

# A THERMOGRAPHIC STUDY ON ACUPUNCTURE ANESTHESIA

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## I. A basic study on acupuncture anesthesia.

Since its recent sensational divulgation for the first time from the People's Republic of China, acupuncture anesthesia has attracted keen international interest. Fundamental and clinical studies on this method are now under way in many countries of the world. However, the principle of this method remains unknown.

The author carried out basic experiments on acupuncture anesthesia with five normal male adults, using information on the temperature of human subjects as the criterion. My associates and I are currently using acupuncture anesthesia not as an anesthetic means, but as a therapeutic means.

The following are the results of a series of therapy using acupuncture anesthesia for 45 patients with SMON (Subacute Myele Optico Neuropathy).

points. Electric stimulation was done in combinations of "left Gohkoku (-)...(+)" right Gohkoku" and "left San-inko (-)...(+)" right San-inko".

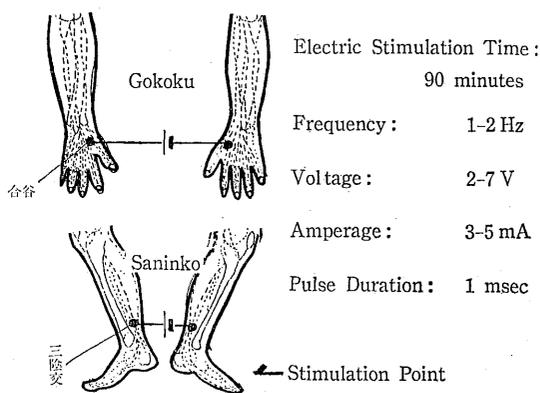


Fig. 1. The method of acupuncture anesthesia.

## METHOD

Subjects: Five normal male adults whose ages range from 22 to 35 years of age.

Term of experiment: June, 1974.

Method: In a room with a constant temperature of  $25 \pm 0.5^\circ\text{C}$  and a constant humidity of 60%, the subjects were each allowed to lie on a bed in the supine position and, after 20 minutes, control values were determined. The experiment was then started. Regions and Methods for Stimulation (Figure 1): The points stimulated were located in the "Gohkoku" spot of both hands and the "San-inko" spot of both ankles. A needle of 5 centimeters long and 0.3 millimeters thick was inserted into these

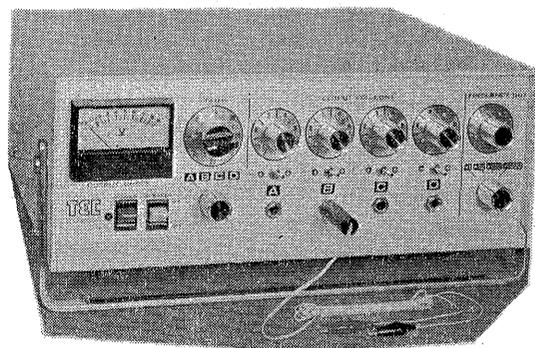


Fig. 2. The electric stimulation was done with TEC 4,000.

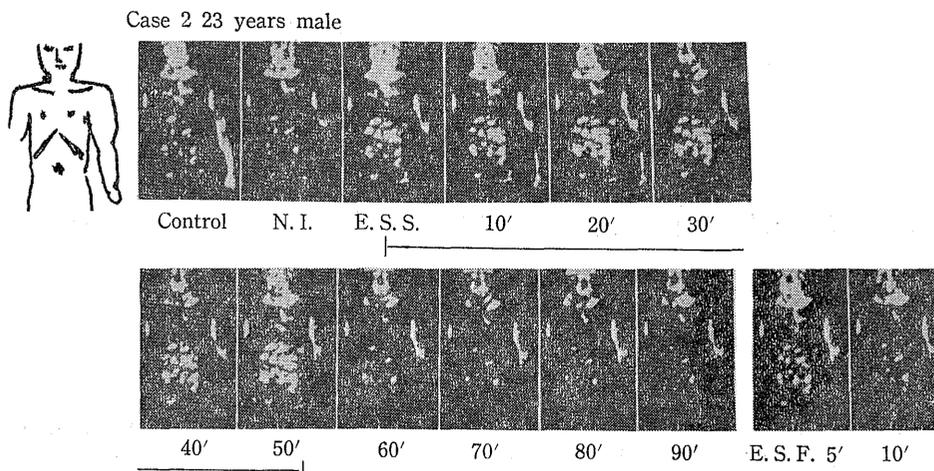


Fig. 3. The variation of skin temperature in the thoraco-abdominal region with acupuncture anesthesia.

N.I.: Needles were inserted

E.S.S.: Electric stimulation was started

E.S.F.: Electric stimulation was finished

The electric stimulation was done with TEC 4,000, a product of Tokyo Denki Company, Ltd., and had a frequency of 1-2 Hz, a voltage of 2-7 V, amperage of 3-5 mA, and a pulse duration of 1 millisecond for a period of 90 minutes.

Determination: At an interval of 10 minutes for a duration of 100 minutes after starting the stimulation, the temperature at the thoraco-abdominal region was determined with a thermography instrument, a product of JEOL, Ltd. Skin temperatures of the index finger, gastrocnemium, and the second toe were measured with the thermister thermometer, a product of Nihon Kohden Kogyo Company, Ltd. The temperature below the tongue was taken with a basal temperature thermometer at the same interval.

The changes in the threshold values of the sense of pain were later experimentally observed in the same manner under the same conditions.

## RESULTS

Figure 3 illustrates the thoraco-abdominal thermogram of case number 2. Following the thrust of the needle, skin temperature over

the entire body fell, except for the abdominal temperature which rose following the initiation of electric stimulation. This condition continued for the next 50 minutes, and at 60 minutes, the skin temperature at the abdomen fell abruptly.

Figure 4 illustrates the normal thermogram of the same case. At 30 minutes following the start of electric stimulation, the skin temperature of the face, thorax and lower abdomen fell, while only the skin temperatures of the upper and middle abdomen were found to have been elevated. The skin temperature of the abdomen fell at 60 minutes.

Figure 5 indicates the changes in temperature below the tongue and the skin temperature of the upper and lower extremities.

Following insertion of the needle, the skin temperatures of both upper and lower extremities clearly dropped. After initiation of electric stimulation, however, the skin temperature began to rise. During the interval in which the rise of skin temperature was recorded with thermography, the skin temperature of both the upper and lower extremities manifested a mountainous curved pattern. In the

Case 2 23 years Male

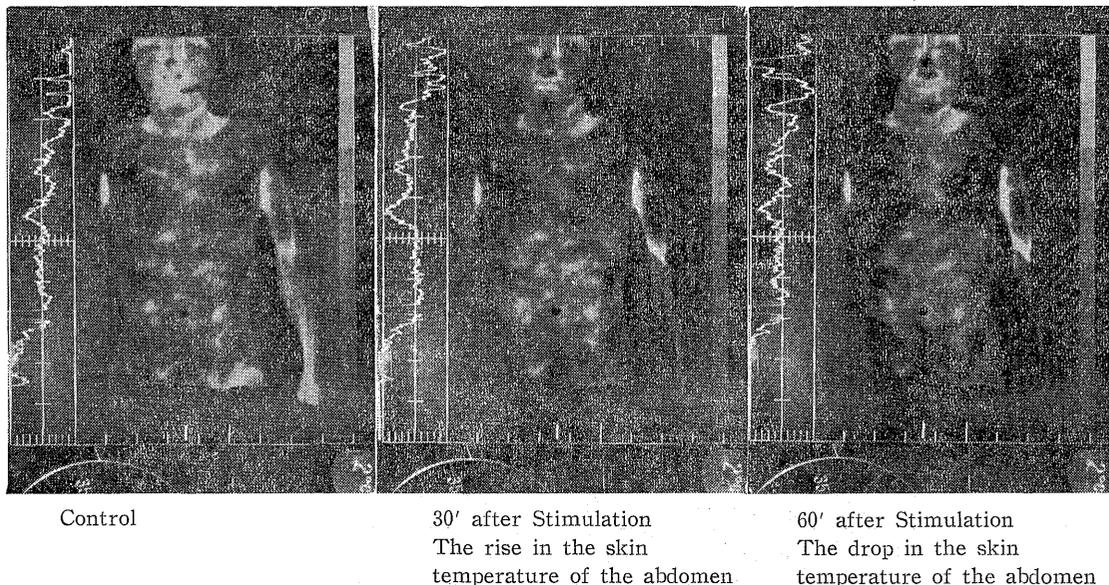


Fig. 4. The variation of skin temperature in the thoraco-abdominal region with acupuncture anesthesia.

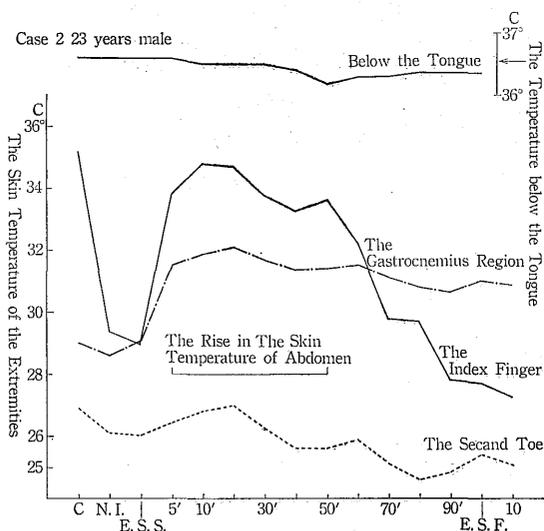


Fig. 5. The variation of the skin temperature in the extremities and the temperature below the tongue with acupuncture anesthesia.

N.I.: Needles were inserted  
 E.S.S.: Electric stimulation was started  
 E.S.F.: Electric stimulation was finished

meantime, the temperature below the tongue had begun to decline until 50 minutes.

Thus, the skin temperature of the abdomen rose as in both the upper and lower extremities and on the trunk, while the temperature below the tongue descended. In general, despite the electric stimulation in process, the temperatures returned abruptly to approximately their original levels. However, skin temperature descended while the temperature below the tongue rose.

Such phenomena can be observed in the other three cases as illustrated by Figure 6. Case number 3, located in the center section, exemplifies a significant change. At 50 minutes after the start of electric stimulation, a rise of 1.0°C was noted in the center temperature. The temperature descended abruptly at 80 minutes; a drop of 1.5°C from the peak reached at 60 minutes. Although this case was the most extreme, analgesia was also noted in the other four cases. As in the cases of skin temperature below the tongue, analgesia in one case appeared after 30 minutes and remain-

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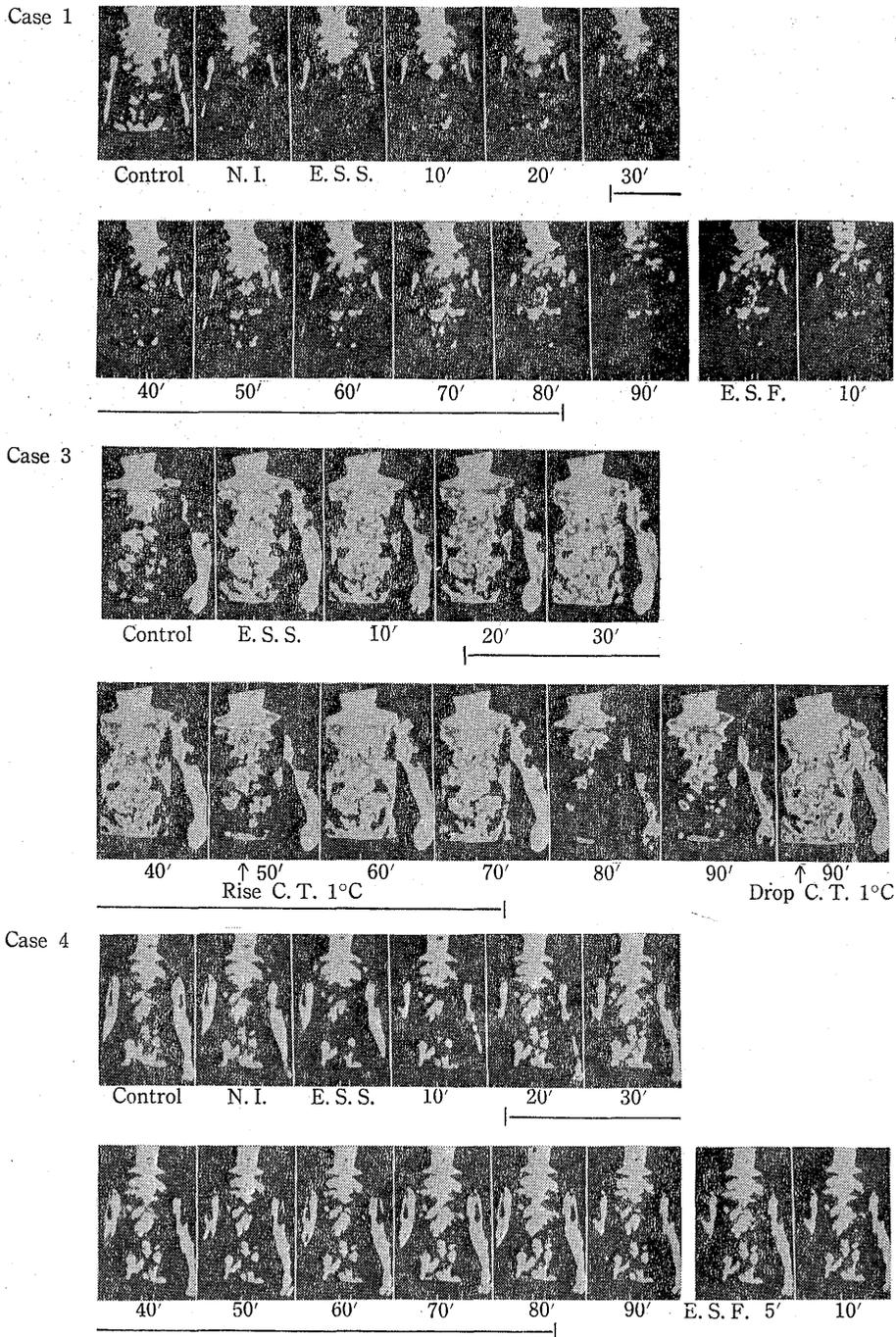


Fig. 6.

Case 5 35 years male

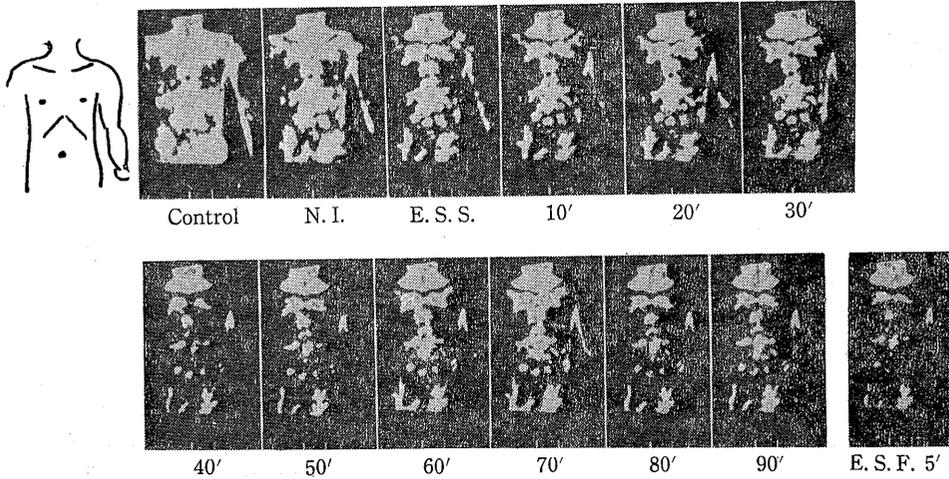


Fig. 7. The variation of skin temperature in the thoraco-abdominal region with acupuncture anesthesia.

N.I.: Needles were inserted  
 E.S.S.: Electric stimulation was started  
 E.S.F.: Electric stimulation was finished

ed until 50 minutes of electric stimulation, after which it disappeared. In a second case, analgesia appeared after 30 minutes and remained until 60 minutes; analgesia appeared after 30 minutes and remained until 60 minutes; analgesia appeared after 30 minutes and remained in a third case until 70 minutes, and appeared after 30 minutes in a fourth case and remained until 80 minutes of electric stimulation.

The case shown in Figure 7 represents the minimum appearance of analgesia. Skin temperature of the body trunk indicated a slow drop during a time lapse of 50 minutes. Unlike the other four cases, no rise in skin temperature of the abdomen appeared. Not until 60-70 minutes did a slight rise in temperature of the abdomen occur, which then fell again at 80 minutes.

Figure 8 illustrates the changes in temperature below the tongue and the skin temperatures of the upper and lower extremities. The other four cases manifested a drop of temperature below the tongue averaging  $0.0^{\circ}$ - $0.4^{\circ}$ C,

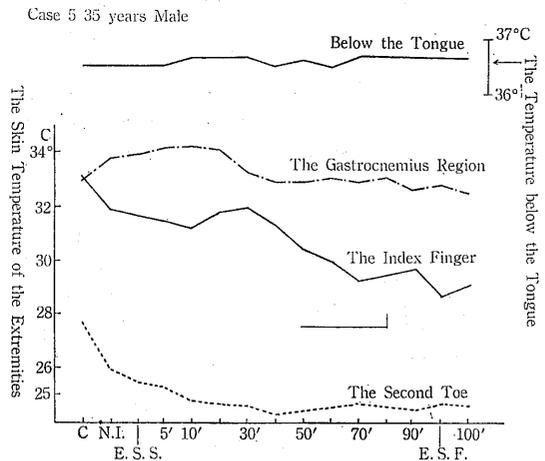


Fig. 8. The variation of the skin temperature in the extremities and the temperature below the tongue with acupuncture anesthesia.

N.I.: Needles were inserted  
 E.S.S.: Electric stimulation was started  
 E.S.F.: Electric stimulation was finished

whereas this case displayed a small change of 0.15°C. No characteristic pattern was seen in the changes of skin temperature of the upper and lower extremities.

**SUMMARY**

The reaction of acupuncture anesthesia was investigated in five normal males. In four cases with a rise in the threshold value of the sense of pain, the temperature below the tongue dropped by an average of 0.4°C, and the rise in the skin temperature of the abdomen and both upper and lower extremities was noted as a phenomenon common in these subjects 20-80 minutes after the start of acupuncture anesthesia, which lasted for a period of 90 minutes.

This fact indicates a possibility of temporary suppression in the physical regulation of body temperature. It is therefore suggested that experimental evidence was obtained in this area for confirming the contribution of acupuncture anesthesia to the regulation of autonomic functions.

**II. Clinical Study on Patients with SMON.**

The clinical effects of spot stimulation to "Keiraku and Keiketsu" were investigated by applying acupuncture anesthesia to 45 patients with SMON. Of these, six were subjected to the study to determine the therapeutic efficacy of acupuncture anesthesia, as measured with

thermography.

As indicated above, since acupuncture anesthesia does not act only as analgesic but also as a regulatory means of autonomic functions, acupuncture anesthesia in being employed as a therapeutic method in our clinic for miscellaneous diseases including SMON.

**METHOD**

Subjects: 45 patients with SMON. Sex: 10 males and 35 females.

Age: 30-77 (average: 57.4)

Forty of the 45 patients had been affected by SMON for three to ten years. Paresthesia was noted increasingly on the periphery of the lower half of the patients bodies. Acupuncture anesthesia was the therapeutic method adopted for them. The therapeutic spots were

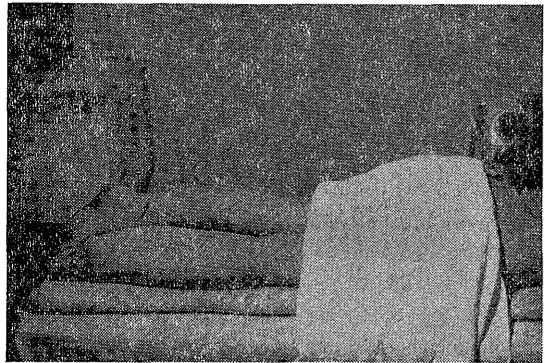


Fig. 10. The therapeutic spots—Pattern 1.

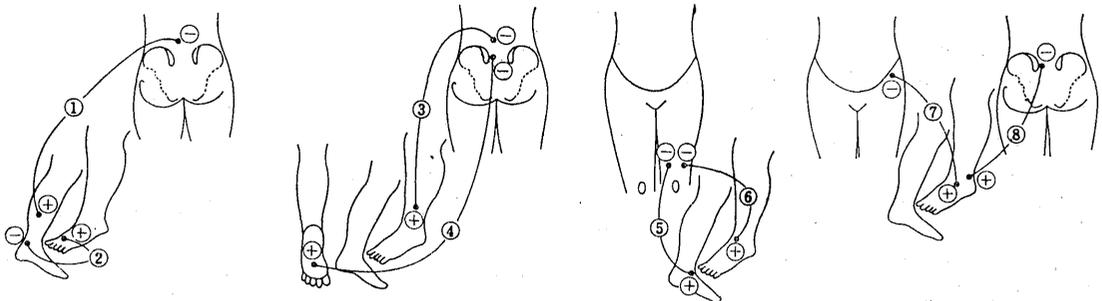


Fig. 9. The stimulation points with acupuncture anesthesia in patients with SMON

- ① Daichoyu 大腸俞 ⊖—⊕ 三陰交 Saninko
- ② Taikei 太谿 ⊖—⊕ 太衝 Taisho
- ③ Daichoyu 大腸俞 ⊖—⊕ 懸鐘 Kensho
- ④ Kangenyu 關元俞 ⊖—⊕ 湧泉 Yusen
- ⑤ Kekkai 血海 ⊖—⊕ 商丘 Shokyu
- ⑥ Ryokyu 梁丘 ⊖—⊕ 解谿 Kaikei
- ⑦ Kyoryo 居髎 ⊖—⊕ 丘虛 Kyukyo
- ⑧ Bokoyu 膀胱俞 ⊖—⊕ 崑崙 Konron

53 years Male

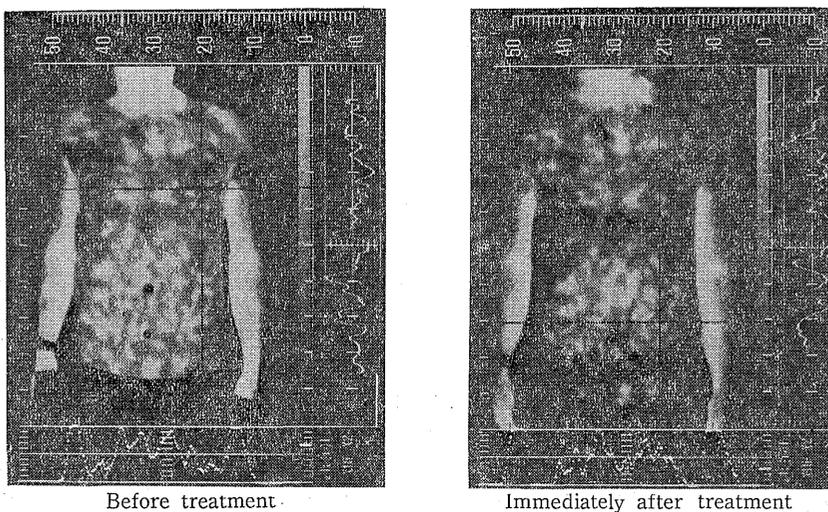


Fig. 11. The variation of skin temperature in the thoraco-abdominal region of the patient with SMON by treatment with acup. anesthesia.

selected on the basis of the patterns of paresthesia as shown in the eight patterns in Figures 9 and 10.

#### Evaluation of Therapeutic Results:

The results were evaluated on the basis of a sensory examination, including a test of walking speed, plethysmography, thermography, etc.

### RESULTS

Figure 11 illustrates the thoraco-abdominal thermogram of a patient with SMON. Immediately after treatment, only the skin temperature of the abdomen was found to have been elevated. This is the same phenomenon observed in the normal male adults.

Figure 12 illustrates the thermogram of the lower extremities which shows paresthesia on the periphery of the extremities. The thermogram of the lower extremities is a mirror image, since the picture was taken in the supine position while using a mirror. Therefore, please note the left side of the lower extremities is shown on the right and vice-versa.

Case 1 (Left Side): T.O. showed an abrupt

drop in the temperature of the right leg from the upper part of the ankle joint and the temperature of the foot was found to be 3°C lower than that of the left leg. There was not even a minor difference in the distribution of skin temperature in both legs. Large differences were observed in skin temperature for the whole process.

In February, the distribution of difference in the entire pattern of the lower extremities became smaller. Minor changes in skin temperature were also observed. The right leg's region of lower temperature was restored to within 1°C of the temperature of the left leg.

Case 2 (Right Side): T.S. exhibited a lower temperature over the regions of foot to gastrocnemium during November. In February, the skin temperatures of the feet and lower legs were elevated, and as in the case of the lines and points with higher temperature, the patterns of blood vessels could be clearly seen.

Figure 13 shows that treatment with acupuncture anesthesia, from November 1974 to February 1976, has continued to improve the condition of the lower extremities.

Figure 14 illustrates improvement of pares-

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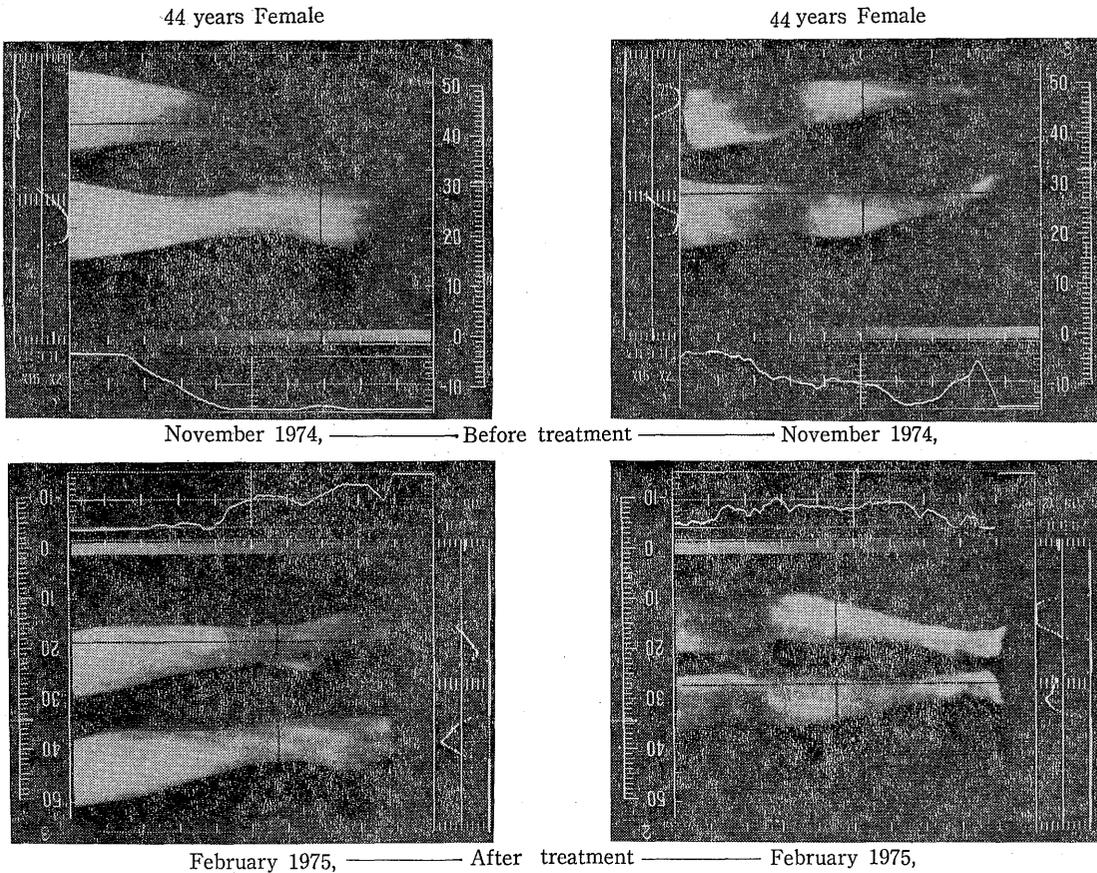
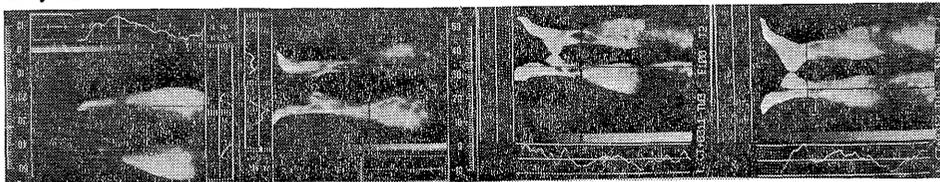
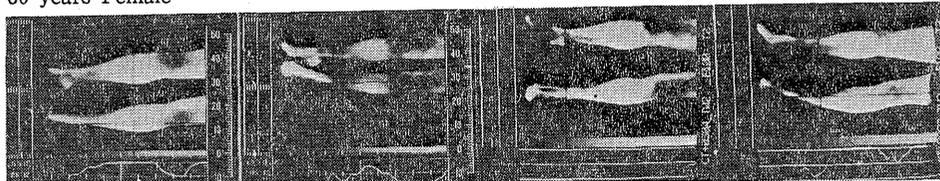


Fig. 12. Improvements were noted in the findings of low temperature in the lower extremities of the patients with SMON by treatment with acupuncture anesthesia.

53 years Male



60 years Female



November 1974, | February 1975, | November 1975, | February 1976,

Fig. 13. Improvements were noted in the findings of low temperature in the lower extremities of the patients with SMON by treatment with acupuncture anesthesia.

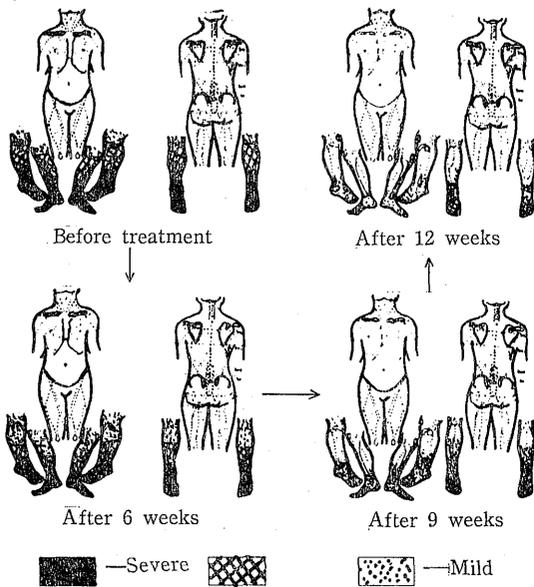


Fig. 14. Remission in paresthesia of patient with SMON following acupuncture anesthesia

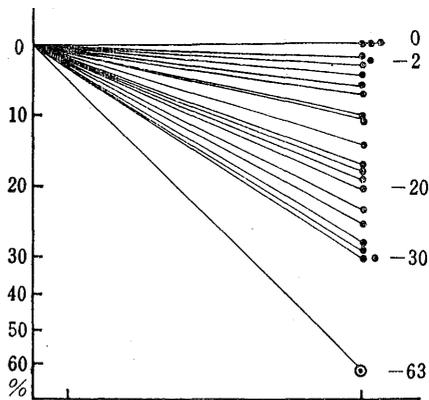


Fig. 15. Improvement in 10 m walking speed test (23 patients with SMON)

esthesia for a patient with SMON, following treatment with acupuncture anesthesia. Figure 15 depicts the improvement after acupuncture anesthesia of a patient with SMON in a 10 m. walking speed test.

Figure 16 shows the total improvement from implementing the treatment of acupuncture

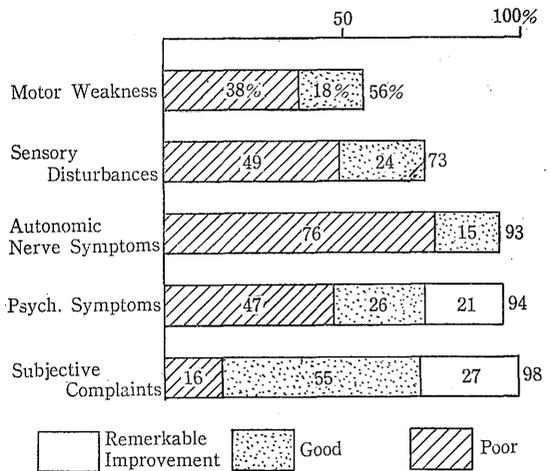


Fig. 16. The treatment with acupuncture anesthesia in 45 patients with SMON

anesthesia.

### SUMMARY

The main object of acupuncture anesthesia lies in the consolidated modification effects resulting from therapeutic treatment of abnormal sensation and clinical symptoms of patients with SMON. Special attention is given to improving the general complaints and psychological subjective symptoms of the patients.

Our acupuncture anesthesia, based upon the above interpretation, is focussed also on treatment of paresthesia as in the cases of clinical symptoms of patients with SMON. Therapy was designed for modifying sense abnormalities through continued therapy for an extended period of time. Attempts were also made for relieving the general complaints of the patients.

Traditional acupuncture did not attain significant results in treating paresthesia in patients with SMON. In contrast to conventional acupuncture, acupuncture anesthesia can be claimed to have greater effects upon autonomic functions.

It is not yet clear what relationship paresthesia of patients with SMON has with sensible functions measured by thermography. Skin temperature and vasomotoric nerve functions are related in this fashion. In consideration

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of the exacerbation of paresthesia following loading of standing position and walking, blood circulation can be claimed to have an important relationship with paresthesia.

本論文は 7th INTERNATIONAL CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION (RIO DE JANEIRO-BRASIL, 1-6 AUGUST, 1976) にて西条一止が発表した。