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PERSPECTIVES

The State of 21st Century Acupuncture in the United States

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Video abstract

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Abstract: The term "acupuncture" commonly refers to a non-pharmacologic therapy that is increasingly employed by diverse segments of the population for a wide variety of complaints including pain, insomnia, anxiety, depression, frozen shoulder, and other issues. The term is also used as a short-hand for the wider medical system from which the placement of needles into the skin for therapeutic benefit and related techniques evolved. Thus "acupuncture" refers both to the therapeutic technique and the therapeutic system of Acupuncture and Herbal Medicine (AHM). The other modalities included within AHM include a wide variety of physical and mechanical manipulations, herbal medicines, dietary recommendations, and lifestyle modifications. Clinically, acupuncture is increasingly offered in a variety of conventional medical settings such as hospitals, medical school clinics, veterans' healthcare centers, oncology facilities, and rehabilitation centers, and its safety profile is excellent overall. Barriers to further incorporation of acupuncture into biomedical sites include insurance coverage of acupuncture, education of conventional medical practitioners and other stakeholders about the utility, efficacy, and evidence base of acupuncture. Acupuncturists in the United States are skilled practitioners who are highly educated in the complex therapeutic system from which acupuncture arose and in the technical aspects of its utility as a treatment modality. The training, certification, licensure, and regulation of acupuncturists is similar to that of conventional providers such has physician's assistants, advanced practice nurses, and medical and osteopathic doctors. While clinical use and acceptance of acupuncture continues to grow, there is to date no definitive composite document explaining the utility of acupuncture in various healthcare settings, the current understanding of how acupuncture works, and the training, professional regulation, and certification of acupuncture practitioners. This article will address these topics and strive to create a reference for practitioners, administrators, legislators, insurance providers, patients and their families, and other stakeholders.

Plain Language Summary: Acupuncture refers to the placement of thin, sterile needles into the skin to stimulate healing effects, and, in the United States, it also refers to the medical system from which the technique of acupuncture evolved. That system, Acupuncture and Herbal Medicine (AHM), uses acupuncture, dietary and lifestyle advice, herbal medicines, and other therapies to facilitate health and healing. Acupuncture is increasingly being used for a wide variety of medical problems including pain, difficulty sleeping, mental health concerns, and other issues in a wide variety of settings and is supported by a growing scientific basis for understanding why and how it works. Training and licensure of acupuncturists are similar to many conventional practitioners, and the process is accredited and overseen by various governmental and regulatory bodies. This paper aims to provide an overview of the use of acupuncture in the United States, the scientific basis for acupuncture, the training and licensure of acupuncturists, and the ways in which acupuncture is and might be incorporated into conventional medical settings.

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Introduction

The term "acupuncture" commonly refers to a non-pharmacologic therapy that is increasingly employed by diverse segments of the population for a wide variety of complaints including pain, insomnia, anxiety, depression, frozen shoulder, and other issues.[1] The term is also used as a short-hand for the wider medical system from which the placement of needles into the skin for therapeutic benefit and related techniques evolved. Thus "acupuncture" refers to both the therapeutic technique and the broader system of Acupuncture and Herbal Medicine (AHM). The other modalities included within AHM include a wide variety of physical and mechanical manipulations, herbal medicines, dietary recommendations, and lifestyle modifications.

Clinically, acupuncture is increasingly offered in a variety of conventional medical settings such as hospitals, medical school clinics, veterans' healthcare centers, oncology facilities, and rehabilitation centers, and its safety profile is excellent overall. Barriers to further incorporation of acupuncture into biomedical sites include insurance coverage of acupuncture and education of conventional medical practitioners and other stakeholders about the utility, efficacy, and evidence base of acupuncture.

Acupuncturists in the United States are skilled practitioners who are highly educated in the complex therapeutic system from which acupuncture arose and in the technical aspects of its utility as a treatment modality. The training, certification, licensure, and regulation of acupuncturists is similar to that of conventional providers such has physician's assistants, advanced practice nurses, and medical and osteopathic doctors and involves didactic classroom learning, hands-on clinical training, standardized national board examinations, state licensure and oversight, and continuing education requirements.

AHM is increasingly sought after as the research foundation and understanding of clinical efficacy grows.[2] While some traditional medicines are being incorporated into healthcare systems worldwide for their efficacy, safety, and lower cost, complete integration remains a work in progress. The World Health Organization (WHO) is furthering the effort to better regulate and incorporate traditional medicines on a global level through the introduction of the International Statistical Classification of Diseases and Related Health Problems (ICD-11) coding system, which will facilitate standardization in documentation, integration, and research.[3–5]

Several groups have published white papers and large-scale reviews of the medical literature around acupuncture, particularly in the context of its use for pain.[6–9] However, to date no literature exists that can serve as a comprehensive, composite document, explaining the utility of acupuncture in various healthcare settings, current understanding of how acupuncture works, role and training of licensed acupuncturists, professional regulatory environment, and certification of acupuncture practitioners. In light of ongoing developments in healthcare with respect to acupuncture—particularly as clinical use and acceptance of acupuncture continues to grow—this paper seeks to fill the gaps of information regarding acupuncture to stimulate further discussion, understanding, and collaboration amongst healthcare practitioners, administrators, legislators, insurance providers, patients and their families, and other stakeholders.

Section I: What is Acupuncture?

Historical Context of Acupuncture Terminology and Current Taxonomy

The term "acupuncture" was derived in about 1690 by Dutch physician Dr. Willhelm Ten Rhijne as a translation from the original Chinese zhēn jiǔ 针灸. The characters indicate "needle" or "injection" on the left and "moxibustion" on the right: the two main therapeutic modalities of treatment performed on acupoints. "Acus" ("needle" in Latin) was combined with the word "puncture" to indicate the practice of puncturing the skin with a needle, thereby creating an English word from the Chinese characters. In this way, the westernized translation of an entire diagnostic and therapeutic system of medicine was condensed into the single term "acupuncture", which refers in common vernacular to only one of the many therapeutic techniques developed in tandem by and used by that system of medicine originally developed in China over 2500 years ago.

The canonical early text of the Acupuncture system of medicine, the *Yellow Emperor's Classic of Internal Medicine*, places acupuncture techniques within this original full body of Chinese medical theory, which dates back approximately 100 BCE. Since this foundational text, the medicine has been further developed throughout East Asia—and subsequently in Western countries-to become the most widely practiced and popular form of traditional and complementary medicine globally, including recognition by 113 Member States of the WHO.[10,11]

In the United States, the term historically used to describe the foundational medical system in which acupuncture was developed has been "Traditional Chinese Medicine" (TCM). This term, however, is entangled with issues of cultural appropriation, with omission of other forms of Asian medicine (Korean, Vietnamese, Japanese, and others), and with problems of proposed alternate naming considerations.[12–14] The term "Traditional Oriental Medicine" is similarly problematic. The creation of a descriptive, inclusive, respectful, and accurate name has long been under discussion between various stakeholders, practitioners, and referent populations. Academic institutions and national acupuncture-related bodies are currently adopting the terminology "Acupuncture and Herbal Medicine" with the intention of putting the focus on the medicine practiced while seeking to non-denominationally include both the many cultural schools of thought that have evolved over the thousands of years and the recent biomedical scientific explication of the medicine.

In this paper, we will use the terms "Acupuncture" or "Acupuncture and Herbal Medicine" to describe the naturalistically based, whole-person system of medicine originating more than 2500-years ago in China and other East Asian countries. We will use the term "acupuncture" to describe the therapeutic technique of stimulating an acupoint. We will use the terms "acupuncturist" or "licensed acupuncturist" to refer to the professionals who practice the technique of acupuncture and related East Asian medical techniques based on the traditional theories and/or the scientifically based understandings of the medicine. The term "acupuncturist" is similarly used by the US Bureau of Labor Statistics to refer to the job title of such persons.[15] All of the other practitioners that practice a portion of acupuncture or AHM will be called by their respective licensed titles.

Definition of Acupuncture

As explained above, the term "acupuncture" in the common vernacular can refer to both the extensive complex system of medicine from which acupuncture-based treatments were originally developed and the modality of acupuncture treatment. Acupuncture, as a system of medicine and a modality can be used independently or as an adjunct to other forms or systems of medicine. The practice of acupuncture is described by the National Center for Complementary and Integrative Health (NCCIH, a Center within the National Institutes of Health) as "a technique in which practitioners insert a needle into the skin to treat health problems" and refers to the therapeutic modality of acupuncture practiced by different medical professions according to their state practice acts.[16] Acupuncture–as practiced by licensed acupuncturists–would be better defined as a "therapeutic treatment founded in AHM involving stimulation on the body surface and/or deep tissues" and including classic acupuncture, moxibustion, Tui Na, acupressure, electroacupuncture, laser acupuncture, and others. It has been used for millennia to treat a wide variety of pathologies and symptoms, but in the West, it is best known for the treatment of acute and chronic pain, in part because the established body of evidence-based research for these conditions.[16]

Most major cultural traditions conceptualize a prescientific vital force. In AHM, this is "Qi" (or "Chi" and both pronounced "chee") which is often translated as "energy". The Chinese character for "Qi" 氣 contains two different characters; the top character signifying air and the bottom character signifying rice, which refer to breath and food as the basic physical needs to support life. This is not dissimilar to the biomedical concept of the creation of biomolecular energy (adenosine triphosphate, ATP) from glucose (rice) and oxygen (breath) via the Citric Acid Cycle.

However, while the medical concept of Qi includes physics and biochemical energy necessary for life, it is much broader. It refers both to the energy force itself and the process of exchange of the information driving the force. Like that of metabolic actions and substrates, Qi is conceptualized as flowing through various defined pathways which influence and form the life sustaining relationships between both organ function and whole-body function.

As a therapeutic system, AHM is based on a traditional, complex, integrated theory of naturalistic observation, developed through prolonged observation of anatomy, physiology, pathology, and clinical outcomes in an era long before

our current notion of science. The schema is systemically based and whole-person focused and consists of therapeutic recommendations targeting medical, behavioral, emotional, and dietary domains.

Similar to illness scripts used to educate learners of conventional western medicine, AHM diagnosis and treatment is based on characteristic groups of symptom patterns that have been identified over thousands of years through meticulous observation of physiologic and pathologic phenomena. Also similar to conventional western medicine, AHM medical systems view the body as constantly striving for homeostasis or "balance". Hence, the aim of the administration of an acupuncture treatment is to provoke a healing response by restoring homeostasis.

The theoretical systems underlying Acupuncture were developed over the centuries in China, Japan, Korea, Vietnam, and other East Asian countries. Differences in climate, culture and other factors led to distinct regional approaches to theory and practice. Over time, a core set of characteristics and principles were identified; these are described in Figure 1. The core system organizes clinical phenomena differently from western medicine as it is systems-based (eg, "the Liver system") rather than structure-based (eg, the physical organ and corresponding physiological functions of the liver).

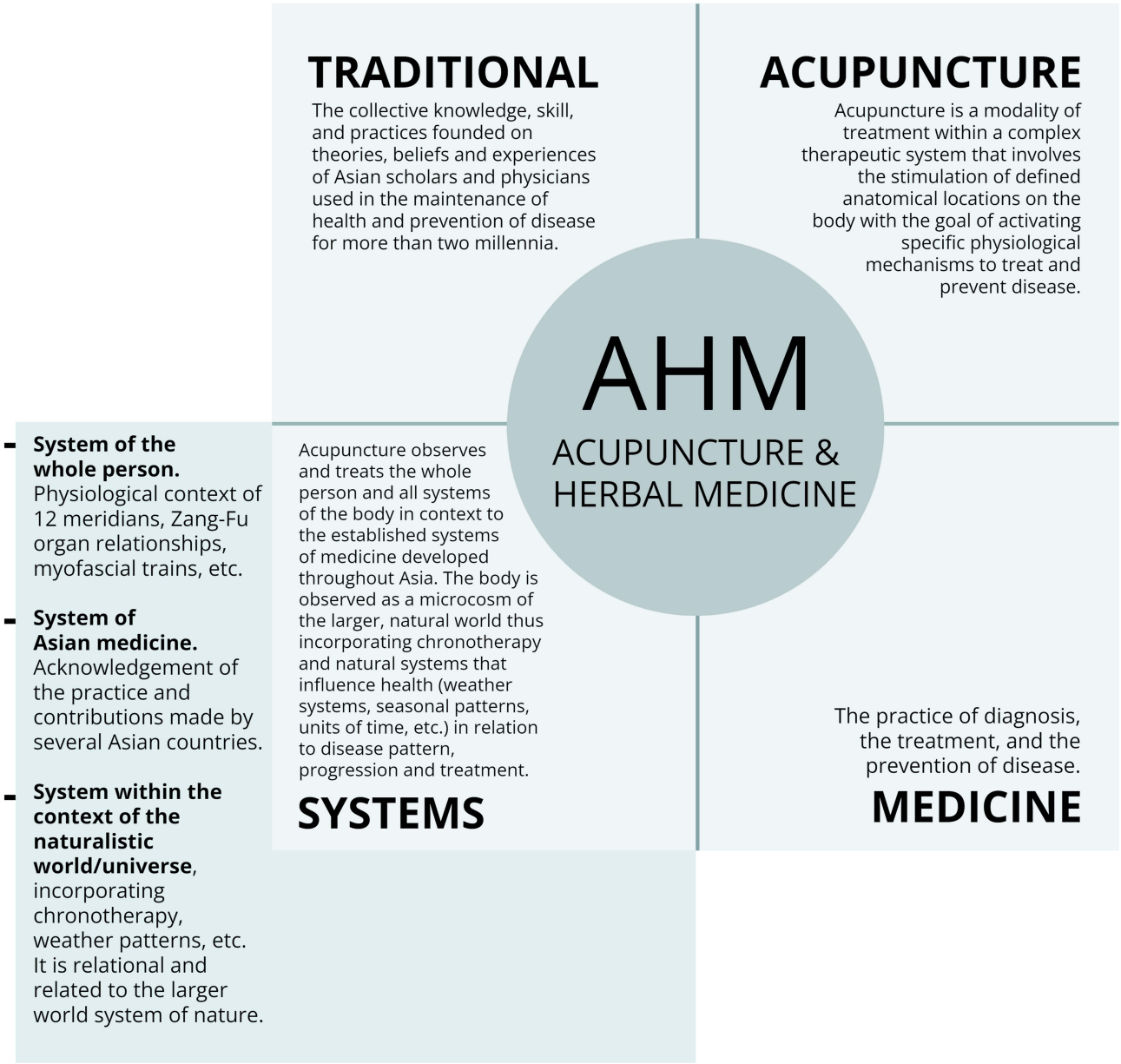

Figure 1 Acupuncture as both a therapeutic medical system and as a modality of treatment.

Overlapping English terminology frequently leads to confusion of these concepts, and it is critical not to equate terms. For example, the Liver system does not exclusively correlate to the hepatocellular functions of the liver. Instead, the Liver system also includes the liver and gall bladder organs, specific emotional responses, relationships to the tendons and connective tissue, some of the functions and organs of the reproductive system and cycle, time of the day and seasons of the year, types and flavors of foods, and other correspondences that correlate to the whole-body AHM system theory.

As a modality of treatment, acupuncture involves the stimulation of defined anatomical locations on the body with the goal of activating specific physiological mechanisms to treat and prevent disease. These locations, termed "acupoints", can be found at discrete anatomical locations along the acupuncture channels (also called "meridians") and at other anatomic sites separate from the channel pathways. The network of acupuncture channels can be thought of as the matrix of information exchange that maintains the equilibrium of a complex system, and acupoints are like hubs in the network, where the exchange of Qi is effectively accessed and transferred.[17] Acupuncture can also be performed on less anatomically defined points such as "Ashi" points, which are painful sites not dissimilar to trigger points.[18] An Ashi point, for example, might be found as a knot in a muscle, but can also be tender non-muscular sites such as nervous tissue or connective tissue.

Selection of Acupuncture Points Used in Therapy

The methods used for the identification and selection of acupuncture points include a comprehensive patient history and a myriad of physical examination strategies including palpation of the channels, pulses, and acupoints; observation of the tongue, face, and other areas of the body; interpretation of sounds and smells in real time or based on patient history; and performance of a biomedical-type physical exam.[17,19] Current basic science research suggests a relationship of connective tissue with the location of many traditional acupuncture points and channels;[20–23] considerable overlap of acupuncture points with contemporary "trigger points" for patterns of referred pain;[24,25] interaction between acupoints and the immune system;[26] and correlation of brain region activation with stimulation of certain distally located acupoints.[27,28]

Historically, the acupoints are selected based on understood relationships between the channels connecting the points, the connections between the points and the deeper organs, the intrinsic anatomical location of the points, and the regulation of movement of various substances along the channels.[17] Today, acupuncturists integrate traditional theoretical knowledge and methods along with current scientific understanding to select the most appropriate, effective acupoints.

Treatment Modalities and Scope of Practice

The scope of AHM spans multiple therapeutic modalities and diagnostic techniques, including but not limited to acupuncture, use of heat and electricity for point stimulation, and medicinal herbs or phytotherapy. It also includes specialized manual therapies of surface mechanical stimulation. Among these are "gua sha", localized, instrument-assisted scraping or rubbing of the skin; "cupping", topical use of suction; "Tui Na", specialized medical massage; mind-body techniques such as "Qi Gong" and "Tai Chi"; individualized dietetics; nutritional and supplement usage; lifestyle counseling; and "moxibustion", a thermal stimulation by an herb (*Artemisia vulgaris* or mugwort) on or near the skin to affect changes in the tissues.

As with other professional medical training, each of these modalities may be practiced with varying levels of mastery, but a baseline competency must be achieved. Acupuncture licensure in most states requires competency in theory and practice of Chinese-style acupuncture, and this is the style most commonly practiced in the US. However, a wide variety of other regionally developed systems are practiced. These include Japanese, Vietnamese and Korean systems, French energetics traditions, and the "Five Elements" system. Acupuncture also includes neuromuscular and orthopedic needling techniques commonly referred to as "dry needling", neuromuscular "trigger point" therapy, or myofascial release techniques that were developed in the US.[29]

The primary acupuncture system is performed on the body as a whole. However, acupuncture may also be performed as a microsystem where specific substructures of the body contain a somatotopic map of the entire body. Examples include the ear (auricular acupuncture), abdomen, and hand (Korean-style hand acupuncture). In some systems of scalp

acupuncture, a somatosensory homunculus is used as a treatment map. Acupuncture may also be applied to "trigger points" or painful sites ("Ashi" points in traditional language) in the skin or muscles.

Acupuncture points may be stimulated using a variety of manual techniques and devices with differing effects. Traditionally, numerous needle types were employed for therapeutic effect, but currently most familiar in the West is the use of filiform, non-cutting, sterile needles. The current Food and Drug Administration (FDA) definition of an acupuncture needle is as follows:

> An acupuncture needle is a device intended to pierce the skin in the practice of acupuncture. The device consists of a solid, stainless-steel needle. The device may have a handle attached to the needle to facilitate the delivery of acupuncture treatment.[30]

Needles can be inserted into the skin, but acupoint activation can also be accomplished through manual or instrumental pressure, laser, gentle electrical current, warming devices, herbs, or other methods. Structures accessed by these techniques include skin, connective tissue, muscles, tendons, bursa, joints, and even bone and periosteum. While nerves are avoided in needling, the therapeutic intent of needling may be to influence the function of nerves or nervous tissue.

Section II: Clinical Utilization, Safety, and Insurance Coverage of Acupuncture

Acupuncture as a Part of Conventional Medicine

In 1997, the National Institutes of Health (NIH) and the WHO sponsored a consensus conference on acupuncture where clinical trials were evaluated and mechanisms of action were addressed.[31] The consensus document produced by this meeting recommended that acupuncture be taught in medical school as a potential first line treatment for a wide range of conditions and complaints. Since that time, many medical and osteopathic schools have incorporated some discussion of integrative medicine, including acupuncture and/or AHM, into their curricula. Additionally, an increasing number of medical residency and fellowship training programs are teaching acupuncture techniques or other components of AHM.[32–35]

The Academic Consortium of Integrative Medicine and Health (ACIMH) includes 9 international and 75 US medical schools and health centers that provide some form of training in complementary, integrative and alternative medicine, however the precise number of schools and extent of educational exposure of biomedical learners and practitioners is unknown at this time.[36]

Guidelines for Utilization of Acupuncture

A broad group of government and private sector documents endorse nonpharmacologic approaches to acute and chronic pain management, many of which specifically highlight acupuncture as one of the options. Other organizations cite the utility of acupuncture for medical issues such as allergies, addiction, and opioid-use disorder (Appendix 1).

Use of Acupuncture in Hospital Settings

Currently, the top ten hospitals in the country (as rated by US News and World Report) offer acupuncture services, and many other hospital systems recognize the economic and therapeutic utility of acupuncture as a valuable addition to their service options.[37–41] In 2006, more than 1 in 4 hospitals offered alternative and complementary therapies including acupuncture, according to the American Hospital Association survey of hospitals across the country. This was an increase from 6% in 1998.[42,43] The most recent available data were closer to 42% in 2010 with 65% of the respondent hospitals offering complementary, alternative, or integrative therapies specifically for pain.[44]

When offered acupuncture in an inpatient setting, studies indicate that patients are open to using acupuncture to manage their pain, and those who received acupuncture report improved pain control.[41,45] In one study performed at an urban hospital over three months, all patients on a mixed medical-surgical-oncology floor were offered acupuncture for treatment of any concern.[46] Patients reported a >50% decrease in their average pain levels (mean of 7/10 to 2.9/10, $p<0.001$). In a subset of 25

acupuncture patients who were Diagnosis Related Group (DRG)-matched to those who did not receive acupuncture, the cost of stay was less by $125,770 (14%), despite variations in length of stay.

In response to the opioid crisis, acupuncture has been increasingly employed in emergency departments.[47,48] Bastyr University acupuncture interns are working in a level 1 trauma unit under the supervision of professors who are licensed acupuncturists, and many other hospitals across the country employ full-time acupuncturists.[49,50] Currently, large medical centers such as Mayo Clinic, Cleveland Clinic, and Rush University Medical Center employ licensed acupuncturists and incorporate them into patient care flow. Further, multiple acupuncture schools send their students to train in a variety of hospital and clinical settings. A few examples include the following: American College of Traditional Chinese Medicine sends students to University of California, San Francisco; Midwest College of Oriental Medicine sends students to Cook County Hospital in Chicago; Pacific College of Health and Science sends students to University of California, San Diego Rady's Children's Hospital and Chicago Women's Health Center; and the Academy of Chinese Culture and Health Sciences sends students to Highland Hospital in Oakland, California.

In a year-long Medicaid pilot study in Rhode Island aimed at patients who suffer from chronic pain conditions and who had had at least 4 emergency room visits in the previous 12 months, a holistic nursing triage program–which included acupuncture, chiropractic care, behavioral health, and massage therapy–reduced opioid prescriptions by 86% and total prescriptions by 63%, average number of emergency room visits by 61%, and the total average medical cost of care by 27%.[51] A large children's hospital used a combination of acupuncture with other integrative therapies to improve pain control and mood, and larger retrospective trials have demonstrated similar results.[52,53]

Use of Acupuncture in Outpatient Settings

Acupuncture is one of the services offered at the Veterans Affairs (VA) Whole Health system and the full cost of acupuncture is covered in the Veterans Choice program.[54] More than 185,000 acupuncture treatments were provided in a single fiscal year at Veteran's Health Administration (VHA) centers.[55] Acupuncture is also offered as a component of shared medical visits in Federally Qualified Health Centers (FQHC) across the country, improving access to care for underserved communities in which people might not otherwise be able to afford the typical out-of-pocket expenses of acupuncture.[56]

Due to the COVID-19 pandemic, there was a nationwide shift toward telemedicine. That shift included acupuncture. Telehealth platforms are being used by acupuncturists to interface with their patients, to examine them, and to counsel them on home care recommendations such as herbal medicine, dietary therapy, acupressure, self-care, Qi Gong, and lifestyle modification. For example, the medical acupuncture program at Boston Children's Hospital shifted to offering a telehealth, virtual clinic in March 2020 to those in need.[57] Though licensed acupuncturists are not eligible to perform telehealth visits in all 50 states, advocacy efforts continue to seek governmental support and inclusion that enables patients to receive telehealth care from licensed acupuncturists across the country.

The National Health Interview Survey conducts surveys by phone and in-person regarding use of complementary health approaches (CHA). Based on the National Health Interview Surveys done in 2002 and 2012 regarding CHA, 3.5 million adults used acupuncture in 2012, a 50% increase from the previous 5 years.[58–62] Most Americans saw acupuncturists for pain management (back, neck, and/or joint pain and headaches/migraines),[59,63,64] and the effectiveness of acupuncture for a wide variety of non-pain-related complaints is established and growing.[65–69] Data from the most recent CHA survey of 2022 is just starting to be released as of Jan 2024 and demonstrates that use of acupuncture in the previous 12 months to the survey doubled from 1% of adults in 2002 to 2.2% in 2022. This equates to over 7.3 million adult patients. Similarly, the use of acupuncture for pain management has increased from 55% in 2002 to 72% in 2022.[70] Overall, the widespread utilization of acupuncture in larger healthcare organizations is growing and the potential for use in inpatient and outpatient settings is just beginning to be explored.

Acupuncture Safety

The side effects of receiving acupuncture treatment are infrequent and most commonly minor in nature. In studies evaluating 13,884[71] and 229,230[72] patients respectively, the most common adverse reactions were itching or redness,

temporary lightheadedness, bruising and bleeding at needle insertion sites, and pain at the needle insertion sites. The rates of these minor adverse events per consultation in the studies above were 7.97% and 8.6%, respectively. No serious adverse reactions–defined as "needing special intervention or interfering with a patient's normal life"–were noted in the smaller study involving 13,884 patients above, and a systematic safety review reported an average of 2 cases of pneumothorax per 250,000 acupuncture treatments.[73] Other studies have demonstrated similar safety profiles, with laser acupuncture having the fewest adverse events/adverse reactions.[71,74–82]

Bleeding risk, even in patients on anticoagulants, appears to be minor. A 2014 study evaluated 4891 acupuncture treatments administered to 242 patients over a two-year period.[83] The occurrence rate for bleeding which ceased within 30 seconds of needle removal ("micro-bleeding") was 4.8% for the warfarin group, 0.9% for the group taking non-warfarin antiplatelet medications, and 3.0% for the group not on any anticoagulant medications. The authors' conclusion was that "acupuncture treatment appears safe even for patients taking warfarin or antiplatelet medications". Other studies have demonstrated similar safety profiles in patients on anticoagulant medicines and in pediatric oncology patients with acute thrombocytopenia.[84–87]

Infection at the needling site has been documented with the external ear being most common with auricular acupuncture.[73,78,88] Though it is rare, chondritis of the ear has been reported using embedded needles.[89]

The overall safety of acupuncture is also reflected in the extremely low premiums for acupuncture malpractice, which average $66 per month for full-time acupuncturists per data from three leading insurance providers. In 2023, acupuncture malpractice with American Acupuncture Council was $870/year; CM&F Group was $772/year; and Healthcare Providers Service Organization was $746/year.

Insurance Coverage of Acupuncture

Several states chose to include acupuncture as an "Essential Health Benefit" under the Affordable Care Act, meaning 100% of benchmark plans cover acupuncture services. Additionally, Alaska, California, Maryland, New Mexico, and Washington chose to provide acupuncture coverage for specific conditions, while Illinois and New Hampshire will or do offer coverage under certain health plans. Beneficiaries in Ohio, New Jersey, Minnesota, California, Oregon and Massachusetts have access to acupuncture through Medicaid.[90] Ohio Medicaid covers acupuncture for six conditions since 2021.[91] As of January 2020, Medicare covers acupuncture for chronic low back pain, however a licensed acupuncturist must have a physician "supervisor" in order to be reimbursed for services.[92] Insurance companies are increasingly providing at least some coverage for acupuncture.[93]

Section III. How Does Acupuncture Work?

Physiological and Anatomical Effects of Acupuncture

Scientific progress from over fifty years of research conducted primarily in Asia, Europe, and the United States provides supporting evidence of significant physiological effects of acupuncture. These effects span from changes in fibroblasts in the connective tissue to modulatory neural effects in the brain.

Upon insertion into the skin, acupuncture needles affect numerous structural and biochemical changes to connective tissue and fascia. When the inserted needle is manually stimulated by twirling and thrusting, these effects are enhanced.[20,21] In these and other studies, acupuncture has been shown to change gene transcription and translation,[94–97] reduce peripheral inflammation,[98–100] influence autonomic function,[101–103] increase blood flow,[104,105] and alter the biochemical environment of tissues surrounding the needle.[106] In addition, acupuncture has been shown to change the concentrations of various peripheral neurotransmitters,[107,108] modulating the excitability of peripheral nerve cells that carry information from the rest of the body to the central nervous system. One of the most well studied actions of acupuncture is its ability to activate the body's own innate pain-relieving mechanism, the endogenous opioid system.[109–115] Human neuroimaging studies have demonstrated that acupuncture can reverse maladaptive neuroplasticity in the brain.[116]

While current research is exploring how acupuncture works to engage such changes, more than 100 functional magnetic resonance imaging (fMRI) studies evaluating evoked brain response to real vs sham acupuncture needling have now been published. A recent meta-analysis of fMRI literature demonstrated that while both real and sham acupuncture

engage somatosensory (ie touch) processing brain areas such as the thalamus and secondary somatosensory cortex, acupuncture needling more readily deactivates affect/emotion processing areas such as the amygdala.[27] Such evoked responses, if entrained over time, may hold the key to how acupuncture can successfully improve symptoms associated with chronic pain such as depression and anxiety. Furthermore, the widespread brain response noted by acupuncture fMRI studies may underlie the broad clinical applications explored by clinical research.

Auricular acupuncture has been shown to affect vagal activity of the autonomic nervous system including cardiovascular, respiratory, and gastrointestinal functions.[117] Afferent projections from the auricular branch of the vagus nerve (ABVN) to the nucleus of the solitary tract (NTS) seem to form–at least in part–the anatomical basis for the vagal regulation of auricular acupuncture. The mechanisms of action of other microsystems, such as hand acupuncture (identified by Korean acupuncturist Yu Tae-u in the 1970's)[118] scalp acupuncture, and abdominal acupuncture (commonly used in Japan),[119] are still not fully elucidated in the English language literature.

The systemic effects of acupuncture treatments and the potential mechanism behind these complex actions are under investigation as well, such as a convergence of the neurophysiology model, the connective tissue model, and the growth control model.[120,121] Because the mechanisms behind both sham and verum acupuncture treatments appear at multiple levels in the nervous system as well as in peripheral tissue at the segmental and central levels,[122] accurate understanding and assessment requires a holistic view of acupuncture's multiple mechanisms.[123]

More recent and ongoing studies are gathering mechanistic information necessary to understand the biological basis of acupoints. One is the Topological Atlas and Repository for Acupoint research (*TARA*) project, currently funded by the NIH (5U24AT012560-02). The TARA project brings together AHM theory and practice with modern biomedical information, anatomy, and physiology into a searchable database.[124]

While the reductionistic analytic approach of biomedicine provides a level of specificity for the lens through which the holistic patterns of AHM may be viewed, this holistic view should also incorporate non-needling context effects of acupuncture, such as the patient-acupuncturist therapeutic interaction, which has been mechanistically assessed with a social neuroscience brain imaging approach.[125,126]

Scope of Acupuncture Efficacy

Recent analytical review of large databases comprised of 17 studies support the cost-effectiveness of acupuncture across any health condition, including allergies, digestive complaints, insomnia, infertility, women's health, etc.,[127–129] with newer studies continuing to support acupuncture's effectiveness in the treatment of health conditions such as stroke, irritable bowel syndrome, xerostomia, combat-related posttraumatic stress disorder, depression, Parkinson's, and insomnia.[130–136] While many published studies support acupuncture's effectiveness in relieving various types of acute and cancer treatment-related pain[137–143] and improving function,[144,145] the most substantial and conclusive body of evidence regarding the clinical effectiveness of acupuncture is in the treatment of chronic pain.[146] Two seminal meta-analyses of individual patient raw-data (20,827 patients from 39 trials published until 2015)[7,8] conducted by Acupuncture Trialists' Collaboration–A group of trialists, statisticians and other researchers–indicate that acupuncture is clearly effective for the treatment of chronic musculoskeletal, headache, and osteoarthritis pain. Furthermore, the treatment effects of acupuncture cannot be explained solely in terms of placebo effects and persist over time.[147] The authors indicate that referral for a course of acupuncture treatment is a reasonable option for a patient with chronic pain.[8] Acupuncture has been of interest to military health scientists since the mid-1960's, and today is an established form of treatment in the military, particularly for pain and pain-related dysfunction.[148]

According to the National Cancer Institute (NCI), acupuncture is used to manage cancer-related symptoms[149,150] such as cancer pain,[142,143,151–154] chemotherapy-induced nausea and vomiting,[155,156] and other symptoms that affect quality of life including weight loss, anxiety, depression, insomnia, poor appetite, fatigue, xerostomia, hot flashes, chemotherapy-induced peripheral neuropathy, joint pain, gastrointestinal symptoms (constipation and diarrhea), and postoperative ileus.[130,157–165] Among NCI-designated comprehensive cancer centers, 89% recommend the use of acupuncture for symptom management in cancer patients. A recent retrospective analysis of 375 cancer survivors who received acupuncture treatments indicates that patients experienced short- and long-term improvements in multiple symptoms including hot flashes, fatigue, numbness, tingling, and nausea.[166] Cancer patients are receptive to receiving acupuncture

for symptom control[152,159] and pain management.[153] Acupuncture is both acceptable and safe for children and adolescents undergoing oncologic treatments.[85,167–169]

Preliminary evaluation of auricular acupuncture indicates that it provides significant reduction in musculoskeletal pain in adults,[170] as well as management of pain in military veterans;[171] primary headaches in an emergency department;[172] post-traumatic stress disorder,[173] and chronic migraines.[174] The research literature on Korean hand acupuncture in English language databases is scarce, but it appears promising in managing chronic pain and improving activities of daily living (ADL's) in elderly patients.[175,176]

Mechanisms of Acupuncture for Pain Management

Pain in AHM typically results from a stagnation of Qi and/or stasis of Blood, which are commonly–but not exclusively–the result of trauma and/or inflammation. An AHM therapy seeks to resolve lack of flow of Qi and Blood by stimulating the body's healing mechanisms. As these treatments work with the body's biological systems, they are both systemic in nature and localized by appropriate needle insertions. While it is outside of the scope of this paper to summarize the effects of acupuncture for all clinical conditions, symptoms and pathology, it is possible to map with certainty many of the pain-modulating mechanisms of acupuncture to elucidate its clinical effect on the management of pain.

Research indicates that acupuncture stimulation inhibits pain by activating a variety of bioactive chemicals throughout all levels of the nervous system including peripheral, spinal, and supraspinal mechanisms. These activations cause the release of endogenous cannabinoids, β-endorphin, dynorphins, serotonin, enkephalins, and gamma-aminobutyric acid (GABA), norepinephrine, and dopamine.[122,177–180] Furthermore, the analgesic effects of an acupuncture treatment have been linked to the release of endogenous opioid peptides (EOPs), which are found in blood plasma and cerebrospinal fluid within 15–20 minutes into the treatment and seem to correlate with the longer lasting effects of the treatment,[109] providing pain relief up to a year in some cases.[181] Deeper acupuncture needling seems to impact sensory neurons in deep fascial tissues,[21,182] while superficial needling stimulates the dense neural network found in the epidermis.[183] Both can modulate painful sensations and may help to elucidate why both superficial and deep needling can be effective for pain control.

The immediate pain relief from acupuncture has also been linked to counter-irritation or conditioned pain modulation (CPM), which in animal models is known as diffuse noxious inhibitory controls (DNIC). In this model, stimulation has been shown to induce immediate suppression of pain transmission in nociceptive neurons.[184] A 2021 study reported by a research team in Harvard Medical School suggested that anti-inflammatory effects of acupuncture likely occur via activation of the autonomic nervous system including the vagal-adrenal axis,[99] reinforcing earlier studies demonstrating similar autonomic responses to acupuncture stimulation.[101,103] Further, analgesic effects may be augmented with needle retention when compared to quick "in-and-out" styles of acupuncture.[185,186] Studies also suggest that acupuncture combined with low dosages of conventional analgesics provides better effective pain management which can reduce the side effects of often-debilitating pharmaceuticals.[122]

Acupuncture Research Trajectory

While acupuncture has been taught by scholars and practiced for more than 2,500 years by clinicians in China and other East Asian countries, its acknowledgement and clinical application in the West is more historically proximate. Medical essays, observational accounts, and clinical case reports by Western physicians date back to the 1600's, with the first medical essay by Dutch physician Dr. Wilhelm Ten Rhijne based on his observation of the practice in Japan. The first recorded observation of the mechanistic effect of acupuncture on pain dates back to the 1700's by the Viennese physician Gerard van Swieten.[187] Dr. Louis Joseph Berlioz published the first case reports of clinical application in France in 1816.[187] Analyses of acupuncture points, meridians, and potential parallels to biomedically defined mechanisms of action took place in Japan in the later part of the 19th Century.

The evolution of research methodologies and clinical trial design helped propel a more rigorous investigation of acupuncture in the 20th Century. In the US, research into the efficacy of acupuncture began in the early 1900's but was expanded in the 1950's to 1970's by the discovery of overlapping mechanisms between acupuncture and general anesthesia and by articles in the mass media.[188,189] In 1972, the NIH first funded acupuncture research. In 1975, the

first impactful randomized controlled trial (RCT) was published in the New England Journal of Medicine describing the use of acupuncture for osteoarthritic pain.[190] In the 1980's inquiry into the effect of acupuncture on conditions other than pain began to take hold. Basic science research findings on the physiological effects of acupuncture stimulation (eg release of neurotransmitters, endorphins, enkephalins, etc) supported exploration of the potential application of acupuncture in health care.[177]

In 1997, the NIH conducted the "Consensus Conference on Acupuncture" and concluded,

> There is sufficient evidence of acupuncture's value to expand its use into conventional medicine and to encourage further studies of its physiology and clinical value.[31]

While an in-depth history of the trajectory of acupuncture research is beyond the scope of this paper, between 1995 and 2014, there was an exponential growth rate in the number of acupuncture papers (mean annual growth rate of 10.7%), which was significantly higher than the growth rate in biomedicine (4.5%).[191]

Section IV: What is an Acupuncturist?

Practitioners Performing Acupuncture

More than 10 million acupuncture treatments are administered per year in the US.[2] The variety of practitioners using the technique of acupuncture inside and outside of the context of AHM, as well as the substantial variation in the extent of training within each practitioner type and state mandated scope of practice, make it challenging to define the term "acupuncturist" for patients or consumers, for other medical professionals, for healthcare leadership, and for public officials (Appendix 2).[192–194]

Licensed acupuncturists are the only medical professionals who are trained comprehensively to perform acupuncture and the full scope of other AHM modalities within the context of the whole-body system of AHM. "Licensed Acupuncturist" is the term used to describe such persons and the professional acronym designation is "LAc". This term is not yet uniform across the country, and equivalent titling includes "Certified Acupuncturist", "Acupuncture Physician", and others. All of these titles have commonality of core education.

In addition to licensed acupuncturists performing the technique of acupuncture as a component part of AHM, Doctors of Chiropractic Medicine (DC) and Doctors of Naturopathic Medicine (ND) may learn acupuncture techniques as a part of their formal degree program, as post-graduate coursework, or as continuing education for maintenance of licensure. Medical Doctors (MD), Osteopathic Doctors (DO), and Doctors of Veterinary Medicine (DVM) may perform acupuncture, which may or may not require varying amounts of acupuncture training per their state practice acts. "Medical acupuncture" is defined as acupuncture performed by an MD or DO and does not specify a particular curriculum or practice style. A variety of training programs offer instruction to MD and DO clinicians.[195]

In some states, LAc's may practice on animals, while in other states only DVM's may do this.[196] The International Veterinary Acupuncture Society provides training to veterinarians in acupuncture.[197]

Dentists are beginning to use acupuncture for limited dental applications.[198–204] However, use of acupuncture by dentists at the time of this writing is not widespread, and training programs are neither standardized nor prevalent. Hence dentists are excluded from the data contained in Appendix 2.

Dry Needling and Trigger Point Therapy

Research clearly demonstrates that the origins of the ideas of phlebotomy, pharmaceutical injection, dry needling, and trigger point therapy come from acupuncture.[205] "Dry needling" and "trigger point therapy" are types of localized orthopedic acupuncture. "Wet needling"–as originally conceived by Janet Travell, MD in the early 1940's--indicated that a wet, injectable, pharmaceutical substance would be administered to the site using a hollow, cutting phlebotomy needle.[206,207] The "dry" designation indicates that no injection will be done, and the procedure will be performed using filiform, non-cutting, acupuncture needles. Travell herself asserted that dry needling is a form of acupuncture.[208,209]

Sites commonly treated with dry needling are trigger points: discrete, localized, hyper-irritated knots of spastic muscle. The concept of "trigger points" is not a new discovery. In AHM, the term used to describe trigger points is

"Ashi" points, which is descriptive of the painful vocalization ("ouch") that a person might make when the knot is firmly palpated. Trigger points may be found throughout muscle fibers at unspecified anatomical locations, and they may also be found at classical acupoint locations.[18] Historically, the treatment of these knots was done by massage therapists, who used massage techniques such as direct pressure to decrease pain at the site of the knot and/or at sites related anatomically to the knot. Trigger points can also be manipulated by acupuncture needles or injected by local anesthetic, steroids or other pharmaceutical agents.

The American Medical Association (AMA) recognizes dry needling as an invasive procedure, asserts that it should be only performed by practitioners with standard training and familiarity with routine use of needles in their practice, and highlights licensed acupuncturists and medical doctors as exemplars of such professionals.[210] Similarly, Centers for Medicare and Medicaid Services (CMS) policies describing coverage of acupuncture for low back pain also clearly establish dry needling as a form of acupuncture.[211] In some states and with wide variation in oversight and training requirements, physical therapists (PT) may perform dry needling or trigger point therapy.[209,212]

Acupuncturists are required to obtain standardized training and certification in Clean Needle Technique (CNT), thus improving the safe administration of orthopedic acupuncture (dry needling) treatments and reducing risk of injuries. Research demonstrates that the safety profile of acupuncturists performing acupuncture is excellent, while the research around PTs performing dry needling is currently less robust. For example, in two studies evaluating reported major adverse events in their respective practitioner groups, the incidence of pneumothorax with acupuncture performed by acupuncturists was 2 per 250,000 treatments, while major adverse events were 20 in 20,494 treatments for physical therapists.[73,213] However, the definition of "major adverse events" is not uniform across studies, and more research is needed in this area, including whether robust, patient-safety focused, national training standards are needed for dry needling. See Appendix 2 for comparisons in training between practitioners practicing acupuncture and using acupuncture techniques.

Scope of Acupuncture Practice

Scope of practice varies significantly among states, but most commonly the scope of licensure for a licensed acupuncturist includes all components of AHM: acupuncture, medical massage (Tui Na), skin brushing and scraping techniques (gua sha and others), cupping, moxibustion, dietary therapy, and lifestyle changes (Figure 2). Herbal medicine may be included in some state's LAc licensure designations or may require additional training and additional National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM) certifications.[15] Some state licensures permit injection therapies and ordering and evaluation of blood work or radiologic studies. In a few states (California, Florida, and New Mexico), licensed acupuncturists are considered primary care providers.

Demographics of Acupuncture Practices

In a 2021 market survey of American acupuncturists, respondents were 71% female, largely aged between 46–55, with 11–15 years of experience in the profession.[214] These results were aligned with the most recent findings from the NCAAOM's Job Task Analysis Survey among recertifying Diplomates between 2014 and 2016.[29] That analysis identified the active workforce as 70% female, averaging 52 years of age with approximately 13 years of experience (Appendix 3).

The 2021 market survey also found that most licensed acupuncturists (56.6%) are owners or partners in a private independent or group practice.[29] When asked to describe their primary practice environment, the majority indicated they are in private practice as a sole proprietor, while 3.9% report working in a hospital setting, as an employee or contractor. The remainder work in a variety of settings such as integrative practices, medical school clinics, academic settings, hospital settings, the VHA, rehabilitation centers, research settings, FQHC's, health centers, and medical spas. Charges for an initial consultation are on average $112, and on average $80 for return visits according to one study,[215] but this varies by geographic location, practitioner experience, and other factors.

Figure 2 The term "acupuncture" in the United States is often mistaken for being the only modality used within Acupuncture and Herbal Medicine system of medicine. However, acupuncturists incorporate a wide variety of modalities as outlined in their scope of practice and training programs to enhance health outcomes.

Number of Licensed Acupuncturists in Practice

The precise, current number of licensed acupuncturists actively practicing in the United States is difficult to quantify, largely due to a lack of centralized tracking of graduation numbers, of state and national licenses issued, and/or of sustained practitioner business success. The number of acupuncturists who finish training and practice acupuncture is not currently tabulated by the NCCAOM, Accreditation Commission for Acupuncture and Herbal Medicine (ACAHM), or other regulatory bodies.

What is known is that, since its inception in 1982, the NCCAOM has issued 24,538 certificates in Acupuncture and 11,140 certificates in Oriental Medicine (with Chinese Herbal Medicine Specialization).[216] Currently, the NCCAOM certifies 1200–1500 acupuncturists annually and represents more than 20,000 nationally certified practitioners.[217] An independent survey conducted in 2018 found 37,886 licensed acupuncturists practicing in the US. Of those, 50% were practicing in California, New York, and Florida.[218] However, these numbers may include those who are licensed in multiple states and those practicing in states where there is not yet a practice act (South Dakota, Oklahoma and Alabama). The US Bureau of Labor Statistics has recently added "acupuncturist" to their list of occupations, which over time may result in a more comprehensive means for tracking the number of acupuncturists practicing in the United States.[15]

Section V: Training, Certification, and Regulation of Acupuncturists

Acupuncture Training

The ACAHM was founded in 1982 as the National Accreditation Commission for Schools and Colleges of Acupuncture & Oriental Medicine (NACSCAOM). It later changed its name to the Accreditation Commission for Acupuncture and Oriental Medicine (ACAOM) and in 2021 the name was again changed to ACAHM. ACAHM serves as the only specialized accreditation agency recognized by the United States Department of Education (USDE) to accredit programs in acupuncture and herbal medicine and institutions exclusively providing traditional East Asian medicine-related programs. Currently more than fifty ACAHM-accredited institutions offer programs in acupuncture alone or with a Chinese herbal medicine specialization.

ACAHM accredits programs at two entry-levels: (1) master's level degree or diploma programs (3–4 years in length) and (2) professional doctoral degree programs (4–6 years in length). Graduates of programs not accredited by ACAHM

risk not being able to take the national certification exams and become professionally licensed. The master's level programs have been the primary entry-level training for decades with options to stop training at the master's level or to complete a doctoral program immediately or sometime later. There is no curricular distinction between a master's degree program and a master's level diploma program, and either fulfill state requirements for licensure.

A less common route to licensure involved apprenticeship training under one or more preceptors who certify the learner's competency and petition for permission for the learner to take certification examinations. While some practitioners trained this way historically, it became increasingly uncommon, accounting for fewer than one percent of board certification applicants from 2012 to 2016. NCCAOM has found that many state acupuncture boards do not accept the apprenticeship route for licensing. As of January 1, 2022, the NCCAOM ceased the apprenticeship route as a training option for fulfilling for certification exam eligibility, requiring all students to attend formal degree programs.

Prior to 2019, ACAHM accreditation standards or policies did not mandate degree titles for entry-level programs and allowed institutions to name their conferred degrees via degree-granting approval from their state higher education authority. This practice resulted in a potpourri of degree titles and caused confusion for the public, patients, other healthcare professions, insurers, and regulators. To help eliminate this confusion and ultimately contribute to growth and recognition of the acupuncture profession, ACAHM implemented a program naming policy at its February 2020 Commission meeting requiring all ACAHM-accredited institutions and programs to use only authorized names for all ACAHM accredited/pre-accredited programs.[219] "Master/Doctor of Acupuncture" or "Master/Doctor of Acupuncture with Chinese Herbal Medicine Specialization" are the recently updated terms mandated by the ACAHM. The former designations included "Master/Doctor of Oriental Medicine" to refer to persons who studied both acupuncture and herbal medicine.

Programmatic accreditation standards for entry-level professional doctoral programs–formerly referred to as first professional doctoral programs–were promulgated in 2013 with inaugural programs initially accredited in 2018. These doctoral programs may be structured as a dual degree program whereby graduates earn both an entry-level master's degree and an entry-level professional doctoral degree. The doctoral programs may also have doctoral degree completion tracks for graduates of an ACAHM-accredited/pre-accredited master's-level program to earn the doctoral degree. Professional doctoral programs lead to the development of all professional competencies designated as master's level, with additional doctoral-level professional competencies in areas such as advanced diagnostic studies, patient care systems, collaborative care, and professional development. Many also incorporate scholarship, research, and evidence-based medicine or evidence-informed practice into patient care.

In addition to entry-level training programs, the profession also has an advanced practice doctoral program, the Doctor of Acupuncture and Oriental Medicine. This is a post-professional program leading to a doctoral-level degree, that provides advanced, in-depth education in clinical specialty areas and research literacy. Program applicants must be graduates of an entry-level program. Advanced practice doctoral programs entail at least two years of study that is both clinically and research based. Students in these programs complete a clinical research project. The entry-level and advanced practice doctorates are the terminal degrees for the profession. These programs are considered clinical/professional programs rather than academic doctoral programs.

The master's level and professional doctoral programs in acupuncture may also include specializations in Chinese herbal medicine, formerly referred to as "Oriental medicine" programs. Training in Chinese herbal medicine is required for acupuncture licensure in some states and typically adds an additional year to the acupuncturist's training program.

Critics argue that some acupuncture programs lack rigorous and comprehensive education in biomedical sciences, particularly in areas such as pharmacology, medical diagnostics, and evidence-based practice. Similar to ongoing discussions by the Liaison Committee on Medical Education (LCME) and Accreditation Council for Graduate Medical Education (ACGME) regarding the components and quality of training for MD's, the acupuncture profession regularly reviews and discusses concerns with all components of acupuncture and herbal medicine training, including the quality of biomedical training.

One concern is that some graduates report that they did not receive the necessary foundation to effectively read and interpret modern acupuncture research papers or apply research findings to their practice, which may make them less likely to engage in or contribute to high-quality research. This may also hinder acupuncturists' ability to communicate

effectively with other healthcare providers regarding acupuncture's evidence base and mechanisms of action and to incorporate acupuncture into conventional healthcare systems.[220] Another is that it might potentially limit acupuncture's integration into multidisciplinary care teams and reduces its potential contribution to patient-centered care. However, this has not been prohibitive in, for example, the VA's Whole Health program, which is expanding its use of acupuncture. Currently, there are 152 licensed acupuncturists employed by the VA.[221] Additionally, acupuncture has been incorporated into emergency departments in Wisconsin and Minnesota,[47,49] and two, large, NIH-funded, multi-center, national studies are underway focused on the implementation of acupuncture in emergency departments for pain management[222] and outpatient clinics for chronic low back pain in seniors.[223]

While the Council of Colleges of Acupuncture and Herbal Medicine (CCAHM) sets the standards of what is to be taught within the biomedical components of an acupuncture and herbal medicine curriculum, review and adjustment of those components is ongoing, working toward an ideal balance of what acupuncture and herbal medicine practitioners need to know to safely, collaboratively, and effectively practice and the unnecessary curricular bloat that is a ubiquitous concern in all medical training curricula.

Acupuncture School Curriculum

Master's programs are typically 3–4 years total in length, and direct entry doctoral programs are typically 5–6 years total in length. Current ACAHM requirements are 1905–2625 hours for master's-level training and 2035–2775 hours for doctoral-level training, with the variations of hours within degree type being determined by whether or not the trainee engages in herbal medicine specialization.

The minimum program length, credits, and hours under ACAHM accreditation standards dictate that entry-level programs must include at least 450 hours of biomedical clinical sciences (including but not limited to anatomy, physiology, pathophysiology, pharmacology, basic radiology and laboratory studies, physical examination techniques, and biomedical red flags and emergencies). There must also be at least 705 hours in AHM medical theory (physiology and pathophysiology), acupuncture (point location and needling techniques), ancillary Asian medical and mind-body techniques (including but not limited to gua sha, cupping, moxibustion, Tui Na, Tai Chi, Qi Gong, etc)., and other topics and electives that vary by college or university. Similar to other clinical training, acupuncture students must have at least 660 hours of clinical observation and internship hours under direct, guided supervision.

Students have the option to study the function and properties of herbal medicine (as individual herbs and as parts of more complex formulas), earning them the ability to test and apply for an additional "Oriental Medicine" or "Chinese Herbal Medicine" designation on their degree and/or board certification and to prescribe herbal medicines for their patients. Training in Chinese herbal medicine may be included as a specialization within an entry-level program or completed as a separate graduate-level certificate for students and graduates of acupuncture-only programs.

Acupuncturist Certification

The NCCAOM, the national-level certifying body for licensed acupuncturists, seeks to ensure the public's safety and well-being while advancing the professional practice of acupuncture by establishing and promoting national, evidence-supported standards of minimal competence and credentialing. NCCAOM Diplomates must agree to and adhere to the NCCAOM Code of Ethics and must recertify every four years to maintain their certifications. Recertification includes a minimum of 60 hours of continuing education: 30 of these hours must include retraining in acupuncture core competencies. Recertifying diplomates must complete at least four hours of safety and ethics training, including education on blood-borne pathogens, and hold a current basic life support (BLS) certification.

Licensed acupuncturists are generally board certified through the NCCAOM or in California via the California Acupuncture Licensing Examination (CALE). As with other licensed healthcare professionals, maintenance of licensure varies state to state but generally requires ongoing certifications in basic life support and a minimum number of continuing education units in such topics as patient safety, ethics, biomedicine, and acupuncture-related therapies and theory.

Practice Acts and State Licensure

Forty-five states, Puerto Rico, Guam, the US Virgin Islands, and the District of Columbia have practice acts in place to define and regulate the practice of acupuncture.[217] Most states require NCCAOM board certification for acupuncture licensure. The remaining states use NCCAOM examinations as a portion of the licensure requirements. Many states also require applicants to take a state examination in jurisprudence or have additional requirements. California administers its own licensing exam (CALE) and completion of the NCCAOM examinations does not qualify one for licensure in California. Certification in CNT is a part of most state's licensure requirements. Three states (South Dakota, Oklahoma, and Alabama) do not have acupuncture practice acts at the time of this writing.

Governmental and Educational Oversight

In the 1970's, the FDA defined acupuncture needles as an "experimental medical device", and, since 1996, has regulated the needles as common medical tools under good manufacturing practices and single-use standards of sterility.[30] Herbal medicines are similarly regulated by the FDA.[224]

The US Bureau of Labor Statistics' Office of Management and Budget included a distinct Standard Occupational Classification (SOC) for acupuncturists (SOC-29-1291) in 2018.[15] The WHO made the decision to include traditional medicine-specific diagnoses in the ICD-11 codes as of May 2019.[3,5]

Like other medical training oversight governance, AHM educational structure is overseen by the CCAHM and ACAHM. Learners generally take certifying board examinations overseen by the NCCAOM and/or CALE, as previously noted. These four organizations were all incorporated in or around the early 1980s.

Professional Organizations

Two professional organizations currently serve the American AHM community broadly: the American Society of Acupuncturists (ASA, incorporated 2017) and the American Association of Acupuncture and Oriental Medicine (AAAOM, incorporated 1983). The primary national professional organization, the ASA, is supported by state-level members and structure, similar to the state and national levels of other professional medical organizations.

There are a large number of additional professional associations related to acupuncture, including the American TCM Organization (ATCMA), American Association of Chinese Medicine and Acupuncture (AACMA), Toyohari Association of North America, Japan Society of Acupuncture and Moxibustion (JSAM), American Acupuncture and Alternative Medicine Association (AAAMA), Society of Korean Medicine (SKOM), Japanese Society of Acupuncture and Moxibustion, Society for Meridians and Acupoints, American Society of Chinese Medicine (ASCM), Asian American Acupuncture Association (AAAA), National Guild of Acupuncture and Oriental Medicine (NGAOM), Acupuncture Now Foundation (ANF), Acupuncturists Without Borders (AWB), American Academy of Medical Acupuncture (AAMA), and National Acupuncture Detoxification Association (NADA). The Society for Acupuncture Research (SAR) is a thirty-year-old international organization that focuses on acupuncture research.

Section VI: AHM Challenges and Future Directions

Over the past few decades, there has been growing evidence from basic science research in acupuncture that helps elucidate possible mechanisms of action. For example, in pain research, it is well-documented that acupuncture can stimulate the release of endorphins and other neurotransmitters, leading to reduced pain and inflammation.[122] However, while biomedical understanding of acupuncture mechanisms is advancing, traditional concepts such as acupuncture points, meridians, and "Qi" remain largely unexplained. Additionally, there is a lack of research connecting specific biomarkers to the effects of acupuncture.[225–227] New research developments to address these challenges include the "i-needle"—a technology proposed to measure molecular signaling, subcellular mechanical stressors and distal data relevant to acupuncture needle introduction into tissues—to enable the analysis of metagenomics, metatranscriptomics and host-microbiome relationships.[228] But to directly connect the biomarkers to the classical theory would involve considering the dynamic and real-time changes in the acupoints as well as the target organ system.[1]

Another key challenge in the advancement of evidence-informed integration of traditional systems of medicine such as AHM, is identifying which types of rigorous research approaches best reflect the unique features of a given traditional medicine paradigm. New technologies such as the i-needle and the global initiative calling for evidential pluralism by the WHO's Global Centre for Traditional Medicine are two different but equally important steps in this direction.[4,229] Comparative effectiveness research should be prioritized over randomized controlled trials in acupuncture studies to better reflect acupuncture's real-world application and its effectiveness compared to the current standard of care.[230]

In addition to gaining a deeper understanding of the connection between biomarkers and theoretical frameworks, several issues persist in clinical research. Findings from sham-controlled trials remain controversial, and the specific influence of needling parameters for both verum and sham needling is not well understood. While both methods have been shown to be significantly statistically different in terms of the degree of their response, both can stimulate acupoints and elicit a positive physiological response.[147]

To better prepare acupuncturists for integration into the healthcare system, acupuncture education and training in the US could benefit from further enhancement. Many acupuncture schools in the US are not affiliated with medical schools or hospitals, which may result in limited or no hospital-based practice experience, limited exposure to the complexity of managing serious medical conditions, and insufficient opportunities to practice communication skills with other health-care providers. Integrating such training into the acupuncture curriculum would ensure that acupuncturists are equipped to function effectively in a wider array of biomedical clinical settings. Additionally, while most US acupuncture programs do not currently offer post-graduate residency training, developing and expanding residency programs would significantly enhance acupuncturists' competencies in hospitals and other specialized environments, such as pain centers, rehabilitation and extended care facilities, reproductive, birthing and neonatal care centers, dialysis centers, inpatient psychiatric facilities, and geriatric care facilities.[217,226,227]

Section VII: Conclusion

Acupuncture and Herbal Medicine is a diagnostic and therapeutic system of whole person care in which distress and dysfunction are recognized as patterns of disharmony within a complex system. Thus, the practice of "Acupuncture" in the United States could be more accurately described as "acupuncture systems medicine", a complex process of diagnosis and intervention that applies techniques of acupuncture and acupressure, herbal medicine, phytotherapy, moxibustion, medical cupping, gua sha, dietetics, specialized manual therapies, mind-body techniques, and other established modalities.

While some mechanisms remain to be fully elucidated, much is known about the way that insertion, retention, and manipulation of acupuncture needles impact the biochemical, cytoskeletal, anatomical, neuromuscular, and neuromodulatory components of the body. Acupuncture is widely studied and accepted as a form of treatment for pain, and it is both safe and effective in addressing a broader set of biomedical conditions and symptoms.

In the United States, acupuncture may be performed by a variety of practitioners who are trained to various levels of expertise. Licensed acupuncturists are the most highly trained practitioners in the context of the acupuncture system of AHM and the technique of acupuncture as a modality.

Acupuncture is being incorporated into inpatient and outpatient settings, has been shown to reduce the costs of medical care, and may provide a substantive, sustained alternative for pharmacologic and surgical management of complex issues such as pain. Acupuncture, as performed by regulated, highly trained medical professionals, is increasingly valued as a safe and effective part of the larger medical system of care in the United States.

Abbreviations

AAAA, Asian American Acupuncture Association; AAAMA, American Acupuncture and Alternative Medicine Association; AAAOM, American Association of Acupuncture and Oriental Medicine; AACMA, American Association of Chinese Medicine and Acupuncture; AAMA, American Academy of Medical Acupuncture; ABAA, American Board of Animal Acupuncture; ABCA, American Board of Chiropractic Acupuncture; ABMA, American Board of Medical Acupuncture; ABVN, auricular branch of the vagus nerve; ACAHM, Accreditation Commission for Acupuncture and Herbal Medicine; ACAOM, Accreditation Commission for Acupuncture and Oriental Medicine; ACGME, Accreditation

Council for Graduate Medical Education; ACIMH, Academic Consortium of Integrative Medicine and Health; ACTMA, American TCM Organization; ADL, activities of daily living; AHM, Acupuncture and Herbal Medicine; AMA, American Medical Association; ANF, Acupuncture Now Foundation; ASA, American Society of Acupuncturists; ASCM, American Society of Chinese Medicine; ATP, adenosine triphosphate; AWB, Acupuncturists Without Borders; BLS, basic life support; CALE, California Acupuncture Licensing Examination; CCAHM, Council of Colleges of Acupuncture and Herbal Medicine; CHA, complementary health approaches; CMS, Centers for Medicare and Medicaid Services; CNT, Clean Needle Technique; CPM, conditioned pain modulation; DAAMA, Diplomat of the American Academy of Medical Acupuncture; DAc, Doctor of Acupuncture; DACM, Doctor of Acupuncture and Chinese Medicine; DAOM, Doctor of Acupuncture and Oriental Medicine; DC, Doctor of Chiropractic Medicine; DNIC, diffuse noxious inhibitory controls; DO, Doctor of Osteopathic Medicine; DRG, Diagnosis Related Group; DVM, Doctor of Veterinary Medicine; EOP, endogenous opioid peptides; FAAMA, Fellow of the American Academy of Medical Acupuncture; FDA, Food and Drug Administration; fMRI, functional magnetic resonance imaging; FQHC, Federally Qualified Health Centers; GABA, gamma-aminobutyric acid; ICD, International Classification of Diseases; JSAM, Japan Society of Acupuncture and Moxibustion; LAc, Licensed Acupuncturist; LCME, Liaison Committee on Medical Education; MD, Medical Doctor; NCCAOM, National Certification Commission for Acupuncture and Oriental Medicine; NCCIH, National Center for Complementary and Integrative Health; NACSCAOM, National Accreditation Commission for Schools and Colleges of Acupuncture & Oriental Medicine; NADA, National Acupuncture Detoxification Association; NCI, National Cancer Institute; ND, Doctor of Naturopathic Medicine; NGAOM, National Guild of Acupuncture and Oriental Medicine; NIH, National Institutes of Health; NTS, nucleus of the solitary tract; PT, Physical Therapist; RCT, randomized controlled trial; SAR, Society for Acupuncture Research; SOC, standard occupational classification; SKOM, Society of Korean Medicine; TARA, Topological Atlas and Repository for Acupoint research; TCM, Traditional Chinese Medicine; USDE, United States Department of Education; VA, Veterans Affairs; VHA, Veteran's Health Administration; WHO, World Health Organization.

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Bill Reddy,* LAc, Dipl. Ac NCCAOM. I'm a licensed acupuncturist and this paper is directly associated with my professional work.

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held for the first 24 months of the project. No funds were exchanged nor relationships established in relation to the work on this paper.

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