Published in final edited form as:

Curr Pain Headache Rep. 2013 March ; 17(3): 321. doi:10.1007/s11916-013-0321-3.

Acupuncture for Cancer Pain and Related Symptoms

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Abstract

Cancer pain is one of most prevalent symptoms in patients with cancer. Acupuncture and related techniques have been suggested for the management of cancer pain. The National Comprehensive Cancer Network (NCCN®) guidelines for adult cancer pain recommends acupuncture, as one of integrative interventions, in conjunction with pharmacologic intervention as needed. This review presents the latest available evidence regarding the use of acupuncture for cancer pain. It also provides “actionable” acupuncture protocols for specific cancer pain conditions and related symptoms in order to provide more clinically relevant solutions for clinicians and cancer patients with pain. These conditions include postoperative cancer pain, postoperative nausea and vomiting, postsurgical gastroparesis syndrome, opioid-induced constipation, opioid-induced pruritus, chemotherapy-induced neuropathy, aromatase inhibitor-associated joint pain, and neck dissection-related pain and dysfunction.

Keywords

Cancer Pain; Acupuncture; Oncology Acupuncture; Electroacupuncture; Clinical Trials; Evidence; Clinical Practice; Acupuncture Protocol; Postoperative Cancer Pain; Postoperative Nausea and Vomiting; Postsurgical Gastroparesis Syndrome; Opioid-Induced Constipation; Opioid-Induced Pruritus; Chemotherapy-Induced Neuropathy; Aromatase Inhibitor-Associated Joint Pain; Neck Dissection-Related Pain

Introduction

Pain is a subjective, but a universal experience of every individual. The International Association for the Study of Pain (IASP) defines pain as: “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” [1]. Pain is always subjective. Therefore, it is also an emotional experience. Approximately 100 million adults in the US suffer from various chronic pain conditions, more than the number affected by heart disease, diabetes and cancer combined.

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Disclosure

No conflicts of interest relevant to this article were reported.

Cancer pain is one of most common but often undertreated symptoms among cancer patients. It is estimated that up to 40–85% of cancer patients suffer from pain [2, 3]. Cancer pain can occur throughout different stages of the cancer journey: 25% in newly diagnosed patients, 33% in patients during the anticancer treatment and up to 75% in patients with advanced stage of cancers [3]. Even among cancer survivors, persons whom have lived more than 2 years from diagnosis, 20% of them have current cancer-related chronic pain and 44% have experienced pain since their diagnosis. Those patients suffer substantial impairment in quality-of-life (QOL) [4]. In addition, a recent study reported 67% of cancer patients having pain or requiring analgesics [5], and 33% of them were receiving inadequate analgesic medications. Compared to Cleeland's landmark study published in 1994, in which 42% of cancer patients with pain were inadequately treated with pain medications [6], the situation improved very little. It has been suggested that patients' concerns about opioid addition and adverse effects, along with other factors such as communication styles, beliefs about the value of stoicism, are barriers for such results [2, 7].

Pathophysiologically, chronic cancer pain is caused by two major factors. One is related to tumors themselves and the second is related to various anticancer treatments, such as surgery, chemotherapy and radiation therapy. Tumor growth and compression-related pain count for 75% of cancer pain and treatment-induced pain counts for about 25% of cancer pain. These pains can be further divided into nociceptive, ongoing tissue injury, or neuropathic if sustained by damage or dysfunction of the nerves [8]. In addition, pain also has psychological and social aspects; therefore, an ideal treatment of pain needs to focus on these three aspects as well.

Acupuncture is an ancient Chinese medical technique, in which fine stainless steel needles are inserted into certain anatomical locations of the body surface to elicit neurohormonal responses of the body system via nerve stimulation. Hand manipulation and/or electrostimulation are often applied during the procedure in order to enhance its effectiveness. The majority of patients who seek acupuncture are for pain-related conditions. In the past 12 years, Integrative Oncology, a branch of integrative medicine, has attempted to combine complementary therapies including acupuncture into conventional mainstream oncology care [9–13]. Clinical trial-generated evidence has been shown that acupuncture is safe and effective as adjunctive treatment for managing cancer-related symptoms [14–16]. However, despite of thousands of years practice outside of conventional medical system, applying acupuncture as an adjunctive therapy in a mainstream oncology setting is a completely new challenge. Oncology acupuncture, a new breed of acupuncture, requires continuously generating, reviewing and disseminating reliable evidence to support its clinical use [17].

The purpose of this paper is twofold: first of all, we would like to review the latest available evidence regarding the use of acupuncture for cancer pain; second, we also synthesize several “actionable” acupuncture protocols for some specific cancer pain conditions and related symptoms in order to provide more direct and clinically relevant solutions for clinicians and cancer patients with pain.

Evidence and clinical applications of acupuncture for cancer pain and related symptoms

Based on The National Health Interview Survey (NHIS) 2007, in the US population, ever acupuncture users has increased from 4.2% to 6.3% of the population, representing 8.19 million and the 14.01 million users in 2002 and 2007, respectively [18]. Despite the abundance of animal studies published in past 30 years which have strongly suggested the existence of acupuncture analgesia [19–24], clinical evidence from many randomized controlled trials (RCT) in non-cancer populations, specifically efficacy trials, have not been able to demonstrate the superiority of true acupuncture intervention over sham acupuncture [25] [26]. Acupuncture analgesia has been largely suggested as a type of placebo effect which remains an intense discussion among clinicians and researchers [27–29].

Nevertheless, several large randomized controlled clinical trials of acupuncture conducted in Western countries strongly suggest that pragmatic evidence of acupuncture for chronic pain is very effective to alleviate some common pain conditions such as chronic shoulder pain, and chronic low back pain [30–32]. For chronic low back pain, the German trials recruited 1,162 patients with chronic pain into three treatment arms: true acupuncture, sham acupuncture and usual care [31]. The US trial recruited 640 patients into four similar treatment arms: standardized true acupuncture, individualized true acupuncture, toothpick-simulated acupuncture and usual care [32]. The treatment period was 10 sessions over five weeks in the German trial and 10 sessions over seven weeks in the US trial. At end of the studies, the true acupuncture arm was twice as effective as optimal usual care: 47.6% versus 27.4% in the German trial and 60% versus 39% in the US trial, with $P < 0.001$ and $P < 0.001$ respectively. However, both trials failed to demonstrate a significant specific effect of true acupuncture over sham/simulated acupuncture.

A recently published meta-analysis study investigated the effect size of acupuncture for 4 chronic pain conditions including back and neck pain, osteoarthritis, chronic headache and shoulder pain [33]. The unique feature of the study is that the authors used individual patient data gathered from 29 high quality, large acupuncture RCTs, including the abovementioned German and US trials. Meta-analysis based upon individual patient data is considered superior to regular meta-analysis that uses summary data because of its enhanced data quality and increased precision. A total of 17,920 patients were included in the study. The results indicated that acupuncture was superior to both the sham and the no-acupuncture control for each pain condition ($P < 0.001$). The specific effect sizes of true acupuncture was 0.23 (95% CI, 0.13–0.33), 0.16 (95% CI, 0.07 – 0.25), 0.15 (95% CI, 0.07 – 0.24) SDs lower than sham controls for back and neck pain, osteoarthritis and chronic headache respectively, strongly suggesting that acupuncture is more than a placebo. The author argued that acupuncture is effective for the treatment of chronic pain and therefore a reasonable referral option.

Randomized clinical trials, specifically examining the effectiveness of acupuncture for cancer-related pain, have also demonstrated the promise of acupuncture to be used to for the cancer population. At least two systematic reviews have been published in recent years [34, 35]. One Cochrane systematic review attempted to investigate the effectiveness of

acupuncture RCTs for cancer pain in adults [34]. The authors were only able to identify three RCTs, with 204 patients in total. Of the three trials, only one was judged as high quality [36]. The authors concluded that there was insufficient evidence to judge whether or not acupuncture is effective in treating cancer pain in adults. Another systematic review searched 14 databases containing RCTs of acupuncture treating cancer pain. Fifteen trials including 1,157 patients were identified. Although the methodological quality of these trials was mostly poor, further analysis suggested a better pain control in the cancer population when acupuncture was combined with an analgesic drug therapy versus an analgesic drug therapy alone. In other words, acupuncture plus analgesic drug therapy demonstrated a significant difference in favor of the combination therapy versus analgesic drug therapy alone ($n = 437$, RR, 1.36; 95% CI: 1.13 to 1.64; $P = 0.003$), suggesting the optimal use of acupuncture for cancer pain control is to combine with existing analgesic drug therapy to achieve a meaningful and clinically relevant outcome.

Clinically, the role of acupuncture applying to cancer pain management is twofold: one is to use acupuncture, along with opioids, to alleviate specific cancer pain conditions; the second is to use acupuncture to minimize opioid-related side effects including opioid-induced constipation, pruritus, and nausea/vomiting. Longitudinally, acupuncture could be applied at different stages of cancer treatment, from postoperative pain, chemotherapy-induced neuropathy, to chronic post treatment neck pain. When the pain intensity is severe, >7 out of 10 on the pain scale, a better outcome may be achieved if a combination of acupuncture and opioids are used. For mild pain, 0–3 out of 10 on the pain scale, acupuncture alone may be sufficient to achieve a satisfactory result. For moderate pain (4–6 out of 10), either the combination or individual application could be employed pending clinical judgment of clinicians and patient preferences. The National Comprehensive Cancer Network (NCCN®) guidelines for adult cancer pain recommends the use of acupuncture, as part of integrative interventions, in conjunction with pharmacologic intervention as needed [37]. The NCCN guidelines consider these integrative interventions may be especially important in vulnerable populations, e.g., frail, elderly or pediatric patients, in whom standard pharmacological interventions may be less tolerated. Acupuncture is one of the treatment options for cancer pain. Clinical trials of acupuncture for cancer pain use various acupuncture-related techniques. Those techniques and protocols may be selected in oncologic practice for different clinical conditions and patient populations. The commonly used acupuncture-related techniques and their clinical features are listed and compared (Table 1). The specific indications, techniques, and protocols are summarized (Table 2), along with related clinical trials and systematic reviews as follows:

Acupuncture for postoperative pain in cancer patients

Acupuncture may reduce postoperative opioid consumption and reduce opioid-related side effects [38]. A systematic review reported that during various surgeries, mainly abdominal surgeries, analgesic consumption was significantly lower in the acupuncture group compared with the sham placebo group. The morphine-sparing effect was 21% at 8 h, 23% at 24 h, and 29% at 72 h post-operation, respectively [38]. The acupuncture treatment group was associated with a lower incidence of opioid-related side-effects such as nausea (RR: 0.67; 95% CI: 0.53, 0.86), dizziness (RR: 0.65; 95% CI: 0.52, 0.81), sedation (RR: 0.78,

95% CI: 0.61, 0.99), pruritus (RR: 0.75; 95% CI: 0.59, 0.96), and urinary retention (RR: 0.29; 95% CI: 0.12, 0.74).

A RCT (n = 138) was conducted to assess the effect of a massage and acupuncture combination versus usual care on postoperative cancer pain in patients [39], who were undergoing cancer related surgeries including mastectomy, reconstructive surgery for breast cancer, abdominal surgery for intestinal and hepatic malignancies, pelvic surgery for ovary cancer, and urological surgery for testicular, prostate, bladder cancers, as well as head and neck cancer surgery. Acupuncture was provided along with massage at day 1 and day 2 post operatively. The average pain score improved from day 1 baseline to day 3 in the intervention group by 1.6 versus 0.6 in the control group ($P = 0.04$). 43% of patients in the acupuncture/massage group improved their pain score for at least two points compared with 26% in the control group ($P = 0.05$). Meanwhile, the intervention group also showed a decrease in depressive mood as compared to the control group ($P = 0.003$), suggesting that acupuncture plus massage in addition to usual care reduce pain and depressive mood among postoperative cancer patients when compared with usual care alone. Another RCT used electroacupuncture (EA) for postthoracotomy pain in patients with lung cancer [40]. The results showed that the cumulative dose of patient-controlled analgesia morphine used on day 2 was significantly lower in the EA group (7.5 ± 5 mg vs. 15.6 ± 12 mg; $P < 0.05$). The detailed acupuncture protocols of the two studies are presented in table 2.

Acupuncture for postoperative nausea and vomiting in cancer patients

In 2009, a Cochrane systematic review reported effects of acupoint P6 stimulation for preventing postoperative nausea and vomiting (PONV) [41]. P6 (or PC 6) is an acupuncture point that has been widely used for nausea and vomiting. Forty RCT trials (n = 4,858) were included into this review. Compared with the sham control, the P6 acupoint stimulation significantly reduced nausea (RR 0.71, 95% CI, 0.61 to 0.83), vomiting (RR 0.70, 95% CI, 0.59 to 0.83), and the need for rescue antiemetics (RR 0.69, 95% CI: 0.57 to 0.83). There are no significant differences regarding the point stimulation techniques, whether they were used with invasive techniques or noninvasive stimulation. Another systematic review was published in 2012 on a similar subject that included 21 publications from November 1996 to August 2009 [42]. The purpose of the review was to assess the outcome of acupuncture prior to surgery to prophylactically avoid or minimize PONV. The results indicated that acupuncture reduced incidence of nausea but not vomiting when compared with the use of antiemetic prophylaxis alone. The author concluded that both the noninvasive and the invasive acupuncture stimulation methods seemed to prevent PONV with minimal side effects.

A recently published RCT trial (n = 130) investigated electrical acupoint stimulation on PONV in patients after infratentorial craniotomy, a procedure commonly used for resection of brain tumors [43]. Patients were randomly allocated into two groups: transcutaneous electrical acupoint stimulation (TEAS) at P 6 and a sham group. The results of the study indicated that the 24-hour cumulative incidence of vomiting was significantly lower in the acupoint stimulation group than in the control group (22% vs. 41% $P = 0.025$). The cumulative incidence of nausea at 6 hours and 24 hours after surgery were also significantly

lower in the acupoint stimulating group than in the control group (27% vs. 47% $P = 0.019$, 33% vs. 58% $P = 0.008$), respectively. The detail acupuncture protocol is presented in table 2.

Another RCT investigated acupuncture versus medications in treatment of postsurgical gastroparesis syndrome (PGS) after abdominal surgery in patients with primary liver cancer [44]. PGS is a common side effect of abdominal surgery presenting nausea, vomiting, abdominal distention without evidence of mechanical gastric outlet obstruction [45]. A total of 63 patients underwent abdominal surgeries for resections of stomach, pancreatic and liver cancers, were randomized into an acupuncture group and an antiemetic drug group. Acupuncture was given daily with a strong stimulation. The control group was given intramuscular injection of 20 mg of metoclopramide, three times a day. The volume of gastric drainage, number of treatment needed and the recovery rate were evaluated. At end of the study, the complete recovery rate in the acupuncture group was significantly higher than in the drug arm (90.6% vs. 32.3%, $P < 0.05$). The detailed acupuncture protocol is presented in table 2.

Acupuncture for opioid-induced constipation in cancer patients

Acupuncture has been used for various types of constipations in patients. A systematic review published in 2009 investigated the effectiveness of traditional Chinese medicine for management of constipation [46]. Three RCTs were identified comparing the effectiveness of acupuncture versus conventional laxatives, including lactulose and *Sennae folium*. All of three trials reported positive outcomes individually but an overall synthesis result was not performed.

Published in a Chinese medical journal in 2009, a RCT ($n = 66$) specifically investigated the effectiveness of EA for morphine-induced constipation in cancer patients [47]. Cancer patients, with lung, pancreatic, liver, breast, esophageal and ovarian cancers, who were chronically taking morphine sulfate controlled-release tablets with constipation, was included in the trial. The study group received EA treatment and the control group was given mosapride citrate tablets 5 mg, three times a day, 30 minutes before meals. A scoring system based upon Rome II diagnostic criteria for functional constipation and the Bristol Stool Form Scale was developed to assess the outcome [48, 49]. At the end of the study, five days later, both groups showed a significant improvement before and after the treatment, with no statistical difference between groups (97.0% vs. 87.9%, $P > 0.05$). This study suggests that cancer patients who are chronically taking morphine for pain control may benefit from acupuncture to alleviate morphine-related constipation. The detailed acupuncture protocol is presented in table 2.

Acupuncture for opioid-induced pruritus

A RCT ($n = 69$) conducted in China investigated the effects of acupuncture on morphine-induced side effects including nausea, vomiting and pruritus [50]. Patients who were undergoing standard spinal-epidural anesthesia for transurethral prostatic resection (TUPR) were randomly assigned to two acupuncture groups with different protocols and one control group and received acupuncture during the operation. The incidences of morphine-related

symptoms were observed at 6 time points until day 1 post-operation. Compared with the control, there was a significant decrease of pruritus in one of acupuncture group ($P < 0.05$). The detailed acupuncture protocol is presented in table 2.

Acupuncture for chemotherapy-induced neuropathy

Chemotherapy-induced neuropathy is a common side effect of chemotherapy as neurotoxic drugs. Although chemotherapy-induced neuropathy is usually reversible, it may take months or years to recover. Up to 76% of patients reported neuropathic symptoms after chemotherapy [51].

A pilot non-RCT study was conducted to evaluate the therapeutic effect of acupuncture for chemotherapy-induced neuropathy measured by changes in nerve conduction studies in 6 patients treated with acupuncture for 10 weeks [52]. Using objective measurement of the nerve conduction studies, at 3 months follow-up after acupuncture treatment, 5 out of 6 patients showed improvement in nerve conduction studies as compared to the control group, in which only 1 out of 5 patients showed improvement. The detailed acupuncture protocol is presented in table 2.

One high quality RCT ($n = 90$) was identified in a Cochrane systematic review [34, 36]. In this study, cancer patients suffering from chronic neuropathic pain were treated with a specific auricular acupuncture implants as the study group, while noninvasive seeds was used as the placebo group. The implants were placed in sensitive points on the ear that were identified by using electrodermal activity. Study patients received acupuncture implants once a month for two times and then were assessed with pain measurement scales. At the end of the second month, the study group showed a significant decrease in pain intensity by 36% from baseline while there was almost no change in the placebo group ($P < 0.0001$). This study is very unique as patients were required to have only two visits with one month apart but the study was able to achieve a significant and clinically relevant outcome. The detailed acupuncture protocol is presented in table 2.

Acupuncture for aromatase inhibitor-associated joint pain

Crew reported a RCT study ($n = 43$) comparing acupuncture versus sham acupuncture for women with breast cancer treated with aromatase inhibitors and suffering from joint pain [53]. The median duration of aromatase inhibitors therapy in the true acupuncture group was 7 months. The Brief Pain Invention-Short Form (BPI-SF) and Western Ontario and McMaster Universities Osteoarthritic Index (WOMAC) were used as main assessment tools. At 6 weeks, the end of the study, the mean BPI-SF worst pain scores was lower in for the true acupuncture compared with the sham arm (3.0 vs. 5.5; $P < 0.001$). Moreover, significant differences between two groups were found in pain severity and pain-related interferences (2.6 vs. 4.5; $P = 0.003$; 2.5 vs. 4.5; $P = 0.002$), respectively. No significant adverse event was reported. This study is consistent with reported acupuncture for the treatment of non-cancer related musculoskeletal pain, such as knee arthritis and the chronic low back pain [33]. The detailed acupuncture protocol is presented in table 2.

Acupuncture for neck dissection related pain and dysfunction in cancer patients

A group of cancer patients ($n = 70$) with a history of neck dissection suffering from persistent chronic pain were randomized into a perspective open-label RCT trial [54]. Patients were randomly assigned to acupuncture, once a week for four weeks versus usual care. The median time from the surgery in the acupuncture group and the control group was 39 month and 34 months, respectively. In addition to net dissections, the majority of patients also received radiation therapy. Constant-Murley Score (CMS), a composite measure of pain, function, and activities of daily living, a numerical rating scale for pain and Xerostomia Inventory (XI) were assessed at baseline and at the end of acupuncture treatment. At the follow-up time, the mean pain scale in the acupuncture group dropped from 5.6 to 3.6 and from 5.92 to 5.8 in the control group ($P < 0.001$), along with improvement in CMS and XI in the acupuncture group ($P = 0.008$, $P = 0.02$), respectively. The results of this study suggested that the patients who received neck dissection and suffering from chronic pain for over 3 years may still benefit from acupuncture treatment. The detailed acupuncture protocol is presented in table 2.

Conclusion

Although far from conclusive, accumulated evidence from clinical and animal studies has suggested that acupuncture may be beneficial to cancer patients with pain. Acupuncture protocols generated from RCT trials should be adopted by clinicians who are using acupuncture in the field. Moreover, oncology acupuncture requires that clinicians possess knowledge and skills in both acupuncture and allopathic oncology [17]. Since cancer pain is never a single entity, multiple clinical manifestations always simultaneously present in each individual patient. Clinicians who attempt to use acupuncture for cancer pain should also have a clear vision on the overall cancer progression of each patient to ensure the safety of cancer patients. The current NCCN practice guidelines and its recommendations for using acupuncture, as one of adjunct integrative interventions, for cancer pain should be followed and disseminated. As more clinical trials of acupuncture are being conducted, we expect a rapid growth of knowledge in acupuncture for cancer pain in the near future.

Acknowledgments

This study is supported by grant #1K01 AT004415 from the National Center for Complementary and Alternative Medicine (NCCAM).

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Table 1

Commonly used acupuncture-related techniques in oncologic practice

Techniques	Device/tools	Skin penetration	Stimulation intensity	Practice features	Potential risks/contraindications
manual acupuncture	fine mental needles with hand manipulation	Yes	vary	general population; traditional style; mostly used	Infections, bleeding
electroacupuncture	fine mental needles with an electrostimulator	Yes	strong	general population; strong stimulation; long and lasting effect	Infections, bleeding, cardiac arrhythmia
ear acupuncture	fine mental needles or mental implants	Yes	medium	general population; quick and easy access; long-term stimulation	Infections, bleeding
transcutaneous electrical acupoint stimulation (TEAS)	rubber electrodes with an electrostimulator	No	medium	pediatric; needle phobia	cardiac arrhythmia
acupressure	Fingers with pressure	No	weak	pediatric; needle phobia	bone metastases

Table 2

Acupuncture protocols for cancer pain and related symptoms

Conditions	Patient Populations	Needles/Device	Acupuncture Points ¹	Intensity	Treatment frequency	Authors
Postoperative cancer pain	Intestinal, hepatic, bladder, kidney, breast, prostate and testicular cancers	34-gauge	LI 4, SP 6, PC 6, ST 36, LR 3, LI 4, <i>Yintang</i> ; corresponding auricular points	<i>Deqi</i> ² , 20 min/session	postoperative day 1 and day 2	Mehling, 2007[39]
Postthoracotomy pain	Operable non-small cell lung cancer	Needles: 0.25 mm × 50 mm; an electroacupuncture stimulator	LI 4, GB 34, GB 36, TE 8, ipsilateral to the side of the thoracotomy	<i>Deqi</i> ; 60 Hz alternating wave; 30 min/session	Immediately after surgery, 2 sessions per day for first 7 postoperative days	Wong, 2006[40]
Postoperative nausea and vomiting	Brain tumor undergoing infratentorial craniotomy	Han's Acupoint Nerve Stimulator (HANS)	PC 6 of the dominant side	2 mA, 2–100 Hz alternating	30 min before the induction of anesthesia and last up to 24 hours postoperative ly	Xu, 2012[43]
Postoperative morphine-related pruritus	Benign prostatic hyperplasia undergoing transurethral prostatic resection	28-gauge	LI 4, LI 11, PC 6, TE 6	Even manipulation	After epidural tube was placed, 30 min. once	Jiang, 2010[50]
Morphine-induced constipation	Liver, pancreatic, breast, esophageal, and ovarian cancers	30-gauge, 2 inch; SDZ – II electroacupuncture stimulator	Bilateral ST 36 and ST 25	Depth: 40 mm; Continuous waveform, tolerable intensity	Once a day, 30 min/session for 5 consecutive days	Zhang, 2009[47]
Postsurgical gastroparesis syndrome	Stomach, pancreatic and liver cancers	0.30 mm × 40 mm or 50 mm	CV 12, ST 36, PC 6, SP 6	Moderate to strong manual stimulation	Once a day, 30 min/session for 7 to 10 days	Sun, 2010
Chemotherapy-induced peripheral neuropathy	Breast, colon, bronchial cancers, and lymphoma	0.30 mm × 30 mm	ST 34, Ex-LE 10 (<i>Bafeng</i>), Ex-LE 12 (<i>Qiduan</i>), 20 needles each session	No <i>Deqi</i> was performed; depth: 10–30 mm	10 weekly sessions, 20 min.	Schroede, 2012[52]
Post cancer treatment, chronic neuropathic pain	Breast, head and neck, lung, and other cancers	1.2 mm × 3.4 mm auricular acupuncture implants	Measuring electrodermal responses of each ear with an electronic microvoltmeter; Six auricular points on average	Implants were left in ear until fell off, average 12 days after treatment	44 min each session, once a month for two times	Alimi, 2003[36]
Aromatase inhibitor associated joint pain	Stage I–III hormone receptor positive breast cancer taking aromatase inhibitors	34-gauge × 25 mm or 40 mm; Auricular needles: 38-gauge × 1.5 mm	Body: TE 5, GB 41 GB 34, LI 4, ST 41, KI 3. Ear: alternating ears with each treatment: shen men, kidney, liver, upper lung, sympathetic. Joint-specific: (1) knee (SP 9, SP 10, ST 34), (2) fingers	<i>Deqi</i> twice, even manipulation	30 min/session, twice-weekly over 6 weeks	Crew, 2010[53]

Conditions	Patient Populations	Needles/Device	Acupuncture Points ^d	Intensity	Treatment frequency	Authors
			(SI 5, SI 3, ba xie, LI 3), (3) (SI 5, SI 3, ba xie, LI 3), (3) (SI 5, SI 3, ba xie, LI 3), (3) (SI 5, SI 3, ba xie, LI 3), (3) (SI 5, SI 3, ba xie, LI 3), (3) (SI 5, SI 3, ba xie, LI 3), (3)	lumbar (GV 3, GV 8, BL 23), (4) lumbar (GV 3, GV 8, BL 23), (4) lumbar (GV 3, GV 8, BL 23), (4) lumbar (GV 3, GV 8, BL 23), (4) lumbar (GV 3, GV 8, BL 23), (4) lumbar (GV 3, GV 8, BL 23), (4)	(4) shoulder (LI 15, TE 14, SI 10), (5) hip (GB 80, GB 39), and (6) (4) shoulder (LI 15, TE 14, SI 10), (5) hip (GB 80, GB 39), and (6) (4) shoulder (LI 15, TE 14, SI 10), (5) hip (GB 80, GB 39), and (6) (4) shoulder (LI 15, TE 14, SI 10), (5) hip (GB 80, GB 39), and (6) (4) shoulder (LI 15, TE 14, SI 10), (5) hip (GB 80, GB 39), and (6) (4) shoulder (LI 15, TE 14, SI 10), (5) hip (GB 80, GB 39), and (6)	
Neck dissection associated chronic pain	Head and neck squamous cell carcinoma, thyroid, melanoma, and others cancers	0.20×30 mm	Standard and customized anatomic points: LI 4, SP 6, GV 20, <i>luozhen</i> , <i>Shenmen</i> /ear; add: Zone distal points, Ashi, LI 2 (14–39 needles each session)	Depth: 0.25 to 0.5 inch; 30 min/session, No <i>Deqi</i>	once a week for four weeks	Pfister, 2010[54]

¹ Some of acupuncture point names in the table were modified from the original publications to be consistent with Cheng X. *Chinese Acupuncture and Moxibustion*, Revised Edition, 1999, Foreign Languages Press, Beijing, China

² *Deqi*, a needling reaction refers to sensations of soreness, numbness, distension or heaviness around the point after the needles is inserted to a certain depth. Meanwhile, the operator may feel tightness around the needle.