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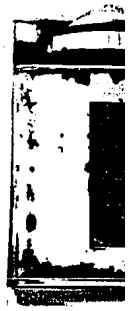

THERAPEUTIC USE OF ELECTRICALLY INDUCED SLEEP IN USSR

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For the past 7 years, the Institute of Psychiatry of the Ministry of Public Health USSR has been working on investigations of the reactions which arise in the organism when the central nervous system is acted on by an electric current. This problem has attracted the attention of physicians for a long time. At the end of the 19th Century, I. M. Sechenov established that the action of an electric current on the ocular bulbs of a frog is capable of inhibiting the frog's spinal reflexes. Later, the condition of general inhibition produced by the action of an electric current on the central nervous system became known as electrical narcosis.

However, electrical narcosis was not extensively applied at the clinic, because it cannot be considered a method of protective therapy in the sense in which this concept was understood by I. P. Pavlov.

The Institute of Psychiatry set itself the task of developing a method which would fully answer the requirements of protective therapy. We found the solution to this problem in the action on the cerebrum of a pulse current of low frequency and of negligible strength. An application of such a current produced a condition in the patients which was very close to natural sleep. The method was named the method of electrically induced sleep.

In discussing this method, one must mention the investigations carried out by V. Yu. Chagovets in 1906, I. A. Golyanitskiy in 1912, K. S. Kalendarov, L, I. Vasil'yev, D. A. Lapitskiy, and F. I. Petrov in 1913-1938, and finally V. A. Glazov in 1940-1947. These investigations were essentially concerned with electrical narcosis. These investigators made an attempt to clarify the nature of the physiological phenomena taking place in the central nervous system during electrical narcosis, to analyze these phenomena, and to explain them correctly.

Chagovets, in connection with his investigation assumed that electrical narcosis is a phenomenon which is basically different from pharmacological narcosis or sleep. The view held by Chagovets differed from that of [S. A.] Leduc, who referred to electrical narcosis as electrically induced sleep.

A group of workers at the Institute of Psychiatry, which at one time investigated, under V. A. Gilyarovskiy's direction, the possibility of applying electrical narcosis in the clinical treatment of psychiatric diseases, established that a certain therapeutic effect was produced by this method when it was applied in the treatment of catatonic and hallucinatory-paranoid forms of schizophrenia. However, the method did not appear to be promising, so that the group of investigators began to study the method of applying small doses of current to induce sleep electrically.

By electrical narcosis we mean the special state produced immediately after switching on a current of considerable strength. This state disappears when the current is switched off. The state is characterized by immobility, a strained position, an alteration of the muscle tonus, analgesia, and (in some cases) changes in the state of consciousness. In some cases, this state resembles sleep to a certain extent; in other cases, it is accompanied by spasms and hyperkinesis.

Electrically induced sleep is a state of slumber or sleep occurring as a result of the prolonged effect of a current of minimal strength. This current does not produce any disagreeable sensations, spasms, or significant vegetative changes. The characteristic of electrically induced sleep is that it is established gradually, sometimes only after the second or third application of the

current. However, once established, the sleep does not always cease when the current is switched off. On the contrary, the sleep often becomes deeper, so that it resembles natural sleep.

The method of treatment with electrically induced sleep began to be used successfully not only in the psychiatric clinic, but also at a number of other clinics for the therapy of various nerve diseases and internal diseases.

The method of electrically induced sleep developed at the Institute of Psychiatry is based on data from I. P. Pavlov's laboratory, showing that the inhibition due to sleep can be induced by the prolonged action of a weak, rhythmic irritant.

As an irritant we applied a pulse current of low frequency and weak strength. The electrodes were attached in the ocular-occipital position. This insures a direct action of the current on the nerve cells of the cerebrum.

In collaboration with the Physicotechnical Division of the State Institute of Physiotherapy, several models of devices for the production of electrically induced sleep were designed. The production of these devices was developed at the experimental workshop. In June 1952, the Scientific Medical Council of the Ministry of Health USSR had already permitted the application of electrically induced sleep in diseases for the treatment of which sleep therapy according to Pavlov is indicated.

A typical characteristic of electrically induced sleep is, on the one hand, its relatively shallow and brief nature; and, on the other hand, its harmlessness and close resemblance to natural sleep. After electrically induced sleep, the patients are refreshed and stimulated, and their frame of mind is improved.

An analysis of the results obtained by applying electrically induced sleep in the treatment of more than 150 patients suffering from various psychiatric diseases demonstrated the effectiveness of this type of treatment in neuroses, reactive conditions, and prolonged asthenic conditions. Good effects were obtained in treating changes of psyche produced by encephalites of various etiology, particularly the choreic form of rheumatic encephalitis in pediatric practice. The treatment with electrically induced sleep of the initial stages of the hallucinatory-paranoid and ordinary forms of schizophrenia also proved effective.

A similar effect was observed when electrically induced sleep was applied at other therapeutic psychiatric institutions. Lately, electrically induced sleep has been applied for the treatment of various nerve diseases and internal diseases. For instance, at the Institute of Physical Therapy, the consequences of traumatic injuries of the cerebrum are being treated by means of electrically induced sleep.

At the initiative of the Institute of Psychiatry, investigation of the effectiveness of electrically induced sleep therapy in the treatment of hypertension was begun. This problem was studied at the Clinic of Therapeutic Nutrition, Academy of Medical Sciences USSR, at the Sverdlovsk Institute of Physical Methods of Treatment, and at other institutions. Positive results were also obtained at the Institute of Obstetrics and Gynecology in the treatment by means of electrically induced sleep of the toxicosis arising during the first period of pregnancy.

There is still no generally accepted interpretation of the physiological nature of electrically induced sleep. Some assume that the action of the current is limited to peripheral receptors and that the greatest significance in the induction of sleep must be ascribed to the so-called conditional component, i.e., the environment produced by lying down in the bed, application of the electrodes

to the eyes, etc. Others attach no less significance to the direct action of the current on the nerve cells of the brain.

To investigate the physiological nature of electrically induced sleep, Yu. Ye. Segal' and N. M. Liventsev carried out appropriate work at the laboratory of the Institute of Psychiatry. During this work, they investigated the dynamics of conditioned reflexes reinforced by speech (according to A. G. Ivanov-Smolenskiy) or reinforced by an unconditional cutaneous electric irritation. The dynamics of vascular reactions were investigated by means of plethysmography. Changes in the electrical activity of the cerebrum were investigated by means of electroencephalography. The results of these investigations permit us to conclude that electrically induced sleep very closely resembles normal physiological sleep.

On the other hand, these investigations have shown that changes produced in the cerebrum, particularly in regard to its bioelectrical activity, take place under the action of the pulse current even in cases when the patient does not fall asleep.

The data obtained show that the pulse current produces, in accordance with the law of the action of rhythmic irritations, inhibition of the cerebral cortex. The inhibition does not necessarily spread to the subcortical-axis sections of the brain. This presumably explains the relatively shallow quality of the sleep produced by the current.

At the same time, the current which enters the cranium primarily from the direction of the brain base and proceeds in the direction of the vascular nerve junctions [literally, blood-vessel nerve bundles] irritates the subcortical-axis divisions to the greatest extent. This, on the one hand, may reinforce the inhibition of the cortex according to the law of induction and, on the other hand, must exert some stimulating effect on the subcortical-axis divisions. The latter effect cannot be indifferent from the standpoint of the total therapeutic action of electrically induced sleep. This working hypothesis most closely corresponds to observed facts.

A short time ago a scientific conference was held at which experience acquired in research on this subject in general and in connection with the clinical application of electrically induced narcosis and electrically induced sleep in particular was exchanged. In papers presented at this conference, interesting data were reported on the therapeutic effectiveness of electrically induced sleep in the treatment of neuroses, psychiatric conditions, some exogenic psychoses, and encephalites. The effectiveness in the treatment of schizophrenia was somewhat less pronounced. The effectiveness was found to be higher in the functional phase of schizophrenia and lower in the lingering phase. Improvement of the therapeutic effect of electrically induced sleep in schizophrenia may be achieved by combining this treatment with the administration of insulin, caffeine, and bromides.

Successful application of electrically induced sleep in the clinical treatment of internal diseases was also reported at the conference. These diseases included hypertension and gastrointestinal ulcers. Beneficial results were also achieved in the treatment of nerve diseases, traumatic injuries of the brain, and phantom pains.

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In their reports, the clinicians did not limit themselves to an exposition of the problem of the therapeutic effectiveness of electrically induced sleep. They also cited data pertaining to the analysis of the action of this type of sleep on the higher nervous activity.

The conference has shown that extensive introduction of the method of electrically induced sleep into practical medicine and the scientific interpretation of this therapeutic method are important tasks.

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