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# 针刺治疗神经系统疾患

## 神经生物学研究

# Acupuncture Therapy for Neurological Diseases

## A Neurobiological View

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Springer

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# 针刺治疗神经系统疾患：神经生物学研究

# Acupuncture Therapy for Neurological Diseases: A Neurobiological View

With 87 figures

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## 内 容 简 介

本书采用现代科学语言，诠释了针刺疗法对于神经系统疾患的作用及其神经生物学机理。内容包括针刺疗法的简要历史、针刺效应的一般机理、穴位功能及现代研究、针刺镇痛及针药复合麻醉、慢性疼痛、中风、心脏病、高血压、癫痫、免疫抑制、不孕症、围绝经期综合征、抑郁症、戒烟和戒毒等。所有章节均邀请有经验的学者撰写，作者分别来自复旦大学上海医学院中西医结合系（针刺原理研究所）及医学神经生物学国家重点实验室、上海市针灸经络研究中心、美国耶鲁大学医学院和哈佛大学医学院。其中复旦大学上海医学院中西医结合系（针刺原理研究所）开展针刺研究已有 50 多年的历史，1983 年被任命为世界卫生组织传统医学合作中心。

本书基于多学科技术的现代研究，为针刺研究和神经科学工作者呈现了针刺疗法的概貌和展望，为临床工作者在针刺疗法的应用及机理方面提供了较为翔实的参考资料。对医学生而言，这是一本中西医结合的专业指导书。



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# Preface

Acupuncture is an ancient Chinese therapy with an extensive history, playing an important role in traditional Chinese medicine. Now it has been widely spread to many parts of the world, although there are still doubts and misgivings in people who are unfamiliar with the practice. Based on my previous experience as a practicing clinician, I truly believe that acupuncture is effective for certain diseases and conditions, especially those related to neurological dysfunction/disorders. Because of its convenience, low cost, and few side-effects, acupuncture is worthy to try as a medical modality, even in the modern medical system. This is especially true for neurology, internal medicine and other medical specialties without surgical operation. Indeed, its value has been increasingly recognized in not only the eastern countries, but also in the western world. For example, after the 1997 NIH hearing in terms of its efficacy, acupuncture has become one of the most popular therapies in complementary and alternative medicine in the USA.

The mechanisms of acupuncture, however, are not yet well understood, which is a major obstacle in the way of the promotion and improvement of acupuncture therapy. In the past 5 decades, many Chinese scientists, especially those from Shanghai and Beijing, have made significant efforts in clinical and basic research on acupuncture and have published substantial data which sheds some light on the mystery of acupuncture. Indeed, two of the editors of this book, Profs. Cao and Cheng, have been engaged in acupuncture research since the late 1950's. In fact, Prof. Cao had been one of my mentors during the time when I conducted acupuncture research in my graduate study at Shanghai Medical University (now Shanghai Medical College of Fudan University) in the early 1980's.

Unfortunately, the majority of the previous data generated by Chinese scientists have been published in Chinese. For this reason, foreign clinicians and scientists have hardly been able to acquire access to the huge information recourse. A few years ago, when I initiated the idea of editing an English monograph that reflects the progress of acupuncture research based on both Chinese and English literature, Profs. Cao, Wu and Cheng expressed great enthusiasm about it and we made an

immediate decision to collaborate on it. Since acupuncture is most effective for clinical conditions related to neurological dysfunction/disorders, we focus this book specifically on this topic. Together we have completed this book and now present it to readers.

In modern scientific language, this book discusses the research with multiple neuroscience approaches on the effect of acupuncture on neurological diseases, and the underlying mechanisms. Besides basic principles of acupuncture in the first section, topics in the second section include acupuncture analgesia, acupuncture-drug balanced anesthesia, chronic pain of the body, stroke, cardiac diseases, hypertension, hypotension, epilepsy, immunosuppression, infertility, menopausal & perimenopausal syndrome, depression, smoking and drug addiction. Each chapter is written by two or more experts in the field. All chapters in the second section are basically divided into two major parts, i.e., clinical application and mechanistic research.

The authors of all chapters were encouraged to comprehensively collect information in their chapters to present a broad view in the covered field although they may not necessarily agree with the conclusions in all original articles. Because of methodological and technical limitations in the past, some early studies look too simple and naïve in today's view. However, they mark the traces along the journey of acupuncture research and provide clues for later studies.

After a half century of research, the mystery of acupuncture is gradually being unveiled. In spite of there being many theories of channels and acupoints, it has been well accepted that acupuncture, including manual- and electro-acupuncture, can generate a neural signal, which in turn alters electrical and chemical activity in the nervous system. Undoubtedly, these biological changes can lead to alterations in the body.

It has long been my belief that an exogenous signal, such as that of acupuncture, may play as a re-setting trigger in the body. Consistent with this idea, recent studies on deep brain stimulation (DBS) show an interesting phenomenon. DBS has helped more than 55,000 people with Parkinson's disease (PD) and other neuropsychiatric disorders. Although little is known about how it works, DBS has been approved by the U.S. Food and Drug Administration early this year to treat severe, intractable cases of obsessive-compulsive disorder (OCD). In contrast to DBS, a recent study shows that spinal cord stimulation may have the same therapeutic benefits in the model of PD (Science 323: 1578, 2009) though the pathological origin of PD is mainly in the basal ganglia. In my mind, the potential mechanism behind these phenomena is possibly more or less the same as that of acupuncture, i.e., re-setting in the body, organ and cells. A delicate and in-depth research on acupuncture may eventually help the development of a far-less invasive or even non-invasive procedure for treating OCD according to the principle of acupuncture. I mention this as an example to indicate the significance of acupuncture research in modern medicine.

This unique book provides a perspective view for acupuncture researchers and neuroscientists on the principles of acupuncture. It summarizes clinical applications

of various acupoints and optimal conditions in the treatment of neurological diseases and therefore can be a reference book for clinicians. For the medical student, this book is a modern course in ancient Traditional Chinese Medicine focusing on acupuncture.

I wish to pay my tribute to Ms. Hui Xue, the editor of the publishing house, for her helpful suggestions and Dr. Xiaozhan Gao for his help to turn in our book on time.

Finally, I would like to thank my wife, Ningyuan, and my daughter, Jessica, for their encouragement and understanding of my travels and long hours for this book.

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# Introduction to the Editors

**Ying Xia**

Dr. Xia is an Associate Professor at Yale University School of Medicine, New Haven, CT, USA. He received his medical training at Soochow Medical College in China. After 4 years of medical practice as a physician, he pursued graduate studies and earned his M.S. degree in Physiology from the Department of Physiology, Shanghai First Medical College in 1983, and his doctoral degree in Integrative Medicine and Neurobiology from the Department of Integrative Medicine and Neurobiology, Shanghai Medical University (former Shanghai First Medical College; now Shanghai Medical College of Fudan University) in 1987.

He worked as a Lecturer of Neurobiology and Integrative Medicine in the Department of Integrative Medicine and Neurobiology at Shanghai Medical University from 1987 to 1988. Subsequently, he pursued further training in neuroscience research as a postdoctoral fellow at Yale University School of Medicine from later 1988 to early 1993. At Yale, he was promoted to Associate Research Scientist in 1993, Research Scientist in 1998, and Associate Professor in 2002. He is also a Guest Professor at Shanghai Research Center for Acupuncture and Meridians, and Shanghai Medical College of Fudan University, China.

His early research focused on cardiovascular regulation, interactive modulation of endogenous opioids and other neurotransmitters, and the mechanism of acupuncture. Currently, Dr. Xia's laboratory investigates molecular neuroscience underlying hypoxic/ischemic conditions and the effects of acupuncture on neurological disorders with molecular, transgenic, and electrophysiological techniques. In particular, Dr. Xia is investigating the cellular mechanisms for the dysfunction of neuronal excitability during hypoxia and new strategies for neuroprotection from hypoxic/ischemic injury. He also has research interests in neurodegenerative disorders such as Parkinson's disease and Alzheimer's disease. He has been collaborating with the Chinese scientists at Shanghai Research Center for Acupuncture and Meridians and Shanghai Medical College of Fudan University to study the effects of acupuncture on stroke, epilepsy, and hypoxic encephalopathy. His research has been supported by National Institute of Health (NIH), American Heart Association, Cerebral Palsy Foundation, and March of Dimes Foundation in USA. He has been serving as a reviewer for a variety of scientific journals and for many grant agencies in USA (e.g., NIH and American Heart Association), Europe, Hong Kong, and China. He has given invited talks at many institutions and international conferences.

**Xiaoding Cao**

Dr. Cao is a Professor of Neurobiology in State Key Laboratory of Medical Neurobiology, Institute of Acupuncture Research, and Department of Integrative Medicine and Neurobiology, Shanghai Medical College of Fudan University, Shanghai, China. She graduated from Shanghai First Medical College in 1953, and obtained her Ph.D. degree from the Institute of Experimental Medicine, Academic Medical Sciences, USSR (Russia) in 1960. She is the member of World Health Organization (WHO) Expert Advisory Panel on Traditional Medicine; the honorable Chairman of All-China Association of Acupuncture Anesthesia; and the member of editorial board of Acupuncture and Electro-Therapeutics Research, the International Journal in USA. She is the honorable director of Institute of Acupuncture Research, Shanghai Medical College of Fudan University, as well as the honorable director of WHO Collaborating Center for Traditional Medicine. She was the former director of State Key Laboratory of Medical Neurobiology and the former director of Department of Neurobiology, Shanghai Medical College of Fudan University.

She has been studying the mechanism of acupuncture analgesia and acupuncture treatment since 1964. She is one of the earliest doctors to study the mechanism of acupuncture, especially paying more attention to correlate the basic medical results with the clinical practice. Her work clearly demonstrated that acupuncture induces analgesia by activating the opiate-mediated pain modulating system. To improve the analgesic efficacy of acupuncture and reduce the drug doses at the clinic, she initiated the research on the combination of acupuncture with small doses of analgesics, and was immensely successful. She has also studied the mechanism of acupuncture treatment against some neurological diseases, such as epileptic seizures and stroke. Her current work focuses on acupuncture-induced neuroimmune modulation.

She has published more than 180 papers and has been an invited speaker for more than 80 times at various International Congresses in USA, Canada, Russia, France, Germany, Italy, Switzerland, Finland, Denmark, Costa Rica, Brazil, Japan, Korea, Singapore, Vietnam, Hong Kong, Macao, and Taiwan. In 1997, Dr. Cao was invited by the NIH of the US to give a lecture on "Protective effect of acupuncture on immunosuppression" at the Consensus Development Conference on Acupuncture. In 1999, Dr. Cao was invited by the WHO Regional Office for the Western Pacific and organized the Consultation Meeting on Traditional and Modern Medicine, Harmonizing the Two Approaches, to give a lecture on "Scientific bases of acupuncture analgesia". She has made a significant contribution toward the development of acupuncture therapy worldwide.

**Genchang Wu**

Dr. Wu is a Professor of Neurobiology; Chairman, Department of Integrative Medicine and Neurobiology; Director, Institute of Acupuncture Research; Director, WHO Collaborating Center for Traditional Medicine; and Shanghai Medical College of Fudan University, Shanghai, China. He obtained his M.D. from Shanghai First Medical College in 1969 and M.S. from the Department of Neurobiology, Shanghai First Medical College in 1982. He was a Research Fellow in the First Department of Physiology, Showa University, Tokyo, Japan (1986–1987) and a Guest Researcher at the National Institute of Environment Health Science (NIEHS), NIH, USA (1992 – 1994).

He is the member of Disciplinary Appraisal Panels, Academic Degrees Committee of the State Council, member of the Specialist Panels of the National Postdoctoral Administration, member of Standing Committee, Chinese Association of Acupuncture and Moxibustion, and the member of the editorial board of the America Journal of Chinese Medicine, the International Journal in USA.

His main research interests are on pain modulation and the mechanism of acupuncture. He has published 154 research articles, including 80 international SCI papers from 1984 to 2007. He has obtained 3 awards from the Chinese Central Government and 15 awards from several ministries of the Chinese Government.

**Jieshi Cheng**

Dr. Cheng is a Professor at State Key Laboratory of Medical Neurobiology, Institute of Acupuncture Research, and Department of Integrated Traditional and Western Medicine (Department of Integrative Medicine and Neurobiology), Shanghai Medical College of Fudan University, Shanghai, China. He graduated from Haerbin Medical University in 1954. From 1955 to 1957, he received additional training in Physiology at Shanghai First Medical College. He was a visiting scholar at Oslo University (1980 – 1981) and at USSR Academy of Medical Sciences (1986 – 1987).

He served as a professor and deputy director at the Institute of Acupuncture Research, WHO Collaborating Center for Traditional Medicine (1976 – 2001) and State Key Laboratory of Medical Neurobiology (1992 – 2001) in Shanghai Medical University.

His research focuses on the neurochemical mechanism of acupuncture antiepileptic effect, neuronal injury and protection in cerebral ischemia, and acupuncture protection against brain ischemia. He has published more than 100 research articles in peer-reviewed journals and has received several honors and awards from the Ministry of Public Health and Ministry of Education of China.

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