

Effect of Potentiated Antibodies to Brain-Specific Protein S100 on the Integrative Activity of the Brain

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Effect of potentiated antiserum to brain-specific protein S100 in a concentration of 10^{-100} prepared according to standard homeopathic procedures on integrative activity of rat brain was studied on models of conditioned avoidance reaction and self-stimulation of the lateral hypothalamus through chronically implanted electrodes. The antibodies reversibly inhibit memory processes during avoidance reaction. The incidence of the self-stimulation reaction increased after single administration of potentiated antibodies, while their administration for 5 days decreased the incidence of this reaction. Administration of water caused no such effects.

Key Words: *brain-specific protein S100; monospecific potentiated antiserum to S100 antigen; integrative activity of the brain*

Mechanisms of the effects of potentiated (homeopathic) forms of neurotropic agents on brain function have been studied [2]. In this study we investigated the effects of potentiated antibodies to brain-specific antigen S100 (AS100) in a concentration of 10^{-100} on integrative activity of the brain. Two experimental series were performed: in series I we analyzed the effect of AS100 on the memory trace in animals on a model of strong conditioned emotional avoidance reaction (CEAR) and in series II we investigated the effect of AS100 on the reaction of self-stimulation of the lateral hypothalamus (RSS).

MATERIALS AND METHODS

Experiments were carried out on 34 outbred adult male albino rats weighing 250 g.

Glass-coated nichrome electrodes (100 μ) were chronically implanted into the lateral hypothalamus at stereotaxic coordinates F=3.7 mm, L=0.7 mm, and H=8.9 mm (O. Fifkova and D. Marshall [1]).

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CEAR was developed in response to an auditory stimulus (metronome, 300 strokes/min). Unconditioned stimulus was a 10-sec electrocutaneous stimulation of the pads with a suprathreshold current in a shuttle box. Conditioned reaction was considered strong if it was reproduced regularly in response to 5 presentations of the conditioned signal with 3-min intervals.

Self-stimulation of positive emotigenic zones of the lateral hypothalamus was carried out with 50-Hz sinusoidal current (0.5 sec stimulus duration). The reaction was recorded on an automated counter. The results were statistically processed using Student's *t* test.

Potentiated AS100 were from Materia Medika.

RESULTS

In series I, 25 rats with strong CEAR were used. Potentiated AS100 (10^{-100}) were administered orally (one drop per day) for 5 days; to controls one drop of distilled water was given. CEAR was recorded 3 min after administration. The latency of CEAR, the number of conditioned responses and corresponding behavioral reactions were recorded.

Potentiated AS100 considerably modified conditioned behavior in rats (Table 1). Prolongation of CEAR

TABLE 1. Effect of Potentiated AS100 on CEAR Latency ($M \pm m$)

| Day of experiment | Control (n=7) | Administration for 5 days | |
|-------------------|---------------|---------------------------|--------------|
| | | water (n=5) | AS100 (n=11) |
| Baseline | 7.05±1.34 | 6.58±1.48 | 7.44±0.93 |
| 1 | 6.78±1.15 | 4.10±0.98 | 12.25±2.31* |
| 2 | 7.10±0.98 | 6.70±1.43 | 11.15±2.37** |
| 3 | 6.49±1.27 | 3.86±1.51 | 15.30±2.41** |
| 4 | 6.24±1.09 | 6.52±1.07 | 17.30±2.89** |
| 5 | 6.98±1.17 | 6.64±1.16 | 19.30±2.51* |

Note. $p < 0.05$: *vs. baseline, **vs. water administration.

latency and its inhibition to complete amnesia were observed in 8 rats (78%). In 3 rats (22%) the latency was increased, but the number of conditioned responses was unchanged. Further administration of AS100 prolonged the latency of CEAR or reduced the number of reactions in 83% animals in comparison with the control. In some animals the metronome lost its significance as a conditioned stimulus: they did not react to it and CEAR was not realized. Activation of the initial component of CEAR (orientation, exploratory, and motor components, gnawing of the floor and wall separating the shuttle compartments) was observed in 6 out of 11 rats.

Administration of potentiated AS100 (but not water) for 1 day and subsequent 4 days reduced the number of conditioned responses (Fig. 1).

In series II, 9 animals with stable self-stimulation parameters were used. Effects of single and repeated (for 5 days) administration of potentiated AS100 in the same concentration (dilution) on the incidence of the lateral hypothalamic RSS were investigated.

Single administration of potentiated AS100 significantly increased the incidence of this reaction

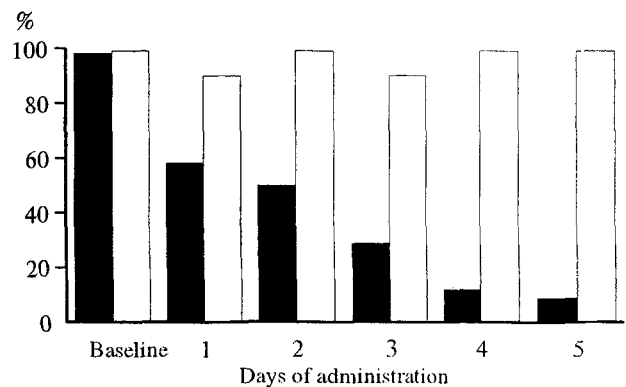


Fig. 1. Time course of conditioned responses in rats after administration of potentiated AS100 (shaded bars) and water (open bars) for 5 days.

during 60 min after administration (Fig. 2). Single and repeated (for 5 days) administration of one drop of water did not modify the incidence of the lateral hypothalamic RSS.

Administration of potentiated AS100 for 5 days significantly decreased the incidence of the lateral

TABLE 2. Effect of Potentiated AS100 on RSS

| Animal No. | Baseline | Water (5 days) | AS100 | |
|------------|----------------|----------------|-----------------|------------------|
| | | | single | 5 days |
| 1 | 3180 | 3468 | 3746 | 1946 |
| 2 | 2950 | 3000 | 3145 | 2385 |
| 3 | 3135 | 3216 | 3675 | 1844 |
| 4 | 2900 | 2940 | 3340 | 2160 |
| 5 | 3168 | 3072 | 3562 | 1780 |
| 6 | 2980 | 3120 | 3240 | 2155 |
| 7 | 3310 | 3672 | 3854 | 1832 |
| 8 | 3540 | 3408 | 3795 | 2835 |
| 9 | 2780 | 3060 | 3610 | 1689 |
| $M \pm s$ | 3104.78±231.58 | 3217.33±246.32 | 3551.89±253.58* | 2069.56±362.65** |

Note. * $p < 0.05$, ** $p < 0.01$ vs. baseline values.

hypothalamic RSS; rest pauses were frequent, and RSS acquired an ambivalent pattern with elements of avoidance. However, the animals returned to the pedal without reminding of self-stimulation and pressed it to produce a series of self-stimulations. The number of successive pedal pressings per series decreased.

Therefore, potentiated AS100 inhibited the formation of memory trace irrespective of the type of conditioned stimulus (acoustic signal in a shuttle box or

situation stimulus in Skinner's box) and the unconditioned reinforcement ("punishment" or "award").

REFERENCES

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