

# *The Uncertain Art*

## Acupuncture and Science

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When last heard from, "The Uncertain Art" had just wandered into a whereabouts far beyond even the vaguely defined boundaries within which it usually makes its way. The subject of the most recent column was acupuncture—acupuncture, in fact, as a re-placement for general anesthesia. That I as a scientifically trained physician should not only consider such an outlandish possibility but embrace it with wondrous enthusiasm must, in the opinion of some, appear to be a wildly erratic departure from the clinical judgment I claim to value so highly. And yet, I had seen the method succeed not once but twice. Moreover, reliable medical observers have re-reported its usefulness in many additional cases. Having witnessed two thyroid operations in which acupuncture successfully substituted for surgical sleep, I joined the ranks of the convinced. Though I was certainly not convinced of the role said to be played by the mysterious energy called chi or of the existence of the channels along which it is said to flow, I had become absolutely sure that the technique was as advertised: it is possible to carry out some major surgical procedures this way.

But there remained the how and the why. I turned first to my surgical colleague, Yan Zhangshou, a man reared in the old traditions but trained in the ways of Western science. I am always very careful during conversations in which Chinese therapies are discussed in scientific terms. I'm not sure that such discussions have much validity. Western researchers simply assume that every observable phenomenon must have a straightforward explanation, which they can discover by applying the methods of their kind of science. If no explanation is forthcoming, the scientifically trained mind will usually do one of two things with the mysterious phenomenon.

The more frequent response is to categorize it as an elaborate, even if not a willful, hoax. Explanations of this sort, which lean heavily on the jargon of the social scientist and the psychologist, are awash with terms like "autosuggestion," "anecdotal evidence," "cultural expectation," "indoctrination," "selection process," and "uncontrolled." When the mystery involves sickness, the well-worn "placebo effect" is often invoked. Many of the Western explainings-away of acupuncture's success, whether in its medical or its surgical uses, have been written in this kind of language, which effectively begs the question, as do terms like the ubiquitous "psychophysiological." Invoking such hypotheses without any evidence except the lack of evidence of something more specific is no elucidation at all, especially when it is produced by the very form of Western reasoning that is supposed to abjure fuzzy thinking.

The second approach is the opposite of the first. In the face of personal observation that cannot be doubted, many a seeker after rational ways of explaining the as-yet-unexplainable will try to squeeze acupuncture into one of the pigeonholes of orthodox biomedical science. This approach has been theoretical or experimental, or sometimes both. The theoreticians base their thinking on a concept called the gate theory, which is that the electricity or the vast number of tiny pain stimuli from the needles so overloads the capacity of the nervous system that the larger bulk of pain produced by the surgery cannot get to the brain, and therefore never enters the patient's awareness. The laboratory scientists have another idea, and they have produced a host of experimental clues to support it.

Chinese, and some Western, researchers have found evidence that the stimulation of acupuncture needles often causes the brain to release narcotic-like substances called endorphins. It is quite possible that starting up the acupuncture current has much the same effect as starting up an intravenous drip of a powerful drug that acts like morphine.

Even now, I have no idea what Yan Zhangshou thinks about all of this, although I have asked him. He was raised in the certainty of

the Middle Kingdom's superior wisdom, and yet everywhere around him he sees the urgent demands of the modern science he has been taught. When he speaks to Westerners—and I am no exception—he seems obliged to show that he thinks about human biology the way we do, because that is the progressive thing. And yet, what has he done with the culture he has inherited? Who is he when he is at home?

I like the answer Dr. Yan gave me after a long discussion of placebos, the gate theory, and endorphins, because it seems to me that it exemplifies his faith in the possibility that Western science, with its need to believe that it can answer all kinds of eternal questions, may be barking up the wrong tree. Dr. Yan's answer was a single sentence, deceptively simple. But it managed to communicate his underlying allegiance to the principles of Chinese medicine, his awe of the mysteries of nature, and his willingness to believe that understanding will come. He said, "We don't really know yet the natural basis of the channels."

Chinese physicians, despite their upbringing in the old ways, have not been content with explanations based on chi and channels. At the Shanghai Medical University, I visited a research team seeking the scientific basis of acupuncture. My host was the university's president, Dr. Tang Zhaoyou. Dr. Tang is a man of my own age who was for much of his career one of the world's authorities on the diagnosis and treatment of primary liver cancer. His research and surgical contributions are widely known, and his credentials as a clinical scientist are impeccable.

When we discussed my impressions of the thyroid surgery I had seen in Changsha and Beijing, Dr. Tang told me of his personal experience as a patient. This was my first opportunity to speak at length with someone who had actually undergone surgery with acupuncture. Even had my own observations left me with significant doubts, any residual skepticism would have been erased by this

account, which came, after all, from the director of one of China's leading institutions of Western-style medicine.

"I had thyroidectomy twice under acupuncture," Dr. Tang told me. "The first time was in the early 1970s, and it was for benign thyroid tumors. The Cultural Revolution was going on, and things were not so sure. I was a little worried that my recurrent laryngeal nerves might be cut, so I decided that I wanted to talk during the operation, to be safe." (The recurrent laryngeal nerves lie alongside the trachea on each side of the neck, and they supply the muscles that move the vocal cords. Because they are situated directly behind the thyroid lobes, they are vulnerable to surgical injury, which inevitably results in permanent hoarseness.) "So I asked for acupuncture, and it went very well. When the condition came back after seventeen years, I needed a total thyroidectomy, to remove all of the remaining gland. I had liked acupuncture so much the first time that I had it again. And again, it was fine."

I asked whether he had been given any supplemental sedation. "Only a very small dose of Valium before they started," he replied. "And that second operation lasted four hours."

What did it feel like?

"Well, you know, it's not like complete anesthesia, so I did feel them working—and I could feel touching and pressure. But I had no pain. My real problem was the position. For four hours I had to lie there with my head arched back. That part of it was unpleasant, and made it difficult to swallow my saliva. But otherwise it was good."

What I had heard was a testimonial from a satisfied customer. What impressed me most about the description was the matter-of-fact way in which it was given, as though to say, "Well, of course it was good. What else would you expect?"

Dr. Tang arranged for me to meet Cao Xiaoding, the director of Shanghai Medical University's Acupuncture Anesthesia and Analgesia Research Coordinating Group, who, in addition to her Chinese medical degree, has a doctorate in neurobiology from the Academy of Medical Sciences in St. Petersburg. Dr. Cao filled her conversation

with talk of experimental protocols, laboratory technology, statistical analysis, and the most fundamental forms of research in neurobiology. In the two hours we spent together, she revealed herself to be a combination of patient pedagogue and incomprehensible fount of abstruse neurophysiological esoterica. I was unprepared to deal with the ultra-sophisticated fruits of her high-powered research team, which consisted of thirty faculty members and six coordinated laboratories of neurophysiology, neuropharmacology, neuromorphology, neurobiochemistry, clinical physiology, and computer science. During an hour of describing experimental studies, Dr. Cao peppered her disquisition increasingly with terms that were only vaguely, if at all, familiar to me, like "microiontophoretic," "dorsal horn enkephalins," "ventrolateral funiculus," and "radioenzymatic assay." Fortunately, as I was leaving, she gave me a gift of journal articles published in English by members of her team, so I was able later to review the vastness of their output while sitting quietly at home surrounded by textbooks and reference materials. What I learned can be summarized in a few paragraphs.

In 1964, the Shanghai researchers began to develop methods to determine the threshold beyond which pain is felt and the threshold at which it can no longer be tolerated. While studying patients who were undergoing traditional Chinese acupuncture for chronic pain, they and other researchers discovered in the blood an elevation of narcotic-like substances, the so-called endogenous opioid peptides, or endorphins. Later, they were able to demonstrate in animals and in human subjects that these acupuncture-induced endorphins are produced in specific sites in the brain called the caudate nucleus and the periaqueductal gray matter, or PAG. Stimuli applied to those areas increase the amount of endorphin production and also enhance the analgesic, or pain-lesening, effect of acupuncture. Moreover, some American researchers have established that the periaqueductal gray matter contains a relatively high concentration of complex molecular structures called opiate receptors. This means that certain

parts of the PAG are the critical sites on which narcotic analgesia has its effect, and those parts are extremely close to the very cells that produce it. Not surprisingly, when the PAG or the caudate nucleus of experimental animals is damaged, the effectiveness of acupuncture is lessened. During the application of traditional acupuncture, the activity of the two brain centers is increased, and they produce more endorphins. It has been shown that the effect of the increased endorphins, and therefore the effectiveness of the acupuncture, can be partly blocked by the use of naloxone, a narcotic antagonist. This is supporting evidence that the active agent in acupuncture is indeed the endorphin.

The basic principle described in the Cao group's publications is the same one that has been identified by research teams working in laboratories in America, in Europe, and in other centers in China: acupuncture functions to raise the threshold of tolerance of pain because it activates the body's inherent system of protection. The diminution in pain awareness involves the integrated action of several levels of the nervous system, but the most important factor so far identified seems to be the increased production of endorphins. Of course, the basic question remains: How do the acupuncture needles activate the process in the first place? Dr. Cao's group believes that stimulating the needles sends signals that are picked up by sensory nerves in the area and carried to specific pathways in the spinal cord, which pass them upward to appropriate areas of the brain.

All this provides a reasonable explanation for the effectiveness of surgical acupuncture. But "reasonable" does not mean "proven" or even well enough documented to satisfy the rigorous criteria of experimental science. Although there is strong support for Dr. Cao's theories, not all laboratories have been able to replicate her findings, and some legitimate questions have been raised about the experimental methods that were used in her research.

Objections like these, however, often arise during the process of validating experimental studies and the theories that develop from them. They are part of the sequence of any scientific inquiry.

Whatever the eventual outcome of acupuncture research, the research itself is certain to increase knowledge about the mechanisms of pain and the body's tolerance of it.

There are those Westerners who have wondered why it is necessary to await experimental validation before using a technique that has been shown to work in practice. Among them was James Reston, one of America's most respected journalists. During his 1971 visit to the People's Republic of China, Reston underwent an appendectomy under spinal anesthesia at the hospital of the Peking Union Medical College. (At that time it had been renamed the Anti-Imperialist Medical College, as though in flaunting rejection of its founder, that symbol of American hegemony, the Rockefeller Foundation. When Reston was admitted to the hospital building in which members of the Western diplomatic corps were treated, he saw a large sign just to the right of the entrance, bearing a quotation from Chairman Mao: "The time will not be far off when all the aggressors and their running dogs in the world will be buried. There is certainly no escape for them.")

Much impressed with the acupuncture used to treat his postoperative pain, Reston wanted to learn more. He was taken to operating rooms in a Shanghai hospital where he saw two wide-awake patients undergoing brain surgery with acupuncture. He also saw an alert young man conversing and even eating a piece of fruit while surgeons removed a tuberculous lung through a "vast gaping hole in his back." Of the Chinese surgeons, he wrote, "While they cannot agree on the theory of how needle anesthesia works, they are increasingly convinced that it does work, and they are operating on the pragmatic evidence and not waiting for theoretical justifications. . . . There is enough objective evidence of practical medical information in the use of acupuncture to justify exploration by somebody more scientific than newspaper reporters."

While surgical acupuncture is not being used in the West, many thousands of Americans, perhaps millions, have been treated with its needles for less acute situations, such as chronic pain. One of my colleagues, Dr. Sung Liao, is an expert in this form of therapy. I first met Dr. Liao in 1961. Although our paths have crossed only occasionally during these almost forty years, it has not been difficult to follow his busy career. A graduate of the Hunan Medical University, he trained in the specialty of rehabilitation medicine at the Massachusetts General Hospital and did further study at St. Thomas's Hospital in London. By the time I met him, he had founded departments in his specialty in several Connecticut hospitals and was serving as chairman of three of them simultaneously. Until he retired about ten years ago, he held the title of Clinical Professor of Surgery at the New York University College of Medicine.

While studying in London, Sung Liao had met Felix Mann, one of England's early proponents of acupuncture, a technique of which Dr. Liao had always been skeptical. "When I was studying at the Hunan Medical University in the nineteen-forties, everything was very scientific," he told me. "We looked down on acupuncture. It was done in the streets." But during the summer of 1971, Dr. Liao suffered the acute onset of rotator cuff syndrome, for which all attempts at nonsurgical therapy failed. In desperation, he sought out Mann, who was at the time lecturing at the Downstate branch of the medical school of the State University of New York. When the condition responded to Mann's acupuncture treatment, he brought together a group of ten physicians to take a course under the master. Gradually, Dr. Liao began to incorporate the technique into the therapy of people who came to him for treatment of a variety of conditions whose major symptom was pain. He was soon flooded with patients. "When I was at my peak," he told me, "I saw about sixty patients a day. Until 1984, I worked six days a week, usually until ten o'clock at night, and then I gradually cut down to a few hours on two days a week."



Sung Liao estimates that by the time of his retirement he had treated some twenty-five thousand people, with a success rate of about 85 percent, by which he meant no recurrence of pain.

Because doctors, like everyone else, are prone to remember their triumphs more accurately than their defeats, I sought out a disinterested evaluation of Dr. Liao's results. In 1977, Marsha Greenfield, a graduate student at the Yale School of Epidemiology and Public Health, did the research for her master's thesis at Dr. Liao's clinic; her dissertation was titled "Acupuncture as a Rehabilitation Modality in Chronic Low Back Pain Syndrome." Chronic low back pain is a notoriously difficult problem to treat, one that often defies the best efforts of internists, orthopedists, neurosurgeons, and specialists in rehabilitation medicine. Although the underlying pathologies run a wide gamut, all types of low back pain are often lumped together by physicians and patients alike. People whose pain is resistant to treatment commonly go from one doctor to another until, in desperation, they turn to nonstandard therapies. Many of Dr. Liao's patients had come to him after having undergone manipulation, injection, and even surgery.

Marsha Greenfield studied 220 patients who were treated for low back pain between August 1975 and July 1976. She established specific criteria for improvement and adhered to strict statistical methods in analyzing the results. She found that three-quarters of the patients could be considered to have had a remarkably good response. What makes this figure even more impressive is that so many of them had histories of therapeutic failure.

Sung Liao is convinced that there are no psychological or personality characteristics that distinguish people who respond to acupuncture from those who do not. He is also convinced—and here he is supported by studies done by others—that there is no relationship between a patient's hypnotizability and the likelihood of response to acupuncture. But like everyone else, he has only theories

about why it succeeds so often in chronic cases. Endorphins seem not to play a role, since they have been shown to be elevated only while the needles are in place. Others have disagreed, claiming that breaking the cycle of pain in this way may be the key to its eradication. Still others believe that increased levels of steroids or some other biochemically active substance are the cause, but there is very little reliable evidence to support such speculations.

The fact is that the basis of acupuncture's practical usefulness, even in the operating room, has still not been explained in terms acceptable to most orthodox Western scientists using orthodox Western investigative methods. In 1962, Aldous Huxley wrote, in an introduction to Felix Mann's first book, "From telepathy to acupuncture, queer facts get ignored by the very people whose business it is to investigate them—get ignored because they fail to fit into any of the academic pigeonholes and do not suffer themselves to be explained in terms of accredited theories."

But there are philosophers of science and medicine who tell us that we are on the threshold of a new way of looking at and interpreting the observations we make of the processes of disease and health. The effectiveness of correctly applied acupuncture is not our only evidence that there are undeniable phenomena that cannot—at least not yet, as Yan Zhangshou would put it—be explained by the investigational methods of today's biomedical science. Other functions may be involved, and perhaps philosophies may be required other than those that have been so successful since the scientific method became a major current of Western thought. Maybe the new perspectives will have room for such concepts as yin, yang, chi, and channels. Maybe they will not. Either way, I find myself agreeing with James Reston: we should get on with it.

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