



# Acupuncture for chronic pain

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Review

Acupuncture has been used to treat health conditions including pain for over 3000 years, yet it has only been in the last half a century that biochemistry and neural imaging advances have allowed scientific understanding of its physiological mechanisms. This treatise reviews the multiple lines of evidence that the endogenous opioid system is involved in acupuncture's pain-relieving mechanisms, and that the peripheral and central nervous systems are intimately involved in the transduction of acupuncture point stimulation via needling. Large, scientifically rigorous, controlled clinical trials of acupuncture for treating neck, lumbar, migraine, knee osteoarthritis, and other pain conditions have been performed in the last 2 decades that confirm acupuncture's clinical efficacy in treating chronic pain. Beyond its demonstrated efficacy in treating chronic pain, acupuncture's excellent safety record and cost-effectiveness compared to other interventions for chronic pain offer the potential that increased incorporation of acupuncture in managing patients with chronic pain could reduce the costs associated with their health care.

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Acupuncture is a part of the practice of traditional Chinese medicine (TCM), which is the most enduring healing tradition. Its tenets were formally described 200 BC in the *Nei Jing* text<sup>1</sup> that is believed to represent the culmination of at least 2000 years of clinical experience in treating human illness.<sup>2</sup> Acupuncture theory and practice have continued to evolve since then based on further clinical experience as well as the application of new materials and technologies (improved metallurgy in needle fabrication and use of electricity to stimulate acupuncture needles, as examples).

Although the Dutch–East Indian Trading Company and Jesuit missionaries brought the acupuncture tradition to Europe as early as the 1600s,<sup>3</sup> it was not well known in North America until the “Ping-Pong” diplomacy of the Nixon administration in the 1970s, when journalist James Reston reported its remarkable pain-relieving effects in relieving

his postoperative pain after he underwent an emergent appendectomy while reporting in China.<sup>4</sup> Acupuncture is probably best known for its use in treating pain conditions in the West, but only about 30% of acupuncture literature concerns its use for treating pain.<sup>3</sup> The vast majority of the acupuncture literature reflects its use in other health disorders ranging from asthma to cancer to dermatitis to psychosis to xerostomia.<sup>3</sup>

Although the primary clinical indications of most of the 361 classical acupuncture points are for treating nonpainful medical conditions, all but 2 acupoints have at least 1 described pain indication.<sup>1,5</sup>

## Epidemiology

In North America, acupuncture is considered part of “complementary” medicine practices—a supplement to allopathic medicine rather than a substitute for it. Traditional medicine including herbal remedies, acupuncture, and massage represent 40% of the health care delivered in China<sup>6</sup>

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and was the first-line treatment for ~28% of respondents in one survey there.<sup>7</sup>

Although other complementary medicine measures such as chiropractic or osteopathic manipulation or massage are more frequently used than acupuncture by the US population, acupuncture's use has expanded in the last 3 decades, with 1% (~2.1 million) of surveyed individuals having reported receiving recent acupuncture treatment, translating to an economic impact of US\$5 billion in 2006.<sup>8</sup> In 1998, the out-of-pocket economic impact of complementary health care expenditures was conservatively estimated at US\$27 billion—about the same as the out-of-pocket expenditures for US physician services that year.<sup>9</sup>

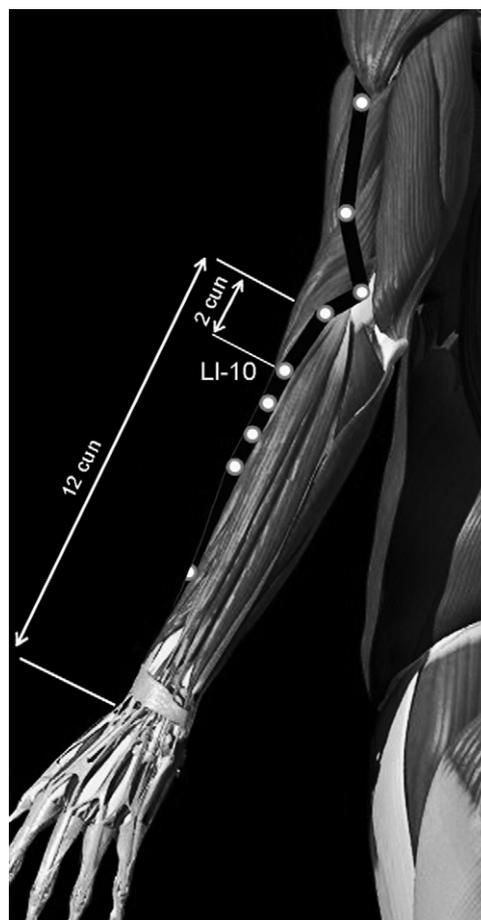
As the world's aging population's health care costs increasingly strain national budgets, acupuncture offers a cost-efficient, safe treatment that could potentially lead to reducing the cost of delivering health care.

## What is acupuncture?

In the 1600s, Jesuit missionaries coined the term acupuncture from the Latin *Acus* (needle) and *punctura* (puncture) based on their observations of this healing tradition in use in China. The term acupuncture describes a group of procedures that stimulate precise anatomical locations by a variety of techniques to produce clinical effects. The style of acupuncture described in TCM will be considered in this treatise, but many other acupuncture styles have been described in the 20th century including Nogier auricular acupuncture,<sup>10</sup> Koryo hand acupuncture,<sup>11</sup> Yamamoto scalp acupuncture,<sup>12</sup> and Po abdominal acupuncture.<sup>13</sup> Acupuncture points can be stimulated by surface pressure (acupressure), insertion of needle without manipulation, insertion of needle with manipulation (twisting and/or thrusting of needle), heating of acupuncture needles through radiant heat or moxibustion, electrical stimulation of inserted needles, or laser stimulation of acupuncture points depending on practitioner preferences and/or desired treatment effects.

The Chinese characters for acupuncture points are 穴 (*xué* = hole, cave) and 位 (*wèi* = position, location). There are 361 classical acupoints, 95% of which were described by AD 200, that reflect the most frequently used and/or clinically important points described as of that time.<sup>1</sup> There have been many other clinically important acupuncture points described since that time (the so-called “miscellaneous” and “new” acupuncture points).<sup>1</sup>

The acupoints are located in palpable depressions in the body surface between muscles, tendons, and/or bones. Acupuncture references 1 and 5 describe the approximate site of each acupuncture point using distances from major surface anatomic landmarks and also describe for each point the proper depth and direction of needle insertion there. To account for individual variations in body habitus, the *cun* system for measurement of acupoint locations was developed. Defined as the width of the interphalangeal joint of the



**Figure 1** Cun system for localizing acupuncture point LI-10 two cun below the lateral elbow crease.

patient's thumb,<sup>1,5</sup> the *cun* system for measuring distances on the patient's body surface serves to normalize size differences between individuals when localizing acupoints. For example, acupoint li-10 is described as being located in a depression 2 cun below the elbow crease on a line connecting li-11 (located in the depression at the lateral elbow crease) to li-5 (located at the lateral/radial wrist crease in the depression between extensor pollicis longus and brevis tendons) as demonstrated in Figure 1.<sup>5</sup> In TCM practice, the acupuncture needle is inserted in the palpable depression at the described acupoint location until (optimally) the *deqi* sensation from needling is experienced by the patient. The *deqi* sensation may be described as numbness (A-beta fiber activation) or as an aching, dull, sore, heavy, and/or warm sensation (A-delta and C fiber activation).<sup>14-16</sup>

Classical acupuncture points with similar therapeutic properties are arranged on meridians, as shown in Figure 2A, B. There are 12 Principal meridians symmetrically arranged around 2 midline meridians (one on the anterior surface of the body and another on the dorsal aspect of the body). Beyond creating conceptual interconnections of acupoints with similar therapeutic properties, the meridians are postulated to have arisen from observing the phenomenon of the spread of *qi* (~energy) sensation from therapeutically

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