1999

Yan, J. H. (1999). "Tai chi practice reduces movement force variability for seniors." J Gerontol A Biol Sci Med Sci 54(12): M629-34.

BACKGROUND: The purpose of this study was to examine whether Tai Chi practice can reduce the inconsistency of arm movement force output in older adults. METHODS: Twenty seniors took part in the 8-week-long exercise intervention program (12 in Tai Chi practice, M = 79.3 years, SD = 2.4; and 8 in a locomotor activity group, walking or jogging, M = 79.5 years, SD = 1.9). Linear and curvilinear manual aiming movements were tested at the beginning (pretest), during 4th week (retest), and the end of the exercise program (post-test). The measure of vertical pressure on the surface of a tablet served as the dependent variable. RESULTS: The findings suggest that the Tai Chi participants significantly reduce more pressure variability than the participants in locomotor activity group after 8 weeks of practice. Additionally, seniors produced higher pressure variability in the curvilinear task than in the linear task. CONCLUSIONS: Evidence from this study proposes that Tai Chi practice may serve as a better real world exercise for reducing force variability in older adults' manual performance.

Scott, A. H. (1999). "Wellness works: community service health promotion groups led by occupational therapy students." Am J Occup Ther 53(6): 566-74.

OBJECTIVE: In the context of a group process course, occupational therapy students learned health promotion skills through working on personal wellness goals and leading community-based health promotion groups. The groups targeted topics such as smoking cessation, improving diet, reducing stress through yoga, meditation, tai chi chuan, ROM (Range of Motion) Dance, aerobics, and a variety of other activities. METHOD: After identifying a personal wellness goal and developing it in a Wellness Awareness Learning Contract, each student used a Goal Attainment Scale (GAS) to predict an expected outcome for achieving the goal and to measure his or her progress toward attaining the goal. Students also used the GAS to measure progress in attaining group leadership skills within the community groups, which they outlined in a separate Group Skills Contract. Students kept weekly logs to foster reflective thinking, and the logs were used for interactive dialogue with the instructor. To further evaluate lifestyle change, students compared pretest and posttest scores on a Self-Assessment Scorecard, which surveyed six areas of health and human potential in body, mind, and spirit. RESULTS: Students monitored their own change process on both their personal health lifestyle goals and their group leadership skills while developing a richer appreciation of the dynamics of working for change with clients in community and traditional settings. Differences on the Self-Assessment Scorecard indicated improvement on two of the six scales for physical health and choices. CONCLUSION: Students experienced firsthand the challenges of developing healthier lifestyles on the basis of their personal goals as well as through fostering group changes. The two GAS learning contracts provided them with concrete evidence of their growth and learning. This experience--embedded in the context of a group process course with a community service learning group practicum--provided most students with a positive initial experience with group leadership as they began to explore roles as agents for lifestyle and health change. Suggestions for expanding health promotion roles in practice in the changing health care environment are also examined.

Ross, M. C., A. S. Bohannon, et al. (1999). "The effects of a short-term exercise program on movement, pain, and mood in the elderly. Results of a pilot study." J Holist Nurs 17(2): 139-47.

Therapeutic effects of a short-term Tai Chi exercise program for the elderly were evaluated in a pretest-posttest quasi-experimental design. This

pilot study evaluated changes in flexibility, balance, sway, pain, and mood after a short slow-motion exercise. The program consisted of a series of movements involving turning, shifting weight, bending, and arm movements in combination with diaphragmatic breathing with slow movements. The measured effects included improved balance, sway, range of motion, decreased perceived pain, and lessened trait anxiety. Participants included 11 elderly females. Instruments consisted of standard goniometry, the Multiple Affect Adjective Check List, stopwatch measures of single-leg stance and a tandem walk (sway), and visual analog measurement of pain. Findings included significant improvement ($p = .05$) in trait anxiety and pain perception. Improvements in mood, flexibility, and balance may have a profound effect on the incidence of falls, injuries, resulting disability, and overall quality of life.

Lane, J. M. and M. Nydick (1999). "Osteoporosis: current modes of prevention and treatment." J Am Acad Orthop Surg 7(1): 19-31.

The most common metabolic bone disorder is osteoporosis, which affects 25 million Americans, of whom 80% are women. Bone loss in women occurs most commonly after menopause, when the rate of loss may be as high as 2% per year. Bone mass can be determined with dual-energy x-ray absorptiometry. The rate of active loss can be assayed by the detection of bone collagen breakdown products (e.g., N-telopeptide, pyridinoline) in the urine. Although it has been suggested that white women are most commonly affected, Hispanic and Asian women are also affected. Strategies for the prevention and treatment of osteoporosis are directed at maximizing peak bone mass by optimizing physiologic intake of calcium, vitamin D therapy, exercise, and maintenance of normal menstrual cycles from youth through adulthood. Coupled with drug therapy should be a comprehensive approach to exercise and fall prevention. Stretching, strengthening, impact, and balance exercises are effective. Of the balance exercises, tai chi chuan has proved to be the most successful in decreasing falls. Prevention of bone loss is obviously preferable to any remedial measures, but new therapeutic strategies provide a means of restoring deficient bone.

Lan, C., S. Y. Chen, et al. (1999). "The effect of Tai Chi on cardiorespiratory function in patients with coronary artery bypass surgery." Med Sci Sports Exerc 31(5): 634-8.

PURPOSE: This study prospectively evaluated the training effect of a 1-yr Tai Chi Chuan (TCC) program for low-risk patients with coronary artery bypass surgery (CABS) after a postoperative outpatient (phase II) cardiac rehabilitation program. METHODS: Twenty patients with mean age of 56.5+/-7.4 yr completed this study. The TCC group included nine men who practiced classical Yang TCC with an exercise intensity of 48-57% heart rate range (HRR). The control group included 11 men whom were recommended to do a home-based self-adjusted exercise program with similar intensity of phase II cardiac rehabilitation. Graded exercise tests were performed before and after 1 yr of training for all subjects. RESULTS: Mean attendance of the TCC group was 3.8+/-1.5 times weekly in contrast to 1.7+/-1.1 times for the control group. During the follow-up examination, the TCC group increased 10.3% in VO2peak (from 26.2+/-4.4 to 28.9+/-5.0 mL x kg(-1) min(-1), $P<0.01$) and increased 11.9% in peak work rate (from 135+/-26 W to 151+/-28 W, $P<0.01$). However, the control group showed slight decrease in VO2peak from 26.0+/-3.9 to 25.6+/-4.6 mL x kg(-1) x min(-1) and in peak work rate from 131+/-23 W to 128+/-32 W. At the ventilatory threshold, the TCC group also showed significant increase in VO2 and work rate ($P<0.05$). The control group did not significantly change in these variables. CONCLUSIONS: The study demonstrated that a 1-yr TCC program for low-risk patients with CABS could favorably enhance cardiorespiratory function.

Ferrari, M. (1999). "Influence of Expertise on the Intentional Transfer of Motor Skill." J Mot Behav 31(1): 79-85.

Intentional transfer of expert knowledge is an important issue in cognitive science and motor skills. How subjects deliberately transfer expertise in karate when learning a closely related motor skill (tai chi) was examined in this study. Subjects (N = 20) learned a videotaped sequence of self-defense movements, evaluated their learning, and then performed the sequence. Self-regulation of learning is believed to be central to effective transfer. The measures of self-regulation were accuracy of self-evaluation, video use, and approach to learning. Results showed that unlike novices, experts used self-regulation, learning strategies, and the video player in more complex ways in self-regulation. Experts, as compared with novices, demonstrated their greater knowledge through the higher quality of their performance and their better comprehension of movement meaning; but both groups recalled an equal number of moments, suggesting that both experts and novices transferred general knowledge about learning.

Farrell, S. J., A. D. Ross, et al. (1999). "Eastern movement therapies." Phys Med Rehabil Clin N Am 10(3): 617-29.

Tai chi, qigong, and yoga represent a class of exercise that differs from the routine strengthening and stretching programs currently employed in physical medicine. These techniques incorporate a "mind-body" approach to the rehabilitation of disorders commonly seen by physical medicine and rehabilitation clinicians. Research into the efficacy of these techniques clearly is in the beginning stages. What little has been conducted thus far is promising. These methods may serve to add valuable contributions to the continuity of care of ambulatory and non-ambulatory patients.

Chen, K. M. and M. Snyder (1999). "A research-based use of Tai Chi/movement therapy as a nursing intervention." J Holist Nurs 17(3): 267-79.

Tai Chi has been widely practiced in China for centuries as an art form, religious ritual, relaxation technique, exercise, and a method of self-defense for people of all ages. It has been used to improve balance; promote postural stability; decrease falls; enhance cardiovascular and ventilatory functions; rehabilitate persons with acute myocardial infarction and rheumatoid arthritis; and reduce pain, stress, and nightmares. The purpose of this article is to summarize, synthesize, and critically evaluate the research-based use of Tai Chi presented in the current literature and give implications and directions for future research. Additional studies about the effects of Tai Chi from a nursing perspective are needed to make clear when it is beneficial as a nursing intervention.

Cerrato, P. L. (1999). "Tai chi: a martial art turns therapeutic." Rn 62(2): 59-60.

Cassileth, B. R. (1999). "Complementary therapies: overview and state of the art." Cancer Nurs 22(1): 85-90.

Studies to determine the prevalence of complementary and alternative medicine (CAM) use among cancer patients show international interest in a wide collection of therapies and a broad span of use, ranging from 7% to 64% of patients sampled. The absence of consistent results across studies is due primarily to differing definitions of unconventional cancer therapies from study to study. Treatments promoted as alternatives to mainstream cancer cures (e.g., the recently disproved "cancer cure" of Italy's Dr. Di Bella) should be distinguished from complementary therapies, which are applied as adjuncts to mainstream care in an integrated fashion. The latter include mind-body techniques and herbal remedies, among many other remedies, all aimed at symptom

control and enhanced quality of life. This differentiation provides a clearer understanding of CAM activity and enables selective evaluation of CAM's clinical effects. It permits us to avoid accepting or rejecting all of CAM out of hand. Health care professionals as well as patients and their families have become increasingly knowledgeable about complementary therapies that can be helpful to patients with cancer. Many such therapies have been well studied (meditation, tai chi), and others remain highly questionable (homeopathy, electromagnetics). Their benefits and potential problems are reviewed.

Cassileth, B. R. (1999). "Evaluating complementary and alternative therapies for cancer patients." CA Cancer J Clin 49(6): 362-75.

"Complementary and alternative" therapies are actually a vast collection of disparate, unrelated regimens and products, ranging from adjunctive modalities that effectively enhance quality of life and promising antitumor herbal remedies now under investigation, to bogus therapies that claim to cure cancer and that harm not only directly, but also indirectly by encouraging patients to avoid or postpone effective cancer care. Complementary therapies such as music and massage, herbal teas to aid digestion and relieve nausea, yoga, tai chi, meditation, and the many other well-documented techniques that relieve stress and enhance well-being should be made available to patients to augment and ease the experience of cancer treatment and recovery. Many time-tested herbal and diet-based remedies are now being studied for their abilities to induce or extend remission without toxicity. At the same time, lack of government regulatory authority leaves consumers at the mercy of those who promote unproved remedies, scores of which the grocery store and pharmacy shelves. Many of these over-the-counter products contain harmful ingredients. Herb-drug interactions, only some of which are documented, occur with frequency and are sufficiently problematic to require that patients stop taking herbal remedies prior to surgery (to prevent interactions with anesthetics and anticoagulant effects); before radiation (due to potential for increased photosensitivity); and during courses of chemotherapy (to prevent product-drug interactions). Moreover, both good information and misinformation that appear in printed materials and on the Internet appeal to better educated consumers, who are, in fact, the most likely to try complementary and alternative methods.

Ross, M. C. and J. L. Presswalla (1998). "The therapeutic effects of Tai Chi for the elderly." J Gerontol Nurs 24(2): 45-7.

Masley, S. (1998). "Tai Chi Chuan." Arch Phys Med Rehabil 79(11): 1483.

Lan, C., J. S. Lai, et al. (1998). "12-month Tai Chi training in the elderly: its effect on health fitness." Med Sci Sports Exerc 30(3): 345-51.

PURPOSE: The objective of this study was to evaluate the effect of Tai Chi Chuan (TCC) on health fitness in older individuals. Methods: Thirty-eight community-dwelling persons aged 58 to 70 yr completed this study. The TCC group included 9 men and 11 women; the control group included 9 men and 9 women. The TCC group practiced TCC for 11.2+/-1.4 months, with the attendance of 4.6+/-1.3 times x wk(-1). Each session included 20 min of warm-up, 24 min of TCC practice, and 10 min of cooldown. The exercise intensity was 52-63% of the heart rate range. Cardiorespiratory function, strength, flexibility, and percent of body fat were evaluated before and at the end of this study. RESULTS: The male TCC group showed 16.1% increase in VO2max ($P < 0.01$), 11 degrees increase in thoracic/lumbar flexibility ($P < 0.05$), 18.1% increase in muscle strength of knee extensor ($P < 0.01$), and 15.4% increase of knee flexor ($P < 0.05$). The female TCC group showed 21.3% increase in VO2max ($P < 0.01$), 8.8 degrees increase in flexibility ($P < 0.05$), 20.3% increase in muscle strength of knee extensor ($P < 0.05$), and 15.9% increase of knee flexor ($P < 0.05$). The control

group showed no significant change in these variables. CONCLUSIONS: The results indicate that a 12-month Tai Chi Chuan program is effective for improving health fitness of the elderly.

Lam, P. (1998). "New horizons ... developing tai chi for health care." Aust Fam Physician 27(1-2): 100-1.

Kirsteins, A. (1998). "Tai-Chi Chuan." Arch Phys Med Rehabil 79(4): 471.

Kessenich, C. R. (1998). "Tai Chi as a method of fall prevention in the elderly." Orthop Nurs 17(4): 27-9.

Falls often lead to the fracture of bones in the elderly population. Fall incidence is increasing with the concomitant rise in the elderly population. Recently, some nontraditional methods of fall prevention have been explored. This article provides some background information about the ancient practice of Tai Chi as well as a brief review of the current literature exploring the effectiveness of Tai Chi in health promotion and fall prevention.

Hsieh, M. H., S. A. Chen, et al. (1998). "Effects of antiarrhythmic drugs on variability of ventricular rate and exercise performance in chronic atrial fibrillation complicated with ventricular arrhythmias." Int J Cardiol 64(1): 37-45.

For conversion of atrial fibrillation to sinus rhythm and management of ventricular arrhythmias, antiarrhythmic drugs were frequently used. However, the effects of antiarrhythmic drugs on exercise performance and on the variability of ventricular rate were not available. This study included 37 patients who had chronic atrial fibrillation complicated with symptomatic ventricular arrhythmias. The patients were divided into three groups and received sotalol, propafenone, and procainamide, respectively. Before and after taking the drugs for 14 days, these patients received treadmill exercise test, 24 h Holter electrocardiogram, and tilt table test for evaluation of the exercise performance and the variability of ventricular rate (including the mean RR intervals, mRR, the standard deviation of RR intervals, SDRR, and the root mean square of the difference in successive RR intervals, rMSSD). All these antiarrhythmic drugs could suppress ventricular arrhythmia but only sotalol could significantly increase the exercise duration (374+/-50 to 476+/-55 s, P=0.02), and reduce the maximal heart rate (186+/-23 to 136+/-16 beats/min, P=0.01) during exercise test. Furthermore, only sotalol increased the mRR (777+/-60 to 885+/-66 ms, P=0.02), SDRR (190+/-40 to 216+/-48 ms, P=0.04) and rMSSD (223+/-48 to 253+/-40 ms, P=0.03) during 24 h Holter electrocardiogram. With head-up tilt, the mRR, SDRR and rMSSD all decreased significantly before drug therapy, and these changes were still present only after propafenone therapy. Therefore, comparisons among sotalol, propafenone and procainamide showed that sotalol increased the exercise performance and the variability of ventricular rate in patients who had chronic atrial fibrillation complicated with symptomatic ventricular arrhythmias.

Henderson, N. K., C. P. White, et al. (1998). "The roles of exercise and fall risk reduction in the prevention of osteoporosis." Endocrinol Metab Clin North Am 27(2): 369-87.

In summary, the optimal model for the prevention of osteoporotic fractures includes maximization and maintenance of bone strength and minimization of trauma. Numerous determinants of each have been identified, but further work to develop preventative strategies based on these determinants remains to be undertaken. Physical activity is a determinant of peak BMD. There also is evidence that activity during growth modulates the external geometry and trabecular architecture, potentially enhancing skeletal strength, while during

the adult years activity may reduce age-related bone loss. The magnitude of the effect of a 7% to 8% increase in peak BMD, if maintained through the adult years, could translate to a 1.5-fold reduction in fracture risk. Moreover, in the older population, appropriate forms of exercise could reduce the risk of falling and, thus, further reduce fracture risk. These data must be considered as preliminary in view of the paucity of long-term fracture outcome data from randomized clinical trials. However, current information suggests that the optimal form of exercise to achieve these objectives may vary through life. Vigorous physical activity (including weight-bearing, resistance, and impact components) during childhood may maximize peak BMD. This type of activity seems optimal through the young adult years, but as inevitable age-related degeneration occurs, activity modification to limit the impact component of exercise may become necessary. In the elderly, progressive strength training has been demonstrated to be a safe and effective form of exercise that reduces risk factors for falling and may also enhance BMD. In the frail elderly, activity to improve balance and confidence also may be valuable. Group activities such as Tai Chi may be cost-effective. Precise prescriptions must await the outcome of well-designed, controlled longitudinal studies that include fracture as an outcome. However, increased physical activity seems to be a sensible component of strategies to reduce osteoporotic fracture.

Chen, C. H., H. H. Shih, et al. (1998). "Chromosomal fragile site expression in lymphocytes from patients with schizophrenia." Hum Genet 103(6): 702-6.

Schizophrenia is a common complex mental disorder. The lifetime prevalence of this disease is about 1% across different populations. The etiology is still unknown despite decades of intensive study. This report is aimed at studying the relationship between chromosomal fragile sites and the etiology of schizophrenia. Lymphocytes of 72 schizophrenic patients and 66 healthy controls were cultured in M medium, which is deficient in folic acid, and in medium RPMI 1640 with distamycin A. G-banding was carried out on 100 metaphases of each individual. Fragile sites were characterized as specific chromosomal bands that exhibit nonrandom gaps or breaks. Culture in M medium resulted in significant differences in the total number of chromosomal lesions and the total number of cells with chromosomal lesions between patients and controls ($P<0.001$), while no difference was noted after exposure to distamycin A. In the case of M medium, 17 bands in both patients and controls were recognized as expressing fragile sites nonrandomly using a statistical method based on the relationship of the binomial and F distributions. Further analysis using Fisher's exact test revealed a significant excess of expression of a rare fragile site at 2q11.2 among patients compared with controls ($P<0.05$). In the case of distamycin A induction, 13 bands were identified as having nonrandom expression of fragile sites using the same statistical method. A significant excess expression of a fragile site at 9q12 was identified among patients compared with controls by applying Fisher's exact test ($P<0.001$). Thus, our data suggest that chromosomal bands 2q11.2 and 9q12 are interesting regions that may harbor important genes associated with schizophrenia.

Wolf, S. L., H. X. Barnhart, et al. (1997). "The effect of Tai Chi Quan and computerized balance training on postural stability in older subjects. Atlanta FICSIT Group. Frailty and Injuries: Cooperative Studies on Intervention Techniques." Phys Ther 77(4): 371-81; discussion 382-4.

BACKGROUND AND PURPOSE: This study explored whether two exercise programs would affect the ability to minimize postural sway of 72 relatively inactive, older subjects who participated in the Atlanta FICSIT trial. SUBJECTS: Subjects were randomly assigned to (1) a computerized balance training group, (2) a tai chi group, or (3) an educational group serving as a control for exercise. Each group consisted of 24 members. METHODS: All subjects were evaluated under four

postural conditions before, immediately after, and 4 months following their respective interventions, each of which was given over 15 weeks. RESULTS: Platform balance measures revealed greater stability after training among subjects in the balance training group but little change in stability among subjects in the tai chi and educational group. Subjects in the tai chi group were less afraid of falling after training compared with subjects in other groups with similar covariates. CONCLUSION AND DISCUSSION: Unlike computerized balance training, tai chi does not improve measures of postural stability. Because tai chi delayed onset to first or multiple falls in older individuals, this effect does not appear to be associated with measures of enhanced postural stability. Tai chi may gain its success, in part, from promoting confidence without reducing sway rather than primarily facilitating a reduction in sway-based measures.

Wolf, S. L., C. Coogler, et al. (1997). "Exploring the basis for Tai Chi Chuan as a therapeutic exercise approach." Arch Phys Med Rehabil 78(8): 886-92.

For many centuries Tai Chi has been a martial art form, practiced primarily in Oriental cultures. For the past 300 years this movement approach has been used as an exercise form, practiced by millions of Chinese elderly people. To date, virtually no information exists about the therapeutic elements of this intriguing movement sequence. This article provides a historical review of existing documentation of reputed Tai Chi benefits. The 108 "forms" of Tai Chi Chuan are reduced to 10 composite forms for ease of application of these forms to older individuals within a reasonable time frame. An effort is set forth to identify the potential therapeutic elements within these forms.

La Forge, R. (1997). "Mind-Body Fitness: Encouraging Prospects for Primary and Secondary Prevention." J Cardiovasc Nurs 11(3): 53-65.

In recent years, health promotion programs have generated many worthwhile psychologic and physiologic benefits but frequently with less than optimal long-term adherence. Incorporating approached such as mind-body exercise with existing health promotion and cardiac rehabilitation services can improve self efficacy and long term adherence to healthy behaviors as well as improve personal stress management skills. Research on mind-body exercise such as yoga and tai chi reveal they have significant mental and physical value. (partial abstract)

Kutner, N. G., H. Barnhart, et al. (1997). "Self-report benefits of Tai Chi practice by older adults." J Gerontol B Psychol Sci Soc Sci 52(5): P242-6.

Older persons who are willing to begin exercise programs are often not willing to continue them. At the Atlanta FICSIT (Frailty and Injuries: Cooperative Studies of Intervention Techniques) site, individuals aged 70+ were randomized to Tai Chi (TC), individualized balance training (BT), and exercise control education (ED) groups for 15 weeks. In a follow-up assessment 4 months post-intervention, 130 subjects responded to exit interview questions asking about perceived benefits of participation. Both TC and BT subjects reported increased confidence in balance and movement, but only TC subjects reported that their daily activities and their overall life had been affected; many of these subjects had changed their normal physical activity to incorporate ongoing TC practice. The data suggest that when mental as well as physical control is perceived to be enhanced, with a generalized sense of improvement in overall well-being, older persons' motivation to continue exercising also increases.

Gibb, H., C. T. Morris, et al. (1997). "A therapeutic programme for people with dementia." Int J Nurs Pract 3(3): 191-9.

A programme involving Tai Chi and structured reminiscence was trialed with nine people suffering from moderately advanced dementia. The analysis reported

here aimed to examine stories the people told with a view to understanding the purpose of story telling in their lives. Themes derived from the narrative data had a strong evaluative quality, ranging from simple evocative expressions to more cognitive complex insights or treasures. The study indicated a major aim in story telling as being able to generate life values, both for the enrichment of identification of self, and to pass on or leave for today's youth. Findings here further substantiate Luke and Freiden's view that old age has its own cognitive and spiritual goals to achieve. There is strong evidence that people with moderate dementia still aim to participate in that endeavour.

Achiron, A., Y. Barak, et al. (1997). "Electrical sensation during Tai-Chi practice as the first manifestation of multiple sclerosis." Clin Neurol Neurosurg 99(4): 280-1.

We report a patient with a 3-year history of brief episodes of electrical sensations over her back and upper limbs that occurred during Tai-Chi practicing. This appearance of Lhermitte's sign was later followed by additional neurologic symptoms, and the patient was diagnosed as suffering from multiple sclerosis. Though the patient related the Lhermitte's sign to her ability to achieve full relaxation in Tai-Chi exercise, we think it was the first manifestation of the disease.

Wolfson, L., R. Whipple, et al. (1996). "Balance and Strength Training in Older Adults: Intervention Gains and Tai Chi Maintenance." Journal of the American Geriatric Society 44(498-506).

To determine the effect on balance and strength of 3 months of intensive balance and/or weight training followed by 6 months of low intensity Tai Chi training for maintenance of gains. Results: Balance training meaningfully improved all balance measures by restoring performance to a level analogous to an individual 3-10 years younger. Significant gains persisted after 6 months of Tai Chi although there was some decrement.

Wolf, S. L., H. X. Barnhart, et al. (1996). "Reducing frailty and falls in older persons: an investigation of Tai Chi and computerized balance training. Atlanta FICSIT Group. Frailty and Injuries: Cooperative Studies of Intervention Techniques." J Am Geriatr Soc 44(5): 489-97.

OBJECTIVE: 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 (occurrence of falls). DESIGN: The Atlanta FICSIT (Frailty and Injuries: Cooperative Studies of 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 (IADL), and psychosocial well-being (CES-D 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%. CONCLUSIONS: 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. Tai Chi warrants further study as an exercise treatment to improve the health of older people.

Schaller, K. J. (1996). "Tai Chi Chih: an exercise option for older adults." J Gerontol Nurs 22(10): 12-7.

The purpose of this study was to determine the effects of Tai Chi Chih on balance, flexibility, mood, health status, and blood pressure in a sample of community-dwelling elders. A quasi-experimental pretest-posttest design was used in the study. Participants were recruited from a senior center located in the suburbs of a large metropolitan area. The experimental group consisted of 24 volunteers over the age of 55 who performed 60 minutes of Tai Chi Chih once a week for 10 weeks and practiced at home. The control group consisted of 22 volunteers who continued with their current level of activity. Analysis of covariance revealed a significant difference between the two groups on balance ($F = 4.3$, $p < .05$). This study suggests that Tai Chi Chih is a safe and enjoyable form of exercise that might improve balance in community-dwelling elders.

Lutz, S. (1996). "The benefits of Tai Chi." Beginnings 16(4): 3.

Lan, C., J. S. Lai, et al. (1996). "Cardiorespiratory function, flexibility, and body composition among geriatric Tai Chi Chuan practitioners." Arch Phys Med Rehabil 77(6): 612-6.

OBJECTIVE: To evaluate the health-related fitness of geriatric Tai Chi Chuan (TCC) practitioners. DESIGN: Case-control study of a TCC group and a group of sedentary controls. SETTING: Research project at a hospital-based exercise physiology laboratory. PARTICIPANTS: Seventy-six community-dwelling senior persons (mean age 69.3 +/- 3.9 yr), a TCC group that included 22 men and 19 women and a control group of sedentary subjects that included 18 men and 17 women with matched age and body size. INTERVENTION: The TCC group had practiced TCC regularly for 11.8 +/- 5.6 years, with an exercise frequency of 4.3 +/- 1.3 times per week. Each session included 20 minutes of warm-up, 24 minutes of TCC training, and 10 minutes of cool-down. Exercise intensity was estimated to exceed 70% of maximal heart rate (HRmax). MAIN OUTCOME MEASURE: Breath-by-breath measurement of cardiorespiratory function was obtained during the incremental exercise of leg cycling. Flexibility of thoracic/lumbar spine was measured by an electronic inclinometer. Percentages of body fat was calculated from biceps and subcapsular skinfolds. RESULTS: In the peak exercise, men in the TCC group showed 19% higher peak oxygen uptake (VO2peak) in comparison with their sedentary counterparts (26.9 +/- 4.7 mL/kg/min vs 21.8 +/- 3.1 mL/kg/min). Women in the TCC group also showed 18% higher VO2peak than in the sedentary group (20.1 +/- 2.9 mL/kg/ min vs 16.5 +/- 2.0 mL/kg/min). The TCC group also showed higher oxygen uptake at the ventilatory threshold. In addition, the TCC practitioners were characterized by greater flexibility and lower percentage of body fat in comparison with their sedentary counterparts. CONCLUSION: It is concluded that TCC training has benefits for health-related fitness, and it may be prescribed as a suitable conditioning exercise for the elderly.

Channer, K. S., D. Barrow, et al. (1996). "Changes in haemodynamic parameters following Tai Chi Chuan and aerobic exercise in patients recovering from acute myocardial infarction." Postgrad Med J 72(848): 349-51.

In this study, 126 patients (90 males, average age 56 years, range 39-80) were randomised to Wu Chian-Ch'uan style Tai Chi (38), aerobic exercise (41) or a non-exercise support group (47) following acute myocardial infarction. Patients attended twice weekly for three weeks then weekly for a further five weeks. Heart rate and blood pressure were recorded before and after each

session. Over the 11 sessions of exercise there was a negative trend in diastolic blood pressure only in the Tai Chi group (Rs = 0.79, p < 0.01). Significant trends in systolic blood pressure occurred in both exercise groups (Rs = 0.64 and 0.63, both p < 0.05). Only four (8%) patients completed the support group eight-week programme which was less than the number completing Tai Chi (82%; p < 0.001) and aerobic exercise groups (73%; p < 0.001).

Province, M. A., E. C. Hadley, et al. (1995). "The effects of exercise on falls in elderly patients. A preplanned meta-analysis of the FICSIT Trials. Frailty and Injuries: Cooperative Studies of Intervention Techniques." Jama 273(17): 1341-7.

OBJECTIVE--To determine if short-term exercise reduces falls and fall-related injuries in the elderly. DESIGN--A preplanned meta-analysis of the seven Frailty and Injuries: Cooperative Studies of Intervention Techniques (FICSIT)--independent, randomized, controlled clinical trials that assessed intervention efficacy in reducing falls and frailty in elderly patients. All included an exercise component for 10 to 36 weeks. Fall and injury follow-up was obtained for up to 2 to 4 years. SETTING--Two nursing home and five community-dwelling (three health maintenance organizations) sites. Six were group and center based; one was conducted at home. PARTICIPANTS--Numbers of participants ranged from 100 to 1323 per study. Subjects were mostly ambulatory and cognitively intact, with minimum ages of 60 to 75 years, although some studies required additional deficits, such as functionally dependent in two or more activities of daily living, balance deficits or lower extremity weakness, or high risk of falling. INTERVENTIONS--Exercise components varied across studies in character, duration, frequency, and intensity. Training was performed in one area or more of endurance, flexibility, balance platform, Tai Chi (dynamic balance), and resistance. Several treatment arms included additional nonexercise components, such as behavioral components, medication changes, education, functional activity, or nutritional supplements. MAIN OUTCOME MEASURES--Time to each fall (fall-related injury) by self-report and/or medical records. RESULTS--Using the Andersen-Gill extension of the Cox model that allows multiple fall outcomes per patient, the adjusted fall incidence ratio for treatment arms including general exercise was 0.90 (95% confidence limits [CL], 0.81, 0.99) and for those including balance was 0.83 (95% CL, 0.70, 0.98). No exercise component was significant for injurious falls, but power was low to detect this outcome. CONCLUSIONS--Treatments including exercise for elderly adults reduce the risk of falls.

Lai, J. S., C. Lan, et al. (1995). "Two-year trends in cardiorespiratory function among older Tai Chi Chuan practitioners and sedentary subjects." J Am Geriatr Soc 43(11): 1222-7.

OBJECTIVE: To evaluate the training effects of Chinese shadow boxing, Tai Chi Chuan (TCC), on the maintenance of cardiorespiratory function in older individuals. DESIGN: Prospective study of a cohort of TCC practitioners and a group of sedentary controls examined 2 years after initial examination. SETTING: Research project at a hospital-based exercise physiology laboratory. PARTICIPANTS: Eighty-four community-dwelling older adults (mean age: 64 +/- 9 years) with no significant cardiovascular, pulmonary, and musculoskeletal disease completed this study. The TCC group, 23 male and 22 female subjects, had been practicing TCC regularly for 6.7 +/- 3.3 years. The control group included 21 male and 18 female sedentary subjects with age and body size matched to the TCC group. INTERVENTION: During the period of the study, the TCC practitioners practiced TCC 5.0 +/- 1.1 times per week. Each session included 20 minutes of warm up, 24 minutes of TCC training, and 10 minutes of cool down. The baseline cardiorespiratory function was recorded in the initial exercise test. The same measurements were repeated 2 years later to determine the rate of decline of

cardiorespiratory function. Furthermore, heart rates (HR) were monitored in 18 men and 16 women during the performance of TCC to determine the exercise intensity of TCC. MAIN OUTCOME MEASURE: The study measured 2-year trends of cardiorespiratory function in both groups. RESULTS: In the TCC group, the males showed a 2.8% decrease in maximal oxygen uptake (VO2max) from 31.6 +/- 7.6 mL x kg-1 x min-1 to 30.7 +/- 7.1 mL x kg-1 x min-1; the females showed a 2.9% decrease in VO2 max from 20.7 +/- 2.3 mL x kg-1 x min-1 to 20.1 +/- 2.5 mL x kg-1 x min-1. In contrast, the male control group showed a 6.6% decrease in VO2max from 24.4 +/- 4.4 mL x kg-1 x min-1 to 22.8 +/- 4.4 mL x kg-1 x min-1; the females showed a 7.4% decrease in VO2max from 16.2 +/- 2.3 mL x kg-1 x min-1 to 15.0 +/- 2.7 mL x kg-1 x min-1. At the ventilatory threshold (VeT), the sedentary group also showed a significant decrease in VO2. During the steady-state performance of TCC, subjects' mean HR was approximately the HR at the VeT (53-57% of HRmax reserve). CONCLUSION: The data substantiate that practicing Tai Chi Chuan regularly may delay the decline of cardiorespiratory function in older individuals. In addition, TCC may be prescribed as a suitable aerobic exercise for older adults.

Brown, D. R., Y. Wang, et al. (1995). "Chronic psychological effects of exercise and exercise plus cognitive strategies." Med Sci Sports Exerc 27(5): 765-75.

Psychological changes associated with 16-wk moderate and low intensity exercise training programs, two of which possessed a cognitive component, were evaluated. Subjects were healthy, sedentary adults, 69 women (mean age = 54.8 +/- 8.3 yr) and 66 men (mean age = 50.6 +/- 8.0 yr). Participants were randomly assigned to a control group (C), moderate intensity walking group (MW), low intensity walking group (LW), low intensity walking plus relaxation response group (LWR), or mindful exercise (ME) group-a Tai Chi type program. Women in the ME group experienced reductions in mood disturbance (tension, $P < 0.01$; depression, $P < 0.05$; anger, $P < 0.008$; confusion, $P < 0.02$; and total mood disturbance, $P < 0.006$) and an improvement in general mood ($P < 0.04$). Women in the MW group noted greater satisfaction with physical attributes (body cathexis, $P < 0.03$), and men in MW reported increased positive affect ($P < 0.006$). No other differences were observed between groups on measures of mood, self-esteem, personality, or life satisfaction. Equivocal support is provided for the hypothesis that exercise plus cognitive strategy training programs are more effective than exercise programs lacking a structured cognitive component in promoting psychological benefits.

Wolfson, L., R. Whipple, et al. (1993). "Training balance and strength in the elderly to improve function." J Am Geriatr Soc 41(3): 341-3.

Short-term exposure to altered sensory input or destabilizing platform movement results in significant improvement in sway control and inhibition of inappropriate motor responses, resulting in improved balance during repetitive testing. In addition, there is recent evidence that strength and function can be increased in both active and frail elderly who participate in strength training programs. Therefore, the hypotheses to be tested are that (1) balance training alone, or (2) strength training alone will each be capable of significantly improving balance, gait, and functional mobility, and that (3) a combined program of balance and strength training will be more effective than either approach alone. These hypotheses will be tested relative to a control group, using a 2 x 2 design (30 subjects per group), in a community-dwelling elderly at least 75 years of age. Intervention sessions of at least 45 minutes will occur three times per week for 3 months, with 6 months of follow-up, home-based Tai Chi training. The primary outcome variable is a basic measure of functional balance, ie, the occurrence of loss of balance during tilts of the support and/or movement of the visual surround.

Wolf, S. L., N. G. Kutner, et al. (1993). "The Atlanta FICSIT study: two exercise interventions to reduce frailty in elders." J Am Geriatr Soc 41(3): 329-32.

This study examines the effect of two different exercise approaches on balance and frailty measures among more than 200 community-dwelling individuals greater than 70 years of age. Exercises are provided for 15 weekly sessions on an individual basis for participants randomly assigned to a Balance Training group. Training consists of center-of-mass feedback displayed on a motor under static conditions, or, in later sessions, as the floor surface is moved, with eyes open or closed. This high technology interface provides instantaneous information about displacement of body weight in space so that balance can be enhanced. An alternative procedure is comparatively simple and requires little expense or space. Tai Chi Quan was originally developed as a martial arts form but has been used for centuries in China as an exercise among elderly citizens. Participants randomly assigned to this intervention meet twice weekly for 15 weeks to learn a condensation of 108 Tai Chi forms into 10 that emphasize movement components often restricted or absent with aging. A third group serves as a control for exercise interventions by meeting weekly for 15 sessions to discuss topics of interest such as memory loss, drug management, and nutrition. All subjects are screened prior to assignment, and a host of physical, behavioral, and functional measures are assessed before and after the intervention as well as 4 months later. Measurements unique to the Atlanta site include: balance with eyes closed, programmed force-distribution changes when stance is perturbed, cardiovascular assessments, WAIS, Affects Balance Scale, and a survey of home environment.

Lai, J. S., M. K. Wong, et al. (1993). "Cardiorespiratory responses of Tai Chi Chuan practitioners and sedentary subjects during cycle ergometry." J Formos Med Assoc 92(10): 894-9.

Tai Chi Chuan (TCC; shadow boxing) is a traditional Chinese conditioning exercise. To evaluate its beneficial effect on cardiorespiratory function, 21 male and 20 female TCC practitioners, ranging in age from 50 to 64 years, voluntarily participated in this study. The control group comprised 23 male and 26 female sedentary subjects. Breath-by-breath measurement of the cardiorespiratory function was obtained during the incremental exercise of leg cycling. At the maximal exercise level, the oxygen uptake (VO2), O2 pulse and work rate of the TCC group were significantly higher than the respective values of the control group ($p < 0.01$). At the ventilatory threshold, the TCC group also showed a higher VO2, O2 pulse and work rate ($p < 0.05$). The results imply that TCC training may be beneficial to the cardiorespiratory function of older individuals. To estimate the exercise intensity of TCC, heart rate (HR) was monitored in 15 men and 15 women while they performed the classical Yang TCC. During the steady-state performance of TCC, the mean HR was 130 +/- 14 bpm for men and 127 +/- 13 bpm for women. The mean HR during TCC exceeded 70% of their HRmax. Our data substantiate that TCC is aerobic exercise of moderate intensity, and it may be prescribed as a suitable conditioning exercise for the elderly.

Judge, J. O., C. Lindsey, et al. (1993). "Balance improvements in older women: effects of exercise training." Phys Ther 73(4): 254-62; discussion 263-5.

BACKGROUND AND PURPOSE. Loss of lower-extremity strength increases the risk of falls in older persons. The purpose of this study was to test the hypothesis that a vigorous program of lower-extremity strengthening, walking, and postural control exercises would improve the single-stance balance of healthy older women and lower their risk of falls and fall-associated injuries. SUBJECTS. From a total of 38 respondents, 21 women were randomly assigned to either a treatment group (combined training, n = 12) or a control group (flexibility training, n = 9). The subjects ranged in age from 62 to 75 years

(mean = 68, SD = 3.5). METHODS. A randomized control trial compared the effects of two exercise programs on static balance. The combined training group exercised three times per week on knee extension and sitting leg press machines, walked briskly for 20 minutes, and performed postural control exercises, which included simple tai chi movements. The flexibility training group performed postural control exercises weekly. Measurements of balance were obtained on a force platform in double and single stance, at baseline and following 6 months of exercise training. RESULTS. Double-stance measurements were unchanged after training. The mean displacement of the center of pressure in single stance improved 17% in the combined training group and did not change in the flexibility training group. A repeated-measures analysis of variance revealed that the difference in improvement between the combined training and flexibility training groups was not significant. DISCUSSION AND CONCLUSION. This is the first intervention trial to demonstrate improvements in single-stance postural sway in older women with exercise training. Additional studies with more subjects will be needed to determine whether a combined training program of resistance training, walking, and postural exercises can improve balance more than a program of postural control exercises alone.

Ng, R. K. (1992). "Cardiopulmonary exercise: a recently discovered secret of tai chi." Hawaii Med J 51(8): 216-7.

Every piece of literature or book about tai chi claims it to be the supreme martial art (soft style) and a therapeutic exercise. Nevertheless, none of the authors can describe scientifically how and why it works. Many people did not gain any health benefit in practicing tai chi and only very few people were able to apply its legendary secret power. During the last 10 years, the author thought he had discovered the secret in Hong Kong and brought it to Los Angeles. The secret lies in the fundamental movements of the body, called tai chi basic exercise routines. The entry level of the exercise has many similarities with medical treatments for respiratory illness and with walking exercise--the most recommended aerobic exercise for coronary artery disease.

Jin, P. (1992). "Efficacy of Tai Chi, brisk walking, meditation, and reading in reducing mental and emotional stress." Journal of Psychosomatic Research 36(4): 361-370.

Tai Chi, a moving meditation, is examined for its efficacy in post stressor recovery. Forty-eight male and 48 female Tai Chi practitioners randomly assigned to four treatment groups: Tai Chi, brisk walking, meditation and neutral reading. Mental arithmetic and other difficult tasks were chosen as mental challenges, and a stressful film was used to produce emotional disturbance. Tai Chi and the other treatments were applied after these stressors. After all treatments the salivary cortisol level dropped significantly, and the mood states were also improved. In general, the stress reduction effect of Tai Chi characterized moderate physical exercise. Heart rate, blood pressure and urinary catecholamine changes for Tai Chi were found to be similar to hose for walking at 6 km/hr. Although Tai Chi appeared to be superior to neutral reading in the reduction of state anxiety and the enhancement of vigour, this effect could be partially accounted for by the subjects high expectations about gains from Tai Chi. Approaches controlling for expectancy level are recommended for further assessment.

Kirsteins, A. E., F. Dietz, et al. (1991). "Evaluating the safety and potential use of a weight-bearing exercise, Tai-Chi Chuan, for rheumatoid arthritis patients." Am J Phys Med Rehabil 70(3): 136-41.

The safety of a traditional Chinese exercise, Tai-Chi Chuan, on rheumatoid arthritis (RA) patients was evaluated. RA patients, who received 1 h of Tai-Chi Chuan instruction once (n = 20) and twice (n = 15) a week for 10 consecutive wk

in two separate studies, showed no deterioration in their clinical disease activities compared with the corresponding controls (n = 11 and 9, respectively). Testing parameters included joint tenderness, joint swelling, time to walk 50 feet, handgrip strength and a written functional assessment. No significant exacerbation of joint symptoms using this weight-bearing form of exercise was observed. Tai-Chi Chuan exercise appears to be safe for RA patients and may serve as an alternative for their exercise therapy and part of their rehabilitation program. Weight-bearing exercises have the potential advantages of stimulating bone growth and strengthening connective tissue, but this effect needs to be documented in long-term studies.

Kirsteins, A. E., F. Dietz, et al. (1991). "Evaluating the Safety and Potential Use of a weight bearing exercise, Tai Chi Chuan, for Rheumatoid Arthritis Patients." Am. J. Phys. Med. Rehabil. 70(3): 136-141.

The safety of a traditional Chinese exercise, Tai Chi Chuan, on rheumatoid arthritis (RA) patients was evaluated. RA patients, who received 1 hour of Tai Chi Chuan instruction once (n=20) and twice (n=15) a week for 10 consecutive weeks in two separate studies, showed no deterioration in their clinical disease activities compared with corresponding controls.(n=11 and 9, respectively). Testing parameters included joint tenderness, joint swelling, time to walk 50 feet, handgrip strength and a written functional assessment. No significant exacerbation of joint symptoms using this weight bearing exercise was observed. Tai Chi Chuan exercise appears to be safe for RA patients and may serve as an alternative for their exercise therapy and part of the rehabilitation program. Weight bearing exercises have the potential advantages of stimulating bone growth and strengthening connective tissue, but this effect needs to be documented in long term studies.

Li, L. S. (1989). "[An introduction to medical literature in Tai Pin Yu Lan] (Chi)." Zhonghua Yi Shi Za Zhi 19(3): 135-40.

Jin, P. (1989). "Changes in heart rate, noradrenaline, cortisol and mood during Tai Chi." J Psychosom Res 33(2): 197-206.

Changes in psychological and physiological functioning following participation in Tai Chi were assessed for 33 beginners and 33 practitioners. The variables in the three-way factorial design were experience (beginners vs practitioners), time (morning vs afternoon vs evening), and phase (before Tai Chi vs during Tai Chi vs after Tai Chi). Phase was a repeated measures variable. Relative to measures taken beforehand, practice of Tai Chi raised heart rate, increased noradrenaline excretion in urine, and decreased salivary cortisol concentration. Relative to baseline levels, subjects reported less tension, depression, anger, fatigue, confusion and state-anxiety, they felt more vigorous, and in general they had less total mood disturbance. The data suggest that Tai Chi results in gains that are comparable to those found with moderate exercise. There is need for research concerned with whether participation in Tai Chi has effects over and above those associated with physical exercise.

Tai, T. Y., C. J. Chang, et al. (1988). "Comparison of diet and nutritional status between normal and diabetic subjects." Taiwan Yi Xue Hui Za Zhi 87(9): 877-84.

Hu, S. (1988). "[Preliminary research on the medical works of Xu Ling-tai. A renowned physician in the Qing dynasty] (Chi)." Zhonghua Yi Shi Za Zhi 18(2): 119-21.

Zhang, X. (1986). "[A study on the Somaratza, a Tibetan medical classic, and Huang Di Nei Jing Tai Su (comprehensive notes to the Internal Classics of Yellow Emperor] (Chi)." Zhonghua Yi Shi Za Zhi 16(4): 235-7.

Zhuo, D., R. J. Shephard, et al. (1984). "Cardiorespiratory and metabolic responses during Tai Chi Chuan exercise." Can J Appl Sport Sci 9(1): 7-10.
Tai Chi Chuan is a form of traditional Chinese exercise which has been widely practised in China for preventive and therapeutic purposes. The present study was designed to determine the physiological demands of this exercise modality. Eleven healthy males, aged 28.4 years, were studied for oxygen cost and related metabolic variables, heart rate and blood pressure during the performance of the Long-Form Tai Chi Chuan of Yang's style. Data was collected by an automated respiratory gas analyzer (Jeger Ergooxyscreen) and ECG telemetry during a 17-25 minute performance session (X = 22 minutes). The average energy cost for the Long-Form Tai Chi Chuan was 4.1 Mets, corresponding to a mean VO2 value of 1.03 l X min-1 or 14.5 ml X kg-1 X min-1. The mean peak heart rate during the exercises was 134 beats per minute. These values suggest that the Long-Form Tai Chi Chuan may be classed as moderate exercise, and its intensity does not exceed 50% of the individual's maximum oxygen intake.

Zhou, D. H. (1982). "Preventive geriatrics: an overview from traditional Chinese medicine." Am J Chin Med 10(1-4): 32-9.
The philosophical tradition of Chinese geriatrics contains a strong preventive element closely tied to the concept of a balanced man-nature relationship and body-mind relationship. It has been emphasized that a sound mind in a sound body is essential to longevity. Moderation in physical and emotional activities is encouraged. There have been a number of approaches to longevity in traditional Chinese medicine. The preventive value of Tai Chi Chuan (a gentle "spiritual" exercise), Chi Kung (a combination of breathing exercise, relaxation and meditation), acupressure and moxibustion on the point of Chu San Li, and tonic herbal medicines like ginseng is discussed in this article. These are regarded to be helpful in improving the general health of the elderly and in promoting longevity.

Koh, T. C. (1982). "Tai Chi and ankylosing spondylitis--a personal experience." Am J Chin Med 10(1-4): 59-61.
On the suggestion of a Chinese physician the author took up Tai Chi, a traditional Chinese exercise, in an attempt to relieve symptoms from his moderately severe ankylosing spondylitis. Conventional medical therapy, used over a 15 year period, had proven of only limited benefit. Tai Chi consists of a series of intricate exercise sequences, and after 2 1/2 years of daily practice the author now feels stronger and healthier than before. Pain, weakness and general malaise return if practice is neglected for as little as one week. It is felt that Tai Chi is of value in minimizing the flexion deformity of the spine. Improved skeletal muscle strength, limb co-ordination, balance, chest movement and ability to relax are further benefits.

Nordemar, R., B. Ekblom, et al. (1981). "Physical Training in Rheumatoid Arthritis: A controlled long-term study." Scand J Rheumatology 10: 17-23.

Koh, T. C. (1981). "Tai Chi Chuan." Am J Chin Med 9(1): 15-22.
Tai Chi Chuan, a mind-body relaxation exercise, was devised by Chang San Feng for meditation and self-defense in the thirteenth century A.D. The 108 forms are performed in a slow relaxed manner, taking 30 minutes altogether. Practitioners of Tai Chi claim that it promotes health and cures certain illnesses but this has not been substantiated and therefore further research into its health benefits is warranted.