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# Acupuncture as a Treatment Modality for the Management of Cancer Pain: The State of the Science

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Cancer pain can result from the direct effects of disease as well as a consequence of cancer treatment. Levy, Chwistek, and Mehta (2008) described the complex nature of pain in cancer, noting that “chronic pain is a frequent complication of cancer and its treatments and is often under reported, under diagnosed and under treated” (p. 401). Pain may be caused by the cancer itself or as a result of treatment, such as chemotherapy-induced peripheral neuropathy. In seeking effective pain management modalities, acupuncture must be explored as an option to determine its effectiveness and to assess whether medical professionals should recommend this treatment for patients with cancer. As patients seek knowledge about the management of their disease, many look toward complementary medicine for symptom management (Bardia, Barton, Prokop, Bauer, & Moynihan, 2006) and nurses must be broadly informed about all modes of effective pain management.

The establishment of acupuncture as a treatment modality dates back more than 3,000 years to its origins in China and is a primary constituent of traditional Chinese medicine that only began to enter the mainstream realm of Western medicine in the 1970s. Acupuncture involves insertion of sterile needles along established meridians in the body to allow flow of energy, known as qi, to create balance between yin and yang. Although this differs significantly from the way health is viewed in Western medicine, in traditional Chinese medicine, regulation of spiritual, emotional, mental, and physical health are affected by this vital energy (National Center for Complementary and Alternative Medicine [NCCAM], 2009).

Western healthcare providers lack understanding about acupuncture's place in cancer pain management, primarily from a lack of research evidence regarding its efficacy and safety in treating cancer-related pain (Lu, Dean-Clower, Doherty-Gilman, & Rosenthal, 2008).

The biologic mechanism by which acupuncture influences pain has been illustrated in mice models (Lee

**Purpose/Objectives:** To explore the current state of the science regarding acupuncture as a treatment modality for cancer pain.

**Data Sources:** PubMed and CINAHL® databases were searched, as were Web sites from the National Cancer Institute, the National Institute of Health's Complementary and Alternative Medicine Program, and the American Cancer Society.

**Data Synthesis:** This article synthesizes nine years of published research on the use of acupuncture as an adjunct treatment for the management of cancer pain.

**Conclusions:** Findings suggest a lack of level I evidence regarding the use of acupuncture as a cancer pain treatment modality. The majority of evidence is level III or higher; therefore, causality cannot be inferred.

**Implications for Nursing:** Future research should focus on level I and level II evidence, controlling for variables to strengthen validity, and addressing sample size to enhance the generalizability of results. Nurses should be knowledgeable about the state of the science evidence available to assist patients in making educated decisions.

et al., 2009). Mice were inoculated with sarcoma cells around the sciatic nerve to generate a neuropathic pain. Magnetic resonance imaging confirmed that cancer cells were present. A control group did not receive electro-acupuncture (acupuncture with the proximal end of the needle connected to an electric stimulator), whereas the experimental group was treated with electro-acupuncture daily for nine days at 30-minute intervals. Levels of substance P (a neurotransmitter associated with inflammation and pain) were found to be decreased in the group treated with electro-acupuncture. Beta-endorphin levels, endogenous opioids, and naturally occurring pain relievers were increased in mice that were treated with electro-acupuncture when compared with the control group.

Acupuncture's contribution to pain management has generally been studied as a complementary rather than alternative treatment for cancer pain. In an article

describing the therapies that serve to accompany traditional therapies for cancer pain, Cassileth, Trevisan, and Gubili (2007) explained that “integrative medicine is the combination of evidence-based complementary therapies and mainstream patient care” (p. 265). Complementary therapies, such as acupuncture, can be incorporated as an adjunct to pain management by enhancing or decreasing the need for pharmacologic management (Cassileth et al., 2007).

The purpose of this article is to amalgamate relevant research published from 2000–2009 pertaining to the treatment of cancer pain, specifically the use of acupuncture as a complementary modality.

## Literature Review

A search was performed using PubMed and CINAHL®. Web sites from the National Cancer Institute (www.cancer.gov), the National Institute of Health’s Complementary and Alternative Medicine program (http://nccam.nih.gov), and the American Cancer Society (www.cancer.org) also were searched for appropriate background information, guidelines, and research updates. Historical searches also were performed from article references. PubMed terms and free text words included *acupuncture for cancer pain* and *cancer pain management acupuncture*. Search limits included human subjects and articles in English. A search for randomized, controlled trials (RCTs) also was performed. For purposes of background, articles also were included if they described cancer pain, the use of acupuncture for pain or for cancer pain, and attitudes associated with acupuncture or complementary and alternative medicine.

Ninety-five articles were identified when using the search terms *cancer pain management acupuncture*. Sixteen RCTs in English were found; however, only three met the inclusion criteria of studies that focused on cancer pain and acupuncture. Studies that focused on postoperative pain were excluded. Using an additional search term, a total of 130 articles were identified when searching for *acupuncture for cancer pain*. Four focused on acupuncture for general cancer pain. Exclusion criteria included studies that combined acupuncture with other modalities, such as massage. Searching reference lists of these eight articles resulted in the inclusion of four additional articles.

Level I studies, which provide the strongest level of evidence, included three RCTs studying acupuncture in cancer pain dated in 2003, 1998, and 1986, all of which were included despite initial time limits placed on this review because of the paucity of RCTs involving acupuncture for cancer pain. An additional pilot RCT dated in 2007 was included. A meta-analysis of RCTs also was included. Two level III studies, which are nonexperimental in nature, were included, one of which was a nested case-control study and the other a prospective

cohort study. Four level V studies, which are expert opinion based on experiential evidence, were included for a total of 11 articles included in this review.

## State of the Science

### Summary of Evidence

Three RCTs assessed the use of acupuncture for the management of cancer pain (Alimi et al., 2003; Dang & Yang, 1998; Xia, Zhang, & Yang, 1986). In addition, a pilot study involving electro-acupuncture versus placebo for cancer pain was included (Minton & Higginson, 2007). A level I study also was included, a meta-analysis of RCTs (Bardia et al., 2006) that described the studies by Dang and Yang (1998) and Xia et al. (1986).

Two level III studies were included: one nested case-control (Wells et al., 2007) and one prospective cohort study (Wong & Sagar, 2006). The remaining four level V studies are expert reviews offering perspectives on the use of acupuncture for cancer pain.

### Level I Evidence: Randomized, Controlled Trials

Alimi et al. (2003) is one of the few RCTs related to the management of cancer pain. The authors randomized patients treated at a pain clinic for chronic peripheral or central neuropathic pain that began after a cancer treatment. Ninety patients were randomized to receive auricular acupuncture. Of this group, patients were further divided into receipt of true auricular acupuncture ( $n = 29$ ), placebo auricular acupuncture ( $n = 30$ ), and placebo auricular seeds ( $n = 31$ ). Three patients withdrew from the study before day 30, five patients refused the second acupuncture treatment because of increased pain (including one who received true acupuncture), and three patients changed analgesics before their second treatment, which was contrary to protocol, causing them to be excluded from the study. Attrition resulted in 79 patients who completed the study ( $\bar{X}$  age = 57 years).

Pain measurements with a visual analog scale were performed at baseline and at days 30 and 60. Analysis of covariance compared pain intensity at days 30 and 60 with pain intensity at baseline among the three groups. Patients in the true acupuncture group had lower pain scores at both day 30 ( $p = 0.02$ ) and day 60 ( $p < 0.001$ ) than both of the placebo groups. No adverse outcomes were reported. Because both placebo groups demonstrated a lack of effect while those enrolled in the true acupuncture group had pain relief, the authors concluded that true acupuncture was beneficial for decreasing levels of cancer pain.

In analyzing the strengths and weaknesses of Alimi et al. (2003), of note is that the acupuncturist was not blinded to the treatment; however, the clinician evaluating

the patient was unaware of the treatment received. The acupuncturist administering treatment in the study was the same throughout, reducing variability in the treatment administration, but this also may limit external validity with replication of the study. Because most of the patients were older French women who had been treated for breast cancer, the generalizability of this study is limited.

Minton and Higginson (2007) conducted a pilot study that included patients with neuropathic cancer pain. This was a single-blind, randomized, placebo-controlled

Complementary therapies, such as acupuncture, can be incorporated as an adjunct to pain management by enhancing or decreasing the need for pharmacologics.

crossover of electro-acupuncture versus placebo acupuncture, defined by acupuncture points. Patients in the treatment group received treatments of electro-acupuncture weekly for 30 minutes over four weeks, followed by four weeks of no electro-acupuncture, and then resumed six weeks of electro-acupuncture treatment. The outcome measures were pain levels at baseline, three weeks, and then six weeks. Results of the study revealed a decrease in reported pain in patients who received acupuncture ( $n = 3$ ) and a small decrease in reported pain from the patients who received placebo ( $n = 4$ ). Independent  $t$  tests revealed a  $p$  value of 0.05; however, results were limited by the small sample size and a high attrition rate. The authors did not mention the number of patients who were included in the outset of their study.

**Meta-analysis of a randomized, controlled trial:** In a meta-analysis by Bardia et al. (2006), three studies addressed the use of acupuncture. In addition to the study by Alimi et al. (2003), an RCT by Dang and Yang (1998) explored the use of acupuncture in three groups of patients with stomach carcinoma pain ( $N = 48$ ). One group received true acupuncture, one received sham acupuncture, and the third group was the control. The duration of treatment was two months. Findings concluded that the administration of true acupuncture resulted in decreased pain when compared to the sham acupuncture and the control group ( $p < 0.05$ ). However, no long-term difference in pain improvement was noted among groups.

A third study (Xia et al., 1986) compared acupuncture and conventional cancer treatment (chemotherapy or radiation) in 76 patients. Although the authors reported that pain relief occurred in the acupuncture group, they do not provide the statistical analysis or significance level. In addition, the duration of treatment was only 15 days and pain was reported verbally rather than with the use of a pain scale. Bardia et al. (2006) described the three

studies as being of poor quality, having small sample sizes, and not thoroughly reporting statistical data.

### Level III Evidence: Prospective Cohort

In a pilot prospective case comparison study (Wong & Sagar, 2006), five female patients, aged 60–71 years, diagnosed with gynecologic cancers received acupuncture for chemotherapy-induced peripheral neuropathy. Each received acupuncture once a week for six weeks followed by a four-week rest and another six weeks of treatment. One patient dropped out of the study after seven treatments, reporting social reasons. After both courses of acupuncture therapy, all five patients (including the one who dropped out early) reported decreased pain and a reduction in analgesic dosage (Wong & Sagar, 2006). After six months, four patients reported continued improvement in pain control. The one patient who did not report an ongoing reduction in pain control at the six month follow-up had a medical history complicated by diabetes that may have affected the ability to adequately control her peripheral neuropathy pain. Limitations included a small sample size ( $N = 5$ ) and the sample characteristics (older women with cancers more commonly found in women). The low statistical power of this study and the lack of attempts to control for confounding variables affected the external validity.

### Level III Evidence: Nested Case Control

Wells et al. (2007) studied the use of complementary and alternative medicine therapies to control diverse symptoms, including pain, in women living with lung cancer. This study explored the differences in patient characteristics among those who chose to augment their medical care with complementary and alternative medicine. Although the sample size was relatively large ( $N = 189$ ) and included women of many races and ages, only 4% ( $n = 3$ ) reported choosing acupuncture specifically for pain management, making it, along with massage, one of the least used complementary medicine therapies in the studied population. This sample size resulted in low statistical power which is, subsequently, a threat to its validity. In addition, this study's population specifically included only women with non-small cell lung cancer, thereby limiting the generalizability of the study. The study specifically focused on understanding the differences of patients who chose complementary and alternative therapies for symptom relief and reported increased frequency of CAM use in those with greater symptom burden.

### Level V Evidence: Expert Opinion

Level V evidence includes expert opinion based on experiential evidence and literature. Konkimalla and Efferth (2007) explained that, in acupuncture, treatment is individualized. The authors suggested a



possible explanation for the lack of clinical trials in acupuncture, noting that, in traditional Chinese medicine, “patient treatment commences without any experimental phase in the laboratory. The Western concept of ‘from the bench to the bedside’ does not fit into clinical practice of traditional Chinese medicine. Nevertheless, a number of clinical studies were conducted during the past years on traditional Chinese medicine to gain credibility and reputation outside China” (p. 207).

Konkimalla and Efferth (2007) mentioned in their article a systematic review that included the evaluation of the value of acupuncture for pain during cancer treatment. The review, by Pan, Morrison, Ness, Fugh-Berman, and Leipzig (2000), concluded that acupuncture demonstrates effectiveness for pain management in patients with cancer and cites two uncontrolled studies in their analysis. The first is by Xu, Liu, and Li (1995), in which 92 patients with abdominal pain were treated with acupuncture daily for a period of one to two weeks, resulting in pain control for at least one month. A limitation of this study was that it lacked randomization. The second study, by Filshie and Redman (1985), treated 183 patients in a cancer pain clinic with acupuncture. Seventy patients reported pain relief. This study also was not randomized, but rather is a case control analytic study.

**Benefits of the addition of acupuncture for cancer pain management must be supported by evidence of safety and effectiveness from evidence-based studies.**

Mansky and Wallerstedt (2006) explored the rationale that patients use to bring complementary and alternative medicine into cancer management, emphasizing that its use is not often for cure, but rather for symptom management. The authors described clinical trials supporting the use of acupuncture for chemotherapy-induced nausea and stated that clinical trials are needed for acupuncture and cancer pain management. The authors caution that acupuncture should not be a method of choice for patients with thrombocytopenia or bleeding disorders.

Cassileth et al. (2007) reviewed complementary therapies for cancer pain and concluded that “complementary therapies can be added to the current standard of care at all stages of disease progression and modified according to the needs of the patient. The addition of these interventions as adjuncts to standard care can produce outcomes that are superior to either alone” (p. 266). The authors described analgesic effects of acupuncture and its role in the release of endogenous opioids, catecholamine, and serotonin. They cited a randomized, placebo-controlled study by Carlsson and Sjolund (2001) in which patients ( $N = 50$ ) with a history of chronic low back pain were given acupuncture treatments weekly for eight weeks. A decrease in pain was

reported at one month for 16 of the 34 patients treated with acupuncture ( $p < 0.05$ ), and at the six-month follow-up for 14 of the 34 patients treated with acupuncture ( $p < 0.05$ ). Cassileth et al. (2007) emphasized the need for research related to acupuncture and cancer pain with attention to the biologic effects as they attempted to propose that if acupuncture has proven to be effective for pain management in conditions such as back pain, perhaps acupuncture’s analgesic effects would be effective as an adjunct to cancer pain management.

Lu et al. (2008) suggested that “to integrate acupuncture into conventional medical practice successfully, it is critical to develop scientific, evidence-based knowledge of acupuncture through basic and clinical research” (p. 632). The authors’ analysis of acupuncture in the management of cancer pain emphasized the need for additional research, citing the existing evidence and RCTs regarding acupuncture’s effectiveness for the treatment of chemotherapy-induced nausea, depression, anxiety, hot flashes, fatigue, neuropathy, insomnia, and dyspnea. Barriers to future research included “a lack of familiarity with acupuncture technique and the assumption that an acupuncture clinical trial is exactly the same as a pharmaceutical trial potentially may lead to inaccurate results. Choosing the appropriate control for acupuncture clinical trials is a challenging task” (p. 641). To ensure success of future clinical trials, the authors emphasized decreasing variations during the administration of acupuncture by standardizing (and providing instruction for standardization) for each acupuncture treatment for cancer pain.

## Summary

The use of acupuncture as a complementary treatment for the management of cancer pain may have the potential to improve the quality of life of patients with cancer. Benefits of the addition of acupuncture for cancer pain management must be supported by evidence of safety and effectiveness from evidence-based studies. A synthesis of the current evidence reveals a lack of level I and II studies pertaining to acupuncture as an intervention for the management of cancer pain. The nonexperimental studies cannot adequately infer causality. Although a few preclinical studies are available, they lack sufficient evidence for generalizability across diverse patient samples and cancer diagnoses. Additional studies analyzing the use of acupuncture in a more heterogeneous population with diverse types of cancer pain are needed.

## Implications for Nursing Research

Pain management is integral to quality of life in the care of patients with cancer. Nurses intervene by not only assessing the pain of the patient with cancer but also by educating the patient regarding the most

effective treatment modalities. Knowledge about the benefits and limitations of complementary treatment modalities, such as acupuncture, are essential for the nurse as a patient advocate and educator.

RCTs are needed to demonstrate the benefit of acupuncture for cancer pain management. To address the shortcomings of existing research, future studies should include diverse populations and cancer diagnoses, an adequate sample size, plans for appropriate power, reduction of bias by concealing treatment assignment, and application of standardized modes of acupuncture. Nurses can be involved not only as primary researchers in RCTs, but also as researchers in gathering qualitative evidence regarding experiences with and views on acupuncture and its role in cancer pain management. Complementary and alternative medicine providers often are seen as separate from the traditional cancer treatment patient care team; however, by bridging this gap, nurses can allow for an increase in the study of acupuncture in cancer pain management. In addition, until it is clear that acupuncture can be effective for cancer-related pain management, the procedure is unlikely to become an insurance-covered benefit or a recommended intervention.

Finally, guidelines for acupuncture in cancer pain management are needed, possibly from NCCAM, to standardize use because various healthcare professionals, once trained, may be recommending or administering acupuncture. Licensure and credentialing of acupuncture practitioners currently is done through

the National Certification Commission for Acupuncture and Oriental Medicine. Although acupuncture is not included in the scope of practice for nurses, those interested in obtaining a certification can do so through a three-year program of study in acupuncture and traditional Chinese medicine. Physicians are eligible to administer acupuncture after a 300-hour course and subsequent examination through the American Board of Medical Acupuncture. Implications for nurses include the practice of acupuncture, with appropriate education; patient referral of acupuncture, once its efficacy has been supported for cancer pain management; and garnering information from patients about their use of acupuncture, as well as the development of guidelines for its use in the management of cancer pain.

*The author gratefully acknowledges Sharon Olsen, PhD, RN, AOCN®, the CNS track coordinator in the School of Nursing at Johns Hopkins University in Baltimore, MD, for her mentorship and manuscript review.*

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Digital Object Identifier: 10.1188/10.ONF.E344-E348

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