Seebeck Effect And The Biomedical Mechanism Of Warm Needling

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Introduction
Moxibustion was a common practicing modality in oriental medicine.

Warm Needling (WN) is an effective acupuncture modality frequently used for pain relief, such as sciatica and osteoarthritis. It is the combination of needle acupuncture and moxibustion.
Warm Needling

- A practice performed by placing an ignited moxa stick on the handle of the needle after insertion.

*WHO international standard terminologies on traditional medicine in the western pacific region World Health Organization (2007)*
Possible Mechanism of Warm Needling

- Effects of Warmth radiation and transmission.
- Thermo-electric effect (Seebeck effect).
Seebeck effect

- The Seebeck effect is the conversion of temperature differences directly into electricity.

- A Estonian-German physicist, Thomas Johann Seebeck, discovered that in 1821. The Danish physicist Hans Christian Ørsted played a vital role in explaining and conceiving the term "thermoelectricity".
There were very few studies to investigate the mechanism of the WN.
Objective

- This study tried to explore the biomedical mechanism of WN by measuring the temperature and electrical property of the needles.
Methodology
Eight 2-inch 30 gauge stainless acupuncture needles were selected.

Eight moxas were weighted and applied to the needles.

The room temperature was controlled at 25±1°C.

The handles of needles were close to the burning moxa, while the tips of needles were close to the skin.
Measuring spots

- Tip Part
- Handle part
The temperatures of handles and tips were measured throughout the moxa burning period using two thermometers.

The electrical current between handles and tips were also measured with an ammeter.
Electronic thermometer and Avometer
Microsoft Excel 2003 was used to perform statistical analysis.
Results
The average weight of moxa was 1.32 ± 0.1g.

The mean temperature of the handles and tips were 60.0±11.5°C and 25.6±0.6°C respectively.

The measured current between handles and tips ranged from 0.01-0.11mA and the mean was 0.05±0.01mA.
The average of temperature differences between handles and tips was 84.7±17.7°C.

The correlation coefficient of electrical current and temperature difference was 0.91.

The temperatures of the tips did not elevate consistently.
Temperature of Warm Needling

- Handle
- Tip
Fig. Distributions of Temperature difference and Electrical current

correlation coefficient = 0.91
Discussion
The result showed persistent low temperature (25.6±0.6°C) near tip. It indicated no strong heat was transmitting to the skin through the needle.

Warmth transmission might not the key mechanism for WN in this study.
The traditional design of acupuncture needles and traditional needle manipulations seem to maintain a temperature gradient across the needle and thus enhance the Seebeck effect.

When the handle is heated or manipulated manually, the polarity of the needle-electrode changes to a negative tip inside the body, and it thereby attracts positive ions.

Measurements along the heated or manually manipulated needle show a current of 10 to 15 micro-amperes.

This corresponds to *tonifying technique* of needling.

-Acupuncture energetics: A Clinical Approach for Physicians
JM Helms 2007 pp. 76
Electrical Acupuncture and WN both got good effects on pain. In our experience, WN had even better effect for chronic pain.

A lower bio-generated current by Seebeck effect could be more adoptable for human body than pure electricity.
This study is a simple and straightforward research, further work using high power electrical and temperature devices (such as infra-thermography) to measure the changes would be continuing.
Conclusion

The study concluded Seebeck effect could be a major role in biomedical mechanism of Warm Needling.
Thank you for your attention!