2 was maintained above 90% indicating no oxygen desaturation during the practice of health qigong for all the subjects. The level of exertion was light as indicated by minimal increase in HR and perceived symptoms. All physiological parameters resumed the resting state at the 2nd minute of recovery. Compliance rate to "safe practice" was one hundred percentage for seven criteria only, with the exception of the 6th one on "hypertensive or hypoadaptive response". One subject, whose blood pressure at rest was 141 / 86, suffered from a mild hypertensive response (173 / 99) after the practice of the

qigong protocol. The possible reasons related to such response might be related to the poor sleep the night before and the stress induced by the evaluation process. Nevertheless, no other corresponding adverse symptoms were identified and his BP resumed to 140 / 92 after two minute of rest.

2.4. Discussion

Although the therapeutic effects of qigong remain inconclusive according to recent systematic reviews, positive clinical effects were supported (Kemp, 2004; Chen & Yeung, 2002). In our study the potential benefits of health qigong as a form of mindful exercise for rehabilitation of patients with COPD were generally supported by the experts. It is also in line with a recent report that many patients suffering from chronic disabilities positively perceived many forms of complimentary and alternative medicine, including qigong, to be adjunct therapy to the mainstream medicine (Carlson & Krahn 2006; Chui et al., 2005). The mechanism underlying the healing capacity of health qigong was postulated to be related to the enhancement of self-healing ability of our own body through increased circulation of the blood and lymph, which promotes delivery of oxygen and nutrients, removal of waste products from the cells, and better surveillance of the immune cells (Sancier & Holeman, 2004). On the other hand, the experts strongly recommended that further experiments are required for testing the efficacy of the health qigong especially the psychosocial benefits.

Based on the feedback of the expert panel and experience generated from the field test, our health qigong training protocol was modified. First, precautions against potential hypertensive response during and after practice the protocol would be employed, which included avoiding prolonged static postures to minimize the amount of isometric muscle work (e.g. the static standing posture during the meditative breathing for the cool down) and utilizing RPE as an aid to check safety. Second, additional sessions would be provided to those who learn slowly. Mild hypertensive response may also be detected in the 1st or 2nd training session associated with anxiety in learning new motor skills among those who may be anxious in exposing to new experience. However, this response would be short lasting and would quickly fade away in the following training sessions. Third, the ability to maintain standing balance and walk a few steps would be used as a criterion to select the appropriate patients for the follow-up RCT. Fourth, the section on handling potential injury of the manual (Appendix III) would be revised to have more information on emergency contact. Fifth, diagrams and posters illustrating the movements would be added to the manual to facilitate learning by the illiterate elderly. Last but not the least, different formats of AV materials would be prepared to facilitate technological compatibility. In fact, all of the suggestions have been addressed in our finalization of the protocol for use in the study. Although the sample in the field test may not be representative because of its size and convenience in nature, it is

reasonable to believe that the protocol would not cause any serious harmful effects when we take the findings in our systematic review into consideration.

2.5. Conclusion

An adapted version of “Baduanjin” specifically designed for COPD patients has successfully been developed based on expert opinions. Its safety and applicability have been reviewed by the pilot study reported above. It has been identified that the protocol is easy to practice, the training material facilitates learning, and the level of exertion is light. Based on the positive results of the pilot study, we then proceeded with the second stage of our study to conduct a randomized clinical trial (RCT) to test the effect of the health qigong protocol on individuals with COPD with constituted the focus of the next chapter.

CHAPTER 3

THE EFFICACY OF HEALTH QIGONG FOR COPD PATIENTS - A RANDOMIZED CONTROL TRIAL

3.1 Introduction

Pulmonary rehabilitation program (PRP) has been shown to effective in controlling symptoms and improving quality of life among patients with COPD. However, it remains uncertain how long the treatment effects would persist (Lacasse et al., 2007). Both overseas reports (Bestall, Paul, Garrod, Garnham, Jones & Wedzicha, 2003; Grosbois, 2002) and local experiences (Ng, So, Wong, Au-yeung & Mok, 2002) suggest that the initial gain from PRP would begin to fade away six months after the completion of rehabilitation program, especially among the older and frailer group. One possible reason may be due to the poor compliance of the patients to the home exercise program, which usually takes the forms of walking, weight training activities, and so forth. Such limitation of the conventional intervention has inspired me to explore if health qigong can be an alternative home exercise program, as it has several characteristics that seem to favor better compliance. First of all, it is easy to learn. Second, it can be practiced within a confined environment, and finally it has good perceived clinical benefits from a cultural perspective (Emery, 1995; Mutrie, 1999). Our prior studies demonstrated that compliance to the daily practice of health qigong was

significantly better than conventional remedial activities among the frail elderly clients with multiple chronic disabilities (Tsang, Mok, Au-yeung, & Chan, 2003; Tsang et al., 2006). Some local self-help groups comprising COPD patients had commenced out of their own initiative to practice this form of qigong regularly with the intention to improve their health.

Health qigong (HQG) is an exercise that the Traditional Chinese Medicine (TCM) practitioners would prescribe to the COPD patients for strengthening the function of different internal organs during the remission stage. The effect of health qigong training among COPD patients were explored in two prior studies. Lung function as well as the descending and ascending breath of the diaphragm showed better improvement after practicing health qigong for three weeks as compared to external diaphragm pacer therapy (Xu, 2000). The extent of paradoxical thoraco-abdominal motion both at rest and during resistance was abated and the threshold of dyspnea was raised after 16 weeks of training (Liang et al., 1998). However, data pertinent to the long-term effect of regular health qigong practice on other aspects, such as the functional capacity and quality of life, is scarce. We intend to investigate the effect of more extended period of practice of Baduanjin, one form of standardized health qigong, on both physical and psychosocial functions of patients with COPD. In this thesis, it is hypothesized that Baduanjin, as an alternative home exercise program, would produce a better functional capacity and quality of life than the conventional management at the 6-month follow-up assessment.

3.2. Method

3.2.1. Design of the Experiment

This was a randomized controlled trial (RCT) with single blinded outcome assessors. The outcomes assessment was administered by blinded assessors, who did not know which treatment arms each subject was assigned, at four time points: on admission to the study prior to randomization, at the time of discharged from the pulmonary rehabilitation program, at 3-month follow-up, and at 6-month follow-up.

3.2.2. Participants and Settings

The study was undertaken in a respiratory care hospital which has been providing ambulatory rehabilitation program for COPD patients since early 90s in Hong Kong. Subjects fulfilling the following criteria were recruited, a) with diagnosis of COPD confirmed by spirometry and medical history, b) with confirmed air-flow limitation of less than 70% of predicted value of forced expiratory volume in the 1^{st} second (FEV_1) , c) medically stable as interpreted by no hospital admissions for chest problems in the past month, d) had already stopped smoking at least for six months, e) no other disabling diseases (e.g. strokes, Parkisonism, etc.), f) willing to participate in our 12-session out-patient pulmonary rehabilitation program, and, g) no prior history of practicing qigong.

3.2.3. Sample Size and Power Calculation

The six-minute walk test (6MW), which is commonly accepted as the most sensitive outcome measure in pulmonary rehabilitation (Wise & Brown, 2005), was chosen in sample size estimation. A change of 54 meters in the 6MW was identified as the minimum clinically significant difference between group means (minDIFF), and the standard deviations (SD) of the measure was reported as 57meters in our prior report (Ng et al., 2002). Setting the alpha at 0.05 (two-tailed) and the power at 80%, the calculated sample size for each arm was 19 according to the following formula, $[1.96 + 0.84]^2 * 2 * SD^2 / minDIFF^2$. To compensate for the potential 30% dropouts and loss to follow-up, the sample size was adjusted to be not less than 27 subjects for each arm. Finally 80 patients were recruited for the randomization.

3.2.4. Randomization & Allocation Concealment

A prior randomization list was drawn based on random number generated by computer before the implementation of the study, and sealed in a data-base file with security password. In order to achieve a balanced numbers of treatment and control subjects at every single point of time for the purpose of ongoing monitoring, randomization strategy according to "permuted blocks" was adopted (Keech 1998). According to the "permuted blocks" strategy, for every block of four subjects, the possible combination sequences were: 1) TTCC, 2)

TCTC, 3) TCCT, 4) CCTT, 5) CTCT, and 6) CTTC, where T indicated "Treatment" and C indicated "Control". Based on the random number drawn for the 1st of every four allocations, the particular sequence of T and C out of the six possible combinations was selected for these four subjects. In case the random number for the 1st subject was out of the range from 1 to 6, the random number for the 2nd subject was adopted. On the 9th training session of the pulmonary rehabilitation training program of each potential subjects, the occupational therapist, who was originally concealed to the list opened the file and assigned the subject to either the treatment or control groups accordingly.

3.2.5. Intervention Protocols

For the treatment group, each patient received four 45-minute training sessions on Health Qigong as led by a trained therapist, together with a home learning package in the format of audio-visual material. The specific form of health qigong chosen in this study was "Baduanjin" (BDJ) (Chinese Health Qigong Association, 2007; Tsang et. al., 2003; Tsang, et. al., 2006). It consists of eight distinct movement routines, and each movement routine is repeated six times. The whole protocol usually takes 12-15 minutes to complete at the usual pace. Based on opinions of the expert panel, five adaptations which have been reported earlier in Chapter 2 were recommended. In order to maximize the potential benefits of the training, the minimal dosage of the training protocol that the experts advised was to keep

practice at least one time per day and for at least four times in a week up till the 6-month follow-up. To keep record of their own practice, each patient was issued a printed dairy time log.

For the control group, each patient received the same number and duration of training sessions reinforcing the current breathing (including pursed-lip and coordinated breathing) and walking exercise programs to make it more comparable to the treatment group in terms of additional staff attention given to the participants. In addition, they were advised to keep daily walking for not less than 30 minutes up till the 6-month FU, and record using the time log.

3.2.6. Outcome Measures

Outcome measures were selected based on a number of criteria that included specificity for pulmonary rehabilitation, local validation data available, and Chinese translation done. Primary outcomes involved functional capacity scales (the Six-minute Walk Test, 6MW; the Monitored Functional Task Evaluation, MFTE). Secondary outcomes involved quality of life scales (the General Health and the Mental Health subscales of the Medical Outcomes 36-Item Short Form Health Survey, SF36; the Chinese Chronic Respiratory Questionnaire, CCRQ)

The **6-minute Walk Test (6MW)** test is a commonly used to assess the exercise capacity and the functional status of elderly and patients with severe cardiopulmonary diseases (Hamilton & Haennel, 2000). It is simple as it uses an exercise mode that is well accepted

by patients and relevant to everyday activities. It is safe as it is self-paced and sub-maximal in nature, and inexpensive. It is usually conducted over a pre-measured walkway. At the beginning of the walk, patients are instructed to walk along the walkway covering as much distance as possible during six minutes. They can slow down or stop if necessary, but the clock continues to run, and they are to resume walking as soon as they are able. Mobility aids are allowed if the patients need to use them. No verbal encouragement would be provided during the test. Saturation of Oxygen, pulse and blood pressure are checked before and after the test. Total distance in meters is calculated for each walk. It has well documented test-retest reliability (intra-class correlation being 0.97), and is found to be linearly related to maximum METs ($r=0.687$, $p<0.001$) (Hamilton & Haennel, 2000).

The **Monitoring Functional Task Evaluation (MFTE)** is a locally developed functional assessment for patients suffering from chronic chest conditions (Fong, Ng, Chow, Chan, Chin, Chen & Mok, 2001). The patient is required to perform five tasks, each simulating actions and energy requirement in daily living. Patients start at the lowest energy level and proceed to another one level up. The duration of each activity is minutes and a rest period of two minutes is allowed before proceeding to another one level up. Saturation of oxygen, pulse, clinical signs & symptoms of cardiopulmonary insufficiency are monitored throughout the assessment. The raw score is converted to a standardized score for subsequent computation of the total score. It has very good test-retest reliability (intraclass correlation being 0.92),

and is linearly related to COPD disability scale ($r=-0.583$, $p<0.01$) and 6-minute walk ($r=0.322$, $p<0.01$).

The **Medical Outcomes 36-Item Short Form Health Survey (SF-36)** is a brief questionnaire with 36 items designed to measure the generic quality of life. Thirty-five items of the SF-36 are summated into a profile of eight scale scores: physical function (PF), role limitations due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitation due to emotional problems (RE), and mental health (MH). The raw scale score is the sum of the values of all items under the scale; the eight raw scale scores have different ranges. The raw scores are then converted to transformed scale scores, which range from 0 to 100. Higher scores indicate better quality of life. In 1991, the SF-36 was selected as the instrument in the International Quality of Life Assessment (IQOLA) Project. Chinese translation is available. For the purpose of supplementing information not measured by the disease specific QOL scales, only the General Health and Mental Health dimension of the score was used in this study. Both the general health and mental health sub-scales have high internal consistency reliability (Cronbach's alpha >0.70 for both). The mental health subscale is also correlated highly with the associated hospital anxiety and depression scores (Spearman rank correlation coefficient = -0.62, $p<0.05$) (Fuh, Wang, Lu, Juang & Lee, 2000; Lam, Gandek, Rex & Chan, 1998).

The **Chronic Respiratory Questionnaire (CRQ)** is questionnaire specifically designed to measure the quality of life of patients suffering from chronic lung diseases. It includes 20 items divided into four domains: dyspnea (five items), fatigue (four items); emotion function (seven items); and mastery, a domain that explores how patients cope with their chronic illness (four items). In the dyspnea domain, items are "individualized": patients are asked to choose the five day-to-day activities that are most important to them and in which they experience exertional dyspnea, and also specify the degree of dyspnea in these items. Patients are asked to grade their function in each item using a seven-point scale. Total score for each domain is divided by the number of items, yielding a potential score of one to seven. Higher numbers represent better function. The questionnaire has been validated (Guyatt, Berman, Townsend, Pugsley & Chambers, 1987) and proved useful in assessing a variety of medical interventions in COPD, including pharmacological intervention (Jaeschke, Guyatt, Willan, Cook, Harper, Morris, Ramsdale, Haddon & Newhouse, 1994) and rehabilitation (Vale, Reardon & ZuWallack, 1993; Wijkstra, Van Altena, Kraan, Otten, Postma & Koëter, 1994). A Chinese version of the CRQ was developed by a group of local occupational therapists (Chan, Tam, Chan, Ng & So, 2006). The Spearman's rho correlation coefficients for test-retest reliability range from 0.79 to 0.94 for different sub-scores, and the dyspnea sub-score is linearly related to the 6MW ($r=0.26$, $p<0.01$) and MFTE ($r=0.36$, $p<0.01$).

Lung function data and the BODE index (body-mass index, airflow obstruction, dyspnea, and exercise capacity index, with a range from 0 to 10. A higher BODE Score, indicates more advance or severe the stages of COPD) which were routinely assessed by the team at baseline would be adopted for use in possible subgroup analysis.

3.2.7. Data Analysis

Student t-test and Fisher exact test were used to compare baseline characteristics of the two groups. To test for differences in group and time interaction, repeated measures ANOVA, followed by post-hoc t-test analysis at each follow-up time point, were employed. To test for group differences in mean change from baseline at the 6-month follow-up, t-test was used. Results were reported as significant at α equal to or less than 0.05, except in post-hoc analysis where the α values were adjusted accordingly. The analysis was firstly done with the intention-to-treat (ITT) approach, which included all randomized subjects classified according to their randomization and irrespective of their completion of treatment and follow-up assessments. Missing values at discharge, at 3-month FU and 6-month FU were imputed using “last observation carried forward” (LOCF) method. Then the analysis was repeated using the per-protocol approach, which included only subjects who had completed all the follow-up assessment and had been complied to the treatment protocol (i.e., at least 4 times of HQG practice in a week).

3.3. Result

A total of eighty-three subjects were approached. Eighty of them, who fitted the inclusion criteria agreed to participate and continued with the random allocation (Fig 3.1). A response rate of 96.4% was thus obtained. Forty subjects were allocated to each treatment arm with no significance differences found between the groups at baseline (Table 3.1). The total numbers of “dropout” and “loss to follow-up” were also comparable between the two groups: 30% for the health qigong group and 27.5% for the control group. All subjects, irrespective of their group status, performed daily walking exercise for not less than 30 minutes during the six month of follow-up. For the HQG group, only twenty-three cases followed through the health qigong practice of not less than one time a day and four times a week by themselves up to the six-month follow-up, according to the prescribed protocol. The remaining five withdrew from practice shortly after discharge from the PRP program. The major reasons were because of poor health and forgetting how to perform the various routines as well as how to use the audio-visual training material.

	Conventional Control (n = 40)	Health Qigong (n = 40)	p
Age	73.12 (1.33)	71.75 (1.05)	0.42[t]
% of “Male”	85.0%	92.5%	0.29[F]
% on “Oxygen Therapy”	40.0%	37.5%	0.82[F]
BODE Index	4.95 (0.35)	4.68 (0.32)	0.57[t]
Body Mass Index	19.97 (0.61)	18.89 (0.60)	0.21[t]
FEV_1(% of predicted)	36.75 (2.11)	37.13 (2.22)	0.90[t]
Functional Capacity			
6-Minute Walk (m)	310.15 (14.99)	310.78 (10.71)	0.97[t]
MFTE	17.53 (0.53)	17.23 (0.45)	0.67[t]
Quality of Life			
SF-36			
General Health sub-scale	49.48 (3.69)	42.58 (3.38)	0.17[t]
Mental Health sub-scale	72.60 (4.31)	68.40 (3.55)	0.45[t]
CRQ			
Dyspnea sub-scale	5.03 (0.17)	4.76 (0.19)	0.28[t]
Fatique sub-scale	4.69 (0.20)	4.66 (0.18)	0.93[t]
Emotion sub-scale	5.31 (0.20)	5.05 (0.20)	0.37[t]
Mastery sub-scale	5.27 (0.19)	5.01 (0.19)	0.34[t]

Numbers in parentheses designate standard error

FEV_1: Forced expiratory volume in the 1st sec. MFTE: Monitored functional task evaluation CRQ: Chronic respiratory questionnaire

[t] Independent sample t-test [F] Fisher’s Exact Test

Table 3.1 Comparison of Baseline Characteristics of all randomized Cases

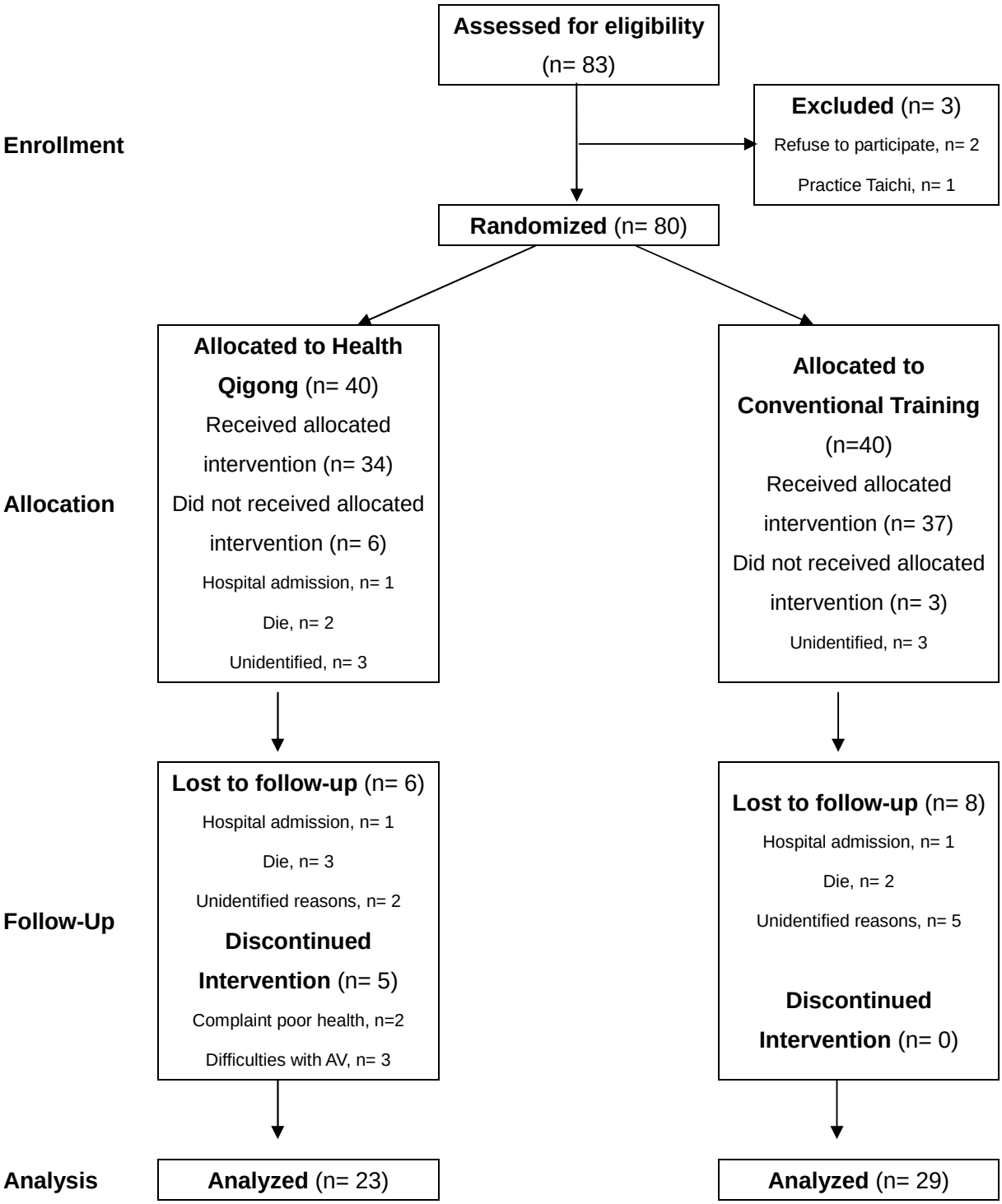


Figure 3.1 CONSORT Flow Diagram

In the ITT analysis, functional capacity measures and quality of life measures did not differ significantly between groups in both repeated measure ANOVA test and t-test for mean changes from baseline at 6-month follow-up (Tables 3.2 & 3.3). However, trends of better improvement in functional capacity among the health qigong subjects were noted. The mean changes from baseline for the 6-minute walk were 27.25 m (SE = 52.26) in the HQG group and 10.65 (SE = 59.43) in the control group, and those for the MFTE were 1.07 (SE = 3.08) in the HQG group and 0.50 (SE = 1.78) in the control group. Moreover, trends of deterioration in quality of life measures were noted in the control group. Four QOL subscales showed negative changes in the mean changes from baseline in the control group, but all QOL subscales showed positive changes in the HQG group. In the per-protocol analysis, the HQG group showed significant better improvement in functional capacity measures in both repeated ANOVA and mean changes from baseline score (Tables 3.2 & 3.3). The mean changes from baseline for the 6-minute walk were 55.22 m (SE = 10.24) in the HQG group and 7.28 (SE = 9.91) in the control group, and those for the MFTE were 1.96 (SE = 0.65) in the HQG group and 0.21 (SE = 0.27) in the control group (Fig 3.2). Post-hoc analysis further reflected that the initial benefit from PRP for the control subjects stopped to improve and/or even started to deteriorate in the period between 3-month and 6-month follow-up, but for the HQG subjects outcomes were maintained and/or continued to improve in the period (Table 3.4, and Fig 3.3). Significant better improvements were also noted in “CRQ: Emotion”

subscale in repeated measures ANOVA test and in “SF36: General Health” subscale in t-test for “mean change from baseline” at 6-month follow-up among the HQG subjects. For the other QOL subscales, trends of better improvement among the HQG subjects especially in the 3-month and 6-month follow-up periods were noted but did not reached a significant level.

Subgroup analysis of those five participants who defaulted HQG training was conducted by comparing the “Mean Changes within subjects from Baseline at 6M-FU” among the three groups; “HQG: Full complaint (n = 23)”, “HQG: Non-complaint (n = 5)”, and the “Control (n = 29)” using one way ANOVA. Post-hoc analysis, using the Bonferroni method, was then performed to further detect differences between these groups. Significant differences were identified for the primary outcome measures and the SF36-General Health Subscale among the 3 groups. Post-hoc analysis found that the 5 participants, who defaulted HQG training, made similar progress as the control group but had significant difference when compared with the “HQG full complaint” group (Table 3.5).

		Intention to treat analysis (Last Observation Carried Forward)				Per-Protocol Analysis		
		Baseline	6-M FU	p-values [#]		Baseline	6-M FU	p-values [#]
Functional Capacity								
6-Minute Walk (m)	HQG (n = 40)	310.78 (13.03)	338.53 (13.42)	0.26	HQG (n = 23)	316.57 (15.43)	371.78 (14.73)	**0.00 ***
	Control (n = 40)	310.15 (13.03)	320.80 (13.42)		Control (n = 29)	318.66 (14.04)	325.93 (13.29)	
MFTE	HQG (n = 40)	17.23 (0.49)	18.30 (0.40)	0.39	HQG (n = 23)	17.33 (0.57)	19.29 (0.36)	**0.01 ***
	Control (n = 40)	17.53 (0.49)	18.03 (0.40)		Control (n = 29)	18.25 (0.51)	18.45 (0.32)	
Quality of Life								
SF-36:General Health	HQG (n = 40)	42.58 (3.54)	44.00 (3.65)	0.26	HQG (n = 23)	44.96 (5.02)	54.00 (5.17)	0.10
	Control (n = 40)	49.48 (3.54)	45.48 (3.65)		Control (n = 29)	50.72 (4.47)	47.24 (4.99)	
SF-36: Mental Health	HQG (n = 40)	68.40 (3.95)	68.50 (4.00)	0.57	HQG (n = 23)	70.26 (4.15)	74.09 (5.00)	0.17
	Control (n = 40)	72.60 (3.95)	69.50 (4.00)		Control (n = 29)	79.59 (3.69)	74.07 (4.89)	
CRQ: Dyspnea	HQG (n = 40)	4.76 (0.18)	5.05 (0.21)	0.52	HQG (n = 23)	4.89 (0.23)	5.52 (0.26)	0.18
	Control (n = 40)	5.03 (0.18)	5.28 (0.21)		Control (n = 29)	5.15 (0.21)	5.41 (0.23)	
CRQ: Fatigue	HQG (n = 40)	4.66 (0.19)	4.77 (0.18)	0.72	HQG (n = 23)	4.57 (0.24)	4.87 (0.24)	0.56
	Control (n = 40)	4.68 (0.19)	4.62 (0.18)		Control (n = 29)	4.85 (0.22)	4.79 (0.21)	
CRQ: Emotion	HQG (n = 40)	5.05 (0.20)	5.29 (0.19)	0.06	HQG (n = 23)	5.06 (0.25)	5.50 (0.22)	**0.04 ***
	Control (n = 40)	5.31 (0.20)	5.24 (0.19)		Control (n = 29)	5.43 (0.23)	5.40 (0.20)	
CRQ: Mastery	HQG (n = 40)	5.01 (0.19)	5.48 (0.19)	0.17	HQG (n = 23)	5.15 (0.25)	5.79 (0.23)	0.36
	Control (n = 40)	5.27 (0.19)	5.48 (0.19)		Control (n = 29)	5.31 (0.22)	5.65 (0.20)	

Numbers in parentheses designate standard error

HQG: Health Qigong MFTE: Monitored Functional Task Evaluation CRQ: Chronic Respiratory Questionnaire

[#] p-values for "Intervention x time interaction" generated from repeated measures ANOVA * indicating statistically significant difference with $p < 0.05$

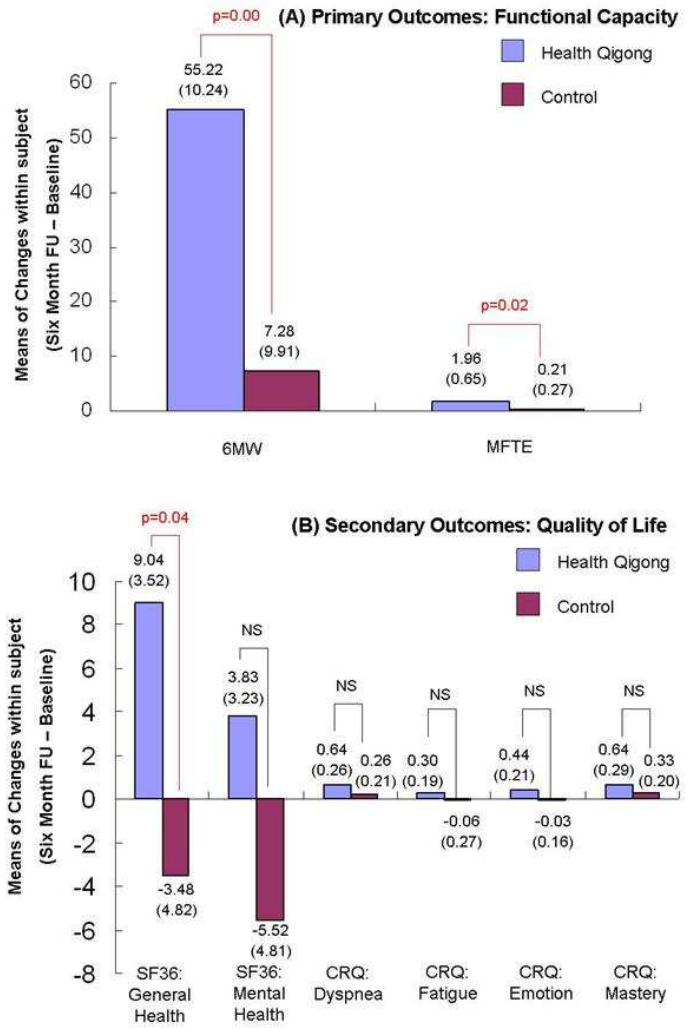
Table 3.2 Summary of Repeated Measures ANOVA for intention to treat analysis and per-protocol analysis

	Intention to treat analysis (Last Observation Carried Forward)				Per-Protocol Analysis			
	HQG (n = 40)	Control (n = 40)	p-value	Effect Size	HQG (n = 23)	Control (n = 29)	p-value	Effect Size
Functional Capacity								
6-minute Walk (m)	27.25	10.65	0.18	0.31	55.22 (10.24)	7.28 (9.91)	**0.00 ***	0.94
	(52.26)	(59.43)						
MFTE	1.07	0.50	0.31	0.23	1.96 (0.65)	0.21 (0.27)	**0.02 ***	0.92
	(3.08)	(1.78)						
Quality of Life								
SF36: General Health	1.4	**-4.0**	0.19	0.30	9.04	**-3.48**	**0.04 ***	0.59
sub-scale	(17.66)	(19.17)			(3.52)	(4.82)		
SF36: Mental Health	0.1	**-3.1**	0.42	0.18	3.83	**-5.52**	0.12	0.44
sub-scale	(18.38)	(17.22)			(3.23)	(4.81)		
CRQ: Dyspnea	0.29	0.25	0.87	0.04	0.64	0.26	0.27	0.32
sub-scale	(1.12)	(1.05)			(0.26)	(0.21)		
CRQ: Fatigue	0.11	**-0.07**	0.48	0.18	0.30	**-0.06**	0.30	0.30
sub-scale	(0.82)	(1.32)			(0.19)	(0.27)		
CRQ: Emotion	0.24	**-0.07**	0.11	0.37	0.44	**-0.03**	0.08	0.51
sub-scale	(1.23)	(0.85)			(0.21)	(0.16)		
CRQ: Mastery	0.48	0.21	0.28	0.25	0.64	0.33	0.39	0.25
sub-scale	(1.13)	(1.07)			(0.29)	(0.20)		

Numbers in parentheses designate standard error

Table 3.3 Comparison of "mean changes from baseline" at 6-month follow-up (i.e. 6M FU data minus Baseline Assessment data)" , and effect sizes, Cohen's ds, for each Outcome Measures for Health Qigong Group and the "Conventional" Control Group subjects using intention to treat analysis and per-protocol analysis.

Figure 3.2 Comparison of "Mean Changes within subjects from baseline at 6-month follow-up", per-protocol analysis



Outcome measure	Intervention group	Time: Baseline Mean (SE)	Time: End of PRP Mean (SE)	Time: 3M FU Mean (SE)	Time: 6M FU Mean (SE)	Intervention x time interaction p value
6-Minute Walk (m)	HQG	316.57 (15.43)	369.52 (12.77) *	370.26 (13.95) *	371.78 (14.73) *	**0.00**
	Control	318.66 (13.74)	344.45 (11.37) *	338.03 (12.42) *	325.93 (13.12)	
	p value: HQG vs Control	*0.92*	*0.15*	*0.09*	***0.02***	
MFTE	HQG	17.33 (0.57)	19.10 (0.31) *	18.98 (0.36) *	19.29 (0.36) *	**0.01**
	Control	18.25 (0.51)	18.76 (0.28)	18.77 (0.32)	18.45 (0.32)	
	p value: HQG vs Control	*0.24*	*0.42*	*0.66*	*0.07*	
SF-36						
General Health sub-scale	HQG	44.96 (5.02)	45.83 (5.34)	51.30 (5.42)	51.83 (5.60)	0.17
	Control	50.72 (4.47)	50.59 (4.76)	57.97 (4.82)	47.24 (4.99)	
	p value: HQG vs Control	*0.40*	*0.51*	*0.36*	*0.54*	
Mental Health sub-scale	HQG	70.26 (4.15)	68.00 (4.59)	69.39 (4.62)	72.35 (5.49)	0.25
	Control	79.59 (3.69)	79.31 (4.09)	78.76 (4.11)	74.07 (4.89)	
	p value: HQG vs Control	*0.10*	*0.07*	*0.14*	*0.82*	

Table to be continued in next page…

Outcome measure	Intervention group	Time				Intervention x time interaction
		Baseline	End of PRP	3M FU	6M FU	
		Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	
CRQ						
Dyspnea sub-scale	HQG	4.89 (0.23)	5.34 (0.21)	5.37 (0.25)	5.52 (0.26) *	0.18
	Control	5.15 (0.21)	5.76 (0.19) *	5.34 (0.22)	5.41 (0.23)	
p value: HQG vs Control		*0.40*	*0.14*	*0.95*	*0.76*	
Fatique sub-scale	HQG	4.57 (0.24)	4.87 (0.20)	4.77 (0.25)	4.87 (0.24)	0.56
	Control	4.85 (0.22)	5.10 (0.18)	4.94 (0.22)	4.79 (0.21)	
p value: HQG vs Control		*0.38*	*0.41*	*0.62*	*0.82*	
Emotion sub-scale	HQG	5.06 (0.25)	5.18 (0.22)	5.26 (0.25)	5.50 (0.22) *	**0.05**
	Control	5.43 (0.23)	5.74 (0.19)	5.54 (0.22)	5.40 (0.20)	
p value: HQG vs Control		*0.29*	*0.06*	*0.39*	*0.74*	
Mastery sub-scale	HQG	5.15 (0.25)	5.57 (0.23)	5.55 (0.26)	5.79 (0.23) *	0.36
	Control	5.31 (0.22)	6.00 (0.20)*	5.71 (0.23)	5.65 (0.20)	
p value: HQG vs Control		*0.64*	*0.16*	*0.66*	*0.63*	

* indicating statistically significant change from baseline value of the corresponding intervention group at p<0.05

Table 3.4 Post-hoc Analysis for Outcome Measures for Health Qigong Group and Control Group subjects over time as in Per-Protocol Analysis

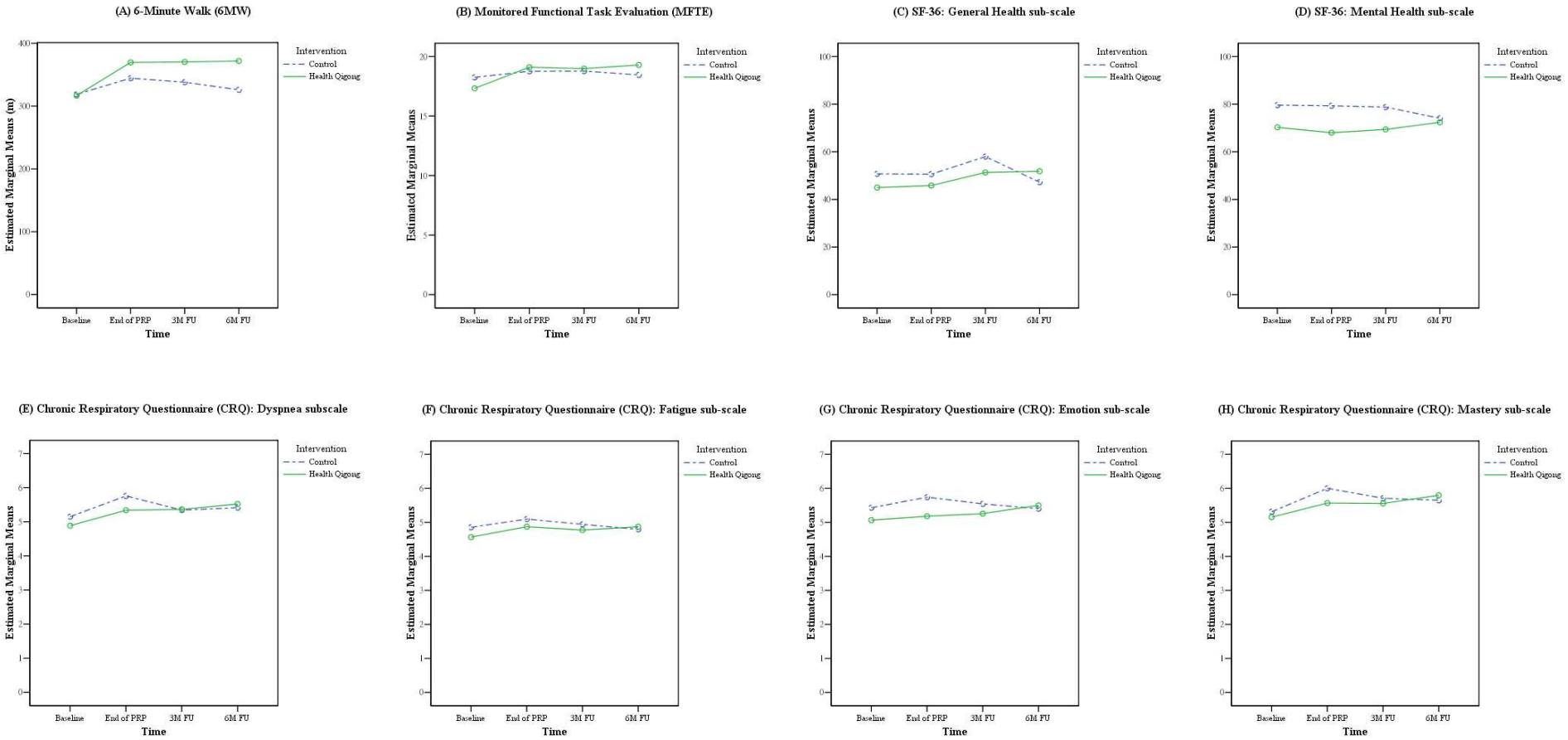


Figure 3.3 Longitudinal changes in outcome measures by intervention (Health Qigong [solid line], or control [dotted line] in Per-Protocol Analysis: (A) 6 Minute Walk, (B) Monitored Functional Task Evaluation, (C) SF-36 General Health subscale, (D) SF-36 Mental Health subscale, (E) Chronic Respiratory Questionnaire (CRQ) Dyspnea sub-scale, (F) CRQ Fatugue sub-scale, (G) CRQ Emotion subscale, &, (H) CRQ Mastery subscale.

	Group			One-way ANOVA		Post-hoc 2 x 2 Comparison by Bonferroni		
Outcomes	HQG-FC n = 23	HQG-NC n = 5	Control n = 29	F	p	HQG-FC vs. HQG-NC	HQG-FC vs. Control	HQG-NC vs. Control
6 MW	55.22 (10.24)	-43.6 (11.35)	7.28 (9.91)	10.60	**0.00**	*	*	**ns**
MFTE	1.96 (0.65)	-1.5 (1.99)	0.21 (0.27)	5.18	**0.01**	*	*	**ns**
SF36-GH	9.04 (3.52)	-15.4 (8.49)	-3.48 (4.82)	4.45	**0.02**	*	*	**ns**
SF36-MH	3.83 (3.23)	4.8 (5.43)	-5.52 (4.81)	1.50	0.23	-	-	-
CRQ-D	0.64 (0.26)	-0.72 (0.27)	0.26 (0.21)	2.94	0.06	-	-	-
CRQ-F	0.30 (0.19)	-0.30 (0.22)	-0.06 (0.27)	0.85	0.43	-	-	-
CRQ-E	0.44 (0.21)	0.03 (0.12)	-0.03 (0.16)	1.81	0.17	-	-	-
CRQ-M	0.64 (0.29)	0.05 (0.09)	0.33 (0.20)	0.70	0.50	-	-	-

FC, Full Compliant NC, non-Compliant

Table 3.5 End-point analysis among the the HQG (Full compliant), HQG (Non-compliant) and control groups by 1-Way ANOVA

3.4. Discussion

The results support the hypothesis that health qigong exercise serves as an alternative home program to produce better improvement in the functional capacity of COPD patients at the 6-month follow-up than conventional program, under the condition that the HQG subjects complied with the protocol. It is not surprising with this finding, as literally the word “gong” in Chinese refers “skills or accomplishment cultivated through committed and regular practice”, and participating only in a few sessions of health qigong training is not adequate to produce any improvement on the health status. However, the group difference appears smaller in the quality of life aspect than in functional capacities; effect sizes for the “SF-36: General Health” subscale and the “CRQ: emotion” subscale being 0.59 and 0.51 respectively, and range from 0.25 to 0.41 for the other aspects. The phenomenon is also noted in our prior studies, which suggests that it takes accumulation of more improvement in physical function over a longer time to make the effect generalized to subjective report of better outcomes among the Chinese (Tsang et. al., 2006).

Non-significant results were obtained based on the ITT analysis. This might be due to: i) under-estimation of the sample size, ii) limitations of the adopted statistical methods, and iii) high attrition rate. In the field of pulmonary rehabilitation the minimum clinically important difference (MCID), usually defined as “the smallest difference perceived as important by the average patient” (Lacasse, Wong, Guyatt, King, Cook & Goldstein, 1996), was applied to

sample size calculation in our study. However, there is still debate on the various aspects of MCID (e.g. its definition, method to calculate it, its response upon specific baseline score, etc.) (Beaton, Boers & Wells, 2002). Tubach, Giraudeau and Ravaud (2009) reported that MCID did not have any impact on treatment effect estimates. Thus it should be more appropriate to implement feasibility study and/or based on results of prior related studies in sample size estimation in planning a RCT. In our study, we conducted interval analysis and upwardly regulated our sample size from 27 to 40 for each arm upon interval analysis. More number of subjects is therefore suggested in future studies. The two statistical approaches we adopted in our study have potential limitations. The “per-protocol analysis” faces sample bias; as the final subjects may not represent those that are randomized. The “intention to treat analysis using the LOCF method to impute missing values” faces estimation bias. However, because of its ease of implementation and low computational complexity, these approaches are considered the commonest methods in most clinical research (Gueorguieva & Krystal, 2004). Mixed-effects models have advantages over these conventional methods by using the most available information across different time-points of measurement, and adjusting for missing data (as long as they are missing at random). In fact, implementing both the conventional as well as the mixed-effect models in data analysis has become an emerging trend. However, our team adhered to the conventional method of analyzing the data. The total attrition rates for the two groups (i.e., 27.5% and 30%), though comparable, are high. In addition, the rate of

treatment discontinuation among the HQG training group (i.e., 17.9%) is high. Control measures to minimize both the attrition rates and treatment discontinuation rates are definitely indicated.

3.5. Conclusion

In conclusion, exercise training is definitely a proven modality in PRP, and how exercise should be conducted in an attempt to produce better outcomes especially for longer period still have room for further improvement. This study provides evidence to support the clinical application as well as further related research in using this traditional Chinese “mind-body” exercise, the Health Qigong, in the rehabilitation of COPD.

CHAPTER 4

DISCUSSION AND CONCLUSIONS

4.1. Summary of Original Contributions

4.1.1. Enhancing the Pulmonary Rehabilitation Program

COPD remains a major health care problem that contributes a cost burden to the community. Despite years of experience in pulmonary rehabilitation, there are still limitations due to the complex pathology, which involves both pulmonary and extra-pulmonary variables, of the disease. Exercise, a major component of pulmonary rehabilitation, is generally supported for its clinical utility in the management of this chronic disease, but many issues remain unresolved such as the specific modalities, the optimal intensity, the interplay among many subject characteristics (e.g., severity of the diseases, coexisting with muscle wasting, etc.), the way of how an exercise habit can be maintained, etc. (Grosbois, 2002). In clinical practice, promotion of regular engagement in any kind of physical activity at a level that the patient feels enjoyable and competent is an accepted standard. It is believed that such regular engagement would contribute improvement in exercise performance, health, and quality of life. In selecting a particular physical activity for enforcing as a regular habit, it should not be constrained by the environment, the need for specialized and high cost equipment. This is essential among our older and frailer COPD

patients, who may have mobility problem to attend sport centers for exercise programmes, or may have less financial resources to invest on sport equipment. Moreover, the physical activity should not be too complex as some of the patients may have less learning ability to acquire new skills. Walking exercise is supposed to fit all these characteristics but in reality it does not necessary produce satisfactory outcomes (Donesky-Cuenco, Janson, Neuhaus, Neilands & Carrieri-Kohlman, 2007). Thus with our prior success in using HQG for elderly with chronic disability and depression (Tsang et al. 2003, 2006), HQG comes into its place during our teams' exploration for improving in pulmonary rehabilitation.

Given the limitations of the existing clinical practice, we intend to explore an alternative exercise program for the older and frailer COPD groups, which can be applied either within a home setting and/or in community settings, for example, in self-help groups. Based on positive findings of our earlier work (Tsang et al. 2003, 2006), there are reasons to believe that health qigong can also be applicable for COPD patients. The empirical findings reported in this thesis are valid in substantiating the clinical efficacy of health qigong in the management of patients with COPD. First, HQG is a safe and alternative form of exercise for patients with COPD as supported by our expert review, the field test, as well as the monitoring of our subjects in the RCT (Chapter 2). Second, trend of better improvement in functional capacities and the QOL aspects is noted among HQG subjects whereas trend of deterioration is noted among control subjects over the 6-month follow-up period across

various outcome measures (Chapter 3).

4.1.2. Adopting Stringent Methodology in Health Qigong Research

In order to let health qigong be recognized according to the Western Medicine standard, our team has tried to be as meticulous as possible in our experiment design. Firstly, to broaden our views on HQG as a therapeutic modality, we conducted a systematic review to explore the state as well as the level of related scientific evidence in the past fifteen years before conducting research. The major findings from this systematic review are that, i) it is safe, ii) positive improvement are warranted though not necessary much better than any existing conventional approaches, iii) the therapeutic effect is proposed to be mediated through enhancing better circulation which is then essential for the regulation of both the inflammatory and immune responses for the enforcement of the body's natural self-healing ability, and, iv) Baduenjin is the most widely applied form of health qigong (Chapter 1). Two related studies on COPD patients are located in the review. One is a RCT while the other one is a pre-post clinical trial, with both studies reporting some positive evidence in support of this intervention for pulmonary rehabilitation. The review also explores the limitations in research methodology of these studies, which served to alert us for consideration in planning our experiment. Most of these HQG studies belong to the low grade level according to the JADAD score indicator.

Secondly, before the implementation of the experiment, the involved intervention was evaluated for its potential value and safety in its application (Dixon, 1998). An expert panel, consisting of members with rich experience in the management of patients with COPD was invited for evaluating the protocol (Chapter 2). The health qigong intervention protocol was generally supported with some valuable comments for the protocol itself as well as for the recruitment of appropriate subjects in the thereafter experiment process. Moreover, a field test was conducted among eight COPD patients with its safety confirmed. Five major adaptations to the treatment protocol were made to address the limitations of the COPD patients; they are, i) focusing the "Mind" on perceived exertion, perceived dyspnea or perceived pain (not over 4.5 on VAS) in order to control the pace of practice, ii) adopting natural breathing, incorporating "pursed-lip" breathing if necessary, and using movements to guide breathing pattern, iii) performing movements at a range within the one's comfort zone, while a little sense of stretching is required, iv) allowing pauses for rest, whenever necessary, and, v) allowing choices of movement routines that the patients feel competent to practice at the start and gradually upgrading to the full set according to individual progress.

Thirdly, in planning and conducting the RCT, methodological limitations in prior RCTs have been fully considered and methods of further improvement are identified. These include; i) allocation concealment, ii) using blinded assessors in outcome assessment, iii) comparable placebo treatment for control group, iv) more subjects, preferably more than 30 for each arm,

v) longer follow-up period, preferably not less than 6 months, vi) controlling for compliance, and vi) using different analysis approaches (including ITT, per-protocol, etc.) in data analysis (Chapter 3). In our RCT, most of the above suggestions were integrated into the methodology. Moreover, to eliminate the potential effect of social support brought about by participating in the HQG groups over the HQG itself, an individual training approach was adopted in our study.

4.1.3. Proposing the Anti-inflammation Effect of HQG

Despite this encouraging clinical finding, the basic physiological mechanism which underpinned the improvement remains unclear. What is certain is that the improvement cannot be explained by “overload” which is regarded as the conventional exercise training principle. The “overload” principle reflects the concept of intensity, and implies that in order for the muscle to improve in structure and/or function it must be taxed beyond a critical level. The metabolic requirement for performing movements of health qigong and Tai Chi belongs to a “low intensity” physical activity. The metabolic equivalents (MET) is estimated to be ranging from 1.5 to 2.6 (Chao, Chen, Lan & Lai, 2002), and the mean of the induced maximum heart rates ranges from 43% to 49% of predicted maximum heart rates (Lan, Chou, Chen, Lai & Wong, 2004). We therefore believe that there should be a different physiological mechanism to explain how health qigong improved the functional capacity of our subjects. There has been

debate on the viewpoint that whether “high intensity” exercise or “low intensity” exercise should be used for COPD patients, especially those with muscle wasting (Datta & ZuWallack 2006). Evidence is mounting in support of the “inflammatory theory” which states that muscle dysfunction in COPD patients cannot be solely explained by “disuse atrophy”. Instead, it is related to myopathic change and inhibition of muscle regeneration with chronic systematic inflammation as the principal “driver” (Wagner 2006; Wüst & Degens 2007). Potential trauma to muscle fibers after “high intensity” exercise releases tumour necrosis factor-alpha (TNF-alpha) which might be involved in the process of inhibition of muscle regeneration (Van Helvoort et. al. 2006). In contrary, “low intensity” regular physical activities, besides producing less chance of inducing muscle damage, may produce a modulation effect on low-level inflammation, which was demonstrated in patients with cardiovascular diseases and diabetic mellitus (Bruunsgaard, 2005; Gielen, Walther, Schuler & Hambrecht, 2005; Petersen & Pedersen, 2005). The mechanism behind may be related to Interleukin-6 (IL-6), which are mediated by regular muscle contractions. Interleukin-6 (IL-6) is proposed to be a messenger to suppress pro-inflammatory activity within skeletal muscles as well as at distant sites, which may be involved in regulating the supply of carbohydrate as muscle reserve of glycogen becomes depleted on exercise, and at a later stage repair muscle injury (Shephard, 2002). Improvement on the overall health status upon the modulation of the chronic systematic inflammation of COPD may serve to explain why health qigong as a low-intensity

physical activity improved the functional capacity among COPD patients in shown by our study. The change in SF-36 General Health scores provided support to this viewpoint. On the other hand, a systematic review on the plausible mechanism behind health qigong postulates that the effect of health qigong is systemic in nature (Ng & Tsang, 2009; Tsang & Fung, 2008), which is also in line with 'anti-inflammation' concept (Figure 4.1).

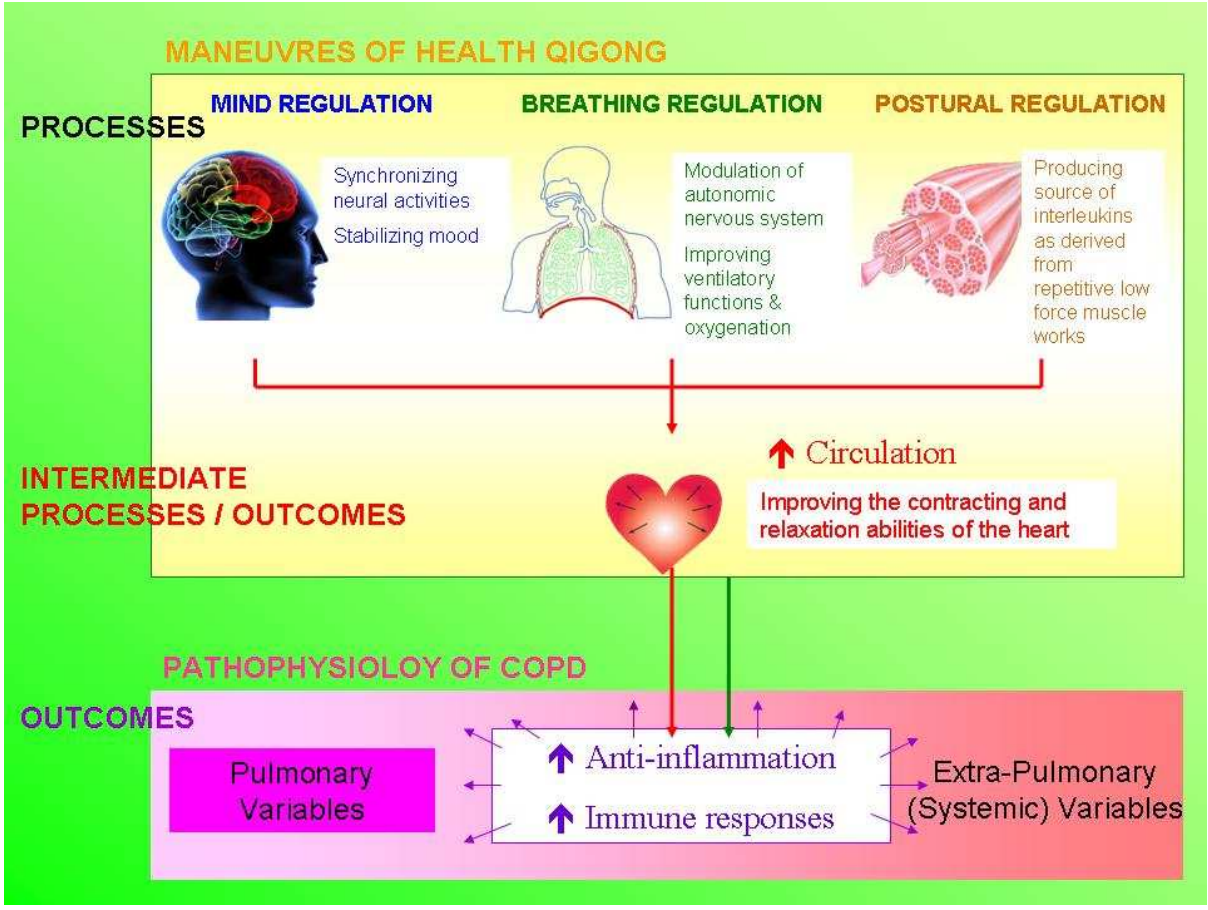


Figure 4.1 Proposed "Anti-inflammation" Effect of Health Qigong

In view of this, documenting state of low-grade systemic inflammation and muscle force to reflect the state of any muscle dysfunction and potential mypopathic changes are essential

in further related studies. On the other hand, measures to document the process of HQG maneuvers are also indicated. We are still exploring the possibility of measuring heart rate variability (HRV) to reflect the activation of the autonomic nervous system, taking salvia samples for assessing variations of stress hormones, and recording electroencephalogram (EEG) activity. These valid and sensitive physiological assessments are affordable and non-invasive.

4.2 Implication for Clinical Practice

Our experiment provides the empirical evidence supporting the clinical benefits of HQG In its clinical application we have the following recommendations.

Health qigong should be treated as a “mind-body” exercise which is complementary to other treatment modalities of the pulmonary rehabilitation program, rather than a stand alone treatment. However, the safety standards commonly used in sports medicine in line with western medicine should also be adopted. For example, use of perceived exertion, and perceived dyspnea are used as guides to determining the relevant exercise intensity. For use among frail COPD patients, the adaptations recommended in our protocol should be adhered. Moreover, given the minimal cost and the potential benefit, the program should also be applied patients with milder symptoms and levels of disability.

Regular participation seems to be the essential feature for promising satisfactory

outcomes. Thus compliance to regular training is an issue that needs to be considered in its application. Self-efficacy is an important factor that governs compliance. The training and practice should be individually tailored and monitored, so that even the frail patients would not be scared and withdraw from treatment. To maximize compliance, the routines can be divided into upper and lower parts so that frail subjects can change postures and only exercise upper limbs in a sitting position. The rate, speed and range of movement should be made adjustable with intermediate rest periods. In addition, training material, audiovisual, book, posters, etc., which are relevant to one's learning style, should be used. Finally, the scientific aspects of HQG should be disseminated in layman terms for purpose of public education, so that patients can acquire more background information of this adjuvant treatment.

As social support is important for long term compliance to exercise training (O'Shea, Taylor & Paratz, 2007), health qigong training should preferably be a combination of home and center-based group program. Use of group program helps arouse interest and greater adherence especially in the early stage of the learning process. In US, such mindfulness-based exercise programs are typically conducted as courses that meet once a week for 8 weeks, which are supplemented by intensive retreat sessions. Local hospital settings providing pulmonary rehabilitation programs can consider cooperation with community partners (e.g., the Community Rehabilitation Network, etc.) in conducting related group programs.

4.3. Limitations and Future Studies

The major limitation in our experiment that affects the external validity of the result is the higher than expected attrition rate. The problem of attrition rate may be solved using a number of strategies. First, multi-center trial is recommended as there will be more sources for subject recruitment within a reasonable time. Second, the recruitment may be extended to include more patients suffering from milder stage of COPD. These patients may be more motivated for treatment and follow-up as they may have more hope for improvement. Third, more patients at a younger age should be recruited as there imply less possibilities of developing other major diseases and or having mobility problems preventing them to attend clinic for follow-up sessions. Fourth, home based treatment can be accompanied by boot-up sessions supervised by professional staff. There have been reports on the use of regular boot-up sessions supervised by professional staff in boosting up the adherence to exercise program. These sessions can also provide social support in the related context. Such program can be done in collaboration of patient self-help group and community based rehabilitation settings which offer program at a reasonable cost.

Though our study has provided empirical evidence supporting the use HQG in rehabilitation in COPD, we have not offered an in-depth investigation into the mechanisms of how HQG work for the patients with COPD. As similar therapeutic effects are observed among patients with different chronic conditions upon health qigong practice, it is reasonable

to suggest that there may be a mechanism underlying the common pathological processes of these chronic conditions. Since early 2000s, a low grade systemic inflammation has been identified which is common among various chronic conditions such as atherosclerosis, diabetics mellitus, heart failure, COPD, depression, etc. Among COPD patients, this inflammation is also proposed to be related to myopathic change, inhibition of muscle regeneration, and then muscle dysfunction (Wagner, 2006; Wüst, & Degens, 2007). The benefit of HQG may stem from the anti-inflammatory activities induced upon its regular practice. Besides the psychosocial effect, the low-intensity muscle activties, slow breathing, and inwardly directed focus of attentions are proposed to have other effects in anti-inflammation. Given all of the above possibilities, systematic efforts to unlock the psychophysiological mechanism underpinning the effect of HQG have been limited. Further studies should therefore be conducted towards this direction.

4.4. Conclusion

To conclude, exercise training is definitely a modality in PRP with fledging evidence to support its clinical effectiveness. However, how exercise should be conducted in an attempt to produce better outcomes especially for longer period still remain undetermined and thus leaves room for further studies. Based on our study and other earlier attempts, health qigong may be regarded as a complementary exercise program. An adapted version of “Baduanjin”

specifically designed for COPD patients has successfully been developed based on expert opinions. Its safety and applicability have been ensured by our study. This protocol is easy to practice, its training materials facilitate learning, and the level of exertion is light. Other than providing evidence to support the clinical application, our study opens up further related research on Health Qigong, in the rehabilitation of COPD. For example, an "anti-inflammatory" hypothesis which may explain the mechanism of how health qigong work is believed to the future direction of research.

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APPENDIX I

Description of the Twenty-Six Reviewed Randomized Controlled Trials on Health Qigong

Author Code	Intervention	Sample	Outcome Measures		Study Quality, Findings & Recommendations
			Biomarkers and/or Physiological Parameters	**Ability tests and/or questionnaire survey**	
1. Astin et al. (2003) Funded by National Center for Complementary & Alternative Medicine, National Institutes of Health	**QG:** Mindful meditation plus "Dance of Phoenix" qigong. 8 no. of 2.5-hr sessions in 8 week **Control** (Attention Control)**:** Same number of educational / Support group mainly involved discussion of the same duration for each session	**Clinical**: Fibromyalgia Age: 47.7 **QG:** n = 32 **Control:** n = 33	Nil	• Pain & Disability Scores of Fibromyalgia Impact Questionnaire • Pain score of SF-36 • Beck Depression Inventory • Total myalgic score (number & severity of tender points) • 6 minute walk • Coping strategies questionnaire **At baseline, 8, 16 & 24 week**	**JADAD Score:** 4 Significant improvement in fibromyalgia impact scores, Beck depression inventory, pain score of SF-36 and total myalgic scores across times in both groups, but there was no difference between group QG practice can be an alternative to exercise program for the management of fibromyalgia
2. Chen et al. (2006)	**QG:** 2 week of Baduanjin training plus 36 practice sessions in the subsequent 12 weeks **Control** (No treatment)**:** Continue lifestyle as usual	**Clinical**: Osteoporosis Age: 45.2 **QG:** n = 44 **Control:** n = 43	• Interleukin-6 (IL-6) • Bone mineral density (BMD) **At baseline & 12 week**	Nil	**JADAD Score:** 2 Significant reduction of IL-6 in the QG group whereas significant reduction of bone mineral density in the control group across time. 12 week of Baudinjin QG practice was helpful to a certain degree in prevention of bone loss common in middle-aged women
3. Cheung et al. (2005) Funded by Li Ka Shing Foundation, HK	**QG:** Goulin Qigong. 8 2-hr training classes in 4 weeks plus home program (daily practice for 60-min in the morning & 15-min in the evening for 16 weeks	**Clinical**: Untreated mild essential hypertension subjects recruited from the community Age: 54.5 **QG:** n = 47	• Systolic & diastolic BPs • BMI • Waist circumference • Renal function • Full lipid profile; total	• Health Status (SF-36) • Beck anxiety & depression scores **At baseline, 4, 8, 12 & 16 week**	**JADAD Score:** 4 Significant reduction in BP, HR, BMI, total cholesterol, renin and 24-hr urinary albumin in both

	Control (Conventional therapy)**:** Same intensity and amount of conventional exercise training	**Control:** n = 41	cholesterol • Urinary cortisol, sodium, creatinine, and protein • Renin & aldosterone • Echocardiographic: left ventricular mass index, ejection fraction **At baseline, 4, 8, 12 & 16 week**		groups after 16 weeks. But no significant differences between qigong and conventional exercise 16 weeks of Guolin QG and conventional exercise have similar effects on BP in subjects with mild essential hypertension. But QG is not superior to conventional exercise, but can be used as an alternative to conventional exercise in those who prefer it as a form of nonpharmacological management of hypertension
4. Du et al. (2006) (Chinese) Funded by General Administration of Sport of CHINA	**QG**: Yi Jin Jing. 1 hour per day and not less than 5 times a week for 6 months. **Control** (No treatment)**:** no systematic training	**Healthy**: Cardiac function in elderly Age: 60.6 **QG**: n = 39 **Control**: n = 30	Echocardiographic measurements for • Stroke Volume (SV) • Peak early transmitral filling velocity (VE) • Peak late transmitral filling velocity (VA) **At baseline & 6 month**	Nil	**JADAD Score:** 1 Significant difference in SV, VE and (VE-VA) across time and between groups, although the value of (VE-VA) remained as negative. Cardiac function improved as attributed to regular QG practice
5. Lee et al. (2005)	**QG:** 1-hr of ChunDoSunBup (CDSB) Qi-training; 10 min rest / 15 min Sound (Chun-moon) reciting / 15 min slow movement / 20 min meditation **Control** (No treatment)**:** un-structure rest for an hour	**Healthy:** Immune responses of young male subject recruited on a voluntary basis at a university Age: 26.5 **QG:** n = 9 **Control:** n = 9	Blood sample for • NK cell quantity and activity as analysis by flow cytometry **At 10-min before QG, within 10-min of the end of QG, and 2-hr after QG**	Nil	**JADAD Score:** 2 NK cell cytotoxicity, but not NK cell number, showed a significant increase in the QG group than in the control group after 1-hr Qi-training. But the NK cell activity returned to basal level

					within 2 h after training. QG had an acute stimulatory effect on NK cell activity; but had no effect on phenotypical changes in the NK cell subset, and it was suggested that QG might have an effect in immune survellance against infection, spontaneously arising tumours, etc.
6. Lee & Huh et al. (2003)	**QG:** 1-hr of ChunDoSunBup (CDSB) Qi-training; 25 min Sound (Chun-moon) reciting / 15 min slow movement / 20 min meditation **Control** (Attention control)**:** sham qigong; similar motion without integrating breath and mind	**Healthy**: Immune responses in adult from 6 cities in Korea Age: 36 **QG:** n = 30 **Control:** n = 30	Blood sample for immune cell concentration from ◆ White blood cell (WBC) ◆ Neutrophil ◆ Lymphocyte ◆ Monocyte ◆ NK cell number **At baseline, immediately after 1-hr of practice & another 2-hr of rest**	Nil	**JADAD Score:** 1 WBC & lymphocyte increased significantly 2-hr after QG, but not in control group. QG demonstrated an effect on modulation of immune cell numbers in peripheral blood.
7. Lee & Lim et al. (2004)	**QG:** 16 30-min sessions of Shuxinpingxuegong in 8 weeks (2 times a week). **Control** (No treatment)**:** Wait-listed subjects; no intervention	**Clinical**: subjects with essential hypertension voluntarily recruited from 3 out-patient clinics at Mokpo, Korea Age: 53.5 **QG:** n = 23 **Control**: n = 24	◆ Blood pressure **At baseline & 8 week**	◆ General sef-efficacy scale (GES) ◆ Exercise self-efficacy (ESE) ◆ Perceived Benefit on exercise ◆ The effect of emotional state on exercise **At baseline & 8 week**	**JADAD Score:** 1 Significant decreases in BPs, as well as improvements in self-efficacy and other cognitive perceptual efficacy variables after QG practice for 8 weeks. QG practice enhanced BP control and perceptions of self-efficacy.
8. Lee & Lee et al. (2004)	**QG:** 16 30-min sessions of Shuxinpingxuegong in 8 weeks (2 times a week).	**Clinical**: subjects with essential hypertension voluntarily recruited from 3 out-patient clinics at	◆ Blood pressure ◆ High density lipoprotein (HDL)	Nil	**JADAD Score:** 1 Significant decreases in BPs, and

	Control (No treatment)**:** Wait-listed subjects; no intervention	Mokpo, Korea Age: 53.5 **QG:** n = 23 **Control**: n = 24	◆ Apolipoprotein A1 (APO-A1) ◆ Total cholesterol (TC) ◆ Triglycerides (TG) **At baseline & 8 week**		changes in level of TC, HDL, APO-A1 after QG practice for 8 weeks. QG reduced BP and might acted as an anti-hypertensive agent by modulation of lipid metabolism.
9. Lee, Lee & Choi et al. (2003)	**QG:** 30 30-min sessions of Shuxinpingxuegong in 10 weeks; the set is composed of eight types of movements, and the whole 30-min session consists of 5-min warm-up, 20-min QG and 5-min cool-down. **Control** (No treatment)**:** Wait-listed subjects; no intervention	**Clinical**: subjects with essential hypertension recruited on a voluntary basis in two living regions in Korea Age: 56.5 **QG:** n = 33 **Control:** n = 32	• Blood pressure • Urinary catecholamines • Forced vital capacity (FVC), forced expiratory volume in the 1st sec (FEV_1) **At baseline & 10 week**	Nil	**JADAD Score:** 1 Significant decrease in BP, norepinephrine, metanephrine and epinephrine, and increase in FVC, FEV1 in the QG group. QG showed a stabilizing effect on the sympathetic nervous systems in patients with essential HT.
10. Lee, Lee & Kim et al. (2003)	**QG:** 30 30-min sessions of Shuxinpingxuegong in 10 weeks; the set is composed of eight types of movements, and the whole 30-min session consists of 5-min warm-up, 20-min QG and 5-min cool-down. **Control** (No treatment)**:** Wait-listed subjects; no intervention	**Clinical**: subjects with essential hypertension recruited on a voluntary basis in two living regions in Korea Age: 56.5 **QG:** n = 29 **Control:** n = 29	• Blood pressure • Plasma norepinephrine (NE) • Plasma epinephrine (EPI) **At baseline & 10 week**	• VAS scale for perceived stress level **At baseline & 10 week**	**JADAD Score:** 2 Siginificant decrease in BP, rate pressure product , norepinephrine, epinephrine, cortisol and stress level in QG gp but not in control group QG might reduce BP and catecholamines via stabilizing the sympathetic nervous system. Therefore, QG was an effective nonpharmacological modality to reduce BP in essential hypertensive patients.
11. Li et al. (2002)	**QG:** Pan Gu Qigong; 25 m for a	**Clinical**: Heroin addicts	• Urine morphine test	• Standard evaluation scale of	**JADAD Score:** 2

	complete session being practiced 4 to 5 times daily throughout the 10 days of detoxification period **Meditation:** Detoxification pill (lofexidine HCl, .2mg) using a 10-day gradual-reduction **Control** (Conventional therapy)**:** received only emergency care for acute physical symptoms such as pain, diarrhoea, sleep disorder when necessary	Age: 32.4 **QG:** n = 34 **Medication:** n = 26 **No treatment control:** n = 26	**Throughout the 10 days of treatment**	withdrawal symptoms • Hamilton Anxiety Scale • Records of physiological or psychological reactions to withdrawal: hallucinations, behavioral deviation, nausea, vomiting, etc. **Throughout the 10 days of treatment**	By day 5 of treatment all subjects in the QG group had negative urine tests, compared to day 9 for medication group and day 11 for the control group. Reduction of withdrawal symptoms in QG group occurred more rapidly than in the other groups. Also the QG group had significantly lower anxiety scores. QG may be an effective alternative for heroin detoxification without side effects.
12. Liu et al. (2006) (Chinese) Funded by General Administration of Sport of CHINA	**QG:** Baduanjin. 30 m per practice and daily practice for 2 times for 3 months **Control** (Attention)**:** Walking	**Healthy**: lipid metabolism in elderly Age: 60 **QG:** n = 20 **Control:** n = 22	• High density lipid (HDL) • Low density lipid (LDL) • Total cholesteriole (TC) • Triglycerine (TG) **At baseline & 3 month**	Nil	**JADAD Score:** 2 Significant better improvement in lowering HDL, LDL, TC & TG in the QG group than in the walking group. Baduanjin QG might have an effect in preventing hyperlipidemia and subsequent cardiovascular diseases.
13. Mannerkorpi et al. (2004) Funded by Swedish Rheumatism Association & the Swedish Research Council	**QG:** Not described in details (included some form of standing still for 20-min). 14 1.5-h sessions in 3 months **Control** (No treatment)**:** Continue lifestyle as usual	**Clinical**: Fibromyalgia Age: 45 **QG:** n = 19 **Control:** n = 17	Nil	• Body Awareness Rating scale • Fibromyalgia Impact Questionnaire • Chair Test • Hand Grip Test **At baseline & 3 month**	**JADAD Score:** 3 Significant better improvement in movement harmony but not in fibromyalgia symptoms or physical function in the QG group. Adverse effects were reported for QG including lengthy standing in

					this patient group. Dynamic form of QG might help improve movement harmony for patients with FM.
14. Manzaneque et al. (2004)	**QG:** Baduanjin. 20 no. of 30-min group sessions, conducted on weekdays in a month **Control** (No treatment)**:** Continue lifestyle as usual	**Healthy**: Immune responses of students not taking any drugs recruited at University of Malaga on voluntary basis Age: 19.5 **QG:** n = 16 **Control:** n = 13	• Total blood count • Serum immunoglobulins and complement • Lymphocytes subsets **At baseline & 1 month**	Nil	**JADAD Score:** 2 Experimental subjects exhibited lower values than controls in innate immune response cells and proteins, including monocytes, granulocytes and complement. However, the direction of these changes was different from the effect of meditation and physical exercise. QG training produced a change in immunological functions and it suggested that QG might represent an effective psychosomatic training for immune modulation
15. Schmitz-Hubsch et al. (2006) Funded by German Parkinson's Patients' organization	**QG:** 3 opeing exercises, 3 exercises from "Frolic of the crane" and all 8 exercises from "eight brocade" **Control** (No treatment)**:** Not stated	**Clinical**: Parkinson's disease Age: 63.8 **QG:** n = 32 **Control:** n = 24	Nil	• Unified Parkinson's Disease Rating Scale motor part (UPDRS-III) • Montgomery Asberg Depression Rating Scale (MADRS) **At baseline, 3, 6 & 12 month**	**JADAD Score:** 2 More patients of QG group improved in motor symptoms as assessed by UPDRS-III at 3 and 6 months FU, but not at 12 months. QG appeared to have a stabilizing effect of on PD motor symptoms.
16. Stenlund et al. (2005)	**QG:** Form developed by Tai Chi & Medicinsk Qi Gong Centre,	**Clinical**: Patient with coronary artery disease(s) admitted to the	Nil	• Activity level • Fear of falling	**JADAD Score:** 2

Funded by Vardal Foundation, the Swedish Heart and Lung Foundation and the Vasterbotten's County Council	Malmo. 12 weekly sessions in 3 months; each session 1-hr Qigong plus 2-hr of discussion on various themes **Control** (Conventional therapy)**:** Continue usual care including medical FU at clinic	Heart Centre at the University Hospital, Umea in Sweden Age: 77.5 **QG:** n = 56 **Control:** n = 53		• Fall efficacy scale • Tandem standing • One-leg stance • Coordination • Box-climbing test At baseline & 3 month	Significant improvement in self-estimated level of physical activity, performance in one-leg stance test, coordination and box-climbing test in the QG & discussion group QG be an option for elderly patients who do not participate in the ordinary cardiac rehabilitation.
17. Tsang et al. (2006) Funded by Area of Strategic Development Grant A102 of the Dept. of Rehab. Sciences, the HK PolyU	**QG:** Bauduanjin. 48 30-45 min sessions in 16 weeks (3 times a week) plus advice on 15 min of daily practice on their own **Control** (Attention control)**:** Same number newspaper discussion session	**Clinical**: Patients with depression Age: >65 **QG:** n = 48 **Control:** n = 34	Nil	• Geriatric Depression Scale (GDS) • Chinese General Self-efficacy Scale (CGSS) • Personal Well-being Index (PWI) • General Health Questionnaire – 12 • Self-concept Scale • Perceived Benefit Questionnaire **At baseline 4, 8 & 16 weeks**	**JADAD Score:** 4 After 8 weeks of QG practice, the intervention group outstripped themselves in improvement in mood, self-efficacy and personal well being when compared to control group. At 16 weeks of QG practice, improvement generalized to daily task domain. QG practice could relieve depression, improve self-efficacy and personal well-being among elderly persons with depression.
18. Tsang et al. (2003) Funded by Area of Strategic Development Grant A102 of the Dept. of Rehab. Sciences, the HK PolyU	**QG:** Bauduanjin. 24 1-hr training sessions in 12 weeks plus home program of daily practice for 30 minutes **Control** (Conventional therapy)**:** Same amount of traditional PT/OT training activities under the supervision of qualified professionals	**Clinical**: Patients with various chronic disabilities from a geriatric day hospital and an elderly home Age: 74.7 **QG:** n = 24 **Control:** n = 26	Nil	• Geriatric Depression Scale (GDS) • Perceived Benefit Questionnaire • WHOQOL-BREF(HK) • Self-concept scale **At baseline, 6 & 12 week**	**JADAD Score:** 1 Trends of improvement in physical health, ADL, PBQ were noted, but no significant difference within group and between groups. However, more positive feedbacks from QG participants were accumulated.

					There was no evidence to support QG was better than traditional PT/OT training, but QG could be considered as an alternative intervention for elderly with chronic physical illness, who felt good about it.
19. Tsujichi et al. (2002)	**QG:** Form not described. Weekly 2-hr session in 4 months and being advised to continue practice at home **Control** (Conventional therapy)**:** Dietary advice and exercise treatment	**Clinical**: Type 2 diabetes Age: 62.9 **QG:** n = 16 **Control:** n = 10	• $HbA1_c$ • C-peptide • Caloric intake • Caloric consumption • BMI • Lipid metabolism **At baseline & 4 month**	• Anxiety Index • Mood Inventory **At baseline & 4 month**	**JADAD Score:** 1 $HbA1_c$ levels was significantly lowered and C-peptide was significant improved in QG group, and improvement could be predicted by: higher pretreatment $HbA1_c$, younger age, obesity and weaker personality. QG improve glucose metabolism and insulin resistance especially in obese type 2 diabetes.
20. Wang et al. (2006) (Chinese)	**QG**: Yi Jin Jing. 1 hour per day and not less than 5 times a week for 6 months. **Control** (No treatment)**:** No systematic training; continue lifestyle as usual	**Healthy**: cardiac function of elderly Age: 50~70 **QG**: n = 110 **Control**: n = 110	• Stroke Volume (SV) • Peak early transmitral filling velocity (VE) • Peak late transmitral filling velocity (VA) **At baseline & 6 month**	Nil	**JADAD Score:** 1 Significant difference in SV, VE and (VE-VA) across time and between groups, although the value of (VE-VA) remained as negative. Cardiac function improved as attributed to regular QG practice
21. Wenneberg et al. (2004)	**QG:** Not described in details. 9 sessions (duration not mentioned) in 3-month plus advice on daily	**Clinical**: Muscular dystrophy Age: 51.4 **QG:** n = 16	Nil	• Berg Balance Scale • 36-item Short Form Health Survey (SF-36)	**JADAD Score:** 4 Benefits in perceived health

Funded by the Claes Groschinsky Memorial Fund, the Center for Rehab. Research Committee in the County of Orebro, the Orebro County Council Research Committee and University of Orebro, Orebro, Sweden	practice **Control** (No treatment)**:** Not described.	**Control:** n = 15		• Ways of Coping Questionnaire (WCQ) • Montgomery Asberg Depression Rating Scale (MADRS) **At baseline & 3 month**	(SF-36) and coping skills were identified in the QG group QG appeared have an impact on perceived health rather than on physical ability.
22. Wu et al. (1999) Funded by NIH grant R21 00-93-002	**QG:** Life Information Qigong. 6 40-min sessions in the 1st 3 weeks, then follow by 7 weeks of self practice daily **Control** (Attention Control)**:** 6 sessions of simulated qigong training	**Clinical**: Treatment-resistant patients with late-stage complex regional pain syndrome type I recruited from the Pain Management Center at New Jersey Medical School Age: 38 **QG:** n = 11 **Control:** n = 11	• Thermography At baseline, 1, 2, 3, 6 & 10 week	• ROM • Visual signs of swelling, discoloration & muscle wasting • Visual analog pain scale (VAPS) • Medication usage • Sleep & rest (SL) & home management (HM) subscales of Sickness Impact Profile (SIP) • Pain awakening At baseline, 1, 2, 3, 6 & 10 week	**JADAD Score:** 4 Among the QG group 82% reported less pain by the end of the 1st training session compared to 45% of control patients. By the last training session, 91% of QG patients reported analgesia compared to 36% of control patients. Anxiety was reduced in both groups over time, but the reduction was significantly greater in the QG group than in the control group. QG was found to result in transient pain reduction and long-term anxiety reduction.
23. Xu (2000) (Chinese)	**QG:** DB & PLB in lying followed by massage to "Dan Tin". 20 m per practice and daily practice for 2 times for 20 days **Control** (Conventional therapy)**:**	**Clinical**: COPD patients Age: 63.5 **QG:** n = 30 **Control:** n = 30	• Lung function (FVC, FEV_1 & PEF) • Blood gas component (PaO_2, $PaCO_2$, SaO_2) • Descending & ascending	Nil	**JADAD Score:** 1 Both QG & EDP were capable of remarkably improving lung function, blood gas component

	External diaphragm pacer (EDP) therapy		breath of diaphragm **At baseline & 20 day**		and the descending and ascending of diaphragm. But QG was superior to EDP in improving lung function. QG was low-cost but produced therapeutic effect for COPD patients.
24. Yuan et al. (2000) (Chinese)	**QG:** Baduanjin. 30~40 m per practice and daily practice for 2 times for 30 days plus herbal medicine **Control** (Conentional therapy)**:** Herbal medicine only	**Clinical**: Patients with radicular cervical spondylopathy Age: not stated **QG:** n = 26 **Control:** n = 18	• Clinical integral • Indexes of blood rheology including high-sheer viscosity, low-sheer viscosity, high-sheer reducation viscosity, aggregation of index of RBC & stiffness index **At baseline, 10, 20 & 30 day**	Nil	**JADAD Score:** 1 Significant better improvement in index of blood rheology, including high-sheer viscosity, low-sheer viscosity, high-sheer reducation viscosity, aggregation of index of RBC & stiffness index in the QG group than in the control grou at 20- & 30- day, but not at 10-day Consistent practice of QG facilitated blood rheology
25. Zhang et al. (2006) (Chinese) Funded by General Administration of Sport of China	**QG:** Yijinjing. 1-hr of daily practice following a coach for not less than 5 times a week in 6 months **Control** (No treatment)**:** No systematic physical training and continue usual life	**Healthy**: cognitive function of elderly Age: 61 **QG:** n = 63 **Control:** n = 61	Nil	Various test (including reaction time, digit memory, etc.) from a computerized cognitive assessment system At baseline & 6 month	**JADAD Score:** 1 Significant improvement in cognitive test performance in the QG group but not in the control group Consistent practice of QG might have an effect to slow down intelligence decline of the aged.
26. Zhong et al. (2006) (Chinese)	**QG:** Yijinjing. 1-hr of daily practice following a coach for not less than	**Healthy**: cognitive function of elderly	Nil	◆ The Symptom Checklist (SCL-90)	**JADAD Score:** 1

Funded by General Administration of Sport of China	5 times a week in 1 year **Control** (No treatment)**:** No systematic physical training and continue usual life	Age: 61 **QG:** n = 115 **Control:** n = 99		**At baseline, 6 & 12 month**	Significant improvement in various aspects of psychological health, e.g. depression, obsession, social relationship, anxiety, etc. at 6 month, and even better at 1 year. Consistent practice of QG might have a positive effect on psychological health of the aged

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APPENDIX II

Expert Review Questionnaire

QUESTIONNAIRE ON THE APPLICATION OF QIGONG (BAUDUENJIN) TO COPD PATIENTS

	Statement	Agree	Don't know	Disagree	Comment
1.	This qigong protocol facilitates COPD patients to relax and develop "peace of mind".	O	O	O	
2.	This qigong protocol facilitates COPD patients to concentrate their mind.	O	O	O	
3.	This qigong protocol facilitates COPD patients to relieve unpleasant feelings, e.g. anxiety, depressed moods.	O	O	O	
4.	The qigong protocol enables the COPD patients to develop a sense of control over their breathing.	O	O	O	
5.	This qigong protocol facilitate COPD patients to develop confidence to deal with their disabilities and medical conditions	O	O	O	
6.	This qigong protocol is an aerobic activity which is good for cardiopulmonary function	O	O	O	
7.	This qigong protocol enforces "deep and slow" breathing pattern in a natural way.	O	O	O	
8.	This qigong protocol enforces coordination between respiration and movements; inspiration coordinates with trunk extension and expiration coordinates with trunk bending.	O	O	O	
9.	This qigong protocol enforces adequate stretching to muscles and soft tissue of the trunk, neck and upper limbs.	O	O	O	
10.	This qigong protocol can promote functional mobility and balance	O	O	O	
11.	From the TCM* perspective, the qigong protocol can promote good health through the practice of reciprocal movements, e.g. bending versus extending, breathing in versus breathing out, movements versus relaxed posture, etc. of the qigong, which is essential to the balance of "Ying" (陰) and "Yang" (陽).	O	O	O	
12.	From the TCM* perspective, the movements of the qigong stimulate trigger points of the body (穴位) and then enforce the flow of "Qi" within the Meridian System (經脈系統), which is essential to good health.	O	O	O	
13.	As the qigong protocol is a culturally relevant activity, the COPD patients of our community would be interested in engaging in the activity.	O	O	O	
14.	This qigong protocol can promote both physical and psychological health in general.	O	O	O	
15.	This qigong protocol can achieve the same effect as the other breathing and relaxation exercises commonly used in pulmonary rehabilitation.	O	O	O	
16.	This qigong protocol can promote more social contact through practicing together and discussion among peels.	O	O	O	

	Statement	Agree	Don't know	Disagree	Remark
17.	The COPD patients should have no difficulty in learning the qigong as the contents of the manual and AV material are easily understood.	O	O	O	
18.	The COPD patients should have no difficulty in learning the qigong as the design of the self-learning material (the AV material and the manual) are user friendly.	O	O	O	
19.	The COPD patients should have no difficulty in learning the qigong, as besides the self-learning material, there are at least 3 45-min training sessions of under the supervision of a well-trained coach.	O	O	O	
20.	The COPD patients should have no difficulty in learning the qigong as the training sessions emphasized on giving feedback specific to individual performance.	O	O	O	
21.	The COPD patients should have adequate confidence to comply to the qigong protocol as the protocol can be adapted to activity tolerance of each individual.	O	O	O	
22.	The COPD patients should have adequate confidence to comply with the protocol as there is detailed information related to formulating a daily training schedule.	O	O	O	
23.	The COPD patients should have adequate confidence to comply to the protocol as it can be practiced within the home environment; even if the environment is not spacious.	O	O	O	
24.	The COPD patients should have adequate confidence to comply with the protocol as it covers adequate precautions to guard against any potential harm or injury.	O	O	O	

* TCM - Traditional Chinese Medicine

For analysis purposes please kindly assist to leave your particulars.

Professional: O Medical doctor O Nurses O PT O OT O TCM doctors O Others _____

Years of Practice with COPD patients _____

APPENDIX III

Manual of the Health Qigong Training Protocol

健 身 氣 功

於

慢 性 阻 塞 性 肺 病

之

復 康 應 用

章節	內容	頁號

鳴謝

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{一} 淺談「健身氣功」

氣功是醫療與體育相結合的健身運動，在中國有著悠久的歷史，古代稱吐納、導引、行氣、服氣、練氣、靜坐、坐禪。歷代養生家和中醫師在許多經典著作中都有記載“氣功”，其說法雖不同，其理則一，有關論述列於**表一**。50 年代初期，唐山氣功療養所所長劉貴珍先生著書立說用了“氣功”一詞，後來就廣泛使用起來，近幾年出版的《辭海》、《簡明中醫辭典》等書都有論述。國家體育總局於 2000 年發布＜健身氣功管理暫行條例＞，界定了“以自我身心鍛鍊為主；透過自覺地對自己的意識、呼吸、肢體進行統一的協調，以防治疾病，強健身心的一種養生、運動方法”，稱為健身氣功，簡單的說，無非是身心兩個方面的鍛煉。這有別於依靠氣功師傅以“外氣發功”來治病的醫療氣功，這類醫療氣功並不包括於本手冊討論的範圍內。

“百病皆由氣生”，三因學說認為“七情”（即喜、怒、憂、思、悲、恐、驚）過激會傷內臟，損傷氣的正常運行，就產生疾病。《黃帝內經》亦有云：“正氣記憶體，邪不可幹，邪之所湊，其氣必虛”之理論，所以養生治病離不開養氣，正氣充盈，病邪不能存在，修練氣功有助**練精養氣**，**暢通經絡**及**調節陰陽**的效果。

從現代（精神行爲和社會生理行爲）學看疾病成因，多種慢性疾病都

是由於患者自身的行爲所製造的，心理因素是重要一環，因此調節身心有助病情。於 50 年代中國首間氣功療養機構；唐山氣功療養所，開始以氣功來治療慢性疾病，如腸潰瘍，神經衰弱等，之後北戴河氣功療養院，上海氣功療養所亦相繼成立。近代臨床心理學及復康醫療科學研究，亦確定了健身氣功可以為輔助主流醫藥的一種健身運動，於 2000 年南京中醫藥大學所作的研究，習練氣功，對慢性阻塞性肺病患者的康復，有顯著的效果；預計功效有：**一）按摩腑臟：**前俯後仰、左右轉腰以及環轉等動作，對腹腔腑臟起按摩作用。**二）增強呼吸：**採用深長呼吸，吸進大量的新鮮空氣，呼出大量二氧化碳。**三）舒緩緊張：**調心入靜使人安靜、放鬆、自然。

《庄子》:	“吹呴呼吸，吐故納新，熊經鳥伸，為壽而已矣。”
《內經》:	“呼吸精氣，獨立守神，肌肉若一” “恬淡虛無，真氣從之，精神內守，病安從來” “靜則神藏，躁則消亡” “得神者昌，失神者亡” “清靜則肉腠閉拒，雖有大風苛毒，弗之能害” “主不明則十二官危，使道閉塞而不通，形乃大傷，以此養生則殃，以為天下者，其宗大危，戒之戒之！”
《千金要方》:	“口吐濁氣，鼻引清氣” “凡吐者去故氣，亦名死氣；納者取新氣，亦名生氣.....故‘老子經’.....綿綿若存，用之不勤，言口鼻天地之門，可以出納陰陽死生之氣也.....氣息得理即百病不生，若消息失宜，即諸痾競起，善攝養者，須知調氣方焉。”

表一　有關氣功於古籍中的論述

健身氣功的練習方法，是將意念、姿勢和呼吸三者揉合在一起，即所謂調身、調息、調神

1. **調身**：調整姿勢；達致放鬆自然，姿勢自然放鬆，是順利進行氣功呼吸和誘導精神鬆靜的先決條件。
2. **調息**：調整呼吸；改淺呼吸爲深呼吸，達致柔和匀暢；按個人練功修養，由自然呼吸法慢慢轉成以膈肌呼吸（丹田呼吸）為主。
3. **調神**（心）：調心指的是調整大腦中樞神經；練功時以調整意念、精神狀態，從而以誘導“入靜”，按功法的要求該想什麼，該意守什麼而配合呼吸和動作。“入靜”即思維集中及全身肢體放鬆，是“氣功”鍛煉的重要一關，由於練功者的身心條件各不相同，每個練功者於“入靜”的感覺也不同，有鬆靜、動觸、快感、虛無等。

健身氣功與一般的體育運動有著不同之處：

1. 大部份的運動著重於姿勢，動作和規則，對呼吸和意念（思維）並不十分重視，而健身氣功則最重視呼吸和意念；
2. 修鍊氣功注重有意識地按習練原則循序漸進，慢慢地控制活動，緩和情緒反應，以達到肌肉放鬆，精神安定，思想入靜，使人處於非常舒適安靜的境地，從而調整肌體的生理功能來發揮作用。

{二} 介紹健身氣功八段錦

八段錦健身氣功是國家體育總局健身氣功管理中心從百多種健身氣功中挑選出來作為國家重點研究四種健身氣功之一。因為其方法簡單易行，香港康體發展局於九十年代推廣八段錦給耆老的一種健身氣功。八段錦之名，最早出現在宋代洪邁所著《夷堅志》一書中，該書記載：“政和七年，李似矩為起居郎……嘗以夜半時起坐，噓吸按摩，行所謂八段錦者。”這些記述說明八段錦在北宋時已流傳於世，發展至明清時代已形成了一個較完整的套路,并有圖文及歌訣幫助其廣泛的傳播(見**表二**)。八段錦的“八”字，不單指段、節和八個動作，而是表示其功法有多種要素，相互制約，循環運轉，“錦”字是由“金”“帛”組成的，以表示其精美華貴，如絲錦那樣絢麗精美。

一　兩手托天**理三焦**	五　搖頭擺尾**去心火**
二　左右開弓似射鵰	六　兩手攀足**固腎腰**
三　**調理脾胃**須單舉	七　攢拳怒目**增氣力**
四　**五勞七傷**往後瞧	八　背後七顛**百病消**

表二　八段錦每段名稱的歌訣

功　用

八段錦是以肢體運動為主，它的功法特點是柔和緩慢，圓活連貫，鬆緊結合，動靜相兼，練習中大腦始終處於覺醒狀態，對呼吸和意念的要求不像靜功要求那麼高，運動量亦可大可小；可個別體質選擇其全套，練其數節或反覆練其中的一節，安全可靠。國家體育總局健身氣功管理中心通過對 200 名年齡 45~70 歲的中老年群衆練習後的調查結果顯示，“健康氣功”八段錦對中老年人的呼吸系統機能、上下肢力量、平衡能力、關節及神經系統靈活性均有明顯提高，在改善心理健康方面，也有良好的效果。另外於中醫學理念，八段錦的每段動作都能刺激不同穴位，疏通經絡，其功效，從每段的名稱上看，是不難理解的。

一　兩手托天理三焦：兩手交叉上托，緩慢用力，保持伸拉，可使三焦通暢、氣血調和（“三焦”，為六腑之一，上焦為胸腔，主納入、呼吸，中焦為腹腔主消化，下焦為盆腔主泄，主排泄）。

二　左右開弓似射鵰：展肩擴胸，可刺激督脈和背部俞穴，同時刺激手三陰、三陽經等，可調節手太陰肺經等經脈之氣。

三　調理脾胃須單舉：左右上肢一鬆一緊的上下對拉，加上靜力牽張，

可以牽拉腹腔，對脾胃中焦肝膽起到按摩作用，同時可以刺激位於腹、胸部相關經絡以及背部俞穴，達到調理脾胃（肝膽）的作用。

四　五勞七傷往後瞧：動作中往後瞧的轉頭動作，可刺激頸部太椎穴，達到防治五勞七傷的目的；“五勞”指心、肝、脾、肺、腎五臟勞損，“七傷”指喜、怒、憂、思、悲、恐、驚七情傷害。

五　搖頭擺尾去心火：兩腿下蹲，擺動尾閭，可刺激脊柱、督脈等；搖頭，可刺激大椎穴，從而達到疏經泄熱的作用，有助於去除心火；心火即心熱火旺的病症，屬陽熱內盛的病機。

六　兩手攀足固腎腰：前屈後伸，可刺激脊柱、督脈以及命門、陽關、委中等穴，有助防治生殖泌尿系統方面的慢性病，達到固腎壯腰的作用。

七　攢拳怒目增氣力：中醫認為兩腿下蹲十趾抓地、雙手攢拳、旋腕、手指逐節强力抓握等動作，可刺激手足三陰三陽十二經脈的俞穴和督脈等，同時，使全身肌肉、筋脈受到靜牽力張刺激，長期鍛煉可使全身筋肉結實，氣力增加。另外，“怒目瞪眼”可刺激肝經，使肝血充盈，肝氣疏瀉，有强健筋骨的作用；所謂“肝主筋，開竅於目”。

八　背後七顛百病消：腳趾為足三陰、足三陽經交會之處，腳十趾抓地，可刺激足部有關經脈，調節相應臟腑的功能，同時，顛足可刺激脊柱與督脈，使全身臟腑經絡氣血通暢，陰陽平衡。

督脈：	奇經八脈之一，循行背部正中線，其脈多次與手足三陽及陽經交會，能總督一身陽經，故稱「陽經之海」。經絡乃聯絡人體表裡及各臟腑的重要網絡，負責真「氣」的傳送。
俞穴：	即穴位，為各條經脈氣血聚會出入、流注的處所。每條經脈的穴位多寡各不同。俞穴與經絡臟腑有密切的關係，當臟腑機能變化時，可通過經脈到俞穴而反映於體表、四肢；同樣，外部刺激因素也可通過俞穴、經脈而影響臟腑的功能。
太椎穴：	位於背上部，第一胸椎棘突之上與第七頸椎棘突之間的凹陷處。
命門穴：	位於腰部後中正線上，第二與第三腰椎棘突之間的凹陷處
陽關穴：	位於腰部後中正線上，第四與第五腰椎棘突之間的凹陷處
委中穴：	在膝關節後面，橫紋之中點處。
丹田：	「煉丹」的重要部位，對丹田各門各派有不同見解，有些認為是某一個重要穴位就是丹田所在，但大部分認為丹田不是一個穴位，而是一個區域，還有上、中、下三個不地方的分別；下丹田即是臍下整個小腹。

表三　部分經脈、穴位名稱淺釋

功法說明

附帶光碟的第二節都詳細說明了八段錦的每段動作，以下文字只列出撮要和重點方便記憶，學習八段錦需配合光碟及掛圖。

第一式 兩手托天理三焦

（一） 預備姿勢：

兩腳平行站立，兩臂自然下垂，目視前方。

（二） 動作說明：

兩臂緩緩自體側向上高舉，同時兩手翻掌成掌心向上，兩手指尖相對，兩肘用力挺直，兩掌如托天爭力，同時兩眼看手，挺胸收腹、展腰，然後兩手及臂從左右體側緩緩放下，上舉下落交替進行。

（三） 呼吸配合:

當兩手上舉，翻掌托天時進行吸氣；當兩手向兩側展開下落時進行呼氣行。

第二式 左右開弓似射鵰

（一） 預備姿勢：

兩腳平行站立與肩同寬,兩臂自然下垂,目視前方。

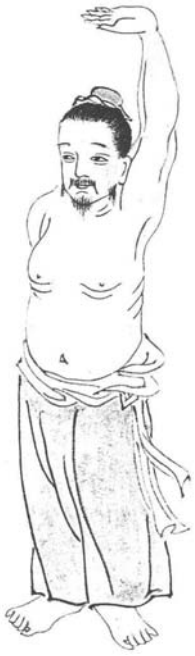
（二） 動作說明：

左腳向左跨出一步，站成馬襠勢，上身正直，兩臂在胸前交叉，左臂在內，右臂在外，手指張開。 先左手往左推，同時右手變成爪形拳往右拉，如同拉弓勢，直至左臂伸直，左肘尖向左側挺，兩目視外推的左手。然後以同樣方法左右兩側交替進行。

（三） 呼吸配合：

拉弓時吸氣，收回時呼氣。

第三式 調理脾胃需單舉



（一） 預備姿勢：

兩腳平行站立，兩臂自然下垂，目視前方。

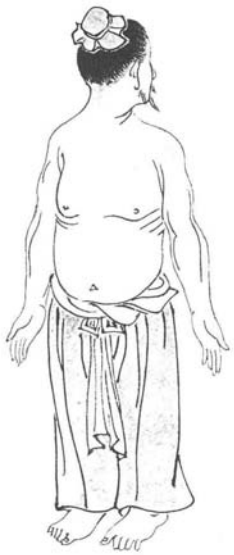
（二） 動作說明：

左手翻掌從左側上舉，五指併攏，左臂用力挺直，掌心向上，指尖向右，同時右手掌心向下用力下按，指尖向前。再右手翻掌從右側上舉，五指併攏，右臂用力挺直，掌心向上，指尖向左，左手從左側落下，掌心下按，指尖向前。左右交替進行。

（三） 呼吸配合：

上舉手接陽氣，下按手沉濁氣。上舉下接時吸氣，兩臂回收時呼氣。

第四式 五勞七傷望後瞧



（一） 預備姿勢：

兩腳立正，頭頸正直，兩臂自然下垂，兩手掌心貼腿旁。

（二） 動作說明：

挺胸，兩肩稍向後引，同時頭慢慢向左轉，眼望後方，還原；再同樣向右側轉頭，向右瞧。左右交替進行。

（三） 呼吸配合：

往後瞧時呼氣，還原時吸氣。

第五式 搖頭擺尾去心火

（一） 預備姿勢：

雙腳分開相距約三腳長，屈膝成馬步站樁勢，兩手扶膝，虎口向裡，要求上體保持正直。

（二） 動作說明：

上體向前俯屈，頭隨之垂下，並向左側擺動搖頭，腰、臀部向左擺，腳步調整，挺胸，然後復原成預備勢。接著上體向前方俯屈，頭隨之垂下，並向右側擺動搖頭，同時腰、臀部向右擺，腳步調整，挺胸，然後回至復原勢，左右交替進行。

（三） 呼吸配合：

挺胸時吸氣，回至復原勢呼氣，順其自然。

第六式 兩手攀足固腎腰

（一） 預備姿勢：

鬆體直立，兩腳分開。

（二） 動作說明：

兩手上托，上身微仰，然後緩緩向前彎腰體屈，兩膝盡量保持伸直，兩臂下垂，兩手觸摸足趾，以能站穩為原則，同時頭頸保持微仰，目視前方，跟著逐漸展腰上升，回原位，前俯後仰交替進行。

（三） 呼吸配合：

腰後仰時吸氣，腰前屈時呼氣。

第七式 攢拳怒目增氣力

（一） 預備姿勢：
兩腿開立，屈膝站成馬襠勢，兩手握拳放於腰旁，拳心向上。

（二） 動作說明：
左拳向前方緩緩用意擊出，拳心向下做伸拳運動。同時右拳用力緊握，右肘後挺。兩眼睜大，向前虎視，然後將左拳收於腰旁，再將右拳向前緩緩用意擊出，同時左拳用力緊握，左肘後挺，兩眼虎視，還原。左右手交替進行。動作要剛而不僵，柔而不軟，發揮以氣助勢，以氣催力的作用。

（三） 呼吸配合：
要求拳擊出時呼氣，收回時隨意吸氣，沉入中丹田，借以蓄氣促力。

第八式 背後七顛百病消

（一） 預備姿勢：
鬆體直立，兩腳靠攏，兩手掌貼於大腿處。

（二） 動作說明：
挺胸腿直，頭用力上頂，同時腳跟儘量離地踮起，然後腳跟放下復原，踮起放下交替進行。

（三） 呼吸配合：
頭上頂與足跟踮起時吸氣，足跟下落時呼氣。

練功安排

一般情況下，練習健身氣功一週應不少於 5 次練習，每次練習在 20-30 分鐘，做 1 至 2 遍全套八段錦，每遍之間休息 2 分鐘，加上開始的準備活動和結束的整理運動，一次練習在 50 分鐘左右為宜，如時間或身體健康情況不允許，可在一天中合適時間安排 1—2 次練習，例如早午各一次，每次練習 15—30 分鐘，數量 1 至 2 遍（**見表四**）。可選擇在最佳精神狀態時練習，例如於吸入氣管舒張劑 30 分鐘後練習。也可將整套拆開選擇適合自己的動作來練習，同樣可以取得良好的鍛煉效果，總之應循序漸進，量力而行。稍靜片刻後，可進行其他活動，如外出散步。

熱身運動	5 – 10 分鐘
開合呼吸式	
↓	
主要運動	20 – 30 分鐘
全套或選段八段錦練習 1 至 2 遍	
↓	
緩和及伸展運動	
包括開合呼吸式、鬆靜站立及深呼吸	5 – 10 分鐘

表四　一般練功安排：最好每天習練，早午各一次

｛三｝八段錦三調要領

學習八段錦要以自然為法，以舒適為度，達到消除心理上的緊張，大腦及形體上的充分放鬆為目的。要做到動作準確，姿勢優美，需要有一個反複練習、逐步提高的過程。對於初學者，最正確的方法是先學習調身，把姿勢、動作學好，再學習調息，掌握所要求的呼吸形式，調勻氣息；然後學習調心，把握特定的意念和境界。這個學習順序是從外到內、逐漸深化的訓練過程，符合順其自然的練功原則。正如古語所說：「形不正則氣不順，氣不順則意不寧，意不寧則氣散亂。」

調身要領

首先要抓好基本身型，預備姿勢；這姿勢貫穿於每式八段錦動作的始終要靜、要鬆，才可達到「動靜相兼」的目的，要做到「頭正頸懸、含胸拔背、直腰鬆胯・・・」:

頭頸　—　**頭部**要微微前傾，操作時只須把下顎稍稍向內收些即可。因為頭部完全豎直時，頸椎是壓縮的，不能伸展，唯有頭部略前傾，頸椎才能充分展開；另外，下顎微收和頭部前傾與含胸拔背的操作也有密切關係。**目光**要求平視或略微下視，雙眼輕閉，初練功容易困倦或意

念散亂時，可露一線微光。口要輕輕閉合，舌應自然置放。還須注意舒展**眉頭**和放鬆**面部肌肉**，要有一點笑意，面部表情安詳舒緩。

上肢　—　首先是肩一定要放鬆，絕對不要聳肩，要自然垂下來，而且要順勢鬆到肘。還有虛腋，即雙臂不要貼在兩脅上，應該分開。

胸背　—　含胸拔背；練功所要求胸部內收的程度是很小，只要不故意挺胸，再加上下顎微收就足夠了。

腰胯　—　伸腰是腰部要伸展開，挺直，不能塌腰，其作用主要是將腰部的脊柱伸直。沉胯是胯部要向下坐，要求臀部如坐高凳。

下肢　—　在能夠保持直立的前提下，兩腿要盡量放鬆，雙膝應微曲，曲的角度以不超出足尖為限。雙腳的距離一般要求與肩同寬，兩腳平行式站立，五趾微微抓地。

調息要領

在初學階段以自然呼吸為主；吸氣量與呼氣量基本相等，中速、均勻地呼吸，可在自然呼吸的基礎上稍延長一點，但不需刻意追求深，也絕不

可憋氣。待動作熟練後，這時可根據動作配合呼吸，一般吸氣會配合展腰挺胸，雙手外展的動作，呼氣會配合彎腰俯身，雙手內合的動作，即「開吸合呼」。當練到造詣高深階段時，呼吸可於動作與動作之間，接著完全呼氣後有片刻停頓。因每個人的肺活量、呼吸頻率存有差異，功法的動作幅度也有大小、長短之別，對呼吸的方法要靈活運用，不可生搬硬套，如氣息不順，應隨時進行調節。

調心要領

於預備姿勢，可引用〔暗示法〕，以排除雜念；例如用良性詞暗示：“我要靜，要身體健康”，反復思念暗示，也可想像圖景、花卉等良物。在練習時，意念活動不是守一（即把思想集中在身體的某一部位），而是意想動作過程。它包括動作的規格、要點、重點部位及呼吸，在練功初期，也就是學習動作階段，主要是意念動作規格和要點，在熟練提高階段，重點是意念動作技術環節，注重風格特點，使意念與呼吸相協調。隨著功法的熟練、技術水平的提高，動作趨於自動化，呼吸也近於自調，這時的意念也隨之越來越恬淡，最後達到動作、呼吸、意念協調一致。

｛四｝健身氣功習練原則

信心、恆心、勤練：當你決定練習健身氣功時，無論你現在的健康情況如何，你都必須要有信心，認定這套功法能使你健康，持之以恆地練習，達到健康的目的。若抱著懷疑、不積極的態度，今天有空閒、有心情，便練習練習；明天工作稍忙、應酬增多，馬上可以找到非常充分的「理由」停止練功，結果一定不理想，也浪費光陰。

思想平穩、心情舒暢：練習健身氣功，一定要配合良好心理狀態；要保持良好的心理狀態，先要選擇合適的場所，盡量要安靜，光線適宜，空氣新鮮，避免受到打擾，跟著要做好準備功夫，練功前 10-15 分鐘應停止興奮激動的談話、遊戲（包括下棋等），也應解決大小便。可深呼吸幾口氣，以助放鬆，排除雜念，將心裏牽掛的事一件件撇開等。與他人吵架後，或太興奮、太憂傷等情緒不穩定的情況下，也不宜練功。在練功中，對有可能產生的異感，如某一肢體、某一部位的脹、麻、跳動、冷、熱、蟻行感、觸電感等的感覺，要處之泰然，不要驚慌；可以不需理會，讓其自然緩解。

慎勿執著、循序漸進：執著，急於求成，強要追求內氣運行的感覺，往往會導致火熾、氣亂；意思是指人的機體在生理和心理上出現較為嚴重

的功能紊亂，也稱“走火入魔”或“出偏”。其實八段錦是以肢體運動為主的健身氣功，其方法簡單易行，練習中大腦始終處於覺醒狀態，對呼吸和意念的要求不像靜功和有些動功要求那麼高，只要按習練要領去做，不可能會出偏。練功時，應專心致志，切忌急躁執著，抱「只求練功，不求成功」的態度，妙在有意無意之間，無為而無不為，功到自然成。

與朋友家人一起練習健身氣功，結伴同行，既增加樂趣，又可互相鼓勵和照顧。

{五} 練功安全守則

適當的習練健身氣功八段錦可以舒展筋骨，更能促進新陳代謝，令人精神抖擻，不過，長者們應留意一些運動安全守則，避免意外發生。

練功前須知

1. 注意飲食：避免於太飽或太餓時練習健身氣功八段錦。不應空肚做練習，特別緊記要吃早餐，以免體力不支，帶備足夠的飲品以作補充。
2. 注意裝備：穿著舒適和厚薄適中的運動衣服和鞋襪。選擇尺碼適合、鞋面柔軟、鞋底可防滑和減低震盪的運動鞋。
3. 注意天氣的轉變，以免著涼或中暑。
4. 熱身及伸展運動：5 至 10 分鐘的熱身及伸展運動，可減低受傷的機會。
5. 練功後的伸展運動：應作緩和的靜止前運動及重複伸展運動，使身體逐漸回復靜止的狀態。

練功注意事項

1. 要了解自己的體質，選擇合適的運動量；說得通俗一點，運動量就是指一次練習多長時間，做幾遍，及所採取的姿勢、高低與用力的大小的總和。由於受到性別、年齡、身體條件等因素的影響，練習者個體差異很

大，不應攀比，心態要平衡，需結合自己的實際情況靈活掌握。運動量安排得是否合理，是練習的最關鍵環節，對運動量的掌握應以本體感覺為準，其最簡便有效的檢測方法是運動後精神愉快，脉搏穩定，血壓正常，食慾及睡眠良好，表明運動量是適宜的，如果運動後身體明顯疲勞，脉搏長時間得不到恢復，食慾不振，睡眠不佳，則表明運動量過大，應及時進行調整。個別初學者在練習中或有出現頭暈、惡心、手足麻痺、心慌氣短等現象，這多與體質虛弱、沒有休息好和身體不舒服還堅持練習，或過於認真而出現緊張有關，只要暫時停止練習，稍加休息，症狀即可消除。

2. 要量力而為，不要勉強做過份劇烈的動作，見**表五**：

一	兩手托天理三焦	因應個人肩關節輻度舉手托天，頭頸向上仰望勿太快和太強。
二	左右開弓似射鵰	因應個人雙膝輻度屈曲坐馬，避免引發疼痛，保持平衡。
三	調理脾胃須單舉	因應個人肩關節輻度舉手托天，頭頸向上仰望勿太快和太強。
四	五勞七傷往後瞧	頭及頸往後瞧勿轉動太快和太強。
五	搖頭擺尾去心火	腰部轉動及挺胸動作勿太快和太強。
六	兩手攀足固腎腰	因應個人能力將身體向前兩手攀足，要留意會否頭暈目眩，注意平衡。
七	攢拳怒目增氣力	出拳避免過份用力，手肘保持微曲。
八	背後七顛百病消	足踝提升時要留意平衡，因應個人雙膝輻度屈曲坐馬，坐馬時足踝要輕力著地。

表五　每段八段錦安全要點

3. 患有急性病徵，例如發燒或劇痛，就不要勉強練功。

4. 練功時，如有頭暈、氣喘、心翳、作嘔、作悶或痛楚增加等情況，應立即停止，需要時應及早求診。

5. 保持自然呼吸，要有適當的休息，不要令自己氣喘如牛，也不可憋氣。

6. 主觀的「運動強度／辛苦程度」評分，應維持在七級或以下（**見表六**）。

	1.	非常非常容易	
	2.	非常容易	
	3.	較容易	
安全區	4.	容易	安全區
	5.	適中	
	6.	較辛苦	
	7.	辛苦	
危險區	8.	非常辛苦	危險區
	9.	非常非常辛苦	
	10.	極度辛苦	

表六　「運動強度／辛苦程度」主觀評分表

7. 每次練功後都要有一個收功過程，切勿突然停止；從氣功態進入醒覺態

要有一個轉變過程，正如從睡眠態進入醒覺需要有一個適應過程一樣。常用的收功順序是：先收心，後收形，再收息。先從原來各種入靜意守的境界回復至醒覺態來，緩緩睜眼，即意念收功；其次是收形，即將原先所擺的姿態調整至輕鬆的坐、站的體位，然後把呼即吸回復至安靜狀態；最後兩手對搓至熱，做幾下自我按摩，再深呼吸幾次，舒展腰肢。

8. 練功後出了大汗，用乾毛巾拭乾，不可馬上沐浴，最好過十五分鐘後。

9. 練功後不要馬上喝冷飲，宜輕嚼暖和飲料。

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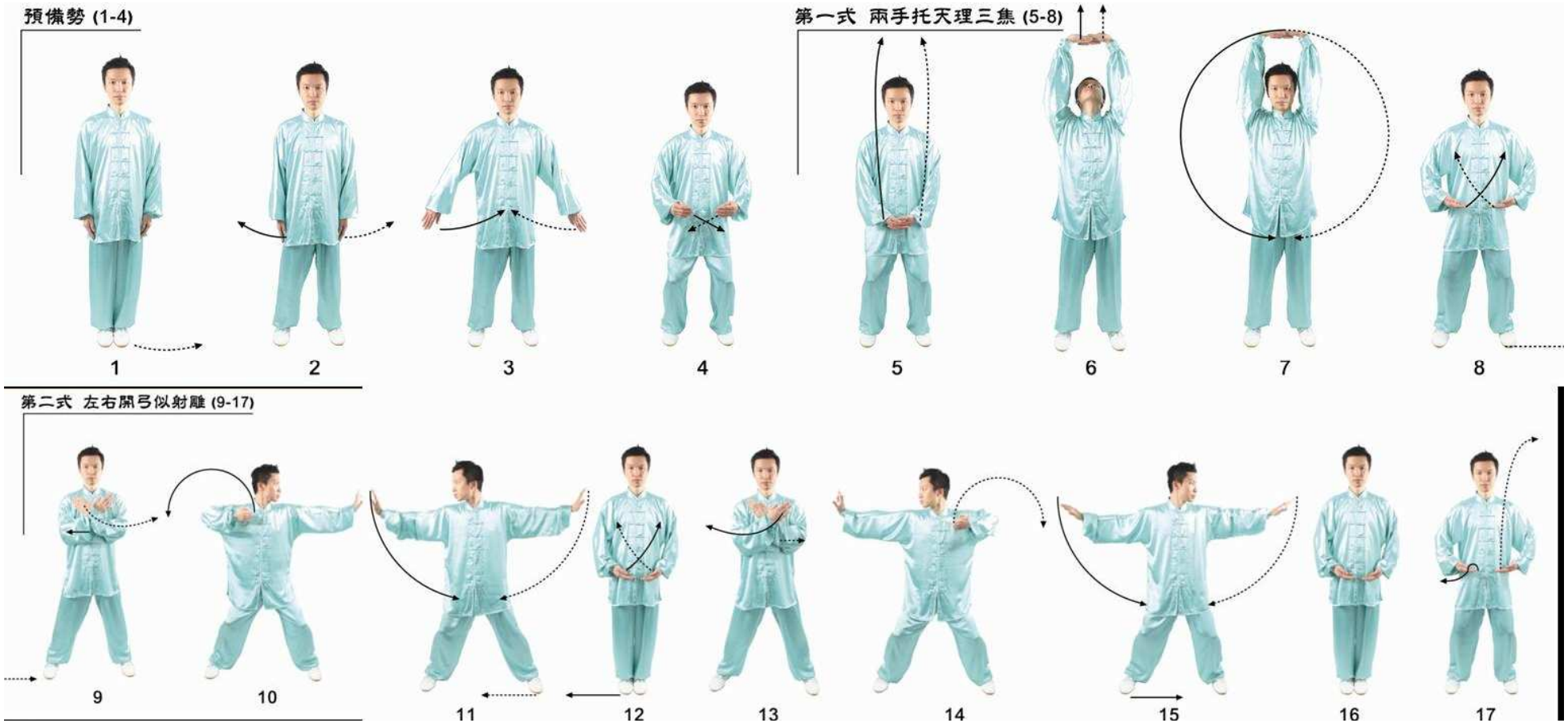
APPENDIX IV

Health Qigong Baduenjin Posters

健身氣功八段錦掛圖（一）：兩手托天理三焦及左右開弓似射鵰

示範：張浩銘先生，四套「標準健身氣功」功法輔導員及屯門醫院職業治療師

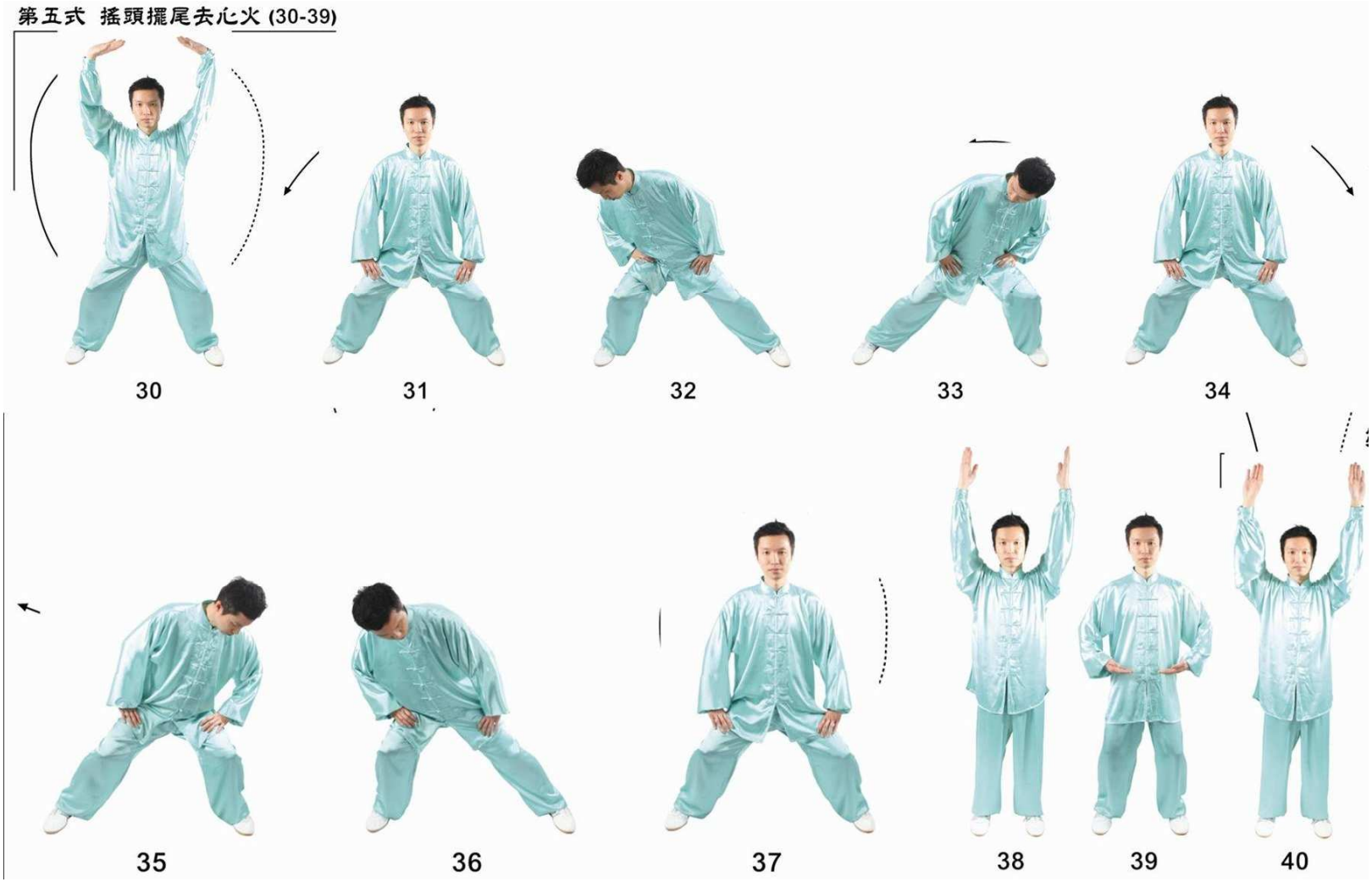


健身氣功八段錦掛圖（二）：調理脾胃需單舉及五勞七傷望後瞧

示範：張浩銘先生，四套「標準健身氣功」功法輔導員及屯門醫院職業治療師

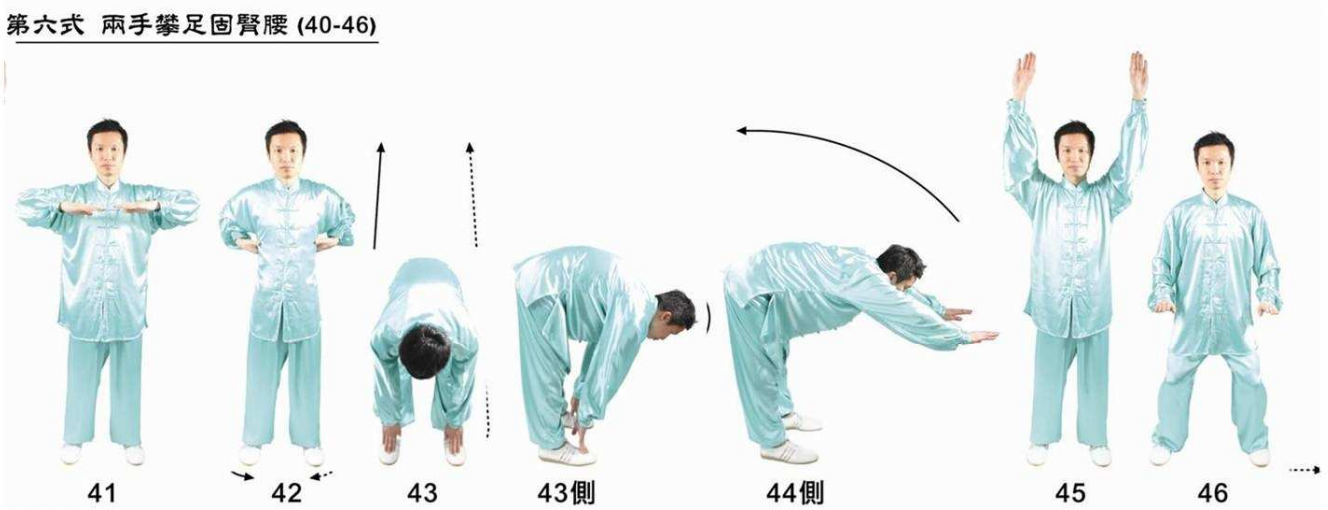
健身氣功八段錦掛圖（三）：搖頭擺尾去心火

示範：張浩銘先生，四套「標準健身氣功」功法輔導員及屯門醫院職業治療師



健身氣功八段錦掛圖（四）：兩手攀足固腎腰及攢拳怒目增氣力

示範：張浩銘先生，四套「標準健身氣功」功法輔導員及屯門醫院職業治療師



健身氣功八段錦掛圖（五）：背後七顛百病消 及 收勢

示範：張浩銘先生，四套「標準健身氣功」功法輔導員及屯門醫院職業治療師