



Acupuncture: Evidence Based Approach to the Management of Chronic Back Pain

Background

With the recent concerns about the opioid crisis in the US, there is growing interest in integrating medical acupuncture and related techniques, such as acupressure, electroacupuncture, and laser acupuncture, into conventional care. The American Academy of Medical Acupuncture, the American College of Physicians, and other medical organizations have endorsed acupuncture as a front-line treatment for pain in general as well as, more specifically, for chronic low back pain, as discussed below.

What is Medical Acupuncture?

Medical acupuncture is the clinical discipline of acupuncture as practiced by a physician who is also trained and licensed in Western biomedicine. Founded on medical texts of ancient China, the interpretation and application of acupuncture within the context of contemporary medicine is an extension of the physician's biomedical training.

The medical acupuncture physician uniquely offers a comprehensive approach to healthcare, which combines classic and modern forms of acupuncture with conventional biomedicine. This opens up a wider array of treatment choices for patients, which may include acupuncture, appropriate use of medications, and other modalities, alone or in combination, for an optimal patient outcome. The Veterans Administration system and parts of the military have recognized the importance of this approach and have announced that all TRICARE beneficiaries can now receive auricular acupuncture as part of their benefit.¹

How does Acupuncture work?

Multiple mechanisms of action have been elucidated:

1. Endogenous Opioids

Animal and human studies have identified many biochemical and neuroanatomical substrates of acupuncture analgesia. There is clear evidence that acupuncture stimulation leads to endogenous opioid release (several classes of opioid

¹ <https://www.military.com/military-report/tricare-and-acupuncture.html>



neuropeptides including enkephalins, endorphins, dynorphins, endomorphins, and nociceptin).²

2. Anti-inflammatory Effect

In addition, acupuncture has been shown to modulate the inflammatory cascade via its effects on the hypothalamic-pituitary-adrenal axis³ and directly on a number of cytokines and other chemical mediators of inflammation. These include glutamate, nitric oxide, and gamma-amino butyric acid (GABA) effects, non-opioid neuropeptides such as substance P, vasoactive intestinal peptide, and calcitonin gene-related peptide.⁴

3. Neuro-modulatory Effect

There is evidence in animal models that acupuncture alters the metabolism of substrates involved in both the ascending facilitatory pathways of chronic pain (e.g., N-methyl-D-aspartate receptors (NMDA), substance P, and interleukin-1). There is also abundant evidence that acupuncture enhances the activity of descending inhibitory pain pathways and can increase central nervous system (CNS) levels of endogenous opioids, serotonin, and norepinephrine.⁵ Furthermore, with the advent of neuroimaging in humans, it is clear that the endogenous anti-nociceptive brain network mediates acupuncture.⁶

4. Connective Tissue Effects

Finally, there is a growing body of evidence that acupuncture stimulation directly influences connective tissue release of ATP and adenosine, which bind to nociceptive fibers and can modulate peripheral pain pathways.⁷

5. Sham Acupuncture

Despite the wealth of science behind the mechanism of acupuncture analgesia, there continues to be slow integration of acupuncture as a mainline treatment for pain. Part of what has driven slow adoption is the misunderstanding of the placebo effects

² Han JS. Acupuncture and endorphins. *Neurosci Lett.* 2004; 361(1-3): 258-261.

³ Kong, JT, Schnyer RN, et al. *Evid Based Complement Alternat Med.* 2013; 2013: 187182

⁴ McDonald JL, Cripps AW, Smith PK. Mediators, receptors, and signaling pathways in the anti-inflammatory and antihyperalgesic effects of acupuncture. *Evid Based Complement Alternat Med.* 2015; 2015: 975632.

⁵ Han JS. Acupuncture analgesia: areas of consensus and controversy. *Pain.* 2011; 152(3 Suppl): S41-S48.

⁶ Dhond RP, Yeh C, Park K, Kettner N, Napadow V. Acupuncture modulates resting state connectivity in default and sensorimotor brain networks. *Pain.* 2008 Jun;136(3):407-18.

⁷ Langevin, Helene M. "Acupuncture, Connective Tissue, and Peripheral Sensory Modulation." *Critical Reviews in Eukaryotic Gene Expression*, vol. 24, no. 3, 2014, pp. 249-253.



of acupuncture. It has been difficult to design an adequate placebo acupuncture intervention. One of the reasons is that insertion of a needle into someone's body, even if not on an acupuncture point, causes a reflex response by the nervous system that automatically activates endogenous analgesic mechanisms.⁸ Thus, both "placebo" acupuncture and "true" acupuncture stimulate pain-inhibitory pathways, especially if the "placebo" and "true" points chosen for comparison overlap neuroanatomically.

Despite the challenges of performing acupuncture with rigorous controls, research is mounting that indicates patients' benefit by the clinically significant improvements it provides in analgesia and recovery from illness.

What is the Clinical Evidence for Acupuncture in Chronic Low Back Pain?

1. NIH Consensus Statement

How strong is the clinical evidence for acupuncture? Twenty years ago, the National Institutes of Health (NIH) published a consensus statement on the role of acupuncture in medicine, which offered strong endorsement for the use of acupuncture to control postoperative and chemotherapy induced nausea as well as postoperative dental pain – another condition for which opioids are commonly prescribed. The NIH panel indicated that acupuncture could be useful as an adjunct treatment, an acceptable alternative, or part of a comprehensive management program for the following conditions: addiction, stroke rehabilitation, headache, menstrual cramps, tennis elbow, fibromyalgia, myofascial pain, osteoarthritis, low back pain, carpal tunnel syndrome, and asthma.⁹

2. The Current Evidence

Decade's later, rigorous investigations have progressed to the point where scientific evidence in support of acupuncture (i.e., level 1A evidence) is stronger than many commonly used conventional pain treatments for chronic low back pain (CLBP). The quality and depth of evidence in favor of acupuncture far outstrips justification for the use of epidural steroid injections, opioids, or other common analgesics.¹⁰

There has been a wealth of recent well-designed clinical studies showing that true acupuncture is superior to sham acupuncture for a variety of pain conditions. In this large review of the literature (29 studies reviewed with a total of 17,922 patients analyzed), it was found that the clinical effect of verum acupuncture was superior to the placebo or sham acupuncture for a number of common pain conditions

⁸ Dhond RP, Kettner N, Napadow V. Do the neural correlates of acupuncture and placebo effects differ? *Pain*. 2007 Mar;128(1-2):8-12.

⁹ NIH Consensus Conference. Acupuncture *JAMA*. 1998 Nov 4;280(17):1518-24.

¹⁰ Lin CW, Haas M, et al. Cost-effectiveness of guideline-endorsed treatments for low back pain: a systematic review. *Spine J*. 2011 Jul; 20(7): 1024–1038.



including osteoarthritis of the knee, CLBP and neck pain, shoulder pain, and chronic headache.¹¹

Low back pain is the most common cause of chronic pain and as a result is a group that needs alternatives to opioids to help maintain function. A recent meta-analysis included thirty-three studies on CLBP. The authors assessed the efficacy of verum acupuncture compared to sham and found the verum treatment to be significantly more effective (standardized mean difference, 0.54 [95% CI, 0.35 to 0.73].¹²

Much has been made of the German acupuncture trials for chronic low back pain (GERAC trial) that did not show significant difference in outcomes between the sham and verum group.¹³ However, the sham and verum group did *so* much better than usual care (response rate of 47.6% in the verum acupuncture group, 44.2% in the sham acupuncture group, and 27.4% in the conventional therapy group; verum vs sham, 3.4% (95% confidence interval, -3.7% to 10.3%; P = .39); verum vs conventional therapy, 20.2% (95% confidence interval, 13.4% to 26.7%; P < .001)) that the national insurance system that sponsored the studies determined that acupuncture *should* be a covered service in Germany for low back pain.

3. Opioids vs. Acupuncture for Chronic Low Back Pain

CLBP, as noted above, can be debilitating, expensive, and resistant to conventional treatment such as opioid-based medication. Moreover, patients with CLBP experience indirect costs, including loss of productivity by missing outside work, school, or work inside the home, even when treated with opioids. Thus, the current approach to CLBP, requiring intensive healthcare utilization and expensive, often detrimental medication, maintains patients at a high level of disability and long-term care.

There has been a concerted effort in the military population to directly confront the opioid crisis through the implementation of integrative strategies with a focus on acupuncture. In a recent study, opioid prescriptions decreased by 45%, muscle relaxants by 34%, NSAIDs by 42%, and benzodiazepines by 14% with the implementation of acupuncture as an alternative. Patients also reported improved

¹¹ Vickers, et al. Acupuncture for chronic pain: individual patient data meta-analysis. Arch Int Med, 2012; 172(19): 1444-1453

¹² Manheimer E, White A, Berman B, Forys K, Ernst E. Meta-analysis: acupuncture for low back pain. Ann Intern Med. 2005 Apr 19;142(8):651-63.

¹³ Haake M, Müller HH, et al. German Acupuncture Trials (GERAC) for chronic low back pain: randomized, multicenter, blinded, parallel-group trial with 3 groups. Arch Intern Med. 2007 Sep 24;167(17):1892-8



symptom control, ability to function, and a sense of well-being after receiving courses of acupuncture by their primary care physicians.¹⁴

Furthermore, patients want alternatives to opioids for low back pain and embrace the option to receive acupuncture. In one study, over 90% reported that they were “very satisfied” and/or “extremely satisfied” with acupuncture treatment.¹⁵ In another paper, acupuncture was “highly accepted” and was shown to be an “effective, well-tolerated therapy with no major adverse events”.¹⁶ In contrast, in a trial of opioids for chronic low back pain compared to non-opioid treatment, patients receiving daily doses of 30 morphine-equivalent milligrams per day or more experienced “a high burden of disability despite the high costs of treatment”.¹⁷

Is acupuncture safe?

With the advent of the sterile, disposable acupuncture needle, acupuncture has become an extremely safe treatment modality. In the German insurance trials, 454,920 patients were treated for headache, low-back pain, and osteoarthritis. Minor adverse events were reported in 7.9% of patients while only 0.003% (13 patients) experienced severe adverse events. Minor adverse events included needling pain, hematoma, and bleeding, while serious adverse events included pneumothorax, acute hyper- or hypotensive crisis, erysipelas, asthma attack, and aggravation of suicidal thoughts.¹⁸ In a study done in Great Britain, only 43 minor adverse events associated with 34,407 treatments, with no serious adverse events reported.¹⁹

¹⁴ Crawford, Paul, et al. “Reduction in Pain Medication Prescriptions and Self-Reported Outcomes Associated with Acupuncture in a Military Patient Population.” *Medical Acupuncture*, vol. 29, no. 4, 2017, pp. 229–231., doi:10.1089/acu.2017.1234.

¹⁵ Liu L, Skinner MA, et al. Acupuncture for chronic low back pain: a randomized controlled feasibility trial comparing treatment session numbers. *Clin Rehabil.* 2017;31(12):1592-1603.

¹⁶ Weiss J, Quante S, Xue F, et al. Effectiveness and acceptance of acupuncture in patients with chronic low back pain: results of a prospective, randomized, controlled trial. *J Altern Complement Med.* 2018;19(12):935-941.

¹⁷ Zgierska AE, Ircink J, Burzinski CA, et al. Cost of opioid-treated chronic low back pain: Findings from a pilot randomized controlled trial of mindfulness meditation-based intervention. *J Opioid Manag.* 2017;13(3):169-181.

¹⁸ Weidenhammer W, Streng A, Linde K, Hoppe A, Melchart D. Acupuncture for chronic pain within the research program of 10 German health insurance funds—basic results from an observational study. *Complement Ther Med.* 2007; 15(4): 238–246.

¹⁹ MacPherson H, Thomas K, Walters S, et al. The York acupuncture safety study: prospective survey of 34,000 treatments by traditional acupuncturists. *BMJ* 2001;323(7311): 486–7.



Consensus of Support for Acupuncture by Federal and National Organizations

1. FDA report: “FDA Education Blueprint for Health Care Providers Involved in the Management or Support of Patients with Pain (May 2017)”

“A number of nonpharmacologic therapies are available that can play an important role in managing pain, particularly musculoskeletal pain and chronic pain. • Psychological approaches – e.g., cognitive behavioral therapy • Physical rehabilitative approaches – e.g., physical therapy, occupational therapy • Surgical approaches • Complementary therapies – e.g., acupuncture, chiropractic”

2. National Academy of Sciences, Engineering, and Medicine: “Pain Management and the Opioid Epidemic: Balancing Societal and Individual Benefits and Risks of Prescription Opioid Use”, Consensus Study Report published 2017

“Nonpharmacologic interventions for pain treatment, including acupuncture, physical therapy and exercise, cognitive-behavioral therapy, and mindfulness meditation, also are powerful tools in the management of chronic pain.”

3. Joint Commission New Pain Assessment and Management Requirements:

“Both pharmacologic and nonpharmacologic strategies have a role in the management of pain. The following examples are not exhaustive, but strategies may include the following: Nonpharmacologic strategies: physical modalities (for example, acupuncture therapy, chiropractic therapy, osteopathic manipulative treatment, massage therapy, and physical therapy), relaxation therapy, and cognitive behavioral therapy”

4. Comprehensive Addiction and Recovery Act of 2016:

VA Hospitals mandated to have access to acupuncture (in addition to other “List 1” complementary and integrative therapies) by October 2018. Lists determined as a result of evidence-based review by the Integrative Health Coordinating Center (IHCC) within the VA's Office of Patient Centered Care and Cultural Transformation.

LIST I Promising/Potential Benefit*	LIST II Generally Considered Safe
<ul style="list-style-type: none">• Acupuncture• Meditation• Tai Chi• Yoga• Massage for treatment• Guided Imagery• Biofeedback• Clinical hypnosis	<ul style="list-style-type: none">• Healing Touch• Acupressure• Alexander Technique• Reflexology• Reiki• Therapeutic Touch• Emotional Freedom Technique• Animal-assisted Therapy (under recreational therapy)

*As of October 2018, these all sites will need to make List 1 options available
<http://www.infoshare.va.gov/sites/OPCC/SitePages/IHCC-Approved-CIH.aspx>



Yet, despite this growth of evidence and the endorsement given by a number of national and federal organizations, acupuncture has only made modest inroads into the mainstream of healthcare. In part, this is due to the lack of knowledge among healthcare providers and third-party payers about the ways in which acupuncture addresses pain in a drug-free manner. That is, over more than half a century, scientific study has revealed that acupuncture for conditions such as chronic low back pain works in several ways. For example, acupuncture normalizes nervous system function and optimizes the body's own pain modulatory capacity. It also releases tension in the muscles and fascia that provides for fuller movement, blood flow, and overall comfort. Acupuncture also restores the ability of the body to maintain health by promoting healthful digestion, immune function, and mental and emotional balance. In contrast, opioids can worsen chronic pain (i.e., cause central sensitization and hyperalgesia), lead to addiction, and have not shown positive effects on function or long-term efficacy. Common short-term downsides of opioids may include nausea, constipation, and increase risk of falls and fractures through over-sedation. Long-term use may lead to depression and sexual dysfunction. Acupuncture causes none of these adverse reactions.

In summary, the strong analgesic medications, including opioids, are just that; a "band aid treatment", associated with tremendous risks and providing only a temporary masking of pain, with no effect on the underlying etiology. Acupuncture on the other hand, not only relieves the pain with minimal risk, but also improves the physiological factors that have led to the chronic pain condition.

The future of medicine and patient care will be greatly enhanced by the integration of this highly effective, low-tech treatment option into conventional pain treatment. Perhaps, more than any other intervention, acupuncture could provide us with the best tool to combat the opioid crisis without sacrificing compassion and violating the underlying moral directive that motivates medical care, to alleviate pain and suffering in our patients. Many barriers still need to be overcome including having more well-trained providers available, finding ways to reduce the barrier of cost given the lack of insurance coverage, and getting patients access even at the front lines of conventional medicine including urgent and primary care. A key to ensure front line access to acupuncture is to ensure that physicians are trained in acupuncture and provided adequate financial and institutional support to integrate acupuncture into the practice of medicine.²⁰

²⁰ Robinson NG. Why we need minimum basic requirements in science for acupuncture education. *Medicines (Basel)*. 2016; 3(3):21. Accessed at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5456252/> on January 28, 2019.



Submitted by:

Joseph F Audette, MD

Joseph_audette@atriushealth.org

Board Member

American Academy of Medical Acupuncture

2512 Artesia Blvd, Ste 200

Redondo Beach, CA 90278

(310) 379-8261