

# Acupuncture and Pain

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**Abstract:** Acupuncture represents an important resource in complementary medicine and it is indicated with good levels of evidence in a variety of health problems. Its mechanisms are explained mainly, but not completely, by the release of endogenous opioids and their influence on the autonomic nervous system. Cervicalgia, lumbago, toothache, headaches and knee pain are some of its indications, having a low percentage of side effects and complications. In Chile, its practice is regulated by the Ministry of Health.

**Key words:** acupuncture; pain; complementary medicine

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## 1. Introduction

Acupuncture represents the best known and most widespread field of traditional Chinese medicine in the West. It includes a technique of inserting very thin needles into specific anatomical points on the body surface based on the disease or condition to be treated. However, its extensive practice still faces challenges in consolidating its foundation and truly therapeutic areas, and research provides strong evidence under the most rigorous scientific methods.

The technique of acupuncture contemplates several modalities of stimulation of the inserted needles, which can be manipulated manually (manual acupuncture), electrical stimuli (electro-acupuncture), heat (moxibustion), pressure (acupressure) or laser energy in order to "realign the body's energies or qi". It also includes auricular therapy, which is the stimulation by pressure or puncture of specific points on the auricle.

Currently, there is a growing demand for acupuncture in hospitals and community clinics, as a sign of recognition of the experience transmitted from the East and scientific reports from the West. The application of acupuncture contemplates a wide range of disorders whose most relevant manifestation is rebellious, chronic and recurrent pain.

## 2. Legal Framework for Acupuncture in Chile

Although the Chilean Ministry of Health (MINSAL) uses the concepts of "Complementary or Alternative" Medicine (CAM) as synonyms, in practice, acupuncture is a therapy that "complements" Western medical management. From the legal point of view, Decree 42 of the Ministry of Health, promulgated on February 12, 2004, is the one that provides the regulations for the exercise of alternative medical practices and the facilities in which they are developed.

Specifically in relation to acupuncture, Decree 123 of the Ministry of Health, promulgated on September 8, 2006, recognizes it as an auxiliary health profession, defines the legal point of view, describes the acupuncture microsystems (cranial, acupuncture, auricular acupuncture, hand acupuncture and foot acupuncture), and describes the associated techniques that can be used (moxibustion, cupping, laser acupuncture, electro-acupuncture and magnets ). On the other hand, it defines the minimum knowledge that anyone practicing acupuncture in Chile must have, both from the point of

view of Western medicine and traditional Chinese medicine, which must be evaluated through an exam that must be passed by anyone who wants to practice this therapy in Chile. The list of acupuncturists authorized to practice can be found in the registry of complementary medicine therapists of MINSAL [2].

### **3. Traditional Chinese Medicine and Acupuncture**

The word acupuncture derives from two Greek words: acus (needle) and punctura (to prick). Its origins go back several thousand years, being the Canon of Internal Medicine of the Yellow Emperor (*Huangdi Neijing*), the first medical compilation describing it, dating from the 2nd century B.C. to the 2nd century A.D. [3]. Acupuncture is part of the so-called Traditional Chinese Medicine, which also includes herbal therapy and therapeutic massages (Tuina).

With a more global view, it can be pointed out that to these three elements (herbal therapy, massages and acupuncture), we must add nutrition and exercises such as Tai Chi [4]. Therefore, when acupuncture is used to treat a disease, it is only part of the Arsenal that traditional Chinese medicine offers its patients.

Sometimes, as in many pathologies involving musculoskeletal pain, acupuncture may be sufficient. In other cases, as in sudden deafness or a disease involving the liver, in an oriental sense, it is necessary to resort to the use of herbs and/or at least dietary changes, favoring certain foods and restricting others.

#### 3.1 Types of acupuncture

##### 3.1.1 Traditional Chinese acupuncture

If you want to apply traditional Chinese acupuncture, you must necessarily know this ancient worldview of the person and his environment, which is based on principles of Taoism and Confucianism: Yin and Yang, understood as opposite, complementary and interdependent energies, and the Theory of the Five Movements that classifies nature and its phenomena as belonging to water, wood, fire, earth and metal. Under these principles, man is an entity between heaven and earth, and health is a state of harmony dependent on his surroundings and his inner world.

In acupuncture, this worldview determines:

- the categorization and systematization of the "acupuncture" points,
- the vital energy or "Qi" (pronounced chi) and the meridians through which it circulates,
- the causes of disease
- the role of the internal organs
- the diagnostic process [5].

According to traditional Chinese medicine, pain is caused by an imbalance between Yin and Yang and this imbalance can manifest itself at the level of organs, viscera, muscle, skin, vessels, tendons and meridians. As long as the etiology, pathogenesis, location, and symptoms are different, their treatment will also vary [6].

The questioning, the observation, the examination of the pulse, the tongue and the areas through which the meridians flow allows us to examine the patient, to interrogate not only the person verbally but also the effects that the illness produces in him, in his emotional and relational life that generate an enriching context for the consultant and therapist that facilitates a diagnosis, and therefore, an adequate therapy.

##### 3.1.2 Western acupuncture

Western medicine acupuncture is based on the way the West observes the world. That is to say, it selects the acupoints with the most repeated treatments or the best treatment effect from all the acupoints used to treat back pain. It requires, of course, general knowledge of acupuncture, but it is far from the diagnostic and therapeutic process used in traditional Chinese medicine [7].

It is important to take into account the differences of these two acupuncture modalities when reading systematic

reviews and meta-analyses of the results of acupuncture versus other therapies, whether Western or Eastern. In reviewing these studies, it is clear that they are not comparable for analysis and differ in the characteristics of the patients and the treatments applied. Because of this, the concluded results have a low level of evidence [8].

### 3.2 Techniques associated with acupuncture

Along with the insertion of needles, other complementary techniques can be used that can be associated with the therapy. Among these we have:

- Moxibustion: It includes heating directly on the needle, or heating through cylindrical or conical shapes produced by burning the plant *Artemisa vulgaris*. It can be applied without the insertion of needles, but following the same points described for acupuncture and according to the required therapy.

- Electro-acupuncture: There is also the possibility of connecting the needles to electrical stimulation equipment, modifying the frequency and amplitude of the current applied.

- Cupping: Consists of the use of air suction cups on areas and points, which can be made of ceramic, glass, wood or other related materials.

- Laser puncture: It is the stimulation of acupuncture points with laser equipment specially designed for this purpose [8].

### 3.3 Variations of acupuncture

Traditional acupuncture uses needles of standard size, described a long time ago. However, during the evolution of this knowledge, some variants have appeared that following the belief that certain areas of our body are the abbreviated representation of the cosmos, treating local areas of the body using smaller needles, where all parts of our body are represented [10, 11]. Such as auricular therapy, cranial puncture, hand puncture and foot acupuncture.

In auricular acupuncture, the auricle represents our body. Its therapy requires much smaller needles than traditional ones and pursues the same objective as traditional acupuncture. Tacks or seeds are also used to stimulate the auricular points.

### 3.4 Modality and technique

A regular acupuncture session involves the insertion of needles into the body, of different lengths and thicknesses at painful points (called Ashi points). In addition to needle stimulation of these points, other points are stimulated according to the pathology of the patient. The WHO has classified 409 stimulation points, distinguishing between regional and distal points. No more than 12 needles are inserted during each session [12].

Obtaining the so-called "qi" at the insertion point, which is a feeling of pain, numbness, and/or heaviness, is considered essential. Keep the needle for 20 to 30 minutes and insert, mobilize, and remove according to the basic pathology. All of these are carried out under sterile conditions and using disposable materials to ensure maximum patient safety.

According to clinical conditions, it usually requires 6 to 10 sessions, with a frequency of 1 to 2 times per week, in order to respond to treatment. Between the 3rd and 4th meetings, good results should have been seen. If not, the key points for diagnosis and use can be reconsidered [13].

## **4. Chronic Pain and Acupuncture**

The use of acupuncture as an auxiliary therapy for the management of chronic pain requires some necessary conditions, such as rigorousness and protocolization:

- (1) A baseline diagnosis should be made prior to the initiation of therapy. Thus, the patient will benefit from effective Western treatments and, above all, will avoid delaying the diagnosis of any potentially serious condition, such as spinal

metastasis in the lumbar spine or coronary pain. If during the course of the sessions symptoms or warning signs appear (persistent pain, nighttime etc.), do not hesitate to contact the doctor who referred the patient or seek support from the appropriate specialist as it could be a complication.

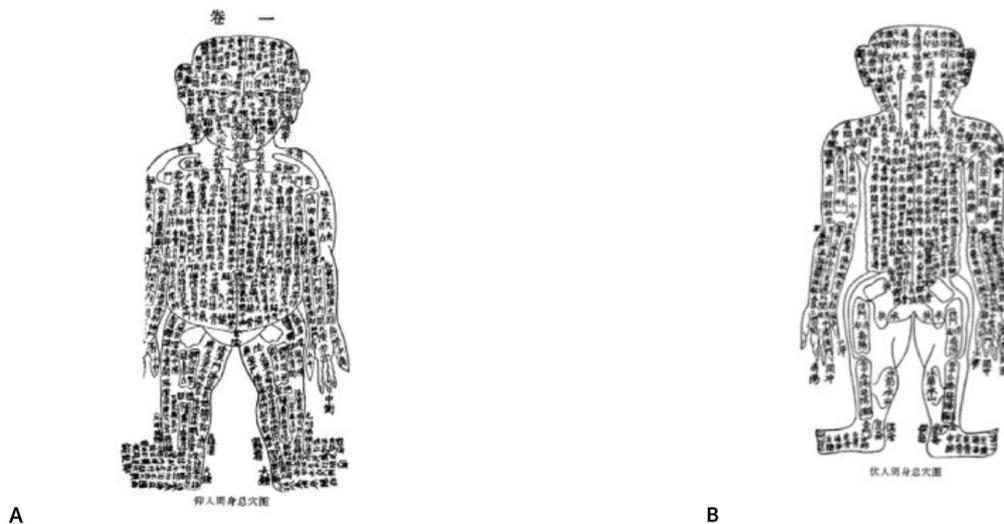
(2) The patient must continue to receive medication treatment as instructed by the treatment doctor. It usually includes not only medication, but also physical therapy, psychological and/or mental support.

(3) All these therapeutic modalities should be understood as adjuvant in the healing process. In addition, in case you are with other complementary therapies and under the principle of "primum non nocere" (the first thing is not to do harm), it is convenient to know the reasons for that choice and to be able to make the respective suggestions according to the existing evidence and one's own experience.

## 5. Physiological Mechanisms of Analgesia in Acupuncture

The mere fact of inserting a needle in some muscle determines local effects, such as the release of ATP, of the peptide related to the calcitonin gene (CGRP) and of substance P and regional effects such as the local increase of the blood supply and the release of endorphins.

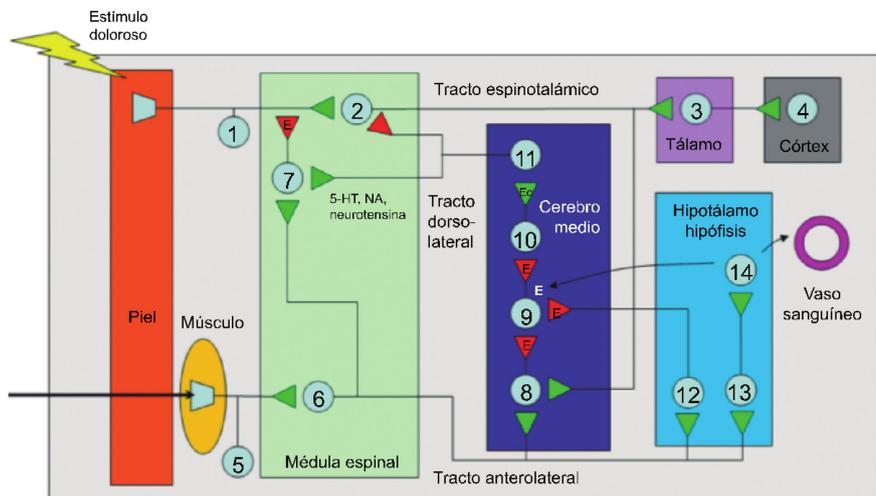
Segmental inhibition effects are also described at the medullary level, which have been demonstrated in humans. This is similar to what occurs in dry needling techniques on trigger points used in physiotherapy. Moreover, a non-negligible percentage of trigger points are shared by both treatment modalities [14] (See Figure 1).



**Figure 1.** Map of acupuncture points of Traditional Chinese Medicine. (a) Anterior view and (b) Posterior view. Images obtained from Van Nghi N, Viet Dzung T, Nguyen R. *Art et pratique de l'acupuncture et de la moxibustion. Tome 1.* Edition N.V.N, Marseille, 1982.

However, evidence from experimental animal and human studies shows that traditional acupuncture needling involves complex mechanisms at different levels of the central and peripheral nervous system, which differ from those obtained with sham acupuncture. Lewith et al. demonstrated an analgesic effect in 40-50% of subjects undergoing sham acupuncture and an effectiveness of 60% in those undergoing true acupuncture [15].

Neurophysiological studies in animals and humans demonstrate that acupuncture increases the pain threshold by activating the endogenous analgesic system, raising the levels of certain endogenous opioids and/or neurotransmitters such as serotonin [16]. In fact, Mayer et al. demonstrated that acupuncture was antagonized by analgesia the use of naloxone in humans, an observation already made in animal models [17]. Studies with electro-acupuncture indicate that low-frequency stimulation induces the release of enkephalins and beta-endorphin, while high-frequency stimulation releases dynorphins [18] (Figure 2).



**Figure 2.** Diagram of the nerve centers and neurotransmitter systems involved in acupuncture analgesia. Modified from Stux,G. and Pomeranz,B. 2004, Ed Masson and cited by Cobos Romana (10).

Other important findings that have been obtained from neurophysiological studies in acupuncture are the following:

- The introduction of nociceptive pathways is crucial for obtaining acupoints analgesia [19].
- The pain threshold caused by acupuncture gradually increases, reaching the maximum effect within 20-40 minutes, and then decreases exponentially. The average life span is about 16 minutes, even if the stimulation is maintained [20].
- Prolonged acupuncture stimulation over time leads to tolerance, which is mediated through the release of the octapeptide cholecystinin centrally [21].
- Immunocytochemical studies indicate that both pain and acupuncture activate the hypothalamic-pituitary-adrenocortical axis [22, 23].
- By conducting neuroimaging (PET, SPECT, and functional RNM) studies on volunteers, it was determined that the hypothalamus plays a central role in the pain relief provided by this method. There is obvious overlap between the pain central nervous system pathway and the acupuncture pathway, indicating that acupoints stimulation may affect the central processing of pain. Shallow needling and traditional needling activate two different central pathways, but both can produce clinical pain relief [24].

## 6. Indications

In 1979, the WHO indicated 49 diseases for which the use of acupuncture was recommended. In 1996, at a conference sponsored by the WHO (WHO Consultation on Acupuncture, Cervia, Italy), its indications were classified according to the degree of existing evidence for each nosological entity [13] (see Table 1).

**Table 1.** Diseases, symptoms or conditions for which acupuncture has been shown, through controlled trials, to be an effective treatment

Headache	Lumbago
Facial pain	Sciatica
Dental and temporomandibular joint pain	Primary dysmenorrhea
Cervical pain	Genualgia
Periarthritis of the shoulder	Pain secondary to sprain/traumas
Biliary colic	Postoperative pain
Renal colic	Rheumatoid arthritis pain

Sánchez-Araujo, M. Acupuncture research: the road not traveled. Rev Int Acupuncture 2011;5, Jan-Mar: 27-37.

The German Acupuncture Society recognizes indications in diseases of the locomotor system, neurological, cardiovascular, gastrointestinal, gynecological, respiratory, skin, ophthalmological and miscellaneous diseases.

The Food and Drug Administration (FDA) of the United States considers its indication in pain, allergy and asthma; in stroke rehabilitation and drug dependence, while the National Institute of Health (NIH) of the same country indicates that acupuncture can be widely used in nausea and vomiting associated with chemotherapy, dental pain, headaches (migraine, tension headache), low back pain, asthma, menstrual pain, fibromyalgia and myofascial pain [25]. Other reviews note its effectiveness in neck pain and osteoarthritis of the knee.

For non-oncologic pain, the main indications are [26]: musculoskeletal diseases, low back and lower extremity pain, headaches, osteoarthritis of the knee, neuralgias, persistent post-surgical pain.

Others: pain associated with the temporomandibular joint, nausea and vomiting (for example, post chemotherapy or in the first trimester of pregnancy) and fatigue associated with malignancy.

### 6.1 Contraindications

On the other hand, there are contraindications to acupuncture that may be absolute or relative and are also related to the type of acupuncture performed [27] (Table 2).

**Table 2.** Contraindications for the use of acupuncture

Absolute	Related
Needle phobia.	Pregnancy.
Severe hemorrhagic picture.	Stitches over nipples, navel and major vessels.
Inability to keep still.	Fontanelles in children.
Sepsis.	Application in menstrual period (there would be less effect according to some authors).
Uncooperative patient (e.g. hallucinations).	Use of corticoids, benzodiazepines or narcotics make it less effective.
Cellulitis, burns and/or ulcerations in areas to be punctured.	Anticoagulants in prophylaxis doses.
Electro-acupuncture: Do not apply on cardiac or cerebral area. Do not apply in the region where there is a pacemaker or implantable pump.	

Stuyt, E, Voyles C. The national acupuncture detoxification association protocol, auricular acupuncture to support patients with substance abuse and behavioral health disorders: current perspectives. *Abuso de Sustancias y Rehabilitación* 2016;7: 169-180.

## 7. Pregnancy and Acupuncture

Pregnancy is considered a relative contraindication. Certain points, especially in the abdomen and some distal points, are avoided because of the potential for uterine contraction. Other authors point out that there are no contraindicated points, as long as an atraumatic needling technique is used. From a practical point of view, it is recommended that the potential adverse effects of acupuncture be made explicit to the pregnant woman prior to obtaining informed consent, [28] and that the obstetrician's authorization be obtained.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

## References

- [1] Galanti, M. El desafío de validar el uso de medicinas complementarias/alternativas. [https://politicaspUBLICAS.uc.cl/wp-content/uploads/2015/08/2\\_MINSAL\\_Galanti-Seminario-UC-2015.pdf](https://politicaspUBLICAS.uc.cl/wp-content/uploads/2015/08/2_MINSAL_Galanti-Seminario-UC-2015.pdf)
- [2] Medicinas complementarias registro de terapeutas. <https://www.minsal.cl/medicinas-complementarias-registro-terapeutas/>
- [3] Unschuld, P. 2003. Huangdi Neijing-Su Wen: Nature, Knowledge, Imaginery in an Ancient Chinese Medical Text. University of California Press Ltd. pp.319-321.
- [4] Flaherty JH, Takahashi R. 2004. The use of complementary and alternative medical therapies among older persons around the world. *Clin Geriatr Med*, 20: 179-200.
- [5] Stör W, Irnich D. 2009. Akupunktur Grundlagen. Praxis und Evidenz. *Der Anaesthetist*, 58: 311-324.6.
- [6] Crettaz M. 2014. Douleur et acupuncture: principe et thérapeutique. *Rev Med Suisse*, 10: 275-276.
- [7] Adrian W. 2009. Western medical acupuncture: A definition. *Acupuncture in Medicine*, 27(1): 33-35.
- [8] Sánchez - Araujo, M. 2011. Investigación de la acupuntura:el camino que no se recorrió. *Rev Int Acupuntura*, 5, ene-mar: 27-37.
- [9] Van Nghi N, Viet Dzong T, Nguyen R. 1982. Art et pratique de l'acupuncture et de la moxibustion. Tome 1. Edition N.V.N, Marseille.
- [10] Cobos Romana R. 2013. Acupuntura, electroacupuntura, moxibustión y técnicas relacionadas en el tratamiento del dolor. *Rev Soc Esp Dolor*, 20(5): 263-277.
- [11] Murakami M, Fox L, Dijkers M. 2017. Ear acupuncture for immediate pain relief-a systematic review and meta-analysis of randomized controlled trials. *Pain Medicine*, 18: 551-564.
- [12] Stuyt E, Voyles C. 2016. The national acupuncture detoxification association protocol, auricular acupuncture to support patients with substance abuse and behavioral health disorders: current perspectives. *Substance Abuse and Rehabilitation*, 7: 169-180.
- [13] Jun Z, Jing Z. 1984. Fundamentos de acupuntura y moxibustión de China. Ediciones en lenguas extranjeras, Beijing. pp.318-331.
- [14] Flores A, Arias L, Azolas, X. y col. 2014. Dolor y medicina complementaria y acupuntura. *Rev Med Clin Condes*, 25(4): 636-640.
- [15] Hsu E, Wu I, Lai B. 2018. Acupuncture. In: Benzon H, Raja S, Fishman S et al, editors. *Essentials of Pain Medicine*, pp.545-551, Elsevier.
- [16] Lewith GT, Machin D. 1983. On evaluation of clinical effects of acupuncture. *Pain*, 16: 111-127.
- [17] Bäuml P, Irnich D. 2017. Physiologische Mechanismen der analgetischen Akupunkturwirkung- ein Update im klinischen Kontext. *Dt Ztschr f Akup*, 60(1): 9-15.
- [18] Han JS, Terenius L. 1982. Neurochemical basis of acupuncture analgesia. *Ann Rev Pharmacol Toxicol*, 22: 193-220.
- [19] Mayer DJ, Price DD, Rafii A. 1977. Antagonism of acupuncture analgesia in man by narcotic antagonist naloxone. *Brain Res*, 121: 368-372.
- [20] Han JS, Sun SL. 1990. Differential release of enkephalin and dynorphin by low and high frequency electroacupuncture in the central nervous system. *Acupunct Sci Int J*, 1: 19-27.
- [21] Pan B, Castro-Lopes J, Coimbra A. 1997. Chemical sensory deafferentation abolishes hypothalamic pituitary activation induced by noxious stimulation or electro-acupuncture but only decreases that caused by immobilization stress.

A c-fos study. *Neuro-Science*, 78: 1059-1068.

[22] Research Group of Acupuncture Anesthesia PMC. 1973. The effect of acupuncture on human skin pain threshold. *Chin Med J*, 3: 151-157.

[23] Han JS, Ding XZ, Fan SG. 1985. Is cholecystokinin octapeptide (CCK-8) a candidate for endogenous anti-opioid substrates? *Neuropeptides*, 5: 399-402.

[24] Pan B, Castro-Lopes J, Coimbra A. 1994. C-fos expression in the hypothalamo-pituitary system induced by electro-acupuncture or noxious stimulation. *Neuroreport*, 5:1649-1652.

[25] Pan B, Castro-Lopes J, Coimbra A. 1997. Chemical sensory deafferentation abolishes hypothalamic pituitary activation induced by noxious stimulation or electroacupuncture but only decreases that caused by immobilization stress. A c-fos study. *Neuro-science*, 78: 1059-1068.

[26] Wang S-M, Kain Z, White P. 2008. Acupuncture analgesia: I. The scientific basis. *Anesth Analg*, 106(2): 602-610.

[27] NIH Consensus Conference: Acupuncture. *JAMA*, 1998, 280: 1518-1524.

[28] Yamauchi N. 1976. The results of therapeutic acupuncture in a pain clinic. *Can Anaesth Soc J*, 3(2): 196-206.

[29] Wilkinson J, Faleiro R. 2007. Acupuncture in pain management. *Continuing Education in Anesthesia Critical Care & Pain*, 7(4): 135-138.

[30] Clarkson C, O'Mahony D et al. 2015. Adverse event reporting in studies of penetrating acupuncture during pregnancy: a systematic review. *Acta Obstetrica et Gynecologica Scandinavica*, 94: 453-464.

[31] Melchart D, Weidenhammer W, Streng A, et al. 2004. *Arch Intern Med*, 164 (Jan 12): 104-105.