Influence of various forms of information drugs on the course of the inflammatory process in the experiment

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This work is a continuation of a series of experimental studies aimed at assessing the mechanisms of action of various forms of information drugs [1, 2, 3, 4, 5]. Previously, we conducted studies of the effectiveness of various information drugs on a model of subacute formalin inflammation in rats: on the basis of germanium, on the basis of sodium diclofenac, blood nosodes.

The aim of this study was a comparative study of the effectiveness of direct and targeted information drugs.

The study was pilot and was carried out on a small number of white outbred male rats (20 animals) weighing 170-190 grams. The animals were kept in standard conditions of a certified vivarium of the FBUZ "Center for Hygiene and Epidemiology in the Rostov Region".

Study design

A model of subacute formalin inflammation was used, caused by the introduction under the aponeurosis of the ankle joint of the hind right paw of a rat, 0.1 ml of a 2% aqueous solution of formalin [6]. This technique is widely used in experimental medicine and pharmacology. We have made a deviation from the standard technology. According to the original method, the administration of an anti-inflammatory drug is performed one hour before the administration of formalin, which provokes inflammation. It seemed to us more correct in our studies to carry out anti-inflammatory effects an hour after the introduction of formalin. In this modification, the experiment was carried out. In 24 hours after the first injection of formalin, a second injection was made. The development of edema of the hind right paw of animals was assessed by measuring the diameter of the paw with a caliper before the 1st injection of formalin and after 1, 2, 3, 5, 24 hours. After that, formalin was re-injected and the swelling was measured after 25, 26, 27, 29 hours, 48, 72, 96 and 168 hours from the beginning of the experiment. As in previous experiments, the following was calculated: the increase in edema in% to the initial values; the effectiveness of the impacts in% to the increase in edema in the control by the timing of measurements [7].

Informational preparations (IP) were obtained by transferring informational properties to a secondary medium - an ampoule of water for injection (2 ml) using the information transfer generator "Golden Section" developed by ARTEMIDA LLC. PI was injected intragastrically with a probe, 0.5 ml once a day, one hour after formalin administration, i.e. after 1 and 25 hours from the start of the study and then after 48.72 and 96 hours, a total of 5 drinks. The animals were divided into 4 groups. Group 1 - Control (5 animals). Intragastric drinking was carried out with water for injection. Group 2 (5 animals) - comparison group - IPD - informational preparation of the original drug diclofenac sodium. Group 3 (5 animals) - informational preparation "The amount of edema" - IPO. IPO was obtained by rewriting the paw edema of 20 animals using a light probe (developed by ARTEMIDA LLC) with the subsequent creation of a total signal. Group 4 (5 animals) - informational drug "The amount of edema", targeted - NIPO. IPO targeting was carried out on “personal” paw edema

each rat using the apparatus "Golden Section".

To assess the functional state of the animals before the start of the experiment (background) and after 48, 96 and 168 hours, blood was taken from the femoral vein of rats to calculate the leukocyte formula (Schilling's formula). The developing general nonspecific adaptive response (stress [8], training, activation [9]), the degree of its usefulness (the “intensity” of the reaction was assessed in points), the level of intoxication according to 3 tests [10].

Results and discussion

An hour after the introduction of formalin, the animals of all groups developed edema. The first watering was carried out. After another hour, a decrease in edema was noted in the group with the administration of the targeted drug. By 24 hours, the decrease in edema was significant in all groups with the introduction of information drugs. The greatest severity of edema in the control group was observed 2 hours after the first injection of formalin and then 2 hours after the second injection of formalin, gradually decreasing somewhat towards the end of the study (Table 1). In the groups with the introduction of information drugs IPO and NIPO, the decrease in edema was more demonstrative. At the end of the study, the smallest edema was observed in animals of the 4th group both after 96 hours and 2 days after the cessation of exposure (168 hours).

Table 1

The increase in edema in% over the duration of testing.

Group	0 hours	1 hour	2 hours	24 hours	25 hours	26 hours	48 hours	72 hours	96 hours	168 hours
Control (1 gr.)	0%	33%	50 %	41%	50 %	58%	41%	41%	33%	33%
IPD (2 gr.)	0%	33%	33%	25%	41%	50 %	41%	41%	33%	25%
IPO (3 gr.)	0%	33%	33%	25%	41%	33%	25%	25%	17%	25%
NIPO (4 gr.)	0%	33%	17%	17%	33%	33%	25%	25%	eight %	eight %

The anti-inflammatory efficacy of the effects was calculated according to the degree of inhibition of the edematous reaction in comparison with the control (Table 2).

table 2

Effectiveness of impacts in% to control by testing time

Group	1 hour	2 hours	24 hours	25 hours	26 hours	48 hours	72 hours	96 hours	168 hours
SDI	0%	34%	39%	eighteen %	29%	0%	0%	0%	24%
IPO	0%	34%	39%	eighteen %	34%	39%	39%	49%	24%
NIPO	0%	66%	59%	34%	34%	39%	39%	76%	76%

From table. 2 shows that the effectiveness of the IP "The amount of edema", both direct (IPO) and, to a greater extent, targeted (NEP), almost at all times exceeded 30%. An efficacy of 30% is considered reliably significant in pharmacology and medicine in experimental studies of anti-inflammatory drugs [11]. Moreover, the effectiveness of the targeted drug NIPO was especially high in the first hours of the development of edema, that is, after the first injection of the drug, and at the final stage, when the effects were no longer carried out (aftereffect).

It was also interesting to evaluate the effectiveness of the drugs "Amount

edema "in comparison with the information drug diclofenac sodium, a non-steroidal anti-inflammatory drug (Table 3).

Table 3

The effectiveness of the effects of information drugs "The amount of edema" IPO and NIPO in% in relation to SDI

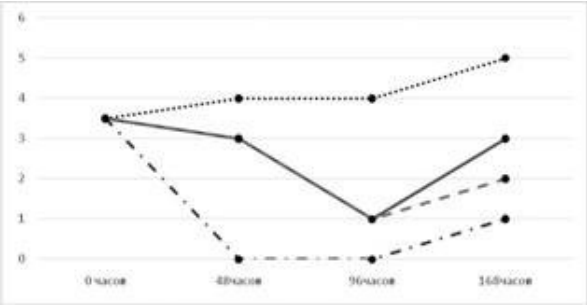
Group	1 hour	2 hours	24 hours	25 hours	26 hours	48 hours	72 hours	96 hours	168 hours
IPO	0%	0%	0%	0%	34%	39%	39%	49%	0%
NIPO	0%	49%	32%	twenty %	34%	39%	39%	76%	68%

The above table more clearly demonstrates the differences in the effect of direct and targeted drugs on the development of inflammation.

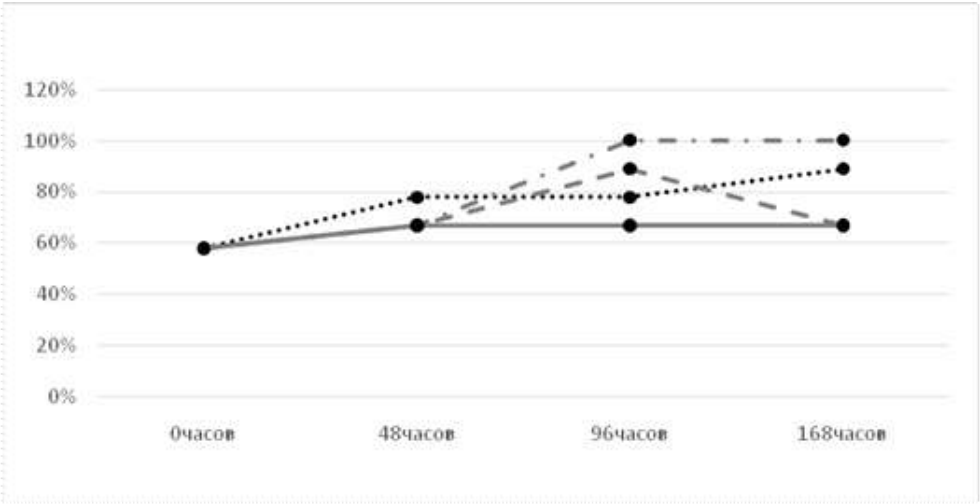
Analysis of developing animals v process research common nonspecific adaptive reactions [8, 9] showed that stress reaction was tested only in animals of the control group. The response of the animals of the experimental groups (2–4) took place in the zone of the physiological norm, the anti-stress responses of training and activation, both calm and increased, were tested. The intensity of the tested reactions (the exit of individual indicators of the white blood cell formula beyond the normal range) was evaluated in points (Fig. 1).

Based on the percentage of formed elements in the white blood smear of animals, the% of intoxication tests included in the normal zone was calculated by groups (Fig. 2).

Both graphs clearly demonstrate a lower intensity of response without an increase in intoxication when using the targeting of the information product.



Rice. 1. Tension of developing adaptive reactions in points (control - dotted curve, SPD - solid curve, IPO - dotted curve, NIPO - dotted curve with a dot)



Rice. 2.% of tests of intoxication in the normal zone (control - dotted curve, SPD - solid curve, IPO - dashed curve, NIPO - dotted curve with a dot)

conclusions

Thus, both informational drugs "The amount of edema" (IPO and NIPO) demonstrated high anti-inflammatory efficacy, both in relation to the control and in relation to the comparison group - an informational drug based on the non-steroidal anti-inflammatory drug diclofenac sodium.

The greater efficiency of the targeted informational preparation was combined with a higher level of adaptive regulation in the formation of adaptive reactions of activation and increased activation and a lower tension of the adaptive capabilities of the organism. These reactions were most pronounced in the first hours of the development of the inflammatory reaction, as well as in the aftereffect period.

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