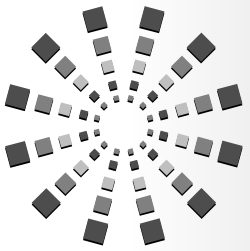


Pei-Shan Tsai, PhD
Pei-Ling Chen, MSN
Yuen-Liang Lai, MD
Ming-Been Lee, MD
Chia-Chin Lin, PhD

# Effects of Electromyography Biofeedback–Assisted Relaxation on Pain in Patients With Advanced Cancer in a Palliative Care Unit

**KEY WORDS**
Advanced cancer
Biofeedback
Pain
Palliative care
Relaxation

Most patients with advanced cancer experience pain. However, many cancer patients do not find satisfaction with conventional treatment of pain relief. This study examined the effect of electromyography (EMG) biofeedback–assisted relaxation on cancer-related pain in advanced cancer patients. We hypothesized that changes in EMG activity in frontal muscles underlie the efficacy of EMG biofeedback–assisted relaxation. This was a randomized control study. The experimental group (n = 12) received 6 EMG biofeedback–assisted relaxation sessions over a 4-week period, whereas the control group (n = 12) received conventional care. The primary efficacy measure was the level of pain, measured by the Brief Pain Inventory. Findings from this study show that relaxation training supplemented with visual and auditory EMG biofeedback signals is effective in reducing cancer-related pain in advanced cancer patients, possibly through a mechanism of attenuation of physiological arousal. Electromyography biofeedback–assisted relaxation training may be used along with medications for effective pain management in patients with advanced cancer.

Cancer patients often experience pain that spans across the history of the disease. Cancer pain remains a major healthcare problem worldwide[1] despite advances in cancer treatment and cancer-related pain management. A systematic review of the prevalence and/or incidence of cancer-related pain demonstrated that a significant number (>60% to >90%) of patients with advanced cancer worldwide experience pain that requires treatment.[2] In addition to pain, many people with cancer experience psychological symptoms that together result in a diminished quality of life.[3] In Taiwan, pain was the second commonest symptom experienced by advanced cancer patients.[4] Increasingly,

From the Graduate Institute of Nursing, College of Nursing, Taipei Medical University, Taipei (Drs Tsai and Lin); Department of Nursing, Taipei Medical University Wan Fan Hospital, Taipei (Dr Tsai); Yuh-Ing Junior College of Health Care and Management, Kaohsiung (Ms Chen); Center of Hospice and Palliative Care, Mackay Memorial Hospital, Tamsui; and College of Medicine, Yang Ming Medical University, Taipei and College of Medicine, Taipei Medical University, Taipei (Dr Lai); Department of Psychiatry, College of Medicine, National Taiwan University, Taipei, Taiwan (Dr Lee).

Corresponding author: Chia-Chin Lin, PhD, Taipei Medical University College of Nursing, 250 Wu Hsing St, Taipei, Taiwan (e-mail: clin@tmu.edu.tw).
Accepted for publication October 12, 2006.

complementary therapies that can help improve both physical and psychological well-being have been advocated to be integrated with conventional therapies because most cancer patients are not satisfied with mainstream treatments in relieving these symptoms.[5] The National Comprehensive Cancer Network guidelines for the management of adult cancer pain recommend adopting nonpharmacological therapies such as massage, acupuncture/acupressure, guided imagery, relaxation training, and cognitive behavioral training if pain scores remain at 4 or above on a 10-point scale after reevaluation and modification of pharmacological management.[6]

Complementary and alternative medicine is of considerable interest to the adult population. Reportedly, relaxation techniques were the second most frequently used of all complementary and alternative medicine modalities by adult general population[7,8] and by cancer patients receiving treatment.[9] The beneficial use of the relaxation response has been demonstrated in various disease states.[10] Few controlled studies have examined the effect of relaxation interventions on the management of cancer pain, in particular, or end-of-life symptoms, in general. Previous systematic reviews revealed that there was insufficient evidence to support the efficacy of relaxation for the relief of cancer-related pain[11] or chronic pain at large.[12] On the contrary, a meta-analysis found significant beneficial effects of relaxation in cancer patients for reducing cancer treatment–related pain, with an average effect size of 0.44.[13] For relaxation training to gain acceptance by the medical community in palliative care as a legitimate treatment modality, it is important to identify effective treatment components and underlying therapeutic mechanisms in advanced cancer patients.

Frontalis electromyography (EMG) has been widely used in clinical biofeedback for stress reduction.[14,15] However, studies examining the effect of frontalis EMG biofeedback was composed mostly of case reports and uncontrolled studies.[15] Surface EMG can be a useful modality in assisting individuals to achieve a desired relaxation response that may help break the pain-anxiety-muscle tension cycle. To date, the application of relaxation interventions in the advanced cancer patients is still understudied. We therefore designed this study to examine the effect of EMG biofeedback–assisted relaxation on cancer-related pain in advanced cancer patients. We also postulated that changes in EMG activity in the frontal muscles are related to the reduction in pain perceived by advanced cancer patients. Results from this study may help determine the potential usage and possible mechanisms of EMG biofeedback in pain management for patients with advanced cancer.

# ■ Patients and Method

## Study Participants

This study was approved by the institutional review board of Taipei Medical University in Taiwan. All participants provided written informed consent. The study included adult patients (≥18 years old) recruited from a palliative care unit in a medical center located in northern Taiwan who scored 3 or higher on the Taiwanese Version of the Brief Pain Inventory (BPI-T), who had been diagnosed with advanced cancer, and who had been taking pain medications for over 1 week before the study. The prescriptions of pain medication were kept consistent in all patients throughout the study period.

Thirty-seven participants were randomized either to the experimental group (n = 20) or the control group (n = 17). Thirteen patients discontinued (5 died and 8 withdrew) the study, resulting in a total of 24 participants (12 in the experimental and 12 in the control group). The flow of participants is diagrammatically presented in Figure 1.

## Study Design

This was a randomized control trial. The experimental group received 6 EMG biofeedback–assisted relaxation sessions over a 4-week period, whereas the control group received conventional care. Participants in both groups spent equal amount of time each week with the nurse who performed the biofeedback training to avoid nonspecific effects such as those resulted from increased personal attention.

## EMG Biofeedback–Assisted Relaxation Training

Electromyography biofeedback–assisted relaxation included 6 sessions of EMG biofeedback using the Procomp+/BioGraph 2.1 biofeedback system (Thought Technology, West Chazy, NY), coupled with relaxation-breathing (ie, deep

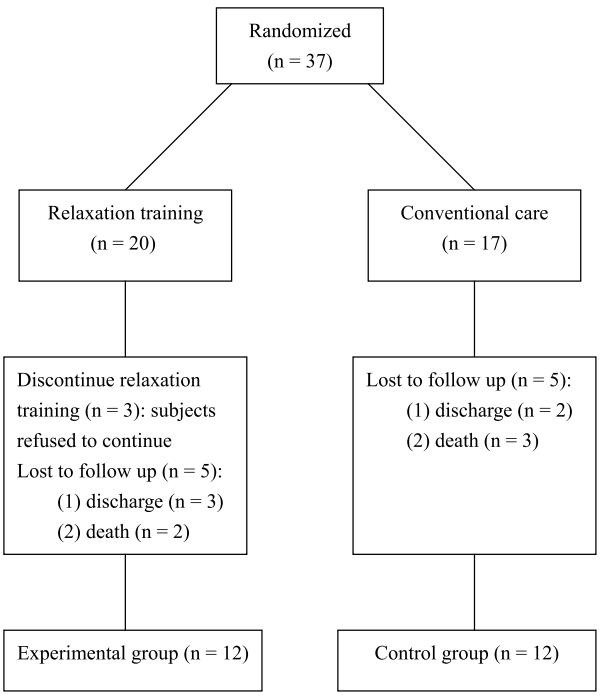



**Figure 1** ■ Flow of participants in the study.

diaphragmatic breathing) training over a 4-week period. Participants were trained by a nurse who had been previously trained by a certified biofeedback therapist, to take slow, deep, and steady breaths, using diaphragm, with minimum possible movement of the chest. Correct diaphragmatic breathing was ensured with the use of the Procomp+ biofeedback apparatus. After ensuing correct practice of diaphragmatic breathing, participants were trained in 6 guided biofeedback sessions. For EMG biofeedback, the electrodes were placed over the frontal area. Participants were asked to breathe deeply and slowly (4–7 times/min) while observing a visual display of their EMG signals during the first 2 training sessions. The beneficial effects of diaphragmatic breathing were shown by demonstrating fall in frontalis EMG levels after practices. During the last 4 sessions, participants were asked to close their eyes and sit comfortably on a reclining chair while paying attention to auditory EMG feedback signals. With the auditory biofeedback sessions, participants were taught to decrease frontalis EMG potentials by inhibiting the auditory signals. Each session lasted 45 min and consisted of three 7- to 10-min trials. The training criterion was a 20% reduction in the EMG from the pretraining level for 50% of the time in each trial.

## Baseline Measurements

Demographic data (age, sex, marital status, and years of education), treatment-related information (types of cancer treatments, cancer pain, and type of analgesics), psychological health, and functional status were assessed at baseline.

Psychological health was assessed using the short form of the Brief Symptom Rating Scale (BSRS-5). The BSRS-5 is a screening tool that facilitates the identification of psychological morbidity.[16] It is composed of 5 questions that assess the severity (from 0 to 4) of 5 common aspects of psychological distress: anxiety, hostility, depression, interpersonal sensitivity, and insomnia, with a score of 0 indicating none to a score of 4 indicating extremely severe. The possible total score ranges from 0 to 20, with a score of 6 being used as the cutoff value.

Functional status was assessed using the Karanofsky Performance Status Scale (KPS). The KPS is a measure of the level of a patient's activity and medical care requirements and has been shown to have good reliability and validity.[17] It is a general measure of patient independence and has been widely used as a general assessment of patients with cancer.[18] The KPS is an ordinal scale that ranges from 0 to 100 at intervals of 10. The lower the score, the lower the functional status.

## Outcome Measures

The primary efficacy measure was pain intensity, measured by the BPI-T, a Taiwanese version of the BPI. The BPI-T was assessed in each patient at baseline and after the 4-week training program. The percentages of patients achieving reductions in pain intensity from baseline of at least 30% and at least 50% were also calculated. The BPI is a pain assessment tool commonly used with cancer patients.[19] It

**Table 1 • Baseline Characteristics of the Study Participants by Group**

| Variable | Experimental (n = 12), n (%) | Control (n = 12), n (%) | *P* |
|---|---|---|---|
| Sex | | | .68* |
| Male | 7 (58.3) | 8 (66.7) | |
| Female | 5 (41.7) | 4 (33.3) | |
| Marital status | | | .623* |
| Married | 10 (83.3) | 9 (75.0) | |
| Not married | 2 (16.7) | 3 (25.0) | |
| Age, y | | | .077† |
| ≤40 | 2 (16.7) | 1 (8.3) | |
| 41–50 | 7 (58.3) | 3 (25.0) | |
| 51–60 | 1 (8.3) | 3 (25.0) | |
| ≥61 | 2 (16.7) | 5 (41.7) | |
| Education | | | .394† |
| None | 1 (8.3) | 2 (16.7) | |
| Elementary school | 1 (8.3) | 3 (25.0) | |
| Junior high school | 4 (33.3) | 1 (8.3) | |
| High school | 2 (16.7) | 4 (33.3) | |
| Junior college | 2 (16.7) | 1 (8.3) | |
| College | 2 (16.7) | 1 (8.3) | |
| Type of pain | | | .155‡ |
| Somatic | 7 (58.3) | 8 (66.7) | |
| Neuropathic | 3 (25.0) | 0 (0) | |
| Visceral | 2 (16.7) | 4 (33.3) | |
| Pain intensity | | | .119† |
| Mild | 2 (16.7) | 6 (50.0) | |
| Moderate | 3 (25.0) | 2 (16.7) | |
| Severe | 7 (58.3) | 4 (33.3) | |
| Type of cancer treatment | | | .147‡ |
| Radiation | 5 (41.7) | 2 (16.7) | |
| Chemotherapy | 0 (0) | 2 (16.7) | |
| Both | 0 (0) | 2 (16.7) | |
| None | 7 (58.3) | 6 (50.0) | |
| Type of analgesics | | | .317† |
| Non-opioids | 6 (50.0) | 3 (25.0) | |
| Weak opioids | 0 (0) | 1 (8.3) | |
| Strong opioids | 6 (50.0) | 8 (66.7) | |
| KPS | | | .184† |
| 40 | 0 (0) | 1 (8.3) | |
| 50 | 1 (8.3) | 2 (16.7) | |
| 60 | 0 (0) | 1 (8.3) | |
| 70 | 3 (25.0) | 2 (16.7) | |
| 80 | 5 (41.7) | 5 (41.7) | |
| 90 | 3 (25.0) | 1 (8.3) | |
| BSRS-5 | | | .411† |
| <6 | 5 (41.7) | 5 (41.7) | |
| 6–9 | 2 (16.7) | 1 (8.3) | |
| 10–14 | 5 (41.7) | 2 (16.7) | |
| ≥15 | 0 (0) | 4 (33.3) | |

KPS indicates Karanofsky Performance Status Scale; BSRS, Brief Symptom Rating Scale.
*Fisher exact test.
†Mann-Whitney *U* test.
‡Chi-square test.

**Table 2 • Results of EMG-Assisted Relaxation for Pain Reduction**

| | Pain Intensity | | | |
|---|---|---|---|---|
| | Experimental (n = 12) | Control (n = 12) | Differences Between Means (95% CI) | *P* |
| Baseline | 4.21 (1.50) | 3.27 (1.32) | −0.26 to 2.14 | .119 |
| Posttest | 1.92 (1.60) | 3.60 (1.38) | −2.96 to −0.21 | .011 |
| Change in score | 2.29 (1.70) | −0.33 (0.86) | 1.46 to 3.79 | <.001 |

EMG indicates electromyography; CI, confidence interval.
Values are expressed as mean (SD).

contains a series of questions related to pain intensity and its interference with daily life. In this study, we used the intensity subscale of the BPI-T, which is an 11-point (ie, 0–10) numerical rating scale. The pain intensity subscale of the BPI-T conforms to the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials recommendation on the core outcome measure in clinical trials of chronic pain treatments.[20] The BPI asks patients to rate their pain at the time of responding to the questionnaire (pain now) and also at its worst, least, and average. Each question is answered by circling a number between 0 (no pain) and 10 (pain as bad as you can imagine). A pain intensity score is calculated by averaging the total score of the 4 items. Mild pain is defined as 1 to 4; moderate pain, as 5 to 6; and severe pain, as 7 to 10. The BPI-T was developed and validated by Ger and colleagues in 1999[21] and has been shown to have good reliability and validity. In a previous study, we demonstrated that pain intensity as measured by BPI significantly correlated to performance status, as measured by KPS, and mood disturbances, as measured by Profile of Mood States Short Form, in a group of Taiwanese cancer patients.[22]

The secondary outcome measure was frontal muscle EMG, which was also assessed at baseline and after the 4-week training program.

## Statistical Methods

Baseline comparisons were made using Fisher exact test, chi-square test, and the Mann-Whitney *U* test. The effects of EMG biofeedback–assisted relaxation training on pain and frontalis EMG were analyzed using multivariate repeated-measures analysis of variance. The relation between the level of pain and muscle tension was tested using the Spearman rank correlation. A *P* value of less than .05 was considered significant.

# Results

Sex, marital status, age, education, cancer treatments received, types of pain, pain intensity, pain medication used, and BSRS-5 and KPS scores did not significantly differ between the experimental and control groups (Table 1). The posttest pain intensity was significantly lower for the experimental group compared with the control group (95% confidence interval = −2.96 to −0.21, *P* = .011). The experimental group obtained a decrease of 2.29 points in pain intensity from baseline, and the reductions were statistically significant when compared with those of the control group (95% confidence interval = 1.46–3.79, *P* < .001). The results of EMG biofeedback–assisted relaxation for pain reduction are presented in Table 2. Among the patients in the experimental group, 67% of them obtained a reduction of at least 30% in pain intensity from baseline and 50% obtained a reduction of at least 50% in pain intensity from baseline, whereas the control group had a mean increase of 14% in pain intensity from baseline. Results from the repeated-measures analysis of variance showed a significant time effect (F = 12.69, *P* = .002) and time-by-group interaction effect (F = 22.8, *P* < .001) for pain (Table 3), suggesting that the change in the pain level in the experimental group (−2.29) was significantly greater than that in the control group (−0.33). Similarly, the effect of EMG-assisted biofeedback on the frontal muscle EMG was analyzed by repeated-measures

**Table 3 • Changes in Pain and EMG From Pretest to Posttest Measurements**

| | Group | | | | Repeated-Measures ANOVA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Experimental (n = 12) | | Control (n = 12) | | Group | | Time | | Interaction | |
| Variable | Pretest | Posttest | Pretest | Posttest | F | *P* | F | *P* | F | *P* |
| Pain | 4.21 (1.50) | 1.92 (1.60) | 3.27 (1.32) | 3.60 (1.38) | 0.51 | .485 | 12.69 | .002 | 22.80 | < .001 |
| EMG, mV | 4.50 (3.80) | 2.63 (2.42) | 4.66 (3.03) | 5.42 (3.26) | 0.832 | .372 | 2.08 | .163 | 6.26 | .021 |

EMG indicates electromyography; ANOVA, analysis of variance.
Values are expressed as mean (SD).

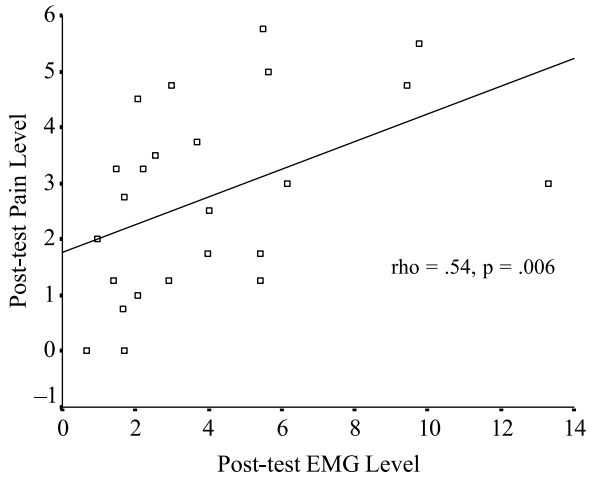



**Figure 2** ■ Bivariate correlation between the posttest pain and EMG level.

analysis of variance. Results showed a significant time-by-group interaction effect (F = 6.26, *P* = .021), suggesting that the change in the EMG level in the experimental group at the posttest measurements was significantly greater than that of the control group.

Correlational analyses revealed that pretest EMG and pain levels were not significantly correlated (ρ = 0.15, *P* = .49), whereas posttest EMG levels significantly correlated with posttest pain levels (ρ = 0.54, *P* = .006; Fig. 2). In addition, the pretest to posttest change in EMG levels significantly correlated to the change in pain levels (ρ = 0.47, *P* = .02, Fig. 3).

With regard to the percentage of training success, 8 participants (67%) from the experimental group met the predetermined EMG training criterion. A comparison of the characteristics of treatment succeeders and nonsucceeders was performed using the Mann-Whitney *U* test (Table 4). As seen in Table 4, participants who met the predetermined criterion have a significantly lower BSRS-5 score (mean rank = 4.88) than did those who did not (mean rank = 9.75).

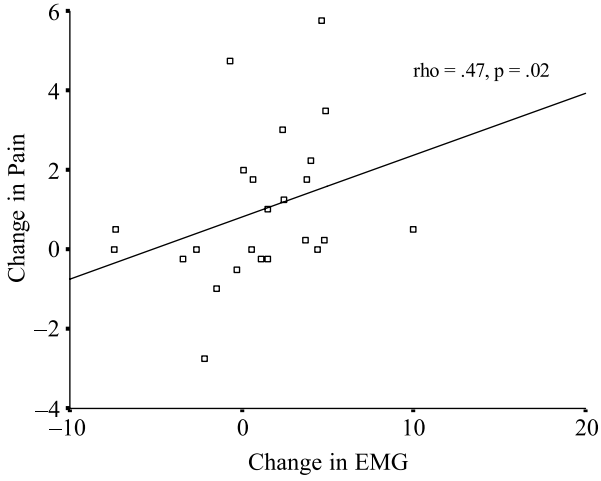



**Figure 3** ■ Correlation between the change in EMG and the change in pain from pretest to posttest.

## ■ Discussion

This study demonstrates the first evidence that relaxation-breathing training with visual and auditory EMG biofeedback signals is both feasible and effective in reducing cancer-related pain in advanced cancer patients. The efficacy was demonstrated by significantly larger reductions in pain intensity from baseline for the biofeedback group compared with the control group. In the present study, we showed that patients with advanced cancer were able to lower their pain intensity using EMG biofeedback–assisted relaxation techniques. We also demonstrated that EMG biofeedback–assisted relaxation significantly changes frontal muscle EMG levels in these patients. The reduction in EMG levels seems to suggest the supposed effectiveness of relaxation through muscular relaxation and, consequently, decreasing anxiety and physiological arousal. A significant correlation between the pretest to posttest changes in the EMG and pain levels further confirms this notion. Although this study did not assess the effect of relaxation-breathing training on anxiety, a recent study has demonstrated the efficacy of a relaxation-breathing exercise on anxiety and depression levels in leukemia patients who were undergoing stem-cell transplantation.[23] Thus, it is likely that EMG biofeedback–assisted relaxation reduces pain experienced by advanced cancer patients by breaking the pain-anxiety-muscle tension cycle.

Of special notice is that two thirds of the participants in the experimental group met the predetermined training criterion for EMG. This suggests that with adequate training, in this study, consisting of six 45-min sessions, most of the advanced cancer patients were able to obtain the skills necessary to induce the "relaxation response." Analyses of the baseline characteristics of those in the experimental group who completed the treatment showed that succeeders were relatively less psychologically distressed compared with nonsucceeders, as those who met the training criterion had a significantly lower BSRS-5 score than those who did not. The BSRS-5, a simple screening tool for identifying psychological morbidity, may be

**Table 4 • Comparison of Baseline Characteristics of Biofeedback Treatment Succeeders Versus Nonsucceeders**

| | Mean Rank | | | |
|---|---|---|---|---|
| Variable | Treatment Succeeders (n = 8) | Nonsucceeders (n = 4) | *z* | *P* |
| Age | 7.19 | 5.13 | −0.942 | .346 |
| Education | 6.06 | 7.38 | −0.608 | .543 |
| KPS | 6.75 | 6.00 | −0.358 | .721 |
| BSRS-5 | 4.88 | 9.75 | −2.216 | .027 |
| BPI-T | 5.31 | 8.88 | −1.631 | .103 |

KPS indicates Karnofsky Performance Scale; BSRS-5, Brief Symptom Rating Scale; BPI-T, Brief Pain Inventory-Taiwanese Version.

used to aid the selection of cancer patients who are most likely to benefit from EMG biofeedback–assisted relaxation. With careful patient selection, EMG biofeedback–assisted relaxation training may be used along with pain medication for effective pain management for patients with advanced cancer.

Learning biofeedback and relaxation skills is likely to enhance a sense of control and self-efficacy, which, in turn, may help individuals cope more effectively with chronic pain. Similar to other patients with chronic pain, cancer patients deal with overwhelming pain on a daily basis. Findings from a previous study suggested that cancer patients choose complementary and alternative medicine therapies supplementary to standard medical treatment as a way to empower themselves and to gain a sense of control.[24] A study assessing the effects of cognitive-behavioral treatment on pain in cancer patients also found that cognitive-behavioral treatment enhanced cancer patients' ability to decrease pain, but not pain intensity or pain distress.[25] We speculated that, similar to other complementary and alternative medicine or cognitive-behavioral treatment therapies, biofeedback-assisted relaxation may alleviate cancer patients' perceptions of pain by enhancing their self-efficacy and ability to cope with pain.

Several limitations existed in this study. First, although participants in both groups spent equal amounts of time each week with the nurse who performed the biofeedback training, it remains likely that the effect of personal attention given to the experimental group might favor the positive outcome. Second, there were slight age differences in both groups in that most participants in the experimental groups were younger than 50 years, whereas in the control group, most participants were older than 50 years. However, after a careful examination of the data, we found that neither the pretest to posttest decrease in pain (both in absolute value and in percentage change) nor the pretest to posttest change in EMG significantly correlated with age (data not shown). Third, the pain intensity varied slightly between groups, and more than 50% of the participants in the control group had mild pain. However, neither the percentage decrease in pain nor the decrease in EMG from pretest to posttest significantly correlated with the baseline pain intensity. Fourth, it should be acknowledged that this study used only 1 efficacy indicator. Thus, the differential effects of the study intervention on multiple dimensions of pain cannot be elucidated in this study. Finally, the cost of the biofeedback-assisted relaxation training program was not estimated, and the long-term effects were not determined in this study. Future studies need to investigate the cost effectiveness of a biofeedback-assisted relaxation program for pain relief in patients with advanced cancer and to study its long-term effects and the possibility of the transfer of the techniques outside the hospital setting.

Although the present study is limited by its small sample size, it demonstrates the potential usefulness of an EMG biofeedback–assisted relaxation training program in the management of pain in a population with advanced cancer. Future studies need to continue examining mechanisms underlying the efficacy of relaxation training for cancer-related pain.

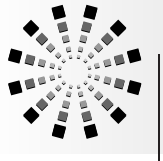
## ■ Conclusions

Electromyography biofeedback–assisted relaxation training successfully reduces pain of advanced cancer patients possibly through a mechanism of attenuation of physiological arousal. With adequate training, most patients are able to learn the skills necessary to induce the "relaxation response." This is particularly true for those who are not in a state of profound psychological distress. Therefore, in combination with pharmacological treatment, EMG biofeedback–assisted relaxation training has a great potential to improve the quality of pain management of patients with advanced cancer in palliative care unit.

## References


1. Caraceni A, Portenoy RK. An international survey of cancer pain characteristics and syndromes. IASP Task Force on Cancer Pain. International Association for the Study of Pain. *Pain*. 1999;82:263–274.
2. Goudas LC, Bloch R, Gialeli-Goudas M, Lau J, Carr DB. The epidemiology of cancer pain. *Cancer Invest*. 2005;23:182–190.
3. Patrick DL, Ferketich SL, Frame PS, et al. National Institutes of Health State-of-the-Science Conference statement: symptom management in cancer: pain, depression, and fatigue, July 15-17, 2002. *J Natl Cancer Inst*. 2003;95:1110–1117.
4. Chiu TY, Hu WY, Chen CY. Prevalence and severity of symptoms in terminal cancer patients: a study in Taiwan. *Support Care Cancer*. 2000; 8:311–333.
5. Deng G, Cassileth BR. Integrative oncology: complementary therapies for pain, anxiety, and mood disturbance. *CA Cancer J Clin*. 2005;55: 109–116.
6. National Comprehensive Cancer Network. Adult cancer pain (Version 2. 2005). NCCN clinical practice guidelines in oncology—v.2.2005. Available at: http://www.nccn.org/professionals/physician_gls/PDF/pain.pdf. Accessed July 1, 2005.
7. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. *JAMA*. 1998;280:1569–1575.
8. Tindle HA, Davis RB, Phillips RS, Eisenberg DM. Trends in use of complementary and alternative medicine by US adults: 1997-2002. *Altern Ther Health Med*. 2005;11:42–49.
9. Yates JS, Mustian KM, Morrow GR, et al. Prevalence of complementary and alternative medicine use in cancer patients during treatment. *Support Care Cancer*. 2005;13:806–811.
10. Esch T, Fricchione GL, Stefano GB. The therapeutic use of the relaxation response in stress-related diseases. *Med Sci Monit*. 2003;9: RA23–RA34.
11. Wallace KG. Analysis of recent literature concerning relaxation and imagery interventions for cancer pain. *Cancer Nurs*. 1997;20:79–87.
12. Carroll D, Seers K. Relaxation for the relief of chronic pain: a systematic review. *J Adv Nurs*. 1998;27:476–487.
13. Luebbert K, Dahme B, Hasenbring M. The effectiveness of relaxation training in reducing treatment-related symptoms and improving emotional adjustment in acute non-surgical cancer treatment: a meta-analytical review. *Psychooncology*. 2001;10:490–502.
14. Schwartz MS, Andrasik F. *Biofeedback—A Practitioner's Guide*. 3rd ed. New York, NY: The Guilford Press; 2003.
15. Cacioppo JT, Tassinary LG, Bernston GG. *Handbook of Psychophysiology*. 2nd ed. New York, NY: Cambridge University Press; 2000.
16. Lee MB, Liao SC, Lee YJ, et al. Development and verification of validity and reliability of a short screening instrument to identify psychiatric morbidity. *J Formos Med Assoc*. 2003;102:687–694.
17. Schag CC, Heinrich RL, Ganz PA. Karnofsky Performance Status revisited: reliability, validity, and guidelines. *J Clin Oncol*. 1984;2: 187–193.

18. Yates JW, Chalmer B, McKegney FP. Evaluation of patients with advanced cancer using the Karnofsky performance status. *Cancer*. 1980; 45:2220–2224.
19. Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. *Ann Acad Med Singapore*. 1994;23:129–138.
20. Dworkin RH, Turk DC, Farrar JT, et al. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. *Pain*. 2005;113:9–19.
21. Ger LP, Ho ST, Sun WZ, Wang MS, Cleeland CS. Validation of the Brief Pain Inventory in a Taiwanese population. *J Pain Symptom Manage*. 1999;18:316–322.
22. Lin CC, Lai YL, Ward SE. Effect of cancer pain on performance status, mood states, and level of hope among Taiwanese cancer patients. *J Pain Symptom Manage*. 2003;25:29–37.
23. Kim SD, Kim HS. Effects of a relaxation breathing exercise on anxiety, depression, and leukocyte in hemopoietic stem cell transplantation patients. *Cancer Nurs*. 2005;28:79–83.
24. Sollner W, Maislinger S, DeVries A, Steixner E, Rumpold G, Lukas P. Use of complementary and alternative medicine by cancer patients is not associated with perceived distress or poor compliance with standard treatment but with active coping behavior: a survey. *Cancer*. 2000; 89:873–880.
25. Arathuzik D. Effects of cognitive-behavioral strategies on pain in cancer patients. *Cancer Nurs*. 1994;17:207–214.



# MEDIA NEWS

Reviews of selected media are presented in this feature. Nurses, other health professionals, and publishers are invited to submit books, videotapes, CD-ROMs, and other related oncology education materials to: Carol Reed Ash, Editor, *Cancer Nursing*, J. Hillis Miller Health Center, PO Box 100187, University of Florida, Gainesville, FL 32610. Selections of items for review will be based on their relevance to cancer care and the availability of space.

REVIEWERS WANTED FOR MEDIA REVIEWS. Cancer nurses interested in reviewing material for publication in the "Media News" feature should submit a letter and a short biographical sketch to the Editor at the address listed above.

## Books Received

### AMA Manual of Style: A Guide for Authors and Editors, 10th Edition

*Cheryl Iverson, MA, Chair, Stacy Christiansen, MA, Annette Flanagin, RN, MA, Phil B. Fontanarosa, MD, MBA, Richard M. Glass, MD, Brenda Gregoline, ELS, Stephen J. Lurie, MD, PhD, Harriet S. Meyer, MD, Margaret A. Winker, MD, Roxanne K. Young, ELS, R. Bruce McGregor, MLS, and Jennifer Reiling*

JAMA and Archives Journal, American Medical Association
Oxford University Press
New York, NY; 2007
www.oup.com
Hardback: 1010 pps.; ISBN: 978-0-19-517633-9

### Pivotal Moments in Nursing: Leaders Who Changed the Path of a Profession, Volume II

*Beth Houser and Kathy Player*

Sigma Theta Tau International Honor Society of Nursing, 2007
www.nursingknowledge.org/STTI/books
Paperback: 443 pps.; ISBN: 1-930538-19-7

### Talking With My Treehouse Friends About Cancer

*Peter R. van Dernoot*

Fulcrum Publishing, 2007
www.fulcrumbooks.com
Paperback: 24 pps.; English ISBN: 13:978-1-55591-630-5; Spanish ISBN: 13:978-1-55591-648-0

### Site-Specific Cancer Series: Breast Cancer

*Suzanne M. Mahon, RN, DNSc, AOCN, APNG, Editor*

Oncology Nursing Society, 2007
www.ons.org
Paperback: 192 pps.; ISBN: 978-1-890504-65-6