contractile activity of the myocardium in the other two antagonists tested is not yet understood because all the antagonists mentioned are able to prevent the platelet aggregation reaction induced by PAF [4, 10, 13]. Two suggestions may be put forward: 1) the mechanisms of interaction of PAF and its antagonists on the excitable membrane of the myocardial cells and the inexcitable membrane of blood cells are not identical; 2) unlike U-66985, the PAF antagonists BL-8701 and Brotizolam cannot interact with specific PAF receptors on the myocardial cell membrane and, consequently, they cannot prevent the cardiodepressive action of PAF.

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EFFECT OF THYMOSIN AND B-ACTIVIN ON LATERALIZATION OF SENSOMOTOR CONTROL IN RATS

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Reorganization of brain activity following the development of vascular and traumatic lesions and tumors is a problem many aspects of which remain far from clear, so that there is a consequent lack of methods of targeted correction of the restoration of brain functions. Much evidence has been obtained of significant differences between the cerebral hemispheres, not only from the functional, but also from the biochemical [4-6, 9, 12, 14] and immunologic points of view [7, 10], and also with respect to their electrophysiological characteristics [1-3]. These data demand a differential approach to lesions of the right and left hemispheres, and point out some directions for the search of regulators of compensation and recovery processes in the CNS.

The aim of this investigation was to study the role of endogenous peptide regulators thymosin and B-activin (myelopide) as lateralized (selective) modulators of functions of the right and left hemispheres.

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EXPERIMENTAL METHOD

Experiments were carried out on 74 noninbred male rats weighing 200-250 g, divided into two equal groups. After the animals had become accustomed to the experimental situation and the orienting reflex extinguished, both groups of rats were taught to visit the feeding bowls, take food, and return to the starting chamber. The experimental situation comprised a fenced off platform on which were three overturnable feeding bowls. Two bowls were located symmetrically to the right and left of the exit from the start chamber, the 3rd was directly opposite. The criterion of learning was individual stabilization of the latent period (LP) of responses, which was usually observed after 80-100 visits. During the next 7-8 days the degree of lateralization of motor control was studied in all the animals and taken as the basic level. Next, the modulating influence of thymosin (1 g) or B-activin (2 g) on lateralization of the behavioral responses were studied also for 7-8 days. Before the experiment the rats were deprived of food for 24 h. The thymosin (fraction 5) used was obtained from the thymus of the Greenland seal by the method of the Research Laboratory of Biologically Active Substances of Hydrobionts, Ministry of Health of the USSR. Thymosin or B-activin was injected intraperitoneally in a dose of 0.5-1 mg/kg 20-30 min before the beginning of the experiment. Lateralization of sensomotor control was evaluated by the following parameters: a) lateralization of visiting the feeding bowl, b) lateralization of the food-getting response, c) the direction and number of spontaneous rotations. The parameter (b) was divided into four gradations: action with only the left or only the right limb, and predominant action with the left or the right limb (Fig. 1, 1). The effect of peptides on the latent period of the visits also was studied. The significance of the results was analyzed by an Olivetti P6060 computer, using an algorithm [8] to evaluate the significance of the difference between general and sample fractions.

EXPERIMENTAL RESULTS

The experiments revealed marked modulating influences of thymosin (1 g) in a dose of 0.5 mg/kg on the lateralization of motor control of all stages of food-getting behavior studied. The fraction tested increased the number of food-getting movements, performed by the rats with the right limb only or predominantly, by 33.9 and 26.7% respectively ($p < 0.05$). There was a tendency toward a decrease in the number of food-getting movements with the left limb and a decrease in LP. After administration of thymosin the number of visits to the right feeding bowl was reduced by 16.4% ($p < 0.05$) and an increase of 59% ($p < 0.05$) in the number of central visits. At the same time, an increase in the number of visits to the left feeding bowl was recorded (Fig. 1, 2). One of the clearest manifestations of the effect of thymosin was its action on spontaneous rotations. Whereas in intact animals the mean number of clockwise (right-sided) rotations and the number of anticlockwise (left-sided) rotations were about equal and did not differ statistically significantly, thymosin created conditions of the appearance of marked asymmetry with respect to this parameter. The number of left-sided rotations was 42.9% ($p < 0.01$) greater than the number of right-sided. LP of the response showed significant changes. In animals of the control group the average LP was 5.9 ± 0.23 sec, whereas in rats of the experimental group it was shortened by half to 2.87 ± 0.11 sec. No general increase in motor activity, grooming, and so on, was found under these circumstances. Analysis of the results of this series of experiments showed that changes in all three parameters of lateralization of motor control caused by thymosin were in the same direction. In fact, the number of food-getting movements was increased only with or mainly with the right limb, a change was observed from visits to the right bowl to visits to the left, and predominance of left-sided rotations was recorded. These facts indicate an increase in tone of the right forelimb [1] and also activation of the corresponding structures in the left hemisphere. Thus thymosin (fraction 5) displaces lateralization of motor control toward the left hemisphere, and activates it.

Administration of B-activin to the animals of the 2nd group also changed all the stages of their behavioral activity studied; the character of these changes, moreover, differed from the effects of thymosin. B-activin reduced the number of food-getting movements performed by the right forelimb by 22.8% ($p < 0.05$), increased the number of visits to the right bowl by 26.5% ($p < 0.05$), while reducing the number of visits to the central bowl by 26.4% ($p < 0.05$), and a tendency for the number of left-sided visits to be reduced (Fig. 2, 2). Just as when thymosin was used, injection of B-actvin led to a significant change in the relative number of right- and left-sided rotations. However, this effect was opposite to the action of thymosin, and consisted of predominance of clockwise rotations by 53.8% ($p < 0.01$). The only parameter to be changed in the same direction by the two peptide factors was LP of the behavioral response. After administration of myelopide LP was reduced by 1.7 times compared with the control (Fig. 2, 4), there was evidence of a decrease in the degree of environmental indeterminacy for the animal and facilitation of the stage of decision making [11]. It must also be pointed out that since the rotation syndrome is largely controlled by the nigrostriatal system [13], the effects of the peptide regulators studied on asymmetry of CNS function will evidently also be manifested at this level. Comparison of the results of the study of the effect of thymosin and B-activin demonstrates the oppositeness of

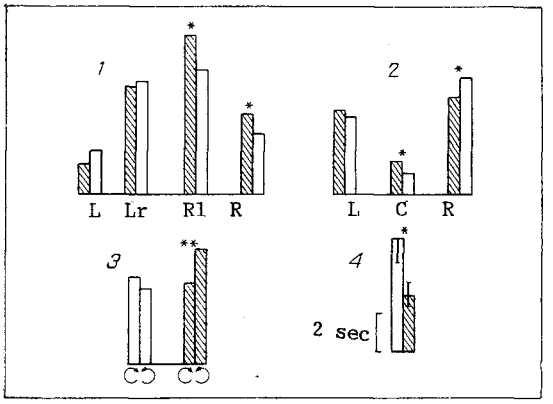

Fig. 1. Modulating effects of thymosin on behavioral activity of rats. Here and in Fig. 2: L) left, R) right limb, R1) action predominantly with the right limb, Lr) predominantly with the left limb. 1) Dynamics of preference of forelimb, 2) change in lateralization of visits, 3) characteristics of spontaneous rotations, 4) LP of response. Unshaded columns — control animals, shaded — after administration of thymosin. *p < 0.05, **p < 0.01.

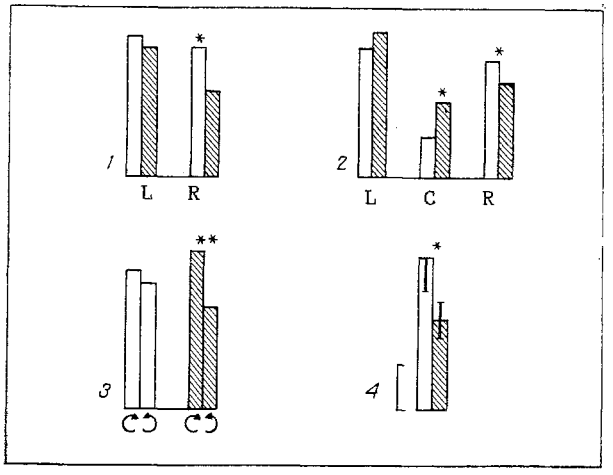

Fig. 2. Modulating effects of B-activin (myelopide) on behavioral activity of rats. Explanation in text.

their action on lateralization of visits, the use mainly of the right or the left limb, and the direction of rotations. It can be concluded from these properties that these peptides can be used for directly influencing the course of compensation and repair processes in the CNS, with a view toward optimization of its development. Moreover, taking account of the factual evidence of activation of zones of the intact hemisphere symmetrically opposite to the pathological focus, at a certain period of the compensatory process [2, 3], it can be postulated that thymosin is most effective in right-hemispheric, B-activin in left-hemispheric pathology.

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INTENSIFICATION OF GAS EXCHANGE DURING HIGH-FREQUENCY ARTIFICIAL VENTILATION

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The method of high-frequency (HF) artificial ventilation of the lungs (AVL) is being used increasingly in the treatment of acute respiratory failure, because of the possibility of intensifying the gas exchange and correcting the hypoxemia which develops as a result of disturbances of ventilation-perfusion ratios and an increase in arteriovenous shunting, which cannot be corrected by ordinary AVL. No satisfactory explanation of the causes of the intensification of gas exchange during HF AVL is yet forthcoming, and this limits the development and more widespread introduction of this type of AVL.

The mechanism of intensification of gas exchange during HF AVL is discussed in this paper, with the aim of determining its optimal parameters.

Traditionally research workers have devoted most attention to the mechanism of gas transport along the bronchial tree. The cause of improvement of ventilation, for example, during jet HF AVL, is considered to be the high initial velocity of the gas jet, which promotes direct carriage of oxygen into the distal portions of the bronchial tree [8]. It is also considered that the gas flows are separated — to the alveoli (along the axis of the bronchial lumen) and in the opposite direction (along the walls of the bronchus), as a result of which the velocity of gas exchange in the lungs is increased. Because of the increased velocity of the jet, turbulence of the gas mixture leads to its more effective mixing and, consequently, to acceleration of gas exchange at the level of bronchi of higher orders than in ordinary types of AVL [5]. These suggestions apply only to gas transport along the bronchi and have nothing to do with diffusion processes in the alveoli. Meanwhile hypoxemia can be overcome only by increasing the volume of oxygen absorbed by the blood, and in turn, this can take place through a reduction in the volume of arteriovenous shunting on account of an increase in the capacity of alveoli ventilation, acceleration of the diffusion of gases in the alveolus, or a combination of both processes. Consequently, the question arises: what determines acceleration of oxygen diffusion into the blood and an increase in the volume of alveolar ventilation in different methods of HF AVL [7]. One possible answer to this question can be formulated as follows.

During jet HF AVL, which consists essentially of injecting a pulsed jet of gas into the air passage of the lungs with a definite following frequency (1-5 Hz), the development of a double oscillatory process is observed in the lung

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