Effectiveness of Acu-TENS on Reducing Dyspnoea and Improving Physical Ability on Stable COPD patients– A Controlled Trial

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Presenter:
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Physiotherapist I, TMH
Background

- Chronic Obstructive Pulmonary Disease (COPD) patients always encounter dyspnoea.

- ↓ physical ability & affects multiple aspects of everyday life.

- One of the most important targets in managing COPD patients.
Background

- **Acupuncture**, originated in **China**, has been practiced for > **2000 years**

A growing evidence ➔ **Acupuncture** may be an **effective, non-pharmacologic treatment** for **attenuating dyspnoea in COPD patients**. (Fu et al 2013)

- However, acupuncture is **invasive** and **carries some risks of injury & infection** (Lau et al 2008)
Transcutaneous electrical nerve stimulation (TENS) ➔ A commonly used electrotherapy modality by physiotherapists

Acu-TENS = Application of TENS over acupoints

A non-invasive adjunctive intervention in managing dyspnoea
**Background**

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention</th>
<th>Acupoints</th>
<th>Result</th>
</tr>
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</table>
| Suzuki et al. (2012) | Acupuncture (n=34) For 50 mins per session for 12 weeks, once per week & control (n=34) placebo needles (Blunt) | LU1 (Zhongfu), LU9 (Taiyuan), LI18 (Futu), CV4 (Guanyuan), CV12 (Zhongwan), ST36 (Zusanli), KI3 (Taixi), GB12 (Wangu), BL13 (Feishu), BL20 (Pishu), BL23 (ShenShu) | ✧ Borg scale score after 6MWT  
✦ 6MWT distance,  
✧ SGRQ  
✧ MRC score  
✧ Nutritional status (BMI, prealbumin level)  
✦ Respiratory function |
### Background

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<tbody>
<tr>
<td>Lau et al. (2008)</td>
<td><strong>AcuTENS</strong> (n=23)</td>
<td>EX-B1 (Ding chuan)</td>
<td>↑ FEV1, ↓ Visual analogue scale (VAS)</td>
</tr>
<tr>
<td></td>
<td>For 45 mins</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Single session</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Control (n=23)</td>
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“A single session of **Acu-TENS** increase FEV$_1$ and reduces dyspnoea in patients with chronic obstructive pulmonary disease: a randomized, placebo-controlled trial”

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</tr>
</thead>
<tbody>
<tr>
<td>Ngai et al. (2010)</td>
<td><strong>AcuTENS</strong> (n=10)</td>
<td>EX-B1 (Ding chuan)</td>
<td>↑ FEV$_1$, ↑ β-endorphin, ↑ 6MWD distance, ↓ Post-6MWT SpO2 decline, ↓ SGRQ</td>
</tr>
<tr>
<td></td>
<td>For 45 mins</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for 4 weeks</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>5-days/week</td>
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“Effect of 4 weeks of **Acu-TENS** on functional capacity and β-endorphin level in subjects with chronic obstructive pulmonary disease: A randomized controlled trials”
Purpose

Implementation of using Acu-TENS since Nov 2011

Reducing dyspnoea in COPD patients

Improving physical ability in COPD patients
Objective

To analyze the effectiveness of the Acu-TENS on dyspnea control and physical ability for stable COPD patients.
Inclusion Criteria

- Stable COPD patients with:
  - **GOLD stage III to IV**
  - **mMRC stage 2 to 4**
- Motivated patients to participate in pulmonary training and Acu-TENS intervention
- Patients with no previous experience on Acu-TENS
Exclusion Criteria

• **Unstable COPD** patients with:
  - Acute type II respiratory failure
  - Unstable bronchospasm

• Patients with **unstable cardiac, neurological and medical signs and symptoms**
Eligible patients were assigned to either:

- **Stable in-patient COPD patients recruited from rehabilitation Wards (n= 92)**

  - **Acu-TENS group:** Conventional pulmonary training + 45-minute Acu-TENS intervention (n= 46)

  - **Control group:** Conventional pulmonary training alone (n= 46)
Program Content

- Conventional Pulmonary Training (30-60mins)
  - Breathing Control
  - Aerobic Training
  - Muscular Endurance Training
# Program Content

- **45-minute Acu-TENS intervention session**
  - **Bilateral Ex-B1 & BL13**

<table>
<thead>
<tr>
<th>Point</th>
<th>Name</th>
<th>Location</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX-B1</td>
<td>Ding Chuan</td>
<td>0.5 cun lateral to the spinous process of the 7th Cervical vertebra (C7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>定喘</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BL13</td>
<td>Fei Shu</td>
<td>1.5 cun lateral to the lower border of the spinous process of the 3rd thoracic vertebra (T3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>肺俞</td>
<td></td>
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</table>
After 5 sessions, pre & post assessments were done

- Six Minute Walk Test (6MWT)
- Modified 10-point Borg Category Ratio Scale at rest
- (“0” signified “no breathless sensation & “10” signified “the worst breathless sensation”)
Stable COPD patients recruited (n= 92)

Acu-TENS group: Conventional pulmonary training + 45-minute Acu-TENS intervention (n= 46)

Control group: Conventional pulmonary training (n= 46)

6MWT and modified Borg Category Ratio Scale were measured at pre- and post-training

Patients were encouraged to continue pulmonary training during hospitalization period
92 patients (81 males & 11 females) were recruited from November 2011 to November 2013. Average age: 69.6 ± 9.38 years old.
Result (Intra-group comparison)

6 MWT

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acu-TENS Group</td>
<td>136</td>
<td>207</td>
</tr>
<tr>
<td>Control Group</td>
<td>114</td>
<td>145</td>
</tr>
</tbody>
</table>

P < 0.001, p < 0.001
Result (Intra-group comparison)

Resting Borg Category Ratio Scale

- Acu-TENS Group: Pre = 0.74, Post = 1.93, p < 0.001
- Control Group: Pre = 1.67, Post = 1.77, p = 0.293
Baseline data of 6MWT distance & Resting Borg category ratio scale revealed no statistical difference across 2 groups.
Result (Across group comparison)

Post intervention data of 6MWT distance & Resting Borg category ratio scale revealed significant statistical difference across two groups.

6MWT

<table>
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<th>Control Group</th>
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<tr>
<td>207</td>
<td>145</td>
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</table>

p = 0.027

Borg Category Ratio Scale

<table>
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<tr>
<th>Acu-TENS Group</th>
<th>Control Group</th>
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</thead>
<tbody>
<tr>
<td>1.67</td>
<td>0.74</td>
</tr>
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</table>

p < 0.001
Stable COPD patients who received Acu-TENS with pulmonary training experienced greater improvement in both 6MWT & Borg category ratio scale as compared with pulmonary training alone. It indicates a better exercise tolerance and dyspnoea control with the use of Acu-TENS intervention than conventional pulmonary training only.
Conclusions

**Acu-TENS**, application of TENS over specific acupoints, provides a **convenient, non-invasive and simple** way for **dyspnoea management** for COPD patients.

It is **safe** and can be **applied by patients or caregivers**.

Further study on **larger sample size and long-term interventions with follow-up evaluations** is recommended.
Grateful thanks for all of your great support!

Ms. Poon Yee Hung, Priscilla, NTWC CC (PHYS)/TMH DM (PHYS)

Mr. To Wing Kin, Ricky, TMH SPT

Dr. Yeung Koon Sing, Associate Consultant (M&G)

Dr. Chu Chun Kwok, Agnes, TMH Associate Consultant (M&G)