Session 5
Introduction to Electro Acupuncture
Chinese Medicine Department
Pre Readings


Pre Readings


Nikola Tesla 1856-1943

“If you want to find the secrets of the universe, think in terms of energy, frequency and vibration.”

Image Wikimedia Commons, 2015
General History of Electroacupuncture (EA)

- Mayor 2007 states Genni Hirga uses static electricity to treat muscle spasm and paralysis in 1764 as the first time that EA had been used.
- Electrotherapy had been used as early as 2750BC showing the use of electric fish (Nile catfish, malopterus electricus) for painful conditions.
- Christian Gottlieb performed the first recorded treatment using static electricity on paralysed patients in 1744.

Mayor, 2007, p9-10
Image Wikimedia Commons, 2015
As time goes by……

- 1823 – Jean-Baptiste Sarlandière starts using the term EA (electropuncture) mainly gold and silver needles for colic into the umbilicus
- Considers electropuncture the most proper method of treating rheumatism, nervous afflictions, gout, asthma, migraine and various forms of paralysis
- 1834 Francesco Camino reproduces Sarlandière’s work and publishes the first book on EA
- 1844 E Hermel uses EA for sciatica and lumboro-sacral neuralgia

Mayor, 2007, p12-3
George Soulié de Morant

- 1925: Morant considers that Qi is either entirely electrical or is carried by measurable electrical waves.
- The instruments prove by their measures, the existence of ‘force vitale.’
- He applies both faradic and galvanic currents via needles and HF electromassage on points.

Mayor, 2007, p15
Image: bkavoussi, 2011
In China

- 1934 Tong Shi-chins book Investigation of Electroacupuncture is published and recommends DC for use with needles
- 1955 Zhu Longyu uses both AC and DC in both acupoints and nerves to treat patients with psychiatric disorders
- 1958 – first operations using acupuncture analgesia
- 1960s EA introduced more into general clinical practice
- First reported case for ovulation in anovulatory women
- 1968 whiplash injury is treated successfully

Mayor, 2007, p18-19
Image: Vin Crosbie, 2010
Richard Nixon and beyond

- Nixon visited China in 1972 there is a huge interest in acupuncture brought back to America after this.
- EA is used in drug withdrawal and increases in popularity
- Many hospitals frequently use EA on nearly every patient in the 1990’s
Rationale for application

- From a Chinese point of view, the use of EA is to promote the circulation of Qi
- Stimulate the body’s healing processes
- Has particular history in the treatment of Bi syndrome and other painful musculoskeletal conditions
- Western approach – stimulates nerves and the circulation of essential substances
- Can modulate endogenous chemicals such as beta-endorphin
- Increases circulation, promotes nutrient delivery and waste removal

Berry and Walsh, 2010, p46-7
Basic Physics and terms

- DC – direct current and supplies by a battery (galvanic)
- AC – power outlet the polarity across the circuits alternates and ions or electrons will flow first one way and then the other
- This is repeated in identical cycles, the transition between the two is not abrupt
- AC is a sine wave; each cycle has equal negative and positive phases (known as biphasic)
- Cycle duration is a period
- Number of cycles or direction changes is the frequency
- Frequency can be HF or LF

Mayor 2007, p29
Most modern machines are AC

- Check with your unit, but modern machines are AC
- This means that +ve and –ve change polarity each pulse
- This means that red and black positioning does not matter
- If you have a DC machine, it DOES matter where they are positioned
- Check your manual

Images: Mannix, 2016
More terms

- **Duty Cycle** – ratio of on time to off time (pulsed duration)
- Frequency measured in Hz or cycles per second
- **EA – LF** is <10 cycles per second (10Hz)
- **EA – HF** is 50-200Hz
- Amplitude in a biphasic current can either be measured as peak amplitude greatest distance from zero and peak or peak to peak amplitude – distance from positive to negative value
- High peak amplitude does not guarantee a stronger stimulation

Mayor 2007, p29-30
Image: Wikimedia Commons, 2015
Benefits of EA

- Substitute for prolonged hand stimulation
- Greater consistency in the stimulus given
- Fewer number of treatments as a higher constant stimulus is achieved – faster results
- More efficient and can see multiple patients
- Stronger stimulation (if desired) without causing tissue damage
- Easier to control the frequency of the stimulus and the amount of stimulus
- EA specific effects on pain, relaxation and circulation

Dharmananda, 2002, Mayor 2007, p1
Image: Picserver.org, 2016
Effects of electro-acupuncture

- Biophysical effects
- Physiological effects:
  - Analgesic: emotional, pain
  - Adjustment: digestive, respiratory, cardiovascular, urogenital, neurohumoral
  - Enhance immune system: anti-inflammatory efforts, anti-febrile effects
  - Induction of needling sensation
  - Circulation and tissue repair, contracting muscles act like a pump to increase blood, lymph and nutrients and help remove lactic acid

Mayor 2007, p64
Image Wikimedia Commons, 2010
Effects of electro-acupuncture

- Muscle Stimulation (contraction/relaxation)
- The stimulation activates the motor and sensory nerves, leading to muscle contraction
- Muscle strengthening – sorry it doesn’t work for normal muscle – but can be used if a muscle has a weak or restricted movement
- Reducing muscles spasms – spastic muscles themselves or antagonists or both – this is a significant use of electro

Denegar, et al, 2016, p144
Image Amazon.com, 2016
Biophysical effects

- Conduction: Tissues, depth needling
- 2 Hz produces release encephalin, β endorphin and endomorphin
- 100 Hz stimulates release of dynorphin
- 80-200 Hz has dynorphin and 5HT involved
- 1Hz showed involvement of histamine, dopamine and noradrenalin in the periaqueductal gray in animal studies
- Elevation of Dopamine in medulla oblongata

Image, WikiMedia Commons, 2007
Adjustment functions

- Pain – analgesia not anaesthesia
- Digestive – in general, reduces gastric acidity, inc gastric blood flow, stimulates peristalsis
- Respiratory – regulatory effects on neurochemical markers in asthma – PC6 & LU6
- Cardiovascular improves HT function, reg BP & HR – PC pts 6 & 4, ST36 and GV26
- Urogenital – regulatory effect on some aspects of the kidney
- Neurohormonal – ST36 & BL23 lower blood glucose levels in animal studies

Mayor 2007, p64-66, 163, 169, 173, 182,
Effects on immune system

- Both affects the humoral and cellular immune function
- Can restore a reduced leukocyte count
- Phagocytosis is increased by EA
- Natural Killer (NK) cells increased as well
- Main researched point ST36 – no real surprise
- Anti-inflammatory effects
- Anti-febrile effects
- De-sensitising effects

Mayor 2007, p66, 116
Image: Wikimedia Commons, 2006
EA and Drug Withdrawal

- Has been investigated extensively and shown to be quite useful
- Neurotransmitters are involved mainly opioids and dopamine
- Both high frequency and low frequency have been shown to be effective as these are produced at different frequencies
- Drugs involved have been opioids, cocaine, amphetamines and alcohol

Mayor 2007, p67
Image: Wikimedia Commons
Constant wave

On for a bit, off for a bit

Speeds up & slows down or varies intensity

Watson, 2009, p201
Nerve fibres

- Sensory fibres are stimulated first (A\(\beta\) fibres).
- Patient may report paraesthesia (pins and needles)
- Motor fibres are recruited next (A\(\alpha\) fibres) with associated contractions
- Nociceptive fibres (A\(\delta\) and C) are stimulated producing a painful stimulus if too intense
- Stay within the patient's tolerance

Watson, 2009, p204
## Clinical Application

<table>
<thead>
<tr>
<th>Routine safety checks on machine</th>
<th>Calibration with an oscilloscope (measures output)</th>
<th>Access the patient</th>
<th>Explain treatment to patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check for contraindications</td>
<td>Position patient comfortably</td>
<td>Demonstrate to patient</td>
<td>Leads are connected correctly</td>
</tr>
<tr>
<td>Select relevant parameters</td>
<td>Check amplitude is at zero before starting</td>
<td>Tell patient what to expect,</td>
<td>Increase amplitude slowly Patient should feel something</td>
</tr>
<tr>
<td>Monitor treatment</td>
<td>Terminate slowly, make sure machine is off before removal</td>
<td>Check area, repalpate muscles or look for adverse reactions</td>
<td>Document any events if necessary</td>
</tr>
</tbody>
</table>

Watson, 2009, p209
Indications

- Psychological – depression, anxiety, sleep, etc.
- Epilepsy, tremors
- Stroke and cerebrovascular disease
- Motor disorders (Wei syndromes)
- Immune system
- Endocrine disorders
- Pain, injuries and muscle tone

- Eye, ear, nose, throat conditions
- Skin conditions like eczema
- Obstetrics, gynaecology
- Cardiovascular conditions
- Respiratory conditions
- Gastrointestinal conditions
- Genitourinary conditions
- Addictions

Mayor, 2007, pp93-274
Point selection

- Same as acupuncture needles
- Point indication, point function or point category
- Ashi points
- Motor Points
- Trigger Points
- Agonist/ Antagonist muscles
- Nearby points
- Points along the meridians
- Microsystems

Mayor, 2007, p109
Different connections electro acupuncture

a) Will have a larger amplitude of penetration

b) Not really used as much but could be more than one point connected with the clips

c) Focused needling targeting a particular tissue, point or area

Mayor, 2007, p71
Placing electros

- There are not any hard rules with electro placement in healthy individuals. See contraindications 33-35
- Look for major points, either muscular, Zang Fu, five elements or eight extra, or other point selection method
- Except don’t run the current through the heart, i.e., BL13-15/CV17, or the Carotid Sinus, GB20-ST9
- Yes you can cross the spine and connect BL20 to BL20 (or other Back shus or HJJ points on the same circuit)
- Yes you can connect both clips to the same point on different sides (ST36 to ST36, or LI4 to LI4)
- Yes you can connect a motor point to the corresponding HJJ innervation, i.e., Extra point Dijia to HJJ of C3-C5 same side
Placing electros

- Yes you can multiple clip i.e. BL10 and GB20 in the same clip, connected to GB21 and SJ15 in a different clip, but on the same circuit – we will explore this further next two weeks
- Yes you can run the clips from SJ3 on one side to GB41 (or other shu stream combinations such as SI3 and BL65) on the other side for hip pain or back pain
- Yes you can just have two needles in the same muscle or tissue structure, i.e., SI12, LI16 both are in the same muscle
- Yes you can stimulate points on the scalp, ear or face
- Yes you can run the current from one ear to the other across the brain
Questions to ask

- Choosing the settings can be confusing but asking questions can help.
- Using “Or” questions to choose your settings:
  - Do I want to use the electro-acupuncture for……
  - Point stimulation (TCM) OR tissue stimulation (therapy)?
  - Endorphin release OR gate control to interrupt the pain cycle?
  - Neuromuscular excitation OR is that not needed.

Purcell, 2016
Image: Marco Bellucci, 2005
TCM or Tissue stimulation

- TCM Point stimulation
  - Using the electricity to stimulate the points
  - Typical selection method
  - Apply electro to chief points
  - Use continuous stimulation
  - Milliamps or microamps
  - Frequency 2-10 Hz
  - Intensity comfortable but strong
  - Eg. LR 3 and LI4 for a headache

- Tissue stimulation
  - Using electricity to affect targeted tissues
  - Choose points based on ability to deliver electricity to the desired location
  - Continuous stimulation
  - Milliamps or microamps
  - Frequency may depend on further questions
  - Intensity comfortable but strong
  - Local shoulder points – area of pain

Purcell, 2016
Opioid Release or Gate Control

- Endogenous opioid release
  - Endorphin 2-4Hz
  - Enkephalin 2-4/15Hz
  - Dynorphin 100Hz
  - Continuous or DD (alt 2-100Hz)
  - Intensity:
    - Microcurrent turn up till just feel it
    - Milliamps comfortable but strong
  - Eg. Fibromyalgia to relieve pain at multiple sites. Pain and Pain medication

- Gate control
  - Frequency: 80-120Hz
  - Continuous or variable
  - Milliamps is better for this
  - Intensity comfortable but strong
  - Eg. Painful tight muscle in the shoulder may benefit from this as it aims to scramble the pain signals. Also, drops the muscle tone

Carrodino 2017, p67
Purcell, 2016
Neuromuscular excitation

- Neuromuscular excitation
- Picking motor points and or trigger points
- Frequency Continuous LF/ Dense-disperse, alternating frequencies (2Hz/100Hz)
- Milliamps needed
- Strong enough to get a muscle contraction or fasciculation (twitch)
- Eg. Bell's palsy, paralysis, hyper-toned muscles

- Not needed
- Frequency, waveform, current type and intensity based on previous questions

Purcell, 2016
Image: Niel-Asher, 2008, p33
Instruments

Common College Electro Units
Common College Electro Units
Contraindications

- Pregnancy in the first trimester, but some authorities do use it for hyperemesis when other treatments are harmful to the foetus
- Stimulation over the uterus in early stage pregnancy
- A patient in a coma unless medically advised
- Febrile disease, septicaemia, TB, and other active infection
- The head of children under 12 – increased risk of seizure
- Over the carotid sinus or larynx

Mayor, 2007, p333
Contraindications

- Electrodes from the same socket should not be placed over the chest wall. Don’t mess with the heart rhythm.
- Patient has a pacemaker.
- In cases where there is an apparent but undiagnosed sprain, unless actual fracture has been ruled out.
- Strong stimulation (especially at HF) should be avoided in patients with high BP.
- Epilepsy.
- Cancer (over the growth).
- Undiagnosed (sudden progressive) pain or swelling.

Mayor, 2007, p333-4
Contraindications

- Unstable spine
- Debilitated patients deficient constitutions, prone to needle shock, or sensitive patients take care with them
- Delicate structures – sense and sex organs
- Acute venous problems – DVT etc.
- Metal implants such as artificial hips, knees, shoulders
- Lymphedema

Mayor, 2007, p334
Practice

- Needle some different points and experiment with the electro on your fellow students.
- See how it feels to have it sharp, or non-existent feeling.
- See what it feels like to have the “Goldie-Locks” – Just right feeling
- You may want to try points in the traps, shoulders, lower back, buttocks, forearm and calf muscles
- Also look at some of the protocols included in week 6 and 7 as all are examinable
References

- "Malapterurus electricus 1" by Stan Shebs. Licensed under CC BY-SA 3.0 via Commons – viewed 30th August 2015, https://commons.wikimedia.org/wiki/File:Malapterurus_electricus_1.jpg#media/File:Malapterurus_electricus_1.jpg
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- Mannix, 2016, LI4-LI11, black-red, private collection
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