PARTICIPATION OF THE RETICULAR FORMATION OF THE PONS
IN THE REGULATION OF BLOOD CLOTTING

G. A. Yakunin

Research Institute of Physical Education and School Hygiene
(Director, Corresponding Member APN RSFSR Dr. Biol. Sci. A. A. Markosyan), Moscow
(Presented by Active Member AMN SSSR V. V. Parin)
Translated from Byulleten' ᾂperimental'noi Biologii i Meditsiny, Vol. 57, No. 3, pp. 11-15, March 1964
Original article submitted July 2, 1961.

Previous investigations [1, 2, 3] revealed differences in the influence of the various segments of the reticular formation of the hypothalamic region on the coagulation of the blood. Continuing these investigations, we studied the influence of the reticular formation of the pons on the blood clotting time, the concentration of factor V, the prothrombin and heparin levels in the blood of the rabbit. The electrical activity of the cerebral cortex and reticular formation was compared with the dynamics of the blood clotting indices studied. No information on this subject could be found in the literature.

EXPERIMENTAL METHODS

Experiments were conducted on unanesthetized rabbits with bipolar electrodes (30-70 μ) implanted in the cerebral cortex and in the reticular formation on the pons. The Sitkovskii-Egorov apparatus was used to measure the blood clotting time. The concentration of factor V was determined by the method of Lewis and Weir, the prothrombin concentration by Quick's method, and heparin by the protamine sulfate titer. The electrical activity was recorded on a four-channel ink-writing electroencephalograph. At the beginning of the experiment the initial electrical activity was recorded and the initial values of the clotting time of the blood and the concentrations of factor V, prothrombin, and heparin were determined. This was followed by a short-period (10 sec) of local electrical stimulation with rectangular pulses with a voltage of 2-3 V. The changes in electrical activity were examined until restoration of the normal EEG and of the normal levels of the blood clotting indices.

![Fig. 1](image_url). Changes in the blood clotting time and concentration of factor V, prothrombin, and heparin after electrical stimulation of the rostral and caudal parts of the reticular formation of the pons (a) and the middle part of this structure (b). The arrows denote the time of stimulation; details of curves: 1) beginning; 2) end of blood clotting; 3) prothrombin; 4) heparin; 5) factor V.
Fig. 2. Changes in the electrical activity of the cortex and reticular formation during stimulation of the caudal part of the reticular formation of the pons with an electric current. Significance of curves (from top to bottom): reticular formation of hypothalamus, reticular formation of pons, motor cortex; time marker (1 sec): a) electrical activity before stimulation; b) 3 min; c) 8 min; d) 15 min; e) 45 min; f) 1.5 h after stimulation. Arrow indicates moment of taking blood.

Blood for analysis was taken from the auricular veins before and at intervals of 10 sec, 5, 10 min, and so on after stimulation until the normal level of the blood clotting indices had been restored. In some experiments the respiratory movements were recorded by means of a pneumographic attachment. After the experiments the position of the electrodes in the brain structures was verified histologically.

EXPERIMENTAL RESULTS

Local stimulation of the various regions of the reticular formation of the pons caused changes of different character in the coagulation of the blood and the electrical activity of the brain. During stimulation of the rostral and caudal parts of the reticular formation of the pons the blood clotting time was shortened, the prothrombin level raised, and the concentrations of factor V and heparin in the blood lowered (Fig. 1a).

Stimulation of the middle part of the reticular formation of the pons caused a somewhat different picture of changes in the electrical activity of the brain and the coagulation of the blood. After stimulation a shortening of the clotting time was observed, which was followed by a slowing a sharp decrease in the factor V, a lowering of the prothrombin level, and a very slight increase or no change in the heparin concentration (Fig. 1b).