cortisone has a marked immunodepressive action and lowers the circulating antibody level through its action on peripheral organs of the immune response, in which it produces severe degenerative changes.

In the experiments with hydrocortisone, just as in those with an immunodepressant [1], a connection was again found between the state of the peripheral lymphoid organs and the development of atherosclerotic lesions of the blood vessels. Whereas in animals kept on an atherogenic diet only the B-system of peripheral lymphoid organs was activated and, parallel with this, progressive development of experiment atherosclerosis was observed [6], when the atherogenic diet was accompanied by administration of hydrocortisone the opposite picture was observed and, despite the high blood lipid level, accompanied by inhibition and atrophy of the B-system of lymph nodes and spleen, the severity of atherosclerotic lesions of the arteries was sharply reduced.

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ANTICONVULSANT EFFECT OF STIMULATION OF THE MESENCEPHALIC RETICULAR FORMATION IN ANIMALS WITH EXPERIMENTAL PHOTOGENIC EPILEPSY

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KEY WORDS: photogenic epilepsy; lateral geniculate body; mesencephalic reticular formation; anticonvulsant stimulation.

The study of the pathogenesis of experimental photogenic epilepsy [3], arising when a generator of pathologically enhanced excitation is formed [5] in the lateral geniculate body (LGB), by injection of tetanus toxin (TT) into this nucleus, has shown that the formation of this syndrome is based on two main pathogenetic factors: 1) pathological enhancement of specific sensory excitation passing through the thalamic relay nucleus; 2) disturbance of nonspecific mechanisms of stabilization of rhythmic brain electrical activity. Following analysis of neuronal mechanisms of generator organization in LGB [4] it was postulated that inhibition of activity of the mesencephalic reticular formation (EP) is an important pathogenetic component of the development of epileptic seizures (ES) in animals with photogenic epilepsy [2].

The investigation described below was devoted to the testing of this hypothesis: to study whether generalized ES can be depressed by increasing MRF activity as a result of electrical stimulation.

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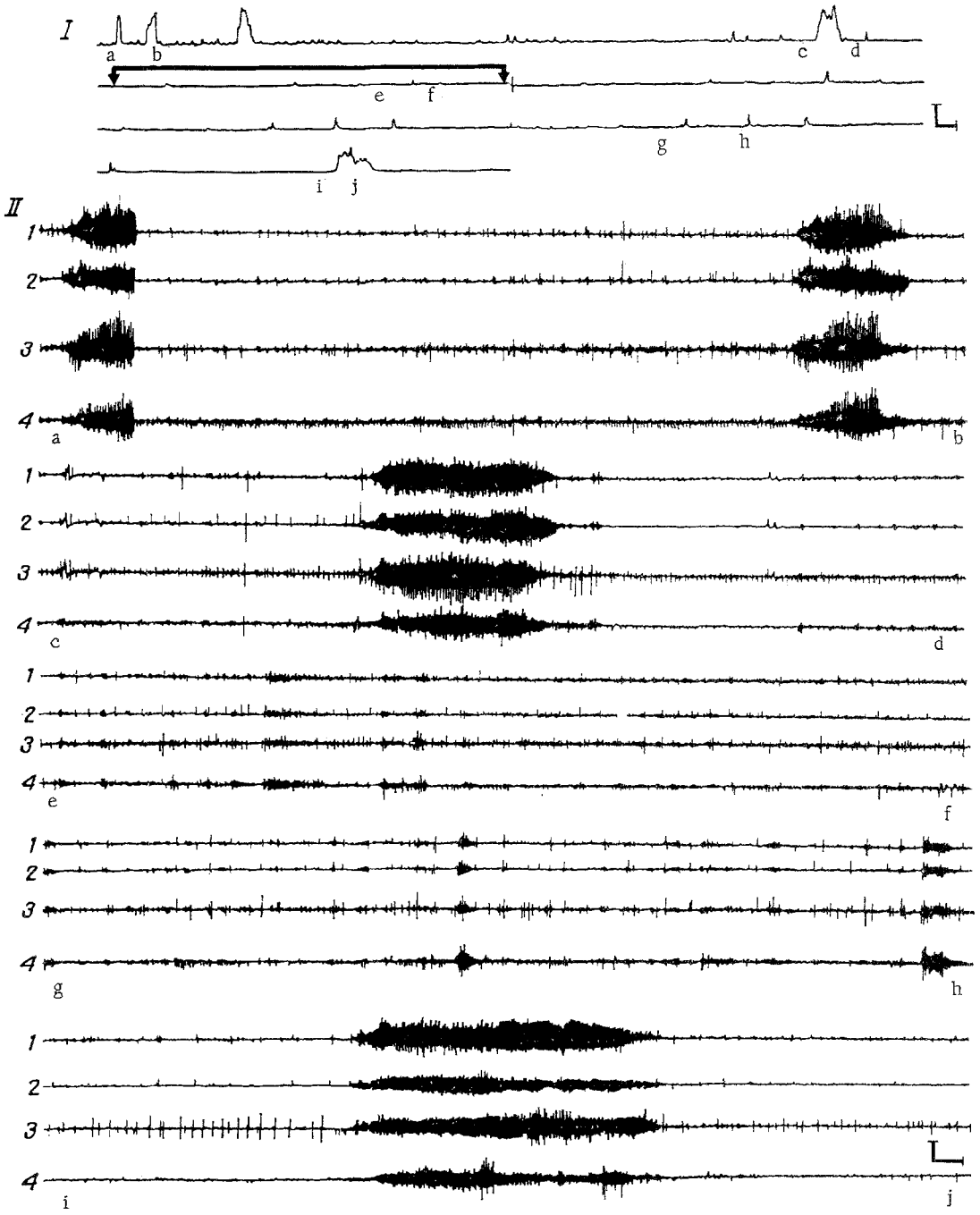

Fig. 1. Effect of stimulation of MRF on epileptic activity in structures of the visual system (rat No. 3, 19 h after injection of TT into LGB). I) Momentary frequency of epileptiform discharges in LGB into which TT was injected (region of generator of pathologically enhanced excitation). Horizontal line marks period of continuous electrical stimulation of MRF (0.8 V; 0.2 Hz); II) fragments of ECoG corresponding to records of computer analysis indicated by letters in I: 1, 2) ipsi- and contralateral LGB, 3, 4) ipsi- and contralateral visual cortex. Calibration: I) 10 Hz, 2 min; II) 200 μV, 5 sec.

EXPERIMENTAL METHOD

Experiments were carried out on male albino rats weighing 200-250 g. Photogenic epilepsy was produced in rats by injecting TT ($0.4 \cdot 10^{-4}$ ml, 2 MLD for rats) into LGB [3]. Monopolar electrodes were inserted, to record the electrocorticogram (ECoG) into LGB and the visual and sensomotor cortex. Bipolar electrodes were inserted into MRF for electrical stimulation (AP 6.5, I 2.5, H 6.5). The investigation was carried out on the day after injection of TT. The

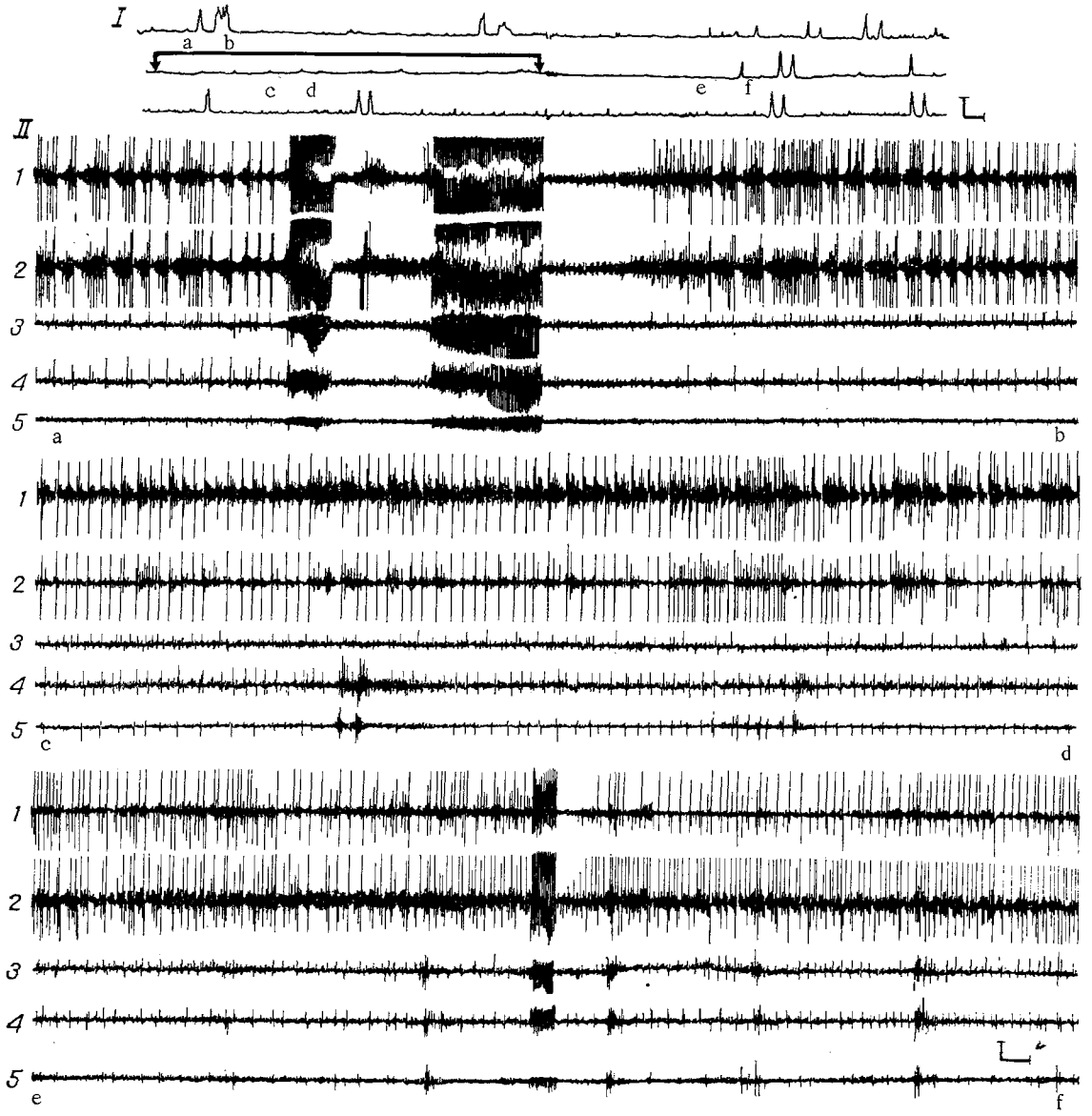

Fig. 2. Suppression of ES against a background of preservation of interictal discharges during stimulation of MRF (rat No. 5, 20 h after injection of TT into LGB). Parameters of stimulation of MRF and legend as in Fig. 1.

rats wore jackets which did not restrict their movements. The results of the investigation were processed on an ATAC-501-20 (Japan) analyzer. After the end of the experiments the location of the electrodes was verified morphologically.

EXPERIMENTAL RESULTS

Between 15 and 17 h after injection of TT the animals began to develop spontaneous ES or ES provoked by photic stimulation. To begin with the frequency of the ES was every 2-3 h, but during maturation of the hyperactive focus the interval between successive ES was shortened to 10 min. Electrical stimulation of MRF (continuous for 40 min with a frequency of 0.2 Hz) was given during the period of stable ES production (the mean interval between ES was 10-30 min). In four of the 12 animals with stable ES that were investigated stimulation of MRF led to total suppression of ES throughout the period of stimulation, and also for 1-2 h after its end. An example of suppression of ES is shown in Fig. 1. Regular ES, accompanied by generalized discharges, were recorded 19 h after injection of TT; the mean interval between ES was 20 min (Fig. 1a, b). Stimulation of MRF led to complete cessation of ES (Fig. 1c), but high-amplitude interictal discharges (IId) continued to be recorded and actually increased somewhat in frequency. The effect of MRF stimulation continued for 2 h after its end (Fig.

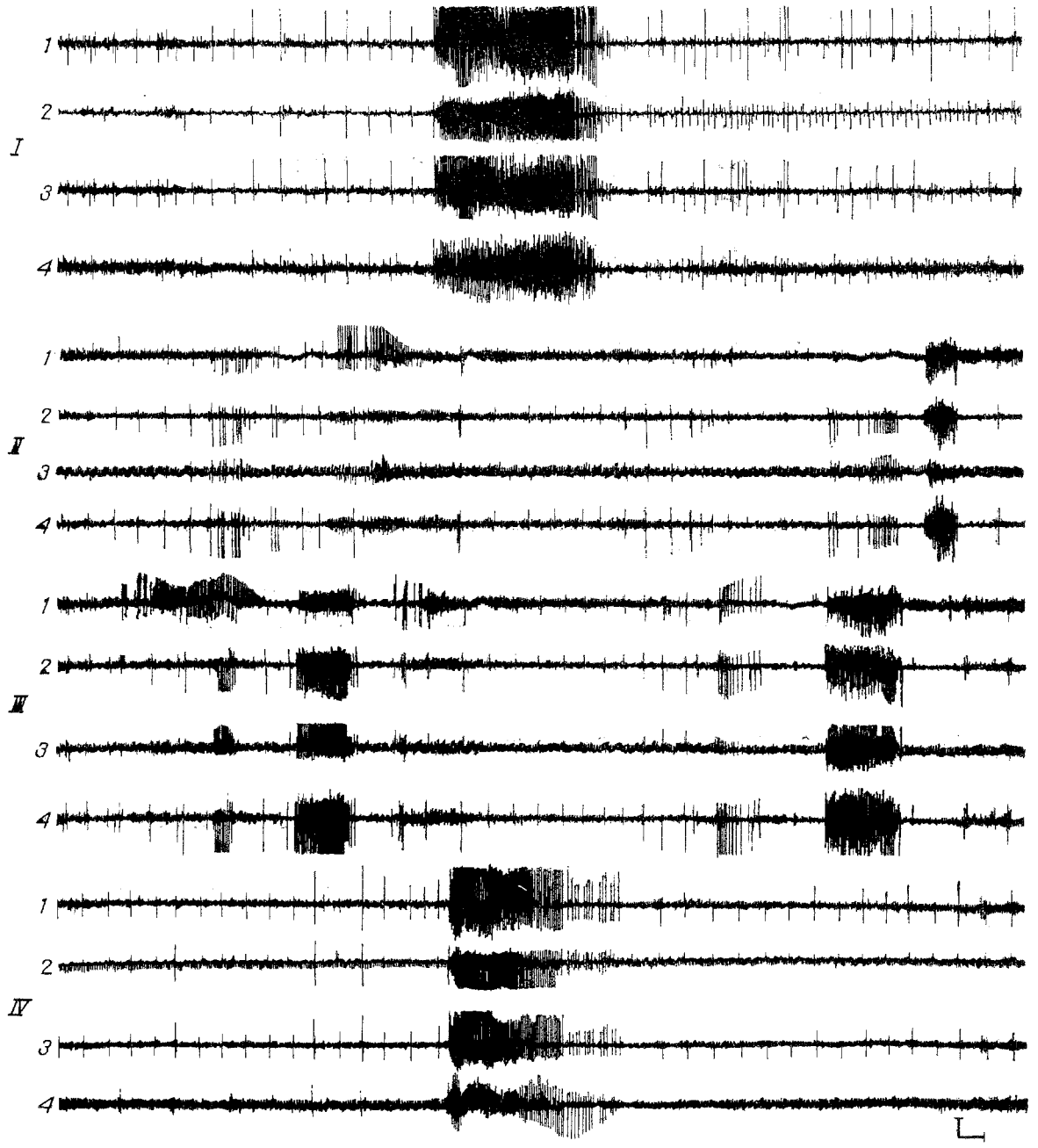

Fig. 3. Inhibition of generalized epileptic activity and activation of focal discharges in LGB during stimulation of MRF (rat No. 7). I) ECoG 18 h after injection of TT into LGB; II) during stimulation of MRF, 15 min after beginning of electrical stimulation (0.8 V, 0.2 Hz); III) 65 min after end of stimulation of MRF; IV) 100 min after end of stimulation of MRF. Remainder of legend as in Fig. 1.

1d). Recovery of ES was accompanied by a decrease in the frequency and amplitude of the IId. An example of suppression of ES in a rat during stimulation of MRF, against the background of unchanged IId, is shown in Fig. 2. Stimulation of MRF could evoke suppression of generalized ES, but under these circumstances focal epileptiform discharges developed in LGB (Fig. 3b,* c*), and did not spread to other parts of the CNS. In six animals stimulation of MRF caused no change in the pattern of the seizure syndrome.

The results are evidence that stimulation of MRF may have an inhibitory action on ES in animals with photogenic epilepsy. An anticonvulsant effect of MRF stimulation has also been obtained in other experimental models of epilepsy [9,13].

The present writers found previously [4] that the inhibitory influence of LGB interneurons on relay neurons is disturbed through the action of TT. It is known [7, 8, 11] that MRF

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has a similar action on LGB, and it was this which served as the basis for the suggestion that MRF participates in the genesis of photogenic epilepsy [4]. Suppression of MRF activity is regarded as an important factor in the formation of generalized paroxysmal reactions [1, 11, 12]. It has also been suggested that the anticonvulsant effect of electrical stimulation of the cerebellum [1, 4] is also mediated through excitation of MRF. Activation of MRF, as the present investigation shows, causes depression of ES but does not inhibit, and may even facilitate, the appearance of IId and of focal epileptiform discharges in LGB. A similar effect has also been observed during suppression of photogenic ES by diazepam [6]. It can accordingly be concluded that the chief target for the antiepileptic action of both stimulation of MRF and administration of diazepam is not the generator in LGB, but the enhanced readiness of the brain for seizure activity, produced by the formation of such a generator in the thalamic relay nucleus.

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