Effect of Cerebral Electro-Therapy on Neurohormone Excretion in Weather-Sensitive Patients

by

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ABSTRACT—Use of a cerebral electro-therapy (CET) device, called PENTA, for weather-sensitive patients is described here. It applies 6-45 V D.C. monopolar triangular shaped pulses of 0.75 ms duration, allowing an input of 0-600 mA mean current via 2 frontal and 1 indifferent occipital electrode. To avoid adaptation it is programmed to two alternating frequencies of 20 and 65 Hz. Its successful application to 15 cases of disturbed neuro-endocrine regulation in weather sensitivity is reported. It resulted in cures for 3-12 months, depending on the type of weather sensitivity treated. The mechanism of CET treatment may be due to a bio-feedback on the limbic system, involving hypothalamic and pituitary hormones. The normalising effects described here were followed up by neurohormone urinalysis of 17-KS, 17-OH, adrenaline, noradrenaline, serotonin, 5-HIAA, histamine and thyroxine. — This method proved itself as a valuable and objective tool for psychosomatic complaints due to weather sensitivity.

INTRODUCTION

There is a fairly consistent body of reports testifying to the beneficial effects in psychosomatic patients of low-level direct electrical currents applied to the forehead and the positive one to the occiput, the so-called „electro-sleep”. Results have been critically reviewed by Nias (1976). They depend on various factors, such as the kind of current used, the voltage and amperage, the placement of the electrodes, and the selection of the patients.

Forehead-negative current application appears to be closely related to the Russian technique of electrosleep, and has become increasingly popular in recent years for a variety of complaints ranging from various autonomous complaints and neurasthenia to migraine, hypertension, anxiety, depression, alcoholism, and insomnia (Iwanovsky and Dodge, 1968; Wageneder et al., 1969, Rosenthal and Wulfschohn, 1970). This technique involves applying a weak, intermittent direct current between negative electrodes over the eyes and positive electrodes behind the ears or at the nape of the neck, thus affecting the limbic area (Nias, 1976). The treatment is given for more than 30 min daily over several weeks and is administered by a small machine which can serve a number of patients at a time.

As the complaints of weather-sensitive patients concern mostly the hypothalamus-pituitary axis (Sulman, 1976), it seemed logical to apply cerebral electro-therapy (CET) to the treatment of weather sensitivity. The present report sums up our results in 15 weather-
sensitive patients who were treated with a cerebral electro-therapy apparatus developed by one of the present authors (J.T.) and called PENTA: Peripheral Nerve Treatment Apparatus (Magora et al., 1964, Tannenbaum and Magora, 1965, Borman et al., 1971).

MATERIALS AND METHODS

CET APPARATUS. — The PENTA CET (developed at the Rothschild-Hadassah University Hospital in Jerusalem and manufactured by „Neurogar“, Kibbut Oinossar, Israel) apparatus is a self-contained unit with its own power supply of four 1.5 V (= 6 V) batteries. It generates positive triangular-shaped pulses of constant voltage. The maximum peak voltage output is 45 V, at 0-600 mA mean current. The small apparatus (15 x 15 x 8 cm) contains:
- (1) a power indicator pilot lamp,
- (2) an amplitude control knob for regulating the required current intensity to a threshold provoking a slight „tingling sensation“,
- (3) a control knob to balance the current between the anterior and posterior electrodes,
- (4) an average-current meter indicating the micro-amperes actually received by the patient,
- (5) a power switch with timer,
- (6) an outlet for three electrodes: two negative ones for the forehead, one positive indifferent-one for the occiput.

The three electrodes provide pulses of two consecutively alternating frequencies that change automatically between 20 and 65 Hz. A train of 60 triangular pulses of 200 μA/s lasting 2 seconds alternates with a train of 20 pulses of 60 μA/s lasting 3 seconds. The fundamental difference between the rectangular pulses used hitherto and the triangular pulse introduced here is obvious. The positive triangular pulse ensures a slow rise up to the peak and a gentle descent to the baseline, thus allowing a higher amplitude to be applied without inconvenience to the patient.

PATIENTS

Fifteen patients were selected for the present pilot study. Data are presented in Table 1, they include 12 females and 3 males 22-54 years of age (No. 1-15). They all suffered from psychosomatic complaints due to weather-sensitivity which had proved resistant to orthodox drug therapy. Ten normal patients (No. 16-25) and another ten weather-sensitive patients (No. 26-35) served as controls. They received a „double-blind“ treatment: neither the patient, nor the nurse could know that the CET apparatus used had its electrode outlet disconnected since the apparatus was always applied to these patients below the threshold of the „tingling sensation“. During the two weeks of CET treatment — 10-12 x 30-minutes sessions — drug treatment was not allowed.

HORMONE ASSAYS

The following neurohormones were routinely assayed in the patients before and after conclusion of the treatment: 17-ketosteroids (17-KS), 17-hydroxysteroids (17-OH), adrenaline and noradrenaline, serotonin, 5-hydroxyindole acetic acid (5-HIAA), histamine, thyroxine (Sulman et al., 1970, Tal and Sulman, 1972).

The patients had to collect 24-h urines on 10 ml 5 N HCl on 3 separate days and bring them in for examination 3 days before and 3 days after the 2-week treatment period. The results of the 6 neurohormone assays on these 2 x 3 days were statistically evaluated by the t-test.