



# ACUPUNCTURE

North Carolina Budget committee January 25<sup>th</sup> 2024



# What is Acupuncture?

The legal definition under NC general assembly:

- (1) Acupuncture. – A form of health care developed from traditional and modern Chinese medical concepts that employ acupuncture diagnosis and treatment, and adjunctive therapies and diagnostic techniques, for the promotion, maintenance, and restoration of health and the prevention of disease.
- (2) Board. – The Acupuncture Licensing Board.
- (3) Practice of acupuncture or practice acupuncture. – The insertion of acupuncture needles and the application of moxibustion to specific areas of the human body based upon acupuncture diagnosis as a primary mode of therapy. Adjunctive therapies within the scope of acupuncture may include massage, mechanical, thermal, electrical, and electromagnetic treatment and the recommendation of herbs, dietary guidelines, and therapeutic exercise. (1993, c. 303, s. 1.)

# WHO recommendations for Acupuncture Treatment, 2017

The World Health Organization recommends acupuncture for these diseases, symptoms or conditions, because acupuncture has been 'prove[d] – through controlled trials – to be an effective treatment':

- Adverse reactions to radiotherapy and/or chemotherapy
- Allergic rhinitis (including hay fever)
- Biliary colic
- Depression (including depressive neurosis and depression following stroke)
- Dysentery, acute bacillary
- Dysmenorrhoea, primary
- Facial pain (inclEpigastralgia, acute (in peptic ulcer, acute and chronic gastritis, and gastrospasm)
- uding craniomandibular disorders)
- Headache
- Hypertension, essential
- Hypotension, primary
- Induction of labour
- Knee pain
- Leukopenia
- Low back pain
- Malposition of fetus, correction of
- Morning sickness
- Nausea and vomiting
- Neck pain
- Pain in dentistry (including dental pain and temporomandibular dysfunction)
- Periarthritis of shoulder
- Postoperative pain
- Renal colic
- Rheumatoid arthritis
- Sciatica
- Sprain
- Stroke
- Tennis elbow

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- Acne vulgaris
- Alcohol dependence and detoxification
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- Insomnia
- Labour pain
- Lactation, deficiency
- Male sexual dysfunction, non-organic
- Ménière disease
- Neuralgia, post-herpetic
- Neurodermatitis
- Obesity
- Opium, cocaine and heroin dependence

# WHO recommendations for Acupuncture Treatment, 2017

**Diseases, symptoms or conditions for which The World Health Organisation recommends acupuncture because its therapeutic effect has been shown, although further proof is needed: (contd.)**

- Osteoarthritis
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- Pain in thromboangiitis obliterans
- Polycystic ovary syndrome (Stein–Leventhal syndrome)
- Postextubation in children
- Postoperative convalescence
- Premenstrual syndrome
- Prostatitis, chronic
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- Retention of urine, traumatic
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- Tietze syndrome
- Tobacco dependence
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- Ulcerative colitis, chronic
- Urolithiasis
- Vascular dementia
- Whooping cough (pertussis)

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Diseases, symptoms or conditions for which only individual controlled trials report some therapeutic effects. The World Health Organisation recommends acupuncture for these when treatment by conventional and other therapies is difficult:

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- Choroidopathy, central serous
- Colour blindness
- Deafness
- Hypophrenia
- Irritable colon syndrome
- Neuropathic bladder due to spinal cord injury
- Pulmonary heart disease, chronic
- Small airway obstruction

# Who can practice acupuncture? What are the education and licensing requirements?

- NCCAOM licensing requirements including education, supervised practice, and passing board exams, maintaining license with CEUs
- NC licensing requirements, maintaining license with CEUs

# The Science of Acupuncture

- Acupuncture is the most widely-studied complementary therapy in the scientific literature.
- Search term “acupuncture” on Pubmed yielded 39,554 results in 2022, and **43,599 results** as of January 2024, an increase of 4000 studies.
- Studies find several mechanisms by which acupuncture is effective for multiple conditions.

# Anatomy of Acupuncture Points

- Points are 5 mV higher than non-points (Becker RO)
- Lowered skin resistance (Becker RO, Chan SHH)
- Richly innervated (afferent type II fibers which produce endorphins, monoamines, cortisol releases)
- Nerves emerging from a deep to superficial location
- Cutaneous nerves emerging from deep fascia
- Nerves emerging from bone foramina
- Motor points of neuromuscular attachments
- Bifurcation points of peripheral nerves
- Dense vascular supply
- Local lymphatic flow
- Suture lines of skull

# Anatomy of Acupuncture Points

## ■ Areas of dense connective tissue

**Langevin et al. 2001.** Mechanical signaling through connective tissue: a mechanism for the therapeutic effect of acupuncture. *FASEB J.* 15(12):2275-82.

## ■ Interstitium

**Benias et al. 2018.** Structure and distribution of an unrecognized interstitium in human tissues. *Nature: Scientific Reports* 8:4947

# How does acupuncture decrease pain?

## AA Endorphin Hypothesis

Opioids: psychoactive substances that resemble morphine; can block pain

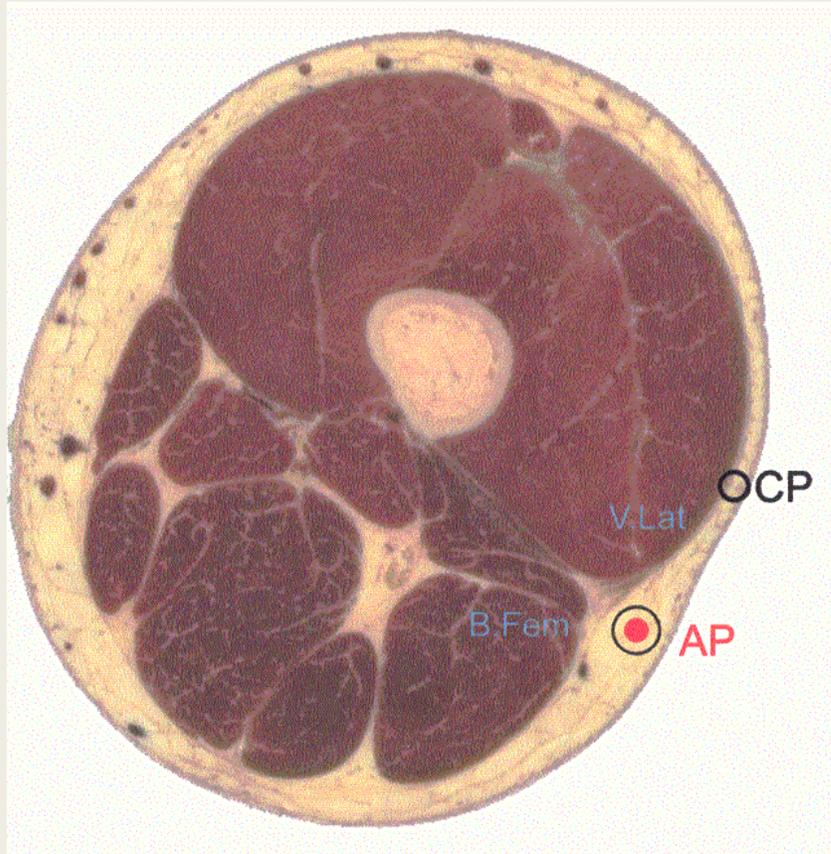
Endorphins: opioid-like substances produced by the body; provide pain relief and a sense of well-being

Naloxone: opioid antagonist

# AA Endorphin Hypothesis

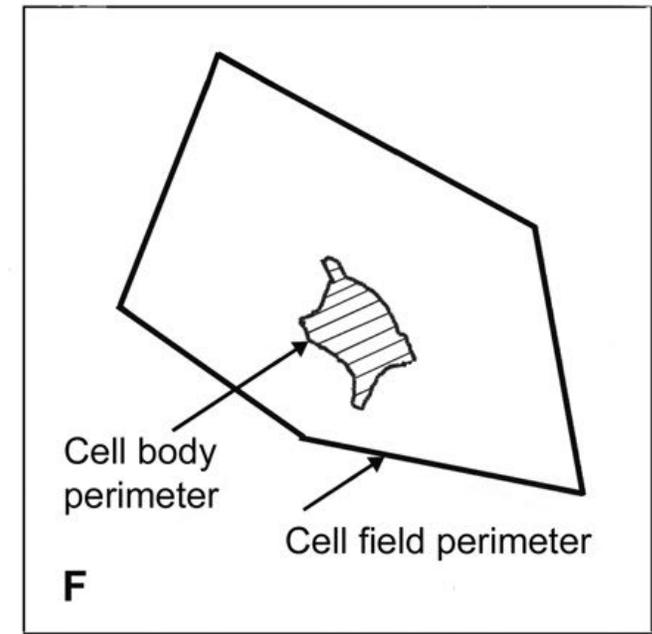
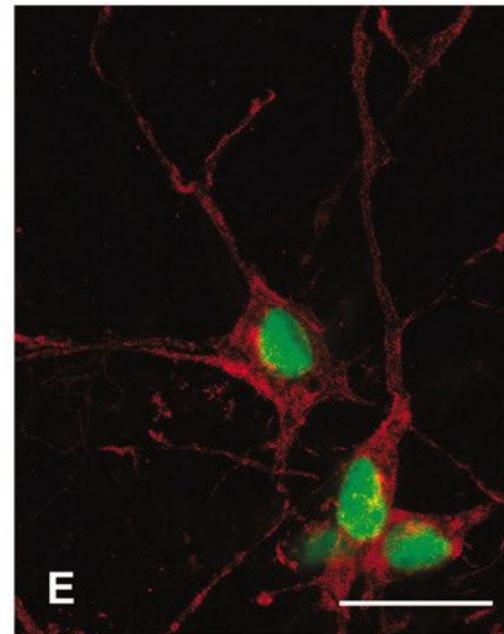
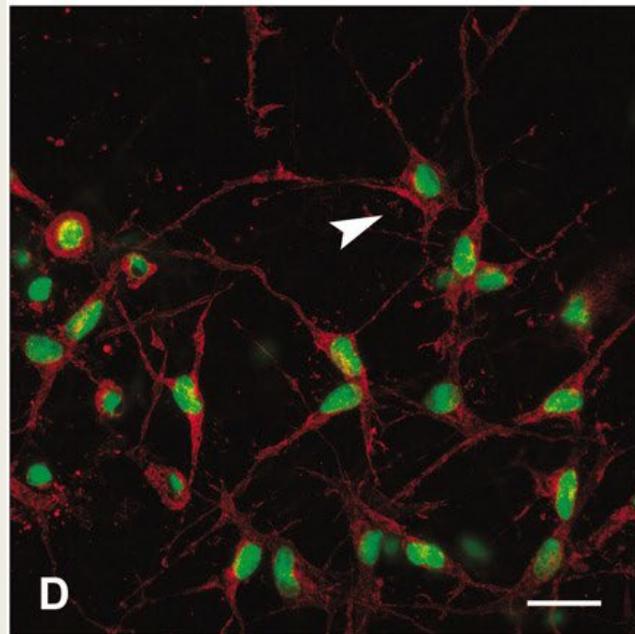
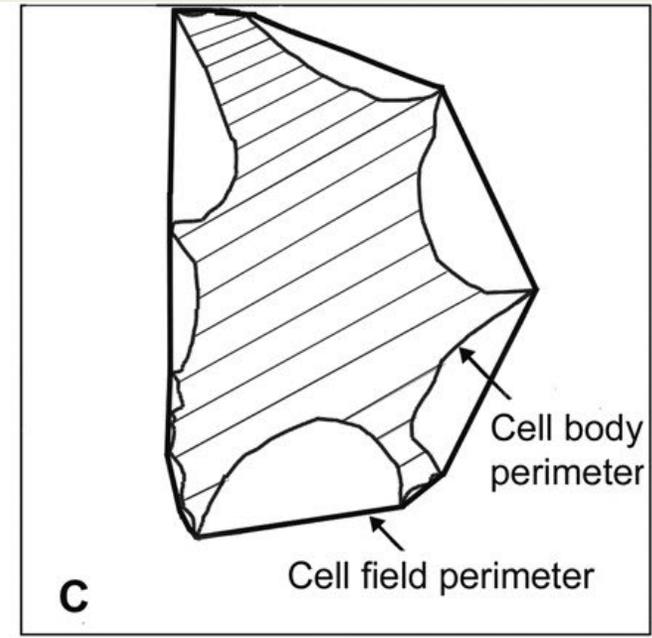
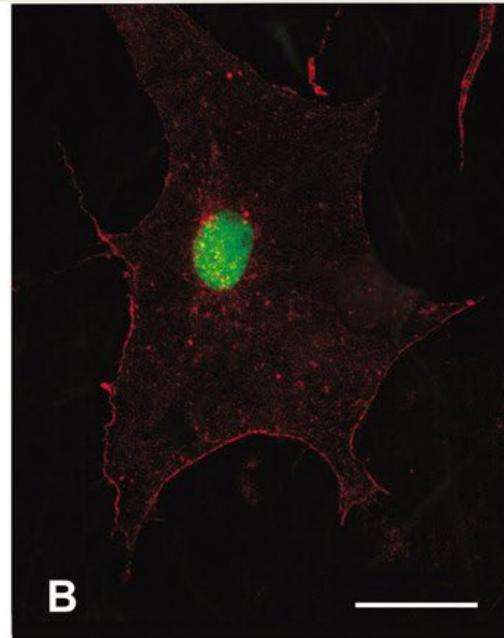
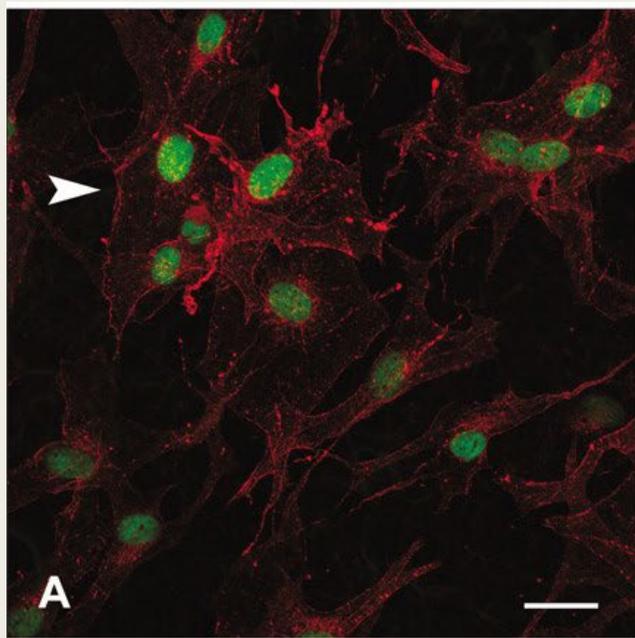
- **Acupuncture Analgesia (AA) can be antagonized by naloxone** Mayer DJ, Price DD, Raffii A 1977; Pomeranz B, Chiu D 1976
- **Many different opiate antagonists block AA** Chen XH, Han JS 1992, Cheng R, Pomeranz B 1979
- **Mice genetically deficient in opiate receptors show poor AA** Peets J, Pomeranz B 1978
- **“Acupuncture Endorphin” search on Pubmed yields 650 papers.**

# Acupuncture Points and Connective tissue



- Acupuncture point locations have 80% correspondence to denser connective tissue distribution.

Langevin HM, Yandow JA, 2002. Relationship of acupuncture points and meridians to connective tissue planes. *Anatomical Record* 269:257-265.



1. “The anatomical relationship of acupuncture points and meridians to connective tissue planes is relevant to acupuncture's mechanism of action.”

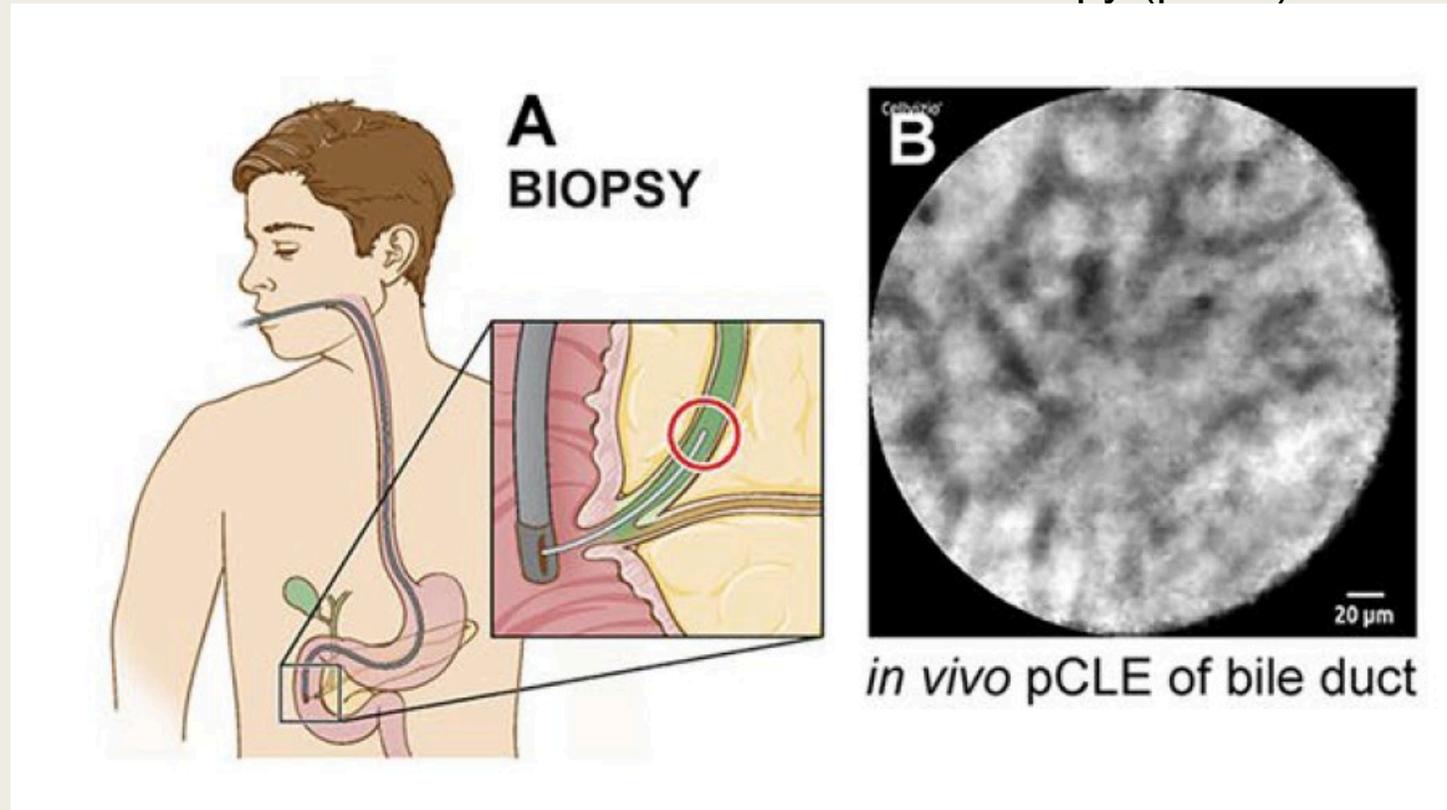
Langevin HM, Yandow JA, 2002. Relationship of acupuncture points and meridians to connective tissue planes. *Anatomical Record* 269:257-265.

2. “Needle manipulation transmits a mechanical signal to connective tissue cells...may explain local and remote, as well as long-term effects of acupuncture.”

Langevin et al. 2001. Mechanical signaling through connective tissue: a mechanism for the therapeutic effect of acupuncture. *FASEB J.* 15(12):2275-82.

# Acupuncture Meridians and the Interstitium

Probe-based Confocal Laser Endomicroscopy (pCLE)

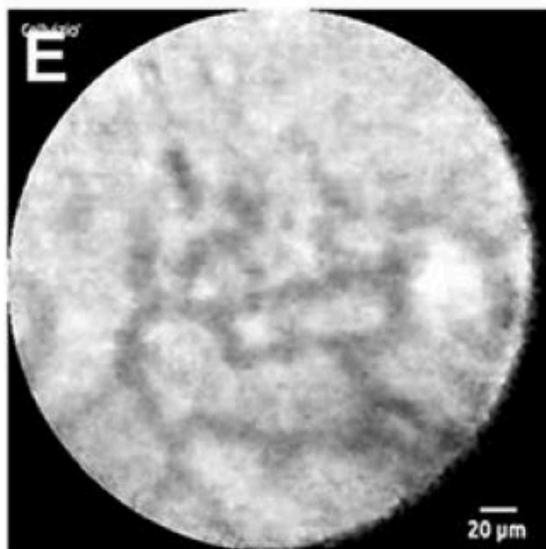


Benias *et al.* 2018. Structure and distribution of an unrecognized interstitium in human tissues.  
*Nature: Scientific Reports* 8:4947

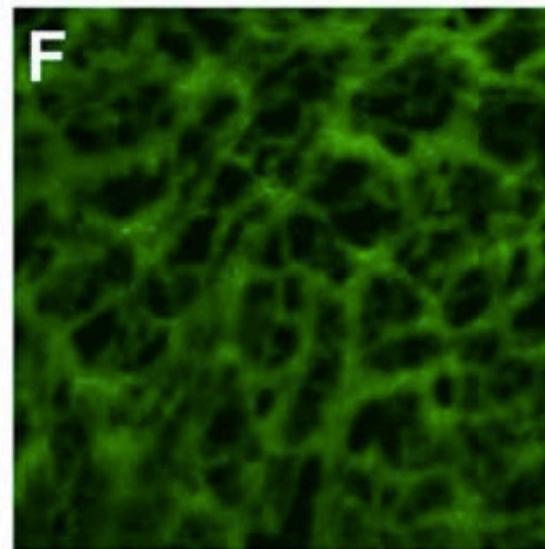
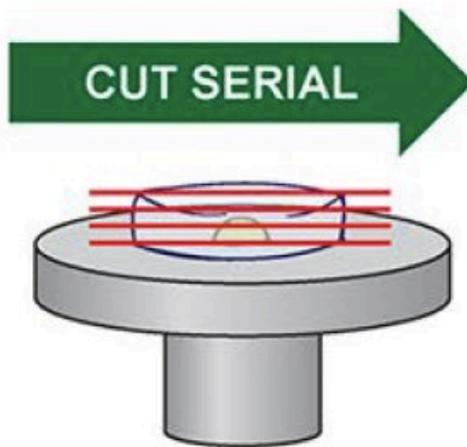
**Endoscopists**  
Petros Benias  
David Carr-Locke



**Pathologist**  
Neil Theise

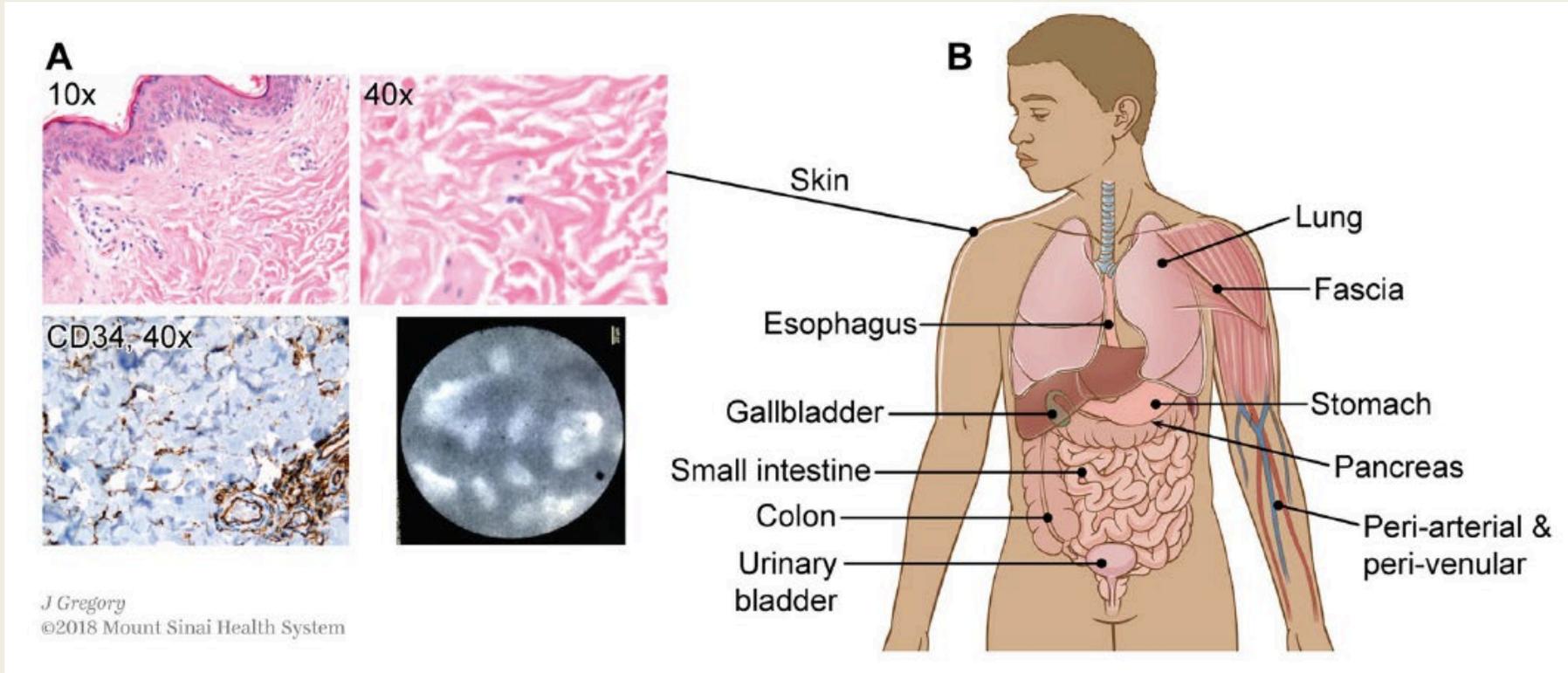


*ex vivo* pCLE



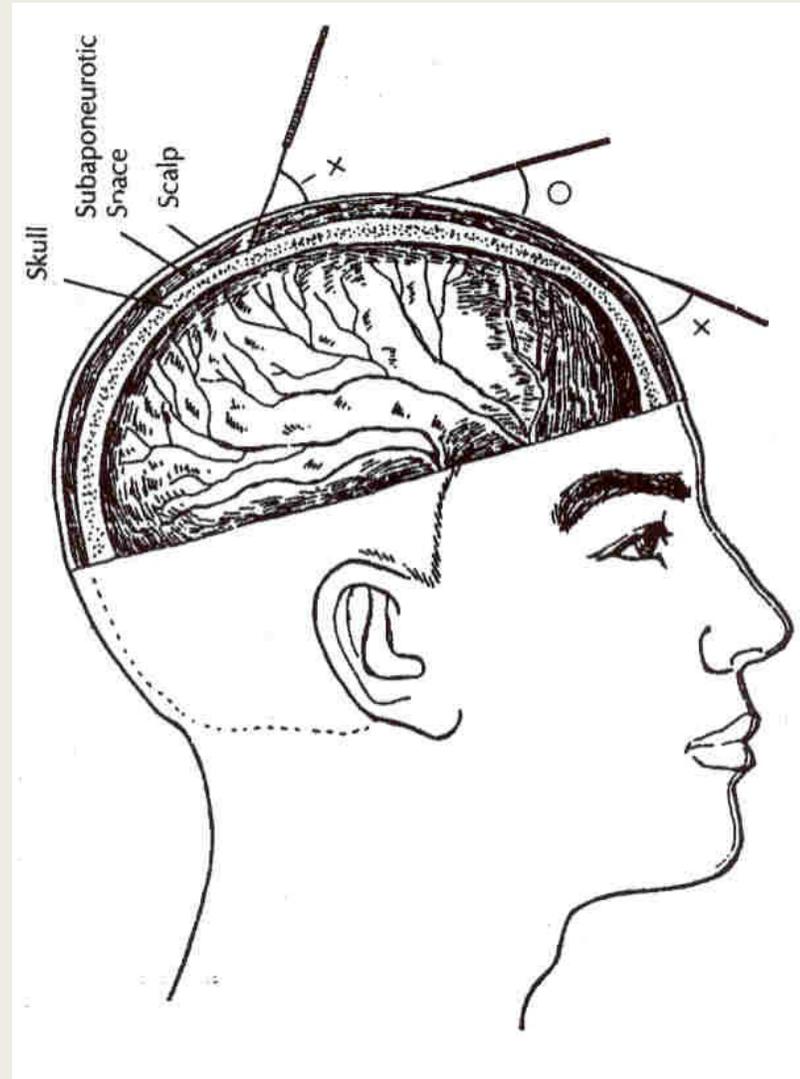
Flourescent Microscopy

Benias *et al.* 2018. Structure and distribution of an unrecognized interstitium in human tissues. *Nature: Scientific Reports* 8:4947



**Benias et al. 2018. Structure and distribution of an unrecognized interstitium in human tissues. *Nature: Scientific Reports* 8:4947**

# Acupuncture's Effects on the Brain



Wang *et al.* Effects of acupuncture on craving after tobacco cessation: a resting-state fMRI study based on the fractional amplitude of low-frequency fluctuation. *Quant Imaging Med Surg* 2019;9(6):1118-1125

**Objective:**

Use fMRI to visualize brain areas stimulated by acupuncture treatments for smoking cessation.

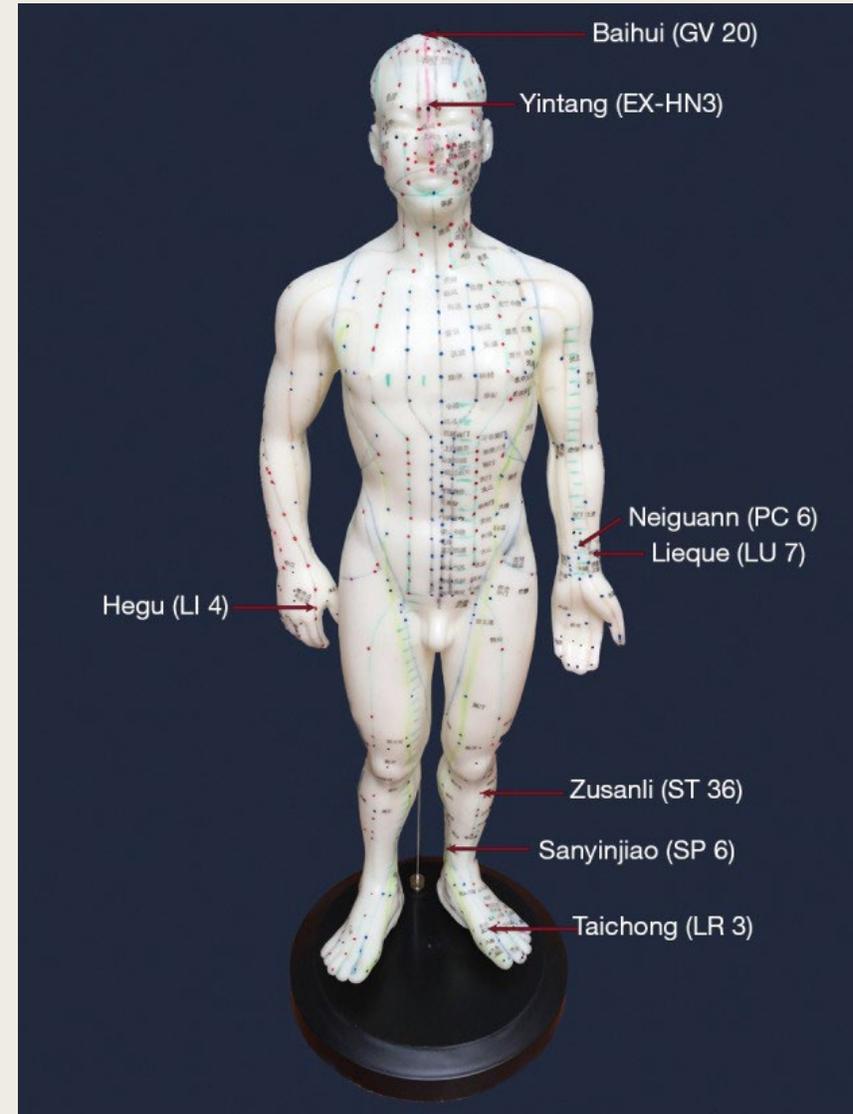
**Methods:**

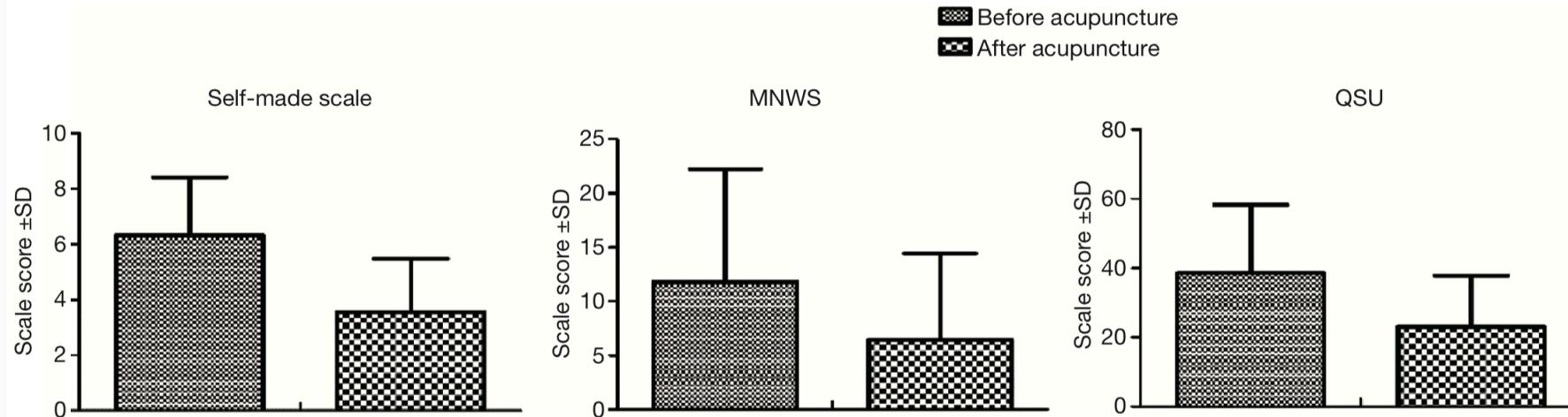
20 non-smokers

20 smokers: Quit smoking 24h before study day/time

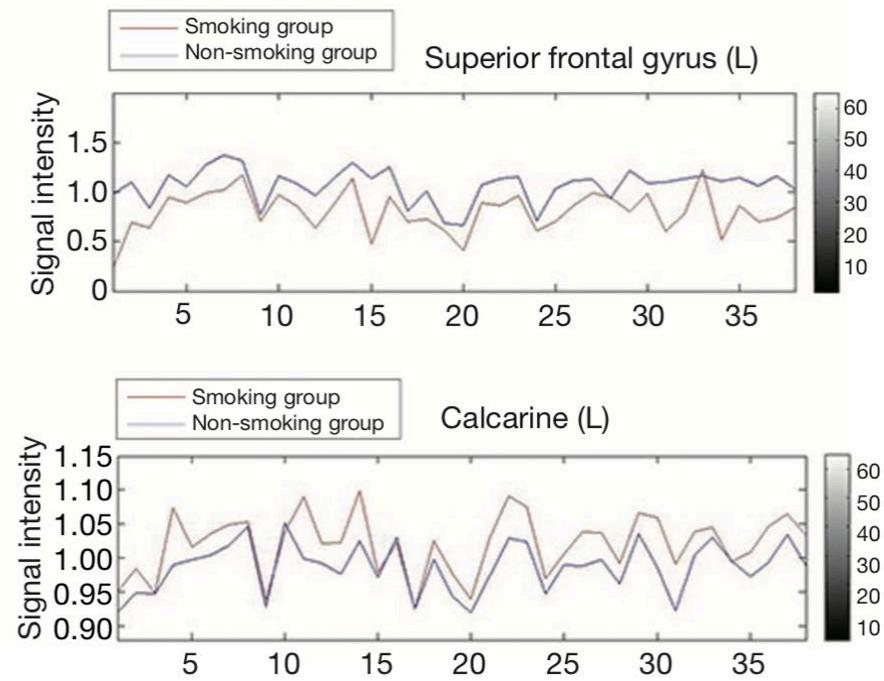
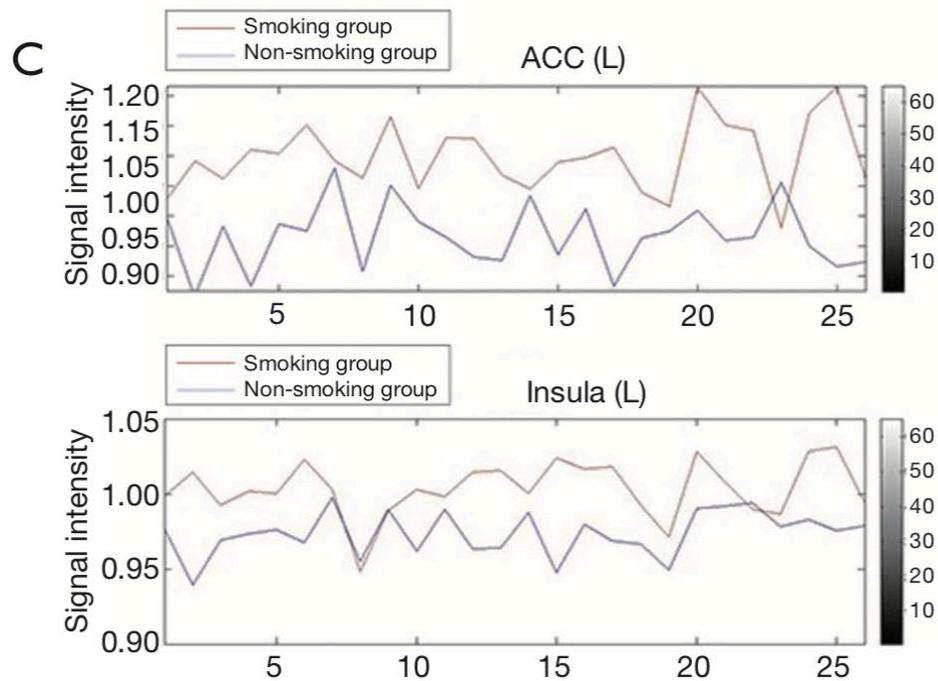
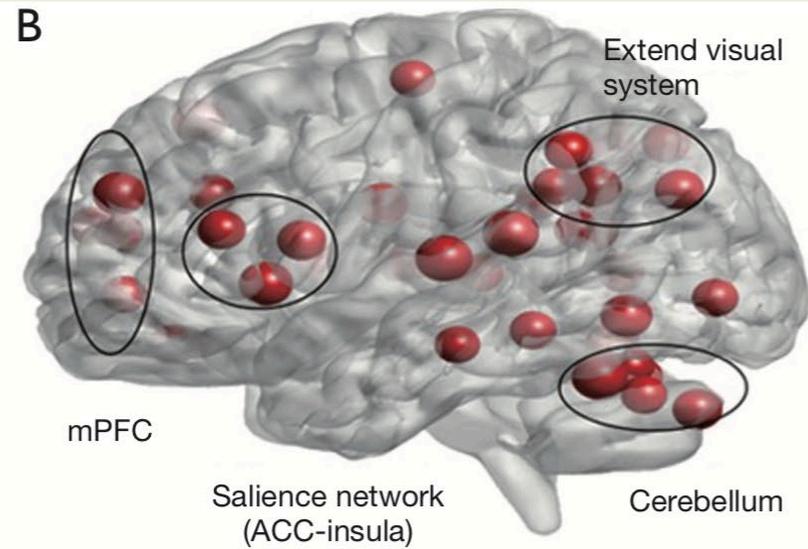
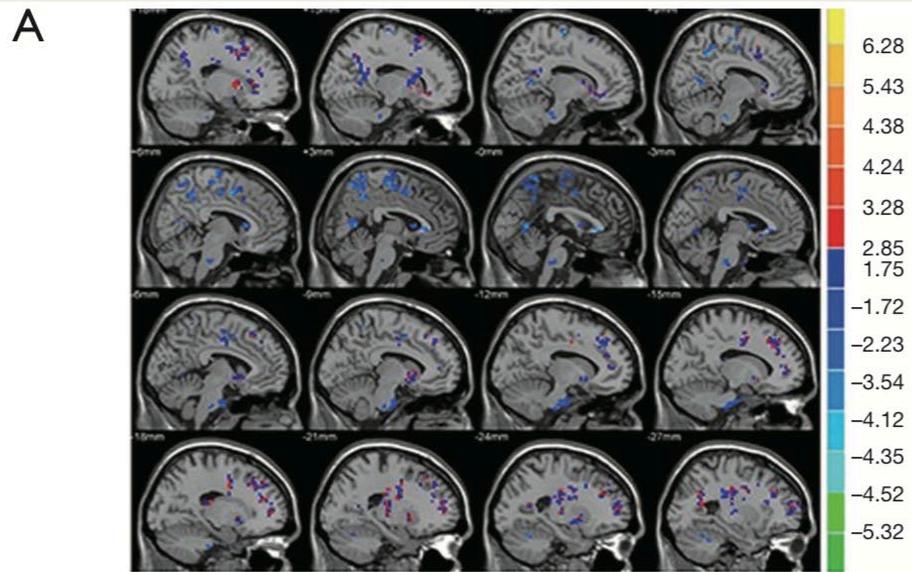
Scan – Acupuncture – Scan

3 different nicotine craving scales





**Figure 1** Three types of scales for craving before and after acupuncture. MNWS, Minnesota Nicotine Withdrawal Scale; QSU, Questionnaire of Smoking Urges.

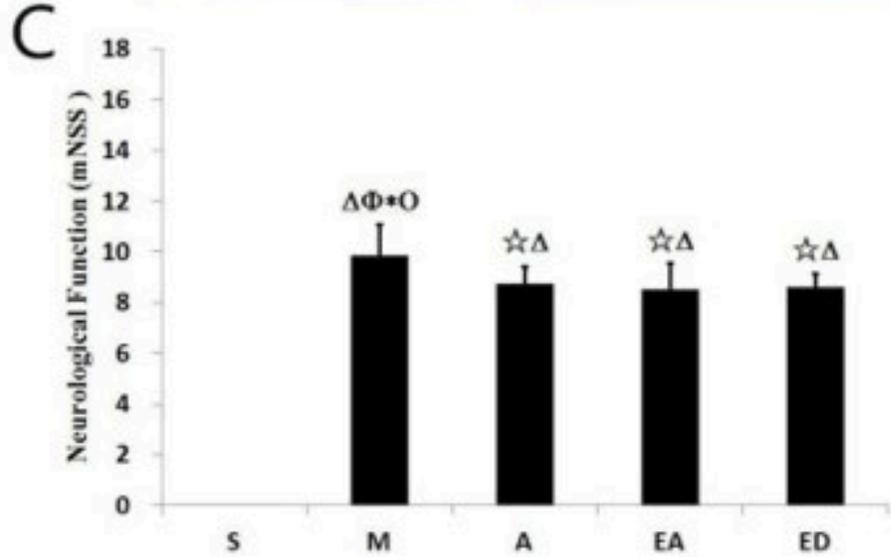
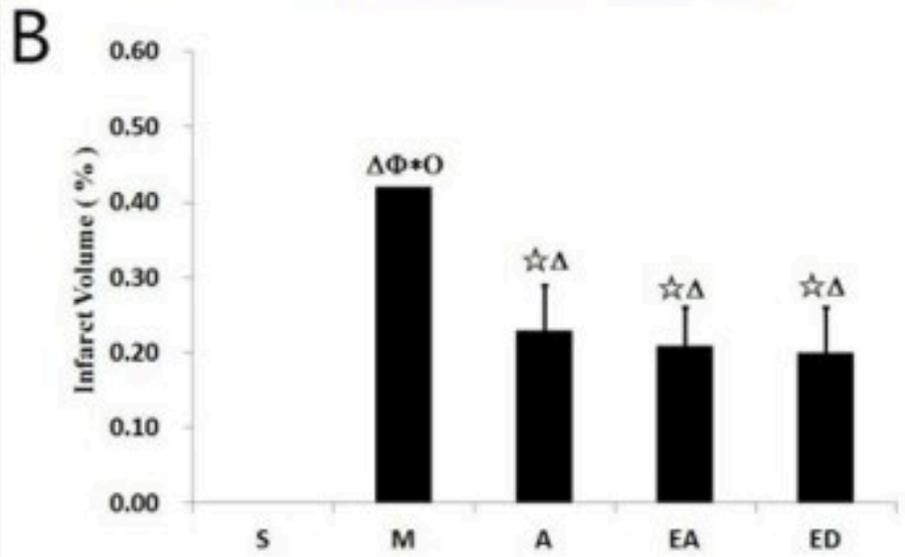
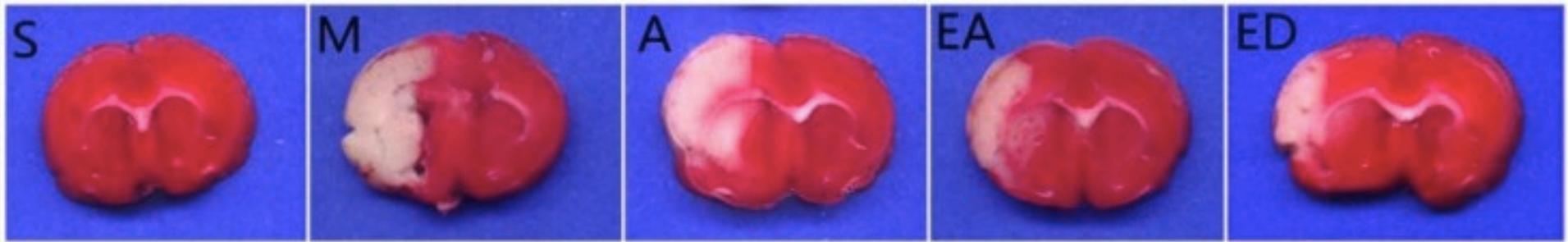


# Acupuncture and Neuro-inflammation

Xu *et al.*, 2014

- Rat model ischemic stroke
- Sham, Control, Acupuncture, EA, Edaravone
- 24h after stroke event, assessed:
  - *Neurological function*
  - *Infarct volume*
  - *Neuro-protein expression*
  - *Inflammatory cell infiltration*

Xu *et al.* Effects of Acupuncture at GV20 and ST36 on the Expression of Matrix Metalloproteinase 2, Aquaporin 4, and Aquaporin 9 in Rats Subjected to Cerebral Ischemia/Reperfusion Injury. PLoS One. 2014; 9(5): e97488.



**Evaluation of infarct volume and neurological scores in CIRI model rats.**

Xu *et al.* Effects of Acupuncture at GV20 and ST36 on the Expression of Matrix Metalloproteinase 2, Aquaporin 4, and Aquaporin 9 in Rats Subjected to Cerebral Ischemia/Reperfusion Injury. PLoS One. 2014; 9(5): e97488.

# Irritable Bowel Syndrome

- **WM:** Characterized as a “functional disorder” --cannot be diagnosed via traditional lab tests, x-rays, etc.
- Treatment: food restrictions, medications e.g. laxatives, anti-diarrheals, anti-spasmodics, antidepressants.
  
- **OM:** Disharmony in Liver and Spleen energies (frequently weakened digestion due to stress).
- Treatment: acupuncture and herbs that strengthen digestion, decrease stress response.

## Recent Research:

Zhu et al., *Evid Based Complement Alternat Med*, 2018:

Acupuncture may improve diarrhea-predominant irritable bowel syndrome better than drugs and has the fewest side effects.

Zheng et al., *Medicine*, 2016:

Electroacupuncture is equivalent to loperamide for reducing stool frequency in IBS patients.

MacPherson, et al., *BMC Gastroenterol*, 2012:

Acupuncture for IBS provided an additional benefit over usual care alone. The magnitude of the effect was sustained over the longer term.

Rated by patients and gastroenterologists:

Both standardized and individualized Chinese herbal formulas helped improve subjects' IBS signs and symptoms, as compared to placebo group ( $P \leq 0.03$ )

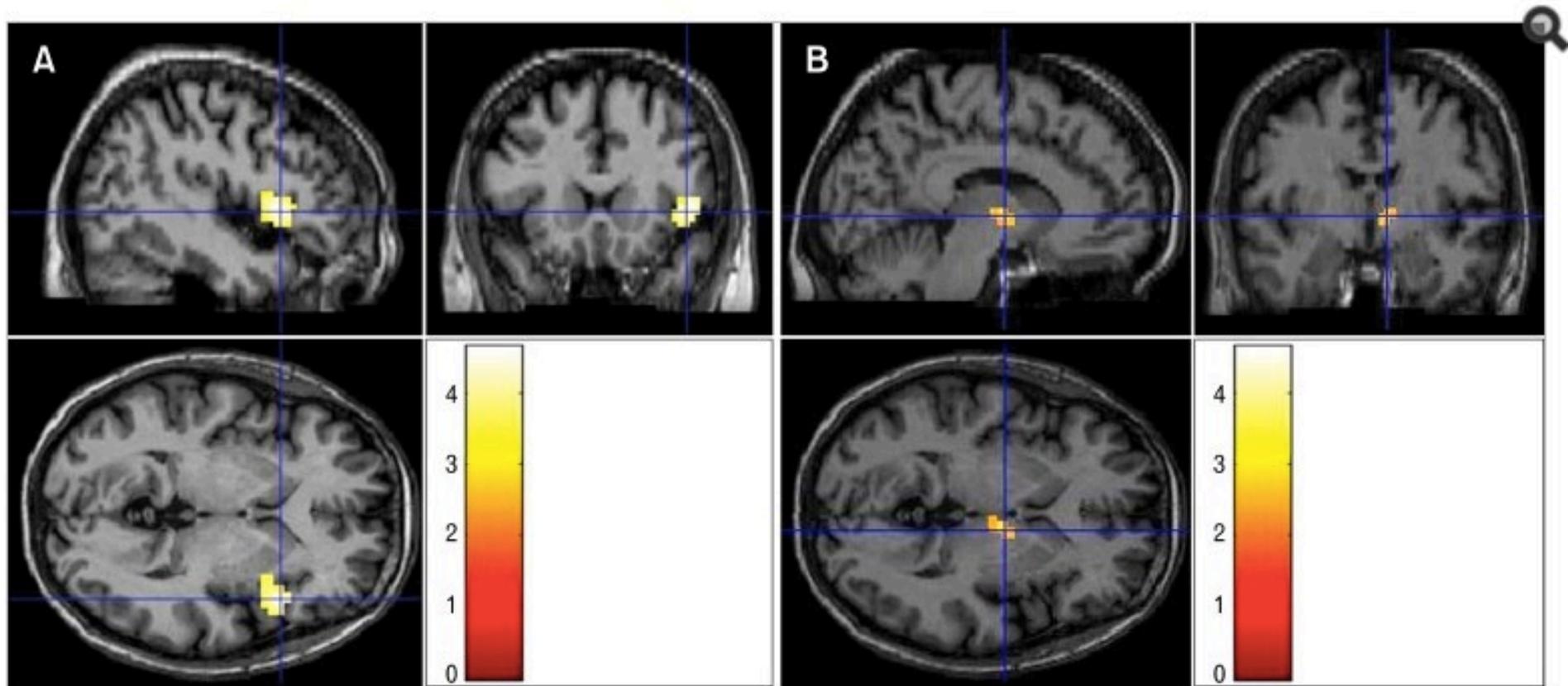
Only those taking individualized herbal formulas had sustained improvement at 14-week followup evaluation.

**Bensoussan A *et al.*, Treatment of irritable bowel syndrome with Chinese herbal medicine: a randomized controlled trial. JAMA. 1998 Nov 11;280(18):1585-9.**

Chu *et al.* Does Acupuncture Therapy Alter Activation of Neural Pathway for Pain Perception in Irritable Bowel Syndrome?: A Comparative Study of True and Sham Acupuncture Using Functional Magnetic Resonance Imaging. *J Neurogastroenterol Motil* 2012 July 18(3):305-316

30 IBS diarrhea patients were randomized to receive electroacupuncture (EA) or sham acupuncture (SA), while having rectal distension (pain stimulation). fMRI was performed at several timepoints during acupuncture treatment and rectal distension.

Figure 3



Significant correlation ( $P < 0.005$ ) between subjective rectal pain rating and brain activation was observed in hypothalamus (z-score, 3.455), bilateral thalami (z-score, 3.207 and 2.912) and bilateral insula (z-score, 2.820 and 3.030).

## Conclusions:

We postulate that acupuncture might have the potential effect of pain modulation in IBS by 2 actions:

(1) modulation of serotonin pathway at insula and

(2) modulation of mood and affection in higher cortical center via ascending pathway at the pulvinar and medial nucleus of the thalamus.

# Acupuncture in Sports Medicine

- Athletes participating in most sports have shown positive outcomes from acupuncture interventions.
- Acupuncture improves peak oxygen levels, maximum heart rate, delayed-onset muscle soreness, pain, swelling, explosive force production, and joint mobility. Furthermore, the efficacy of acupuncture appears to be similar regardless of age and sex.
- Pujalte GGA, Malone M, Mandavalli A, Phrathep DD, Shah NP, Perlman AI. Acupuncture in Sports Medicine. J Acupunct Meridian Stud. 2023 Dec 31;16(6):239-247. doi: 10.51507/j.jams.2023.16.6.239. PMID: 38115589.

# Acupuncture improves perioperative outcomes

- Acupuncture has been used in the Far East for more than 2000 years. Since the early 1970s, this technique has been gaining popularity among Western medical community. A number of studies suggest that its mechanism of effect can be explained in biomedical terms. In this context, a number of transmitters and modulators including beta-endorphin, serotonin, substance P, interleukins, and calcitonin gene-related peptide are released. For that reason, acupuncture can be used in a wide variety of clinical conditions. Studies showed that acupuncture may have beneficial effect in perioperative period. It relieves preoperative anxiety, decreases postoperative analgesic requirements, and decreases the incidence of postoperative nausea and vomiting. In this review article, we examine perioperative use of acupuncture for a variety of conditions.
- Acar HV. Acupuncture and related techniques during perioperative period: A literature review. *Complement Ther Med*. 2016 Dec;29:48-55. doi: 10.1016/j.ctim.2016.09.013. Epub 2016 Sep 13. PMID: 27912957.

# Is Acupuncture Safe?

A Systematic Review of Case Reports. Lao L, et al.  
Altern Ther Health Med 2003;9(1):72-83

- 35 years, 1965-1999, 98 papers, 22 countries
- 202 serious adverse events, 7 deaths
- 94 cases of hepatitis prior to 1988, none since improvement due to clean needle procedure
- Pneumothorax, 2nd most common complication
- Spinal cord injury rare from okibari technique
- Cardiac tamponade rare, but cause of 2 deaths

# What we know about Acupuncture

- **Acupuncture shows efficacy in some diseases**
- **Acupuncture can save money**
- **Acupuncture has very few side effects**
- **Acupuncture is at least as effective as WM for certain conditions**
- **Acupuncture can increase quality of life**

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## Who can practice acupuncture?

NCCAOM is the national licensing organization. Requirements for licensure are as following

Minimum 4-Year Master degree, 2625 Hours/ 146 Credits		
	Subject	Hours Required
<b>Oriental Medicine Program</b>	Oriental Medicine/Acupuncture Theory	705 Hrs. / 47 credits
	Didactic Oriental Herbal Studies	450 Hrs. / 30 credits
	*Acupuncture /Chinese Herbology Clinic	870 Hrs. / 29 credits
	Biomedicine	510 Hrs. / 34 credits
	Counseling, Communications, Ethics, Practice Management	90 Hrs. / 6 credits
Minimum 3-Year Master degree, 1905 Hours/ 105 Credits		
<b>Acupuncture Program</b>	Oriental Medicine/Acupuncture Theory	705 Hrs. / 47 credits
	Acupuncture Clinic	660 Hrs. / 22 credits
	Biomedicine	450 Hrs. / 30 credits
	Counseling, Communications, Ethics, Practice Management	90 Hrs. / 6 credits
<b>Chinese Herbology Program</b>	*ACAHM Guideline: Chinese herbal certificate training program for Master of Acupuncture students and practitioners will be a minimum of 450 hours of didactic instruction in herbs and 210 hours of herbal clinical training.	

NCALB is the licensing organization for North Carolina

Below is a link to the legal requirements outlined by the NCALB to practice acupuncture in the state of NC;

<https://www.ncalb.com/wp-content/uploads/2018/11/Inset-for-Home-Page-link-View-Requirements-for-Licensure.pdf?x56695>

## What is the science behind acupuncture?

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- Search term “acupuncture” on Pubmed yielded 39,554 results in 2022, and **43,599 results** as of January 2024, an increase of 4000 studies.
- Studies find several mechanisms by which acupuncture is effective for multiple conditions. Review attached power point for details on studies regarding acupuncture.

## What we know about Acupuncture

- Acupuncture shows efficacy in some diseases
- Acupuncture can save money, decreasing need for more expensive procedures or by reducing the number of procedures needed
- Acupuncture has very few side effects
- Acupuncture is at least as effective as WM for certain conditions
- Acupuncture can increase quality of life