Electroacupuncture for treating neuropsychiatric symptoms in breast cancer: a randomized, controlled pilot trial

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Introduction

- Cancer diagnosis, treatment and related stressors often precipitates **co-occurring neuropsychiatric symptoms** (i.e., cognitive impairment, distress, fatigue, and insomnia), significantly impairing patients' quality of life and well-being.
- Preclinical studies **suggest electroacupuncture (EA) may alleviate symptoms by reducing inflammation and promoting neurogenesis**, but clinical evidence remains limited.
- We conducted a **randomized, controlled, double-blinded pilot trial** evaluating the **preliminary efficacy and safety of EA** to treat neuropsychiatric symptoms in breast cancer.

Methods

- **Study design:** Randomized (1:1), sham-controlled, patient- and assessor-blinded pilot trial (NCT05283577).
- **Eligibility criteria:** Participants were (1) diagnosed with breast cancer who had received anti-cancer treatment, (2) ≥16 yo, (3) life expectancy ≥6 months, (4) one or more of following symptoms: cognitive impairment, fatigue, insomnia, distress, (5) able to provide informed consent, (6) no contraindications to EA (e.g., needle phobia, bleeding disorder).
- **Interventions:** Ten weekly sessions of EA administered on disease-related (neuropsychiatric EA, nEA) or non-disease-related (sham EA, sEA) acupoints (**Figure 1**) administered by acupuncturists at UC Irvine Susan Samueli Integrative Health Institute.
- **Data collection:** Patient-reported outcomes (FACT-Cog, MFSI-SF, EORTC QLQ-C30), computerized neurocognitive tests (CANTAB®), and blood draws at three timepoints: pre-treatment, after five, and after ten sessions.
- **Endpoints:** (1) Pre-post effect sizes (small: 0.2, medium: 0.5, large: 0.8) in change of health outcomes within each treatment group. (2) Comparison of changes in biomarkers, proportions of treatment responders (MCID and RCI), and safety outcomes between groups.
- **Sample size calculation:** 30 evaluable participants (pilot trial).
- **Intention-to-treat analysis:** Baseline-adjusted mixed effects models with multiple testing correction (Benjamini-Hochberg procedure).
- **Per-protocol analysis:** Differences in proportions with χ^2 test.

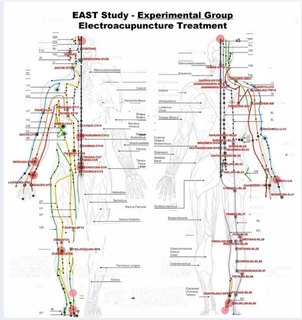
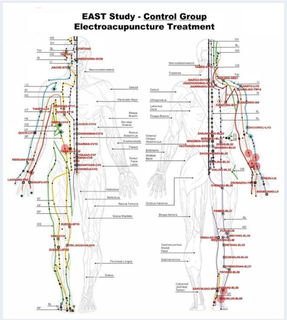
Neuropsychiatric EA (nEA)	Sham EA (sEA)
	
Intervention: Ten 30-min treatment visits over 10-12 weeks	
Needle insertion depth of 9-24mm	Superficial insertion
Electrical stimulation at 2 Hz with individually adjusted intensity	2 Hz with minimal stimulation
13 acupoints, total 24 needles (including bilateral ones)	7 acupoints, total 14 needles (including bilateral ones)
Shenting (GV24) – Baihui (GV20) Sinshencong (EX-HN1) --|-- Zhongwan (CV12) – Guanyuan (CV4) Neiguan (PC6) – Shenmen (HT7) Hegu (LI4) – Taichong (LIV3) Zusanli (ST36) – Sanyinjiao (SP6) Taixi (KI3) – Zhaohai (KI6)	Daheng (SP15) left – right Pianli (LI6) – Wenliu (LI7) Sanyangluo (TE8) – Sidu (TE9) Fuyang (BL59) – Kunlun (BL60)

Figure 1. *Diagram of acupoints and acupoint names for both the nEA and sEA groups.*

Results: Baseline demographics

Table 1. *Characteristics of study participants at baseline*

Characteristics	nEA (N=18)	sEA (N=17)
Age at recruitment, mean (SD)	60.8 (11.9)	55.4 (12.2)
Race/ethnicity, n (%)		
Non-Hispanic White	12 (66.7%)	11 (64.7%)
Hispanic/Latino	0 (0%)	1 (5.9%)
Non-Hispanic Asian	2 (11.1%)	4 (23.5%)
Other	4 (22.2%)	1 (5.9%)
Self-reported symptoms at baseline, n (%)		
Cognitive impairment	11 (61.1%)	11 (64.7%)
Fatigue	12 (66.7%)	13 (76.5%)
Insomnia	15 (83.3%)	13 (76.5%)
Psychological distress	13 (72.2%)	11 (64.7%)
≥2 symptoms present, n (%)	15 (83.3%)	15 (88.2%)
Stage II or more, n (%)	6 (33.3%)	8 (47.1%)
Currently receiving cancer drug therapies, n (%)	6 (33.3%)	5 (29.4%)
Prior acupuncture experience, n (%)	8 (44.4%)	10 (58.8%)

Results: Patient-reported outcomes

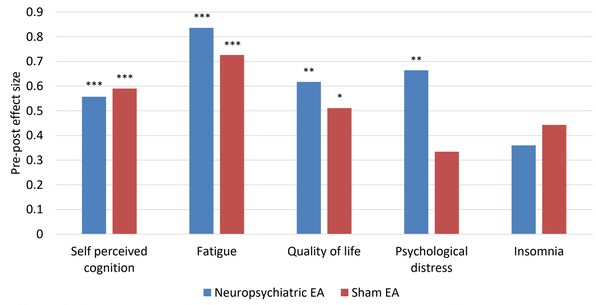


Figure 2. *Pre-post effect sizes in patient-reported outcomes, stratified by groups.*
Statistical significance for pre-post change (after BH procedure): ** p-adj < 0.05; ** p-adj < 0.01; *** p-adj < 0.001*

Results: CANTAB®

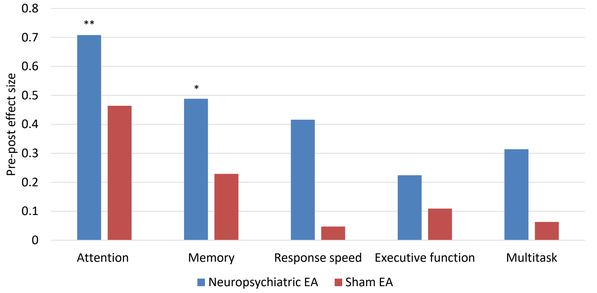


Figure 3. *Pre-post effect sizes in CANTAB® neurocognitive outcomes, stratified by groups.*
Statistical significance for pre-post change (after BH procedure): ** p-adj < 0.05; ** p-adj < 0.01; *** p-adj < 0.001*

Results: Treatment responders

Table 2. *Treatment responders by group after ten weekly sessions of EA*

	nEA (N=14)	sEA (N=16)	p
Responders, n (%)			
Obj. cognition	6 (42.9%)	2 (12.5%)	0.101
Sub. cognition	6 (42.9%)	9 (56.3%)	0.715
Fatigue	10 (71.4%)	11 (68.8%)	1.000
Psychological distress	7 (50.0%)	6 (37.5%)	0.713
Insomnia	7 (50.0%)	7 (43.8%)	1.000
Improved in ≥1 symptom(s)	13 (92.9%)	13 (81.3%)	0.602
Participants with clinically meaningful improvement in quality of life, n (%)	8 (57.1%)	7 (43.8%)	0.715

Results: Biomarkers

Table 3. *Pre-post changes in neurotrophic and inflammatory plasma biomarkers after ten weekly sessions of EA*

	nEA (N=18)		sEA (N=17)	
	% change (95% CI)	Abs change (95% CI)	% change (95% CI)	Abs change (95% CI)
BDNF (pg/mL)	2.5% (-43.7%, 86.6%)	60 (-1054, 2089)	61.6% (-9.7%, 189.2%)	1265 (-123, 3884)
IL-6 (pg/mL)	-69.7% (-95.4%, 99.6%)	-0.65 (-0.89, 0.93)	-9.7% (-85.8%, 476.3%)	-0.11 (-0.94, 5.2)
TNF-α (pg/mL)	-41.3% (-90.1%, 249.9%)	-3.3 (-7.3, 20.1)	172.6% (-51.8%, 1442.3%)	14.9 (-4.5, 124.3)

- No significant difference was observed between the two groups.

Results: Safety outcomes

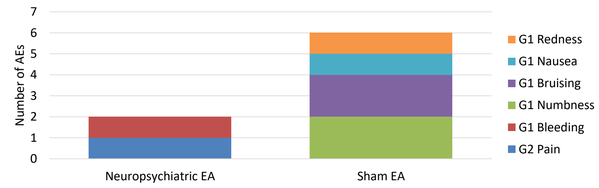


Figure 4. *Distribution of CTCAE v5-graded adverse events (AEs) during EA treatment, stratified by groups.*

Discussion

- **Preliminary evidence suggests that targeting disease-related acupoints** improves cognitive function and distress symptoms in breast cancer patients and survivors.
- Changes in **inflammation and neurogenesis** may underlie the observed changes in health outcomes, **although findings remain inconclusive.**
- **Results warrant validation in larger, well-powered trials.**

Acknowledgement

Research reported in this publication was supported by the National Cancer Institute of the National Institutes of Health under award number P30CA062203 and the California Breast Cancer Research Program under IDEA award number B2BIB5461. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. We would like to thank all study participants, partners, and undergraduate student researchers who have made this project possible.