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# Feasibility and Effects of a Tai Chi Self-Help Education Program for Korean Gastric Cancer Survivors

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**E**xercise has been recommended as an intervention to enhance physical functioning (Segal et al., 2001) and health-related quality of life (HRQOL) in cancer survivors (Courneya, 2003; Mustian et al., 2004; Mustian, Katula, & Zhao, 2006). Tai chi is a form of Chinese martial art that is considered to be a light to moderate form of exercise. Tai chi is a widely practiced movement exercise combining characteristics of meditative practice and aerobic exercise (Mansky et al., 2006). Tai chi exercise has been shown to have multiple positive effects on physical fitness (Audette et al., 2006; Brismee et al., 2007; Burke, Al-Adawi, Lee, & Audette, 2007; Li et al., 2005; Song, Lee, & Lee, 2002), HRQOL (Barrow, Bedford, Ives, O'Toole, & Channer, 2007; Mustian et al., 2004), and improved mood state (Chou et al., 2004; Jin, 1989, 1992). Tai chi also has been shown to improve depression in patients with heart failure (Barrow et al.) and older patients with depressive disorders (Chou et al.). Very little data exist on the potential for tai chi as a therapeutic intervention for patients with cancer or cancer survivors.

A limited number of studies suggest that tai chi influences immune function (e.g., natural killer [NK] cell activity), which may provide an additional benefit for patients with cancer as well as survivors. For example, Yeh, Chuang, Lin, Hsiao, and Eng (2006) demonstrated that tai chi had positive effects on regulatory T cells by increasing the ratio of T helper to suppressor cells in healthy middle-aged adults. Similar results were found in healthy older adults (Irwin, Olmstead, & Oxman, 2007). Tai chi may have potentially positive effects on overall health outcomes as well as immune function in cancer survivors, including patients with cancers of the gastrointestinal tract.

In the Republic of Korea, gastric cancer is the most common form of cancer. Gastric cancer is the leading cause of cancer death in Korean women and third most

**Purpose/Objectives:** To determine the feasibility of conducting a study of a tai chi self-help education program in Korean adults with gastric cancer and to describe the effects of a six-month tai chi self-help education program on depression, health-related quality of life (HRQOL), and immune markers.

**Design:** One-group, pre- and post-test design.

**Setting:** Outpatient clinics of two large hospitals in the Republic of Korea.

**Sample:** Convenience sample of 33 Korean adults with gastric cancer diagnoses after gastrectomy.

**Methods:** The Korean gastric cancer survivors participated in a 24-week tai chi self-help education program. The participants completed the Center for Epidemiologic Studies–Depression (Korean version) and the Functional Assessment of Cancer Therapy–General (Korean version) for HRQOL and provided blood samples for immune markers. All measurements were conducted at baseline and at one week following the 24-week intervention.

**Main Research Variables:** Feasibility was determined as the percentage of participants completing the 24-week protocol. Preliminary data on depression, HRQOL, and immune markers were obtained.

**Findings:** The dropout rate was 36.4%; 21 of 33 survivors participated in the tai chi self-help education program for 24 weeks. No complications or injuries occurred to the participants during the program. No significant differences were noted in depression, HRQOL, and immune markers before and after the intervention.

**Conclusions:** Tai chi exercise, in combination with a self-help program, can be safe and feasible for Korean gastric cancer survivors. This feasibility study did not show that the tai chi self-help education program improves depression, HRQOL, and immune markers in Korean gastric cancer survivors.

**Implications for Nursing:** Additional studies are needed to determine the long-term impact relative to usual care.

common cause of death in Korean men (Korea National Statistical Office, 2007). If gastric cancer is detected in an early stage, the overall five-year survival rate in

Korea is greater than 80% after gastrectomy only or gastrectomy with chemotherapy (Yoon et al., 2003). Patients with gastric cancer are surviving longer and living with the consequences of their illness and its treatment. For example, survivors of gastric cancer report higher levels of depression following surgery as compared to before surgery (Matsushita, Matsushima, & Maruyama, 2005).

Survivors of gastric cancer who have had surgery may experience alterations in immune function as a result of the cancer, its treatment, inadequate nutrition, and depression (Lee, Chang, Lee, & Chen, 1994; Yan, 1990). HRQOL in survivors of gastric cancer often is reduced as a consequence of other symptoms (e.g., fatigue) as well as impaired nutritional intake and anemia. In this study, the authors examined the effects of a self-help education program plus tai chi on mood state, HRQOL, and immune function indicators in Korean survivors of gastric cancer. Therefore, the purposes of this pilot study were to determine the feasibility of conducting a study of a tai chi self-help education program in Korean adults with gastric cancer and to compare the effects of a six-month tai chi self-help program on depression, HRQOL, and immune markers.

## Methods

### Design

A quasi-experimental design, one-group, pre- and post-test was used to investigate the feasibility and the effects of a self-help education program that includes tai chi. The gastric cancer survivors participated in a

12-week self-help education program plus 24 weeks of tai chi exercise.

### Subjects and Setting

The gastric cancer survivors were recruited from the outpatient clinics of two large hospitals in Korea. Two hundred and forty-six cancer survivors were identified for the study based on the inclusion criteria. Only 33 of 246 survivors accepted the opportunity to participate. All of the participants had a diagnosis of gastric cancer. At the time of diagnosis, the patients were in stage I or II of their disease. At study entry, all patients were within at least two years after surgery. Potential subjects who regularly exercised for three months or more were excluded. The study was approved by the institutional review board of Seoul National University in Korea. The subjects agreed to participate in this study with written informed consent.

### Study Intervention: Tai Chi Self-Help Education Program

The tai chi self-help education program was developed specifically for this study. Two dimensions make up this program: biweekly self-help education class and weekly tai chi exercise. The self-help education session was provided every other Saturday for the first 12 weeks. Self-help education sessions provided information to the patients including principles of self-help management and humor therapy, activity of daily life management, nutrition management, alcohol consumption, smoking, emotional and social management, and beneficial effects of physical exercise.

The tai chi exercise class was held every Saturday for 24 weeks. Each session consisted of a 10-minute warm-up exercise to loosen the body and joints and to stretch six parts of the body (neck, shoulders, spine, hips, knees, and ankles) and chi kung (also known as qi gong) exercise, a 30- to 40-minute period of tai chi (11 combination forms of Sun and Yang style) and chi kung exercise, and a 10-minute cooling down and chi kung exercise. Each practice session included traditional Korean music accompaniment. The overall tai chi exercise protocol was similar to that described by others (Mustian et al., 2004; Yeh et al., 2006). However, the specific tai chi exercises used were designed for the gastric cancer survivors by co-author Paul Lam, MD, who is an expert in tai chi. Improving mental strength, reducing stress, and enhancing immune function were emphasized. All sessions were led by trained tai chi practitioners. Because tai chi is initially difficult to learn, the level of tai chi exercise was gradually increased, reaching full potential on the ninth week. Subjects were reminded to attend class via telephone each week. Each participant also received a

**Table 1. Baseline Characteristics of the Study Participants**

Characteristic	Completed Study (N = 21)		Dropped Out of Study (N = 12)		p
	$\bar{X}$	SD	$\bar{X}$	SD	
Age (years)	57.86	1.9	62.25	2.79	0.191
Characteristic	n	%	n	%	p
<b>Gender</b>					1
Female	7	33	4	33	
Male	14	67	8	67	
<b>Education</b>					1
Middle school or less	7	33	4	33	
High school or more	14	67	8	67	
<b>Economic status</b>					1
Enough	18	86	11	92	
Insufficient	3	14	1	8	
<b>Marital status</b>					0.125
Married	20	95	9	75	
Not married or widowed	1	5	3	25	
<b>Religion</b>					0.259
Yes	13	62	10	83	
No	8	38	2	17	

CD demonstrating the tai chi program to practice at home.

## Measurements

All participants completed a demographic and health history questionnaire at baseline. Depression, HRQOL, and immune markers were measured at baseline and at one week following the 24-week intervention.

**Depression:** The participants' depression level were assessed with the Korean version of the Center for Epidemiologic Studies–Depression (CES-D) scale, which is a 20-item self-rating tool (Chon & Rhee, 1992). This tool includes a four-point Likert scale ranging from 0–3. Higher scores indicate higher levels of depression. The internal consistency of a Korean version of CES-D was 0.89 and consisted of four factors showing similar factor structure to that of the original CES-D (Radloff, 1977). In this study, the Cronbach alpha was 0.655 at baseline.

**Health-related quality of life:** HRQOL was measured with the Korean version of the Functional Assessment of Cancer Therapy–General (FACT-G) (Kim et al., 2003). The fourth edition of FACT-G (Cella et al., 1993; Ward et al., 1999) consisted of 27 items, but the Korean version of FACT-G has 25 items: physical (six items), social (six items), emotional (six items), and functional (seven items). The FACT-G overall scores and subscale scores were calculated with inversion of items as needed, such that higher scores indicated better QOL. The internal consistency of a Korean version of FACT-G was 0.87. The Cronbach alpha of this study was 0.72. Cronbach alpha of FACT-G subscales in this study were 0.62 (physical well-being), 0.57 (social well-being), 0.33 (emotional well-being), and 0.86 (functional well-being).

**Immune markers:** Blood samples were obtained from 9–10 am for the measurement of complete blood count, CD4, CD8, CD4/CD8 ratio, NK cell number, tumor necrosis factor (TNF)- $\alpha$ , and interleukin (IL)-6 levels. The samples were referred to the Seoul Clinical Laboratories at the Seoul Medical Science Institute for analysis. The proportions of CD4, CD8, and NK cells from separated lymphocytes were analyzed with a flow cytometer. TNF- $\alpha$  and IL-6 levels were measured with commercially available kits using a Molecular Devices V-MAX 220 VAC ELISA™ reader.

## Statistical Analysis

The data were analyzed with SPSS® 15.0. Depression, HRQOL, and immune markers at baseline and after

**Table 2. Comparison of Depression, Health-Related Quality of Life, and Immune Markers at Baseline**

Variable	Completed Study (N = 21)		Dropped Out of Study (N = 12)		t	p
	$\bar{X}$	SD	$\bar{X}$	SD		
Depression	11.76	6.51	12.83	10.43	-0.364	0.718
EWB (6 items)	19.48	2.52	19.42	2.11	0.069	0.945
FWB (7 items)	23.48	4.51	22.83	5.44	0.365	0.717
PWB (6 items)	20.52	3.57	21.42	1.83	-0.948	0.351
SWB (6 items)	15.9	4.44	15.75	2.22	0.133	0.895
FACT-G (25 items)	79.38	9.18	79.42	8.1	-0.011	0.991
WBC ( $10^3/\text{mm}^3$ )	5.49	1.29	5.5	1.69	-0.018	0.986
Lymphocyte (%)	34.11	10.13	32.31	10.17	0.491	0.627
Monocyte (%)	6.54	2.53	5.88	3.58	0.627	0.535
CD4 (T helper %)	36.9	7.2	36.13	9.08	0.272	0.787
CD8 (Supp/cytotoxic %)	26.05	8	24.5	9.33	0.503	0.618
CD4/CD8 ratio	1.49	0.52	1.86	0.92	-1.48	0.149
NK cell (%)	23.67	9.2	26.58	13.23	-0.746	0.461
Interleukin-6 (pg/ml)	1.77	2.64	1.45	1.33	0.393	0.697
TNF- $\alpha$ (pg/ml)	1.23	0.59	1.07	0.52	0.776	0.444

CD—cluster of differentiation; EWB—emotional well-being; FACT-G—Functional Assessment of Cancer Therapy–General; FWB—functional well-being; NK—natural killer; PWB—physical well-being; SWB—social well-being; Supp—suppressor; TNF—tumor necrosis factor; WBC—white blood cell

Note. FACT-G is the summed totals from EWB, FWB, PWB, and SWB.

intervention were reported as means with standard deviations. The independent sample t test was used to compare the variables between the participants who completed the program and those who dropped out. Fisher's exact test was used to compare demographic variables between the two groups. A paired sample t test was used to identify the changes in depression, HRQOL, and immune marker levels before and after intervention ( $p < 0.05$  was considered significant, and all tests were two tailed).

## Results

### Feasibility

Of the 33 survivors enrolled, 12 participants (36%) dropped out and 21 completed data collection after the intervention. Of the 12 participants who dropped out, 3 chose not to participate after the first session, 1 participant dropped out after two sessions because of child care responsibilities, 6 withdrew after three months (4 returned to work and 2 withdrew because of lack of time). In addition, 1 person was hospitalized for surgical correction of a bowel obstruction and 1 subject died as a result of cancer recurrence. Baseline characteristics of the participants who completed the data collection after the intervention or dropped out are shown in Table 1. No significant differences existed for depression, HRQOL, and immune markers between participants who dropped out and those who completed the study

**Table 3. Depression and Health-Related Quality of Life Before and After the Tai Chi Self-Help Program**

Variable	Before		After		t	p
	$\bar{X}$	SD	$\bar{X}$	SD		
Depression	11.76	6.51	10.86	4.94	0.615	0.546
EWB	19.48	2.52	20.57	2.94	-1.474	0.156
FWB	23.48	4.51	19.76	7.89	1.881	0.075
PWB	20.52	3.57	21.62	1.96	-1.426	0.169
SWB	15.9	4.44	16.86	5.63	-0.653	0.521
FACT-G	79.38	9.18	78.81	12.9	0.169	0.867

EWB—emotional well-being; FACT-G—Functional Assessment of Cancer Therapy—General; FWB—functional well-being; PWB—physical well-being; SWB—social well-being

Note. FACT-G is the summed totals from EWB, FWB, PWB, and SWB.

at baseline (see Table 2). The attendance rate for the 24-week study was 83% at the end of the first 12 weeks and 67% for the final 12 weeks. Overall, the mean attendance rate at 24 weeks was 75.2%. No complications or injuries occurred in the group during the program. Only 3 of 21 participants performed the tai chi exercise for one hour three times per week at home during the 24 weeks of the study. Two participants regularly exercised for the first 12 weeks at home only. The remaining 16 participants exercised “very little” at home.

## Effects

Comparison of before and after intervention scores showed no significant differences in depression and HRQOL levels. Similarly, no significant differences were noted in before and after intervention immune markers except white blood cell and monocyte percentages. Tables 3 and 4 show changes in levels of depression, HRQOL, and immune markers after the intervention in the 21 participants who completed the study.

## Discussion

This study examined the feasibility and effects of a 24-week tai chi self-help education program on depression, HRQOL, and immune markers in Korean adults with a diagnosis of gastric cancer. The results of the study suggest that tai chi exercise in combination with an educational self-help program can be safe and feasible for gastric cancer survivors.

The overall dropout rate was 36%, with about 50% of the participants dropping out within the first three months of the intervention. In addition, not everyone completed all sessions and few participated in home exercises, similar to that

reported by others using tai chi as an intervention (Li et al., 2004; Mustian et al., 2004). Li et al. (2004), in a study of healthy older adults in Oregon using tai chi, also reported a high dropout rate. However, in the Li et al. (2004) study, participants were expected to exercise three times a week for the 24 weeks of the study.

In the current study, many participants anecdotally reported being unfamiliar with tai chi exercise prior to study enrollment. Whether this contributed to the dropout rate is unknown. Other factors that may have contributed to the relatively high dropout rate include the time commitment and other personal activities, such as job and family responsibilities.

Mustian et al. (2004) studied breast cancer survivors and reported an attendance rate of 72% at 12 weeks for tai chi only. In the current study, the attendance rate at the first 12 weeks was 83%, suggesting that the inclusion of a self-help education component may have increased participation. Despite being encouraged to perform the exercises at home and being given a CD, most participants did not exercise at home. Additional studies may provide information on how to motivate gastric cancer survivors to exercise. The most common barriers to participating in exercise in healthy Korean adults were busy lifestyle, no desire to exercise, and not interested in exercise (Han & Nam, 1991). The common reasons to stop exercise in Korean patients with chronic arthritis were lacking time, having difficulties with transportation, and being bored (Kang, Kim, & Lee, 1999).

The tai chi self-help program used in the current study put special emphasis on improving mental strength and reducing stress through using combination of Sun style and Yang style movements. The program also included chi kung (also known as qi gong) cultivation for healing of the gastric region and enhancing immune function. Overall, in this small sample of survivors with gastric cancer, no differences were noted between before and

**Table 4. Immune Markers Before and After the Tai Chi Self-Help Program**

Marker	Before		After		t	p
	$\bar{X}$	SD	$\bar{X}$	SD		
WBC ( $10^3/\text{mm}^3$ )	5.49	1.29	6.07	1.65	-2.783	0.011
Lymphocyte (%)	34.11	10.13	35.09	8.78	-0.555	0.585
Monocyte (%)	6.54	2.53	7.73	2.03	-2.536	0.02
CD4 (%)	36.9	7.2	38.33	8.67	-1.12	0.276
CD8 (%)	26.05	8.01	25.86	8.29	0.315	0.756
CD4/CD8 ratio	1.54	0.48	1.61	0.54	-1.052	0.305
NK cell (%)	23.67	9.2	23.24	10.5	0.275	0.786
Interleukin-6 (pg/ml)	1.77	2.64	1.64	3.23	0.537	0.597
TNF- $\alpha$ (pg/ml)	1.23	0.59	1.16	0.56	1.154	0.262

CD—cluster of differentiation; NK—natural killer; TNF—tumor necrosis factor; WBC—white blood cell

after intervention immune marker values. However, participants had immune marker levels within the normal range at baseline, suggesting that there may have been little room for improvement.

Although this feasibility study did not show that the tai chi self-help education program influenced immune parameters in gastric cancer survivors, other studies have reported a positive influence of regular exercise. For example, Yeh et al. (2006) reported that regular tai chi exercise increased the CD4/CD8 ratio in healthy middle-aged adults. Whether the lack of an effect in this study is related to the small sample size, the duration of the exercise program, or the preexisting illness cannot be determined. Additional studies are needed to explore the characteristics of tai chi (i.e., intensity and duration) that may promote immune function in this patient population.

Anecdotally, participants reported feeling better about themselves following the intervention. However, no significant differences were noted in HRQOL and depression scores before and after intervention. This differs from the work of Mustian et al. (2004), who found that, in women with breast cancer, tai chi had a positive influence on self-esteem and HRQOL. Other researchers also have reported positive effects of tai chi on depression and HRQOL in patients with heart failure and in older patients with depressive disorders (Barrow et al., 2007; Chou et al., 2004; Yeh et al., 2004). Future studies should

be conducted to replicate these findings using a larger sample size and inclusion of a control group.

This feasibility study has several limitations. First, as expected, the small sample of participants provided statistically analyzeable data but did not provide results generalizable to the larger patient population. Second, the study participants were in remission and had normal values of immune markers at baseline; therefore, changes in immune markers were not observed. In conclusion, tai chi is a safe, well-accepted form of exercise for gastric cancer survivors.

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## References

- Audette, J.F., Jin, Y.S., Newcomer, R., Stein, L., Duncan, G., & Frontera, W.R. (2006). Tai chi versus brisk walking in elderly women. *Age and Ageing, 35*, 388–393. doi: 10.1093/ageing/af1006
- Barrow, D.E., Bedford, A., Ives, G., O'Toole, L., & Channer, K.S. (2007). An evaluation of the effects of tai chi chuan and chi kung training in patients with symptomatic heart failure. *Postgraduate Medical Journal, 83*, 717–721. doi: 10.1136/pgmj.2007.061267
- Brismee, J.M., Paige, R.L., Chyu, M.C., Boatright, J.D., Hagar, J.M., McCaleb, J.A., . . . Shen, C.L. (2007). Group and home-based tai chi in elderly subjects with knee osteoarthritis: A randomized controlled trial. *Clinical Rehabilitation, 21*, 99–111. doi: 10.1177/0269215506070505
- Burke, D.T., Al-Adawi, S., Lee, Y.T., & Audette, J. (2007). Martial arts as sport and therapy. *Journal of Sports Medicine and Physical Fitness, 47*, 96–102.
- Cella, D.F., Tulskey, D.S., Gray, G., Sarafian, B., Linn, E., Bonomi, A., . . . Brannon, J. (1993). The Functional Assessment of Cancer Therapy scale: Development and validation of the general measure. *Journal of Clinical Oncology, 11*, 570–579.
- Chon, K.K., & Rhee, M.K. (1992). Preliminary development of Korean version of CES-D. *Korean Journal of Clinical Psychology, 11*, 65–76.
- Chou, K.L., Lee, P.W., Yu, E.C., Macfarlane, D., Cheng, Y.H., Chan, S.S., & Chi, I. (2004). Effect of tai chi on depressive symptoms amongst Chinese older patients with depressive disorders: A randomized clinical trial. *International Journal of Geriatric Psychiatry, 19*, 1105–1107. doi: 10.1002/gps.1178
- Courneya, K.S. (2003). Exercise in cancer survivors: An overview of research. *Medicine and Science in Sports Exercise, 35*, 1846–1852. doi: 10.1249/01.MSS.0000093622.41587.B6
- Han, J.H., & Nam, C.H. (1991). A study on the status of physical exercise of community people in city area. *Journal of Korean Society for Health Education, 8*, 68–86.
- Irwin, M.R., Olmstead, R., & Oxman, M.N. (2007). Augmenting immune responses to varicella zoster virus in older adults. *Journal of the American Geriatrics Society, 55*, 511–517. doi: 10.1111/j.1532-5415-2007.01109.x
- Jin, P. (1989). Changes in heart rate, noradrenaline, cortisol and mood during tai chi. *Journal of Psychosomatic Research, 33*, 197–206. doi: 10.1016/0022-3999(89)90047-0
- Jin, P. (1992). Efficacy of tai chi, brisk walking, meditation, and reading in reducing mental and emotional stress. *Journal of Psychosomatic Research, 36*, 361–370. doi: 10.1016/0022-3999(92)90072-A
- Kang, H.S., Kim, J.I., & Lee, E.O. (1999). Influencing factors on aquatic exercise adherence and dropout in patients with arthritis. *Journal of Rheumatology, 6*, 185–196.
- Kim, H., Lee, K.H., Kim, J.C., Chung, H.Y., Yoo, H.J., Lee, J.H., . . . Kim, W.K. (2003). Development and validation of Korean Functional Assessment of Cancer Therapy-General (FACT-G). *Korean Journal of Clinical Psychology, 22*, 215–229.
- Korea National Statistical Office. (2007). *Annual report of the mortality and causes of death, 2006*. Seoul, South Korea: Author.
- Lee, W.J., Chang, K.J., Lee, C.S., & Chen, K.M. (1994). Selective depression of T-lymphocyte subsets in gastric cancer patients: An implication of immunotherapy. *Journal of Surgical Oncology, 55*, 165–169. doi: 10.1002/jso.2930550307
- Li, F., Fisher, K.J., Harmer, P., Irbe, D., Tearse, R.G., & Weimer, C. (2004). Tai chi and self-rated quality of sleep and daytime sleepiness in older adults: A randomized controlled trial. *Journal of the American Geriatrics Society, 52*, 892–900. doi: 10.1111/j.1532-5415.2004.52255.x
- Li, F., Harmer, P., Fisher, K.J., McAuley, E., Chaumeton, N., Eckstrom, E., & Wilson, N.L. (2005). Tai chi and fall reductions in older adults: A randomized controlled trial. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences, 60*, 187–194.

- Mansky, P., Sannes, T., Wallerstedt, D., Ge, A., Ryan, M., Johnson, L.L., . . . Gerber, L. (2006). Tai chi chuan: Mind-body practice or exercise intervention? Studying the benefit for cancer survivors. *Integrative Cancer Therapies, 5*, 192–201. doi: 10.1177/1534735406291590
- Matsushita, T., Matsushima, E., & Maruyama, M. (2005). Psychological state, quality of life, and coping style in patients with digestive cancer. *General Hospital Psychiatry, 27*, 125–132. doi: 10.1016/j.genhosppsych.2004.10.006
- Mustian, K.M., Katula, J.A., Gill, D.L., Roscoe, J.A., Lang, D., & Murphy, K. (2004). Tai chi chuan, health-related quality of life and self-esteem: A randomized trial with breast cancer survivors. *Supportive Care in Cancer, 12*, 871–876. doi: 10.1007/s00520-004-0682-6
- Mustian, K.M., Katula, J.A., & Zhao, H. (2006). A pilot study to assess the influence of tai chi chuan on functional capacity among breast cancer survivors. *Journal of Supportive Oncology, 4*, 139–145.
- Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research on the general population. *Applied Psychological Measurement, 1*, 385–401. doi: 10.1177/014662167700100306
- Segal, R., Evans, W., Johnson, D., Smith, J., Colletta, S., Gayton, J., . . . Reid, R. (2001). Structured exercise improves physical functioning in women with stages I and II breast cancer: Results of a randomized controlled trial. *Journal of Clinical Oncology, 19*, 657–665.
- Song, R.Y., Lee, E.O., & Lee, I.O. (2002). Pre-post comparisons on physical symptoms, balance, muscle strength, physical functioning, and depression in women with osteoarthritis after 12-week tai chi exercise. *Journal of Rheumatology, 9*, 28–39.
- Ward, W.L., Hahn, E.A., Mo, F., Hernandez, L., Tulskey, D.S., & Cella, D. (1999). Reliability and validity of the Functional Assessment of Cancer Therapy-Colorectal (FACT-C) quality of life instrument. *Quality of Life Research, 8*, 181–195. doi:10.1023/A:1008821826499
- Yan, M. (1990). Effects of perioperative parenteral nutrition on immunocompetence in patients with gastric cancer. *Chinese Journal of Surgery, 28*, 739–741, 782.
- Yeh, S.H., Chuang, H., Lin, L.W., Hsiao, C.Y., & Eng, H.L. (2006). Regular tai chi chuan exercise enhances functional mobility and CD4CD25 regulatory T cells. *British Journal of Sports Medicine, 40*, 239–243. doi: 10.1136/bjsm.2005.022095
- Yeh, S.H., Wood, M.J., Lorell, B.H., Stevenson, L.W., Eisenberg, D.M., Wayne, P.M., . . . Philips, R.S. (2004). Effects of tai chi mind-body movement therapy on functional status and exercise capacity in patients with chronic heart failure: A randomized controlled trial. *American Journal of Medicine, 117*, 541–548. doi: 10.1016/j.amjmed.2004.04.016
- Yoon, H.J., Chung, J.P., Choi, S.H., Kim, C.S., Kang, B.S., Lee, T.H., . . . Lee, S.I. (2003). A study on the prognosis and prognostic factors of gastric proper muscle cancer. *Korean Journal of Gastroenterology, 41*, 87–93.