

Acupuncture and Traditional Chinese Medicine

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Goals

- Integrating Modern Medicine and Traditional Chinese Medicine
- Literature Review
- Essentials of Acupuncture: Theories, Concepts, and Practice
- Locations and Properties of Important Acupuncture Points

Huangdi Neijing The Yellow Emperor's Classic

- Ancient Chinese medical text that has been treated as the fundamental doctrinal source for TCM
- Dated by scholars around 400 B.C.
- The work is composed of two texts in a question-and-answer format between the mythical Yellow Emperor and one of his ministers (physicians)



Author: Unknown



Author: Merck & Co.

$$\text{pediatric dose} = \frac{1}{\left(\frac{\text{age} + 12}{\text{age}}\right)}$$

$$\text{e.g.: } \frac{3+12}{3} = 5$$

$$\frac{1}{5} = 0.2$$

"For example, a child three years old will require of the adult dose. Of powerful narcotics, children will require scarcely more than one-half of this proportion. Children bear opiates poorly; while they stand comparatively large doses of arsenic, belladonna, ipecac, mercurials, pilocarpine, rhubarb and some other purgatives, and squill."

- “...extraordinary claims demand extraordinary proof.” - Dr. Steven Shafer



- “You must keep an open mind, but not so open that your brains fall out” - James Oberg, NASA engineer and science writer

Shafer SL. Did our brains fall out? *Anesth Analg.* 2007;104:247-8. – Source: *Wellcome Collections*

Acupuncture Modern Day Applications

- Preventative Health
 - Stress
 - Weight management
 - Female reproductive health
- Behavioral health
 - Depression
 - Anxiety
 - Addiction
- Acute illness
- Chronic medical conditions
- Acute and Chronic pain



Author: Christopher Michel (CC BY 2.0)

Effective Treatment of Animals is Usually Cited As Proof that Acupuncture is Not Merely Placebo



- Veterinary medical journals cite many examples of objective clinical success
 - ✓ Potentially lethal arthritis in horses
 - ✓ Congenital hip dysplasia in dogs

<https://www.publicdomainpictures.net/en/hledelj.php?hleda=veterinary+acupuncture>

Acupuncture definition

- *Acus* = meaning a sharp point
- *Punctura* = meaning to pierce
- Technique of inserting and manipulating fine filiform needles into specific points on the body for various therapeutic purposes
- Original acupuncture technique: manipulate needle in an up-and-down and rotating movement
- Attempt to reopen the meridian so that the obstructed Qi can resume its path

Imaginary Words to a Western Doctor

- Meridians?
- Obstructed Qi?



Source: <https://nccih.nih.gov/>

With So Many Applications, Who Do You Trust?



The Government,
of Course!

Author: NASA / Neil A. Armstrong

The NIH is “the” National Medical Research Agency

- Includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services
- The National Center for Complementary and Integrative Health (NCCIH) is the Federal Government’s lead agency for scientific research on complementary and integrative health approaches

<https://nccih.nih.gov/about/ataglance>

What is Traditional Chinese Medicine to a Modern Day Physician?

- <https://www.nih.gov/>
- <https://nccih.nih.gov/>



National Center for
Complementary and
Integrative Health

<https://nccih.nih.gov/>

NCCIH's Mission and Vision

- **Mission = Define Usefulness and Safety of complementary and integrative health interventions and their roles in improving health and health care**
- **Vision = Scientific Evidence will inform decision-making by the public, by health care professionals, and by health policymakers regarding the use and integration of complementary and integrative health approaches**

<https://nccih.nih.gov/health/integrative-health>

NCCIH Quick Facts

- **Established: by Congress 1992; later renamed 1999**
- **Funding: FY 2020: \$151.9 million; FY 1992: \$2.0 million**
- **Staff: Approximately 74 FTEs (2015)**

<https://nccih.nih.gov/about/ataglance>

<https://nccih.nih.gov/research/statistics/NHIS>

<https://nccih.nih.gov/about/budget/appropriations.htm>

Integrative Medicine

- Many definitions, but all involve bringing conventional and complementary approaches together in a coordinated way
- Researchers are currently exploring the potential benefits of integrative health in a variety of situations, including:
 - Pain management for military personnel and veterans
 - Relief of symptoms in cancer patients and survivors
 - Programs to promote healthy behaviors

<https://nccih.nih.gov/health/integrative-health#cvsa>

Complementary versus Alternative

- When describing these approaches, people often use “alternative” and “complementary” interchangeably, but the two terms refer to different concepts:
- If a non-mainstream practice is used together with *conventional medicine* = “complementary”
- If a non-mainstream practice is used in place of conventional medicine = “alternative”

<https://nccih.nih.gov/health/integrative-health#cvsa>

TCM Doctrine

- Diseases develop from natural effects of diet, lifestyle, emotions, environment, and age
- The universe is composed of various forces and principles, such as Yin and Yang, Qi and the Five Elements (or phases)
- Man can stay in balance or return to balance and health by understanding the laws of these natural forces

TCM encompasses many practices, including:

- Herbal medicine
- Acupuncture
- Tai chi

- Food is medicine
- Moxibustion
- Cupping
- Tui na
- Qi gong

<https://nccih.nih.gov/health/whatiscam/chinesemed.htm>

The Sign of Tai Chi

- also known as the Yin Yang symbol, which is the epitome of balanced Qi energy
- Yin and Yang are equal but opposite
- Yin and Yang are complementary to each other
- Cyclical rhythm of nature
- Yin and Yang are interdependent and cannot exist without each other
 - cannot have day without night
 - cannot have dark without light

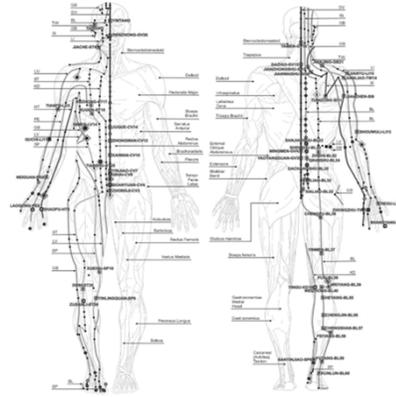
The Sign of Tai Chi

- | | | |
|-----------------------|--|-------------------|
| YIN |  | YANG |
| • Negative | | • Positive |
| • Female | | • Male |
| • Night | | • Day |
| • Passive | | • Active |
| • Moon | | • Sun |
| • Intuitive | | • Logical |
| • Cold | | • Hot |
| • Soft | | • Hard |
| • Parasympathetic NS? | | • Sympathetic NS? |
| • Anabolism? | | • Catabolism? |
- Author: Gregory Maxwell*

Yin and Yang Are in a State of Continuous Support

- Relative levels of yin and yang are continuously changing
- When yin or yang are out of balance, they affect each other, and too much of one can eventually weaken (consume) the other = leading to disease state

Body Acupuncture Meridians and Acupoints



https://upload.wikimedia.org/wikipedia/commons/f/fc/Chinese_meridians.JPG

The Elusive “Meridian” has not Materialized Yet

- Media = nerves, blood vessels, lymphatic, connective tissues?
- In modern times, new *methods* of stimulating the acupuncture points (acupoints) have been introduced, including
 - Electroacupuncture (EA)
 - Transcutaneous Electrical Acupoint Stimulation (TEAS);
 - Injection of chemicals into the acupoints
 - Acupressure

How does Acupuncture work?

- Qi influenced and balanced by stimulating specific points on the body's surface
- Recruits endogenous neurotransmitters and neuropeptides, such as endorphins, to suppress pain
- Interrupt the vicious cycle of pain mechanisms

T.R. Deer et al. (eds.), *Treatment of chronic pain by integrative approaches: the American Academy of Pain Medicine textbook on patient management*. 2015. ISBN 978-1-4939-1820-1 ISBN 978-1-4939-1821-8 (eBook)

WHO Classification System of Meridians

- Consensus Report reached by WHO Scientific Group for standard international acupuncture nomenclature in 1989
- Naming system: alphanumeric code as well as the Han character names of meridians and acupuncture points, along with their transliterations into the Chinese phonetic alphabet (Pinyin) and their English translations
- Proposed standard nomenclature for the 14 main meridians, the 361 classical acupuncture points, the 8 extra meridians and the 48 extraordinary points, and for scalp acupuncture lines

<http://apps.who.int/medicinedocs/en/d/Jh2947e/>

https://en.wikipedia.org/wiki/List_of_acupuncture_points#Large_intestine_meridian

Meridian Labeling

- Each point has a specific function and meaning relating to its internal organ and meridian
- Names often refer to flow on the surface of the earth:
 - Well, Spring, Stream, River, Sea
 - Valley, Marsh, Crevice

Theory of Meridians

- Channels that transfer blood and Qi (vital energy) throughout the body
- Connected with the surface and all the internal organs of the body
- Regulate yin and yang
- According to Chinese medical theory, illness arises when the cyclical flow of Qi in the meridians is blocked or becomes unbalanced

Xu, J. (2014). *Praeger handbook of acupuncture for pain management : A guide to how the 'magic needles' work*. Retrieved from <https://ebookcentral.proquest.com>

Meridians are connected with each other in an endless cycle to nourish and adjust the energy of the body



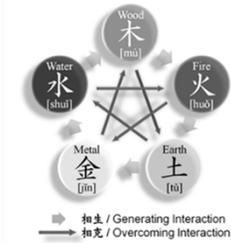
Author: Joe Haupt (CC BY-SA 2.0)

Begin with the lung meridian, connected to the large intestine → stomach → spleen → heart → small intestine → urinary bladder → kidney → pericardium → San Jiao → gallbladder → liver → finally returns to the lung again

Xu, J. (2014). *Praeger handbook of acupuncture for pain management : A guide to how the 'magic needles' work*. Retrieved from <https://ebookcentral.proquest.com>

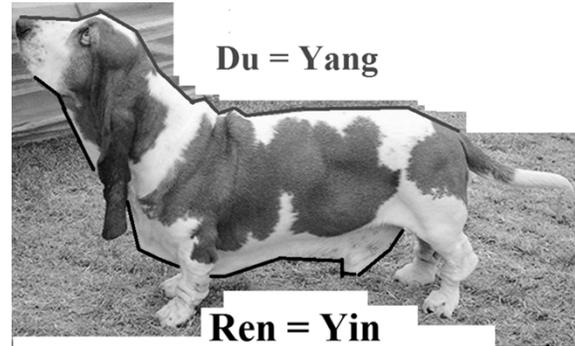
14 Common Meridians = (6 pairs + 2 unpaired)

- Relating to the Zang-Fu organ systems
- Meridians Relate to the 5 elements
 - ✓ Urinary bladder and Kidney meridians (Water)
 - ✓ Gallbladder and Liver (Wood)
 - ✓ Heart and Small intestine (Fire)
 - ✓ Stomach and Spleen (Earth)
 - ✓ Lung and Large Intestine (Metal)
 - ✓ Pericardium and San Jiao meridians
- 2 other meridians = Du (Governing Vessel) and Ren (Conception Vessel)



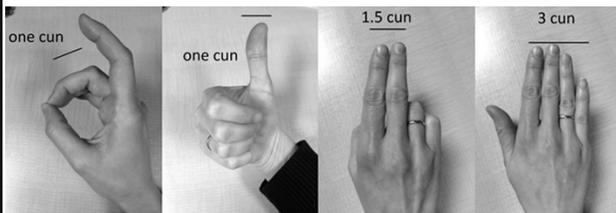
Author Parnassus (CC BY-SA 3.0)

2 other meridians = Du (Governing Vessel) and Ren (Conception Vessel)



https://upload.wikimedia.org/wikipedia/commons/d/d9/Collage_of_Nine_Dogs.jpg

Cun Measurements of the Body



- Since everyone's body is of a different size, use a person's inborn measurement system

Five elements = water, wood, fire, earth, metal = symbolically represent all phenomena

- Includes stages of human life, and explain the functioning of the body and how it changes during disease

Based on five categories in nature:

- Water nourishes wood
- Wood provides the generative force for fire
- Fire enriches the earth
- Earth contains metal
- Metal produces water
- And so it goes

<https://nccih.nih.gov/health/whatiscam/chinesemed.htm>

Xu, J. (2014). *Praeger handbook of acupuncture for pain management : A guide to how the 'magic needles' work*. Retrieved from <https://ebookcentral.proquest.com>

Five Element Theory

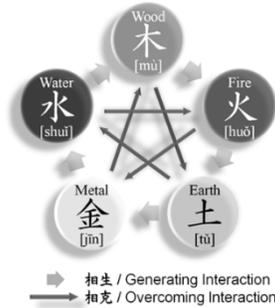


Diagram of the interactions between the wuxing. The "generative" cycle is illustrated by grey arrows running clockwise on the outside of the circle, while the "destructive" or "conquering" cycle is represented by red arrows inside the circle.

Author Parnassus (CC BY-SA 3.0)

2012 National Health Interview Survey (NHIS) Provides Most Comprehensive Information on Use of Complementary Health Approaches in US

- This analysis is the first to provide data on children, on total spending across age groups, and on mean spending per user for any use of these approaches
- About 59 million Americans spend money out-of-pocket on complementary health approaches
- Total spending adds up to \$30.2 billion a year

Clarke, TC et al. Trends in the use of complementary health approaches among adults: United States, 2002-2012. *Natl Health Stat Report*. 2015 Feb 10;(79):1-16.

Health Care Approaches Outside of (Conventional) mainstream Western Medicine



- More than 30% of adults
- 12% of children

Source: <https://nccih.nih.gov/health/children>

2012 National Health Interview Survey (NHIS) = Data Published 2/2015

- Conducted by the National Center for Health Statistics (NCHS), part of the CDC
- Each year 35,000 and 40,000 households to ask people questions about their health
- In 2002, 2007, 2012, and 2017 the NHIS included a section, developed by NCHS and the National Center for Complementary and Integrative Health (NCCIH), on the use of complementary health approaches

National Health Statistics Reports
Number 79 • February 10, 2015

Trends in the Use of Complementary Health Approaches Among Adults: United States, 2002-2012

by Taylor C. Clarke, M.D., M.P.H., University of Iowa, and Tracy A. Lieu, M.D., National Center for Health Statistics

Submitted by: Christopher G. Lohr, National Center for Health Statistics, and Tracy A. Lieu, National Center for Health Statistics

Abstract

Objective: This report presents national estimates of the use of complementary health approaches among adults in the United States from 2002 to 2012. Trends in use of complementary health approaches are presented by age, sex, race, and education level.

Methods: Data from the 2002, 2007, 2012, and 2017 National Health Interview Survey (NHIS) are used to estimate the prevalence of complementary health approach use among U.S. adults. The use of complementary health approaches is defined as the use of any of the following: yoga, Tai Chi, meditation, acupuncture, chiropractic, massage, herbal supplements, and other natural products.

Results: In 2012, 30.1% of U.S. adults used complementary health approaches. The use of complementary health approaches increased from 2002 to 2012, with the largest increase among those aged 18-44 years.

Conclusion: The use of complementary health approaches among U.S. adults has increased over the past decade. This increase is consistent across most demographic groups, but is particularly pronounced among young adults.

Introduction

Complementary health approaches are those practices, products, and services that are used in addition to conventional medicine. These approaches include yoga, Tai Chi, meditation, acupuncture, chiropractic, massage, herbal supplements, and other natural products.

Methods

Data source

Conclusion

<https://nccih.nih.gov/research/statistics/NHIS/2012/about>

Acupuncture Use

Table 1. Trends in the use of selected complementary health approaches during the past 12 months, by type of approach, United States, 2002, 2007, and 2012

Complementary health approach	2002		2007		2012		Percentage point change			Trend
	Number (in thousands)	Age-adjusted percent* (standard error)	Number (in thousands)	Age-adjusted percent* (standard error)	Number (in thousands)	Age-adjusted percent* (standard error)	2002-2007	2007-2012	2002-2012	
Nonvitamin, nonmineral dietary supplements	28,183	18.9 (0.26)	28,797	17.7 (0.37)	40,579	17.7 (0.37)	..	..	..	..
Deep-breathing exercises [†]	23,627	15.6 (0.24)	27,794	12.7 (0.25)	24,218	10.9 (0.26)	1.1	..	..	..
Yoga, tai chi, and qigong	11,796	8.8 (0.17)	14,426	6.7 (0.22)	22,281	10.1 (0.25)	0.9	1.5	1.4	Linear
Herbals [‡] or osteopathic manipulation [§]	10,206	7.6 (0.16)	16,761	8.6 (0.27)	19,369	8.4 (0.22)	..	-0.2	..	..
Meditation	10,206	7.6 (0.20)	20,641	9.4 (0.27)	17,848	8.0 (0.24)	1.8	..	..	..
Acupuncture	10,022	6.0 (0.10)	18,068	8.0 (0.22)	16,491	6.9 (0.10)	2.3	1.4	1.9	Quadratic
Spinal (chiropractic) treatment [¶]	6,785	3.0 (0.12)	6,040	2.8 (0.14)	4,863	2.0 (0.13)	0.1	1.6	-0.5	Linear
Progressive relaxation	6,185	3.0 (0.12)	6,464	2.9 (0.15)	4,766	2.1 (0.10)	-0.1	1.8	-0.9	Linear
Sublingual immunotherapy ^{**}	4,423	1.7 (0.06)	3,600	1.8 (0.11)	5,046	2.2 (0.11)	0.1	0.4	0.5	Linear
Bioidentical hormone therapy	4,194	2.1 (0.10)	4,666	2.2 (0.10)	3,846	1.7 (0.10)	0.1	-0.5	-0.4	None
Acupuncture	2,138	1.1 (0.07)	3,141	1.4 (0.10)	3,484	1.5 (0.06)	0.3	0.1	0.4	Linear
Energy healing therapy	1,080	0.5 (0.08)	1,216	0.5 (0.06)	1,077	0.5 (0.06)	0.0	0.0	0.0	None
Meditation	699	0.2 (0.03)	729	0.3 (0.04)	957	0.4 (0.04)	0.1	0.1	0.2	Linear
Yoga/qigong	606	0.2 (0.03)	561	0.2 (0.04)	547	0.1 (0.03)	0.0	-0.1	-0.1	None
Herbal/teas	278	0.1 (0.02)	392	0.2 (0.04)	281	0.1 (0.02)	0.1	-0.1	0.0	None
Yoga/qigong	154	0.1 (0.02)	214	0.1 (0.03)	241	0.1 (0.02)	0.0	0.0	0.0	None

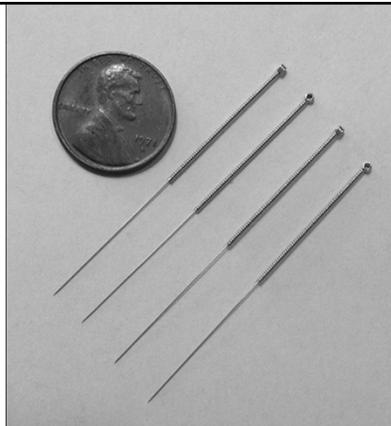
- 2002 – 2.136 million; 1.1% population (age adjusted)
- 2007 – 3.141 million; 1.4% population
- 2012 – 3.484 million; 1.5% population

<http://www.cdc.gov/nchs/data/nhsr/nhsr079.pdf>

Is TCM safe?

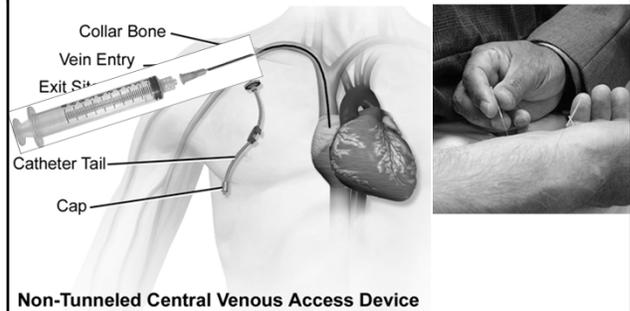
- Improperly performed acupuncture = serious side effects
- Reports of Chinese herbal products being contaminated with drugs, toxins, or heavy metals or not containing the listed ingredients
- Some herbals can interact with drugs, have serious side effects, or be unsafe for people with certain medical conditions

<https://nccih.nih.gov/health/whatiscam/chinesemed.htm>



Author Acuhealth (CC BY-SA 3.0)

Risk Assessment



Non-Tunneled Central Venous Access Device

Author BruceBlais (CC BY 3.0)
 Author: Kyle Hunter
 Author: William Rafti of the William Rafti Institute

Chinese Herbal Medicine

- Chinese *Materia Medica* (the pharmacological reference book) describes thousands of medicinal substances =
 - primarily plants
 - some minerals
 - animal products
- Herbs are often combined in formulas



Author: Wikidudeman



FDA statement Cautioning against Herbals

Use Caution With Ayurvedic Products



Ancient medicine is a traditional system of medicine that has been practiced for thousands of years. It is a holistic approach to health that focuses on the balance of the body, mind, and spirit. Ayurvedic products are made from natural ingredients and are used to treat a variety of conditions. However, some Ayurvedic products may contain heavy metals such as lead, mercury, and arsenic, which can be harmful to health. The FDA has issued a warning to consumers to be cautious when purchasing Ayurvedic products, especially those that are imported from India.

A study ... demonstrated that one-fifth of U.S.-manufactured and Indian-manufactured Ayurvedic products bought on the Internet contained detectable lead, mercury, or arsenic.

Researchers recently analyzed 100 Ayurvedic products and found that 20% contained detectable levels of lead, mercury, or arsenic. The products were purchased from various online retailers. The study found that the highest levels of contamination were found in products that were imported from India. The researchers also found that many of the products did not have the required labeling for Ayurvedic products. The FDA is currently reviewing the results of the study and will issue further guidance to consumers.

Source: Food and Drug Administration

Cupping



<https://www.publicdomainpictures.net/>



Author: Iwansw (CC BY-SA 3.0)

Cupping



Source: Wellcome Collection gallery (2018-03-28) - (CC BY 4.0)

Author: Alanna Ralph (CC BY 2.0)

Moxibustion



https://en.wikipedia.org/wiki/Acupuncture#/media/File:A_Dose_of_Moxa.jpg

The Status of TCM Research

- In spite of the widespread use of TCM in China and its use in the West, rigorous scientific evidence of its effectiveness is limited
- TCM can be difficult for researchers to study because its treatments are often complex and are based on ideas very different from those of modern *Western medicine*
- Most research studies on TCM have focused on specific techniques, primarily acupuncture and Chinese herbal remedies, and there have been many systematic reviews of studies of TCM approaches for various conditions

<https://nccih.nih.gov/health/whatiscom/chinesemed.htm>

NIH Review Finds Nondrug Approaches Effective for Pain



https://nccih.nih.gov/news/press/pain_review
Nahin, Richard L et al. "Evidence-Based Evaluation of Complementary Health Approaches for Pain Management in the United States." *Mayo Clinic proceedings* vol. 91,9 (2016): 1292-306. doi:10.1016/j.mayocp.2016.06.007

NIH Review Trial Evidence on Complementary Approaches for Five Painful Conditions

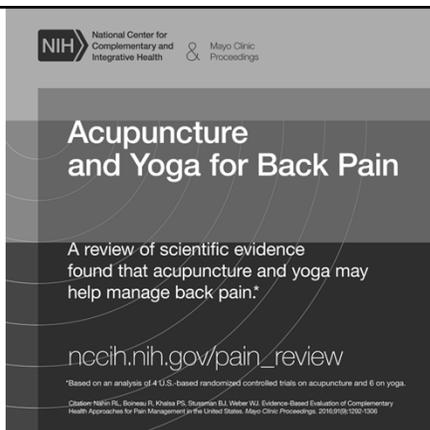
- Painful conditions are the most common reasons why American adults use complementary health approaches
- About 40 million American adults experience severe pain in any given year
- 5 conditions = low back pain, osteoarthritis, neck pain, severe headaches and migraine, and fibromyalgia

<https://nccih.nih.gov/research/results/spotlight/five-painful-conditions>

NCCIH Review Article Continued

- Review conducted by a group of scientists from the National Center for Complementary and Integrative Health (NCCIH) at the National Institutes of Health
- To identify RCTs for each complementary approach, published from January 1, 1966, through March 31, 2016
- Limited to RCTs in United States
- Found RCT-evidence for treating pain:
 - Acupuncture and yoga for back pain
 - Acupuncture and tai chi for osteoarthritis of the knee

Nahin, Richard L. et al. "Evidence-Based Evaluation of Complementary Health Approaches for Pain Management in the United States." *Mayo Clinic proceedings* vol. 91,9 (2016): 1292-306. doi:10.1016/j.mayocp.2016.06.007

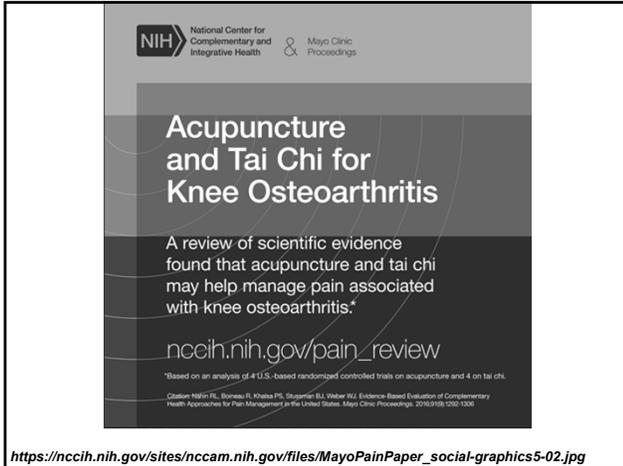


https://nccih.nih.gov/sites/nccam.nih.gov/files/MayoPainPaper_social-graphics5-01.jpg

NIH Review Article: Low Back Pain

- 4 RCTs (total participants, 1092)
- Age range, 28-60 years
 - used primary study outcomes of self-report of pain intensity (numeric rating scale or visual analog scale [VAS]) and/or functional disability (Roland-Morris Disability Questionnaire, Oswestry Disability Index [ODI], or Disability Rating Index)
- Cherkin et al reported modest improvement in pain intensity and function compared with usual care
- In pregnant women using auricular acupuncture, Wang et al found a significant reduction in pain intensity and improved functional status

Nahin, Richard L. et al. "Evidence-Based Evaluation of Complementary Health Approaches for Pain Management in the United States." *Mayo Clinic proceedings* vol. 91,9 (2016): 1292-306. doi:10.1016/j.mayocp.2016.06.007



NIH Review article: Knee OA

- 4 RCTs; Predominantly female, had mean ages 60–65 years, and had knee pain for an average of 9 to 11 years
- All used Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) total score or the WOMAC pain subscore
- In 2 of the RCTs no difference was seen between verum acupuncture and sham acupuncture for either the primary or secondary outcome measure
- The third trial, which used a sham control, found significantly better improvement in both the WOMAC pain subscale and function subscale after 14 weeks of treatment.

Nahin, Richard L et al. "Evidence-Based Evaluation of Complementary Health Approaches for Pain Management in the United States." Mayo Clinic proceedings vol. 91,9 (2016): 1292-306. doi:10.1016/j.mayocp.2016.06.007

NCCIH tips for finding a Provider

- If you need names of practitioners in your area, first check with your doctor or other health care provider
- Unfortunately, the National Center for Complementary and Integrative Health (NCCIH) cannot refer you to practitioners
- NCCIH is not involved in the clinical training, credentialing, or licensing of complementary health practitioners
- Find out as much as you can about any potential practitioner, including education, training, licensing, and certifications
- The credentials required for complementary health practitioners vary tremendously from state to state and from discipline to discipline

<https://nccih.nih.gov/health/tips/selecting>

National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM):

- National organization that validates entry-level competency in the practice of acupuncture and Oriental medicine through professional certification
- Provides patient-level information about these practices and a provider-finder link

<https://www.nccaom.org/>

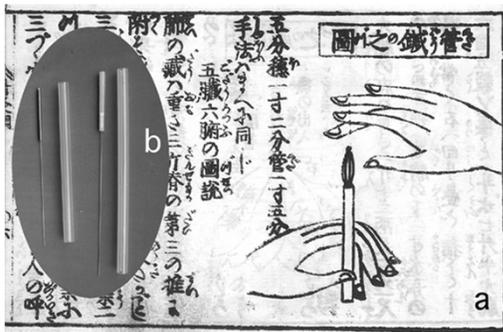
Acupuncture subsets

- Body
- Scalp
- Ear
- Hand



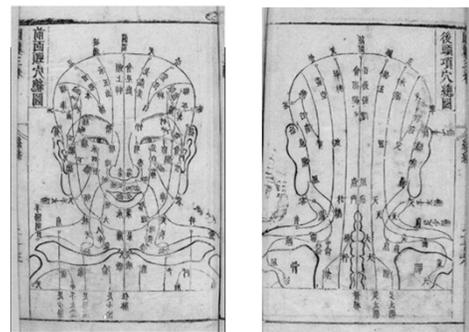
https://upload.wikimedia.org/wikipedia/commons/a/a2/Archie_McPhee_acupuncture.jpg

Demonstration of Acupuncture



https://upload.wikimedia.org/wikipedia/commons/7/7f/Japanese_kudabari.jpg

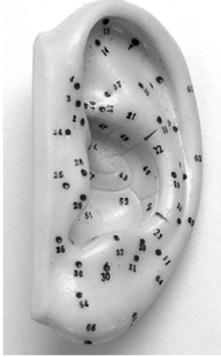
Scalp Acupuncture



<https://wellcomecollection.org/works/mg48ykd6>

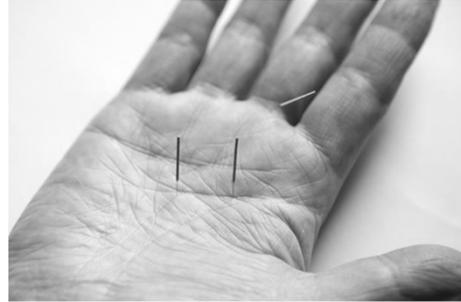
<https://wellcomecollection.org/works/hvvtvy4k>

Ear Acupuncture



Author: Wouterhagens at Dutch Wikipedia (CC BY-SA 3.0)

Hand Acupuncture



Author: National Institute of Korean Language (CC BY-SA 2.5)

History of Acupuncture Research

Acupuncture Anesthesia During Surgery

- In the late 1950s up to 1970s, there was a large-scale clinical practice in China of using acupuncture in lieu of anesthetics for surgical procedures
- In fact, in most hospitals, acupuncture was used in combination with anesthetics to form “acupuncture-assisted anesthesia (AAA)”
- Almost all reports stressed the benefits
 - less anesthetic requirements
 - earlier recovery
 - less postoperative pain and other complications
 - shortened hospitalization

T.R. Deer et al. (eds.), Treatment of chronic pain by integrative approaches: the American Academy of Pain Medicine textbook on patient management. 2015. ISBN 978-1-4939-1820-1 ISBN 978-1-4939-1821-8 (eBook)

Acupuncture Raises Pain Threshold in Humans and Suggests Neurochemical Mechanisms

- Study to ascertain whether acupuncture stimulation would indeed lower pain sensitivity
- Skin potassium iontophoresis method was used, whereby the minimal intensity of an anode (5 mm diameter) current needed to produce a clear pain sensation was recorded, usually by 1 mA
- Following the continuous manipulation of the needle (at Hegu point) for 50 min, a gradual increase of the pain threshold was observed over 30 min to increase from 1 to around 2 mA, and leveled off thereafter

Research Group of Acupuncture Analgesia, Beijing Medical College. The effect of acupuncture on pain threshold of the skin on human volunteers. Chin Med J. 1973;3:151-7.

Pain Threshold Increases After Acupuncture at LI-4

- Eight representative skin points were identified for the measurement of pain threshold
- Slow rise of pain threshold during the stimulation period and the slow decay after the removal of the needle suggest the involvement of neurochemical mechanisms

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LI-4 = Hegu = translated as Conjoining Valley

- Location: On the dorsum of the hand, between the 1st and 2nd metacarpal bones, in the middle of the 2nd metacarpal bone on the radial side.



https://upload.wikimedia.org/wikipedia/commons/0/05/Acupuncture_point_Hegu_%28LI_4%29.jpg

Cerebrospinal Fluid Cross-perfusion Study Determines that Chemical Mediators produced in Brain are Responsible for Analgesia (BL-60)

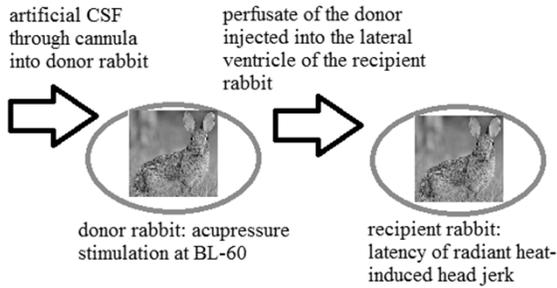
BL-60 = translated as "Kunlun Mountains"

Location: On the foot, behind the external malleolus, in the depression between the tip of the external malleolus and calcaneal (Achilles) tendon



Research Group of Acupuncture Anesthesia, Beijing Medical College: the role of some neurotransmitters of brain in acupuncture analgesia. Sci Sin. 1974;17:112-30.

Neurochemical Mechanisms of Acupuncture



Author: Gareth Rasberry (CC BY-SA 3.0)

Research Group of Acupuncture Anesthesia. Beijing Medical College: the role of some neurotransmitters of brain in acupuncture analgesia. *Sci Sin.* 1974;17:112-30.

Acupuncture Analgesia found to be Modulated through Opioidergic Pathways

- The analgesic effect of acupuncture for dental pain can be prevented by the subcutaneous injection of naloxone
- Suggests the involvement of endogenous opioid substances



<https://wellcomecollection.org/works/xy86ag9c/items?canvas=1&langCode=fre>
Mayer DJ, Price DD, Raffi A. Antagonism of acupuncture analgesia in man by narcotic antagonist naloxone. *Brain Res.* 1977;121:368-72. Author: James Heilman, MD (CC BY-SA 4.0)

Standard TEAS Device for Research Studies

- Clinical trials demonstrated efficacy in treating pain and addictions, autism, infertility, insomnia, depression, and urinary incontinence
- Gentle electrical stimulation at certain frequencies mobilizes the body's own natural healing processes to restore biological balance



<https://upload.wikimedia.org/wikipedia/commons/6/6b/Tens.jpg>

Acupuncture is Modulated by Ascending and Descending Pathways in the Brain and Spinal Cord

- From neurophysiological point of view, acupuncture analgesia can be taken as a reflex action
 - Afferent = (mostly A β fibers) innervating the acupoint
 - Efferent = descending pathway modulating the sensitivity of the dorsal horn neurons not only in the same segment but also in heterogeneous segments
- Rat studies revealed that 100-Hz stimulation of the acupoint would trigger the release of dynorphin in the spinal cord
- After destruction of the parabrachial nucleus of the brainstem, high-frequency EA would no longer produce an analgesic effect

Han JS, Wang Q. Mobilization of specific neuropeptides by peripheral stimulation of identified frequencies. *News Physiol Sci.* 1992;7:176-80.

Different Electroacupuncture Frequencies Recruit Different Opioid Receptors

- Used a specific antagonist for the three types of opioid receptors
- 2-Hz stimulation releases endorphins and enkephalins; mediated by *mu* and *delta* receptor
- 100-Hz stimulation releases dynorphins; mediated by *kappa* receptors

Han JS. Acupuncture: neuropeptide release produced by electrical stimulation of different frequencies. *Trends Neurosci.* 2003;26:17–22.

Neuromodulation (continued)

- Conversely, 2-Hz EA induces the release of β -endorphin in the brain and enkephalin in the whole central nervous system
- After the destruction of the arcuate nucleus of the hypothalamus (where β -endorphin neurons aggregated), 2-Hz EA would no longer elicit analgesia
- Neither low- nor high-frequency EA would work if a lesion is placed at the periaqueductal gray (PAG) of the midbrain

Han JS, Wang Q. Mobilization of specific neuropeptides by peripheral stimulation of identified frequencies. *News Physiol Sci.* 1992;7:176–80.

Functional Magnetic Resonance Imaging (fMRI) shows EA-induced Analgesia by 2- or 100-Hz EA stim

- Magnitude of acupuncture-induced BOLD signal change observed in identified brain area with the magnitude of the analgesic effect
- The results showed that the analgesic effect induced by low and high frequencies seems to be mediated by different, though partially overlapping brain networks

Zhang WT, Jin Z, Cui GH, et al. Relations between brain network activation and analgesic effect induced by low versus high frequency electrical acupoint stimulation in different subjects: a functional magnetic resonance imaging study. *Brain Res.* 2003; 982:168–78.

Serotonin in the CNS Plays Important Role in Acupuncture Analgesia

- The role played by central 5-hydroxytryptamine (5-HT) has been studied in rats with the tail-flick response
- Increase of availability of 5-HT in brain or spinal cord potentiated acupuncture analgesia
- Whereas blockade of 5-HT synthesis or receptor activation resulted in a significant decrease of the analgesic effect

Han JS, Chou PH, Lu CH, et al. The role of central 5-HT in acupuncture analgesia. *Sci Sin.* 1979;22:91–104.

Acupuncture is shown by Evidence-Based Medicine to be Cost Effective

- Postoperative pain
- Nausea and vomiting
- Anxiolysis
- Lack of clinical toxicity

White PF. Use of alternative medical therapies in the perioperative period: is it time to get on board? *Anesth Analg* 2007;104:251-4.

TEAS Device Decreases Postoperative Pain

- Transcutaneous Electrical Acupoint Stimulation (TEAS) to assess if it can reduce the postoperative PCA requirement for hydromorphone (HM)
- Dr. Paul White's group = single-blind controlled study, first of many using specific device
- Compared to the blank control of "PCA only" group:
 - The HM used in the sham TEAS group showed a 22% reduction
 - For the real TEAS group, they used two levels of intensity, the threshold level (4-5 mA) and double threshold level (9-12 mA),
 - resulting in a 34% ($P < 0.05$) and 65% ($P < 0.001$) reduction, respectively
- Postoperative side effects significantly reduced

Wang BG, Tang J, White PF, et al. Effect of the intensity of transcutaneous acupoint electrical stimulation on the postoperative analgesic requirement. *Anesth Analg*. 1997;85:406-13.

PC-6 Neiguan = translated as Inner Gate

- Location: On the palmar aspect of the forearm, 2 cun above the transverse crease of the wrist, between the tendons of m. palmaris longus and m. flexor carpi radialis



Postoperative Nausea and Vomiting

- For 3,347 postoperative subjects in 26 trials, acupuncture point PC-6 was found to be very effective in reducing nausea and vomiting postoperatively
- Manipulating the needles, either manually or by electronic stimulation, can enhance the effects

Lee, A, Done, ML. "Stimulation of the wrist acupuncture point P6 for preventing postoperative nausea and vomiting." *Cochrane Database System Review*. 17. CD003281, 2004. Update in: *Cochrane Database System Review*. (2): CD003281, 2009.

Evidence Supports Ear Acupuncture Effectiveness Ameliorating Withdrawal and Craving Symptoms



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https://en.wikipedia.org/wiki/Alcoholic_drink#/media/File:Common_alcoholic_beverages.jpg

SAMHSA Publishes TIP 45 Manual Recommending Ear Acupuncture

Substance Abuse and Mental Health Services Administration
SAMHSA

Detoxification and Substance Abuse Treatment

A Treatment Improvement Protocol
TIP 45

SAMHSA, of the U.S. Department of Health and Human Services
 Publication Date: 10/2015

<http://store.samhsa.gov/product/TIP-45-Detoxification-and-Substance-Abuse-Treatment/SMA15-4131>

National Acupuncture Detoxification Association Protocol Summary (Lincoln Hospital, NY)



(1) Clinicians use three to five ear acupuncture points

(2) Treatment is provided in a group setting for 40–45 min

(3) Acupuncture treatment is integrated with conventional elements of psychosocial rehabilitation

Sympathetic
 Shen Men
 Kidney
 Liver
 Lung

Author: Genusfotografen (Tomas Gunnarsson) / Wikimedia Sverige (CC BY-SA 4.0)
 Johnson, B. A. (Ed.). (2011). *Addiction Medicine*. doi:10.1007/978-1-4419-0338-9



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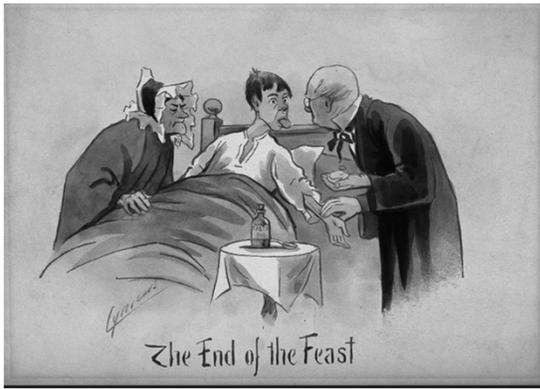
How to Decide which Acupoints?

- **History and Physical**
 - Tongue Diagnosis
 - Pulse Diagnosis
- **Different combinations of points and meridians can treat different diseases**
- **Acupuncture points are the locations along each of the specific meridians used for needle insertion**

Categories of TCM Diagnosis

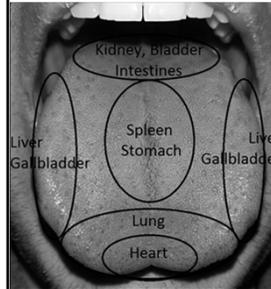
- Yin and Yang
- Hot and Cold
- Exterior and Interior
- Deficiency and Congestion

Comprehensive Training Course on Acupuncture for Physicians – Academy of Pain Research



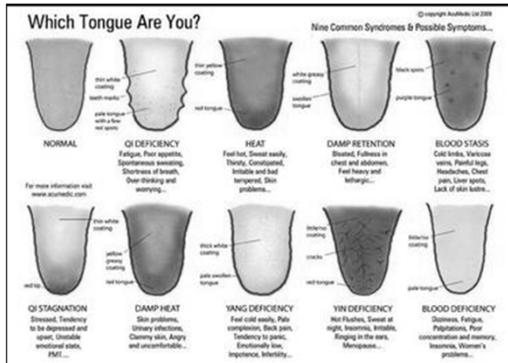
Source: <https://wellcomecollection.org>

Tongue Areas



Author: Mahdiabbasin (CC BY-SA 4.0)

- Tongue related to both meridians and the internal organs
- Important during inspection for confirming TCM diagnosis
- Can present strong visual indicators of a person's overall health



Author: AcuMedic Ltd 2003 Fair Use

Pulse Diagnosis (~28 types) on the Lateral Wrist Detects the Energy and Blood of an Internal Organ

- Middle finger at eminent head of radius and other 2 fingers are adjacent
- Separation of fingers depends on size of the patient (greater if taller), along the artery



Author: a Delhi painter. (Life time: Unknown)

Pulse Quality

- Choppy
- Deep
- Fast
- Full
- Hurried
- Intermittent
- Knotted
- Short
- Slippery
- Slow
- Superficial
- Thin
- Tight
- Weak
- Wiry

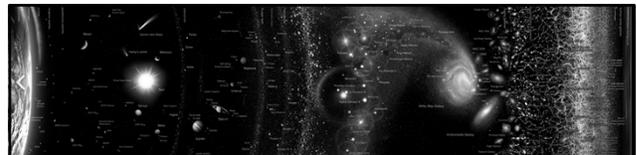
http://www.tcmstudent.com/study_tools/Pulse%20Quality.html

Limitations to Proving the Efficacy of Acupuncture

- Strict study protocol that cannot be varied from patient to patient
- Multiple confounding medical problems
- Highly complex art
- Sham acupuncture that is effective
- Ineffective techniques

Why is Acupuncture Able to Treat Different Disorders? = Acupuncture Restores Homeostasis

- Sophisticated regulatory mechanisms keep the body in a biological balance in an ever-changing environment
- Severe or prolonged deviation of the system beyond the set points may lead the body into pathology
- Although the manifestations of diseases are different, they often share similar pathological pathways



Author: Pablo Carlos Budassi (CC BY-SA 4.0)



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Thank You

Source: Needpix.com