

Current State of Science Supporting Acupuncture for Cancer Treatment Side Effects

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Fatigue

Author ^[Ref] Year	Study Design	Sample size	Control arm (n)	Treatment Freq	Follow-up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Molassiotis ^[1] 2012	RCT	302	Usual Care (75)	Once per week for 4 weeks	6 weeks	ST 36, SP 6, GB 34, SP 9	Multidimensional Fatigue Inventory (MFI)	Acupuncture is an effective intervention for managing the symptom of cancer-related fatigue and improving patients' quality of life.
Cheng ^[2] 2017	RCT	28	Placebo (14)	Twice per week for 4 weeks	6 weeks	LI 4, REN 6, ST 36, K 3, SP 6	Brief Fatigue Inventory (BFI)	Acupuncture may be a safe and feasible optional method for adjunctive treatment in cancer palliative care.
Mao ^[3] 2021	RCT	76	Sham Acu (20) and waitlist control (26)	Twice per week for 2 weeks, then once per week for 6 weeks	12 weeks	Electroacupuncture at 2 Hz; individualized treatment based on patients' signs and symptoms.	Brief Fatigue Inventory (BFI)	Compared to usual care, electroacupuncture produced significant improvement in fatigue, anxiety and depression.
Li ^[4] 2020	RCT	40	Sham Acu (10) and usual care (10)	Once per week for 20 weeks	20 weeks	Individualized treatment based on patients' signs and symptoms applying the Time-Acupoints-Space Acupuncture technique.	Multidimensional Fatigue Inventory (MFI) and Visual Analog Scale (VAS)	This pilot study has demonstrated that Acupoints- Time-Space-Acupuncture (ATAS) acupuncture can significantly reduce fatigue induced by chemotherapy.
Jang ^[5] 2020	Systematic review and meta-analysis	809	Sham and usual care	Varied	Varied	Varied	Brief Fatigue Inventory (BFI)	The current literature review suggests that acupuncture has therapeutic potential in management of Cancer-Related Fatigue (CRF) for cancer survivors. Promotion of acupuncture in cancer care to manage CRF may improve the quality of life of cancer survivors.

Insomnia/Sleep Disturbance

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Höxtermann ^[6] 2021	RCT	52	1 session of psycho-education (26)	Twice per week	0, 5, 17 and 29 weeks	Auricular postantitragal belt, helix channel, Shenmen (inserted in that order)	Pittsburgh Sleep Quality Index	A semi-standardized group auricular acupuncture might be an effective and safe intervention in treating insomnia in breast cancer survivors in the short term, and may reduce stress, anxiety, and fatigue as well.
Zhang ^[7] 2021	RCT	28	Wait List (15)	Twice per week for 6 weeks	6 weeks	Core points: EX-HN1 (Sishencong), DU 20, DU 24, P 6, K 13 and SP 6, auricular Shenmen, Sympathetic and Heart. Additional points: EX-HN3 (Yintang), Ren 4, LI 4, HT 7, ST 25, ST 36, LIV 3, and K 6.	Insomnia Severity Index (ISI)	Acupuncture is safe, feasible, and effective for chemotherapy-associated insomnia in breast cancer patients under or post chemotherapy. A larger sample size randomized clinical trial is warranted to confirm the present findings.
D'Alessandro ^[8] 2022	RCT	60	Sham acu (20) and wait list (20)	Once per week for 10 weeks	10 weeks	DU 16, DU 20, BL 23, REN 6	Pittsburgh Sleep Quality Index	This trial showed that acupuncture improved management of climacteric-like symptoms induced by hormonal blockage in patients with breast cancer through relief of sleep, and mental and emotional distress.
Feng ^[9] 2011	RCT	80	Prozac, 20mg per day (40)	Once per day for 30 days	4 weeks	ST 40, SP 9, SP 10, EX-HN3 (Yintang), DU 20, P 6, EX-HN1 (Sishencong)	Pittsburgh Sleep Quality Index	Acupuncture can effectively reduce malignant-related depression, improve sleep quality, and help to improve the quality of life of cancer patients.
Choi ^[10] 2017	Systematic review of RCTs	475 (6 RCTs)	Sham acu, conventional drug or hormone therapy	Range of 7-30 treatments with varied frequency	Varied	Major points: DU 20, HT 7, SP 6, P 6	Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and Athens Insomnia Scale (ASI)	The current trials showed that acupuncture may be superior to sham acupuncture, conventional drug therapy and hormone therapy for the management of cancer-related insomnia. Further clinical trials are warranted.

Nausea and Vomiting

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Shen ^[11] 2000	RCT	104	Antiemetic drugs (34) minimal needling (33)	Once per day for 5 days	5 days	EA at P 6 and ST 36 at 2-10Hz, 0.7 ms duration pulse width, square wave Minimal needling: LU 7, GB 34	Total number of emesis episodes, and proportion of emesis-free days compared within the three groups	In this study of patients with breast cancer receiving high-dose chemotherapy, adjunct electroacupuncture was more effective in controlling emesis than minimal needling or antiemetic pharmacotherapy alone, although the observed effect had limited duration.
Reindl ^[12] 2005	Multi-center crossover study	11	Antiemetic drugs	Daily or as needed during the chemo infusion cycle	22 courses of chemo	Varied based on signs and symptoms; common points included P 6, ST 36, REN 12 and LI 4 (Stimulation included acupuncture needles or laser acupuncture)	Total number of emesis episodes and doses of antiemetic drugs	Our data indicate that acupuncture might reduce antiemetic medication and episodes of vomiting in pediatric oncology.
Li ^[13] 2020	Multi-center, single-blind, randomized, sham-controlled trial	134	Sham acu (66)	2x per day for the first day of chemo, then once per day for 4 days	Eval at days 1, 2, 3, 7, 10, 14, and 21.	LIV 3, ST 25, P 6, ST 36 (bilateral), REN 12, REN 6: Electrical stimulation at ST 36 with alternating frequency of 2/100 Hz	Common Terminology Criteria for Adverse Events (CTCAE)	Acupuncture as an adjunctive approach could alleviate the severity of chemotherapy-induced nausea and vomiting compared to the sham control, even though the effect of acupuncture in preventing CINV occurring is relatively modest.
Bi ^[14] 2011	Observational	50	Ondansetron hydrochloride injection (25)	Plasters were applied to the auricle before chemo infusions, pressed by the patient 4-5 times per day for 10-15 mins each	5 days	Auricular Stomach, Shenmen, Subcortex using Wang Bu Liu Xing sticking plasters	Ondansetron dosage	Auricular point sticking can reduce the dose of Ondansetron hydrochloride in patients with chemotherapy-induced vomiting, and effectively attenuate vomiting.
Konno ^[15] 2010	Cochrane systematic review	1247 (11 RCTs)	Sham acu and/or antiemetics	Varied	Varied	Common points were P 6 and ST 36 using electrostimulation, acupuncture, and/or acupressure	Incidence of nausea/vomiting	This review demonstrated some beneficial effects of acupuncture point stimulation on chemotherapy-induced acute nausea and vomiting in adult cancer patients with the antiemetic regimen recommended by the American Society of Clinical Oncology.



									Stimulation with needles and electro-acupuncture was shown to reduce acute vomiting. Acupressure was shown to reduce acute nausea. The use of self-administered acupressure may be suggested to patients.
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Hot Flashes

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
2008 Hervik ^[16]	RCT	59	Sham acu (29)	Twice per week for 5 weeks, then once per week for 5 weeks	12 weeks after the last treatment	LIV 3, GB 20, LU 7, K 3, SP 6, REN 4, P 7, LIV 8	Kupperman Index and number of hot flashes per day/night	Acupuncture seemed to provide relief from hot flashes both day and night in women operated for breast cancer, treated with Tamoxifen. This treatment effect seems to coincide with a general health improvement measured with the validated Kupperman index
Porzio ^[17] 2002	Pilot Study	15	None	Once per week for 3 months	Before treatment, 1, 3, and 6 months	K 6, SP 6, BL 23, GB 35, and HT 5	Greene Menopause Index	Acupuncture seems to be safe and effective for the treatment of menopausal symptoms in women with previous breast cancer taking tamoxifen. Confirmatory studies with a larger number of patients and with a placebo-treated group are warranted.
Deng ^[18] 2007	RCT	72	Sham acu (30)	Twice per week for 4 weeks	6 weeks and 6 months after treatment	DU 14, BL 13, GB 20, P 7, HT 6, K 7, ST 36, SP 6, auricular Shenmen and sympathetic	Hot flash frequency	Hot flash frequency in breast cancer patients was reduced following acupuncture.
Frisk ^[19] 2008	RCT	45	Hormone therapy (18)	Twice per week for 2 weeks, then once per week for 10 weeks	12 weeks, 6, 9, 12, 18 and 24 months	Electroacupuncture (points not listed)	Kupperman Index	Electro-acupuncture is a possible treatment of vasomotor symptoms for women with breast cancer and should be further studied for this group of women.
Walker ^[20] 2010	RCT	50	Venlafaxine (25)	Twice per week for 4 weeks, then once per week for 8 weeks	Observed for 1-year post-treatment	Primary: B 23, K 3, SP 6 Secondary: DU 14, GB 20, LU 9, LIV 3, DU 20, ST 36, REN 6, P 7, HT 7	Hot Flash Diary	Acupuncture appears to be equivalent to drug therapy in these patients. It is safe, effective and durable treatment for vasomotor symptoms secondary to long-term antiestrogen hormone use in patients with breast cancer

Peripheral Neuropathy

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Lu ^[21] 2020	RCT	20	Waitlist control (20)	18 treatments over 8 weeks	4, 8 and 16 weeks	Electroacupuncture (2-10 Hz alternating) applied to bilateral SJ 5 and second Baxie and/or SP 6 and LIV 3 An infrared heat lamp (TDP CQ-27) was placed above the feet	Brief Pain Inventory – Short Form (BPI-SF), Functional Assessment of Cancer Therapy – Neurotoxicity subscale (FACT-NTX), Patient Neurotoxicity Questionnaire (PNQ), and European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire Core 30	This randomized pilot trial demonstrated that an 8-week acupuncture intervention, versus usual care, led to clinically meaningful and statistically significant improvements in neuropathic sensory symptoms in breast cancer survivors with mild and moderate CIPN after the completion of chemotherapy.
Iravani ^[22] 2020	Pilot, randomized, assessor-blinded, controlled trial	40	Vitamin B1 and Gabapentin	3 times per week for 4 weeks	4 weeks	REN 6, DU 20, bilateral ST 36, SP 6, LI 4, LI 11, LIV 3, Bafeng and Baxie	Numeric Rating Scale	Our study revealed that acupuncture, as a kind of traditional Chinese therapeutic method, is significantly effective and safe in the treatment of CIPN. Moreover, acupuncture is more effective than using vitamin B1 and gabapentin as the conventional treatment.
Bao ^[23] 2020	RCT	75	Sham acu (23), Usual care – no intervention (21)	Not included	8 and 12 weeks	Auricular Shenmen, zero point, and third electrodermal active point; Bilateral LI 4, P 6, SI 3, LIV 3, GB 42, ST 40, and Bafeng. Electroacupuncture bilaterally from LIV 3 and GB 42 at 2-5 Hz	Numeric Rating Scale	We found the therapeutic benefit of real acupuncture for neuropathic pain that is consistent with previous pilot acupuncture CIPN trials.

Molassiotis ^[24] 2019	Randomized assessor-blinded wait list-controlled trial	87	Standard care/waitlist	2 times per week for 8 weeks	8, 14, and 20 weeks	LI 4, LI 11, P 7, SJ 5, Baxie (upper limb involvement) ST 36, SP 6, LIV 3, ST 41, and/or Bafeng (lower limb involvement)	Brief Pain Inventory (BPI)	Acupuncture is an effective intervention for treating chemotherapy-induced peripheral neuropathy and improving patients' quality of life and experience with neurotoxicity-related symptoms with longer-term effects evident.
Baviera ^[25] 2019	Systematic Review	109 (5 studies)	Varied	Varied	Varied	Common points included SP 6, ST 36, LIV 3, LI 4, BL 60, Bafeng/Baxie	Varied	The use of acupuncture appears to be associated with an improvement in the symptoms of chemotherapy-induced peripheral neuropathy and has no side effects.

Xerostomia/Dry Mouth

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Garcia ^[26] 2019	RCT	339	Sham acu (115) and standard care (112)	3 days per week (same days as radiation treatment)	7 weeks, 3, 6, and 12 months	REN 24, LU 7, K 6 and auricular Shenmen, Zero point, Salivary Gland 2 prime and Larynx bilaterally	Xerostomia Questionnaire	This randomized clinical trial found that “True Acupuncture” resulted in significantly fewer and less severe RIX symptoms 1 year after treatment vs standard care control (SCC).
Menezes ^[27] 2021	Preventive, parallel, single-blind, 2-arm controlled study	107	No intervention (55)	Once per week through radiation therapy treatment	Varied based on the length of radiation therapy	Local: Yintang, DU 20, ST 3, ST 4, ST 5, ST 6, ST 7, GB 2, SI 19, SJ 21 Distal: LI 4, LI 11, ST 36, LU 5, LU 9, P 3, K 3, K 5 Auricular seeds applied to Shenmen, brain, sympathetic, kidney, spleen, pancreas, and mouth	Xerostomia Inventory	Combining traditional and auricular acupuncture reduced xerostomia and increased saliva volume without changing the saliva’s pH in irradiated patients with Head and Neck Squamous Cell Carcinoma (HNSCC). Additionally, the combination of traditional and auricular acupuncture reduced Beck Anxiety Index (BAI) scores.
Cho ^[28] 2008	A single-blind sham-controlled study	12	Sham acu (6)	Twice per week for 6 weeks	3 and 6 weeks after treatment	Not specified in the paper	Whole salivary flow rates	Our results showed a significantly meaningful amelioration of the subjective sensation of xerostomia closely associated with QOL in patients with head and neck cancer treated with irradiation.
Meng ^[29] 2012	RCT	86	Standard Care (46)	3 times per week for 7 weeks	6 months	REN 24, LU 7, K 6, and auricular Shenmen, Zero-point, Salivary Gland, and Larynx	Xerostomia questionnaire	Acupuncture given concurrently with radiotherapy significantly reduced xerostomia and improved quality of life.
Deng ^[30] 2008	RCT	20	Sham Acu (20)	Once	fMRI immediately following treatment (both actual and sham acupuncture)	LI 2	Saliva production	Acupuncture at LI-2 was associated with neuronal activations absent during sham acupuncture stimulation. Neuroimaging signal changes appear correlated to saliva production.

Pain

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Garcia ^[31] 2014	Pragmatic Pilot Study	41	N/A	One to three times per week		Head: Yintang, DU 20, S 8, GB 8, GB 20, BL 10 Neck/Shoulders: Huatojaji, GB 21, LI 15, SJ 14, SI 9-12 Upper extremities: Baxie, LI 4, LI 11, LI14, SI 3 Lower extremities: Bafeng, Heding, Xiyan, LIV 3, SP 6, ST 36, GB 34, GB 39 Upper-mid back: DU 14, BL 11-21, BL 41-50 Lower back: Yaoyan, BL 22-35, BL 51-54 Chest: LU 1-2, REN 17 Abdomen: REN 4, REN 6, REN 12, ST 25 Hips/Thighs: GB 27-30 General body pain: SP 21 Auricular Cingulate gyrus, Shenmen, Zero Point, Subcortex	Brief Pain Inventory – Short Form	Acupuncture was feasible, safe, and a helpful treatment adjunct for cancer patients experiencing uncontrolled pain in this study. Randomized placebo-controlled trials are needed to confirm these results.
Crew ^[32] 2010	RCT	43	Sham acu (20)	Twice per week for 6 weeks	3 and 6 weeks	Not specified in paper	Brief Pain Inventory – Short Form	Women with aromatase inhibitor-induced arthralgias treated with true acupuncture had significant improvement of joint pain and stiffness, which was not seen with sham acupuncture. Acupuncture is an effective and well-tolerated strategy for managing this common treatment-related side effect.
Bao ^[33] 2018	Cross-sectional study	592	N/A	N/A	N/A	N/A	Measured preference for medication or acupuncture for pain management using Acupuncture Expectancy Scale (AES)	We found similar preference rates for acupuncture and medication use among patients with breast cancer for pain management. This suggests that acupuncture may have an important role as an integrative approach for pain management.

Kim ^[34] 2018	RCT	30	Sham acu (15)	Intradermal needles are attached for 48 to 72 hours for 3 weeks. Patients pressed needles twice per day	3, 4, And 6 weeks	Bilateral ST 25, LI 4, LIV 3, and P6; and REN 12	Numerical Rating Scale (NRS)	Intradermal Acupuncture (IA) treatment appears feasible and safe for advanced cancer patients. It might reduce analgesic usage in the early World Health Organization analgesic ladder stage cancer patient, though it could not show significant outcome differences due to design limitation of sham IA.
Crew ^[35] 2007	Pilot study	21	Delayed acupuncture (21)	Twice per week for 6 weeks	6 and 12 weeks	SJ 5, GB 41, GB 34, LI 4, ST 41, and K 3; auricular Shenmen, Kidney, Liver, Upper Lung, and Sympathetic Joint pain: Shoulder – LI 15, SJ 14, SI 10 Wrist – SJ 4, LI 5 Fingers – SJ 5, Baxie, LI 3 Low back – DU 3, DU 8, BL 23 Hip – GB 30, GB 39 Knee – SP 9, SP 10, ST 34	Brief Pain Inventory – Short Form	In this pilot study, acupuncture reduced aromatase inhibitor (AI)-related joint symptoms and improved functional ability and was well-tolerated.

Leukopenia/Neutropenia

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Lu ^[36] 2009	RCT	21	Sham acu (10)	2-3 treatments per week for 10 sessions	28 days	LI 4, LIV 3, P 6, LI 11, K 3, SP 6, ST 36, SP 10, DU 20	White Blood Cell (WBC) count, Absolute Neutrophil Count (ANC) and plasma granulocyte colony-stimulated factor (G-CSF)	We observed clinically relevant trends of higher WBC values during one cycle of chemotherapy in patients with ovarian cancer, which suggests a potential myeloprotective effect of acupuncture. A larger trial is warranted to more definitively determine the efficacy of acupuncture on clinically important outcomes of chemotherapy-induced neutropenia.
Shih ^[37] 2021	Systematic review and meta-Analysis	650 (10 RCTs)	Sham acu, routine care and/or medication	Varied	Varied	Acupuncture and/or electroacupuncture and/or moxibustion	White Blood Cell (WBC) count and/or Absolute Neutrophil Count (ANC)	The current meta-analysis supports acupuncture possibly ameliorating chemotherapy-induced leukopenia, as WBC and neutrophil values significantly increased after acupuncture in patients undergoing chemotherapy. Additionally, regardless of the type of acupuncture, values of WBCs increased. These findings are actionable and support both the clinical use of acupuncture to relieve chemotherapy-induced leukopenia and further research regarding the use of acupuncture in patients experiencing immunosuppression when undergoing chemotherapy.
Nian ^[38] 2022	Systematic review and meta-Analysis	1130 (15 RCTs)	Sham acu, routine care and/or medication	Varied	Varied	Acupuncture and/or electroacupuncture and/or moxibustion	White Blood Cell (WBC) count and/or Absolute Neutrophil Count (ANC)	It is recommended to use acupuncture in the treatment of leukocytopenia after chemotherapy, but this result needs further research for verification.
Pais ^[39] 2014	Randomized Pilot Study	18	Waitlist - No acupuncture or moxibustion (9)	Twice per week for 3 weeks	Once per week for 4 weeks	Acupuncture: LIV 3, LI 4, ST 36, SP 3, GB 39, P 6, SJ 5, and LU 7 Moxibustion: SI 6, SJ 5, ST 32, REN 6 (2 minutes per acu-point)	White Blood Cell (WBC) count and Absolute Neutrophil Count (ANC)	Our pilot study suggests that acupuncture and moxibustion may (1) stimulate anticancer immunity, (2) promote a myeloprotective effect, (3) improve the psych emotional status and quality of life, and (4) minimize chemotherapy side effects.

Safety Profile

Author ^[Ref] Year	Study Design	Sample Size	Control Arm (n)	Treatment Freq	Follow – Up Length	Intervention/Acupoints	Primary Outcome Assessment	Conclusion
Xu ^[40] 2013	Systematic Review	117 case reports from 25 countries	N/A	N/A	N/A	Acupuncture, Electroacupuncture, Cupping, Moxibustion	Number and severity of adverse events	Although serious AEs associated with acupuncture are rare, acupuncture practice is not risk-free. Adequate regulation can even further minimize any risk. We recommend that not only adequate training in biomedical knowledge, such as anatomy and microbiology, but also safe and clean practice guidelines are necessary requirements and should continue to be enforced in countries such as the United States where they exist, and that countries without such guidelines should consider developing them in order to minimize acupuncture adverse events.
Baumler ^[41] 2021	Systematic Review and Meta-Analysis	22 studies	N/A	N/A	N/A	Acupuncture and Electroacupuncture	Number and severity of adverse events	Acupuncture can be considered among the safer treatments in medicine. Serious adverse events (AE) are rare, and the most common minor adverse events are very mild. AEs requiring medical management are uncommon but necessitate medical competence to assure patient safety. Clinical and methodological heterogeneity call for standardized AE assessments tools, clear criteria for differentiating acupuncture-related AEs from therapeutically desired reactions, and identification of patient-related risk factors for AEs.
Ernst ^[42] 2001	Systematic Review	10 studies	N/A	N/A	N/A	Acupuncture, electroacupuncture, moxibustion, and cupping	Number and severity of adverse events	Although the incidence of minor adverse events associated with acupuncture may be considerable, serious adverse events are rare. Those responsible for establishing competence in acupuncture should consider how to reduce these risks.

Da Silva ^[43] 2014	Prospective Survey	1157 patients, 13,884 treatments	N/A	N/A	N/A	Acupuncture	Number and severity of adverse events	Acupuncture provided by physicians, even in a training program, is a relatively safe treatment. Emphasis must be still given to the knowledge of conventional medicine, the study of anatomy and constant supervision.
MacPherson ^[44] 2004	Prospective National Survey	6,348 patients, 30,000 treatments	N/A	N/A	3 months	Acupuncture	Number and severity of adverse events	Patients report a range of adverse events but these do not prevent most patients seeking further acupuncture. This large-scale survey supports existing evidence that acupuncture is a relatively safe intervention when practiced by regulated practitioners.

*Common exclusion criteria: Patients with needle phobia; patients with low platelet count (<50 000); comorbidity with a bleeding disorder or coagulopathy; pregnancy, or having received acupuncture treatment in the past 1-3 months; patients with lymphedematous limbs or who have undergone axillary dissection; and patients with metastatic bone disease or metastatic involvement of the neural system.

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