INFLUENCE OF PARAMION ON DECEREBRATED RIGIDITY AND MORPHINE TWITCHING OF THE TAIL

B. M. Butaev

From the Laboratory of General Pharmacology (Director Corresponding Member Acad. Med. Sci. USSR Prof. V. M. Karasik) of the Department of Pharmacology of the Institute of Experimental Medicine (Chairman Corresponding Member of the Acad. Med. Sci. USSR Prof. D. A. Biryukov) Acad. Med. Sci. USSR, Leningrad

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The present article contains findings characterizing paramion (meso-3, 4-diphenylhexanditrimethylammonium iodide) as a means of overcoming rigidity of the skeletal musculature and muscular contractures.

Method and Results of Investigation

The influence of paramion on decerebrated rigidity was investigated in 19 cats. The animal was decerebrated at the level of the upper protuberance of the quadrigeminal bodies, then the head and hind limbs were bound from behind to the experimental table. The forelimbs, which remained free, under the influence of rigidity of the muscles straightened out and stretched upwards (Fig. 1, a). The passive flexure of them at the joints was made extremely difficult. The animal was subsequently injected with paramion intravenously, which in doses of 30–250 γ/kg body weight produced a lessening of the rigidity: the forelimbs flexed at the joints and fell slowly to the torso (Fig. 1, b). Their passive flexure at the joints became free and was performed easily.

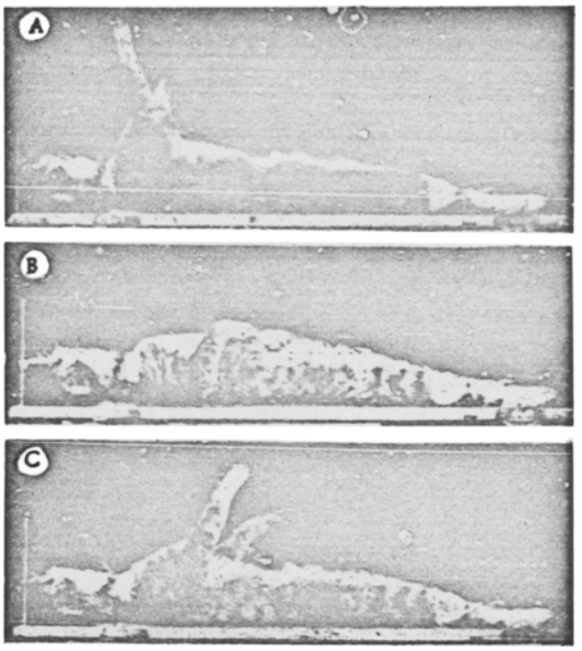
Approximately 1–3.5 hours later, the rigidity began to return, and the limbs, extending at the joints, again stretched upward (Fig. 1, c). Passive flexure at the joints again became difficult.

In a dose of 15 γ/kg body weight paramion did not produce a lessening of the decerebrated rigidity. Thus, in doses not disturbing respiratory movements (respiration was suppressed at a dose of 300 γ/kg body weight), paramion in 1–3.5 hours removed the decerebrated rigidity. Experiments with morphine-twitching of the tail were carried out on 30 mice. Pick and Richards [3] found that curare overcomes the morphine tail reaction of the mice, and suggested the use of this suppression of the tail reaction as a test for curare effect. For a long time the appearance of morphine twitch in the tail in mice was attributed to spasm of the internal anal sphincter. However, this explanation is incorrect; morphine twitch of the tail depends on the contractions not of the smooth, but of the transverse striated musculature and the test of Pick and Richards, fully confirms this (curare does not in practice paralyze the smooth musculature). According to V. K. Zburzhinsky [2] (S.V. Anichkov Laboratory), twitching of the tail was observed in rats with the anal musculature excised, and is prevented by a transverse incision of the spine at the level of the 3–4th vertebrae.

In our experiments, morphine hydrocholoride was subcutaneously introduced into the mice in doses of 25–30 γ/g weight. In 10–20 minutes, motor excitation began and the tails rose and bent in the form of the letter S. After this, the animals were given paramion intraperitoneally (in 0.00[illegible]% solution) in an isotonic solution of NaCl. In 24 experiments paramion was introduced in doses of 0.1 and 0.2 γ/g body weight. In 21 mice, within 4–10 min., the tails began to droop, and within 10–17 min. tail twitching and motor excitation ceased. Within

0.5-2 hours, twitching of the tail and motor excitation were renewed. In three experiments dropping of the tail was not permanent. In a dosage of 0.5 γ/g body weight (6 experiments) paramion did not produce slackening of the morphine twitch of the tail in a single case.

When pyrolaxon-- a synthetic preparation of curare-like effect [1]— was introduced into the mice, it overcame the morphine twitch of the tail in mice at does of 2 and 3γ/g body weight, i.e., 20 times greater than the dose of paramion.



Influence of paramion on decerebrated rigidity of cats. a) Decerebrated rigidity of cats before introduction of paramion. Limbs stretched out at joints and sharply extended upward. Passive flexure at joints hindered; b) 46 minutes after introduction of paramion (30γ/kg body weight). Limbs bent at joints and dropping downward. Passive flexure at joints easy; c) 1 hour 33 minutes after introduction of paramion. Rigidity restored: limbs extended at joints, stretching upward; passive flexure at joints again difficult.

LITERATURE CITED

[1] Briskin, A. I., Farmakol. i Toksikol. Vol. 14, No. 6, p. 31 (1951).

[2] Zburzhinsky, V. K., Farmakol. i Toksikol. Vol. 16, No. 3, p. 21 (1953).

[3] Pick, E. P. and Richards, G. V., J. Pharmacol. Exptl. Therap. 1947, 1, 90.