Acupuncture for Peripheral Neuropathy: Conceptual Framework and Overview of the Evidence

Alexandra Dimitrova, MD, MA, MCR
Assistant Professor ORCCAMIND Neurology Wellness Clinic OHSU Department of Neurology
Financial Disclosure

- NCCAM T32 AT002688 (Oken) - “CAM Research Training in Neuroscience & Stress”

- NCCAM K23 AT008405 (Dimitrova) “Electrophysiologic Study of Acupuncture's Effect on the Peripheral Nervous System”
Talk Objectives

• Brief Historic Overview
• Introduce acupuncture’s *conceptual framework* and *mechanism of action*
• Introduce *current mechanistic research*
• Review the evidence for acupuncture in *peripheral neuropathy*
Acupuncture is the insertion of fine needles into points along meridians (energetic lines along the body)
Modern Day Acupuncture

- Acupuncture variants:
  - Manual, Electroacupuncture, Laser
  - Acupressure, Moxibustion (*Artemisia argyi*)
  - Microsystems: Scalp, Hand, Foot, Ear, Abdomen

- Acupuncture Traditions: Chinese, Japanese, Korean, German, Medical, Structural, Practitioner-specific
Move toward Modernization

• Wang Qingren – **Correcting the Errors of the Medical World (1830)**
  – Promoted anatomical knowledge and dissections
  – Concept of blood stasis as cause of many chronic illnesses

• 1850s – western medical texts, including anatomy atlases were published by missionaries in Chinese

• TCM Medical colleges were established in early 1900s, but did not teach acupuncture

• Acupuncture was outlawed in 1929
Modern Chinese Acupuncture

- **Dr. Cheng Dan’an** – Acupuncture Revival
  - studied acupuncture in Japan and was familiar with western physiology and anatomy principles
  - *Chinese Acupuncture and Moxibustion Therapeutics*(1932):
    - Acupuncture is effective because its mechanism of action is stimulation of the nerves described in European medical theory.
    - Repositioned acupoints away from blood vessels (?blood letting) toward the nerve pathways.
Cheng Dan’an, 1930
Acupuncture Mechanism of Action - ???

- **Fascia theory** – fibroblast effects (Helene Langevin)
- **Endorphin theory** - cerebrospinal fluid levels of endorphins, enkephalins, adrenocorticotropic – naloxone blocks effects
- **Immune theory** - increased activity of splenic NK cells and levels of interferon-gamma
- **Gene expression theory** - of neuropeptides and their receptors
- **Central Theory** – deactivation in the medial prefrontal, parietal and temporal lobes; activation of the primary sensorimotor area and isolated paralimbic structures; involvement of the amygdala and hypothalamus (K. Hui, V. Napadow)
- **Placebo Theory**
- **Structural Theory**
Structural Theory

• Dr. Cheng Dan’an – repositioned acupoints closer to the nerves - “Acupuncture is effective because its mechanism of action is stimulation of the nerves”

• 1980s – H.C. Dung – series in The American Journal of Chinese Medicine – correlation between acupoint location and peripheral nerves, spinal segments and spinal plexuses

• Descriptive theory – based on anatomical correlations/observations

• There is consensus that the nervous system is vital in processing the effects of acupuncture
Structural Theory

- Acupuncture’s effect is mediated via afferent input through the peripheral nervous system, eliciting a reflex at the level of the spinal cord via the sympathetic plexuses and via efferents to the visceral organs and skeletal muscle.

- The neurophysiologic testing to support these theories is lacking so far.
CURRENT RESEARCH

• **Hypothesis:** acupuncture has local effects on the underlying nerve, as the needles deliver mechanical and electrical stimulation to the peri-neural tissues.

• **Objective:** to characterize and quantify and acupuncture’s effect on a healthy nerve and a diseased nerve (CTS) using nerve conduction studies and Quantitative Sensory Testing.
Nerve/Channel Correlations in the Arm

Median Nerve/Pericardium Channel – PC3, 5
Ulnar Nerve/Heart Channel – HT3, 4
Experimental Design

• 3 groups (20 subjects each)
  – manual acupuncture
  – low-frequency electroacupuncture
  – high-frequency electroacupuncture

• Outcome variables:
  – Quantitative Sensory Testing
    • Cold, Vibration Detection threshold
  – Nerve Conduction Studies

• Subjects with Carpal Tunnel Syndrome (CTS)
Preliminary Data

**Pilot 1:**
- 65 yo woman with moderate CTS
- HF-EA to Median nerve (Week 1)/HF-EA to Ulnar nerve (Week 2)
  - **Cold detection** in the Median nerve territory improved (13.1 to 8.7 units). Ulnar territory cold detection – unchanged with acupuncture.
  - **Median nerve compound muscle action potentials (CMAP) amplitude** at the wrist and elbow increased with acupuncture by a third, whereas Ulnar CMAPs were unchanged with acupuncture
  - **Symptomatic improvement**
    (at Week 2)
Preliminary Data

- **Pilot 2:**
  - 69 yo man with moderate CTS
  - HF-EA to Median nerve (Week 1)/HF-EA to Ulnar nerve (Week 2)
  - No significant changes in QST with acupuncture
  - **Reconstitution of Sensory Nerve Action Potentials (SNAP)** in the Median nerve during Week 2 (absent in Week 1)
  - **Symptomatic improvement** at Week 2
Preliminary Data

• Pilot 3:
  – 43 yo woman with moderate CTS
  – HF-EA to Median nerve (Week 1)/HF-EA to Ulnar nerve (Week 2)
  – QST improvements in Median Nerve
    • **CDT** - 12.5 to 8.4 units
    • **VDT** - 8.7 to 3.9 units
  – **Nerve Conduction Velocity Improvements**
    • Median Motor NCV - 54.5 to 59.3 m/s
    • Median Sensory NCV - 42.3 to 50.2 m/s
  – **Ulnar sensory NCV** did not change in Week 1 (not treated), but increased from 66.7 to 78.6 m/s in Week 2 (treated)
  – **Ulnar SNAP amplitude increase** (Week 2)
  – **COMPLETE symptom resolution** after exiting study (2 months)!
Acupuncture-induced Analgesia in Healthy Volunteers, ages 18-45

Deep peroneal nerve points
- GB34
- ST36
- ST41
- LR3
- QST Thermal Probe
- QST Vibration Probe

Posterior tibial nerve points
- KD9
- SP6
- KD3
- KD1
- Tibial n.
- Lateral Sural cutaneous n.
- Sural Communicating branch of the Peroneal n.
- Lateral Sural cutaneous n.
- Sural n.
- Common Digital Plantar nerves
- Lateral Plantar n.
- Medial Plantar n.
Acupuncture-induced analgesia in Healthy Volunteers

• E-stim at 100 Hz for 20 min
• Randomization –
  – 14 DPTN (16 needles) or
  – 14 DP only (8 needles)
• Outcomes – QST – CDT, VDT, HP
• Local in the leg and systemic in the hand
• Prelim findings – significantly increased
  – CDT, VDT, HP 0.5, HP 5.0
  – Hand and Calf effects comparable
  – No difference between groups
QST parameters Assessed

• QST systemic measurement in the hand
  - VDT - CDT, HP0.5, HP5.0

• QST local measurement in the leg as shown
  - Thermal probe to the calf (CDT, HP0.5, HP5.0)
  - Vibration probe to the tip of the great toe (VDT)
• Expand this study to the leg, other meridian/nerve pairs
• Use of other neurophysiologic techniques to assess acupuncture’s effect on PNS and CNS:
  – **Pain-related Evoked Potentials (PREP)** – acupuncture effect on paired pulse inhibition, P1/N1 and N2 latencies and amplitudes, habituation
  – **Study of depth electrodes in EMU patients**
  – **Study of neuropace patients**
Clinical Applications of Acupuncture for Peripheral Neuropathy
Acupuncture Efficacy

• NIH Consensus Development Panel (1997)

• “Promising results”
  – post-op & chemotherapy-induced nausea and vomiting
  – postoperative dental pain

• May be useful as an adjunct treatment or acceptable alternative in:
  – addiction, stroke rehabilitation, headache, menstrual cramps, tennis elbow, fibromyalgia, myofascial pain, osteoarthritis, low back pain, carpal tunnel syndrome, asthma
Acupuncture Efficacy

- Proven effective through controlled trials:
  - allergic rhinitis, biliary colic, dental pain, depression, dysentery, dysmenorrhea, epigastralgia, facial pain, headache, hypertension, labor induction, knee pain, leukopenia, low back pain, fetal malposition correction, morning sickness, nausea and vomiting, neck pain, TMJ, postoperative pain, Radiotherapy/chemotherapy side effects, renal colic, Rheumatoid arthritis, sciatica, shoulder arthritis, sprain, stroke, tennis elbow
Peripheral Neuropathy

- **Disease of the peripheral nerves** – may affect myelin sheaths, axons or both, depending on etiology
- Large Nerve involvement – Tibial, Peroneal, Sural Nerves
- Small fiber involvement – sensory symptoms
- **Sx:** gradual onset numbness and tingling in feet, hands
- **Pain:** sharp, jabbing or electric-like pain
- Extreme sensitivity to touch
- Skin, hair or nail changes
- Muscle weakness or paralysis if motor nerves are affected
Peripheral Neuropathy – Common Causes

<table>
<thead>
<tr>
<th>Disease-Related</th>
<th>Drug-Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer (paraneoplastic syndrome)</td>
<td>Myasthenia gravis</td>
</tr>
<tr>
<td>Carpal tunnel syndrome</td>
<td>Paraproteinemia (associated with amyloid deposition in multiple myeloma)</td>
</tr>
<tr>
<td>Charcot-Marie-Tooth disease</td>
<td>POEMS (nonamyloid neuropathy symptom complex)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Vasculitis</td>
</tr>
<tr>
<td>Guillain-Barré syndrome</td>
<td>Vitamin $B_{12}$ deficiency</td>
</tr>
<tr>
<td>Heavy metal poisoning</td>
<td></td>
</tr>
<tr>
<td>Human immunodeficiency virus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drug-Related</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Nucleoside reverse transcriptase inhibitors</td>
</tr>
<tr>
<td>Amiodarone</td>
<td></td>
</tr>
<tr>
<td>Colchicine</td>
<td>Phenytoin</td>
</tr>
<tr>
<td>Dapsone</td>
<td>Pyridoxine</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>Statins</td>
</tr>
</tbody>
</table>

- 1/3 of cases – idiopathic
- **Difficult to treat with available medications** – Pregabalin, Gabapentin, Amitriptyline/TCAs, Cymbalta/SSRIs, Steroids, Immunosuppressive therapy


Neurology  published online April 11, 2011
DOI 10.1212/WNL.0b013e3182166ebe
Acupuncture For the Treatment of Peripheral Neuropathy

• Clinical Observation – improvement in neuropathic pain and sensation
• Numerous recent RCTs published
• Lack of systematic reviews/summary of evidence, which encompass various types of neuropathy
Acupuncture for the Treatment of Peripheral Neuropathy: A Systematic Review and Meta-Analysis

Alexandra Dimitrova, MD, Charles Murchison, MS, and Barry Oken, MD, PhD

- Goal: to critically assess and summarize the evidence for acupuncture in the treatment of various types of peripheral neuropathy
  - Bell’s Palsy
  - Carpal Tunnel Syndrome
  - Diabetes Mellitus
  - HIV-related neuropathy
  - Idiopathie neuropathy
  - Chemotherapy-related
Acupuncture for Peripheral Neuropathy Review

339 Records identified through searching Medline
18 Records identified through searching Cochrane Library
485 Records identified through searching Scopus
46 Records identified through searching AMED
88 Records identified through searching CINAHL
32 Records identified through searching clinicaltrials.gov

1008 Records Generated

772 Records After Duplicates Removed

772 Records Screened

46 Full-text Articles Assessed for Eligibility

31 Full-text papers excluded:
Control type (3)
Not an RCT (15)
Descriptive study (1)
Duplicate paper (1)
Focus on other intervention (3)
SASQI-CAM <10 (8)

13 Studies included (15 papers)
<table>
<thead>
<tr>
<th>Study</th>
<th>Condition</th>
<th>SASQI-CAM</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li et al, 2004</td>
<td>Bell’s Palsy</td>
<td>12/21</td>
<td>Acupuncture, Moxibustion</td>
<td>1. Acupuncture, Moxibustion, Meds po, IM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. Meds – po, IM</td>
</tr>
<tr>
<td>Tong et al, 2009</td>
<td>Bell’s Palsy</td>
<td>14/21</td>
<td>Acupuncture</td>
<td>1. Prednisolone po + Pepsidine po</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. Conservative Tx (non-medical)</td>
</tr>
<tr>
<td>Khosrawi et al, 2012</td>
<td>CTS</td>
<td>18/21</td>
<td>Acupuncture, Night Splinting</td>
<td>Sham acupuncture, splinting, Vit B1, B6 po</td>
</tr>
<tr>
<td>Kumnerddee et al, 2010</td>
<td>CTS</td>
<td>14/21</td>
<td>Electroacupuncture</td>
<td>Splinting</td>
</tr>
<tr>
<td>Yao et al, 2012</td>
<td>CTS</td>
<td>17/21</td>
<td>Acupuncture, Night Splinting</td>
<td>Sham acupuncture, splinting</td>
</tr>
<tr>
<td>Yang et al, 2009, 2011</td>
<td>CTS</td>
<td>18/21</td>
<td>Acupuncture</td>
<td>Prednisolone po</td>
</tr>
<tr>
<td>Yu et al, 2001</td>
<td>DM</td>
<td>10/21</td>
<td>Electroacupuncture</td>
<td>Meds – po, IM</td>
</tr>
<tr>
<td>Zhang et al, 2010</td>
<td>DM</td>
<td>11/21</td>
<td>Acupuncture</td>
<td>Inositol po</td>
</tr>
<tr>
<td>Zheng et al, 2004</td>
<td>DM</td>
<td>10/21</td>
<td>Acupuncture, Electroacupuncture</td>
<td>Mecobalamin po</td>
</tr>
<tr>
<td>Zuo et al, 2010</td>
<td>DM</td>
<td>12/21</td>
<td>Acupuncture, B12 IV</td>
<td>Vit B12 IV</td>
</tr>
<tr>
<td>Anastazi et al, 2013</td>
<td>HIV</td>
<td>18/21</td>
<td>Acupuncture, Moxibustion</td>
<td>Sham acupuncture, Placebo Moxibustion</td>
</tr>
<tr>
<td>Schiflett et al, 2011</td>
<td>HIV</td>
<td>15/21</td>
<td>Acupuncture</td>
<td>Control (non-acupuncture) points</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. Control points, Amitriptyline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Control points, Placebo po</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4. Amitriptyline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5. Placebo po</td>
</tr>
<tr>
<td>Penza et al, 2011</td>
<td>DM/IPN</td>
<td>12/21</td>
<td>Electroacupuncture</td>
<td>Sham electroacupuncture</td>
</tr>
</tbody>
</table>
Meta-analysis of DM and Bell’s Palsy Trial Data

<table>
<thead>
<tr>
<th>Study</th>
<th>Condition</th>
<th>N</th>
<th>Odds Ratio [95%CI]</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yu, 2001</td>
<td>DM</td>
<td>78</td>
<td>15.6 [5.03, 48.3]</td>
<td>18</td>
</tr>
<tr>
<td>Zhang, 2010</td>
<td>DM</td>
<td>65</td>
<td>4.0 [1.13, 14.2]</td>
<td>17</td>
</tr>
<tr>
<td>Zheng 2004</td>
<td>DM</td>
<td>104</td>
<td>3.1 [1.10, 8.8]</td>
<td>19</td>
</tr>
<tr>
<td>Zuo, 2010</td>
<td>DM</td>
<td>75</td>
<td>2.7 [0.73, 9.8]</td>
<td>17</td>
</tr>
<tr>
<td>Li, 2004</td>
<td>Bell's</td>
<td>288</td>
<td>5.0 [0.55, 45.2]</td>
<td>11</td>
</tr>
<tr>
<td>Tong, 2009</td>
<td>Bell's</td>
<td>70</td>
<td>2.4 [0.80, 7.2]</td>
<td>18</td>
</tr>
</tbody>
</table>

DM Specific (fixed-effects) p<0.001

4.9 [2.8, 8.7]

DM Specific (random-effects) p<0.001

4.85 [2.2, 11]

Bells Specific (fixed-effects) p=0.032

2.84 [1.1, 7.5]

Bells Specific (random-effects) p=0.042

2.78 [1, 7.4]

Combined (fixed-effects) p<0.001

4.26 [2.6, 7]

Combined (random-effects) p<0.001

4.23 [2.3, 7.8]
# Nerve Conduction Study Results

<table>
<thead>
<tr>
<th>Nerve Conduction Study Parameter</th>
<th>Change from baseline in Acupuncture group</th>
<th>Change from baseline in Control group</th>
<th>Change in Acupuncture vs Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distal Sensory Latency (DSL)</strong></td>
<td>↓ Yang 2009</td>
<td>↓ Yang 2011</td>
<td>(p=0.07) Khosrawi 2012</td>
</tr>
<tr>
<td>Median Nerve</td>
<td>↓↓↓ Yang 2011</td>
<td>↓↓↓ Yang 2011</td>
<td></td>
</tr>
<tr>
<td><strong>Distal Motor Latency (DML)</strong></td>
<td>↓ Yang 2009</td>
<td>↓ Yang 2011</td>
<td></td>
</tr>
<tr>
<td>Median Nerve</td>
<td>↓↓↓ Yang 2011</td>
<td>↓↓↓ Yang 2011</td>
<td></td>
</tr>
<tr>
<td><strong>Sensory Nerve Conduction Velocity (SNCV)</strong></td>
<td>↑ Khosrawi 2012</td>
<td>↑ Yang 2009</td>
<td></td>
</tr>
<tr>
<td>Peroneal Nerve</td>
<td>↑↑↑ Zuo 2010</td>
<td>↑↑↑ Zuo 2010</td>
<td>↑ Zuo 2010</td>
</tr>
<tr>
<td><strong>Motor Nerve Conduction Velocity (MNCV)</strong></td>
<td>↑↑↑ Yu 2001</td>
<td>↑↑↑ Yu 2001</td>
<td></td>
</tr>
<tr>
<td>Ulnar, Tibial Nerve</td>
<td>↑↑↑ Yu 2001</td>
<td>↑↑↑ Yu 2001</td>
<td></td>
</tr>
<tr>
<td>Median Nerve</td>
<td>↑↑↑ Yang 2011</td>
<td>↑↑↑ Yang 2011</td>
<td></td>
</tr>
<tr>
<td>Peroneal Nerve</td>
<td>↑↑↑ Zuo 2010</td>
<td>↑↑↑ Zuo 2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>↑↑↑ Yang 2011</td>
<td>↑↑↑ Yang 2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>↑↑↑ Yang 2011</td>
<td>↑↑↑ Yang 2011</td>
<td></td>
</tr>
</tbody>
</table>

Legend: ↑↑↑ = increased p < 0.01; ↑ = increased p < 0.05; ↓↓↓ = no significant change p > 0.05; ↓ = decreased p < 0.05; ↓↓ = decreased p < 0.01
Summary of Findings

• **Methodological problems**
  – Blinding - insufficient
  – Drop-out rates – not properly addressed
  – Subjective outcome measurements
  – Design issues – acupuncture used as control, etc
  – Underpowered – lack of power calculations, poor statistics

• **Difficult to compare trials**
  – Widely varying protocols – treatment, followup
  – Varying control treatments
  – Different populations – medical conditions, countries

• **Exclusion of non-English language Studies**
• In spite of multiple methodological problems, the reviewed RCTs show that acupuncture is effective for the treatment of peripheral neuropathy caused by CTS, DM and Bell’s palsy.

• Acupuncture is most likely effective for the treatment of HIV neuropathy, however further studies are needed to better characterize its effect in this population.

• There is not enough evidence to draw definitive conclusions on acupuncture’s effect for idiopathic and chemotherapy-induced neuropathy treatment. We identified a single negative study, which was likely underpowered.
Acupuncture for Neuropathy

Acupuncture points used in CTS

Acupuncture points used in Bell’s palsy
Acupuncture for Neuropathy

Acupuncture points used in Polyneuropathy
10 cases of peripheral neuropathy

- Consecutive cases from OHSU’s Neurology Wellness Clinic
- Various etiologies
- Large and small fiber neuropathy
- Treated at least 6 sessions
- Standardized treatment protocol with point selection based on anatomical relationship with peripheral nerves
- **High-frequency Electroacupuncture (100 Hz)** to feet – Deep Peroneal and Tibial nerves
Arm Points Used

Anterior Arm

- LATERAL ANTEBRACHIAL CUTANEOUS NERVE
- SUPERFICIAL BRANCH OF RADIAL NERVE
- DEEP RADIAL NERVE
- ULNAR NERVE
- MEDIAN NERVE
- ANTERIOR INTEROSSEOUS NERVE
- DEEP BRANCH OF ULNAR NERVE
- SUPERFICIAL BRANCH OF ULNAR NERVE
- PALMAR DIGITAL NERVES

Posterior Arm

- DEEP BRANCH OF RADIAL NERVE
- SUPERFICIAL BRANCH OF RADIAL NERVE
- DORSAL DIGITAL NERVES
- POSTERIOR INTEROSSEOUS NERVE
- LI14
- TE5
- LI11
Leg Points Used

**Anterior Leg**
- GB34
- ST36
- SP9
- ST41 (EA)
- LR3 (EA)
- Bafeng

**Posterior Leg**
- SP6 •
- KI3 (EA) •
- KI1 (EA)
- E-stim
- E-stim
<table>
<thead>
<tr>
<th>N</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Symptom Duration</th>
<th>Diagnostic workup</th>
<th>EMG Findings</th>
<th>Failed Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>F</td>
<td>Idiopathic small fiber neuropathy</td>
<td>9 years</td>
<td>Serologic testing&lt;br&gt;Urine heavy metals&lt;br&gt;Abdominal fat pad biopsy&lt;br&gt;MRI brain&lt;br&gt;MRI cervical, thoracic, lumbar spine</td>
<td>1) NCS of the left arm and leg – unremarkable&lt;br&gt;2) NCS/EMG of the right leg - unremarkable</td>
<td>gabapentin 2400 mg daily&lt;br&gt;methylprednisolone 1 gram 1-2 day course, 1-4 times per year, x 7 years&lt;br&gt;nortriptyline 30 mg nightly&lt;br&gt;citalopram 20 mg daily&lt;br&gt;hydrocodone/acetaminophen 5-500 pm</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>20 years</td>
<td>Serologic testing</td>
<td>1) NCS of the left arm and leg - normal, with mildly prolonged peak latency of Sural nerve, attributed to cold temperature. 2) NCS/EMG of left arm and leg - normal Sural latency; no evidence of large fiber neuropathy</td>
<td>gabapentin 300 mg daily&lt;br&gt;tramadol 50 mg every 6 hours prn&lt;br&gt;vit E daily</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>10 months</td>
<td>Serologic testing&lt;br&gt;CSF testing&lt;br&gt;MRI brain, MRI cervical, thoracic, lumbar spine</td>
<td>NCS/EMG of the right arm and leg - no evidence of large fiber neuropathy</td>
<td>gabapentin 2700 mg daily&lt;br&gt;amitriptyline 75 mg at bedtime</td>
</tr>
<tr>
<td>4</td>
<td>52</td>
<td>F</td>
<td>Length-dependent axonal sensorimotor neuropathy, limited autonomic neuropathy</td>
<td>4 years</td>
<td>Serologic testing&lt;br&gt;Autonomic testing</td>
<td>NCS/EMG of the left arm and leg - Mild, axonal, length dependent sensorimotor peripheral neuropathy</td>
<td>alpha-lipoic acid twice daily&lt;br&gt;vit E daily</td>
</tr>
<tr>
<td>5</td>
<td>56</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>6.5 years</td>
<td>Serologic testing&lt;br&gt;MRI cervical spine</td>
<td>Right arm NCS/EMG - negative for neuropathy or radiculopathy</td>
<td>gabapentin 1800 mg daily&lt;br&gt;hydrocodone/acetaminophen 5/300 mg as daily prn&lt;br&gt;duloxetine 60 mg daily&lt;br&gt;amitriptyline 25 mg at bedtime</td>
</tr>
<tr>
<td>6</td>
<td>57</td>
<td>F</td>
<td>Idiopathic small fiber neuropathy</td>
<td>2 years</td>
<td>Serologic testing</td>
<td>NCS/EMG of the left arm and leg - No evidence of large fiber neuropathy</td>
<td>alpha-lipoic acid twice daily&lt;br&gt;vit E daily</td>
</tr>
<tr>
<td>7</td>
<td>58</td>
<td>M</td>
<td>Length-dependent axonal sensorimotor neuropathy, idiopathic small fiber neuropathy</td>
<td>1 year 9 months</td>
<td>Serologic testing&lt;br&gt;Skin biopsy&lt;br&gt;Autonomic testing, QST&lt;br&gt;MRI cervical, lumbar spine</td>
<td>NCS/EMG of the left arm and leg - Length-dependent sensorimotor axonal neuropathy</td>
<td>gabapentin 2700 mg daily&lt;br&gt;alpha-lipoic acid twice daily&lt;br&gt;vit E daily</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>M</td>
<td>Anti-myelin-associated glycoprotein (MAG) neuropathy</td>
<td>6 years</td>
<td>Serologic testing&lt;br&gt;CSF testing</td>
<td>NCS/EMG of the right arm and leg - Very severe sensory predominant sensorimotor polyneuropathy</td>
<td>IVIG (4 day course) for 3 months&lt;br&gt;plasmapheresis x 3 over 3 months&lt;br&gt;rituximab – 3 courses&lt;br&gt;gabapentin 3600 mg daily&lt;br&gt;pregabalin 600 mg daily&lt;br&gt;duloxetine 60 mg daily&lt;br&gt;tramadol 50 mg q6h as needed</td>
</tr>
<tr>
<td>9</td>
<td>67</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>7 years</td>
<td>Serologic testing&lt;br&gt;Skin biopsy</td>
<td>NCS/EMG of the left arm and leg - Mild bilateral carpal tunnel syndrome; no evidence of large fiber neuropathy</td>
<td>gabapentin 2700 mg daily&lt;br&gt;alpha-lipoic acid twice daily&lt;br&gt;coenzyme Q10 and vit E daily&lt;br&gt;gluten-free and lactose-free diet</td>
</tr>
<tr>
<td>10</td>
<td>69</td>
<td>M</td>
<td>Length-dependent axonal sensorimotor neuropathy</td>
<td>3 years</td>
<td>Serologic testing&lt;br&gt;Autonomic testing</td>
<td>EMG x 2: Length-dependent, sensorimotor, axonal peripheral neuropathy</td>
<td>gabapentin 1800 mg daily&lt;br&gt;oxycodone 5 mg as needed at bedtime</td>
</tr>
</tbody>
</table>

Abbreviations: NCS = Nerve Conduction Studies, prn = as needed, EMG = electromyography, mg = milligram, IVIG = Intra-venous Immunoglobulin, CSF = cerebrospinal fluid, MRI = Magnetic Resonance Imaging
### Table 2. Treatment Table

<table>
<thead>
<tr>
<th>N</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Treatment Course</th>
<th>Sessions/week</th>
<th>Maintenance Course</th>
<th>Baseline VAS pre-Tx</th>
<th>Peak VAS Pre-Tx</th>
<th>VAS post-Tx</th>
<th>Summary of other points used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>F</td>
<td>Idiopathic small fiber neuropathy</td>
<td>14 sessions over 17 weeks</td>
<td>0.82</td>
<td>12 sessions over 13 months</td>
<td>3-4/10</td>
<td>7-8/10</td>
<td>0/10</td>
<td>EA to ST 41-GB 34 Back Treatment: EA to bilateral GB 21-SI 14, SI 12-9, BL 32-38, BL 27, 28, 37, Huato T1-T4, Huato L5-GB 30 MA to right GB 20, GV 12,14, bilateral GB 21, Huato C5-7, T2-3, T10-11</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>10 sessions over 11 weeks</td>
<td>0.91</td>
<td></td>
<td>3/10</td>
<td>7/10</td>
<td>1/10</td>
<td>3 of the 10 visits with different acupuncturist for low back pain</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>12 sessions over 18 weeks</td>
<td>0.67</td>
<td></td>
<td>8/10</td>
<td>9-10/10</td>
<td>4/10</td>
<td>Back treatment: MA to right GB 20, GV 7,14, bilateral GB 21, LI 11,15, BL 40-58-60</td>
</tr>
<tr>
<td>4</td>
<td>52</td>
<td>F</td>
<td>Length-dependent axonal sensorimotor neuropathy</td>
<td>12 sessions over 19 weeks</td>
<td>0.63</td>
<td>ongoing</td>
<td>2-3/10</td>
<td>6-7/10</td>
<td>1/10</td>
<td>EA to bilateral PC 3-6</td>
</tr>
<tr>
<td>5</td>
<td>56</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>10 sessions over 13 weeks</td>
<td>0.77</td>
<td></td>
<td>5/10</td>
<td>9/10</td>
<td>2-3/10</td>
<td>MA to bilateral Baxie, left shoulder AShi points</td>
</tr>
<tr>
<td>6</td>
<td>57</td>
<td>F</td>
<td>Idiopathic small fiber neuropathy</td>
<td>6 sessions over 9 weeks</td>
<td>0.67</td>
<td></td>
<td>2/10</td>
<td>4/10</td>
<td>1/10</td>
<td>EA to bilateral Bafeng</td>
</tr>
<tr>
<td>7</td>
<td>58</td>
<td>M</td>
<td>Length-dependent axonal sensorimotor neuropathy, Idiopathic small fiber neuropathy</td>
<td>16 sessions over 24 weeks</td>
<td>0.67</td>
<td>8 sessions over 10.5 months</td>
<td>1-2/10</td>
<td>6-7/10</td>
<td>0/10</td>
<td>EA to bilateral SP 5-9, KI 6-SP 9, KI 1-ST 36, ST 36-41 Back treatment: MA to right GB 20, GB 21, LI 14, LU 1, GV 12,14</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>M</td>
<td>Anti-myelin-associated glycoprotein (MAG) Neuropathy</td>
<td>25 sessions over 37 weeks</td>
<td>0.68</td>
<td></td>
<td>7-8/10</td>
<td>10/10</td>
<td>4-6/10</td>
<td>EA to bilateral ST 41-GB 34 Back treatment: MA to GV 12, GV 14, bilateral LI 14, LI 5,BL 40-58-60, BL 52, GB 25, ST 10, right GB 20</td>
</tr>
<tr>
<td>9</td>
<td>67</td>
<td>M</td>
<td>Idiopathic small fiber neuropathy</td>
<td>12 sessions over 17 weeks</td>
<td>0.70</td>
<td>6 sessions over 3.5 months</td>
<td>3-4/10</td>
<td>6-7/10</td>
<td>0-1/10</td>
<td>EA to bilateral ST 41-ST 36 bilateral</td>
</tr>
<tr>
<td>10</td>
<td>69</td>
<td>M</td>
<td>Length-dependent axonal sensorimotor neuropathy</td>
<td>24 sessions over 40 weeks</td>
<td>0.60</td>
<td></td>
<td>5-6/10</td>
<td>8/10</td>
<td>1-3/10</td>
<td>EA to bilateral Baxie Points, ST 41-GB 34, ST 41-36 Back treatment: MA to right GB 20, Huato C5-7, T2-3, GV 12, GV 14, BL 40-58-60, bilateral GB 21, Trapezius dry needling/trigger pointing</td>
</tr>
</tbody>
</table>

Abbreviations: VAS = visual analogue scale, Tx = treatment, EA = electroacupuncture, MA = manual acupuncture
Typical Acupuncture Course

• **Active Treatment:**
  – 6-8 weeks, at least once a week, preferably twice
  – peripheral neuropathy may take up to 12-14 weekly treatments

• **Transition/Spacing out:**
  – Every other week, then once a month

• **Maintenance (if needed):**
  – Once every 2-3 months or less often

• **Session Duration:**
  – 30-45 min, longer for neuropathy (60 min)
THANKS

- My clinic patients
- Research volunteers
- Yunpeng Luo, DAOM
- Charles Murchison, MS
- Richard Hammerschlag, PhD
- Cynthia Morris, PhD
- Suzanne Mitchell, PhD
- Mitchell Elkind, MD
- Mark Green, MD

- Barry Oken, MD, PhD
• Claiming CME
• Course and Plenary Presentations

Visit: [www.aanem.org/resources](http://www.aanem.org/resources)

Record your attendance hours after each session or do it all at once after the meeting is complete! Credit not recorded by December 15, 2018 will not be reported to ABPN and ABPMR. The AANEM will report ALL Annual Meeting attendees’ credit to ABPN and ABPMR by December, 31, 2018.