ELECTROPHYSIOLOGICAL CHARACTERISTICS OF THE ACTION OF FOREIGN BLOOD UPON SPLENIC INTEROCEPTORS

T.A. Nazarova

From the Department of Pathological Physiology (Chairman-Prof. A. N. Gordienko)
Rostov Medical Institute

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When investigating the mechanism establishing the interoceptive reflexes, great significance must be attached to clarification of the roles played by the individual links of the central nervous system leading to the completion and fulfillment of the reflexes.

According to the data of V. N. Chemigovsky [10] and his co-workers - V. A. Lebedeva [7], G. A. Kovaleva [4], as well as V. A. Alexeev [1], in decerebrate animals, when interoceptors of the internal organs are stimulated, there are vasomotor and respiratory responses but no basic or even substantial alterations occur. It should be noted that with high decerebration, when the transection is made superior to the anterior colliculus of the corpora quadrigemina, the reflex arc coming from the interoceptors does not appear to be markedly affected.

V. N. Chemigovsky in analyzing his results came to the conclusion that the principal prerequisite for the preservation of the interoceptive reflexes is the intactness of the visual colliculi.

Of great interest are the studies of R. S. Vinitskaya [2, 3] who showed the presence of a regulating influence within the hypothalamic region, this determining the intensity of the interoceptive reflex response.

The present investigation used the method of recording bioelectric potentials within certain subcortical areas as a partial index of the reaction of the organism to interoceptive irritations produced by irrigating the spleen with foreign species blood.

EXPERIMENTAL METHODS

The experiments were performed on dogs as short experiments. Under ether anesthesia, the skull had trephine openings made in it, ebonite plugs being used to close them and electrodes being inserted through them. As electrodes silver wires were used, their diameter being 0.2 mm and their manufacture following the method of A. B. Kogan [5].

The precise place of insertion of the electrodes was determined by studying anatomic preparations of the fixed brain with the additional aid of serial frontal sections, as well as by histological studies of the areas where the insertions were actually made.

The bioelectrical activities of the subcortical regions were registered by means of a single channel oscillograph recording on photopaper moving 2.8 cm per second. The sensitivity of the instrument - 2.8 µV for every 1 mm declination of the ray.

The experiments were conducted in a screened chamber.

From the moment of inserting the electrodes into the brain tissues to the beginning of recording of the potentials in the individual experiments, from 1.5 to 2.3 hours would elapse. This greatly exceeded the time needed to free the subcortical EEG's from the currents of injury (10-15 minutes) as established by A. B. Kogan [6].
The experiments were begun only after stabilization of the background of electrical activity.

The spleen circulation was also isolated under ether anesthesia, by the method of V. N. Chemigovsky. The foreign blood used came from rabbits, the citrated blood being introduced into the perfusate from a vessel suspended on the wall of the oscillographic chamber and allowed to flow for 5-10 minutes, thus irrigating the spleen.

The bioelectric potentials of the subcortical structures were correlated with kymographic recordings of the arterial pressure and were taken before and during perfusion as well as well as 5, 10 and 20 minutes after the spleen had been perfused with the foreign blood.

**EXPERIMENTAL RESULTS**

In the experiments the electrical activities of the visual colliculi (anterior, medial and ventral nuclei as well as the hillock), the subcollicular region, the caudate nucleus, the corpora quadrigemina and the pons Varoli were recorded.

It was established that perfusion of the isolated spleen by the V. N. Chemigovsky method using foreign (citrated rabbit) blood led to numerous alterations in the enumerated structures.

The changes were greatest in the electrothalamograms showing themselves in the increased amplitude of the slow waves – 3-7 cps constituting their specific characteristic (Experiments Nos. 90, 97 and 100), occasional discharges of sharp, spike-like negative waves (Expt. No. 90) slow waves with sharp peaks (Expt. Nos. 95 and 97), and voltage increases of all components of the electrothalamogram.

These changes coincided with the beginning of the perfusion, the electrothalamogram quieting by its end (Fig. 1).

![Fig. 1. Bioelectrical activity of the thalamic region in the dynamics of stimulation produced by foreign blood stimulating the spleen interoceptors (Expt. 95, October 12, 1952). Dog weighed 22 kg. Tracing records electrical activity of the ventral nucleus of the visual colliculus; a) before perfusion of spleen with foreign blood; b) during irrigation; c) at end of perfusion. Time marker (1/20 second).]

In the instances described, the introduction of the rabbit blood into the perfusing fluid led to a sharp reaction on the part of the cardiovascular system, the response having a pressor-depressor character.

In those experiments where the background activity was characterized by low amplitude bioelectric waves (Expts. Nos. 97a, 105, 109 and 110), perfusion with foreign blood did not provoke activity changes. The hemodynamic response in these cases was also feeble.