J Acupunct Meridian Stud 2014;7(3):105—114

Available online at www.sciencedirect.com

Journal of Acupuncture and Meridian Studies

journal homepage: www.jams-kpi.com

REVIEW ARTICLE

Neurobiological Mechanisms of Acupuncture for Some Common Illnesses: A Clinician's Perspective

Kwokming James Cheng*

North East Medical Services, San Francisco, USA

Available online 17 August 2013

Received: Jun 14, 2013
Revised: Jul 8, 2013
Accepted: Jul 9, 2013

KEYWORDS
acupuncture;
acupuncture point specificity;
clinical applications;
neurobiological mechanism;
somato-autonomic reflex;
Western medical acupuncture

Abstract
This paper presents some previously proposed neurobiological mechanisms on how acupuncture may work in some clinical applications from a clinician's perspective. For the treatment of musculoskeletal conditions, the proposed mechanisms included micro-injury, increased local blood flow, facilitated healing, and analgesia. Acupuncture may trigger a somatic autonomic reflex, thereby affecting the gastric and cardiovascular functions. Acupuncture may also change the levels of neurotransmitters such as serotonin and dopamine, thereby affecting the emotional state and craving. This mechanism may form the basis for the treatment of smoking cessation. By affecting other pain-modulating neurotransmitters such as met-enkephalin and substance P along the nociceptive pathway, acupuncture may relieve headache. Acupuncture may affect the hypothalamus pituitary axis and reduce the release of the luteinizing hormone in the treatment of polycystic ovary syndrome. In addition, two other approaches to the acupuncture mechanism, the fascia connective tissue network and the primo vascular system, are briefly reviewed. Finally, the idea of true versus sham acupuncture points, which are commonly used in clinical trials, is examined because the difference between true and sham points does not exist in the neurobiological model.

1. Introduction

Acupuncture is a modality of medicine involving insertion of needles at certain locations of the body to achieve therapeutic effects. Believed to be originated in China thousands of years ago, it is remarkable that acupuncture is still widely practiced [1—3]. Clinical evidence supports the efficacy of acupuncture treatment in many applications. At

* North East Medical Services, 82 Leland Avenue, San Francisco, CA 94134, USA.
E-mail: kjcheng@sbcglobal.net.

pISSN 2005-2901 eISSN 2093-8152
http://dx.doi.org/10.1016/j.jams.2013.07.008

present, acupuncture is not only practiced by practitioners from the school of traditional Chinese medicine (TCM), but is also practiced or recommended by clinicians of mainstream Western medicine especially for the treatment of musculoskeletal conditions such as back pain. This use of acupuncture in mainstream medicine is certainly an encouraging trend in the promotion and advancement of acupuncture. Although the traditional concepts of qi, meridians, and yin—yang are appealing to many, they are foreign and archaic to many clinicians and patients of Western medicine. To promote acupuncture and incorporate it into mainstream medicine, it would be helpful to describe the mechanism of acupuncture to clinicians and patients alike of mainstream medicine using contemporary concepts of neurobiology.

To formulate the mechanisms of acupuncture based on concepts of contemporary science and medicine, it is useful to first think of the essence of acupuncture simply as the process of inserting acupuncture needles at certain locations of the body to achieve certain therapeutic effects, disassociating it from the ideas of qi and meridians. This is shown in Fig. 1A, where the input is the insertion of the acupuncture needles and the output is the therapeutic effect. This phenomenon is what ancient practitioners discovered thousands of years ago. Based on the contemporary knowledge at that time, the ancient practitioners

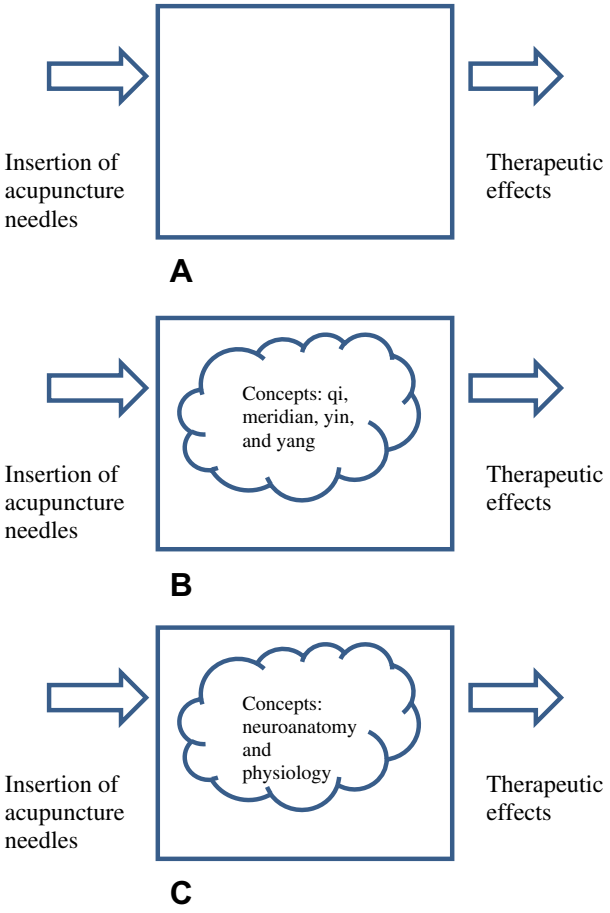

Figure 1 (A) The phenomenon of acupuncture. (B) The phenomenon of acupuncture with concepts of traditional Chinese medicine. (C) The phenomenon of acupuncture with concepts of contemporary science and medicine.

associated this phenomenon with the ideas of qi and meridians, in an attempt to explain how acupuncture works. This is shown in Fig. 1B. Instead of using the ideas of qi and meridians, one may also use concepts of contemporary science and medicine to explain this phenomenon. This is shown in Fig. 1C. This paper is based on this approach. Much progress has been made in the past few decades toward this approach.

This paper presents the perspective of a clinician practicing Western mainstream medicine using an approach to acupuncture, in which the classical concepts of TCM are foregone and only contemporary scientific concepts are embraced. This approach is known as Western medical acupuncture [4,5]. An important difference between the TCM and the Western medical approach is the diagnosis process. In TCM, the diagnosis is achieved using the principles of syndrome differentiation, which could be in accordance with the state of the zàng—fǔ organs or qi, or in accordance with the doctrine of meridians [6]. This diagnostic process has no equivalence in Western mainstream medicine. In the Western medical approach, one adheres to the usual diagnosis process of mainstream medicine.

In this paper, some neurobiological mechanisms of acupuncture treatment for some common illnesses from a clinician's perspective are presented. The evidence of efficacy for these applications is indicated. In addition, the implication of this approach on the idea of sham acupuncture points commonly used in clinical trials is briefly discussed. Two other scientific approaches to the study of acupuncture mechanisms—the fascia network and primo vascular system—are also discussed. As will be seen eventually, the historical concepts of qi, meridians, and yin—yang might be accounted for loosely, though not exactly, in terms of concepts of contemporary science.

2. Acupuncture mechanism

A pioneer discovery in modern acupuncture research is that acupuncture stimulates the secretion of the endogenous opioid endorphin [7]. At first sight this may appear to be of limited clinical relevance, as only a limited number of common clinical applications involve analgesia. The significance of this discovery is that it establishes the neural model of acupuncture mechanism. If acupuncture stimulation generates a nerve signal to the brain resulting in the secretion of endorphin, it may also result in the activation of other neural pathways as well as the secretion of other neurotransmitters.

Much work has been done on the neural mechanism of acupuncture since then [8—15]. However, there is no unified theory of acupuncture mechanism, but rather only various models and hypotheses for different clinical applications are available. In the following discussions, the mechanism of acupuncture is considered separately for local effects, somato-autonomic reflex, and systemic effects through neurotransmitters. In Table 1 [16,17] [4] [15] [8,18] [19] [20—23] [24,25] [26,27] [28] [29,30] [31] [32] [33—35] [36,37], a list of some acupuncture clinical applications of interest, their proposed mechanism, and evidence for efficacy is presented. A key to the acupuncture points mentioned in the applications is given in Table 2.