(frequency 500cps). Channel 2 records the action potentials arising in response to stimulation. As is evident from the Figure, continuous stimulation of the nerve gives a picture on the screen in which the whole of the curve of recovery of excitability is visible, in the form of a line enclosing the action potential waves.

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PROCEDURE FOR LEADING OFF ELECTRICAL POTENTIALS FROM AND FOR STIMULATING THE BASAL REGIONS OF, THE BRAIN OF DOGS, UNDER CONDITIONS OF SERIES EXPERIMENTATION

G. Ya. Khvoles

From the Chair of Normal Physiology (Director: G. Ya. Khvoles), Karaganda Medical Institute (Director: Assistant Prof. P. M. Pospelov)

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A number of procedures are used in modern physiology for permanent leading off biopotentials from and for applying stimuli to, various parts of the brain. Of these procedures, the most useful has been that devised by A. B. Kogan [1], depending on the insertion of indwelling electrodes. By this procedure, action potentials can be led off from, and electrical stimulation can be applied to, the basal areas of the brain of dogs, using indwelling electrodes. This is a drawback of the method, since the electrode introduced into the brain injures conducting pathways and nuclear formations when being inserted into the desired locality, and may interfere with the normal physiological relations existing between different parts of the central nervous system. In this connection, we have devised a procedure for the direct leading off of bioelectric potentials from, and for the stimulation of, the basal areas of the brain under conditions of series experimentation in dogs, involving the designing of a Plexiglass screw-in electrode 10 mm long, with a diameter of the thread of 4 mm, and with 7 turns of the screw-thread.

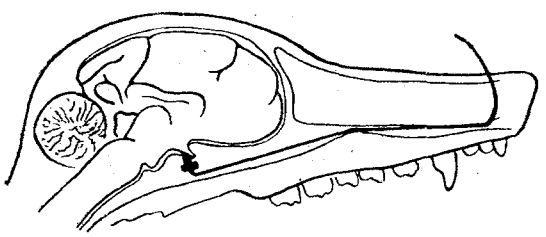

Fig. 1. Diagrammatic representation of the location of a basal screwed-in electrode, in the skull of a dog.

* In Russian.

A piece of silver or platinum wire 1.5 cm long and 1 mm in diameter, flattened at the end to a width of 2-3 mm, is inserted through a 1 mm hole in the threaded piece of Plexiglass.

The other end of the piece is provided with a square cap, to facilitate screwing in. An insulated multistrand lead is soldered to the piece of wire inside the Plexiglass, and is led out through the nasal passage to the skin surface of the bridge of the nose, at the boundary between its bony and cartilaginous parts (Figure 1). For short-term experiments, plated wood-screws may be used instead of the above arrangement, the dimensions being the same.

The operation of insertion of the electrodes is conducted under general hexenal anesthesia. A 10% solution of hexenal is injected into the saphenous vein, at a dosage level of 0.2-0.5 ml/kg body weight. The dog is tied down on its back. The assistant raises the lower jaw and depresses the upper one, by means of two napkins. The tongue is caught in a pair of tongue-retractors, and held out of the mouth. The soft palate is swabbed with alcohol, and split longitudinally, from the hard palate to the uvula. The edges of the wound are retracted with two pairs of hemostatic clamps, thus widely exposing the nasopharynx. A cruciform incision is made into the mucous membrane and periosteum of the palatal bone, using a sharp lancet, and the tissues are retracted with a raspatory, exposing the bone. A hole is bored with a drill through the palatal bone, at its junction with the sphenoid. The anterior hypothalamus is located here. A metal sleeve is fitted to the drill, so as to act as a guard against penetration of the drill into the brain substance. A screw-tap is inserted into the opening in the bone, and a thread is cut to accommodate that of the electrode. When the screw-tap has penetrated to the meninges, the surrounding tissues and the bony canal are treated with penicillin solution, and the electrode, previously sterilized by boiling in water, immersion in alcohol, and treatment with penicillin, is screwed in. A steel wire ending in a narrow loop is then inserted through a nostril into the nasopharynx. Catching the electrode lead in the loop, we pull it out through the nostril. A passage from the nasal cavity to the exterior surface of the bridge of the nose is pierced by means of a narrow lancet or a blade of a pair of ophthalmological scissors, at the junction of the bony and the cartilaginous parts of the nose. The tip of the lancet is seized in a small hemostatic clamp, which is pulled down through the opening made in the nose to the exterior. The knife is then released, and the electrode lead is seized in the jaws of the clamp, drawn up through the passage to the exterior, and sutured in position on the bridge of the nose. The wound in the soft palate is closed, using three silk stitches. The postoperational course is usually uncomplicated, and the dog may be taken for experimentation within 7-10 days. A basal electrode implanted in this way remains very firmly attached to the bone. We have used similar screw electrodes for recording the electrical potentials of the cerebral hemispheres, and we are thus able to study cortical-subcortical interrelations.

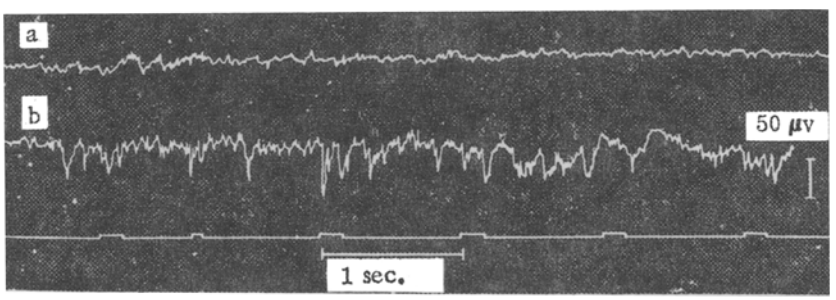

Fig. 2. Tracings of biopotentials recorded from the anterobasilar areas of a dog's brain, by the procedure described. a) Normal tracing, before applying a therapeutic mudpack; b) after the application.

Figure 2 presents recordings of biopotentials from the anterior hypothalamic region of a dog's brain.

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