2003

Wong, S. S. and R. L. Nahin (2003). "National Center for Complementary and Alternative Medicine perspectives for complementary and alternative medicine research in cardiovascular diseases." Cardiol Rev 11(2): 94-8.

The National Center for Complementary and Alternative Medicine (NCCAM) was established in 1998 by the US Congress to conduct and support basic and applied research and research training and disseminate information with respect to identifying, investigating, and validating complementary and alternative therapies. Because of limited appropriations, NCCAM prioritizes its research programs according to the relative use of a modality, the evidence supporting its value and safety, and opportunities to advance the relevant fields of science. While NCCAM's top priority is supporting clinical trials of alternative therapeutics, increasingly it is supporting basic and preclinical research. To accomplish its mission, NCCAM encourages the research community to undertake high-quality and rigorous research in complementary and alternative medicine (CAM). In the area of cardiovascular diseases, NCCAM is supporting clinical trials, specialized centers, research training, and investigator-initiated projects. Virtually all aspects of CAM modalities are open for investigation. Current NCCAM projects are investigating Tai Chi (Taiji) exercise, hawthorn, phytoestrogens, biofeedback, Ayurvedic herbals, acupuncture, qigong, Reiki, meditation, spirituality, Ginkgo biloba, ethylenediaminetetraacetic acid chelation therapy, and special diets.

Wolf, S. L., R. W. Sattin, et al. (2003). "Intense tai chi exercise training and fall occurrences in older, transitionally frail adults: a randomized, controlled trial." J Am Geriatr Soc 51(12): 1693-701.

OBJECTIVES: To determine whether an intense tai chi (TC) exercise program could reduce the risk of falls more than a wellness education (WE) program in older adults meeting criteria for transitioning to frailty. DESIGN: Randomized, controlled trial of 48 weeks duration. SETTING: Twenty congregate living facilities in the greater Atlanta area. PARTICIPANTS: Sample of 291 women and 20 men aged 70 to 97. MEASUREMENTS: Demographics, time to first fall and all subsequent falls, functional measures, Sickness Impact Profile, Centers for Epidemiologic Studies-Depression Scale, Activities-specific Balance Confidence Scale, Falls Efficacy Scales, and adherence to interventions. RESULTS: The risk ratio (RR) of falling was not statistically different in the TC group and the WE group (RR=0.75, 95% confidence interval (CI)=0.52-1.08), P=.13). Over the 48 weeks of intervention, 46% (n=132) of the participants did not fall; the percentage of participants that fell at least once was 47.6% for the TC group and 60.3% for the WE group. CONCLUSION: TC did not reduce the RR of falling in transitionally frail, older adults, but the direction of effect observed in this study, together with positive findings seen previously in more-robust older adults, suggests that TC may be clinically important and should be evaluated further in this high-risk population.

Wolf, S. L., H. X. Barnhart, et al. (2003). "Selected as the best paper in the 1990s: Reducing frailty and falls in older persons: an investigation of tai chi and computerized balance training." J Am Geriatr Soc 51(12): 1794-803.

OBJECTIVES: To evaluate the effects of two exercise approaches, tai chi (TC) and computerized balance training (BT), on specified primary outcomes (biomedical, functional, and psychosocial indicators of frailty) and secondary outcomes (occurrences of fall). DESIGN: The Atlanta Frailty and Injuries: Cooperative Studies and Intervention Techniques, a prospective, randomized, controlled clinical trial with three arms (TC, BT, and education (ED)). Intervention length was 15 weeks, with primary outcomes measured before and after intervention and at 4-month follow-up. Falls were monitored continuously

throughout the study. SETTING: Persons aged 70 and older living in the community. PARTICIPANTS: A total of 200 participants, 162 women and 38 men; mean age was 76.2. MEASUREMENTS: Biomedical (strength, flexibility, cardiovascular endurance, body composition), functional instrumental activities of daily living (IADL), and psychosocial well-being (Center for Epidemiological Studies for Depression scale, fear of falling questionnaire, self-perception of present and future health, mastery index, perceived quality of sleep, and intrusiveness) variables. RESULTS: Grip strength declined in all groups, and lower extremity range of motion showed limited but statistically significant changes. Lowered blood pressure before and after a 12-minute walk was seen following TC participation. Fear of falling responses and intrusiveness responses were reduced after the TC intervention compared with the ED group (P=.046 and P=.058, respectively). After adjusting for fall risk factors, TC was found to reduce the risk of multiple falls by 47.5%. CONCLUSION: A moderate TC intervention can impact favorably on defined biomedical and psychosocial indices of frailty. This intervention can also have favorable effects upon the occurrence of falls. TC warrants further study as an exercise treatment to improve the health of older people.

Tsang, W. W. and C. W. Hui-Chan (2003). "Effects of tai chi on joint proprioception and stability limits in elderly subjects." Med Sci Sports Exerc 35(12): 1962-71.

PURPOSE: The objectives of this study were to examine whether elderly Tai Chi practitioners have developed better knee joint proprioception and standing balance control than control subjects. METHODS: Tai Chi and control subjects (N = 21 each, aged 69.4 +/- SD 5.5 and 72.3 +/- 6.1 yr, respectively) were matched with respect to age, sex, and physical activity level. Passive knee joint repositioning was used to test joint proprioceptive acuity. Control of body sway during static standing and subjects' intentional weight shifting to eight different spatial limits of stability within their base of support were conducted using force platform measurements. RESULT: Tai Chi practitioners were found to have better knee joint proprioceptive acuity, in that they made less absolute angle error (2.1 +/- 1.2 degrees) than control subjects (4.0 +/- 3.4 degrees, with P = 0.023) in passive knee joint repositioning. No significant difference was found in the anteroposterior and mediolateral body sway during static standing (P > 0.05). However, Tai Chi practitioners initiated voluntary weight shifting in the limits of stability test more quickly (reaction time: 0.8 +/- 0.2 s for Tai Chi practitioners) than control subjects (1.1 +/- 0.3 s; P = 0.008). Moreover, they could lean further without losing stability (maximum excursion: 5.2 +/- 0.6% for Tai Chi practitioners and 4.6 +/- 0.5% for control subjects; P = 0.001) and showed better control of their leaning trajectory (directional control: 75.9 +/- 10.0% for Tai Chi practitioners and 68.5 +/- 6.9% for control subjects; P = 0.008). CONCLUSIONS: These results demonstrate that long-term Tai Chi practitioners had improved knee joint proprioception and expanded their limits of stability during weight shifting in stance.

Tsai, J. C., W. H. Wang, et al. (2003). "The beneficial effects of Tai Chi Chuan on blood pressure and lipid profile and anxiety status in a randomized controlled trial." J Altern Complement Med 9(5): 747-54.

OBJECTIVES: To evaluate the effects on blood pressure, lipid profile, and anxiety status on subjects received a 12-week Tai Chi Chuan exercise program. DESIGN: Randomized controlled study of a Tai Chi Chuan group and a group of sedentary life controls. SETTING: Taipei Medical University Hospitals and University campus in the Taipei, Taiwan, area. SUBJECTS: Two (2) selected groups of 76 healthy subjects with blood pressure at high-normal or stage I hypertension. INTERVENTION: A 12-week Tai Chi Chuan exercise training program was practiced regularly with a frequency of 3 times per week. Each session

included 10-minute warm-up, 30-minute Tai Chi exercise, 10-minute cool-down. Exercise intensity was estimated to be approximately 64% of maximal heart rate. OUTCOME MEASURES: Blood pressure, lipid profile and anxiety status (State-Trait Anxiety Inventory; STAI) were evaluated. RESULTS: After 12-weeks of Tai Chi training, the treatment group showed significant decrease in systolic blood pressure of 15.6 mm Hg and diastolic blood pressure 8.8 mm Hg. The serum total cholesterol level decreased 15.2 mg/dL and high-density lipoprotein cholesterol increased 4.7 mg/dL. By using STAI evaluation, both trait anxiety and state anxiety were decreased. CONCLUSIONS: This study shows that under well-designed conditions, Tai Chi exercise training could decrease blood pressure and results in favorable lipid profile changes and improve subjects' anxiety status. Therefore, Tai Chi could be used as an alternative modality in treating patients with mild hypertension, with a promising economic effect.

Taylor-Piliae, R. E. (2003). "Tai Chi as an adjunct to cardiac rehabilitation exercise training." J Cardiopulm Rehabil 23(2): 90-6.

Heart disease is a chronic condition needing lifetime secondary prevention measures to decrease morbidity and mortality, and to improve quality of life. Cardiac rehabilitation exercise training, one aspect of cardiac recovery, traditionally includes some form of aerobic fitness and, more recently, muscle strength training to improve exercise tolerance. Tai chi, widely practiced in China for centuries, is a popular form of exercise among older Chinese persons associated with enhanced well-being and health among traditional Chinese practitioners. Recent research has reported improvement in cardiorespiratory function, balance and postural stability, fall prevention, and stress reduction. A review of the literature suggests potential benefits from tai chi exercise performed as an adjunct to cardiac rehabilitation exercise training. Tai chi is cost-effective and facilitates a lifestyle of health-related behavior practices.

Taggart, H. M., C. L. Arslanian, et al. (2003). "Effects of T'ai Chi exercise on fibromyalgia symptoms and health-related quality of life." Orthop Nurs 22(5): 353-60.

BACKGROUND: Fibromyalgia (FM), one of the most common musculoskeletal disorders, is associated with high levels of impaired health and inadequate or limited symptom relief. The cause of this complex syndrome is unknown, and there is no known cure. Numerous research results indicate that a combination of physical exercise and mind-body therapy is effective in symptom management. T'ai Chi, an ancient Chinese exercise, combines physical exercise with mindbody therapy. PURPOSE: To investigate the effects of T'ai Chi exercise on FM symptoms and health-related quality of life. DESIGN: Pilot study, one group pre-to-post posttest design. METHODS: Participants with FM (n = 39) formed a single group for 6 weeks of 1-hour, twice weekly T'ai Chi exercise classes. FM symptoms and health-related quality of life were measured before and after exercise. FINDINGS: Twenty-one participants completed at least 10 of the 12 exercise sessions. Although the dropout rate was higher than expected, measurements on both the Fibromyalgia Impact Questionnaire (FIQ) (Buckhardt, Clark, & Bennett, 1991) and the Short Form-36 (SE-36) (Ware & Sherbourne, 1992) revealed statistically significant improvement in symptom management and health-related quality of life. IMPLICATIONS FOR NURSING RESEARCH: Knowledge of interventions to enhance health for the patient with musculoskeletal problems is a National Association of Orthopaedic Nurses priority. Tai Chi is potentially beneficial to patients with FM. Further research is needed to support evidence-based practice.

Song, R., E. O. Lee, et al. (2003). "Effects of tai chi exercise on pain, balance, muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis: a randomized clinical trial." J Rheumatol 30(9): 2039-44.

OBJECTIVE: Twelve forms of Sun-style tai chi exercise have been developed specifically to reduce the symptoms and improve the physical functioning of arthritic patients, and this randomized study examined the changes in symptoms and physical characteristics in older women with osteoarthritis (OA) at the completion of a 12-week tai chi exercise program. METHODS: Seventy-two patients with OA were randomly assigned into 2 groups. Due to a 41% overall dropout rate, 22 experimental subjects and 21 controls completed pre- and post-test measures over a 12 week interval. Outcome variables were physical symptoms and fitness, body mass index, cardiovascular functioning, and perceived difficulties in physical functioning. The independent t test was used to examine group differences. RESULTS: The homogeneity test confirmed that there were no significant group differences in demographic data and pretest measures. Mean comparisons of the change scores revealed that the experimental group perceived significantly less pain ($t = -2.19$, $p = 0.034$) and stiffness ($t = -2.13$, $p = 0.039$) in their joints, and reported fewer perceived difficulties in physical functioning ($t = -2.81$, $p = 0.008$), while the control group showed no change or even deterioration in physical functioning after 12 weeks. In the physical fitness test, there were significant improvements in balance ($t = 3.34$, $p = 0.002$) and abdominal muscle strength ($t = 2.74$, $p = 0.009$) for the tai chi exercise group. No significant group differences were found in flexibility and upper-body or knee muscle strength in the post-test scores. CONCLUSION: Older women with OA were able to safely perform the 12 forms of Sun-style tai chi exercise for 12 weeks, and this was effective in improving their arthritic symptoms, balance, and physical functioning. A longitudinal study with a larger sample size is now needed to confirm the potential use of tai chi exercise in arthritis management.

Song, R., E.-O. Lee, et al. (2003). "Effects of Tai Chi Exercise on Pain, Balance, Muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis: A randomized clinical trial." The Journal of Rheumatology 30(9): 2039-2044.

Twelve forms of Sun Style tai chi exercise have been developed specifically to reduce the symptoms and improve the physical functioning of arthritic patients, and this randomized study examined the changes in symptoms and physical characteristics in older women with osteoarthritis at the completion of a 12 week tai chi exercise program. Conclusion: Older women with OA were able to safely perform the 12 forms of Sun style tai chi exercise for 12 weeks, and this was effective in improving their arthritis symptoms, balance, and physical functioning. A longitudinal study with a larger sample size is now needed to confirm the potential use of tai chi exercise in arthritis management.

Rosengren, K. S., E. Christou, et al. (2003). "Quantification of taiji learning in older adults." J Am Geriatr Soc 51(8): 1186-7.

Mak, M. K. and P. L. Ng (2003). "Mediolateral sway in single-leg stance is the best discriminator of balance performance for Tai-Chi practitioners." Arch Phys Med Rehabil 84(5): 683-6.

OBJECTIVES: To identify a balance measure that can best distinguish Tai-Chi from non-Tai-Chi practitioners and to examine whether longer Tai-Chi practice results in better balance control. DESIGN: Cross-sectional comparative study. SETTING: Community. PARTICIPANTS: Nineteen Tai-Chi practitioners (who practiced Tai Chi for 30-45min at least 3/wk for >1y) and 19 healthy subjects with regular exercise habits (who practiced Tai Chi for 30-45min at least 3/wk for >1y). INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: Scores on 2 clinical tests (functional reach, gait) and 1 laboratory test (postural sway). RESULTS: Tai-Chi practitioners had better clinical test scores for functional reach, gait speed, stride length, and sway parameters during single-leg stance

(P<.05). Sway in mediolateral direction during single-leg stance was the balance performance variable that best discriminated the Tai-Chi group from non-Tai-Chi group. More experience practicing Tai Chi was associated with better balance performance. CONCLUSIONS: Tai-Chi practitioners performed better both in clinical and laboratory tests when compared with subjects who did not practice Tai Chi. More Tai-Chi experience was associated with better postural control.

Lu, W. A. and C. D. Kuo (2003). "The effect of Tai Chi Chuan on the autonomic nervous modulation in older persons." Med Sci Sports Exerc 35(12): 1972-6.

PURPOSE: This study evaluated the effect of Tai Chi Chuan (TCC) on the autonomic nervous modulation in older persons. METHODS: Twenty TCC practitioners and 20 normal controls were included in this study. The stationary state spectral heart rate variability (HRV) measures between TCC practitioners and normal controls, and the sequential changes in HRV measures after classical Yang's TCC were compared. RESULTS: The total power, very low-frequency power, low-frequency power, normalized low-frequency power, and low-/high-frequency power ratios in TCC practitioners were all significantly higher than those of normal controls, whereas the heart rate and systolic and diastolic blood pressures were not different between these two groups of subjects. After TCC, the normalized high-frequency power increased significantly from 22.8 +/- 14.6 normalized units (nu) before TCC to 28.2 +/- 16.1 nu 30 min after TCC and to 30.6 +/- 18.4 nu 60 min after TCC. In contrast, the low-/high-frequency power ratio decreased significantly from 2.5 +/- 2.4 before TCC to 1.8 +/- 1.4 30 min after TCC and to 2.2 +/- 2.9 60 min after TCC. The heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, and pulse pressure also decreased sequentially after TCC. CONCLUSION: The short-term effect of TCC was to enhance the vagal modulation and tilt the sympathovagal balance toward deceased sympathetic modulation in older persons. TCC might be good health-promoting calisthenics for older persons.

Lee, M. S., M. S. Lee, et al. (2003). "Qigong reduced blood pressure and catecholamine levels of patients with essential hypertension." International J Neuroscience 113: 1691-1701.

See previous.

Lee, M. S., M. S. Lee, et al. (2003). "Effects of Qigong on Blood Pressure, Blood Pressure determinants and ventilatory function in middle-aged patients with essential hypertension." The American Journal of Chinese Medicine 31(3): 489-497.

This study was designed to measure changes in blood pressure (BP) urinary catecholamines and ventilatory functions of patients with mild essential hypertension after 10 weeks of Qigong. Fifty eight patients volunteered to participate in this study and were randomly divided into either a Qigong group (n=29) or a control group (n=29). Systolic and diastolic pressure decreased significantly in the Qigong group... Also there was a significant reduction of nor epinephrine, metanephrine and epinephrine compared to baseline values in the Qigong group.

Lee, M. S., H. J. Huh, et al. (2003). "Effects of Qigong on Immune Cells." The American Journal of Chinese Medicine 31(2): 327-335.

The aim of this study was to investigate the influence of two acute Qigong interventions (Qi-training and Qi-therapy) on immune cells. Increase in monocyte and lymphocyte numbers shown.

Lavery, L. L. and S. A. Studenski (2003). "Tai chi, falls, and the heritage of JAGS." J Am Geriatr Soc 51(12): 1804-5.

Kressig, R. W., O. Beauchet, et al. (2003). "[T'ai chi in the elderly: practical aspects]." Rev Med Suisse Romande 123(11): 671-5.

New approaches to health promotion for the growing geriatric population are needed. Low to moderately intense exercise programs, such as T'ai Chi seem particularly appropriate for older individuals because of many worthwhile physiological and psychological long-term benefits. T'ai Chi reduces falls and improves postural stability in older adults. It also has a positive impact on muscle strength and cardiovascular fitness and can improve mobility in patients with rheumatoid arthritis. It imparts a sense of well-being and confidence, and can reduce fear of falling in older adults. This article reviews the current medical literature regarding the multiple effects of T'ai Chi. Historical aspects of T'ai Chi and its current adaptation for practice by healthy older adults are presented. Finally, a set of modified exercises is proposed that is based on underlying principles of T'ai Chi and can be applied to patients with mild to moderate cognitive impairment.

Judge, J. O. (2003). "Balance training to maintain mobility and prevent disability." Am J Prev Med 25(3 Suppl 2): 150-6.

Balance is important for the safe performance of many activities that allow older people to remain independent in their community. Housework, cooking, shopping, and travel generally require the ability to stand, reach, turn, and bend down and pick up objects from the floor. Multiple interacting factors are implicated in the deterioration of balance. Several strategies have been tested to improve balance and reduce falls. Home-based individualized training that attempted to improve identified deficits reduced falls and improved physical performance and stabilized or reduced disability. Home-based exercise programs that included low-intensity strength and balance training have improved balance and reduced fall rates by about 40% compared to controls. Class-based exercise programs in senior centers or exercise centers have improved balance and physical performance, and some have reduced falls. Programs such as tai chi and social dance look promising and should be further investigated.

Irwin, M. R., J. L. Pike, et al. (2003). "Effects of a behavioral intervention, Tai Chi Chih, on varicella-zoster virus specific immunity and health functioning in older adults." Psychosom Med 65(5): 824-30.

OBJECTIVE: Both the incidence and severity of herpes zoster (shingles) increase markedly with increasing age in association with a decline in varicella-zoster virus (VZV) specific cell-mediated immunity (CMI). This study examined whether a behavioral intervention, Tai Chi Chih (TCC), affects VZV specific immunity and health functioning in older adults who, on average, show impairments of health status and are at risk for shingles. METHODS: Thirty-six men and women (age > or =60 years) were assigned randomly to a 15-week program of TCC instruction (three 45 minute classes per week; N = 18) or a wait list control condition (N = 18). VZV-specific CMI was measured at baseline and at 1-week postintervention. Health functioning (Medical Outcome scale: SF-36) was assessed at baseline, and at 5, 10, and 15 weeks during the intervention, and at 1-week postintervention. RESULTS: In the intent-to-treat sample, VZV-specific CMI increased 50% from baseline to 1-week postintervention in the TCC group ($p < 0.05$) but was unchanged in the wait list control group. In those who completed the study, 1-week postintervention SF-36 scale scores for role-physical ($p < 0.05$) and physical functioning ($p < 0.05$) were higher in the TCC group (N = 14) as compared with controls (N = 17). Older adults who had impairments of physical status at baseline showed the greatest increases of SF-36 role-physical ($p < 0.01$) and physical functioning ($p < 0.001$) during the TCC intervention. CONCLUSIONS: Administration of TCC for 15 weeks led to an increase in VZV-specific CMI. Gains in health functioning were found in participants who

received TCC and were most marked in those older adults who had the greatest impairments of health status.

Irwin, M. R., J. L. Pike, et al. (2003). "Effects of a behavioral intervention, Tai Chi Chih, on Varicella Zoster Virus specific immunity and health functioning in older adults." Psychosomatic Medicine 65: 824-830.

Both the incidence and severity of herpes zoster increase markedly with increasing age in association with a decline in VZV specific CMI. This study examined whether a behavioral intervention, Tai Chi Chih (TCC), affects VZV specific immunity and health functioning in older adults, who on average, show impairments of health status and are at risk for shingles. Methods: Thirty six men and women (age>60 years) were assigned randomly to a 15 week program of TCC instruction (45 minute classes per week, N=18) or a wait list condition (N=18). VZV-specific CMI was measured at baseline and 1 week post intervention. Health functioning (Medical Outcome Scale:SF-36) was assessed at baseline, and at 5, 10 and 15 weeks during the intervention and at 1 week post intervention. Results: In the intent-to-treat sample, VZV specific CMI increase 50% from baseline to one week post intervention in the TCC group (N=14) as compared with control (N=17). Older adults who has impairments of physical status at baseline showed the greatest increases of SF-36 role-physical (p>0.01) and physical functioning (p>0.001) during the TCC intervention. Conclusions: Administration of TCC for 15 weeks led to an increase in VZV specific CMI. Gains in health functioning were found in participants who received TCC and were most marked in those older adults who had the greatest impairments of health status.

Humphrey, R. (2003). "Tai chi in cardiac rehabilitation." J Cardiopulm Rehabil 23(2): 97-9.

Gillespie, L. D., W. J. Gillespie, et al. (2003). "Interventions for preventing falls in elderly people." Cochrane Database Syst Rev(4): CD000340.

BACKGROUND: Approximately 30 per cent of people over 65 years of age and living in the community fall each year; the number is higher in institutions. Although less than one fall in 10 results in a fracture, a fifth of fall incidents require medical attention. OBJECTIVES: To assess the effects of interventions designed to reduce the incidence of falls in elderly people (living in the community, or in institutional or hospital care). SEARCH STRATEGY: We searched the Cochrane Musculoskeletal Group specialised register (January 2003), Cochrane Central Register of Controlled Trials (The Cochrane Library, Issue 1, 2003), MEDLINE (1966 to February 2003), EMBASE (1988 to 2003 Week 19), CINAHL (1982 to April 2003), The National Research Register, Issue 2, 2003, Current Controlled Trials (www.controlled-trials.com accessed 11 July 2003) and reference lists of articles. No language restrictions were applied. Further trials were identified by contact with researchers in the field. SELECTION CRITERIA: Randomised trials of interventions designed to minimise the effect of, or exposure to, risk factors for falling in elderly people. Main outcomes of interest were the number of fallers, or falls. Trials reporting only intermediate outcomes were excluded. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial quality and extracted data. Data were pooled using the fixed effect model where appropriate. MAIN RESULTS: Sixty two trials involving 21,668 people were included.Interventions likely to be beneficial: Multidisciplinary, multifactorial, health/environmental risk factor screening/intervention programmes in the community both for an unselected population of older people (4 trials, 1651 participants, pooled RR 0.73, 95%CI 0.63 to 0.85), and for older people with a history of falling or selected because of known risk factors (5 trials, 1176 participants, pooled RR 0.86, 95%CI 0.76 to 0.98), and in residential care facilities (1 trial, 439 participants, cluster-adjusted incidence rate ratio 0.60, 95%CI 0.50 to 0.73) A

programme of muscle strengthening and balance retraining, individually prescribed at home by a trained health professional (3 trials, 566 participants, pooled relative risk (RR) 0.80, 95% confidence interval (95%CI) 0.66 to 0.98) Home hazard assessment and modification that is professionally prescribed for older people with a history of falling (3 trials, 374 participants, RR 0.66, 95% CI 0.54 to 0.81) Withdrawal of psychotropic medication (1 trial, 93 participants, relative hazard 0.34, 95%CI 0.16 to 0.74) Cardiac pacing for fallers with cardioinhibitory carotid sinus hypersensitivity (1 trial, 175 participants, WMD -5.20, 95%CI -9.40 to -1.00) A 15 week Tai Chi group exercise intervention (1 trial, 200 participants, risk ratio 0.51, 95%CI 0.36 to 0.73). Interventions of unknown effectiveness: Group-delivered exercise interventions (9 trials, 1387 participants) Individual lower limb strength training (1 trial, 222 participants) Nutritional supplementation (1 trial, 46 participants) Vitamin D supplementation, with or without calcium (3 trials, 461 participants) Home hazard modification in association with advice on optimising medication (1 trial, 658 participants), or in association with an education package on exercise and reducing fall risk (1 trial, 3182 participants) Pharmacological therapy (raubasine-dihydroergocristine, 1 trial, 95 participants) Interventions using a cognitive/behavioural approach alone (2 trials, 145 participants) Home hazard modification for older people without a history of falling (1 trial, 530 participants) Hormone replacement therapy (1 trial, 116 participants) Correction of visual deficiency (1 trial, 276 participants). Interventions unlikely to be beneficial: Brisk walking in women with an upper limb fracture in the previous two years (1 trial, 165 participants). REVIEWER'S CONCLUSIONS: Interventions to prevent falls that are likely to be effective are now available; less is known about their effectiveness in preventing fall-related injuries. Costs per fall prevented have been established for four of the interventions and careful economic modelling in the context of the local healthcare system is important. Some potential interventions are of unknown effectiveness and further research is indicated.

Gass, R. (2003). "Tai Chi Chuan and bone loss in postmenopausal women." Arch Phys Med Rehabil 84(4): 621; author reply 621-3.

Gallagher, B. (2003). "Tai Chi Chuan and Qigong: physical and mental practice for functional mobility." Topics in Geriatric Rehabilitation 19(3): 172-181.

Evidence mounts that Tai Chi Chuan and Qigong, a system of mental and physical practice, is a preventive and restorative therapy for elders seeking to reverse or prevent frailty by preventing falls, improving balance, strengthening, enhancing cardiorespiratory fitness, treating arthritis, and eliciting a relaxation response. Knowledge of the Chinese internal martial arts, together with clinical biometrics and psychophysiology, suggests that Tai Chi Chuan and Qigong should also benefit some elders who have incontinence or low back pain. The combination of direct and indirect evidence can serve as a springboard for further evaluation of this system by researchers and clinicians.

Dorcas, A. and P. Yung (2003). "Qigong: Harmonising the breath, the body and the mind." Complement Ther Nurs Midwifery 9: 198-202.

Qigong is a form of exercise developed in China over millennia to prevent illness and foster physical and mental health. Despite many claims of the therapeutic effects of Qigong, the fundamental concepts and principals underlying this holistic therapy remain unfamiliar to Western populations. This article helps practitioners to understand the art of Qigong based on three main principles, harmonising the breath, the body and the mind.

Davidson, R. J., J. Kabat-Zinn, et al. (2003). "Alterations in Brain and Immune Function produced by mindfulness meditation." Psychosomatic Medicine 65: 564-570.

The underlying changes in biological processes that are associated with reported changes in mental and physical health in response to meditation have not been systematically explored. We performed a randomized controlled study on the effects on the brain and immune function of a well known and widely used 8 week clinical training program in mindfulness meditation applied in a work environment of healthy employees. Method: We measured brain electrical activity before and immediately after, and then 4 months after an 8 week training program in mindfulness meditation. Twenty five subjects were tested in the meditation group. A wait list control group (N=16) was tested at the same points in time as the meditators. At the end of the eight week period, subjects were vaccinated with influenza vaccine. Results: We report for the first time significant increases in left sided anterior activation, a pattern previously associated with positive affect, the meditators compared with those in the wait list control group. Finally, the magnitude of increase in left sided activation predicted the magnitude of antibody titer rise to the vaccine. Conclusions: These findings demonstrate that a short program in mindfulness meditation produces demonstrable effects on brain and immune function. These findings suggest that meditation may change brain and immune function in positive ways and underscore the need for additional research.

Christou, E. A., Y. Yang, et al. (2003). "Taiji training improves knee extensor strength and force control in older adults." J Gerontol A Biol Sci Med Sci 58(8): 763-6.

The purpose of this study was to examine the effects of Taiji training on knee extensor strength and force control in older individuals. Twenty-six healthy older adults (71.9 +/- 1.8 years) participated in the study. Sixteen of the older adults (70.2 +/- 1.8 years) underwent Taiji training for 20 weeks (experimental group), whereas the other 10 (74.6 +/- 1.2 years) served as the control group. For both groups, strength and force control of the knee extensors was assessed twice with an isokinetic dynamometer. Strength was assessed with a maximum voluntary isometric contraction (MVC). Force control was measured as the standard deviation (SD) and coefficient of variation (CV) of force during a constant isometric knee extension task at 2%, 30%, 60%, and 90% MVC. For the experimental group, MVC significantly increased (19.5 +/- 4.9%) and the CV of force decreased (18.9 +/- 3.3%) following Taiji training. Improvements in the CV of force were primarily due to decreases in the SD of force (R(2) =.86) rather than increases in strength (R(2) =.12). Furthermore, decreases in SD of force were independent of improvements in strength. For the control group, strength, SD, and CV of force were not different for the 2 tests. The overall findings suggest that Taiji training improves knee extensor strength and force control in older adults.

Chan, S. P., T. C. Luk, et al. (2003). "Kinematic and electromyographic analysis of the push movement in tai chi." Br J Sports Med 37(4): 339-44.

BACKGROUND: Tai chi is a form of exercise derived from the martial art folk traditions of China. The force used in tai chi includes different principles of mechanical advantage. No studies on the kinematic features of tai chi exercise have been published. OBJECTIVE: To analyse the kinematics and electromyographic characteristics of tai chi. METHODS: An experienced tai chi master was asked to perform a sequence of basic movements: ward off, roll back, press, and push. The movements were videotaped and digitised using a motion analysis system. Electromyographic activities of the lumbar erector spinae, rectus femoris, medial hamstrings, and medial head of gastrocnemius were recorded by surface electrodes. The push movement data were analysed. RESULTS:

The medial hamstrings and medial head of gastrocnemius muscle groups maintained low activity, with higher electromyographic values in the lumbar erector spinae and substantially higher ones in the rectus femoris during the push movement. Both concentric and eccentric contractions occurred in muscles of the lower limbs, with eccentric contraction occurring mainly in the anti-gravity muscles such as the rectus femoris and the medial head of gastrocnemius. The forward and backward shifts in centre of gravity (CG) were mainly accomplished by increasing and decreasing respectively the joint angles of the bilateral lower limbs rather than by adopting a forward or backward postural lean. The path of the CG in the anteroposterior and mediolateral component was unique, and the sway or deviation from the path was small. The master maintained an upright posture and maintained a low CG (hips, knees, and ankles bent) while travelling slowly and steadily from one position to another. CONCLUSION: The eccentric muscle contraction of the lower limbs in the push movement of tai chi may help to strengthen the muscles.

Breslin, K. T., M. R. Reed, et al. (2003). "An holistic approach to substance abuse treatment." J Psychoactive Drugs 35(2): 247-51.

The purpose of this article is to describe a model outpatient substance abuse treatment program. This program is designed to provide patients with not only traditional modalities of treatment such as individual, group, and family therapy, but also to provide an opportunity for patients to express thoughts and feelings through holistic modalities. These modalities include dance/movement therapy, Tai Chi, art therapy, leisure and recreational skills, spiritual growth and development, cultural awareness and appreciation, vocational services, psychiatric care and physical health. The authors describe features of this program that they believe to be unique and that focus on ways to help patients develop a stronger sense of self-identity, self-esteem and self-confidence.

Astin, J. A., S. L. Shapiro, et al. (2003). "Mind-body medicine: state of the science, implications for practice." J Am Board Fam Pract 16(2): 131-47.

BACKGROUND: Although emerging evidence during the past several decades suggests that psychosocial factors can directly influence both physiologic function and health outcomes, medicine had failed to move beyond the biomedical model, in part because of lack of exposure to the evidence base supporting the biopsychosocial model. The literature was reviewed to examine the efficacy of representative psychosocial-mind-body interventions, including relaxation, (cognitive) behavioral therapies, meditation, imagery, biofeedback, and hypnosis for several common clinical conditions. METHODS: An electronic search was undertaken of the MEDLINE, PsycLIT, and the Cochrane Library databases and a manual search of the reference sections of relevant articles for related clinical trials and reviews of the literature. Studies examining mind-body interventions for psychological disorders were excluded. Owing to space limitations, studies examining more body-based therapies, such as yoga and tai chi chuan, were also not included. Data were extracted from relevant systematic reviews, meta-analyses, and randomized controlled trials. RESULTS: Drawing principally from systematic reviews and meta-analyses, there is considerable evidence of efficacy for several mind-body therapies in the treatment of coronary artery disease (eg, cardiac rehabilitation), headaches, insomnia, incontinence, chronic low back pain, disease and treatment-related symptoms of cancer, and improving postsurgical outcomes. We found moderate evidence of efficacy for mind-body therapies in the areas of hypertension and arthritis. Additional research is required to clarify the relative efficacy of different mind-body therapies, factors (such as specific patient characteristics) that might predict more or less successful outcomes, and mechanisms of action. Research is also necessary to examine the cost offsets associated with mind-body therapies. CONCLUSIONS: There is now considerable evidence that an array of

mind-body therapies can be used as effective adjuncts to conventional medical treatment for a number of common clinical conditions.

2002

Wu, G. (2002). "Evaluation of the effectiveness of Tai Chi for improving balance and preventing falls in the older population--a review." J Am Geriatr Soc 50(4): 746-54.

One of the challenges faced by people with advancing age is decreased postural stability and increased risks for falls. There has been an increased interest over the last decade in using Tai Chi as an intervention exercise for improving postural balance and preventing falls in older people. Despite the increased number of studies in recent years relating Tai Chi to balance and fall prevention, results are scattered and inconsistent. There is wide variation in the use of balance measures, subject population, type and duration of Tai Chi exercise, and type of study. This paper provides a systematic review/analysis of currently available study reports. The goal of the review is to address the following concerns: how the effect of Tai Chi on balance or fall prevention has been evaluated to date, what level of evidence exists supporting Tai Chi as an effective exercise for improving balance or preventing falls, and what factors could possibly affect the benefit of Tai Chi on balance or falls. This review also helps identify directions for future research.

Wu, G., F. Zhao, et al. (2002). "Improvement of isokinetic knee extensor strength and reduction of postural sway in the elderly from long-term Tai Chi exercise." Arch Phys Med Rehabil 83(10): 1364-9.

OBJECTIVES: To compare isokinetic strength of leg muscles and foot center of pressure (COP) as a measure of sway between long-term Tai Chi practitioners and controls. DESIGN: Cross-sectional study. SETTING: Community setting. PARTICIPANTS: Twenty subjects in the Tai Chi group and 19 subjects in the control group (age, >55 y). INTERVENTION: Subjects in Tai Chi group had practiced Tai Chi for a minimum of 3 years. MAIN OUTCOME MEASURES: Concentric and eccentric strength of knee extensors and flexors at 60 degrees/s and 120 degrees/s, and foot COP displacement during quiet stance with eyes open or closed. RESULTS: People in the Tai Chi group had significantly higher knee extensor strength at all speeds tested (P<.013), and smaller foot COP excursions for both eyes open and eyes closed conditions (P<.05) than people in control group. No significant difference existed in knee flexors between the 2 groups (P<.713). The COP excursions correlated significantly with the eccentric strength of knee extensors (P<.07) but not with the concentric strength of knee extensors (P<.14) or with the isokinetic strength of knee flexors at most of the speeds (P<.27). CONCLUSION: These findings support the hypothesis that the maintenance of eccentric strength of postural muscles in the lower extremities, which is beneficial for maintaining good postural stability, is helped through the long-term practice of Tai Chi.

Wang, J. S., C. Lan, et al. (2002). "Tai Chi Chuan training is associated with enhanced endothelium-dependent dilation in skin vasculature of healthy older men." J Am Geriatr Soc 50(6): 1024-30.

OBJECTIVES: The vascular endothelium modulates vascular tone by synthesizing and metabolizing vasoactive substances. Endothelium-dependent vasodilation declines with age. This study investigated whether Tai Chi Chuan (TCC) training could enhance endothelial function in the skin vasculature of older men. SETTING: Community setting. DESIGN: Basic hemodynamic characteristics and skin vascular response to endothelium-dependent and -independent vasodilators were studied. PARTICIPANTS: Ten older men who practiced TCC, 10 older healthy sedentary men, and 12 younger healthy sedentary men. The older TCC

subjects had practiced classical Yang TCC for a mean +/- standard deviation of 11.2 +/- 3.4 years; mean attendance was 5.1 +/- 1.8 times weekly. Sedentary subjects had not participated in any regular exercise training for at least 5 years. MEASUREMENTS: Different doses of 1% acetylcholine (ACh) and 1% sodium nitroprusside (SNP) were iontophoretically applied to the skin of subjects' lower legs, and cutaneous microvascular perfusion responses were determined by laser doppler measurements. Additionally, arterial and venous hemodynamic variables were measured by impedance plethysmograph. RESULTS: The older TCC group had higher lower leg arterial blood flow (LABF); LABF in response to reactive hyperemia; and lower leg venous capacity, tone and blood flow than their sedentary counterparts, but the older TCC group displayed similar arterial and venous hemodynamic variables to the younger sedentary group. The younger sedentary group had a higher ACh-induced cutaneous perfusion and a higher ratio of ACh- to SNP-induced cutaneous perfusion than the two older groups. The older TCC group showed a higher ACh-induced cutaneous perfusion and a higher ratio of ACh- to SNP-induced cutaneous perfusion than the older sedentary group. Skin vascular responses to SNP did not differ significantly between the three groups. CONCLUSIONS: Regular practice of TCC is associated with enhanced endothelium-dependent dilation in skin vasculature of older individuals. Moreover, TCC training may delay the age-related decline of venous compliance and hyperemic arterial response.

Voukelatos, A. and A. Metcalfe (2002). "Central Sydney Tai Chi Trial: methodology." N S W Public Health Bull 13(1-2): 19.

Vaananen, J., S. Xusheng, et al. (2002). "Taichiquan acutely increases heart rate variability." Clin Physiol Funct Imaging 22(1): 2-3.

A group of 15 elderly men and 14 young male students of physical education made twice a series of Taichiquan (TCQ) practices. Their electrocardiograms were recorded on tape-recorder and heart rates and heart rate variability (HRV) were calculated from digitized data. Here we report the results of recordings in supine positions before and after the first and second series of TCQ. Intervals between heart beats (RRIs) and their standard deviation (SDNN) increased in older men from recordings before the exercise to postexercise. In young subjects the SDNN and total variance (TV) of RRIs increased. HRV increases immediately after TCQ-exercise in young and old male healthy subjects. Whether these practices have permanent effects and effects in patients need controlled and prospective studies.

Taggart, H. M. (2002). "Effects of Tai Chi exercise on balance, functional mobility, and fear of falling among older women." Appl Nurs Res 15(4): 235-42.

The purpose of this study was to determine the effects of Tai Chi exercise among older women. Multiple regression analysis revealed statistically significant improvements in scores for balance ($p < .001$), functional mobility ($p < .05$), and fear of falling ($p < .001$) and associated demographic factors. Three months of twice weekly, 30-minute Tai Chi classes was associated with statistically significant improvements in balance and functional mobility and a reduction in the fear of falling in this sample of older women living in retirement communities. T'ai Chi exercises may be an age-appropriate and acceptable form of exercise for older women.

Qin, L., S. Au, et al. (2002). "Regular Tai Chi Chuan exercise may retard bone loss in postmenopausal women: A case-control study." Arch Phys Med Rehabil 83(10): 1355-9.

OBJECTIVE: To evaluate the potential benefits of regular Tai Chi Chuan exercise on the weight-bearing bones of postmenopausal women. DESIGN: Case-control study. SETTING: University medical school in Hong Kong. PARTICIPANTS:

Postmenopausal women (age range, 50-59y), including 17 self-selected regular Tai Chi Chuan exercisers (TCE) with over 4 years of regular exercise, and 17 age- and gender-matched nonexercising controls (CON). INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: Bone mineral density (BMD) in the lumbar spine and proximal femur was measured at baseline and at follow-up 12 months later by using dual-energy x-ray absorptiometry (DXA) and in the distal tibia using multislice peripheral quantitative computed tomography (pQCT). RESULTS: Baseline results showed that the TCE group had significantly higher BMD (10.1%-14.8%, all P<.05) than the CON group in the lumbar spine, proximal femur, and the ultradistal tibia. The follow-up measurements showed generalized bone loss in both groups. Although both DXA and pQCT measurements revealed decelerated rates of bone loss in the TCE group, only the more sensitive pQCT showed significantly reduced rate of bone loss in trabecular BMD of the ultradistal tibia (TCE vs CON: -1.10%+/-1.26% vs -2.18%+/-1.60%, P<.05) and of cortical BMD of the distal tibial diaphysis (TCE vs CON: -0.90%+/-1.36% vs -1.86%+/-0.93%, P<.05). CONCLUSION: This is the first case-control study to show that regular Tai Chi Chuan exercise may help retard bone loss in the weight-bearing bones of postmenopausal women.

Porter, N. (2002). "Yoga & Tai Chi: stress management and low impact fitness from the East." Pa Health You 105(2): 6-8.

Li, F., K. J. Fisher, et al. (2002). "Delineating the impact of Tai Chi training on physical function among the elderly." Am J Prev Med 23(2 Suppl): 92-7.

BACKGROUND: Through a re-analysis of a Tai Chi intervention data set, the study objective was to determine which, if any, subgroups of the study sample evidenced differential benefits from the intervention.METHOD: Re-analysis of a Tai Chi intervention study, a randomized controlled trial in Eugene and Springfield, Oregon. Physically inactive participants aged > or =65 years were randomly assigned to one of two groups: Tai Chi (n=49) and a wait-list control (n=45). The main outcome measure was self-reported physical function.RESULTS: Initial latent curve analyses indicated significant Tai Chi training effects: Participants in the Tai Chi group reported significant improvements in perceived physical function compared to those in the control group. However, there was significant interindividual variability in response to Tai Chi. The overall intervention effect was further delineated by identifying two subgroups. This delineation showed that Tai Chi participants with lower levels of physical function at baseline benefited more from the Tai Chi training program than those with higher physical function scores. Inclusion of additional measures of individual characteristics at baseline, change in movement confidence, and class attendance further explained differences in treatment responses.CONCLUSIONS: Findings from this study suggest that although an intervention may show an overall effect (or no overall effect), it may be differentially effective for subgroups of participants that differ in their pre-intervention characteristics. Examination of variability in outcome measures can provide important information for refining and tailoring appropriate interventions targeted to specific subgroups.

Lan, C., J. S. Lai, et al. (2002). "Tai Chi Chuan: an ancient wisdom on exercise and health promotion." Sports Med 32(4): 217-24.

Tai Chi Chuan (TCC) is a Chinese conditioning exercise and is well known for its slow and graceful movements. Recent investigations have found that TCC is beneficial to cardiorespiratory function, strength, balance, flexibility, microcirculation and psychological profile. The long-term practice of TCC can attenuate the age decline in physical function, and consequently it is a suitable exercise for the middle-aged and elderly individuals. TCC can be prescribed as an alternative exercise programme for selected patients with

cardiovascular, orthopaedic, or neurological diseases, and can reduce the risk of falls in elderly individuals. The exercise intensity of TCC depends on training style, posture and duration. Participants can choose to perform a complete set of TCC or selected movements according to their needs. In conclusion, TCC has potential benefits in health promotion, and is appropriate for implementation in the community.

Kreitzer, M. J. and M. Snyder (2002). "Healing the heart: integrating complementary therapies and healing practices into the care of cardiovascular patients." Prog Cardiovasc Nurs 17(2): 73-80.

Complementary therapies and healing practices have been found to reduce stress, anxiety, and lifestyle patterns known to contribute to cardiovascular disease. Promising therapies include imagery and hypnosis, meditation, yoga, tai chi, prayer, music, exercise, diet, and use of dietary supplements. Many of these complementary approaches to healing have been within the domain of nursing for centuries and can readily be integrated into the care of patients with cardiovascular disease. While individual complimentary modalities hold considerable merit, it is critical that the philosophy underlying these therapies--caring, holism, and harmony--also be understood and honored.

Kerr, C. (2002). "Translating "mind-in-body": two models of patient experience underlying a randomized controlled trial of qigong." Cult Med Psychiatry 26(4): 419-47.

This study explores two conflicting models of how patients experience mind-body therapies; these models frame the design of a clinical trial examining the effects of qigong (a traditional Chinese movement therapy) on the immune systems of former cancer patients. Data consist of ethnographic research and in-depth interviews conducted at the Boston teaching hospital where the trial is to take place. These interviews, with biomedical researchers who designed the trial and with the qigong master responsible for the qigong arm of the trial, reveal two fundamentally different understandings of how qigong is experienced and how that experience may be beneficial. The biomedical team sees qigong as a non-specific therapy which combines relaxation and exercise. The qigong master, on the other hand, sees qigong as using specific movements and visualizations to direct mental attention to specific areas of the body. Thus while the biomedical team frames qigong as a "mind-body" practice, the qigong master frames it as a "mind-in-body" practice. This research suggests that the biomedical notion that mind-body therapies work by eliciting mental relaxation is only one way of thinking about how patients experience modalities like qigong: indeed, characterizations of mind-body therapies which emphasize a mental sense of relaxation may be specific to biomedicine and the cultures which surround it. More broadly, the paper argues that gaps in understanding between researchers and practitioners may be hindering scientific efforts to assess therapies like qigong. It concludes by proposing that clinical trials of traditional and alternative therapies build ethnographic inquiry about practitioner experience into the design process.

Jeng, C., F. L. Chu, et al. (2002). "Empowering: the experiences of exercise among heart transplantation patients in Taiwan." J Adv Nurs 40(5): 560-7.

AIM: To explore the experiences of exercise among Taiwanese heart transplant patients on the basis of a grounded theory. BACKGROUND: Although studies conducted around the world have proven how important exercise is to heart transplant patients, little information was found about heart transplant patients' exercise experience. In addition, because of different cultural backgrounds, people in Taiwan do not care about 'regular exercise' as much as Americans and Europeans do. Therefore, it is very important to find ways so that they can value 'regular exercise.' METHODS: In-depth interviews were undertaken

with a purposive sample of eight heart transplant patients. Data was analysed by repeated verification. RESULTS: Eight valid cases were separately and thoroughly interviewed while they were exercising at a sports medical centre. The results revealed that 'empowering the new heart' is the core reason for their exercise. During the exercise training process, every participant felt that his or her new heart was filled with power or energy. The 'hardness and endurance' in terms of feeling discomfort in the body was identified at the beginning of post-surgical exercise training. Throughout the process of empowerment, patients experienced the following five interactive behaviour categories: 'self-protection', 'sharing', 'being watched and cared for', 'being aware of the benefits', and 'strengthening the new heart'. CONCLUSIONS: Exercise can empower the new heart. After the exercise training, all patients felt that their new hearts were empowered with energy and vigour, and thus were willing to continue exercising. They even expanded their regimen to include folk therapies such as Tai Chi and breathing exercises.

Gorman, C. (2002). "Why Tai Chi is the perfect exercise." Time 160(6): 68.

Cumming, R. G. (2002). "Intervention strategies and risk-factor modification for falls prevention. A review of recent intervention studies." Clin Geriatr Med 18(2): 175-89.

At least 21 randomized trials of falls-prevention interventions have been published in the past 10 years; thus, many falls clearly can be prevented. The most effective interventions are those that target community-dwelling people who are at high risk for falling. There is no doubt that for this group multifactor intervention is effective. Convincing evidence that exercise can prevent falls does exist, but the best type of exercise remains uncertain. Tai Chi, intensive strength and endurance training, and home-based exercises prescribed by a physiotherapist seem promising. Reducing the use of psychotropic medications does prevent falls, but the value of home modifications is still unclear.

Chao, Y. F., S. Y. Chen, et al. (2002). "The cardiorespiratory response and energy expenditure of Tai-Chi-Qui-Gong." Am J Chin Med 30(4): 451-61.

The purpose of this study was to evaluate the cardiorespiratory response and energy expenditure during the practice of Tai-Chi-Qui-Gong (TCQG). Forty-seven TCQG practitioners with a mean age of 60.7 +/- 9.9 years participated in this study. The cardiorespiratory responses and energy expenditure were measured by a K4 telemetry system. TCQG has 54 motions and can be divided into 3 sets. The result indicated that the exercise intensity of each motion is about 3 metabolic equivalents (MET) and the energy expenditure of each set is about 60 Kcal. The estimated intensity of TCQG in elderly individuals approximated 50% of the maximum oxygen uptake (vO2max) for men, and 60% of the maximum oxygen uptake (vO2max) for women. The findings demonstrate that TCQG is a low intensity exercise and can be prescribed as an alternative exercise program for cardiopulmonary rehabilitation.

Brudnak, M. A., D. Dundero, et al. (2002). "Are the 'hard' martial arts, such as the Korean Martial Art, TaeKwon-Do, of benefit to senior citizens?" Medical Hypotheses 59(4): 485-491.

Falls are a leading cause of death in the elderly. Associated with aging is a loss of muscular strength, flexibility and coordination. Regular exercise is widely believed to to be of benefit to the elderly. To this end, various exercise regimes have been employed to battle the associated problems of aging. One such has been the Chinese martial art, Tai Chi Chuan (TC). TC as an exercise system uses slow smooth movements to train the body in balance, endurance and strength. For this reason it is known as a 'soft' martial art in that it is very non impact oriented. There have been a variety of studies in the west examining

the beneficial effects of TC. However, to date, there have been no studies with senior citizens using other martial arts, of which, TC is but one. The present study was designed to examine the appropriateness and effects of a Korean martial art known as TaeKwon-Do (TKD), a 'hard' martial art on an elderly population measuring similar parameters reported for TC. Of those participants that attended >85% of the classes, an increase was observed in the average number of push-ups, trunk flexion, and balance time on each foot. TKD proved effective at increasing one leg balance in the population examined. Additionally, the overall drop out rate was extremely low suggesting both that the elderly are capable of participating in a hard martial art and that they have an interest in it as a viable alternative to other forms of exercise. The present study suggests that TKD as a form of exercise for an elderly population is both viable and potentially popular and warrants further study.

(2002). "Learning about tai chi chuan. Feeling stressed? Give this quiet exercise a try." Nursing 32(12): 86.