UDC 612.821

EVOKED POTENTIALS IN HOLOTROPIC BREATHING

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Translated from Fiziologiya Cheloveka, Vol. 20, No. 1, pp. 44 – 48, January – February, 1994.

Original article submitted March 15, 1993.

The evoked potentials (EP) were recorded in six neurosis patients during treatment with the holotropic breathing method in the acoustic "odd-ball" test before and after a session of holotropic breathing leading to changes in the state of consciousness. Changes in the P300 component were found whose magnitude was correlated with the degree of consciousness alteration.

The holotropic breathing (HB) method proposed by the American psychiatrist St. Grof ten years ago, is succesfully used for treating neuroses [1 – 3]. HB leads to a curative alteration of consciousness, which activates the mechanisms of physiological recovery developed during evolution. St. Grof believes that the HB therapeutic effects activate subconsciousness and provide a possibility for the transformation of different emotional and psychosomatic symptoms into the altered state of consciousness.

The literature on holotropic breathing mainly describes the results of monitoring of the dynamics of a patient's consciousness. In this process neither physiological nor electrophysiological examination is conducted, as a rule. Moreover, physiological methods are sometimes considered to be noninformative as the matter concerns extremely fine alterations in the psyche, which are difficult to study objectively [1, 2].

The present study is designed to analyze the dynamics of brain evoked potentials (EPs), which are correlated with an altered state of consciousness in neurotic patients during an HB seance.

METHODS

During a therapeutic procedure prone patients breath deeply, rythmically and frequently (20 – 35 inspirations per min). Musical accompaniment ("psychotropic music") is an indispensible condition of the procedure. Patients keep their eyes closed during the whole seance not communicating either with each other or with a doctor. If they feel discomfort in their bodies they show it by gestures, facial expression or body position changes. The person responsible for therapy massages these body areas or can regulate the degree of a consciousness alteration by instructing the patients to change their breathing frequency. Recollections for the whole period of a HB seance are completely preserved.

Out of 28 patients under examination, six were selected who did not made movements and thereby could not disturb the position of the recording electrodes on their heads. EP dynamics were studied in these patients. All of them suffered from neuroses: five patients had neuroasthenia and one was in a lingering neurotic state. All the subjects were females aged from 23 to 25 with illness duration from six months to three years. Before the holotropic therapy they were unsuccessfully treated by neuropathologists and took tranquillizers. Their symptoms included irritability, hot temper, poor sleep, low mood, reduced working capacity, and rapid fatigue. EP analysis was performed at the sixth or seventh HB seance (the general number of seances was 12 – 13). An acoustic "odd-ball" test used was a modification of a well-known paradigm widely used in psychophysiology to study the P300 component of EP recorded from the head surface.

Subjects were exposed to high and low (800 and 400 Hz) tones of comfortable loudness of 50 msec duration and were instructed to press a button in response to a low tone, which was applied with a probability of 25%. The first half of the test, with 128 tone presentations, was performed before, and the second one, identical to the first one, after the seance of a holotropic breathing seance.

EPs were recorded from the standard points *Fz*, *Cs*, and *Pz* according to the international EEG recording system 10-20 with a reference electrode on the ear. To control eye movement artefacts, an oculogramm was simultaneously recorded by two electrodes positioned one above the external and another below the internal corner of the eye, respectively. EPs and the oculogram were amplified by a 16-channel polyneurograph in the frequency range of 1.5 – 30 Hz [4, 5]. Attenuation above the cut-off frequency 1.5 Hz was

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0362-1197/94/2001-0017$12.50 © 1995 Plenum Publishing Corporation

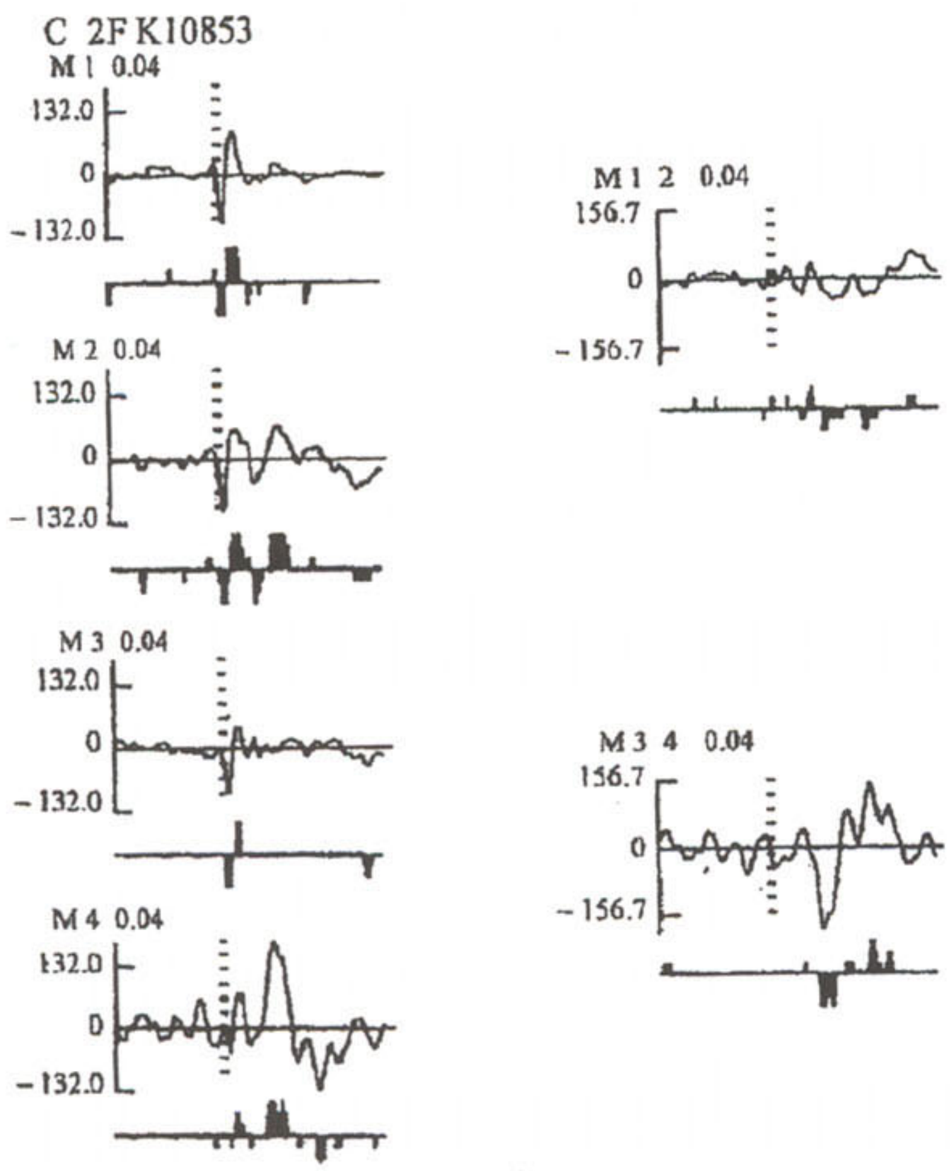

Fig. 1. Evoked potentials recorded in patient V. I. in *Cz* point before (*1*, *2*) and after (*3*, *4*) a holotropic breathing seance. *1* and *3*) EP to the presentations of frequent irrelevant tones (800 Hz, $p = 0.75$); *2* and *4*) EP to the presentations of infrequent ($p = 0.25$) relevant tones (400 Hz) before and after HB respectively. *1* – *2* and *3* – *4* (on the right)) Difference EP, obtained by subtracting the corresponding pairs of curves. The significance levels ($p < 0.05$, 0.01, 0.001) for the difference between the averaged potential in some bin and corresponding baseline fragment (EP estimation) and for the difference between EPs to relevant and irrelevant stimuli are shown under the curves.

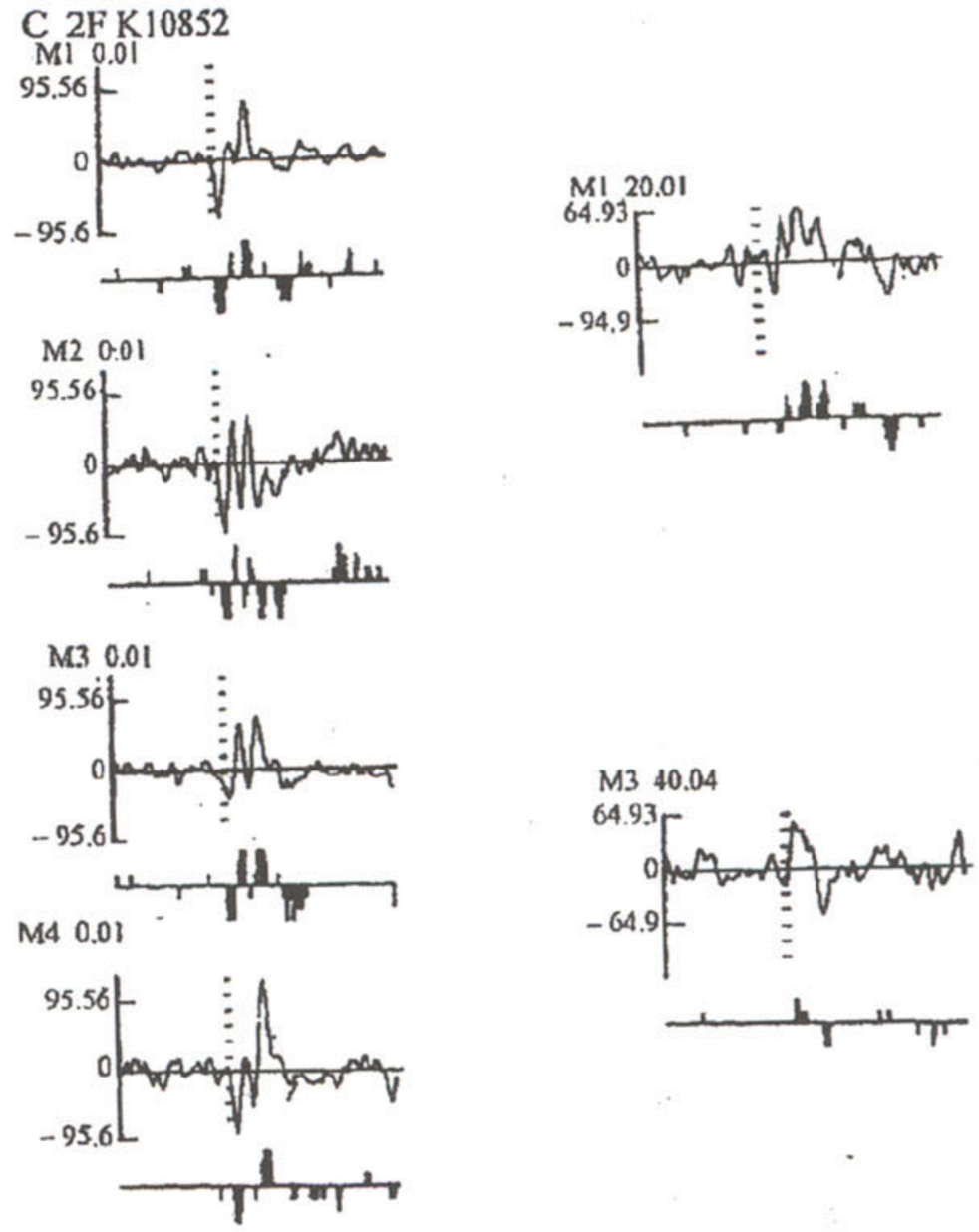

Fig. 2. Evoked potentials recorded in patient M. P. in *Cz* point before (*1*, *2*) and after (*3* and *4*) holotropic breathing seance. See symbols in Fig. 1.

6 dB/octave. An amplified signal was entered to the IN-110 computer (Intertechnique, France) through the analog-to-digital convertor with a digitizing frequency of 50 Hz.

The potentials recorded by every electrode were averaged for each EP group throughout a period ranging from 1 sec before the stimulus to 1.5 sec after it at the off-line computer treatment of the data. Potential distributions in the consecutive 20 msec intervals were calculated for each group and estimated statistically by means of non-parametric Wilcoxon's rank test. The statistical significance was estimated for both the EPs and for their difference , calculated by subtracting the EPs to one tone from those to the other [6]. In addition, we tested the null-hypothesis that two samples are identical. For the EP assesment in the same group, the distribution of potentials in every bin of the post-stimulus interval was compared to that in all the bins of the base line fragments. To assess the difference potential, we compared the distributions in corresponding post-stimulus bins of two EP groups.

Here is some brief information about two patients.

V. I., 23 years old, a technician. For the past three year she has had an obsession associated with the chronic illness and invalidity of her child. She often cries, periodically feels discomfort in her body and finds it hard to work. She took nozepamum, nootropil and radedorm on her own initiative with no real improvement. She participated in 12 holotropic therapy sessions. Her personal state at HB: beginning from the second session, she took the position of an "embryo" snuggling up to a colorifer, lying motionless without changing her position. After the session she was always in good spirits, laughed and said with some uneasiness that had felt so comfortable as if "she had not yet been born and was in her mother's womb". The therapy seances noticeably improved her mood and working efficiency as well as sleep and rest. EP was recorded at the sixth session. During the procedure she lay quietly in the laboratory bed, absorbed in her internal feelings and experiencing her "usual session condition," i.e., that she seemingly had not been born yet and was to "enter the world" soon. Such a condition usually arises from the activation of the first perinatal matrix ("birth associated matrix") and is indicative of the manifestation of some level of unconscious psychic activity.

M. P., 30 years old, an engineer. For the past two years she has been suffering from inertia, low mood, irritability and poor sleep caused by some deep personal troubles. She participated in 13 sessions. During a session she is almost motionless, calm, with no evident facial expressions. Nevertheless she always experienced visual illusions of a pleasant nature. At the third session she unexpectedly began to wring

her hands, burst into sobbing, and "arched her back." She reported afterwards that she had experienced "a terrible feeling of pity for herself." At the same time, treatment sharply improved her condition.

The alteration of consciousness in this patient was of a different nature: it was some level of changes in conscious psychic activity, a so-called "biographical level."

EPs were recorded at the seventh session. She was lying quietly in the laboratory. After the session she reported that all the time she experienced bright visual illusions – "red flower over the sea waves."

RESULTS AND DISCUSSION

Holotropic therapy induced significant EP changes ($p < 0.05$) in 4 out of 6 patients under examination. The most pronounced changes in the EP component composition were observed in those two patients (V. I. and M. P.) whose brief anamneses were discussed above. It was exactly these patients who demonstrated the most evident alterations in consciousness identified on the basis of behavioral reactions and self-reports.

The most evident changes were observed in the late EP components at the time interval of 250 – 400 msec. Figures 1 and 2 illustrate the EP recorded in the two patients (V. I. and M. P.) in the *Cz* point before and after HB. The curves, which represent the difference between EPs evoked by relevant and irrelevant stimuli (this difference usually contains the *P*300 component) show, that the most typical feature of EP changes under the influence of HB is an increase in the P300 component magnitude. These changes in one patient (Fig. 1) were not accompanied by any changes in *N*100 and *P*200 components. Changes in the *P*200 component of EP to both relevant and irrelevant stimuli were seen in the other patient (Fig. 2), along with a marked increase in the *P*300 component of EP to a relevant stimulus. There is no direct evidence for the relation of the observed EP changes to the altered state of consciousness. HB itself may result in metabolic changes in brain tissue, which can directly manifest themselves in EP changes. This assertion seems to be partly true as at least one patient showed changes in the EP pattern under the influence of HB. At the same time, the fact that the most pronounced changes are observed in the late EP components, which are associated with cognitive functions, suggests that the observed changes in EP are at least in part due to the alteration of the conscious state provoked by HB.

CONCLUSIONS

Consciousness alternations, occurring during HB, have not only phenomenological features but also physiological correlates. In this case the EP pattern was changed and the most pronounced changes were noticed in the late components, which are usually connected with cognitive functions. Consciousness alteration depth was discovered to correlate with the degree of EP manifestation: the deeper consciousness alterations are followed by more pronounced changes in EP.

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