



Acupuncture for Pain Management, Substance Use, and Mental Health

by Kelly Ilseman, L.Ac. (MACOM, MS, MEd) she/her
Quest Center for Integrative Health, Advanced Acupuncture, PDX Points
Oregon Association of Acupuncturists (OAA) Research Committee Chair

“Acupuncture can address the national opioid epidemic as a medically effective, evidence-based, safe, cost-effective, non-pharmacological pain-management intervention.” ¹⁰³

Outline



- Goals
- Personal Experience
- Literature Review Criteria
- About Acupuncture
- Sham and Placebo
- Supporting Agencies
- Clinical- and Cost-Effectiveness: Pain, Opioids, Mental Health
- Mechanisms
- Insurance Coverage
- Model Clinic
- References



Goals

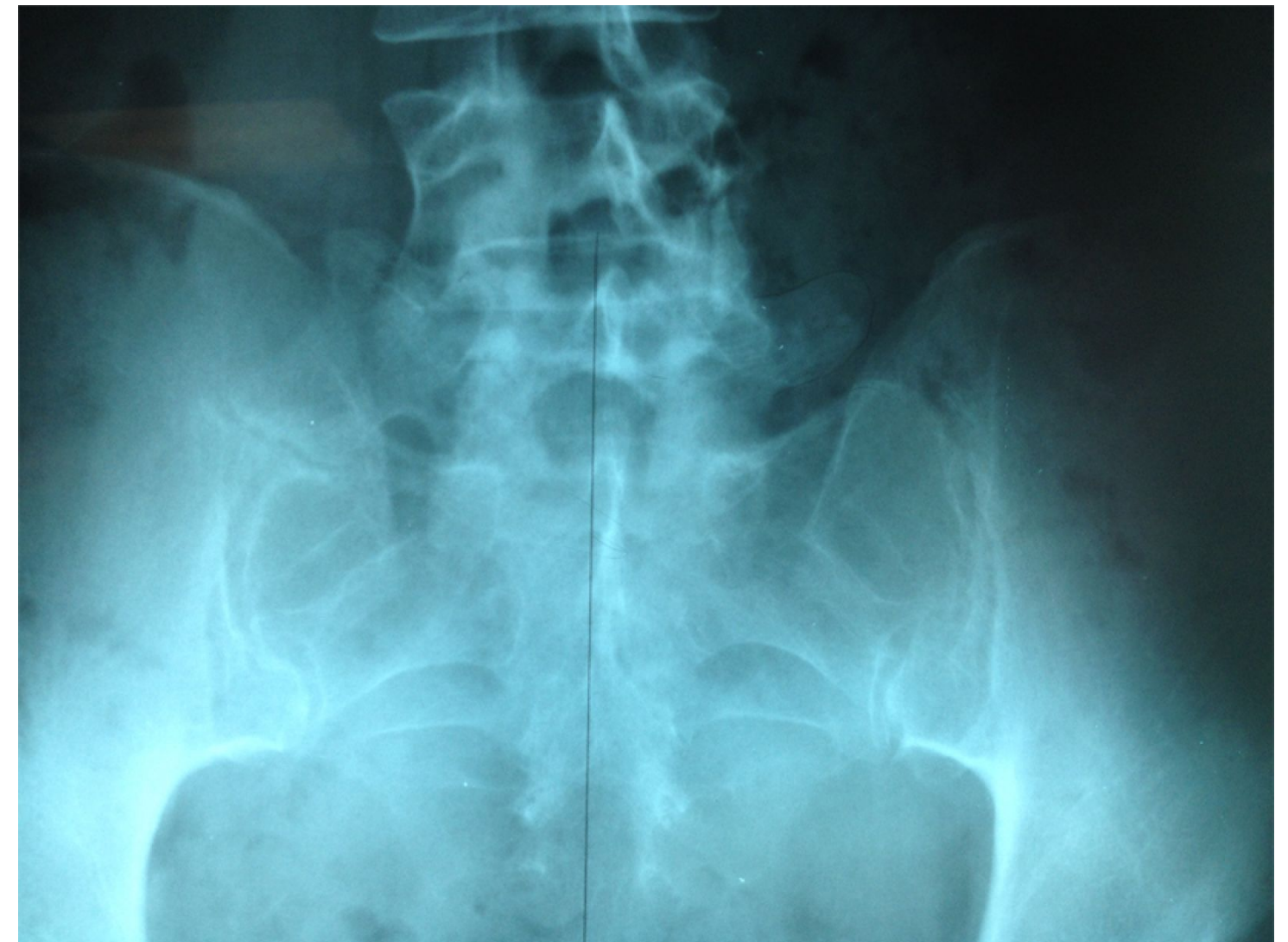


- (1) Demonstrate the position of acupuncture to be a first-line, non-pharmacological pain management and substance dependence treatment option
- (2) Equip you with the confidence to refer patients for acupuncture knowing that it is safe, evidence-based, well-supported by both leading institutions, and covered by most insurance plans in Oregon.

Personal Experience with Chronic Pain



- Car accident at age 12, 100 mph impact
- Transitional segment / ligament laxity
- Pain relief
 - acupuncture, breathing, yoga, qigong, shiatsu, prolotherapy, physical therapy



About Acupuncture



- Modern technique
- Ancient roots in China and Southeast Asia
- Involves the **insertion of very fine, sterile, single-use needles** into various points on the body ^{1,2}
- Accessory techniques/modalities: electro-stim, cupping, gua sha, moxibustion, acupressure, ear seeds, bodywork (shiatsu, tuina)
- **Diagnosis => observational data intake**
 - OPQRST; range of systems; tongue/pulse; palpation
 - individualized pattern diagnoses + unique point prescriptions



Acupuncture Training Regulation



- In the US, acupuncturists complete academic training →→ **Master's and Doctoral degrees.** ^{3,4,5,6}
- **Regulatory agencies oversee the practice of acupuncture**
 - academic program accreditation ⁷ (ACAHM)
 - certification ^{8,9} (CCAHM Clean Needle Technique and 4 NCCAOM board exams)
 - licensing ¹⁰ (Oregon Medical Board)
 - continuing education and professional development ⁹ (NCCAOM)
 - advocacy for the profession ^{11,12} (ASA, OAA)

Supporting Agencies



The use of acupuncture as an effective, evidence-based pain-management option has **strong support from leading healthcare institutions.** ¹³⁻¹⁹

- Center for Disease Control (CDC) ¹³
- Centers for Medicare & Medicaid Services (CMS) ¹⁴
- Department of Veterans Affairs (DVA) ¹⁴
- American Academy of Pain Medicine (AAPM) ¹⁶
- American College of Physicians ¹⁷
- Food and Drug Administration (FDA) ¹⁷
- The Joint Commission, a hospital accrediting agency ¹⁷
- National Academies of Science, Engineering, and Medicine ¹⁷
- National Institutes of Health (NIH) ¹⁸
- World Health Organization (WHO) ¹⁹

Literature Review Background



- **PAST**
 - 2018-2020: Oregon College of Oriental Medicine (OCOM)
 - Research proposal on acupuncture needle retention duration
 - 2022: OAA written comment for CDC's new Opioid Prescription Guidelines
 - *The new guidelines mention acupuncture 45 times!*
- **PRESENT**
 - 2023-2024: OAA written content for Oregon Health Authority's (OHA's) Oregon Pain Management Commission (OPMC)
 - 5-min video segment on acupuncture for pain management
- **FUTURE**
 - 2024-2025: OAA future submission to Oregon Health Evidence Review Commission (HERC)
 - expand insurance coverage for conditions treated by acupuncture

Literature Review Methods/Results



- Methods (systematic reviews; PubMed; 1-5 years, 10+ years)
- Results (not exhaustive; all included in written content)
 - 49 systematic reviews (clinical effectiveness, sham, placebo, cost-effectiveness)
 - 16 randomized controlled trials (RCTs) (clinical effectiveness, sham, placebo, cost-effectiveness)
 - 5 Randomized Trials (RTs) (clinical effectiveness, sham, cost-effectiveness)
 - 1 Prospective Cohort (clinical effectiveness for opioid use reduction)
 - 4 Insurance Claims Analyses (1 opioid use reduction and 3 cost-effectiveness)
 - 6 Reviews of Current Research (placebo)
 - 1 Clinical Update (placebo)
 - 1 Scientific Talk Summary (placebo)
 - 1 Conversation Paper (placebo)
 - 3 White Papers (sham, acute pain, cost-effectiveness)

A Note on Sham Acupuncture



- Equivalent results between acupuncture treatment and sham or minimal acupuncture controls ²⁰⁻²⁵:
 - **“consistent underestimation of the true effect size of acupuncture interventions”** ²⁰
 - **under-reporting in the literature** ^{21,23-28}
- **Sham and placebo-controlled acupuncture produce treatment effects.** ^{20,26-42}
- Acupuncture and sham often have **clinically superior outcomes**
 - **to standard of care** ^{20,23-25,30,32,33,35-37} and to **no intervention controls.** ^{24-29,33,36-38}
- **Acupuncture + standard of care** often improves clinical outcomes. ²⁴⁻²⁶
- **Clinical effectiveness comparison outcomes** emerge as new standard in acupuncture research

A Note on Placebo



- **“Placebo effect” may be a collection of treatment effects present in all medical encounters:**
 - the medical ritual ⁴⁵⁻⁵³ and symbolic importance ^{50,53} of treatment
 - the patient-practitioner relationship ^{43,47,50,52,53}
 - listening to and caring for the patient ^{43,46,50,53}
 - encouragement, ^{43,53} empathy, ^{43,48,49,53} reassurance, ³⁶ mutual respect, ^{43,53}
 - practitioner communication style, ^{43,48,50,52} appearance of competence, ⁵⁰ and desire to help ⁴³
 - the treatment setting ^{48,49,53} and type of intervention ⁴⁸
 - “mental, social, and contextual factors” ⁴⁹ embedded in medical encounters ^{49,50}
- Placebos **cause physiological change** ⁵⁰
 - increased endogenous opioids, cannabinoids, and peptide hormones (cholecystokinin)
 - increased dorsolateral prefrontal cortex activity → → heightened descending pain modulation pathways

Clinical Effectiveness of Acupuncture:

Evidence-Based Research



- **Safe, effective, evidence-based, non-pharmacological pain management option**
 - chronic and acute pain ^{30,22,24-30,34-37,40,54-69}
 - lower need for opioids ^{64,70-75}
 - improved mental-health outcomes ^{31-33,38,39,41,42,76-85}
 - benefits persist over time (cost-effective) ^{20,27,28,40,86-102}

Clinical Effectiveness of Acupuncture:

Evidence-Based Research - Conditions Included



Pain ^{20,22,24-30,34-37,40,54-69}

Chronic Pain ^{20,}

Low Back Pain ^{20,26-29,40,55}

Neck Pain ^{37,40,56}

Episodic Migraine Pain ^{20,40,57}

Tension Headache Pain ^{20,34,40,58}

Osteoarthritis Pain ^{20,36,49,59-61}

Cancer Pain ^{20,62-64}

Acute Pain ^{22,65-69}

Pancreatic Pain ^{66,67}

Low Back Pain ^{22,68}

Post-Tonsillectomy Pain ⁶⁹

Acupuncture for Opioid Use Reduction ^{64,70-75}

Opioid Use During/After Surgery ⁷⁰⁻⁷²

Opioid Dependence Treatment ⁷³⁻⁷⁵

Acupuncture for Mental Health ^{32,33,38,39,41,42,76-80,83-85}

Depression ^{32,33,76-80}

Anxiety ^{81,82}

Insomnia ^{38,39,41,42,83}

PTSD ^{84,85}

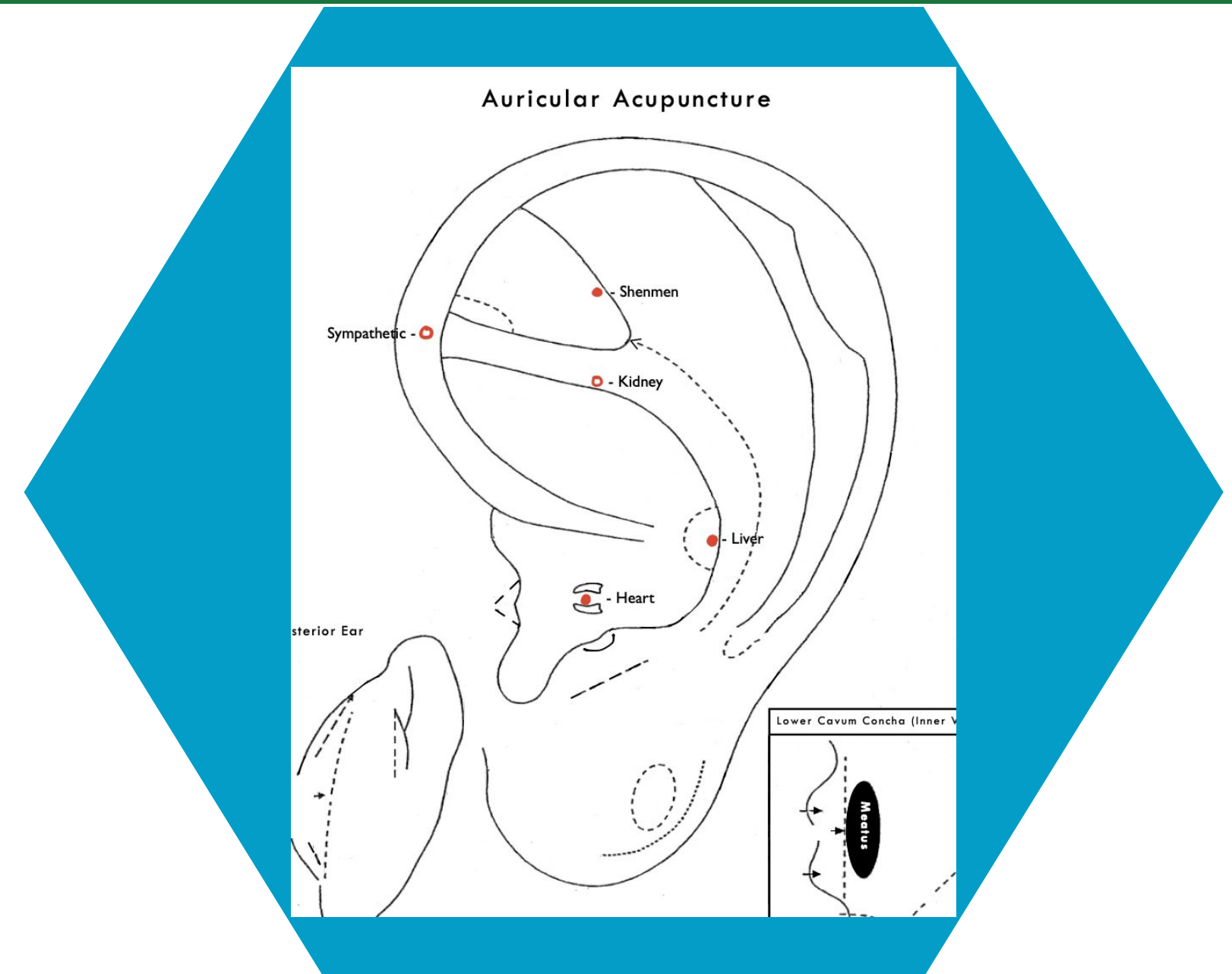
Clinical Effectiveness of Acupuncture:

Auricular Acupuncture



- National Acupuncture Detox Association (NADA)
 - 5NP (5-needle protocol)
 - pain
 - substance use
 - mental health

image source: Oregon College of Oriental Medicine



Clinical Effectiveness of Acupuncture for Pain: Evidence-Based Research - Foundational Reviews



Hempel et al., (2014) Department of Veterans Affairs' Evidence Map of Acupuncture⁵⁴

- Systematic Review/Meta-Analysis of 183 studies
- **Strong evidence of positive effect:** *headaches, chronic pain, and migraines*
- **Potential positive effect** (10 conditions): *general pain, osteoarthritis, dysmenorrhea, pregnancy pain, labor pain, prostatitis, cancer pain, temporomandibular pain, plantar heel pain, ankle sprain*

McDonald & Janz (2017) Australian Acupuncture/Chinese Medicine Association's Acupuncture Evidence Project²⁰

- **Evidence of effect:** 117/122 conditions; **evidence increased:** 24/122 conditions
- **Positive Treatment Effect (8); Cost-Effectiveness (10); Evidence of Safety (9)**
 - chronic low back pain, migraines, headache, knee osteoarthritis, allergic rhinitis
 - dysmenorrhea and post-op nausea/vomiting

Clinical Effectiveness of Acupuncture for Pain: Evidence-Based Research - Chronic Pain



Vickers AJ, Vertosick EA, Lewith GL, MacPherson H, Foster NE, Sherman KJ, Irnich D, Witt CM. Acupuncture for chronic pain: update of an individual patient data meta-analysis. *J Pain*. 2018 May;19(5):455–474. doi:10.1016/j.jpain.2017.11.005.²⁷

- **Study:** 2018 systematic review/meta-analysis; **42 randomized controlled trials (RCTs); 20,827 patients**
- **Methods:** MEDLINE + Cochrane through 2015
- **Pain and Function Results**
 - **“Acupuncture superior to sham and no acupuncture control for each pain condition (all $p < 0.001$).”**
 - acupuncture vs no acupuncture: ~0.5 standard deviations (SD)
 - acupuncture vs sham: ~0.2 SDs
- **Conclusions**
 - **“Clear evidence that the effects of acupuncture persist over time”**
 - **Effect sizes related to type of control**

Clinical Effectiveness of Acupuncture for Pain: Evidence-Based Research - Chronic Pain



Cummings M. Modellvorhaben Akupunktur - a summary of the ART, ARC and GERAC trials. *Acupunt Med.* 2009;27(1):26-30. ²⁸

- **Study:** German Federal Committee of Physicians and Health Insurers (October 2000)
 - **51,666 participants** in three randomized controlled trials (RCTs)
- **Overall Conclusions:**
 - Acupuncture “**effective in a range of chronic conditions**” (low back pain, migraines, osteoarthritis)
 - **More effective than usual care:** *low back pain, knee osteoarthritis* ($p < 0.000$); *differences at 3 months* ($p < 0.001$)
 - “**Acceptable [biomedical] cost-effectiveness**” with **persistent effects (up to 1 year)** with/without usual care
 - “**Sham acupuncture ... unlikely to be an inactive placebo.**”
 - April 2006: **German social insurance plans cover acupuncture** (*chronic low back pain, chronic knee osteo*)

Clinical Effectiveness of Acupuncture for Pain: Evidence-Based Research - Chronic Pain



- **RECENT SYSTEMATIC REVIEWS/META-ANALYSES + ONE LARGE-SCALE RCT**
 - **ACUPUNCTURE + ROUTINE TREATMENT (RT) = GREATER BENEFITS**
 - Turkistani et al., (2021)⁵⁸ 8 articles; 846 tension headache patients: 50% > pain relief; manual therapy = pharma
 - Zhu et al., (2021)⁶⁶ 19 studies; 1,503 acute pancreatitis patients: significant increase in total effectiveness rate (P = 0.001)
 - Zhang et al., (2019)⁶⁷ 12 studies; acute pancreatitis pain patients: significantly improved total effectiveness rate + GI function
 - Seo et al., (2017)⁵⁶ 16 RCTs; 744 chronic neck pain patients: even greater pain relief
 - Cummings (2009) 3 parallel RCTs; 51,666 chronic pain patients: “clinically relevant differences at 3 months” (p<0.001)
 - Lee et al., (2013)³⁵ 11 RCTs; 1,139 acute low back pain patients: relieved acute low back pain better than NSAIDs

Clinical Effectiveness of Acupuncture for Pain: Evidence-Based Research - Chronic Pain



- **RECENT SYSTEMATIC REVIEWS/META-ANALYSES + TWO SMALL RCTs**
 - **MORE EFFECTIVE + SAFER THAN MEDICATION**
 - **Giovanardi et al., (2020)⁵⁷** 9 RCTs; 1,484 migraine patients: “mildly more effective and much safer than medication”
 - **Su et al., (2021)⁶⁸** 13 RCTs; 899 acute low back pain patients: 11 RCTs; 707 participants
 - **statistically significant (moderate-quality) visual analog scale score improvements; fewer pills vs control**
 - **Gilbey et al., (2014)⁶⁹** RCT; 60 children 3–12 years with acute post-tonsillectomy pain
 - **“Less pain, less analgesic drug consumption, and higher patient/parent satisfaction.”** No adverse effects.
 - **DOSE-RESPONSE**
 - **Lin et al., (2020)⁵⁹** RCT; 60 knee osteoarthritis patients; 1 or 3 acupuncture sessions/week for pain/function
 - **3 sessions/week: *significant differences* week 4 (P = 0.001), week 16 (P < 0.001); **benefits persisted****

Clinical Effectiveness of Acupuncture:

Evidence-Based Research - Opioid Use Reduction



- Acupuncture is a **safe, effective, evidence-based, non-pharmacological pain management option** that **reduces patients' needs for opioids** ^{64,70-75}
 - Opioid Use During/After Surgery ⁷⁰⁻⁷²
 - Opioid Dependence Treatment ⁷³⁻⁷⁵

“The majority of reviews found acupuncture therapy to be an efficacious strategy for acute pain, with potential to avoid or reduce opioid reliance.”⁶⁵

-Nielsen (2022) meta-analysis of 22 studies

Clinical Effectiveness of Acupuncture:

Evidence-Based Research - Opioid Use Reduction



He Y, Guo X, May BH, Zhang AL, Liu Y, Lu C, Mao JJ, Xue CC, Zhang H. Clinical evidence for association of acupuncture and acupressure with improved cancer pain: a systematic review and meta-analysis. *JAMA Oncol.* 2020 Feb 1;6(2):271-278. doi: 10.1001/jamaoncol.2019.5233. ⁶⁴

- **Study:** 2020 systematic review/meta-analysis; 14 RCTs; 920 cancer pain patients
- **Results Acupuncture, Acupressure, + Analgesic Therapy (moderate evidence)**
- **“Significant association” with**
 - **PAIN REDUCTION:** (MD, -1.44 points; 95% CI, -1.98 to -0.89; I₂ = 92%)
 - **OPIOID DOSAGE REDUCTION:** (MD, -30.00 mg morphine equivalent daily dose; 95% CI, -37.5 mg to -22.5 mg)

Clinical Effectiveness of Acupuncture:

Evidence-Based Research -

Post-Surgical Opioid Use Reduction



Pham T, Ma O, Agiro A, Bukowiec J, Flannery T. Do acupuncture services reduce subsequent utilization of opioids and surgical interventions compared to noninvasive therapies among patients with pain conditions? *Pain Med.* 2021;22(11):2754-2762. doi: 10.1093/pm/pnab187⁷¹

- **Study:** 2021 retrospective observational study of insurance claims; 52,346 patients
- **Treatments:** acupuncture, NSAIDs, PT
- **Acupuncture Results**
 - **LOWER OPIOID USE** for those “with ($P < .001$) and without ($P < .001$) baseline opioid use.”
 - **FEWER ER VISITS** ($P < .001$)

Clinical Effectiveness of Acupuncture:

Evidence-Based Research - Opioid Use Reduction



Tedesco D, Gori D, Desai KR, Asch S, Carroll IR, Curtin C, McDonald KM, Fantini MP, Hernandez-Boussard T. Drug-free interventions to reduce pain or opioid consumption after total knee arthroplasty. *JAMA Surg.* 2017; 152(10): e172872. doi: [10.1001/jamasurg.2017.2872](https://doi.org/10.1001/jamasurg.2017.2872)⁷²

- **Study:** 2017 systematic review/meta-analysis; 39 RCTs; 2,391 patients
- **Acupuncture Results**
 - **DELAYED OPIOID USE (P < .001):** statistically significant (moderate level) evidence
 - **REDUCED PAIN (P = .003):** statistically significant (low certainty) evidence
- **Electroacupuncture Results**
 - **REDUCED OPIOID USE** -5.90 to -1.10 mg/kg morphine equiv/48 hours (P = .004); moderate evidence

Clinical Effectiveness of Acupuncture: Evidence-Based Research - Opioid Use Reduction



Wen H, Wei X, Ge S, Zeng J, Luo W, Chen R, Dong Y, Xiao S, Lai Y, Lu L. Clinical and economic evaluation of acupuncture for opioid-dependent patients receiving methadone maintenance treatment: the integrative clinical trial and evidence-based data. *Front Public Health*. 2021;9:1-12. ⁷³

- **Study:** 2021 RCT involving 123 patients; acupuncture and methadone
- **RESULTS: ACUPUNCTURE + METHADONE significantly improved ($P < 0.05$):**
 - **DAILY METHADONE DOSAGE** (17.68 vs. 1.07)
 - **DRUG CRAVINGS** (visual analog scores (VAS) 38.27 vs. 2.64)
 - **INSOMNIA** (Pittsburgh Sleep Quality Index (PSQI) 2.18 vs. 0.30)
- **RESULTS: ACUPUNCTURE**
 - **HIGHER QUALITY OF LIFE (Quality-Adjusted Life Year (QALY) quality/quantity measures**
 - 0.0784 (95%CI: 0.0761–0.0808); control: 0.0762 (95%CI: 0.0738–0.0787)
 - **HIGHER ACUPUNCTURE COSTS but “economically efficient” ICER scores** (clinical effectiveness compared w/ comparative value)
 - ICER scores: daily methadone dosage (41.15), VAS (17.86), PSQI (313.51)

Clinical Effectiveness of Acupuncture:

Evidence-Based Research for Mental Health



- Acupuncture is a **safe, effective, and evidence-based non-pharmacological pain management option for improved mental health outcomes.** ^{31-33,38,39,41,42,76-85}
 - Depression ^{32,33,76-80}
 - Anxiety ^{81,82}
 - Insomnia ^{38,39,41,42,83}
 - PTSD ^{84,85}

Clinical Effectiveness of Acupuncture:

Evidence-Based Research for Mental Health - Depression



Xu G, Xiao Q, Huang B, Lei H, Yin Z, Huang L, Zhou Z, Tian H, Huang F, Liu Y, Sun M, Zhao L, Liang F. Clinical evidence for association of acupuncture with improved major depressive disorder: a systematic review and meta-analysis of randomized control trials. *Neuropsychobiology*. 2023;82(1):1. Epub 2022 Dec 22. ²⁴

- **Study:** 2023 systematic review/meta-analysis; 43 studies; 3,756 participants with depression
- **Results “HIGH-QUALITY EVIDENCE”**
 - Acupuncture or acupuncture + antidepressant medications to treat depression vs sham or antidepressants
 - **Acupuncture = adverse effects than antidepressants**
- **Conclusions:** According to **high-quality evidence**, acupuncture and acupuncture + antidepressant treatment of depression yielded a **statistically significant reduction in depression scores**.

Clinical Effectiveness of Acupuncture:

Evidence-Based Research for Mental Health - Depression



Xu G, Lei H, Huang L, Xiao Q, Huang B, Zhou Z, Tian H, Huang F, Liu Y, Zhao L, Li X, Liang F. The dose-effect association between acupuncture sessions and its effects on major depressive disorder: a meta-regression of randomized controlled trials. *J Affect Disord.* 2022 Aug 1;310:318-327. doi: 10.1016/j.jad.2022.04.155. Epub 2022 May 2. ⁷⁷

- **Study:** 2022 systematic review/meta-analysis; 62 studies; 2,269 patients with major depressive disorder (MDD)
- **Results dose-dependent: > acupuncture sessions = > reduction in depression scores, improved symptoms**
 - 8 acupuncture treatments: depression scores decreased by 17.68 (95% CI: -11.81, -4.80) to 8.30 (95% CI: 14.23-21.13)
 - 24 acupuncture treatments: depression scores decreased for 51% of cases (95% CI: 48% to 54%)
 - **36 acupuncture treatments: depression rating score improvement maxed at 66% of cases (95% CI: 59% to 72%).**

Clinical Effectiveness of Acupuncture:

Evidence-Based Research for Mental Health - Anxiety



Li M, Liu X, Ye X, Zhuang L. Efficacy of acupuncture for generalized anxiety disorder: a PRISMA-compliant systematic review and meta-analysis. *Medicine (Baltimore)*. 2022 Dec 9;101(49):e30076. doi: 10.1097/MD.00000000000030076.⁸¹

- **Study:** 2022 systematic review/meta-analysis; 27 studies; 1,782 participants with generalized anxiety disorder (GAD)
- **Results (Acupuncture vs Control)**
 - **REDUCED ANXIETY**
 - Hamilton Anxiety Scale score [MD = -0.78, 95%CI (-1.09, -0.46)]
 - Total effective rate [RR = 1.14, 95%CI (1.09, 1.19)]
 - Self-Rating Anxiety Scale score [MD = -2.55, 95%CI (-3.31, -1.80)]
 - **HIGHER SAFETY WITH FEWER ADVERSE EVENTS**
 - Lower Treatment Emergent Symptom Scale (TESS) scores [MD = -1.54, 95%CI (-1.92, -1.17)]

Clinical Effectiveness of Acupuncture:

Evidence-Based Research for Mental Health - Insomnia



Kim S-A, Lee S-H, Kim J-H, van den Noort M, Bosch P, Won T, Yeo S, Lim S. Efficacy of acupuncture for insomnia: a systematic review and meta-analysis. *Am J Chin Med.* 2021;49(5):1135-1150. doi: 10.1142/S0192415X21500543. ⁸³

- **Study:** 2021 systematic review/meta-analysis; 22 RCTs (6 quantitative; 22 qualitative); 1,678 cancer patients/survivors
- **Acupuncture Results**
 - **Qualitative:** “beneficial efficacy of acupuncture on sleep without serious adverse events in several studies (55%).”
 - **Meta-analysis (4 studies): significant Pittsburgh Sleep Quality Index (PSQI) SCORES vs waitlist** for breast cancer patients (MD -1.92, 95% CI -3.25 to -0.59, $p = 0.005$)
 - **MANUAL ACUPUNCTURE vs ESTAZOLAM (2 studies)**
 - **Similar results immediately post-intervention** (RR: 0.94, 95% CI: 0.87 to 1.01, $p = 0.09$)
 - **At 1-week acupuncture “SIGNIFICANTLY BETTER EFFECTIVE RATE VS ESTAZOLAM”**
 - (RR: 1.25, 95% CI: 1.10 to 1.43, $p = 0.0009$).
 - **“Adverse events were mild or moderate in severity.”**

Clinical Effectiveness of Acupuncture:

Evidence-Based Research for Mental Health - PTSD



Engel CC, Cordova EH, Benedek DM, Liu X, Gore KL, Goertz C, Freed MC, Crawford C, Jonas WB, Ursano RJ. Randomized effectiveness trial of a brief course of acupuncture for posttraumatic stress disorder. *Med Care*. 2014 Dec;52(12 Suppl 5):S57-64. doi: 10.1097/MLR.0000000000000237. ⁸⁴

- **Study:** 2014 randomized trial (RT); 55 military service members w/ PTSD
- **Treatments:** acupuncture 2x/week for 4 weeks + usual care or usual care alone
- **RESULTS: ACUPUNCTURE vs USUAL CARE**
 - **SIGNIFICANTLY GREATER “mean IMPROVEMENT in PTSD SEVERITY”** (PCLΔ=19.8±13.3 vs. 9.7±12.9, P<0.001; CAPSΔ=35.0±20.26 vs. 10.9±20.8, P<0.0001)
 - **“SIGNIFICANTLY GREATER IMPROVEMENTS IN DEPRESSION, PAIN, AND PHYSICAL AND MENTAL HEALTH FUNCTIONING.”**
- **Conclusions:** ***“ACUPUNCTURE WAS EFFECTIVE FOR REDUCING PTSD SYMPTOMS”*** in this small sample size group.

Cost-Effectiveness of Acupuncture: Evidence-Based Research



- Acupuncture is
 - **cost-effective**^{20,27,28,40,86-102}
 - **benefits persist over time**^{20,27,28,40,86-102}

Cost-Effectiveness of Acupuncture: Evidence-Based Research



Elton D (Optum Insurance). The National Academies of Science, Engineering, Medicine. Session 3 [Video]. YouTube. Published Dec 7, 2018. Accessed January 22, 2022. <https://www.youtube.com/watch?v=vQO5CsuzfRM>.⁸⁵

- 2018 insurance claims data talk
- **Cost savings** when patients see integrative care providers (acupuncturists, physical therapists, chiropractors) first
 - vs primary care physicians
 - > \$100 per *non-surgical low back pain event*
 - vs specialists
 - \$1,000 savings *per medical event*

Cost-Effectiveness of Acupuncture: Evidence-Based Research



MacPherson H, Vertosick EA, Foster NE, Lewith G, Linde K, Sherman KJ, Witt CM, Vickers AJ. The persistence of the effects of acupuncture after a course of treatment: a meta-analysis of patients with chronic pain. *Pain*. 2017 May; 158(5): 784–793. doi:10.1097/j.pain.0000000000000747⁴⁰

- **Study:** 2017 systematic review/meta-analysis; 29 trials; 17,922 patients with chronic musculoskeletal pain, knee osteoarthritis, and headache/migraine
- **Results:** long-term follow-up data (20 trials; 6,376 patients)
 - **acupuncture vs control** (wait-list, usual care): *treatment effects persisted at 3 mo* (95% CI: -0.014 to 0.037, p = 0.4)
 - *“About 90% of the benefit[s] ... sustained at 12 months.”*
- **Conclusions:**
 - *“Treatment effects persist”* at least 3-12 months.

Cost Effectiveness of Acupuncture:

Evidence-Based Research - Cost-Effectiveness



Zhao W, Huang H, Liu K, Wang S, Lin S, Long W, Li L, Zeng J, Lin G. Acupuncture and moxibustion for peripheral neuropathic pain: a frequentist network meta-analysis and cost-effectiveness evaluation. *Evid Based Complement Alternat Med.* 2022 Mar 16:2022:6886465. doi: 10.1155/2022/6886465. eCollection 2022. ¹⁰¹

- **Study:** 2022 systematic review/meta-analysis; 16 RCTs; 1,308 peripheral neuropathic pain (PNP) patients
- **Treatments:** 7 acupuncture and/or moxibustion treatments and 2 pharmaceutical interventions
- **Results:**
 - All **acupuncture and moxibustion** treatments (except acupoint injection) “**showed superior improvements**”
 - They “*were more cost-effective as compared to pharmaceutical treatments.*”
 - Most effective treatments: **warm needling, fire needling, moxibustion**
 - **Fire needling:** “lowest incremental cost” vs NSAIDS
- **Conclusions:** Acupuncture and moxibustion *clinically effective and cost-effective treatments for peripheral neuropathic pain.*

Cost Effectiveness of Acupuncture:

Evidence-Based Research - Cost-Effectiveness



ADDITIONAL SYSTEMATIC REVIEWS/META-ANALYSES

- **NIH (2022)⁹⁶** 6 studies; adults ≥ 16 years of age with osteoarthritis (any joint)
 - *“Electroacupuncture was cost effective versus usual care”* for treating osteoarthritis pain.
- **Skonnord et al., (2022)⁸⁹** 2° analysis of 1 Norwegian RCT; 171 participants with acute low back pain ≥ 14 days.
 - *“Acupuncture may be cost-effective [for acute non-specific low back pain] from a 1-year perspective.”*
- **Sutton and McCormack (2019)⁹⁹** 33 publications; acupuncture for chronic non-cancer pain.
 - Majority “suggested evidence of effectiveness” but varied “depending on the patient population.”
 - *Electroacupuncture > cost-effective than 6 NSAIDS for chronic low back pain.*
- **Vickers et al., (2018)²⁷** 42 studies; 20,827 patients with 4 chronic pain conditions
 - **Persistence: “clear evidence that the effects of acupuncture persist over time”** ~15% decrease in effect at one year.

Mechanisms of Acupuncture



- **Connective Tissue**

- Ultrasound visualizations show collagen connective tissues winding and pulling around acupuncture needles upon insertion into tissue, stimulating matrix deformation, microstructural cellular changes, and mechanotransduction.^{103-117,133}

- **Biochemical, Bioelectrical, and Molecular**

- Mechanical connective tissue forces trigger downstream physiological cascades involving biochemical, bioelectrical, and molecular expression pathways that produce tangible physiological effects:¹⁰³⁻¹³⁹

Nociceptive/analgesic, pain-relieving actions^{103,118,121,123,127-129}
Anti-inflammatory actions^{118,120-125,128,129,132}
Antioxidant effects^{120,121,125,126,132}
Autonomic vagus nerve regulation^{119,122,125,127,132}
Increased endogenous opioids^{119,121,123,126,128,129}
Action on cannabinoid CB2 receptors^{121,129}
Neuromodulation via neurotransmitter actions^{105,119,121,123,126,128,129}

Neuroendocrine actions^{119,121,123,126,128,129}
Neuroimmune regulation via mast cell activation^{103,121,125,130,132}
Neuroplastic brain changes visible on MRI/fMRI¹³³⁻¹³⁶
Neural growth and /regeneration/apoptosis reduction^{120,121,123}
Whole-brain impacts via the default mode network^{125,135,137,138}
Microbiome changes^{121,125,139} affect mood/pain perception^{121,137}
Microcirculatory changes¹²⁰

3. Experience of Pain

- The changes that occur within the brain and body affect the psychological interpretation and experience of pain.^{121,129,137}

Insurance Coverage for Acupuncture in Oregon



- Since January 2022, **Oregon Law (OAR 836-053-0017) requires all insurance companies to cover acupuncture as an essential health benefit with 12 visits/year.** ¹⁴¹
- Most common conditions covered: ¹⁴¹⁻¹⁵⁵
 - **pain:**
low back pain, neck pain, spine pain, osteoarthritis, chronic pain, migraine and tension headache pain, neuromuscular conditions, postoperative dental pain, temporomandibular disorders
 - **nausea:** post-operative/chemotherapy-induced/pregnancy-related nausea and vomiting
 - **substance use**
- **Note:** plans vary → conditions covered, number of visits, preauthorization requirement

Insurance Coverage for Acupuncture in Oregon:

Oregon Health Plan (OHP)



- The Oregon Health Plan (OHP), a medicaid program run by the Oregon Health Authority, covers regular acupuncture visits “to reduce pain and symptom burden” for the following conditions: ^{142, 143}
 - **conditions of the back and spine**
 - **scoliosis**
 - **knee osteoarthritis**
 - **migraine headaches**
 - **tension headaches**
 - **substance use**
 - **behavioral health conditions related to substance use**
 - post-stroke depression
 - HIV+ status
 - palliative care pain and symptom relief
 - symptoms from multiple types of cancer (various comprehensive body systems)
 - conditions of pregnancy (hyperemesis gravidarum, breech, and back/pelvic pain)

Acupuncture within an Integrative Care Setting:

Quest Center for Integrative Health ¹⁵⁶



- **Mental Health Services** - Individual Counseling, Group Therapy, Peer Support
- **Medical Services** - Acupuncture, Chinese Herbal Medicine, Naturopathy, Massage, Nutrition
 - **WISH** - Wellness, Integrity, and Sustainable Health, *Pain Management Program*
 - **FSR** - Finding and Sustaining Recovery, *Substance Dependence Treatment Program*
 - **LINK** - Living with Intention and Knowledge, *Harm Reduction Program*
 - **TRI** - The Resilience Initiative, *Outpatient Substance Treatment*
 - **HIV Services** - *Integrated Behavioral Health Services* for people living with HIV

Summary



Highly regulated.³⁻¹² **Strong support from leading healthcare institutions.**¹³⁻¹⁹

Safe, effective, evidence-based non-pharmacological pain management option^{20,22,24-30,34-37,40,54-69}
for chronic and acute pain, lower need for opioids,^{64,70-75} **and improved mental-health.**^{31-33,38,39,41,42,76-85}

Cost-effective. Benefits persist.^{20,27,28,40,86-102}

Mechanisms: connective tissue stimulates biochemical, bioelectrical, and molecular cascades,
producing tangible physiological effects that reduce pain and the experience of pain.¹⁰³⁻¹³⁹

Insurance companies in Oregon are **required to cover acupuncture as an essential health benefit**, including the **Oregon Health Plan (OHP)** and private insurance carriers.¹⁴⁰⁻¹⁵⁵

Quest Center for Integrative Health: a model integrative clinic for mental health, pain management, substance use¹⁵⁶



OAA website:

<https://www.oregonacupuncturists.com/resources/>

email Kelly at:

research@oregonacupuncturists.com





Questions, comments,
thoughts?

References



1. National Center for Complementary and Integrative Health. Acupuncture: What You Need To Know. Accessed on April 8, 2024. Available at <https://www.nccih.nih.gov/health/acupuncture-what-you-need-to-know>.
2. Cleveland Clinic. Acupuncture. Accessed on April 9, 2024. Available at <https://my.clevelandclinic.org/health/treatments/4767-acupuncture>.
3. National University of Natural Medicine. Course Catalog: 2023-24. Accessed on April 9, 2024. Available at <https://www.pacificcollege.edu/current/college-catalog>.
4. Oregon College of Oriental Medicine. College Publications: Academic Catalogs. “2023-2024 + addenda.” Accessed on April 8, 2024. Available at <https://www.ocom.edu/publications-archive>.
5. Emperor’s College. Emperor’s College Publications. “2023-24 Catalog and Student Handbook (updated 9/13/2023).” Accessed on April 8, 2024. Available at <https://www.emperors.edu/publications/>.
6. Colorado Chinese Medicine University Course Catalog. Accessed on April 5, 2024. Available at <https://ccmu.edu/wp-content/uploads/2024/04/CCMU-Catalog-Spring-2024-4-1-2024.pdf>
7. Accreditation Commission for Acupuncture and Herbal Medicine (ACAHM). Accessed on April 8, 2024. Available at <https://www.acahm.org/>.
8. Council of Colleges of Acupuncture and Herbal Medicine (CCAHM). Clean Needle Technique (CNT). Accessed on April 8, 2024. Available at <https://www.ccahm.org/ccaom/default.asp>.
9. National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM). Certification Handbook. Accessed on April 8, 2024. Available at https://www.nccaom.org/wp-content/uploads/pdf/NCCAOM_Certification_Handbook_Sept_2023.pdf.
10. Oregon Medical Board. Acupuncturist: Eligibility Requirements for Oregon Licensure. Accessed on April 8, 2024. Available at <https://www.oregon.gov/omb/licensing/pages/acupuncturist.aspx>.
11. American Society of Acupuncturists. Accessed on April 8, 2024. Available at <https://asacu.org/about-us/#mission-vision>.
12. Oregon Acupuncturists Association. About Us. Accessed on April 8, 2024. Available at <https://www.oregonacupuncturists.com/about/>.
13. McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017. <https://www.asacu.org/wp-content/uploads/2017/09/Acupuncture-Evidence-Project-The.pdf>
14. Langevin HM, Wayne PM, MacPherson H, Schnyer R, Milley RM, Napadow W, Lao L, Park J, Harris RE, Cohen M, Sherman KJ, Haramati A, Hammerschlag R. Paradoxes in acupuncture research: strategies for moving forward. *Evid Based Complement Alternat Med*. 2011;1-11. doi:10.1155/2011/180805
15. Cho Y-H, Kim C-K, Heo K-H, Lee MS, Ha I-H, Son DW, Choi BK, Song G-S, Shin B-C. Acupuncture for acute postoperative pain after back surgery: a systematic review and meta-analysis of randomized controlled trials. *Pain Pract*. 2015;15(3):279-91. doi:10.1111/papr.12208. Epub 2014 Apr 28.
16. Linde K, Niemann K, Schneider A, Meissner K. How large are the nonspecific effects of acupuncture: a meta-analysis of randomized controlled trials. *BMC Med*. 2010;8:75. <http://biomedcentral.com/1741-7015/8/75>
17. Linde K, Streng A, Jurgens S, et al. Acupuncture for patients with migraine: a randomized controlled trial. *JAMA*. 2005;293(17):2118-2125.
18. Melchart D, Streng A, Hoppe A, et al. Acupuncture in patients with tension-type headache: randomised controlled trial. *BMJ*. 2005;331(7513):376-382.
19. Vickers AJ, Cronin AM, Maschino AC, Lewith G, MacPherson H, Foster NE, et al. Acupuncture for chronic pain: individual patient data meta-analysis. *Arch Intern Med*. 2012;172(19):1444-53.
20. Vickers AJ, Vertosick EA, Lewith GL, MacPherson H, Foster NE, Sherman KJ, Irnich D, Witt CM. *J Pain*. 2018 May ; 19(5): 455–474. doi:10.1016/j.jpain.2017.11.005
21. Cummings M. Modellvorhaben Akupunktur—a summary of the ART, ARC and GERAC trials. *Acupunt Med*. 2009;27(1):26-30.
22. Baroncini A, Maffulli N, Eschweiler J, Molsberger F, Klimuch A, Filippo Migliorini F. Acupuncture in chronic aspecific low back pain: a Bayesian network meta-analysis. *J Orthop Surg Res*. 2022 Jun 20;17(1):319. doi:10.1186/s13018-022-03212-3

References



23. Li Z, Feng J, Yin S, Chen X, Yang Q, Gao X, Che D, Zhou L, Yan H, Zhong Y, Zhu F. *BMC Complement Med Ther*. Effects of acupuncture on mental health of migraine patients: a systematic review and meta-analysis. 2023 Aug 4;23(1):278. doi: 10.1186/s12906-023-04103-8.
24. Xu G, Xiao Q, Huang B, Lei H, Yin Z, Huang L, Zhou Z, Tian H, Huang F, Liu Y, Sun M, Zhao L, Liang F. Clinical evidence for association of acupuncture with improved major depressive disorder: a systematic review and meta-analysis of randomized control trials. *Neuropsychobiology*. 2023;82(1):1. Epub 2022 Dec 22.
25. Armour M, Smith CA, Wang LQ, Naidoo D, Yang GY, MacPherson H, Lee MS, Hay P. Acupuncture for depression: a systematic review and meta-analysis. *J Clin Med*. 2019;8(8) Epub 2019 Jul 31.
26. Smith CA, Armour M, Lee MS, Wang LQ, Hay PJ. Acupuncture for depression. *Cochrane Database Syst Rev*. 2018;3(3):CD004046. Epub 2018 Mar 4.
27. Linde K, Allais G, Brinkhaus B, et al. Acupuncture for the prevention of tension-type headache. *Cochrane Database Syst Rev*. 2016;(4):CD007587.
28. Lee J-H, Choi T-Y, Lee MS, Lee H, Shin B-C, Lee H. Acupuncture for acute low back pain: a systematic review. *Clin J Pain*. 2013;29(2):172-85. doi: 10.1097/AJP.0b013e31824909f9.
29. Manheimer E, Cheng K, Linde K, et al. Acupuncture for peripheral joint osteoarthritis. *Cochrane Database Syst Rev*. 2010;(1):C0001977.
30. Trinh KV, Graham N, Gross AR, Goldsmith CH, Wang E, Cameron ID, Kay T. Acupuncture for neck disorders. *Cochrane Database Syst Rev*. 2006.
31. Zhao F-Y, Fu Q-Q, Kennedy GA, Conduit R, Zhang W-J, Wu W-Z, Zheng Z. Can acupuncture improve objective sleep indices in patients with primary insomnia? A systematic review and meta-analysis. *Sleep Med*. 2021 Apr;80:244-259. doi:10.1016/j.sleep.2021.01.053. Epub 2021 Feb 2.
32. Zhang J, He Y, Huang X, Liu Y, Yu H. The effects of acupuncture versus sham/placebo acupuncture for insomnia: a systematic review and meta-analysis of randomized controlled trials. *Complement Ther Clin Pract*. 2020 Nov;41:101253. doi:10.1016/j.ctcp.2020.101253. Epub 2020 Nov 1.
33. MacPherson H, Vertosick EA, Foster NE, Lewith G, Linde K, Sherman KJ, Witt CM, Vickers AJ. The persistence of the effects of acupuncture after a course of treatment: A meta-analysis of patients with chronic pain. *Pain*. 2017 May; 158(5):784–793. doi:10.1097/j.pain.0000000000000747
34. Yin X, Liang T, Lu , Yue H, Li S, Zhong VW, Zhang W, Zhou S, Mi Y, Wu H, Xu S. Effect of electroacupuncture on insomnia in patients with depression: a randomized clinical trial. *JAMA Netw Open*. 2022;5(7):e2220563. doi:10.1001/jamanetworkopen.2022.20563.
35. 34. 83. Yin X, Gou M, Xu J, Dong B, Yin P, Masquelin F, Wu J, Lao L, Xu S. Efficacy and safety of acupuncture treatment on primary insomnia: a randomized controlled trial. *Sleep Med*. 2017;37:193. Epub 2017 Mar 8.
36. International Association for the Study of Pain (IASP). Nonspecific treatment effects in pain medicine. Published January 2011. Accessed April 11, 2024. <https://painsa.org.za/wp-content/uploads/2015/08/Nonspecific-Treatment-Effects-in-Pain-Medicine.pdf#:~:text=The%20nonspecific%20effects%20of%20treatment%20could%20be%20due,reduction%20of%20anxiety%2C%20increased%20optimism%2C%20and%20improved%20coping>
37. Kaptchuk T. Placebo effects in acupuncture. *Med Acupunct*. 2020;32(6):352-356. doi: 10.1089/acu.2020.1483
38. Kaptchuk TJ, Stason WB, Davis RB, Legedza ATR, Schnyer RN, Kerr CE, Stone DA, Nam BH, Kirsch I, Goldman RH. Sham device v inert pill: randomised controlled trial of two placebo treatments. *BMJ*. 2006;332(7538):391-7. doi:10.1136/bmj.38726.603310.55

References



39. Bannuru RR, McAlindon TE, Sullivan MC, Wong JB, Kent, DM, Schmid CH. Effectiveness and implications of alternative placebo treatments: a systematic review and network meta-analysis of osteoarthritis trials. *Ann Intern Med.* 2015;163:365-372. doi:10.7326/M15-0623
40. Miller FG, Brody H. Understanding and harnessing placebo effects: clearing away the underbrush. *J Med Philos.* 2011;36:69–78. doi:10.1093/jmp/jhq061
41. Conrad R. The hardest thing to see is what is in front of your eyes – quo vadis placebo analgesia? *J Pain Res.* 2016;9:819–823. <http://dx.doi.org/10.2147/JPR.S122147>
42. Jonas WB. The myth of the placebo response. *Perspect Sci.* 2019;10. doi:10.3389/fpsyg/2019.00577
43. Leopold S. A conversation with ... Ted J. Kaptchuck, expert in placebo effects. *Clin Orthop Relat Res.* 2021;479:1645-1650. doi:10.1097/CORR.0000000000001824
44. Kaptchuk TJ, Goldman P, Stone DA, Stason WB. Do medical devices have enhanced placebo effects? *J Clin Epidemiol.* 2000;53(8):786-792.
45. Kaptchuk TJ. The placebo effect in alternative medicine: can the performance of a healing ritual have clinical significance? *Ann Intern Med.* 2002;136:817-825.
46. Kaptchuk TJ, Hemond CC, Miller FG. Placebos in chronic pain: evidence, theory, ethics, and use in clinical practice. *BMJ.* 2020;370:m1668 doi: 10.1136/bmj.m1668
47. Center for Disease Control. Opioid Prescription Guidelines. Accessed January 8, 2024, from https://www.cdc.gov/mmwr/volumes/71/rr/rr7103a1.htm?s_cid=rr7103a1_w.
48. Centers for Medicaid and Medicaid Services (CMS). Decision Memo for Acupuncture for Chronic Low Back Pain (CAG-00452N). Accessed March 31, 2022, from <https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=29>
49. U.S. Department of Veterans Affairs. Veterans Health Administration. Acupuncture in VA - Fact Sheet. Accessed on January 8, 2024, from https://www.va.gov/WHOLEHEALTH/docs/AcupunctureFactSheet_508.pdf#:~:text=This%20allowed%20acupuncture%20care%20to%20be%20created%20by,provide%20acupuncture%20care%20at%20VA%20Medical%20center%20%28VAMC%29
50. Stanos SP. Stemming the tide of the pain and opioid crisis: AAPM reaffirms its commitment to multidisciplinary biopsychosocial care and training. *Pain Med.* 2017;18:1005–1006. doi:10.1093/pm/pnx120
51. Gong C-Z, Liu W. Acupuncture and the opioid epidemic in america. *Chin J Integr Med.* 2018;24(5):323-327.
52. NIH. NIH Consensus Conference. Acupuncture. *JAMA.* 1998;280(17):1518–1524.
53. World Health Organization. WHO benchmarks for the practice of acupuncture. Published May 16, 2021. Accessed January 8, 2024. <https://www.who.int/publications/i/item/978-92-4-001688-0>
54. Hempel S, Shekelle PG, Taylor SL, Solloway MR. The evidence map of acupuncture. Department of Veterans Affairs VA-ESP Project #05-226. January 2014.
55. Xiang Y, He JY, Tian HH, Cao BY, Li R. Evidence of efficacy of acupuncture in the management of low back pain: a systematic review and meta-analysis of randomised placebo- or sham-controlled trials. *Acupunct Med.* 2020. Internet ISSN:1759-9873.
56. Seo SY, Lee K-B, Shin J-S, Lee J, Kim M-R, Ha I-H, Ko Y, Lee YJ. Effectiveness of acupuncture and electroacupuncture for chronic neck pain: a systematic review and meta-analysis. *Am J Chin Med.* 2017;45(8):1573-1595. doi:10.1142/S0192415X17500859. Epub 2017 Nov 9.

References



57. Giovanardi CM, Cinquini M, Aguggia M, Allais G, Campesato M, Cevoli S, Gentili F, Matra A, Minozzi S. Acupuncture vs. pharmacological prophylaxis of migraine: a systematic review of randomized controlled trials. *Front Neurol*. 2020 Dec 15;11:576272. doi: 10.3389/fneur.2020.576272. eCollection 2020.
58. Turkistani A, Shah A, Jose AM, Melo JP, Luenam K, Ananias P, Yaqub S, Mohammed L. Effectiveness of manual therapy and acupuncture in tension-type headache: a systematic review. *Cureus*. 2021;13(8):e17601. doi:10.7759/cureus.17601. eCollection 2021 Aug.
59. Lin L-L, TU J-F, Wang L-Q, Yang J-W, Shi G-X, Li J-L, Zhang N, Shao J-K, Zou X, Liu C-Z. Acupuncture of different treatment frequencies in knee osteoarthritis: a pilot randomised controlled trial. *Pain*. 2020;161(11):2532-2538. doi: 10.1097/j.pain.0000000000001940
60. Sun N, TU JF, Lin LL, et al. Correlation between acupuncture dose and effectiveness in the treatment of knee osteoarthritis: a systematic review. *Acupunct Med*. 2019;37(5):261-267. doi:10.1136/acupmed-2017-011608
61. Chen N, Wang J, Mucelli A, et al. Electro-acupuncture is beneficial for knee osteoarthritis: the evidence from meta-analysis of randomized controlled trials. *Am J Chin Med*. 2017;45(5):965-985.
62. Yang J, Wahner-Roedler DL, Zhou X, Johnson LA, Do A, Pachman DR, Chon TY, Salinas M, Millstine D, Bauer BA. Acupuncture for palliative cancer pain management: systematic review. *BMJ Support Palliat Care*. 2021 Sep;11(3):264-270. doi:10.1136/bmjspcare-2020-002638. Epub 2021 Jan 13.
63. Mao M, Liou KT, Baser RE, Bao T, Panageas KS, Romero SD, Li S, Gallagher RM, Kantoff PW. Effectiveness of electroacupuncture or auricular acupuncture vs usual care for chronic musculoskeletal pain among cancer survivors: the PEACE randomized clinical trial. *JAMA Oncol*. 2021 May 1;7(5):720-727. doi:10.1001/jamaoncol.2021.0310.
64. He Y, Guo X, May BH, Zhang AL, Liu Y, Lu C, Mao JJ, Xue CC, Zhang H. Clinical evidence for association of acupuncture and acupressure with improved cancer pain: a systematic review and meta-analysis. *JAMA Oncol*. 2020 Feb 1;6(2):271-278. doi:10.1001/jamaoncol.2019.5233.
65. Nielsen A, Dusek JA, Taylor-Swanson L, Tick H. Acupuncture therapy as an evidence-based nonpharmacologic strategy for comprehensive acute pain care: the academic consortium pain task force white paper update. *Pain Med*. 2022;23(9):1582-1612. doi:10.1093/pm/pnac056
66. Zhu F, Yin S, Zhu X, Che D, Li Z, Zhong Y, Yan H, Gan D, Yang L, Wu X, Li L. Acupuncture for relieving abdominal pain and distension in acute pancreatitis: a systematic review and meta-analysis. *Front Psychiatry*. 2021;12:Article 786401. doi:10.3389/fpsy.2021.786401
67. Zhang K, Gao C, Li C, Li Y, Wang S, Tang Q, Zhao C, Zhai J. Acupuncture for acute pancreatitis: a systematic review and meta-analysis. *Pancreas*. 2019;48(9):1136-1147. doi:10.1097/MPA.0000000000001399
68. Su X, Qian H, Chen B, Fan W, Xu D, Tang C, Lu L. Acupuncture for acute low back pain: a systematic review and meta-analysis. *Ann Palliat Med*. 2021;10(4):3924-3936. doi:10.21037/apm-20-1998
69. Gilbey P, Bretler S, Avraham Y, Sharabi-Nov A, Ibrgimov S, Luder A. Acupuncture for posttonsillectomy pain in children: a randomized, controlled study. *Pediatr Anesth*. 2014. doi:10.1111/pan.12621
70. Cheng SI, Kelleher DC, DeMeo D, Zhong H, Birch G, Ast MP. Intraoperative acupuncture as part of a multimodal analgesic regimen to reduce opioid usage after total knee arthroplasty: a prospective cohort trial. *Med Acupunct*. 2022; 34(1). doi: 10.1089/acu.2021.0072
71. Pham T, Ma O, Agiro A, Bukowiec J, Flannery T. Do acupuncture services reduce subsequent utilization of opioids and surgical interventions compared to noninvasive therapies among patients with pain conditions? *Pain Med*. 2021;22(11):2754-2762. doi: 10.1093/pm/pnab187

References



72. Tedesco D, Gori D, Desai KR, Asch S, Carroll IR, Curtin C, McDonald KM, Fantini MP, Hernandez-Boussard T. Drug-free interventions to reduce pain or opioid consumption after total knee arthroplasty. *JAMA Surg.* 2017; 152(10): e172872. doi:10.1001/jamasurg.2017.2872
73. Wen H, Wei X, Ge S, Zeng J, Luo W, Chen R, Dong Y, Xiao S, Lai Y, Lu L. Clinical and economic evaluation of acupuncture for opioid-dependent patients receiving methadone maintenance treatment: the integrative clinical trial and evidence-based data. *Front Public Health.* 2021;9:1-12.
74. Jackson HJ, Walters J, Raman R. Auricular acupuncture to facilitate outpatient opioid weaning: a randomized pilot study. *Med Acupunct.* 2021;33(2):153-158. doi: 10.1089/acu.2020.1450
75. Chen Z, Wang Y, Wang R, Xie J, Ren Y. Efficacy of acupuncture for treating opioid use disorder in adults: a systematic review and meta-analysis. *Evid Based Complement Altern Med.* 2018 Dec 2:2018:3724708. doi: 10.1155/2018/3724708. eCollection 2018
76. Zheng L, Sun Z, Liu C, Zhang J, Jin Y, Jin H. Acupuncture-adjuvant therapies for treating perimenopausal depression: a network meta-analysis. *Medicine (Baltimore).* 2023 Aug 18;102(33):e34694. doi:10.1097/MD.00000000000034694.
77. Xu G, Lei H, Huang L, Xiao Q, Huang B, Zhou Z, Tian H, Huang F, Liu Y, Zhao L, Li X, Liang F. The dose-effect association between acupuncture sessions and its effects on major depressive disorder: A meta-regression of randomized controlled trials. *J Affect Disord.* 2022 Aug 1;310:318-327. doi:10.1016/j.jad.2022.04.155. Epub 2022 May 2.
78. Ching WL, Li HJ, Guo J, Yao L, Chau J, Lo S, Yuen CS, Ng BFL, Yu EC-L, Zhaoxiang Bian Z, Lau AY, Zhong LLD. Acupuncture for post-stroke depression: a systematic review and network meta-analysis. *BMC Psychiatry* 2023;23:314. doi:10.1186/s12888-023-04749-1
79. Xu M-M, Guo P, Ma Q-Y, Zhou X, Wei Y-L, Wang L, Chen Y, Guo Y. Can acupuncture enhance therapeutic effectiveness of antidepressants and reduce adverse drug reactions in patients with depression? A systematic review and meta-analysis. *J Integr Med.* 2022 Jul;20(4):305-320. doi: 10.1016/j.joim.2022.05.002. Epub 2022 May 6.
80. Hang X, Li J, Zhang Y, Li Z, Zhang Y, Ye X, Tang Q, Sun W. Efficacy of frequently-used acupuncture methods for specific parts and conventional pharmaceutical interventions in treating post-stroke depression patients: a network meta-analysis. *Complement Ther Clin Pract.* 2021 Nov;45:101471. doi:10.1016/j.ctcp.2021.101471. Epub 2021 Aug 4.
81. Li M, Liu X, Ye X, Zhuang L. Efficacy of acupuncture for generalized anxiety disorder: A PRISMA-compliant systematic review and meta-analysis. *Medicine (Baltimore).* 2022 Dec 9;101(49):e30076. doi:10.1097/MD.00000000000030076.
82. Tong QY, Liu R, Zhang K, Gao Y, Cui GW, Shen WD. Can acupuncture therapy reduce preoperative anxiety? A systematic review and meta-analysis. *J Integr Med.* 2021;19(1):20. Epub 2020 Nov 18.
83. Kim S-A, L S-H, Kim J-H, van den Noort, M, Bosch P, Won T, Yeo S, Lim S. Efficacy of acupuncture for insomnia: a systematic review and meta-analysis. *Am J Chin Med.* 2021;49(5):1135-1150. doi: 10.1142/S0192415X21500543. Epub 2021 May 27.
84. Hollifield M, Sinclair-Lian N, Warner TD, Hammerschlag R. Acupuncture for posttraumatic stress disorder: a randomized controlled pilot trial. *J Nerv Ment Dis.* 2007 Jun;195(6):504-13. doi:10.1097/NMD.0b013e31803044f8.
85. Engel CC, Cordova EH, Benedek DM, Liu X, Gore KL, Goertz C, Freed MC, Crawford C, Jonas WB, Ursano RJ. Randomized effectiveness trial of a brief course of acupuncture for posttraumatic stress disorder. *Med Care.* 2014 Dec;52(12 Suppl 5):S57-64. doi:10.1097/MLR.0000000000000237.

References



86. Elton D (Optum Insurance). The National Academies of Science, Engineering, Medicine. Session 3 [Video]. YouTube. <https://www.youtube.com/watch?v=vOO5CsuzfRM>. Published Dec 7, 2018. Accessed January 8, 2024.
87. Taylor P, Pezzullo L, Grant SJ, Bensoussan A. Cost-effectiveness of acupuncture for chronic non-specific back pain. *Pain Pract*. 2014;14(7):599-606.
88. Witt CM, Jena S, Selim D, Brinkhaus B, Reinhold T, Wruck K, Liecker B, Linde K, Wegscheider K, Willich SN. Pragmatic randomized trial evaluating the clinical and economic effectiveness of acupuncture for chronic low back pain. *Am J Epidemiol*. 2006;164(5):487–496. doi:10.1093/aje/kwj224
89. Skonnord T, Fetveit A, Skjeie H, Brekke M, Grotle M, Klovning A, Aas E. Cost-effectiveness analysis of acupuncture compared with usual care for acute non-specific low back pain: secondary analysis of a randomised controlled trial. *Acupunct Med*. 2022 Apr;40(2):123-132. Doi: 10.1177/09645284211055747. Epub 2021 Nov 30.
90. Thomas KJ, MacPherson H, Ratcliffe J, Thorpe L, Brazier J, Campbell M, Fitter M, Roman M, Walters S, Nicholl JP. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. *HTA*. 2005;9(32):1-128.
91. Martin BI, Gerkovich MM, Deyo RA, Sherman KJ, Cherkin DC, Lind BK, Goertz CM, Lafferty WE. The association of complementary and alternative medicine use and health care expenditures for back and neck problems. *Med Care*. 2012 December;50(12): 1029–1036. doi:10.1097/MLR.0b013e318269e0b2.
92. Lind BK, Lafferty WE, Tyree PT, Diehr PK. Comparison of health care expenditures among insured users and nonusers of complementary and alternative medicine in Washington state: a cost minimization analysis. *JACM*. 2010;16(4):411-417. doi: 10.1089=acm.2009.0261
93. Nicolian S, Butel T, Gambotti L, Durand M, Filipovic-Pierucci A, Mallet A, Kone M, Durand-Zaleski I, Dommergues M. Cost-effectiveness of acupuncture versus standard care for pelvic and low back pain in pregnancy: a randomized controlled trial. *PLoS One*. 2019 Apr 22;14(4):e0214195. doi: 10.1371/journal.pone.0214195. eCollection 2019.
94. Willich SN, Reinhold T, Selim D, Jena S, Brinkhaus B, Witt CM. Cost-effectiveness of acupuncture treatment in patients with chronic neck pain. *Pain*. 2006;125(1):p 107-113. doi:10.1016/j.pain.2006.06.006
95. Witt CM, Reinhold T, Jena S, Brinkhaus B, Willich SN. Cost-effectiveness of acupuncture treatment in patients with headache. *Cephalalgia*. 2008; 28:334–345. doi:10.1111/j.1468-2982.2007.01504.x
96. NIH. *Evidence Review for the Clinical and Cost-Effectiveness of Acupuncture for People with Osteoarthritis: Osteoarthritis in Over 16s: Diagnosis and Management*. NICE Evidence Reviews Collection. London: National Institute for Health and Care Excellence (NICE); 2022 Oct. Accessed November 16, 2023.
97. Woods B, Manca A, Weatherly H, Saramago P, Sideris E, Giannopoulou C, Rice S, Corbett M, Vickers A, Bowes M, MacPherson H, Sculpher M. Cost-effectiveness of adjunct non-pharmacological interventions for osteoarthritis of the knee. *PLOS ONE*. March 7, 2017;12(3):1-18. doi:10.1371/journal.pone.0172749
98. Reinhold TR, Witt CM, Jena S, Brinkhaus B, Willich SN. Quality of life and cost-effectiveness of acupuncture treatment in patients with osteoarthritis pain. *Eur J Health Econ*. 2007 July 19;9:209–219.
99. Sutton D, McCormack S. *Acupuncture for Chronic Non-Cancer Pain: A Review of Clinical Effectiveness, Cost Effectiveness and Guidelines [Internet]*. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2019 Oct 29. Accessed November 16, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK551954/>
100. Zhao W, Huang H, Liu K, Wang S, Lin S, Long W, Li L, Zeng J, Lin G. Acupuncture and moxibustion for peripheral neuropathic pain: a frequentist network meta-analysis and cost-effectiveness evaluation. *Evid Based Complement Alternat Med*. 2022 Mar 16:2022:6886465. doi: 10.1155/2022/6886465. eCollection 2022

References



101. Witt CM, Reinhold T, Brinkhaus B, Roll S, Jena S, Willich SN. Acupuncture in patients with dysmenorrhea: a randomized study on clinical effectiveness and cost-effectiveness in usual care. *Am J Obstet Gynecol*. 2008 Feb;198(2):166.e1-8. doi:10.1016/j.ajog.2007.07.041.
102. Fan Y, Miller DW, Bolash B, Bauer M, McDonald J, Faggert S, He H, Ming Y, Matecki A, Camardella L, Koppelman ML, Stone JAM, Meade L, Pang J. Acupuncture's role in solving the opioid epidemic: evidence, cost-effectiveness, and care availability for acupuncture as a primary, non-pharmacologic method for pain relief and management - white paper 2017. *J Integr Med*. October 17, 2017;15(6):411-425.
103. Liddle CE, Harris RE. Cellular reorganization plays a vital role. *Med Acupunct*. 2018;30(1). doi:10.1089/acu.2017.1258
104. Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: evidence for a mechanotransduction-based mechanism. *J Cell Physiol*. 2006;207:767-774.
105. Langevin HM, Churchill DL, Cipolla MJ. Mechanical signaling through connective tissue: a mechanism for the therapeutic effect of acupuncture. *FASEB*. 2001;15:2275-2282.
106. Langevin HM, Schnyer RN. Reconnecting the body in eastern and western medicine. *J Altern Complement Med*. 2017;23(4):238-241. doi: 10.1089/acm.2017.0028
107. Langevin H, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast response to acupuncture: dose-dependent effect of bidirectional needle rotation. *JACM*. 2007;13(3):355-360. doi: 10.1089/acm.2007.6351
108. Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: evidence for a mechanotransduction-based mechanism. *J Cell Physiol*. 2006;207:767-774.
109. Langevin HM, Konofagou EE, Badger GJ, Churchill DL, Fox JR, Ophir J, Garra BS. Tissue displacement during acupuncture using ultrasound elastography techniques. *Ultrasound Med Biol*. 2004;30(9):1173-1183. doi:10.1016/j.ultrasmedbio.2004.07.010
110. Langevin HM, Churchill DL, Wu J, Badger GJ, Yandow JA, Foxá JR, Kragá MH. Evidence of connective tissue involvement in acupuncture. *FASEBJ*. 2002. doi:10.1096/fj.01-0925fje. Published online April 10, 2002.
111. Langevin, HM, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast response to acupuncture: dose-dependent effect of bidirectional needle rotation. *J Altern Complement Med*. 2007;13:355-360.
112. Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: evidence for a mechanotransduction-based mechanism. *J Cell Physiol*. 2006;207:767-774.
113. Langevin HM, Konofagou EE, Badger GJ, Churchill DL, Fox JR, Ophir J, Garra BS. Tissue displacement during acupuncture using ultrasound elastography techniques. *Ultrasound Med Biol*. 2004;30(9):1173-1183. doi:10.1016/j.ultrasmedbio.2004.07.010
114. Langevin HM, Churchill DL, Junru W, Badger GJ, Yandow JA, Fox JR, Krag MH. Evidence of connective tissue involvement in acupuncture. *FASEB J*. 2002.
115. Schleip R, Zorn A, Klingler W. Biomechanical properties of fascial tissues and their role as pain generators. *J Musculoskelet Pain*. 2010;18(4). doi:10.3109/10582452.2010.502628
116. Bai Y, Wang J, Wu J, Dai J, Sha O, Yew DTW, Yuan L, Liang Q. Review of evidence suggesting that the fascia network could be the anatomical basis for acupoints and meridians in the human body. *Evid Based Complement Altern Med*. 2011;2011:260510. doi:10.1155/2011/260510
117. Ahn AC, Wu J, Badger GJ, Hammerschlag R, Langevin HM. Electrical impedance along connective tissue planes associated with acupuncture meridians. *BMC Complement Altern Med*. 2005;5:10. doi:10.1186/1472-6882-5-124.

References



118. Sheng-xing MA. Biophysical and biochemical studies of low electrical resistance properties of acupuncture points: roles of NOergic signaling molecules and neuropeptides in skin electrical conductance. *Chin J Integr Med.* 2021; 27(8): 563–569. doi:10.1007/s11655-021-3318-5.
119. Qin E-Q, Liang F-R, Li Y, et al. [Research progress of neuroendocrine mechanism of acupuncture for dyspnea]. *Zhen Ci Yan Jiu.* 2022; 47(6):559-64. doi: 10.13702/j.1000-0607.20210430
120. Jiang K, Sun Y, Chen X. Mechanism underlying acupuncture therapy in spinal cord injury: a narrative overview of preclinical studies. *Front Pharmacol.* 2022;13. doi:10.3389/fphar.2022.875103
121. Zhang B, Shi H, Cao S, Xie L, Ren P, Wang J, Shi B. Revealing the magic of acupuncture based on biological mechanisms: a literature review. *BioSci Trends.* 2022; 16(1):73-90. doi: 10.5582/bst.2022.01039
122. Liu S, Wang Z, Su Y, et al. A neuroanatomical basis for electroacupuncture to drive the vagal-adrenal axis. *Nature.* 2021; 598(7882): 641–645. doi:10.1038/s41586-021-04001-4.
123. Chen W, Zhang WW, Chu Y-X, Wang Y-Q. Acupuncture for pain management: molecular mechanisms of action. *Am J Chin Med.* 2020; 48(4):793–811. doi: 10.1142/S0192415X20500408
125. Wang F, Cui G-w, Kuai L, Xu J-m, Zhang T-t, Cheng H-j, Dong H-s, Dong G-r. Role of acupoint area collagen fibers in anti-inflammation of acupuncture lifting and thrusting manipulation. *ECAM.* 2017. doi:10.1155/2017/2813437
124. Wang F, Cui G-w, Kuai L, Xu J-m, Zhang T-t, Cheng H-j, Dong H-s, Dong G-r. Role of acupoint area collagen fibers in anti-inflammation of acupuncture lifting and thrusting manipulation. *ECAM.* 2017. doi:10.1155/2017/2813437
125. Song G, Fiocchi C, Achkar J-P. Acupuncture in inflammatory bowel disease. *Inflamm Bowel Dis.* 2019; 25(7):1129-1139.
126. Li Y-H, Ma Q-L, Hu B, Wang Z-L. [Current state about research on selection of experimental index mechanisms of acupuncture underlying improvement of chronic fatigue syndrome]. *Zhen Ci Yan Jiu.* 2021;46(11):980-4. doi:10.13702/j.1000-0607.200998
127. Neves ML, Karvat J, Simoes RR, et al. The antinociceptive effect of manual acupuncture in the auricular branch of the vagus nerve in visceral and somatic acute pain models and its laterality dependence. *Life Sci.* 2022;309. doi: 10.1016/j.lfs.2022.121000
128. Zhang R, Lao L, Ren K, Berman BM. Mechanisms of acupuncture-electroacupuncture on persistent pain. *Anesthesiology.* 2014;120(2): 482–503. doi:10.1097/ALN.000000000000101
129. Leung L. Neurophysiological basis of acupuncture-induced analgesia – an updated review. *J Acupunct Meridian Stud.* 2012;5(6):261-270.
130. Li YM. Song's mast cell theory of acupuncture. *Med Acupunct.* 2022;34(5):316-324. doi: 10.1089/acu.2022.0035
131. Li Y, Yu Y, Liu Y, Yao W. Mast cells and acupuncture analgesia. *Cells.* 2022;11:860. doi:10.3390/cells11050860
132. Li N, Guo Y, Gong Y, et al. The anti-inflammatory actions and mechanisms of acupuncture from acupoint to target organs via neuro-immune regulation. *J Inflamm Res.* 2021;14: 7191–7224.
133. Bianco G. Fascial neuromodulation: an emerging concept linking acupuncture, fasciology, osteopathy and neuroscience. *Eur J Transl Myol.* 2019;29(3):195-201.
134. Li B, Deng S, Sang B, et. al. Revealing the neuroimaging mechanism of acupuncture for poststroke aphasia: a systematic review. *Neural Plast.* 2022; Article ID 5635596: 23 pages. doi:10.1155/2022/5635596
135. Zhang J, Lu C, Wu X, Nie D, Yu H. Neuroplasticity of acupuncture for stroke: an evidence-based review of MRI. *Neural Plast.* 2021;Article ID 2662585: 14 pages. doi: 10.1155/2021/2662585
136. Maeda Y, Kim H, Kettner N, et al. Rewiring the primary somatosensory cortex in carpal tunnel syndrome with acupuncture. *Brain: A Journal of Neurology.* 2017;140:914–927. doi:10.1093/brain/awx015
137. Zhang Y, Zhang H, Nierhaus T, Pach D, Witt CM and Yi M. Default mode network as a neural substrate of acupuncture: evidence, challenges and strategy. *Front Neurosci.* 2019;13:100. doi:10.3389/fnins.2019.00100

References



138. Ji S, Zhang H, Qin W, Liu M, Zheng W, Han Y, Song H, Li K, Lu J, Wang Z. Effect of acupuncture stimulation of hegu (LI4) and taichong (LR3) on the resting-state networks in alzheimer's disease: beyond the default mode network. *Neural Plast.* 2021; Article ID 8876873, 9 pages. doi:10.1155/2021/8876873
139. Qamar N, Castano D, Patt C, Chu T, Cottrell J, Chang SL. Meta-analysis of alcohol induced gut dysbiosis and the resulting behavioral impact. *Behav Brain Res.* 2019;376:112196. doi: 10.1016/j.bbr.2019.112196. Epub 2019 Aug 30.
140. Oregon Department of Consumer and Business Services. Insurance Regulation - Chapter 836, Division 53 - Health Benefit Plans. "836-053-0017 Additions to Essential Health Benefits for Plan Years Beginning on or after January 1, 2022. Accessed March 31, 2024, from <https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3778>.
141. Oregon Health Plan (OHP) Benefits: Physical Health Care. Published N.D. Accessed November 25, 2023. <https://www.oregon.gov/oha/hsd/ohp/pages/benefits.aspx>
142. Prioritized List of Health Services. Oregon.gov/oha. Published October 1, 2023. Accessed November 25, 2023. <https://www.oregon.gov/oha/hpa/dsi-herc/pages/prioritized-list.aspx>
143. Access alternative medicine with help from your health plan. Regence.com. Updated 2023. Accessed November 26, 2023. <https://www.regence.com/member/understanding-health-insurance/alt-medicine>
144. Acupuncture Policy, Professional. UHCHealthcare. Updated 2023. Accessed November 26, 2023. <https://www.uhcprovider.com/content/dam/provider/docs/public/policies/comm-reimbursement/COMM-Acupuncture-Policy.pdf>
144. Acupuncture Policy, Professional. UHCHealthcare. Updated 2023. Accessed November 26, 2023. <https://www.uhcprovider.com/content/dam/provider/docs/public/policies/comm-reimbursement/COMM-Acupuncture-Policy.pdf>
145. Your Benefits Summary. Providence.org. Published N.D. Accessed November 26, 2023. <https://phpcws.providence.org/phpcws/DocsNew/9ALP0039.pdf>
146. Chiropractic Manipulation and Acupuncture. PacificSource.com. Published N.D. Accessed November 26, 2023. https://pacificsource.com/sites/default/files/plans/2020/CustomGroup/BCOC_Chiropractic%20Manipulation%20and%20Acupuncture_1000_0120.pdf
147. Complementary and Alternative Medicine. KaiserPermanente.org. Updated 2023. Accessed November 26, 2023. <https://wa-provider.kaiserpermanente.org/provider-manual/patient-care/specialty/alternative>
148. Acupuncture. Modahealth.com. Published January 2019. Accessed November 26, 2023. https://www.modahealth.com/pdfs/med_criteria/Acupuncture.pdf
149. Integrative Healthcare Services. CHPgroup.com. Published 2022. Accessed November 26, 2023. <https://chpgroup.com/>
150. Acupuncture and Dry Needling. Aetna.com. Last Reviewed April 5, 2023. Accessed November 26, 2023. https://www.aetna.com/cpb/medical/data/100_199/0135.html
151. Cigna Medical Coverage Policy- Therapy Services Acupuncture. Cigna.com. Updated 2023. Accessed November 26, 2023. https://static.cigna.com/assets/chcp/pdf/coveragePolicies/medical/CPG024_acupuncture.pdf
152. Veteran Eligibility and Covered Services. TriWest.com. Published 2023. Accessed November 26, 2023. <https://www.triwest.com/en/provider-handbook/veteran-eligibility-and-covered-services/>
153. Alternative Care. HealthNetOregon.com. Published 2023. Accessed November 26, 2023. <https://www.healthnetoregon.com/employers/supplemental-coverage/alternative-care-providers.html>
154. Take Advantage of Valuable Extras. Humana.com. Updated October 31, 2023. Accessed November 26, 2023. <https://www.humana.com/member/discounts>
155. Does Humana Cover Acupuncture? Published October 05, 2023. Accessed November 26, 2023. <https://www.helpadvisor.com/medicare/does-humana-cover-acupuncture>
156. Quest Center for Integrative Health. Programs. Accessed March 31, 2024, from <https://quest-center.org/>.