

## Thermography Shows Impact of Acupuncture

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### ABSTRACT

Acupuncture has become a tool in the management of pain, although scientific proof for its efficacy is scarce. To judge the effects of acupuncture, one has to rely on the statements of patients. Thermographic imaging may offer an alternative in these cases, allowing physicians to objectively rate the alleviation of symptoms.

### INTRODUCTION

Acupuncture is an ancient Chinese approach to all kinds of diseases. Usually acupuncture is combined with dietetics and physical exercise relative to the underlying disease and the person's general state of health. It may provide relief when traditional medicine fails to alleviate symptoms, though the combination of both approaches seems to be the only effective method for managing pain. With humans becoming much older, a variety of diseases have occurred that are not treatable by conventional methods. On top of that, many people do not want to take medication for the treatment of pain because they are afraid they may become dependent on these drugs or pills. In Western medicine the demand for acupuncture has grown, as traditional medicine may not offer a solution if no morphologic changes are found. Nonetheless, scientific proof for the efficacy of acupuncture has not been found yet.

There are several theories of why and how acupuncture might work. Because of a lack of scientific evidence, traditional medicine often does not accept nor believe in pain alleviation by holistic methods. Here, we would like to present a case where thermographic imaging proved the efficacy of acupuncture, even though the underlying disease had to be treated according to traditional surgical medicine. In acupuncture, if the needle is inserted correctly, patients often state that they feel a strange sensation that is named "de-qi" in Chinese Medicine. This sensation may comprise a feeling of warmth, cold, strong emotions or relaxation. Scientists have not been able to attribute this feeling to a specific bodily reaction, though hormones and/or catecholamines may be involved in this response.

### THE CASE

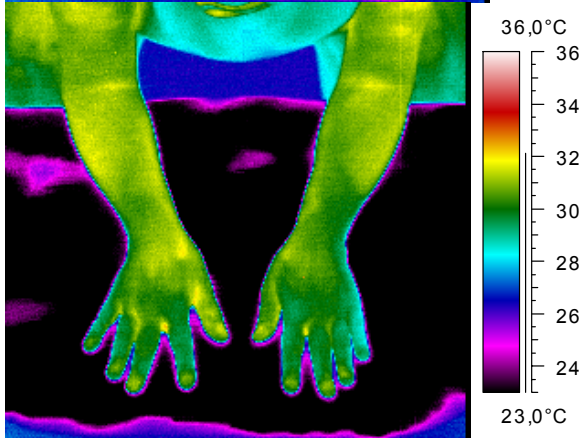
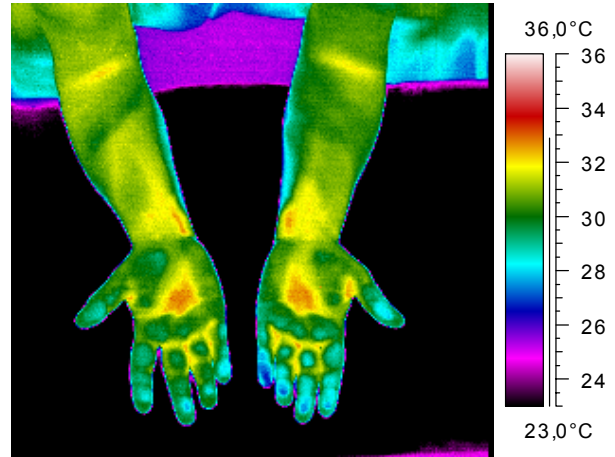
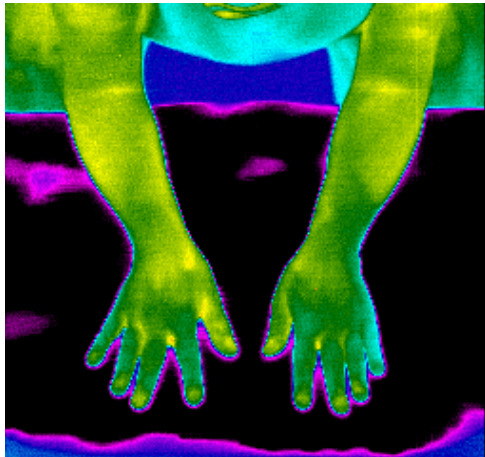
**History:** A 55-year-old woman presented with hypoesthesia of forearms and hands, asking for relief by means of Traditional Chinese Medicine. She had used crutches for the past 6 weeks post arthroscopy, and suffered from musculoskeletal pain around the neck and shoulders and cold hands. On top of that she suffered from paresthesias from time to time.

**Method:** Medical examination revealed muscular triggerpoints in the musculature along with a mild sensory loss of hands and forearms not confined to dermatomes and without impairment of motion. Since her cold hands did not respond to warming devices, thermographic imaging was performed (Inframetrics Model ThermaCAM PM390) before acupuncture and further investigation. For imaging and acupuncture the patient was placed in a special room with laminar flow at a temperature of 24.5°C and an atmospheric humidity of 50% for 30 minutes, along with the thermographic device to acclimatize before imaging was performed. A couple of images were taken each from the dorsal and the volar surface. Since no neurologic or orthopaedic pathology could be located by physical examination and history taking, three acupuncture needles were placed generating de-qi-sensation: LI 4, PC 6 and SJ 5. Ten minutes after placing the needles for 20 minutes and 10 minutes after removing them, thermography was repeated.

**Result:** The patient experienced a warm feeling in her hands within 4 minutes after placing the needles and reported decreased numbness. Thermographic images revealed an increase of skin temperature of 2.5°-3.0°C. She received acupuncture three more times until a schwannoma of the cervical spine was diagnosed by MR imaging and the patient underwent neurosurgery.

## MEASUREMENT

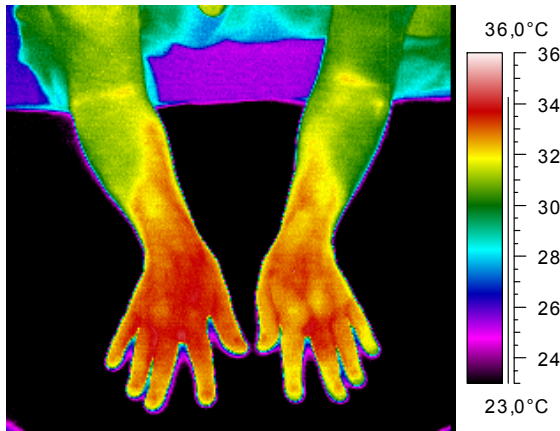
Figure 1 is the IR image of the dorsal hands as the lady presented in the outpatient clinic looking for relief of her problem. Muscular triggerpoints could be palpated but showed no alteration in skin temperature. Neurological deficits could not be detected in thermography. Figure 2 shows the volar aspect.



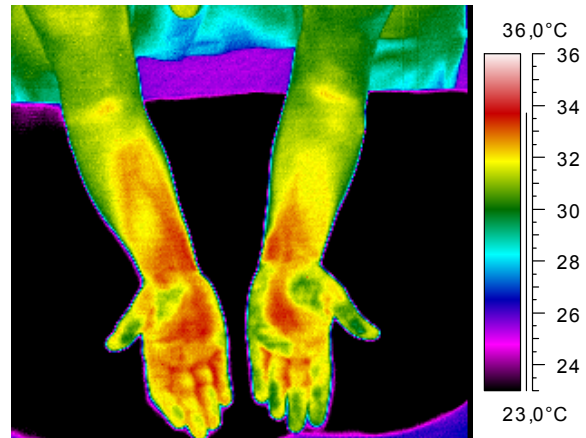
*Figure 1. Thermogram of the dorsal hand before acupuncture*

*Figure 2. Thermogram of the volar hand before acupuncture*

Both pictures were taken before acupuncture. This patient was looking for prompt help, since warming devices had not helped yet and no organic disease had been detected. She did not expect any underlying disease and attributed her findings to having put too much load on her hands.



*Figure 3. Thermogram of the dorsal hand after acupuncture*



*Figure 4. Thermogram of the volar hand after acupuncture*

Acupuncture points were chosen according to traditional Chinese Medicine after physical examination and history taking. Shortly after inserting the needles, the patient indicated rising temperature of her hands. Again the dorsal (figure 3) and the volar (figure 4) side were monitored. An increase in temperature of more than 2.5°C could be found at 3 minutes after removing the needles that had stayed in place for only 10 minutes. Usually, needles stay in place for at least 20-40 minutes. The patient asked to have the needles removed, since she experienced an increase in temperature before the anticipated time.

No specific points are being measured when regarding an increase in skin temperature after Interventional Pain Therapy, as the complete aspect in temperature rise has to be analyzed in order to correlate the effect to the underlying therapy. Thus, pictures are taken of the area of interest.

The expected temperature increase cannot be defined yet, but it is important to set up a strict algorithm, in order to be able to compare outcome and results. Acclimatization and standardized conditions are very important as well, as skin blood flow depends on room temperature, humidity and air-flow as well as conditions that we do not have any influence on, like state of mind and/or anxiety.

## **SUMMARY**

As this case report reveals, thermographic imaging might become a precious tool in judging the effect of acupuncture without having to rely solely on patients' statements. Nonetheless, further diagnostics should not be dismissed, even if results found with thermography are overwhelming. If this patient had not undergone surgery as soon as possible, she would have become tetraplegic.

## **REFERENCES**

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## **ABOUT THE AUTHORS**

Kamayni Agarwal and Helge Beck are anesthesiologists specialized in pain therapy focusing on Interventional Pain Management of neuropathic, sympathetically maintained and malignancy associated pain. They have been using infrared thermography for the past 16 years. Ann-Christin Lange is a medical student who acquired above mentioned data for her thesis.

