Acupuncture scientific basis and Acupuncture Safety in Children
Presenter: Tiffane Le
MSAOM, L.Ac, Pharm. D, BCOP

Disclosures
I do not have anything to disclose

Objectives
- acupuncture introduction
- General cautions and contraindications of acupuncture
- Discuss MOA of acupuncture in scientific points of views
- Common acupuncture applications
- Acupuncture safety in children

Acupuncture began about 3000 years ago...

What is acupuncture?
- Acus → needle
- Punctura → to needle or to stick needles
- Insertion of thin needles through your skin

Acupuncture History
- Oldest, most commonly used medical practices in the world
- first written record of practice of acupuncture exits in *Huang Di Nei Jing (Yellow Emperor’s Classic of Internal Medicine)* about 5000 years ago.
- Acupuncture has been practice in Asian countries for over 4000 years and in the United states for more than 200 years
- FDA approved the acupuncture needles as a medical device class II in 1996
Why acupuncture?
The National Institutes of Health Consensus Statement states "one of the advantage of acupuncture is that the incidence of adverse effects is substantially lower than that of many drugs or other accepted procedures for the same conditions."

Acupuncture is in Demand
- Acupuncture is currently practiced in over 140 hospitals in the United States
- One-third of 43 pain clinics in North American children’s hospitals offered acupuncture services
- 1 in 10 Americans have tried acupuncture
- A 2007 US study estimated that 3 million adults and 150,000 (0.2%) children use acupuncture

Traditional acupuncture Introduction

TCM foundation of acupuncture
- Qi
- Meridian
- Acupuncture points

Qi and TCM
- Qi is essential energy force and the root of human being
- Basic principle of TCM is “where is Qi there is Life”.

TCM Meridian theory
- Meridian is the Qi flow system
- Lines of empirical acupuncture points on the body
  - There are 365 (classic) acupuncture points
  - 14 visible main meridians
  - 12 main meridians are named after the 12 major organs.
  - Based on accumulated empirical experience over thousand years
- There is no obvious correlation between the 14 identified meridians and the actual location of organs within the body
Meridians
- transport and distribute qi and blood throughout the body
- link organs, limbs, joints, bones, tendons, tissues, and skin
- Provide communication between the body's interior and exterior

Meridians: Lung meridian

acupuncture
- Acupuncture and related therapies regulate the flow of Qi when acupuncture points are stimulated by pressure, needling, heat, electrical, or laser stimulation.

Meridians and acupuncture
- There is no pain if Qi flows smoothly

Pain, disease
Acupuncture stimulation
Good health
Good health

Pain, disease
Acupuncture stimulation
Good health
Good health
Cautions and Contraindications

1. Pregnancy
   - lower abdomen; lumbar, sacral region during the first trimester; points that induce strong sensation; ear acupuncture points that may induce labor
2. Medical emergencies
3. Surgical conditions
4. Bleeding disorders
   - bleeding; clotting disorders; anticoagulation therapy
5. Malignant tumors
   - Should not be used for the treatment
   - May be used as complementary measures: relieve pain and side-effects of chemotherapy and radiotherapy; improve quality of life

Acupuncture indications

- http://www.evidencebasedacupuncture.org/who-official-position/
- In 2003 World Health Organization published a report about clinical trials researching the effectiveness of acupuncture. More than one hundred indication were discussed based on the results of 255 trials published.
- Acupuncture was proven effective for 28 conditions in this report.

2003 WHO report (cont.)

- Indications were divided into four groups concerning the strength of existing evidence
  - Diseases, symptoms or conditions for which acupuncture has been proved—through controlled trials—to be an effective treatment
  - Diseases, symptoms or conditions for which the therapeutic effect of acupuncture has been shown but for which further proof is needed
  - Diseases, symptoms or conditions for which there are only individual controlled trials reporting some therapeutic effects, but for which acupuncture is worth trying because treatment by conventional and other therapies is difficult
  - Diseases, symptoms or conditions for which acupuncture may be tried provided the practitioner has special modern medical knowledge and adequate monitoring equipment


- In 1997, the National Institutes of Health (NIH), after mounting evidence from clinical trials, formally acknowledged acupuncture for its value in relieving pain, nausea after surgery or chemotherapy, and morning sickness; and effectiveness in treating conditions, such as headaches, asthma, stroke rehabilitation, and fibromyalgia.
- The NIH also recommended that acupuncture to be taught in medical schools.

Acupuncture indications

Acupuncture has been proved – 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, primary dysmenorrhea, acute epigastralgia, (in peptic ulcer, acute and chronic gastritis, and gastraspasm), facial pain (including craniofaciofacial disorders), headache, primary hypotension, induction of labour, chronic pain (knee, low back, neck, dental, TMJ, periartthritis of shoulder, postoperative, RA, sciatica, tennis elbow, sprain), correction fetal malposition, morning sickness, nausea and vomiting, renal colic, stroke
Recommendation 1: Given that most patients with acute or subacute low back pain improve over time regardless of treatment, clinicians and patients should select nonpharmacologic treatment with superficial heat (moderate-quality evidence), massage, acupuncture, or spinal manipulation (low-quality evidence). If pharmacologic treatment is desired, clinicians and patients should select nonsteroidal anti-inflammatory drugs or skeletal muscle relaxants (moderate-quality evidence). (Grade: strong recommendation)

Recommendation 2: For patients with chronic low back pain, clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction (moderate-quality evidence), tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation (low-quality evidence). (Grade: strong recommendation)

Recommendation 3: In patients with chronic low back pain who have had an inadequate response to nonpharmacologic therapy, clinicians and patients should consider pharmacologic treatment with nonsteroidal anti-inflammatory drugs as first-line therapy, or tramadol or duloxetine as second-line therapy. Clinicians should only consider opioids as an option in patients who have failed the aforementioned treatments and only if the potential benefits outweigh the risks for individual patients and after a discussion of known risks and realistic benefits with patients. (Grade: weak recommendation, moderate-quality evidence)

Local acupuncture point reaction: redness, decrease skin resistance

Distal effects: decrease heart rate, decrease blood pressure, release of hormones in blood, and chemical substances in the brain

Scientific Mechanism of Actions of Acupuncture

- Neurophysiology of acupuncture points and de qi
- Micro trauma theory
- Natural opioid activation
- Promote circulation
- Stress reduction

Neurophysiology of acupuncture: Acupuncture points

- Li et al Brain Res. 2004
  - Found denser distribution of C-fibers/reflex complex at acupuncture points
  - Rich number of Aδ fibers, C fibers, and nNOS receptors compared with non-acupoints

<table>
<thead>
<tr>
<th>Afferent nerve fibers</th>
<th>Diameter</th>
<th>Velocity</th>
<th>Functions</th>
<th>Acupuncture sensations</th>
</tr>
</thead>
<tbody>
<tr>
<td>β II myelinated</td>
<td>8-13 µm</td>
<td>40-70 m/s</td>
<td>Touch, vibration</td>
<td>Numbness</td>
</tr>
<tr>
<td>Aδ III myelinated</td>
<td>1-4 µm</td>
<td>5-15 m/s</td>
<td>Pain, warmth, cold, pressure</td>
<td>Sensation, pressure, pain, numbness, cold</td>
</tr>
<tr>
<td>C IV unmyelinated</td>
<td>0.2-1 µm</td>
<td>0.2-2 m/s</td>
<td>Pain, warmth, cold, pressure</td>
<td>Sensation, pressure, pain, numbness, cold</td>
</tr>
</tbody>
</table>

Neurophysiology of acupuncture: acupuncture points (cont.)
De qi

- Needle sensation
- The excitation of qi or vital energy inside meridians by acupuncture needle stimulation
- De qi indicates right channels were stimulated and is mandatory for effective analgesia
- This sensation includes
  - Numbness
  - Distension/extension/fullness
  - Heaviness
  - Aching

Natural opioid activation theory
Mayer. Brain Research 1977

- Acupuncture stimulated the production of endogenous painkilling opiate substances (i.e. endorphins, enkephalins, dynorphins)

Han JS. Trends Neurosci. 2003

- Acupuncture increases local NO in treated area
- NO improves local circulation: local warmth, pain relief, improvement of sweating and inflammation

Promote circulation

- Acupuncture increases local NO in treated area
- NO improves local circulation: local warmth, pain relief, improvement of sweating and inflammation
**Stress reduction**

- Enkephalin has antidepressant, anticonvulsant, and antianxiety effects
- Acupuncture increases serotonin
  - increases the effect on feeling well and happiness
  - increase appetite
  - Increase sexual stimuli
- Acupuncture inhibits the sympathetic nervous system and activates the parasympathetic system

**Risks associated with Acupuncture..**

- Pneumo-thorax
- Bladder puncture
- Allergic reaction to needles
- Fainting
- Convulsion
- Peripheral nerve damage

**Is acupuncture safe?**

  - feeling weak and tired – 3%
  - bleeding or bruise – 3%
  - aggravation of symptoms – 2%
  - pain connected with puncturing – 1%
  - 11 per 4,441,103 procedures reported serious and extremely rare adverse effects
  - Pneumo-thorax, fracture of needle in patient’s body, transmission of infectious diseases, hematoma or bleeding in the place of puncture, deterioration of symptoms, vertigo.

**Pediatric acupuncture breakthrough**

- Gold et al. eCAM 2009
  - Nausea/vomiting (chemo-induced, postoperative)
  - Seasonal allergic rhinitis
  - Neurologic disorders (nocturnal enuresis, epilepsy)
  - GI disorders (constipation, IBS)
  - Addiction
  - Pain
  - Chronic pain, headache, abdominal pain, back pain, cancer pain

**Safety of acupuncture in children**

  - Review of 9 randomized controlled trials
  - 782 patients with age range of 2 to 18 years
  - Total treatments 1865
  - Total adverse events 29
  - Adverse incident rate 1.55/100
  - Total serious adverse event rate 1

**Safety of acupuncture in pediatric oncology patients**

  - Retrospective analysis of medical records for 133 pediatric oncology patients undergoing cancer treatments between the ages of 0–18 years received acupuncture therapy between January 2004 and September 2012
  - Common reason for acupuncture referrals: pain (42.8%), nausea/vomiting (38.6%), neuropathies/neurological dysfunction (10%)
  - Total 454 acupuncture treatments
  - Total adverse events: 34
  - Transient or mild discomfort, dizziness, headache, skin irritation, pain at the needle site
  - 79.4% of these adverse events resolved by the end of the treatment or at the time of needle removal
Safety of acupuncture in pediatric patients with cancer related thrombocytopenia

- Retrospective evaluation of medical records of 32 patients receiving acupuncture
- Demographics of the patient population receiving acupuncture treatment
  - Age
    - Mean Age (years) 15.7
    - Median (years) 17 (2–22)
  - Gender
    - Male 16
    - Female 16
  - Diagnosis
    - Brain tumor 5
    - Solid tumor 13
    - Leukemia/lymphoma 8
    - Stem cell transplant 6

Safety of acupuncture in pediatric patients with cancer related thrombocytopenia (cont.)

- Limitation of the study
  - Unreported minor bruising or pain occurring more than 24 hours after acupuncture treatment
- Conclusion
  - The results suggest that acupuncture may be safe in the setting of platelet counts below 50,000/L
  - Low risk of bleeding is associated with specific type of acupuncture, needling depth, needle size, and mild manual stimulation

Safety of acupuncture in pediatric patients with cancer related thrombocytopenia (cont.)

<table>
<thead>
<tr>
<th>Thrombocytopenia (µL)</th>
<th>Acupuncture treatment (N=237)</th>
<th>Platelets (µL)</th>
<th># of needles</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;20 (severe)</td>
<td>48</td>
<td>7 (1–17)</td>
<td>10 (2–17)</td>
</tr>
<tr>
<td>21–50 (moderate)</td>
<td>18</td>
<td>35.5 (24–49)</td>
<td>11 (3–18)</td>
</tr>
<tr>
<td>51–100 (mild)</td>
<td>46</td>
<td>74.5 (52–99)</td>
<td>9 (2–19)</td>
</tr>
<tr>
<td>&gt;100</td>
<td>125</td>
<td>202 (101–534)</td>
<td>10 (1–28)</td>
</tr>
</tbody>
</table>

Conclusion

- Current literatures showed that acupuncture is safe and feasible
- There are several theories to explain how acupuncture works in biomedicine points of view.
- Acupuncture has become increasingly popular as a therapy for pain and a wide variety of mostly chronic disorders which are difficult to manage with conventional treatments
- Acupuncture mechanism of actions are difficult to test under double-blind, placebo-controlled trials

References

9. Ladas E, Benharash P. Acupuncture mechanism of actions are difficult to test under double-blind, placebo-controlled trials. [Evid Based Complement Alternat Med.] 2014; 2014:424961
10. Ladas E, Benharash P. Acupuncture mechanism of actions are difficult to test under double-blind, placebo-controlled trials. [Evid Based Complement Alternat Med.] 2014; 2014:424961

Questions