# Chapter 1
# History of Acupuncture

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## Introduction

Acupuncture, an ancient medical technique of traditional Chinese medicine practiced for over 2,500 years, was first introduced into the US mainstream society in 1971. Among three major indications of the treatment (pain relief, functional adjustment, and immune modulation), acupuncture analgesia (AA) is the most widely used treatment in humans. Thanks to the advances in biochemical and biophysical technology, the mechanisms of AA are elucidated as a consequence of peripheral acupoint stimulation, mobilization of central neural peptides, and triggering of the central inhibitory pathway for modulation of pain sensation. A comprehensive understanding of the origin and history of acupuncture will help Western scientists integrate this ancient technique as a complementary practice into modern medicine.

## Definition of Acupuncture

"Acupmoxa" is a hybrid word of "acupuncture" and "moxibustion", which closely resembles the Chinese ideograph for this treatment. Acupuncture involves penetration of skin areas (acupoints) with thin metallic needles, followed by manipulation of the needles, either manually or by electrical stimulation. Moxibustion is a technique in which heat is applied to acupoints through the burning of compressed, powdered herbal materials at the acupoints to be stimulated [1]. Acupuncture or moxibustion, either alone or in combination with each other, can be applied for the treatment of many diseases [2].

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## Origin of Acupuncture

In contrast to Western medicine, which can be traced back to Hippocrates in a clear distinct path, Chinese acupuncture theory was fully developed by the end of second century BC. There is undocumented evidence that the tattoo marks on the Tyrolean Iceman (dated to 3300 BCE) coincide with acupuncture points known to us today. This may date the origin of acupuncture back to time immemorial, and indicate its spread beyond China, or perhaps a spontaneous development in other regions of the world [3]. However, among many old civilizations, such as kingdoms in Africa, Sumer, China, Mesoamerica, and Indus-Ganges, China is the only civilization where acupuncture was well documented 2,000 years ago.

In 1972, documents were discovered in China, written on silk scrolls from the Ma Wang Dui tomb (sealed in 198 BCE). These documents referred to moxibustion, without reference to acupuncture or acupoints, and included 11 lines of channel (meridians). This suggests that the origins of moxibustion and meridians predate those of acupuncture and acupoints [4].

The first document (dated about 100 BCE) to systemically describe acupuncture's use in treating human disorder through the propelling of hypothetic "qi" (vital energy or life force) in the meridians is titled *Ling Shu* (translation: *The Spiritual Pivot*). *Ling Shu* is the second part of an ancient Chinese textbook of medicine with the English title *The Yellow Emperor's Classic of Internal Medicine* (*Nei Jing* in Chinese). The first part of the book, the *Su Wen* (or *Simple Questions* or *Plain Questions* in English), describes the treatment strategy of traditional Chinese medicine. For a thousand years, the principles and logical intension described in *Ling Shu* remain the central dogma of acupuncture treatment.

## History of Acupuncture

### *Before Documentation of Acupuncture*

The clan commune period in China began about 100,000 years ago, and lasted until 4,000 years ago. Before the first documentation of acupuncture, or *Ling Shu*, acupuncture instruments are postulated to have been made from sharpened stone called "bian stone," also referred to as "needle stone," or "arrow-headed stone." "Bian" indicates treating disease with stone, and the "bian stone" is an ancient device that was employed for external treatment. Described in chapter 12 of *Su Wen*, bian stones could be found along the seashore, and were the first choice in treating human disorders such as abscesses. Discovered relics of bian stone ranging from 4.5 to 9.1 cm in size provide powerful evidence of acupuncture's origin in eastern China.

**Table 1.1** Classification and function of the Nine Needles for acupuncture

| Types | Length Traditional[a] (100 BCE) | Length Metric (cm) | Functions |
|---|---|---|---|
| Chisel-like needle | 1′6″ | 3.696 | Superficial piercing |
| Round-tipped needle | 1′6″ | 3.696 | Massaging acupoints |
| *Chih* needle | 3′5″ | 8.085 | Knocking or pressing points |
| Tri-edegd needle | 1′6″ | 3.696 | Venipuncture or blood-letting |
| *Pi* needle | 4′ | 9.240 | Drainage of abscesses |
| Round-sharp needle | 1′6″ | 3.696 | Rapid pricking |
| Filiform needle | 1′6″ | 3.696 | Model for today's needles |
| Long needle | 7′ | 16.170 | Muscle insertion |
| Large needle | 4′ | 9.240 | Joint insertion |

[a] Traditional measurement scale: 1′6″ = 1 Cun 6 Fen (100 BCE)

## *Evolution of Acupuncture Needles*

The evolution of the acupuncture needle has historically been connected with cultural backgrounds and available local materials. In the Shang Dynasty (1000 BCE), for example, hieroglyphs of acupuncture appeared in inscriptions on bones or shells, but with the development of bronze casting techniques, bronze needles appeared. Upon the introduction and application of iron instruments between 475 BCE and 24 AD, bian stones were replaced by metallic needles, opening a new era for acupuncture practice with ease of handling.

According to the description in *Ling Shu*, there were nine types of metallic needles ("the Nine Needles") at that time, with varying shapes and uses: the chisel-like needle, round-tipped needle, chih needle, tri-edged needle, *pi* (sword-like) needle, round sharp needle, filiform needle, long needle, and large needle. The length and function of the Nine Needles are shown in Table 1.1. In 1308 AD, the figures of "the Nine Needles" were first illustrated in the book *Chi Shen Ba Tuei*, followed by subsequent versions, and again demonstrated in *The Great Compendium of Acupuncture and Moxibustion* (1601) (see Fig. 1.1). Modern needles currently used to achieve pain relief are derived from the filiform needle.

## *Lineage of Meridian and Acupoint*

As mentioned previously, silk scrolls discovered in 198 BCE contain the only evidence of moxibustion and 11 lines of meridian, without any reference to acupuncture or

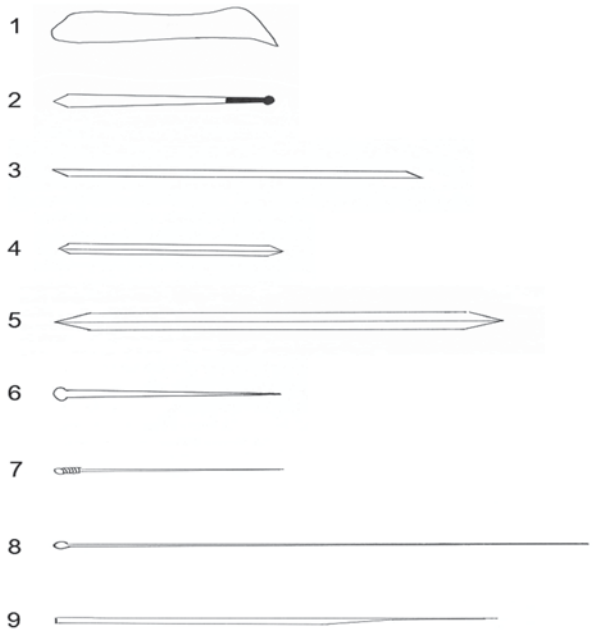


**Fig. 1.1** The Nine Needles from "The Great Compendium of Acupuncture and Moxibustion" (1601). They were chisel-like needle (*1*), round-tipped needle (*2*), *chih* needle (*3*), tri-edged needle (*4*), *pi* (sword-like) needle (*5*), round sharp needle (*6*), filiform needle (*7*), long needle (*8*), and large needle (*9*). The needles still currently in use for pain relief are derived from the filiform needle

acupoints [4]. It is reasonable to deduce that the acupoints currently in common use are plotted upon these original meridians. In the time following the discovery of the Ma Wang Dui texts, much literature was produced relating to the development of acupoint localization. One example, *Systematic Classic of Acupuncture and Moxibustion* compiled by Huangfu Mi (256–260), consists of 12 volumes with 128 chapters. It includes 349 acupoints and is one of the most influential works in the history of acupuncture and moxibustion. *Prescriptions for Emergencies* by Ge Hong (265–581) popularized medical knowledge, especially the therapeutic methods of acupuncture and moxibustion. Further modification by acupuncture experts for centuries has resulted in the number of meridians and acupoints increasing to 12 regular and eight extra meridians and 365 points in total, respectively.

By the Tang dynasties (618–907), acupuncture was recognized as a specialized branch of medicine, and those practicing in the field bore the title "Acupuncturist." Supported by the Northern Song government (1026), the book *Illustrated Manual on the Points for Acupuncture and Moxibustion on a New Bronze Figure* describes in detail the locations of acupoints, their related meridians, and includes a supplement to their indications. This publication was followed by the manufacture of two bronze statues designed by Wang Weiyi (1027), depicting the internal organs set inside and the meridians and acupoints engraved on the surface for teaching and examination purposes.

## Traditional Concept of Pain Relief by Acupuncture

Although controversy exists concerning the true nature of "meridians," there is consensus that circulation of qi in the meridians is essential for the maintenance of normal body functions. According to the description in *Ling Shu*, there are two hypotheses about the characteristics of meridians: (1) a meridian is a space containing those structures essential for qi transportation and (2) qi is a vital energy, indicating that only live persons can drive the circulation of qi. In traditional Chinese medicine, pain and illness are interpreted as symptoms that occur when the corresponding meridians are blocked (known as the "meridian blocked theory"). Acupuncture treatment can unblock these meridians, thereby reestablishing the flow of qi and relieving the symptoms. These hypotheses, however, have not yet been validated by modern science and technology.

## Recent Study on Acupuncture Analgesia

### *The Role of Endogenous Opioids in Acupuncture Analgesia*

In the early 1970s when acupuncture was first introduced to the USA, gate theory and diffuse noxious inhibitory control (DNIC) models were used to explain its effectiveness [5, 6]. Nearly at the same time β-endorphin (1976) was discovered by Li and Chung, amidst a flurry of discoveries in the field of "endogenous opiates," which also included Met-enkephalin, Leu- enkephalin (1975), dynorphin (1979), and more recently, the endomorphin (1997), and were postulated to act as potent analgesic agents [7–10]. The relationship between AA and different kinds of endogenous opiates was then explored in detail. The most well-known group is Han JS's. They postulated that the mechanisms of AA is through peripheral stimulation of acupoints and mediated by mobilization of central neuropeptides [9, 11, 12]. Furthermore, stimulation by different frequencies (2, 15, 100 Hz) on destined points on the skin surface mobilizes different neuropeptides (β-endorphin, enkephalin, dynorphin), bind to the corresponding receptors (μ-opioid receptor, δ-opioid receptor, κ-opioid receptor) and induce analgesic effects, respectively [9, 13].

### *The Role of Serotonin and the Descending Inhibitory Pathway in Acupuncture Analgesia*

Acupuncture-induced analgesic effect is demonstrated not only in humans but also in rabbits and rats. In addition to opioids, other central substances such as 5-hydroxytryptamine (5-HT) [14–17] and spinal orphanin and norepinephrine (NE) are related to AA effect, whereas central cholecystokinin-8 (CCK-8), NE, and orphanin are related to tolerance of AA [18–20].

### *Evidence for Acupuncture Analgesia*

Recent history of AA can be traced back to the late 1950s, when the clinical practice of AA in China was used as a technique to induce analgesic effects during surgery [21]. Evidence (level IV) showing acupuncture's use was reported in 1971, when *New York Times* reporter James Reston wrote about doctors in China using needles to ease his pain after appendectomy [22]. To collect scientific evidence of acupuncture's effectiveness, randomized controlled trials began emerging in 1992. By 2000, 12 articles on the subject had been published, increasing to 113 by the end of 2009 [23].

Two consensus meetings were held for acupuncture research, which contributed to efficacy exploration of this ancient technique, despite some skeptical critiques [24–26]. The first of these meetings, entitled "NIH Consensus Development Conference on Acupuncture," was held in 1997 in Bethesda, MD [27]. A World Health Organization report and a National Institutes of Health consensus conference each provided long lists of indications for which acupuncture was allegedly of proven benefit. The second "NIH Consensus Development Conference on Acupuncture," held in 2007, summarized not only AA but also the modulation of visceral functions and anti-inflammation as acupuncture indications [28].

There is still work to be done to improve scientific AA research. During the past few decades, researchers have addressed their greatest methodological challenge, placebo needling. Cochrane's recent reviews of acupuncture for the treatment of any type of pain suggest that acupuncture is effective for some, but not all, types of pain [29]. In summary, areas of consensus and controversy exist, and large scale, well-designed clinical trials are still needed to reveal the mysteries of AA with results that pass muster with scientists [26, 30, 31].

## fMRI Study on Acupuncture Analgesia

In addition to the discovery of biochemical substances, such as endogenous neuropeptides, advancements in technology have contributed to the advancement of acupuncture research as well. Functional magnetic resonance imaging (fMRI) allows researchers to obtain visualization of the brain at the moment of sensory stimulation.

The first acupuncture research study employing magnetic resonance imaging was reported in 1998. It may prove to be a landmark study, despite having been withdrawn by the authors in 2006 [32]. Since the start of the current millennium, much effort has been devoted to acupuncture-related fMRI or positron emission tomography (PET) studies. The accumulating evidence suggests that acupuncture modulates many distributed cortical and subcortical brain areas [33–37]. These brain areas support endogenous antinociceptive mechanisms and part of the pain neuromatrix, and may contribute to the therapeutic effect of acupuncture by shifting the autonomic nervous system balance and altering the affective and cognitive dimensions of pain processing [38, 39]. There is also evidence, both in animals and in

**Table 1.2** Chronicle of AA

| Year | Events related to AA |
|---|---|
| ~5000 BCE | Sharpened stones as tools of acupuncture [2] |
| 3300 BCE | Tattoo marks on the Tyrolean Iceman [3] |
| 198 BCE | Silk scrolls (origin of moxibustion) [4] |
| 100 BCE | *The Yellow Emperor's Classic of Internal Medicine*, 1st document (Ling Shu) describing AA [2] |
| 1950s | AA developed in China [21] |
| 1965 | Gate theory for AA [5] |
| 1971 | Introduction of AA into USA [22] |
| 1975 | Discovery of enkephalin [9] |
| 1976 | Discovery of endorphin [7, 8] |
| 1979 | Discovery of dynorphin [9], non-endorphin system for AA [14], DNIC theory for AA [6] |
| 1986 | Cholecystokinin 8 as a mediator for AA tolerance [18] |
| 1997 | Discovery of endomorphin [10], 1st NIH consensus meeting on acupuncture [27] |
| 1998 | 1st fMRI study for AA studies [32] |
| 2007 | 2nd NIH consensus meeting on acupuncture [28] |

*AA* acupuncture analgesia, *DNIC* diffuse noxious inhibitory control, *NIH* National Institute of Health, *fMRI* functional magnetic resonance imaging

humans, that sham electroacupuncture (EA) and real EA both activated the reported distributed pain neuromatrix. Real EA, however, elicited significantly higher activation over the hypothalamus and primary somatosensory–motor cortex than sham EA, as well as deactivation over the rostral segment of anterior cingulate cortex. This may explain the relative acupuncture specificity in clinical aspect [40–42].

## Conclusion

There is an increasing trend in people outside Asia using acupuncture as a complementary treatment for their disorders. For the past four decades, extensive studies of both the basic and clinical aspects have rigorously explored the efficacy and mechanisms of AA. Becoming familiar with the recent history of AA (see Table 1.2) provides a better understanding of the benefits of integrating the practice into current, western, medical pain management.

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