



Acupuncture in Back Pain Management

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Objective

- Review the roots of acupuncture theory and basic Traditional Chinese Medicine (TCM) concepts.
- Outline basic science concepts in acupuncture analgesia and its physiological mechanism of action.
- Perform a review of the current literature on acupuncture efficacy in the treatment of chronic low back pain.



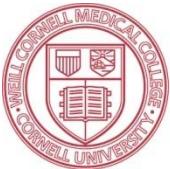
Introduction

- **Acupuncture is a widely practiced therapeutic intervention in the United States and has grown in popularity.**
- **In 2002 , estimated 8.2 million Americans had experienced acupuncture at least once in their lifetime, and an estimated 2.1 million had done so in the previous year alone.**



Introduction

- Acupuncture has been the subject of active research both in regard to its basis and therapeutic effectiveness since the late 20th century
- It has remained controversial among medical clinicians.
- While there have been many studies of its potential usefulness, many of these studies provide equivocal results because of limited design, sample size, and other factors.



Introduction

- The issue is further complicated by inherent difficulties in the use of appropriate controls in acupuncture research.

Such as using sham acupuncture groups as placebos.



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Conditions for treatment

- **Post operative pain**
- **Chemotherapy induced nausea and vomiting**
- **Low back pain**
- **Osteoarthritis**
- **Neck pain**
- **Myofascial pain**
- **Migraines headache**
- **Tendonitis**
- **Strains and sprains**
- **Neuropathy**
- **Carpal tunnel syndrome**



**There is general agreement that acupuncture is safe when administered by trained practitioners using single use sterile needles.
(WHO,AMA, NIH)**

Most common negative effects are local pain, bleeding, hematoma, dizziness, hypotension, very rarely pneumothorax <1%.



What is acupuncture?

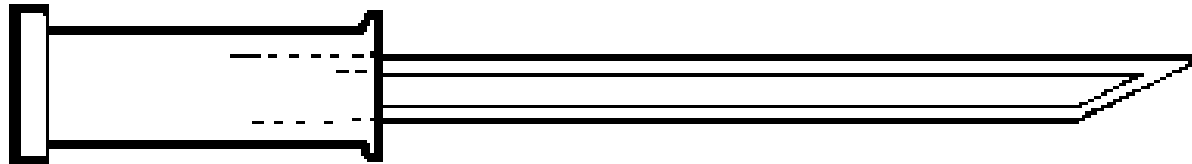
It is the procedure of inserting and manipulating needles into various points on the body to relieve pain or for a therapeutic purpose.



Comparison between acupuncture needle and beveled hypodermic needle

DIAGRAM OF ACUPUNCTURE NEEDLE HAIR & HYPODERMIC NEEDLE

HYPODERMIC NEEDLE



HUMAN HAIR



ACUPUNCTURE NEEDLE



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needle insertion, manual stimulation



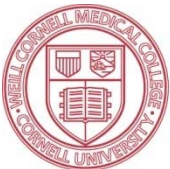
Twirling to obtain “needle grasp” and “De Qi”= feeling of heaviness, fullness, or numbness



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history

- **Acupuncture originated in China more than 2000 years ago, earliest written record of acupuncture *Yellow Emperor's Inner Canon*, dated 2nd century BC.**
- **One of the oldest most commonly used medical procedure in the world.**
- **Different variations of acupuncture are practiced throughout the world, the most widely practiced American form originates from China .**



Basic theories in TCM

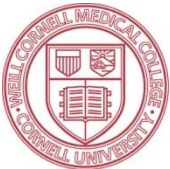
Acupuncture is a branch of Chinese Medicine. Believing that health is maintained by a balance of two opposing forces:

- Ying and Yang
- the human body with external environmental



In chinese physiological concepts

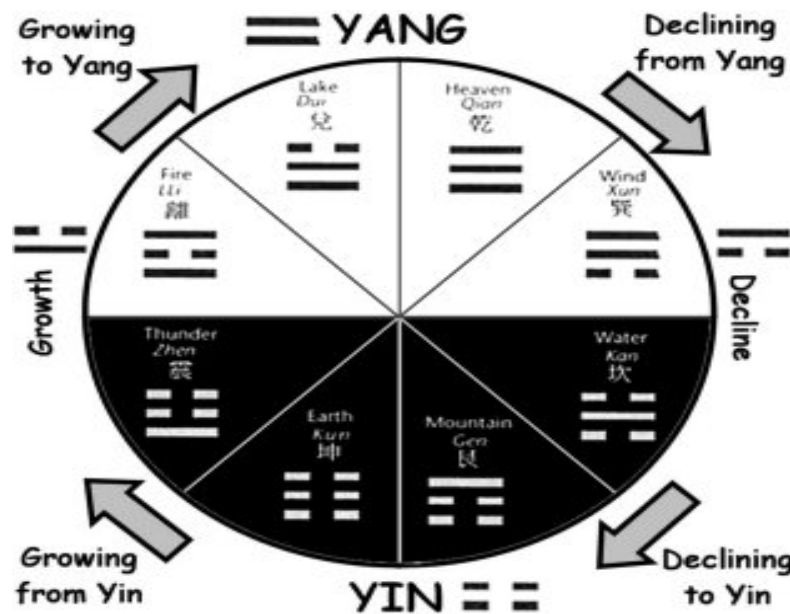
- Tissue and organs are connected through a network of ***meridian channels*** inside and outside the human body.
- “***Qi***“ acts as a carrier of energy that is expressed externally through meridian channel system.



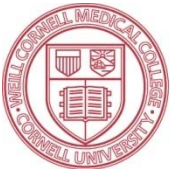


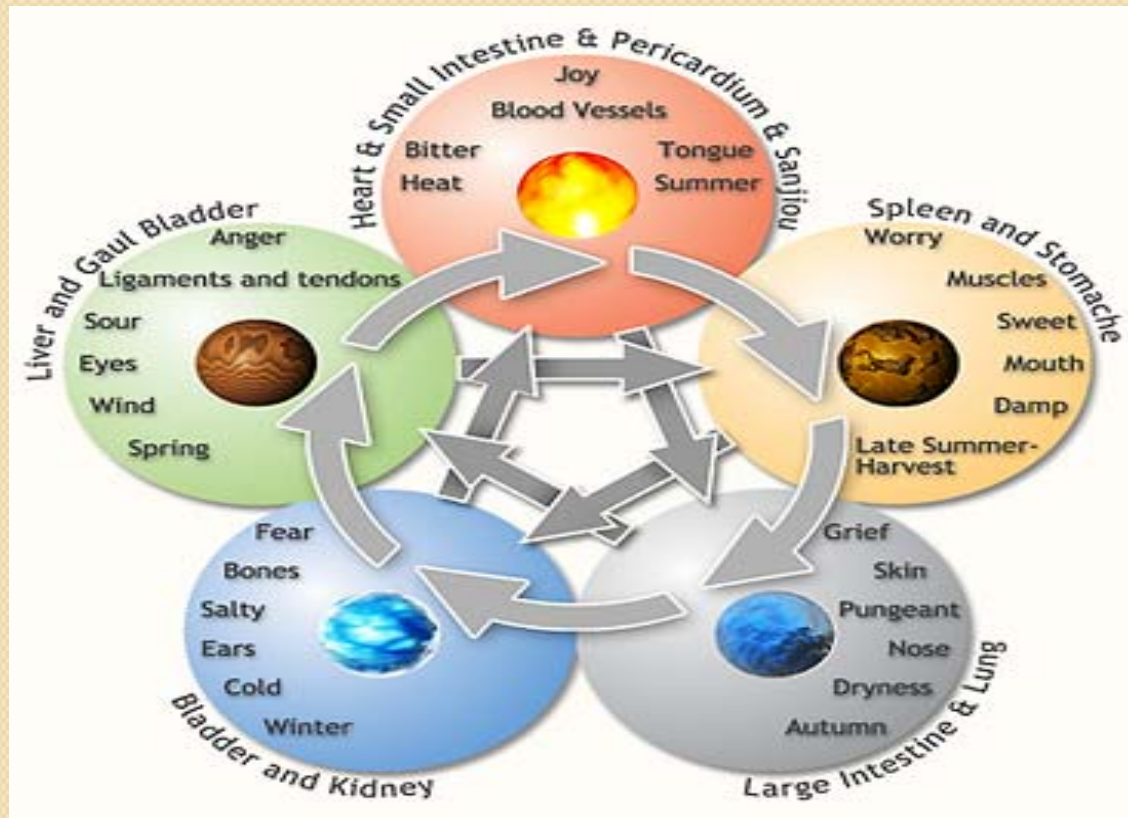
- Imbalance leads to blockage in the flow of the body's vital energy, "Qi", along the meridian pathway.
- Pathology, is a blockage of energy through the surface channel networks, manifesting as symptoms or medical condition.





✘ The clinical diagnosis and treatment are mainly based on the correctly identifying the imbalances between yin-yang, five elements, and organ dysfunction controlled by the meridian channel.



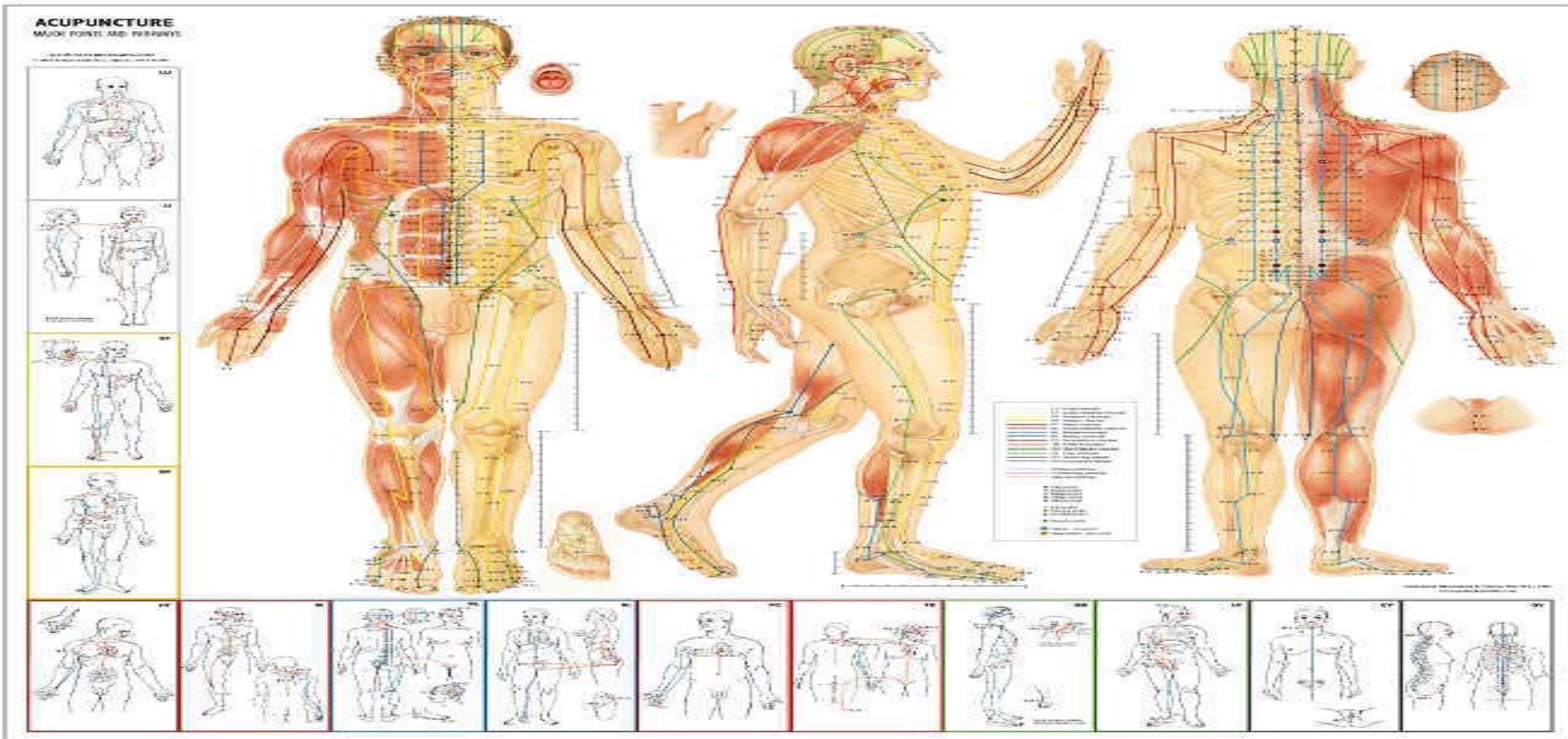


Acupuncture utilizes all these interrelationships in guiding point selection. Medical acupuncture also incorporates a neuro anatomical approach in point selection.

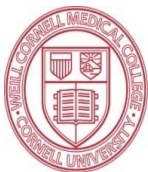


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Acupuncture points along meridian channels



✘ There are *12 principal meridian channels* and *8 accessory meridians*.



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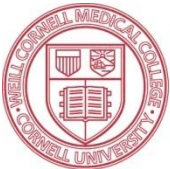
Scientific bases for acupuncture analgesia

- 1970s, studied the mechanism for pain relief in acupuncture by using **Naloxone** as pharmacological tool in research.
- Naloxone, an opioid receptor antagonist, used to correlate pain receptor activation causing perceived pain relief animals and humans.



Pomerantz and Chu, 1976

- First published administration of Naloxone, completely blocked the pain relieving effects from acupuncture induced analgesia in mice
- **Animals given acupuncture + Naloxone demonstrated pain behavior, no different than the control group. Whereas those receiving acupuncture were comfortable.**



Demonstrating Naloxone blockade in humans

Mayer et al., 1977 studied induced tooth pain in humans.

Double blind study, where all were administered acupuncture with either intravenous Naloxone or saline.

Those administered Naloxone showed no signs of pain relief from acupuncture compared to the saline group.

- Mayer et al. and Pomerantz et al. were the earliest researchers to show **acupuncture induced analgesia can be blocked by Naloxone suggesting the participation of endogenous opioids in pain relief.**



Electroacupuncture and endorphins

- Han et al. in 1987
- Measured neuropeptide release in the central nervous system triggered by EA at different frequencies.
- Rats were given EA at 2, 15, 100Hz, using radiant heat as noxious stimuli.
- Cerebral spinal fluid was collected in 30min intervals before or during the EA stimulation.



- Frequency of EA

2hz

15hz

100hz

Endomorphine,
Enkephalin,
 β -endorphin

Dynorphin

μ

δ

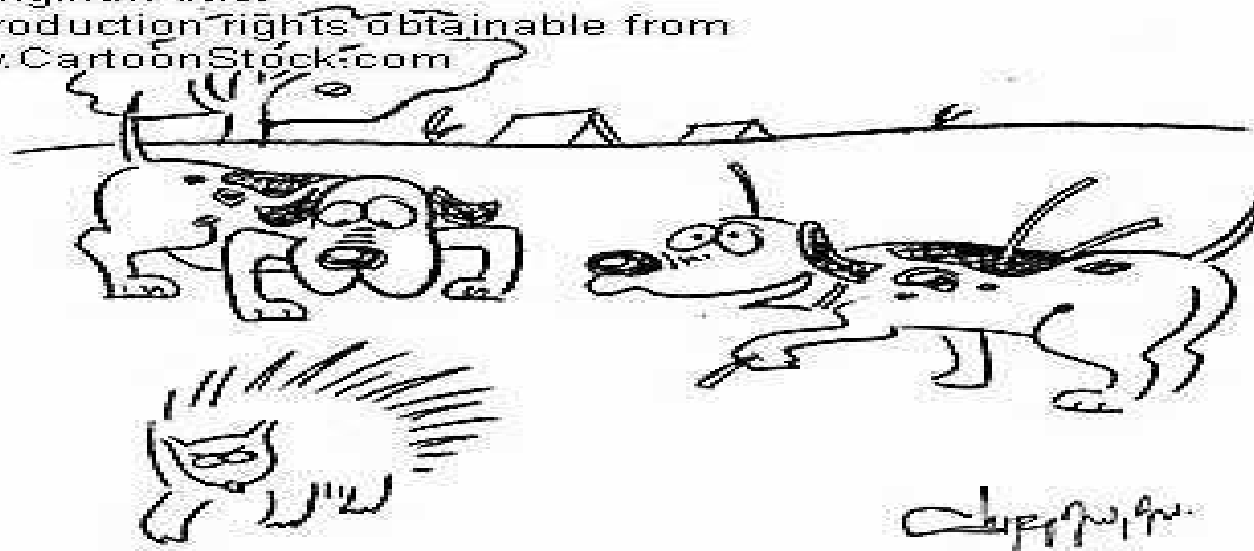
Opioid receptors

K

Antinociception physiological therapeutic effects

- **Endogenous opioid peptide release in the central nervous system play an essential role in mediating the analgesic effect of acupuncture.**

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"Hey! my lower back pain! It's gone!"



Pain pathway

pomerantz et al. 2003

activate type II and
type III muscle
sensory nerves



spinal cord
anterolateral tracts
dorsal lateral tract

enkaphalin, dynorphins

serotonin, norepinephrine

endorphin

Midbrain
Periaqueductal
gray

Pituitary-
Hypothalamus

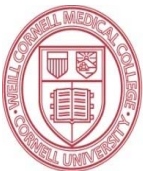
Arcuate
nucleus

adrenocorticotrophic hormone

ACTH

Adrenal cortex

cortisol



Acupuncture, tissue perfusion

Jansen et al., 1989

- Studied effects of electroacupuncture (EA) on circulation in muscle flaps in rodents.
- Examined skin blood flow using doppler flowmetry in muscle flaps before and after EA.
- Findings: **acupuncture increased blood flow** moving into the muscle flap by 66% comparison to no treatment.



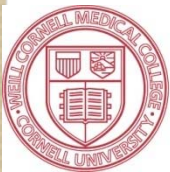
Acupuncture and circulatory effects

- Sandberg et al. 2003
- Examined the effects of acupuncture needle stimulation on skin and muscle blood flow in women .

Laser Doppler was used to observe tissue perfusion during needle insertion into:

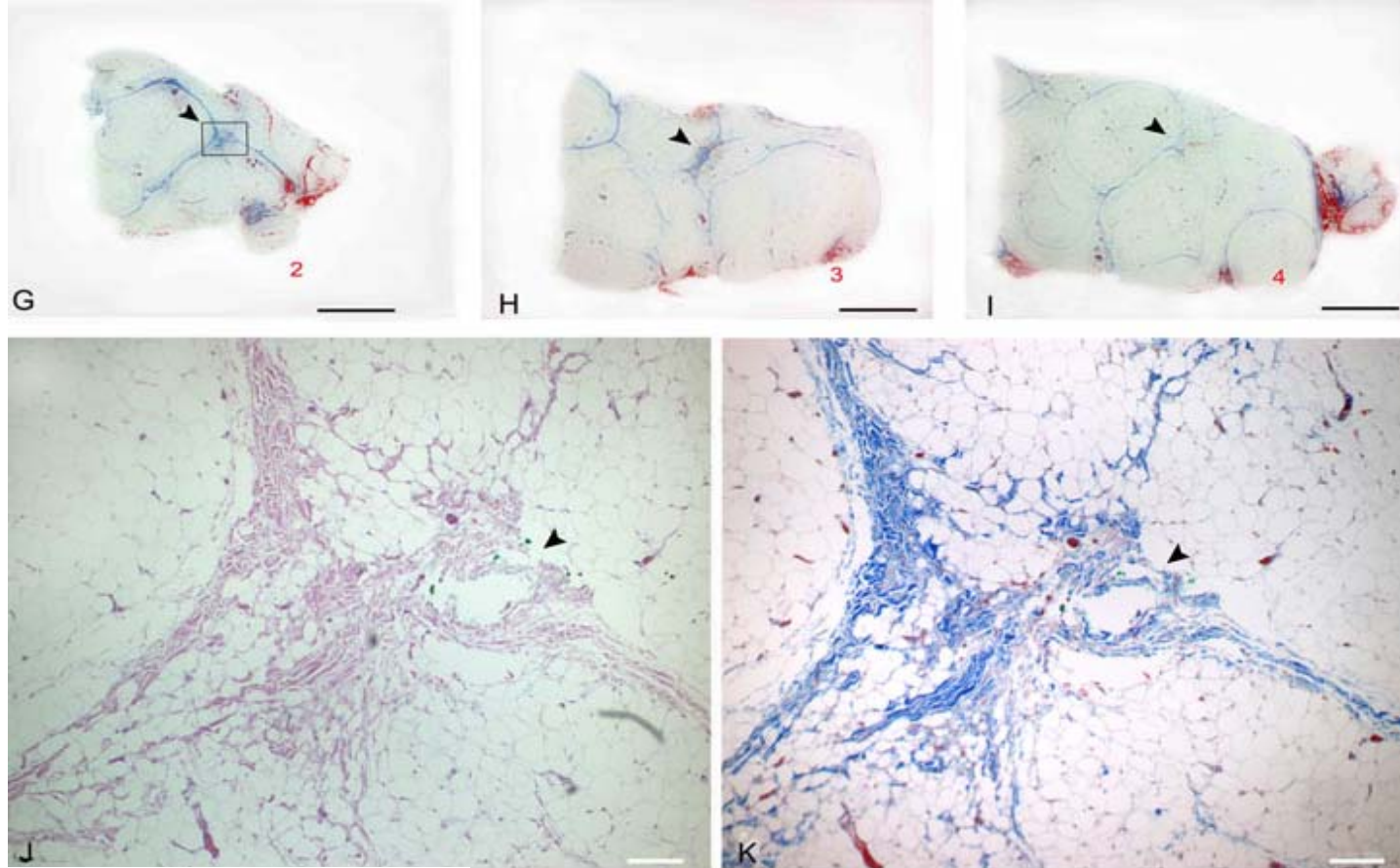
- superficially into fascia only
- muscle only
- muscle with needle manipulation

Increased blood flow to both skin and muscle was observed in both intramuscular insertion groups compared the control period were no needle was present.



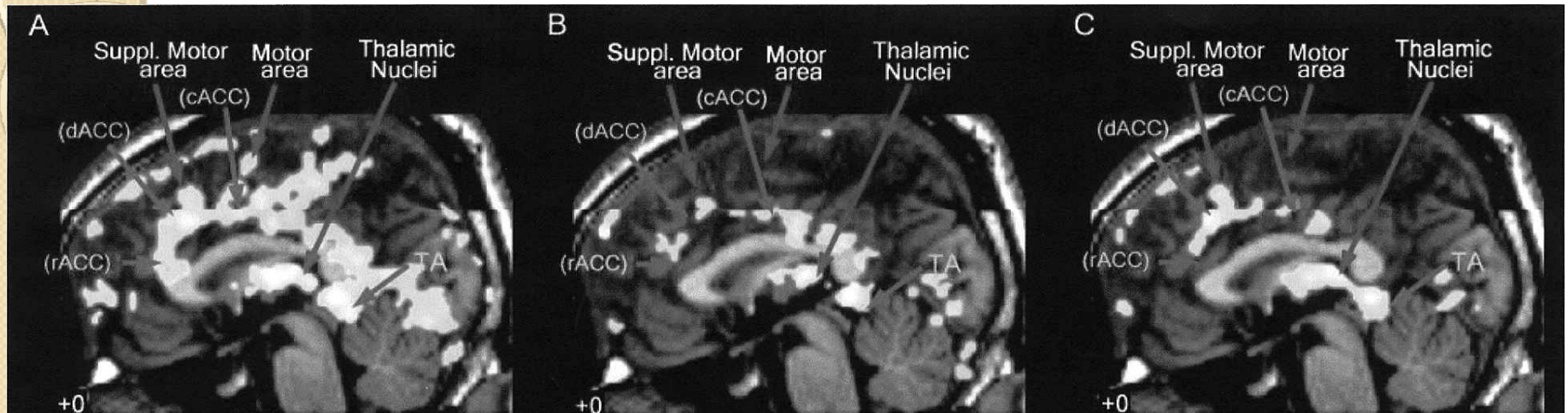
Dynamic characterization of local connective tissue winding

- Langevin et al. 2007



acupuncture

Cho et al. 2002



Comparison of cortical activation in three settings, a result of:

A - pain alone → increased activity

B- meridian acupuncture with pain → decreased activity

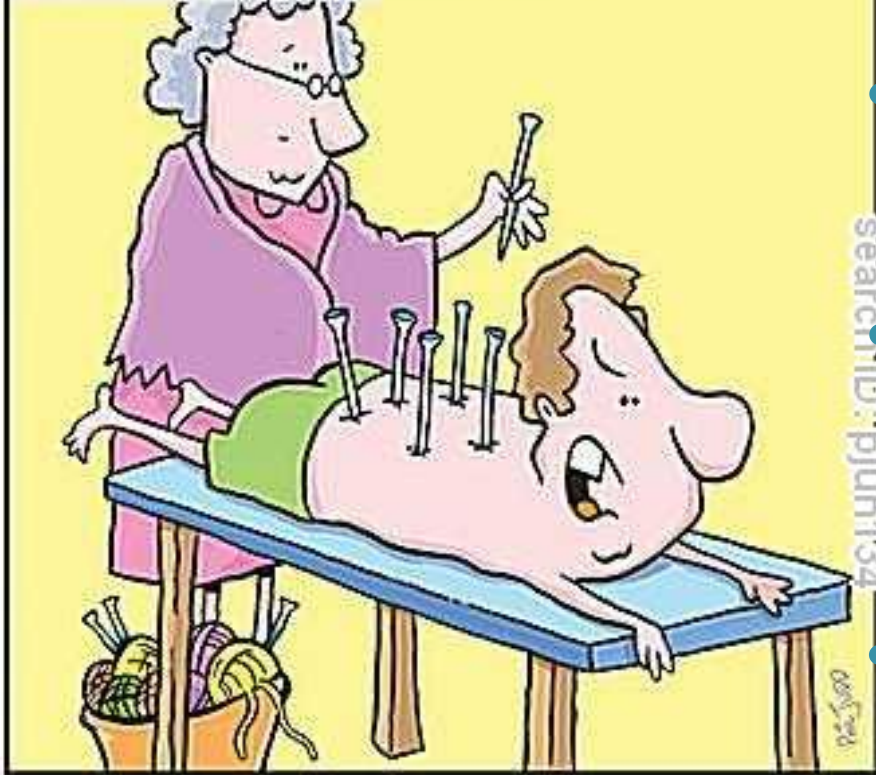
C- sham acupuncture and pain respectively → decreased activity



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"Exactly which school of
acupuncture are you from?"

- Acupuncture is increasingly used as a therapy for chronic pain conditions,
- Cochrane review 2003 could only conclude that acupuncture may be useful as an adjunct to other therapies.
- Many chronic LBP patients use complementary alternative medicine.
- Most common reason for visits for acupuncture



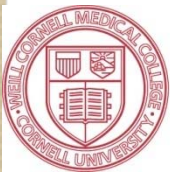
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Chronic low back pain and acupuncture

- × Witt et al 2006, American Journal of Epidemiology
- × Starting in 2000, began a large research initiative on acupuncture that was funded by the German government
- × Produced large randomized controlled trial (+nonrandomized) cohort
- × chronic LBP > 6months
- × **N= 11,630 patients**
- × **Randomized into acupuncture versus no acupuncture**



- ✘ Each patient received up to 15 acupuncture sessions during a 3 month period.
- ✘ Patient who were not randomized to acupuncture was able to receive it at the end of the 3 month control period.
- ✘ Acupuncture points used was determined by the individual physician.
- ✘ Needles were only **manually** stimulated.
- ✘ All treatment groups were allowed to use additional conventional treatments as needed.
- ✘ Outcomes: Back function, Pain, and Quality of life at baseline, 3months and 6months



Back function outcomes:

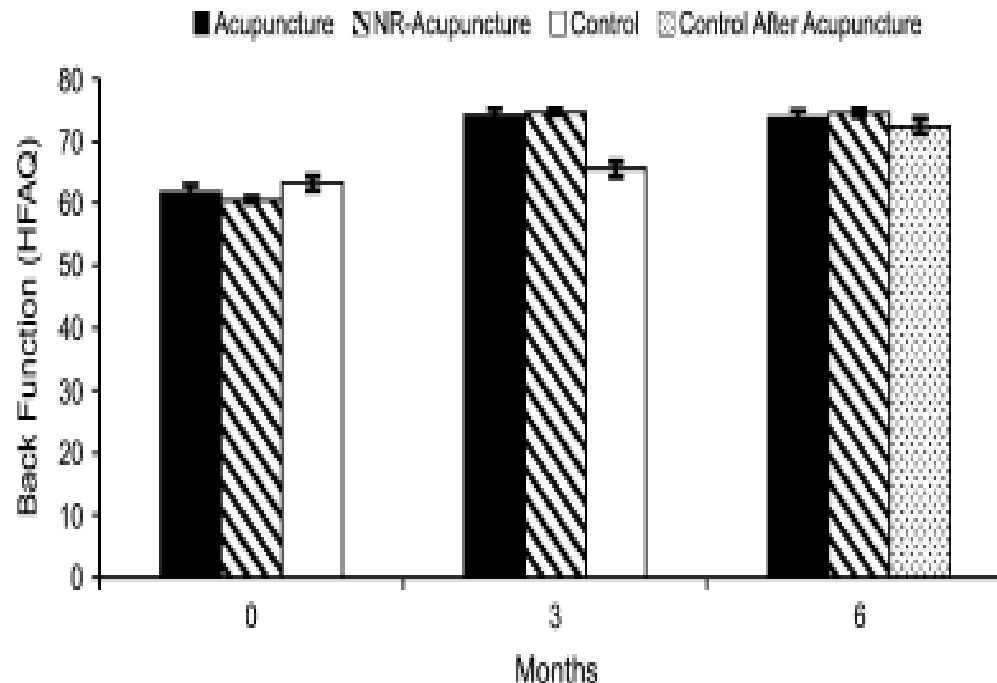


FIGURE 2. Course of back function (mean Hannover Functional Ability Questionnaire (HFAQ) score) in three groups of participants at baseline, 3 months, and 6 months (between 3 months and 6 months, the controls received acupuncture), Germany, January 2001–October 2004. Bars, 95% confidence interval. NR, nonrandomized.

Am J Epidemiol 2006;164:487–496



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Conclusion

Patients with chronic low back pain treated with acupuncture in addition to routine care showed significant improvements in symptoms and quality of life compared with those with routine care alone.



German acupuncture trials (GERMAC) for chronic low back pain

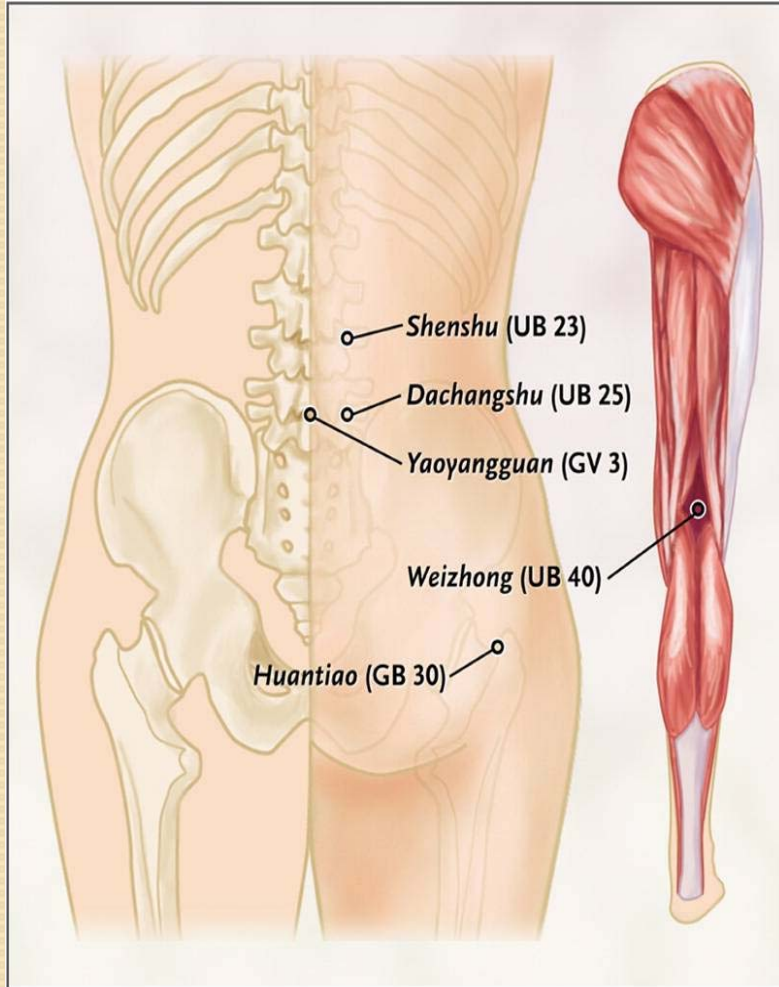
- Haake et al. 2007 ,Archives internal medicine
- **Randomized multicenter blinded parallel group trial with 3 groups: *acupuncture, sham acupuncture, and conventional therapy.***
- **1162 patients**
- History of low back pain for > 6months, mean 8 years.



- Ten 30 minute sessions twice weekly TCM
- acupuncture n=387 , sham acupuncture n=387, conventional therapy n=388.
- Conventional therapy= combination medications, physical therapy, and exercise.
- Examined treatment response at 6months
- Good outcome was defined as 33% improvement in the pain scale or better functional ability.



Needling



- Identical needle were use for both groups
- Only manual needle stimulation was allowed
- *Traditional group*: 14-20 needles were inserted to depth of 5-40mm with induction of De Qi sensation on the body.
- *Sham group*: 14-20 needles were insert 1-3mm depth without stimulation on lateral back or lower limbs was standardized- non meridian points.



Conventional treatment

- 10 sessions with a physical therapist
- Non steroidal anti-inflammatory drugs or pain medications
- Massage, heat therapy, electrotherapy, back school, injections, and guidance,



outcomes

- At 6 months almost $\frac{1}{2}$ of acupuncture groups but only $\frac{1}{4}$ of the conventional therapy group benefited.
- **Both acupuncture groups had 30% or better in pain and back function.**
- *Traditional acupuncture was not superior to sham acupuncture.*



Meta-analysis of LBP research in 2008

AMMENDOLIA ET AL , 2008, THE SPINE JOURNAL
YUAN ET AL, 2008 , SPINE

- **Acupuncture compared to no treatment:**

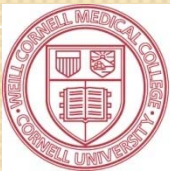
moderated evidence
acupuncture **demonstrates improvement** in pain
compared to no treatment .

- **Acupuncture compared to Sham:**

there is moderate evidence
that **acupuncture is no different from sham**
acupuncture for global
improvement.

Acupuncture added with other interventions:

- All included studies demonstrated that the **addition of acupuncture** to other interventions **was more effective than the other interventions alone.**



Conclusion

- Acupuncture can provide an analgesic effect by stimulating the release of endogenous opioids and cortisol.
- Acupuncture acts on the level of the peripheral and central nervous system to decrease cortical activation of pain perception.
- Acupuncture also act on a local level through increased tissue perfusion and local changes in connective tissue arrangement.
- Sham acupuncture, superficial needling, is not a true placebo, providing therapeutic benefit .
- **Acupuncture should be viewed as another tool in conservative management , similar to NSAID use and physical therapy in the treatment of low back pain.**
- **Acupuncture combine with traditional conservative management has better outcomes than conservative management alone = in 42 research studies.**















