The Safe and Effective Use of Acupuncture for the Treatment of Radiation Induced Side Effects

Douglas McDaniel, DACM, Dipl.Ac. (NCCAOM), L. Ac.
Integrative Medicine Program Manager
Roswell Park Comprehensive Cancer Center
September 7, 2018
Unwanted Effects of Radiation Therapy (RT)

• Cancer patients often experience debilitating side effects during and after their treatment.
• While conventional treatments exist to address these symptoms most are inadequate or may have their own unwanted side effects.
• As a result, many patients turn to complementary and alternative medicine modalities (CAM), including acupuncture, to reduce side effects, increase tolerance and efficacy of their treatment and support their immune system.
Acupuncture’s Role in Oncology Care

• Acupuncture is the insertion of very thin needles into specific points that correspond to various organ systems and body processes to support and optimize the functioning of these systems and processes by balancing and promoting the smooth flow of the body’s vital energy (qi), blood and fluids.

• Acupuncture works to promote health through the cultivation and preservation of yin and the activation of yang.

• Supporting and maintaining these interactions helps to treat disease, promotes a state of health and well-being and offers a protective mechanism that may prevent or lessen the occurrence of unwanted side effects during cancer treatment.

• As a result, the patient is more resilient and able to stay the course and receive maximum benefit by experiencing fewer debilitating side effects that may interrupt their treatment schedule and leave them with unresolved complications long after their treatment has finished.
RT in Cancer Treatment

• Cancer patients may be treated with radiation
  • as a primary therapy
  • in conjunction with chemotherapy or
  • secondary to surgery

• Those treated with radiation therapy (RT) often experience serious and difficult to treat side effects that
  • begin shortly after initiation of treatment and
  • linger long after treatment has finished
  • negatively impacting quality of life (QOL) and overall future health.
Side Effects of RT

• Common side effects experienced by those receiving RT include
  • xerostomia
  • reduced saliva production
  • dysphagia
  • nausea
  • emesis
  • fatigue
  • cognitive impairments
  • often result in treatment delays and loss of tumor control
RT Induced Side Effects & Current Conventional Treatment

• The severity and type of side effect experienced is influenced by
  • radiation field
  • dose
  • length of treatment

• Current conventional treatments for these side effects are
  • mainly palliative
  • often ineffective
  • have unwanted side effects of their own
Evidence for Acupuncture & RT Induced Side Effects

• Studies to evaluate the effectiveness of acupuncture in preventing or alleviating these symptoms have been conducted.

• Results from these studies have been mixed.

• Increasing evidence exists that acupuncture may provide a safe, effective and longer lasting alternative to conventional treatments for RT related side effects.
Critical Review

Use of acupuncture to alleviate side effects in radiation oncology: Current evidence and future directions

Rebecca Asadpour a,c, Zhiqiang Meng MD PhD d, Kerstin A. Kessel PhD a,b, Stephanie E. Combs MD a,b,c,*
Inclusion Criteria & Study Characteristics

• Inclusion Criteria
  • Patients treated w/RT
  • Acupuncture to alleviate symptoms or side effects of RT
  • Randomized prospective trials

• Study Characteristics
  • Of 10 identified, 2 were feasibility studies for larger trials
  • All from university based centers with special institutions focusing on CAM treatments
  • Small number of trials & small number of patients – trial by trial comparison method chosen
  • Designs and statistical methods were very heterogeneous
  • Endpoints included well measurable items – QoL or patient reported reduction/improvement
<table>
<thead>
<tr>
<th>No.</th>
<th>Study</th>
<th>Year of publication</th>
<th>No. of patients</th>
<th>Target symptom</th>
<th>Needlepoints</th>
<th>Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blom et al²¹</td>
<td>1996</td>
<td>38</td>
<td>Xerostomia</td>
<td>Du 20, St 7, Si 17, Li 18, Si 3, St 5, St 6, P 6, H 7, Li 11, Li 10, Li 4, Si 3, Si 36, Liv 3, Sp 8, Sp 6, Ki 7, Ki 3, Ki 5, Ki 3, Ki 5, Sp 3</td>
<td>Improvement, no significance; improvement also in placebo group</td>
</tr>
<tr>
<td>2</td>
<td>Cho et al²²</td>
<td>2008</td>
<td>12</td>
<td>Xerostomia</td>
<td>St 6, Li 4, Si 36, Sp 6</td>
<td>Significant improvement</td>
</tr>
<tr>
<td>3</td>
<td>Balk et al²⁹</td>
<td>2009</td>
<td>27</td>
<td>Cancer-related fatigue</td>
<td>Li 4, Ren 6/CV 6, Sp 6 Ki 3, Si 36</td>
<td>Improvement</td>
</tr>
<tr>
<td>4</td>
<td>Eablon et al²³</td>
<td>2011</td>
<td>109</td>
<td>Emesis</td>
<td>PC 6</td>
<td>Improvement with sham and venum acupuncture compared with standard care</td>
</tr>
<tr>
<td>5</td>
<td>Eablon et al²⁴</td>
<td>2011</td>
<td>10</td>
<td>Nausea</td>
<td>PC 6</td>
<td>Suggested benefit of venum</td>
</tr>
<tr>
<td>6</td>
<td>Eablon et al²⁵</td>
<td>2012</td>
<td>215</td>
<td>Nausea</td>
<td>PC 6</td>
<td>No difference between venum and sham</td>
</tr>
<tr>
<td>7</td>
<td>Meng et al²⁶</td>
<td>2012</td>
<td>23</td>
<td>Xerostomia</td>
<td>Ren 24, LU 7, K 6, Shenmen, Point Zero, SG 2, Larynx</td>
<td>Significant reduction of xerostomia and improvement of QoL compared with sham acupuncture</td>
</tr>
<tr>
<td>8</td>
<td>Meng et al²⁷</td>
<td>2012</td>
<td>86</td>
<td>Xerostomia</td>
<td>Ren 24, LU 7, K 6, Shenmen, Point Zero, SG 2, Larynx</td>
<td>Significant reduction of xerostomia and improvement of QoL compared with sham acupuncture</td>
</tr>
<tr>
<td>9</td>
<td>Lu et al²⁸</td>
<td>2012</td>
<td>42</td>
<td>Dysphagia</td>
<td>GV 24, GV 20, I 16, GB 20, SV 24, SV 23, ST 7, Si 6, Si 5, Li 2, Li 11, ST 36, SP 9, SP 6, K 3, Yintang</td>
<td>Ongoing</td>
</tr>
<tr>
<td>10</td>
<td>Simcock et al²⁹</td>
<td>2013</td>
<td>145</td>
<td>Xerostomia</td>
<td>LI 12, LI 20, Salivary Gland 2, Modified Point Zero, Shen Men</td>
<td>Significant improvement than standard oral care</td>
</tr>
</tbody>
</table>
Xerostomia

- 5 Trials
- Patients with RT in Head & Neck region
- 4 of 5 studies showed significant reduction with acupuncture
- Blom et al.
  - 38 patients – 20 true acupuncture, 18 superficial
  - Both groups showed significant increase in salivary flow rates post acupuncture
  - 12 sessions
  - Results usually persisted during the results year
- Cho et al.
  - 12 patients randomized to 2 groups
  - Standard arm = sham group; experimental group = 4 acupoints (ST 6, LI 4, ST 36, Sp6)
  - 2x week for 6 weeks
  - Inclusion criteria – minimum dose > 38 Gy & exposed volume of the parotid > 50%
  - Endpoints – non stimulated & stimulated saliva flow and QoL assessed by a xerostomia questionnaire, 8 item survey by MD Anderson Symptom Inventory Head and Neck
  - No statistical difference between groups – real acupuncture increased salivary flow and improved QoL
Xerostomia, cont.

• Meng et al. Shanghai Group – Fudan University – 2 trials
  • 1st feasibility
    • Determine whether randomized trial w/sham as comparator practicable
    • Data showed significant increase in QoL & reduction of xerostomia
  • Then prospective randomized trial
    • 86 patients randomized – 40 true acupuncture; 46 sham
    • Endpoints QoL and stimulated & unstimulated salivary flow rates
    • Significant improvement in QoL and salivary flow rates in early phase week 3 & follow up at 1 & 6 months in true acu group

• Simcock et al.
  • Compared acupuncture w/ oral care chronic xerostomia after RT for head & neck cancer
    • 7 oncology centers in UK
    • Inclusion criteria – prior RT (at least 18 months) w/ at least 1 parotid in the target volume (without any dose constraints)
    • Crossover design beginning 4 weeks after the end of the 1st intervention (acupuncture vs oral care) was used
    • Weekly for 8 consecutive weeks – 20 mins per session
    • Significant improvement for xerostomia but saliva measurement unchanged for both groups
Cancer-related Fatigue

• Pilot study
• Randomized, modified, double-blinded, placebo-controlled
• 54 patients
  • Surgery alone or in combination w/chemo w/ indication for RT
• Standard arm- acupuncture 1x or 2x week for 4 weeks
• Control arm – sham mimicking true acupuncture
• 26 of 27 in true acupuncture arm completed
• Fatigue improvement better in true arm
• Physical & mental distress & QoL improved as well, but not significantly
• Clear benefit shown in reducing fatigue
Nausea & Emesis

• 3 trials from the same group
• 1st Trial
  • 267 patients – 109 acu, 106 sham, 62 standard care
  • Patients had received RT to abdominal/pelvic region
  • Nausea lower in acu group than standard of care
  • Almost all expected large antiemetic effect, no difference between acu & sham group observed
• 2nd Trial
  • Pilot study of 10 patients
• 3rd Trial
  • 215 patients
  • True & sham acu close to (before or after) 1st RT session
  • 30 mins. 3x week for 1st 2 weeks
  • 2x week for remaining course of RT
  • True acupuncture not more effective than sham
  • Both had significant nausea reduction
Dysphagia

- 42 patients after RT for head & neck cancer
- Changes in MD Anderson Dysphagia Inventory Score from baseline to 12 months and QoL
- Subgroup received testing for salivary flow rates & cytokines, including plasma transforming growth factor and interleukin to identify a biological explanation for changes observed
- Study results not yet published, however design may be promising to support acupuncture use in this population
<table>
<thead>
<tr>
<th>No.</th>
<th>Study</th>
<th>Year of publication</th>
<th>No. of patients</th>
<th>Target symptom</th>
<th>Needlepoints</th>
<th>Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blom et al^21</td>
<td>1996</td>
<td>38</td>
<td>Xerostomia</td>
<td>Du 20, St 7, Si 17, Li 18, St 3, St 5, St 6, P 6, H 7, Li 11, Li 10, Li 4, Si 3, St 36, Liv 3, Sp 8, Sp 6, Ki 7, Ki 3, Ki 5, Sp 3 St 6, Li 4, St 36, Sp 6 Li 4, Ren 6/CV 6, Sp 6/Ki 3, St 36</td>
<td>Improvement, no significance; improvement also in placebo group</td>
</tr>
<tr>
<td>2</td>
<td>Cho et al^22</td>
<td>2008</td>
<td>12</td>
<td>Xerostomia</td>
<td></td>
<td>Significant improvement</td>
</tr>
<tr>
<td>3</td>
<td>Balk et al^20</td>
<td>2009</td>
<td>27</td>
<td>Cancer-related fatigue</td>
<td></td>
<td>Improvement</td>
</tr>
<tr>
<td>4</td>
<td>Enblom et al^23</td>
<td>2011</td>
<td>109</td>
<td>Emesis</td>
<td>PC 6</td>
<td>Improvement with sham and verum acupuncture compared with standard care</td>
</tr>
<tr>
<td>5</td>
<td>Enblom et al^24</td>
<td>(feasibility trial)</td>
<td>10</td>
<td>Nausea</td>
<td>PC 6</td>
<td>Suggested benefit of verum</td>
</tr>
<tr>
<td>6</td>
<td>Enblom et al^25</td>
<td>2012</td>
<td>215</td>
<td>Nausea</td>
<td>PC 6</td>
<td>No difference between verum and sham</td>
</tr>
<tr>
<td>7</td>
<td>Meng et al^26</td>
<td>(feasibility trial)</td>
<td>23</td>
<td>Xerostomia</td>
<td>Ren 24, LU 7, K 6, Shenmen, Point Zero, SG 2, Larynx</td>
<td>Significant reduction of xerostomia and improvement of QoL compared with sham acupuncture</td>
</tr>
<tr>
<td>8</td>
<td>Meng et al^27</td>
<td>2012</td>
<td>86</td>
<td>Xerostomia</td>
<td>Ren 24, LU 7, K 6, Shenmen, Point Zero, SG 2, Larynx</td>
<td>Significant reduction of xerostomia and improvement of QoL compared with sham acupuncture</td>
</tr>
<tr>
<td>9</td>
<td>Lu et al^28</td>
<td>2012</td>
<td>42</td>
<td>Dysphagia</td>
<td>GV 24, GV 20, I 16, GB 20, SV 24, SV 23, ST 7, St 6, St, 5, LI 2, LI 11, ST 36, SP9, SP6, K3, Yintang</td>
<td>Ongoing</td>
</tr>
<tr>
<td>10</td>
<td>Simcock et al^29</td>
<td>2013</td>
<td>145</td>
<td>Xerostomia</td>
<td>LI 12; LI 20; Salivary Gland 2, Modified Point Zero, Shen Men</td>
<td>Significant improvement than standard oral care</td>
</tr>
</tbody>
</table>
How Acupuncture Points Are Chosen

• Along Meridian Pathway

• Local, Adjacent, Distal

• Auricular

• Point Category

• Existing Pathology
MERIDIANs AND ACUPoINTs

These drawings are meant only to convey an idea of the complexity of the fourteen major meridians. Due to space and angle of view limitations, all acupoints are not shown. Drawings reprinted by permission.
Auricular Acupuncture Points
Frequently Used Points – LI 4
Case Presentation

Relief of Radiation-Induced Xerostomia With Acupuncture Treatment: A Case Presentation

Hong Wu, MD, MS, Kimberley Wong, MD, Dian Wang, MD, PhD

Figure 1. Acupuncture points were localized to the head, ears, arms, and legs.
Frequently Used Points – Stomach Meridian
Location of Salivary Glands vs Facial Points
Research Article

Reduced Need for Rescue Antiemetics and Improved Capacity to Eat in Patients Receiving Acupuncture Compared to Patients Receiving Sham Acupuncture or Standard Care during Radiotherapy

Anna Enblom,^1,2^ Gunnar Steineck,^3,4^ Mats Hammar,^5^ and Sussanne Börjeson^6^

^1^Division of Physiotherapy, Department of Medical and Health Sciences, Linköping University, Linköping, Sweden
^2^Department of Clinical Neuroscience, Osher Center for Integrative Medicine, Karolinska Institutet, Stockholm, Sweden
^3^Department of Oncology-Pathology, Karolinska Institutet, Stockholm, Sweden
^4^Division of Clinical Cancer Epidemiology, Department of Oncology, Sahlgrenska Academy, Gothenburg University, Gothenburg, Sweden
^5^Division of Obstetrics and Gynecology, Department of Clinical and Experimental Medicine, Linköping University, Linköping, Sweden
^6^Division of Nursing, Department of Oncology and Department of Medical and Health Sciences, Linköping University, Linköping, Sweden

Hindawi Publishing Corporation
Evidence-Based Complementary and Alternative Medicine
Volume 2017, Article ID 5806351, 11 pages
http://dx.doi.org/10.1155/2017/5806351
# Antiemetic Prescription

<table>
<thead>
<tr>
<th>Variable</th>
<th>Antiemetic type</th>
<th>Name and dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>At <em>first</em> occurrence of mild nausea, prescribe¹</td>
<td>Antihistamine with antiemetic effect</td>
<td>Meclozine 25 mg 1-2/day</td>
</tr>
<tr>
<td>At <em>first</em> occurrence of severe nausea or occurrence of vomiting, <em>instead prescribe¹ or if not satisfactory nausea control, also add¹</em></td>
<td>Serotonin-receptor antagonists</td>
<td>Ondansetron 8 mg 2/day or granisetron 1 mg 1/day or tropisetron 5 mg 1/day</td>
</tr>
<tr>
<td>If not satisfactory nausea control, also add¹</td>
<td>Corticosteroids</td>
<td>Betamethasone 4 mg 2/day</td>
</tr>
</tbody>
</table>

Description of the standardised clinical routines for prescription of antiemetic medications. mg = milligram. ¹If the patient agreed to consume medications.
Delivery of Acupuncture – True vs Sham

- 7 physiotherapists trained in acupuncture delivered either true or sham treatments
- Treatments were 30 minutes in length, started on the 1^{st} day of radiation, delivered 3x week for 1^{st} two weeks, continued 2x week for the remainder of radiation
- Engaged in everyday conversations with patients but avoided the subject of emesis
- 1-3 patient treated simultaneously in different rooms
True Acupuncture Group

- Bilateral P6, traditional antiemetic point
- Stainless steel acupuncture needles manufactured in Korea, 0.25 x 40mm inserted to depth of ½ body inch (cun)
- 1 cun = the width at the widest part of the patient’s thumb
- Needles manipulated 3x (start, middle & end) during tx
- Manipulation consisted of lifting & thrusting until *de qi* sensation obtained
Frequently Used Points – P6
Sham Acupuncture Group

- Physiotherapist deliver sham acupuncture to a non acupuncture point 2 cun proximal to P6 using “Park’s sham device”, a nonpenetrating telescopic sham needle, 0.25 x 40mm
- Stainless steel, manufactured in Korea, looks identical to a regular acupuncture needle
- Needle glides up into handle instead of penetrating skin – gives the illusion of penetration
- Sham needle held in place by bottom plate and double sided stick tape
- Sham needle manipulated 3x during session – needle touches but does not penetrate skin
Park’s Sham Device

Starting position
Placebo Insertion
True Insertion

1 Needle handle
2 Needle
3 Blunt tip of the placebo needle
4 Plastic ring
5 Plastic cover
6 Skin
7 Dermis
8 Muscle
9 Sharp tip of acupuncture needle
Antiemetic Use

Capacity to Eat

**Figure 2:** Proportion (%) of patients consuming antiemetics or not (left) and with capacity to eat as usual or not (right). Measured in patients in the verum acupuncture group; *n* = 89, sham acupuncture group; *n* = 95 (*n* = 94 graded eating capacity), and standard care group; *n* = 62, when all three groups had received 27 Gray (mean) dose of radiotherapy.

**Figure 3:** Proportion (%) of patients with different levels of eating capacity during and after radiotherapy in the verum and the sham acupuncture group. The number of patients decreases over time due to the individual length of radiotherapy. *Two patients did not answer; reason unknown.*
Emesis in patients receiving acupuncture, sham acupuncture or standard care during chemo-radiation: A randomized controlled study

Ylva Widgren\textsuperscript{a,*}, Anna Enblom\textsuperscript{b}

\textsuperscript{a} The Social Rehabilitation Unit, Sundsvall Municipality and Department of Medical and Health Sciences, Division of Physiotherapy, Linköping University, Linköping, Sweden

\textsuperscript{b} Region of Östergötland, Department of Medical and Health Sciences, Division of Physiotherapy, Linköping University, Linköping, Sweden
Nausea & Vomiting

Fig. 2. Proportions (%) of the patients in the verum acupuncture group, the sham acupuncture group and the standard care group who experienced nausea or vomited at the cross-sectional comparison. P-values compare the verum acupuncture group to the other patients (sham acupuncture plus standard care).
Intensity of Nausea

Fig. 3. Proportions (%) of the patients in the verum acupuncture group, the sham acupuncture group and the standard care group who experienced nausea of different intensities at the cross-sectional comparison. P-value compare the verum acupuncture group to the other patients (sham acupuncture plus standard care).
RESEARCH ARTICLE

Electroacupuncture Prevents Cognitive Impairments by Regulating the Early Changes after Brain Irradiation in Rats

Xing-Wen Fan¹,⁵, Fu Chen², Yan Chen², Guan-Hao Chen¹,⁵, Huan-Huan Liu³, Shi-Kuo Guan¹, Yun Deng¹, Yong Liu¹, Sheng-Jian Zhang⁴, Wei-Jun Peng⁴, Guo-Liang Jiang¹,⁵, Kai-Liang Wu¹,⁵*
Effects of Brain Irradiation (BI) Leading to Cognitive Impairment

• Profound oxidative stress & inflammatory stress
• Loss of hippocampal neurogenesis
• Persistent changes in neuronal structure & synaptic plasticity
• White matter impairment
• Blood brain barrier (BBB) damage
• Decreased capillary density
Evidence for Acupuncture in BI

- Evidence suggests acupuncture is effective in treating several neurological disorders
  - Stroke
  - Depression
  - Fatigue
- Acupuncture’s therapeutic effect comes from stimulating acupuncture points resulting in adenosine A1 receptors & nerve fibers transfer the signal
- Neuroimmune system modulation has also been reported
- EA immediately after middle cerebral artery occlusion prevented extensive BBB damage & inhibited neuroinflammation, 2 important elements of irradiation-induced brain injury
Acupuncture Points Used

Du 20 (Baihui)  
Du 26 (Shiugou)
EA – Method of Delivery

- 5 mins. after BI
- EA applied for 30 mins
- Wave type – dense sparse
- Frequency – 2/15 Hz
- Intensity – 3 mA
Effects of EA after Brain Irradiation (BI) in Rats

• Therapeutic effects of electroacupuncture (EA) were seen immediately after BI in rats
• Changes in cognitive function, neurogenesis and synaptic density were detected at varying time points post irradiation

• Early Phase
  • protect blood brain barrier (BBB) in hypocampus & cortex
  • inhibit neuroinflammatory cytokine expression
  • upregulate angiogenic cytokine expression
  • modulate neuronal function

• Delayed Phase
  • protected spatial memory and recognition
  • prevented the onset of cognitive impairments

• Cellular/molecular level
  • preventive effect on cognitive dysfunction not dependent on hippocampal neurogenesis
  • Reduced the loss of synaptophysin expression
Acupuncture for Dysphagia after Chemoradiation in Head and Neck Cancer: Rationale and Design of a Randomized, Sham-Controlled Trial

Weidong Lu, MB, MPH, PhD1,*, Peter M. Wayne, PhD2, Roger B. Davis, ScD3, Julie E. Buring, ScD2, Hailun Li, MS4, Laura A. Goguen, MD5, David S. Rosenthal, MD1, Roy B. Tishler, MD, PhD6, Marshall R. Posner, MD6, and Robert I. Haddad, MD6
Figure 1.
Hypothesized effects of acupuncture for dysphagia in head and neck cancer
Solid curve lines: pathological damage of chemoradiation therapy;
Dash lines: potential effects of acupuncture on pathological factors of dysphagia;
Downward small arrows: inhibitory effects of acupuncture;
Upward small arrows: stimulating effects of acupuncture.
Figure 2.
The study design and the flow of the participants through the trial.
<table>
<thead>
<tr>
<th>Name</th>
<th>Chinese Pinyin Name</th>
<th>Location</th>
<th>Innervations</th>
</tr>
</thead>
<tbody>
<tr>
<td>GV24</td>
<td>Shenting</td>
<td>0.5 cun$^{**}$ directly above midpoint of anterior hairline.</td>
<td>The branch of the frontal nerve.</td>
</tr>
<tr>
<td>GV20</td>
<td>Baihui</td>
<td>On the midline of the hand; 7 cun directly above posterior hairline; approximately on midpoint of line connecting apaxes of two auricles.</td>
<td>The branch of the great occipital nerve.</td>
</tr>
<tr>
<td>SI16</td>
<td>Tianshuang</td>
<td>In the lateral aspect of the neck, in the posterior border of m. sternocleidomastoideus, posterosuperior to Futa.</td>
<td>The cutaneous cervical nerve, the emerging portion of the great auricular nerve.</td>
</tr>
<tr>
<td>GB20</td>
<td>Fengshi</td>
<td>In the depression between the upper portion of m. sternocleidomastoideus and m. trapezius, on the same level with Fengfu.</td>
<td>The branch of the lesser occipital nerve.</td>
</tr>
<tr>
<td>CV24</td>
<td>Chengjiang</td>
<td>In the depression in the centre of the mentalabial groove.</td>
<td>The branch of the facial nerve.</td>
</tr>
<tr>
<td>CV23</td>
<td>Lianquan</td>
<td>Above the Adam’s apple, in the depression of the upper border of the hyoid bone.</td>
<td>The branch of the cutaneous cervical nerve, the hypoglossal nerve, and the branch of the glossopharyngeal nerve.</td>
</tr>
<tr>
<td>ST7</td>
<td>Xiaguan</td>
<td>At the lower border of the zygomatic arch, in the depression anterior to the condylar process of the mandible.</td>
<td>The zygomatic branch of the facial nerve and the branches of the auriculotemporal nerve.</td>
</tr>
<tr>
<td>ST6</td>
<td>Jiache</td>
<td>One finger-breadth anterior and superior to the lower angle of the mandible where m. masseter attaches at the prominence of the muscle when the teeth are clenched.</td>
<td>The great auricular nerve, facial nerve and musseteric nerve.</td>
</tr>
<tr>
<td>ST5</td>
<td>Duying</td>
<td>Anterior to the angle of mandible, on the anterior border of the attached portion of m. masseter, in the groove-like depression appearing when the cheek is bulged.</td>
<td>The facial and bucal nerves.</td>
</tr>
<tr>
<td>LI2</td>
<td>Erjian</td>
<td>On the radial side of the index finger, distal to the metacarpal-phalangeal joint, at the junction of the red and white skin. The point is located with the finger slightly flexed.</td>
<td>The dorsal digital nerve of the radial nerve, and the palmar digital proprioal of the median nerve.</td>
</tr>
<tr>
<td>LI11</td>
<td>Quchi</td>
<td>When the elbow is flexed, the point is in the depression at the lateral end of the transverse cubital crease, midway between Chize and the lateral epicondyle of the humerus.</td>
<td>The posterior antebrachial cutaneous nerve; deeper, on the medial side, the radial nerve.</td>
</tr>
<tr>
<td>ST36</td>
<td>Zusanli</td>
<td>3 cun below Dubi, one finger-breadth from the anterior crest of the tibia, in m. tibialis anterior.</td>
<td>Superficially, the lateral aural cutaneous nerve and the cutaneous branch of the saphenous nerve; deeper, the deep peroneal nerve.</td>
</tr>
<tr>
<td>SP9</td>
<td>Yinlingquan</td>
<td>On the lower border of the medial condyle of the tibia, in the depression on the medial border of the tibia.</td>
<td>Superficially, in the medial crural cutaneous nerve; deeper, the tibial nerve.</td>
</tr>
<tr>
<td>SP6</td>
<td>Sanyinjiao</td>
<td>3 cun directly above the tip of the medial malleolus, on the posterior border of the medial aspect of the tibia.</td>
<td>Superficially, the medial crural cutaneous nerve; deeper, in the posterior aspect, the tibial nerve.</td>
</tr>
<tr>
<td>K3</td>
<td>Taixi</td>
<td>In the depression between the medial malleolus and tendo calcaneus, at the level with the tip of the medial malleolus.</td>
<td>The medial crural cutaneous nerve, on the course of the tibial nerve.</td>
</tr>
<tr>
<td>Extra</td>
<td>Yintang</td>
<td>Midway between the medial ends of the two eyebrows.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

$^{**}$cun, a measuring unit in acupuncture, approximately 1 inch
Figure 1. Acupuncture points used for chemoradiation-related dysphagia in head and neck cancer. To avoid the radiation field, acupuncture points needed before week 4 after CRT (phase 1, solid round circles) were selected to avoid the chin and neck area. Additional points were added at week 4 after CRT visit (phase 2, solid diamonds) and at the week 12 after CRT (phase 3, solid triangles). Electrostimulation was added starting with the third visit.

Abbreviation: CRT, chemoradiation therapy.
<table>
<thead>
<tr>
<th>Phases of Treatment</th>
<th>Treatment Intention</th>
<th>Treatment Visits</th>
<th>Points, Stimulation and Number of Needles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reduce anxiety regarding needling; familiarize patient with procedure; initiate body response</td>
<td>1(^{st}) and 2(^{nd})</td>
<td>ST36, SP9, K3, LI11, GV20, GV24, Yintang; mild; 13 needles ***</td>
</tr>
<tr>
<td>2</td>
<td>Increase intensity; expand to facial area; continue body response</td>
<td>3(^{rd})–7(^{th})</td>
<td>Add LI2, ST7, ST5, CV24; Add electroacupuncture moderate; 22 needles</td>
</tr>
<tr>
<td>3</td>
<td>Increase intensity; expand to the back and front of neck; maximize body response</td>
<td>8(^{th})–12(^{th})</td>
<td>Add SI16, GB20, CV23, continue electroacupuncture; 27 needles</td>
</tr>
</tbody>
</table>

*** Acupuncture point selection will remain at phase one until the 4th week post CRT, regardless of the number of acupuncture sessions received.
Table 5

Sham acupuncture point locations

<table>
<thead>
<tr>
<th>Sham points</th>
<th>Anatomical Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>No 1.</td>
<td>3 cun above the tip of the medial malleolus, 2 cun posterior to the posterior border of the medical aspect of tibia.</td>
</tr>
<tr>
<td>No 2.</td>
<td>2 cun above the superior lateral border of the patella and 2 cun posterior to the line of connecting with the Anterior Superior Iliac Spine (ASIS)</td>
</tr>
<tr>
<td>No 3</td>
<td>1 cun above the superior medial border of the patella and 1 cun posterior.</td>
</tr>
<tr>
<td>No 4</td>
<td>3 cun above crease of wrist on the posterior lateral aspect of the forearm, midway between TW 6 (Zhiguo) and LI 6 (Pianli).</td>
</tr>
<tr>
<td>No 5</td>
<td>On the lateral side of the upper arm, 1 cun above LI11 (Quchi), midway between LI12 (Zhouliao) and the pathway of Lung meridian.</td>
</tr>
<tr>
<td>No 6</td>
<td>3 cun directly above the midpoint of the anterior hairline and 1 cun lateral to the midline on the right side.</td>
</tr>
<tr>
<td>No 7</td>
<td>3 cun directly above the midpoint of the anterior hairline and 1 cun lateral to the midline on the left side.</td>
</tr>
<tr>
<td>No 8</td>
<td>1 cun directly below the depression posterior and inferior to the mastoid process, GB12 (Wangu)</td>
</tr>
</tbody>
</table>
## Table 6

Summary of outcome measures and testing schedule

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Description</th>
<th>Baseline</th>
<th>@2nd Tx</th>
<th>@ 4 wk post CRT</th>
<th>@ 8 wk post CRT</th>
<th>@ 12 wk post CRT</th>
<th>@ 20 wk post CRT</th>
<th>@ 12 mos from baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>History/physical</td>
<td>Cancer history and treatment</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Weight changes</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Feeding Tubes</td>
<td>Presence and absence of feeding tube and time-to-removal</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>QOL: MDADI</td>
<td>Dysphagia specific QOL</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>QOL: FACT-H&amp;N</td>
<td>General cancer plus HNC QOL</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>QOL: XQ</td>
<td>Xerostomia specific QOL</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Dietary Consistency</td>
<td>Monitor dietary continuum</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>TCS</td>
<td>Monitor treatment expectation and credibility</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blinding</td>
<td>Assess treatment blinding effect</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VFSS study *</td>
<td>Assess the oral pharyngeal and esophageal stages of deglutition</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salivary flow rate*</td>
<td>Assess salivary flow production</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TGF-β1/IL-6</strong></td>
<td>Assess TGF-β1/IL-6 levels</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MDADI: The M.D. Anderson Dysphagia Inventory
FACT-H&N: The Functional Assessment of Cancer Therapy-Head and Neck
XQ: Xerostomia Questionnaire
TCS: Treatment Credibility Scale
VFSS: Videofluorographic swallowing study
* only patients who participate the mechanistic tests need to take these tests.
Acupuncture for Chemoradiation Therapy-Related Dysphagia in Head and Neck Cancer: A Pilot Randomized Sham-Controlled Trial


Leonard P. Zakim Center for Integrative Therapies and Head and Neck Oncology Program, Dana-Farber Cancer Institute, Boston, Massachusetts, USA; Osher Center for Integrative Medicine, Division of Preventive Medicine, Brigham and Women’s Hospital and Harvard Medical School, Boston, Massachusetts, USA; Department of Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts, USA; Dana-Farber/Harvard Cancer Center, Boston, Massachusetts, USA; Biostatistics Center, Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts, USA; Department of Radiation Oncology, Dana-Farber Cancer Institute/Brigham and Women’s Hospital, Boston, Massachusetts, USA; Head and Neck Oncology Center, Mount Sinai Medical Center, New York, New York, USA
**Conclusion**

A blinded, sham-controlled, randomized clinical trial to evaluate the effectiveness of verum acupuncture in treating dysphagia-related QOL in patients with advanced stage of HNC undergoing intense CRT found the procedure to be feasible, safe, and well tolerated. Dysphagia-related QOL improved with both active acupuncture and sham acupuncture. A future, more definitive trial, is warranted.
Acupuncture for non-palliative radiation therapy related fatigue: a feasibility study

Jun James Mao, MD, MSCE\textsuperscript{1,2,3}, Terry Styles, MD\textsuperscript{3,4}, Andrea Cheville, MD MSCE\textsuperscript{5}, James Wolf, BA\textsuperscript{1}, Shawn Fernandes, BS\textsuperscript{2}, and John T Farrar, MD PhD\textsuperscript{2,3}
Figure 1. Lee fatigue scale score among clinical trial participants (N=16)
We did not collect post RT data from the first 3 subjects.
Higher number indicates higher fatigue as well as higher energy
Table 3

Patient’s global impression of fatigue as compared to baseline

<table>
<thead>
<tr>
<th>Patient Global Impression of Change</th>
<th>Mid-RT (N=16)</th>
<th>End-RT (N=16)</th>
<th>Post-RT* (N=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worsened</td>
<td>1 (6%)</td>
<td>2 (13%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Stable</td>
<td>11 (69%)</td>
<td>8 (50%)</td>
<td>2 (15%)</td>
</tr>
<tr>
<td>Improved</td>
<td>4 (25%)</td>
<td>6 (38%)</td>
<td>10 (78%)</td>
</tr>
</tbody>
</table>

Abbreviation: RT-radiation therapy

* We did not collect post RT data from the first 3 subjects
STandards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) Guidelines

<table>
<thead>
<tr>
<th>Item</th>
<th>Detailed Description</th>
</tr>
</thead>
</table>
| 1. Acupuncture rationale | 1a) Style of acupuncture (e.g., Traditional Chinese Medicine, Japanese, Korean, Western medical, Five Element, ear acupuncture, etc.).  
1b) Reasoning for treatment provided, based on historical context, literature sources, and/or consensus methods, with references where appropriate.  
1c) Extent to which treatment was varied. |
| 2. Details of needling | 2a) Number of needle insertions per subject per session (mean and range where relevant).  
2b) Names or location if no standard names of points used (umbilical point).  
2c) Depth of needle, based on a specified unit of measurement, or on a particular tissue level.  
2d) Response sought (e.g., decrease in muscle twitch response).  
2e) Needle stimulation (e.g., manual, electrical).  
2f) Needle retention time.  
2g) Needle type (diameter, length, and manufacturer or material). |
| 3. Treatment regimen | 3a) Number of treatment sessions.  
3b) Frequency and duration of treatment sessions. |
| 4. Other components of treatment | 4a) Details of other interventions administered to the acupuncture group (e.g., moxibustion, cupping, herbs, exercises, lifestyle advice).  
4b) Setting and context of treatment, including instructions to practitioners, and information and explanations to patients. |
| 5. Practitioner background | 5) Description of participating acupuncturists (qualification or professional affiliation, years in acupuncture practice, other relevant experiences). |
| 6. Control or comparator interventions | 6a) Rationale for the control or comparator in the context of the research question, with sources that justify this choice.  
6b) Precise description of the control or comparator. If sham acupuncture or any other type of acupuncture-like control is used, provide details as for items 1 to 3 above. |

Note: This checklist, which should be read in conjunction with the explanations of the STRICTA items, is designed to replace CONSORT 2010’s item 3 when reporting an acupuncture trial.
Conclusions

- Acupuncture has been shown to be effective in treating side effects related to radiation therapy in cancer patients
- The current literature is mixed
- Clinical trials must be standardized
- Higher powered studies are necessary
- STRICTA guidelines for acupuncture protocols must be followed to guide future research and improve translation into clinical practice
References


