The effect of bioresonance therapy on the leukocyte count of the peripheral blood of intact animals

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Purpose of the study: to study the effect of BRT on the leukocyte count of peripheral blood in intact animals.

Material and research methods

Research objects

1. Sexually mature white mice (20–25 g), (n = 265).
2. Sexually mature white rats (150–170 g), (n = 52).
3. Seven day old white rats (6–8 g), (n = 12). The animals were divided into control and experimental groups.

Control groups:

1st group - intact sexually mature white mice;

1a - intact sexually mature white mice;

1b - intact sexually mature white mice (taking blood twice with an interval of 1 hour);

Group 2 - intact sexually mature white rats;

2a - intact sexually mature white rats;

2b - intact sexually mature white rats (taking blood twice with an interval of 1 hour);

Group 3 - seven day old white rats;

3a - intact seven-day-old white rats;

3b - seven-day-old white rats + one BRT session for 20 minutes;

Experienced groups: BRT IN ROLLING MODE

group No. 4 - white mice, which underwent BRT (in the rocking mode for 20 minutes) every other day for a week;

4a - animals with low leukocyte counts (within normal limits);

4b - animals with high leukocyte counts (within normal limits);

group No. 5 - white mice, which underwent BRT (in the rocking mode for 20 minutes) every day for a week;

group number 6 - Sexually mature white mice + one BRT session for 20 minutes;

6a - animals with high leukocyte counts;

6b - animals with low leukocyte counts;

group number 7 - white rats + one BRT session for 20 minutes;

group number 8 - sexually mature white rats (offspring of one female) + one BRT session for 20 minutes.

Research methods

Peripheral blood of experimental animals (mice and rats). Simulation of leukopenia in animals.

The following were used as a criterion for the effectiveness of the therapy:

determination of the total number of leukocytes in the peripheral blood (Goryaev's chamber);

determination of the leukocyte formula on peripheral blood smears.

Blood was taken from the tails of animals. The total number of leukocytes was counted in the Goryaev chamber,

for which a light microscope was used (magnification 10 × 15). Blood smears were prepared in parallel. Blood smear preparations after fixation for 5 min. in the fixative of Main Grunwald, washed with distilled water. Giemsa dye (EUROTURBO, DELTALAB, Spain) was used for staining (30 min.) Washed preparations. The colored preparations were transferred into running water. Calculation of the leukocyte formula was carried out in a light microscope (magnification 90 × 10). The reliability of the data obtained was assessed by the Student criterion.
Bioresonance therapy in swing mode was carried out on the APK-IMEDIS-FALL (Gotovsky Yu.V. Bioresonance and multiresonance therapy [1].

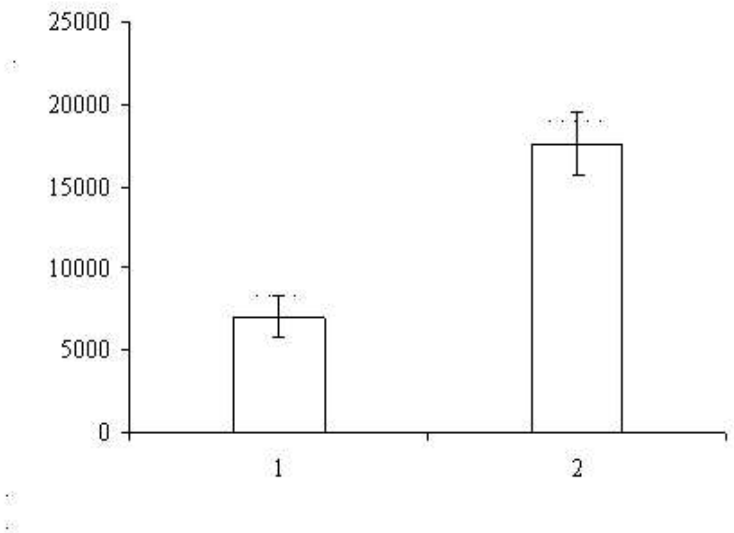
A task # 1. Investigation of the effect of BRT on the leukocyte count of peripheral blood in intact animals.

We have previously shown that the basic BRT, carried out every other day for one week, promotes the acceleration of wound healing in experimental animals (Vissarionov V.A. et al. 2005). Based on this, to assess the effect of BRT on the change in the number of leukocytes in intact animals, we used a similar scheme - BRT every other day for one week.

A task 1a. Study of changes in the number of leukocytes in the peripheral blood of intact white mice after BRT (in the rocking mode for 20 minutes) every other day for one week (group No. 4).

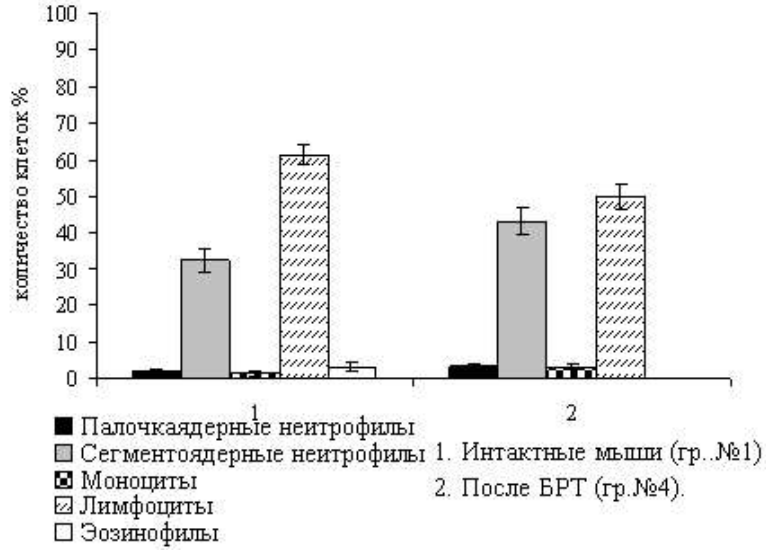
Studies have shown that repeated exposure to BRT causes an increase in the total number of leukocytes in the blood of intact animals. Seven days after the start of therapy, the number of leukocytes in 1 mm^3 blood test animals 150% higher than the corresponding indicator of control animals (Fig. 1a). Naturally, the question arises why BRT causes such an increase in the number of leukocytes in the blood of intact animals? According to the literature, the total number of leukocytes in the blood of intact mice varies within the range of 7500-15000 1mm^3 blood. As can be seen from Figure 1a, before BRT, the indicator of the total number of leukocytes in the blood of this group (No. 4a) of animals is close to the value of the lower limit of the norm (7022 ± 1256). An increase in the number of leukocytes after BRT sessions to the upper limit of the norm indicates a corrective effect of therapy.

Analysis of peripheral blood smears of animals of both groups (No. 1 and No. 4a) showed that in the blood of animals of the experimental group, the percentage of individual types of cells changes (Fig. 1b). The reason for such a violation of the percentage of cell types can be considered a sharp increase in the total number of leukocytes observed by us after BRT (Fig. 1a).



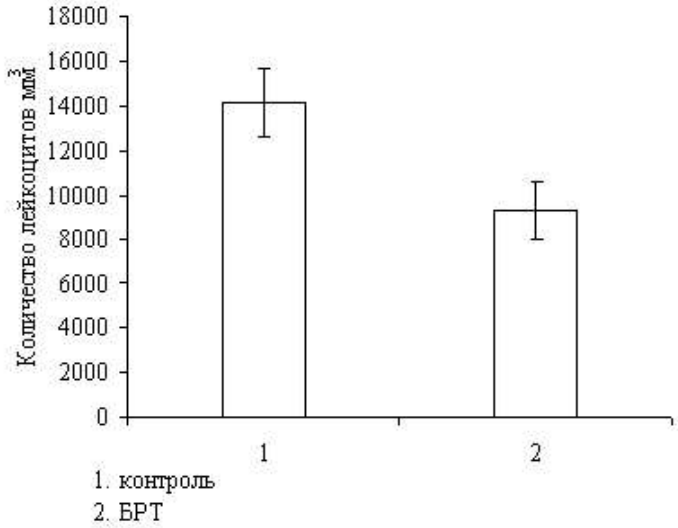
Rice. 1a.The effect of BRT (every other day for a week) on the change in the number of leukocytes

peripheral blood of intact mice

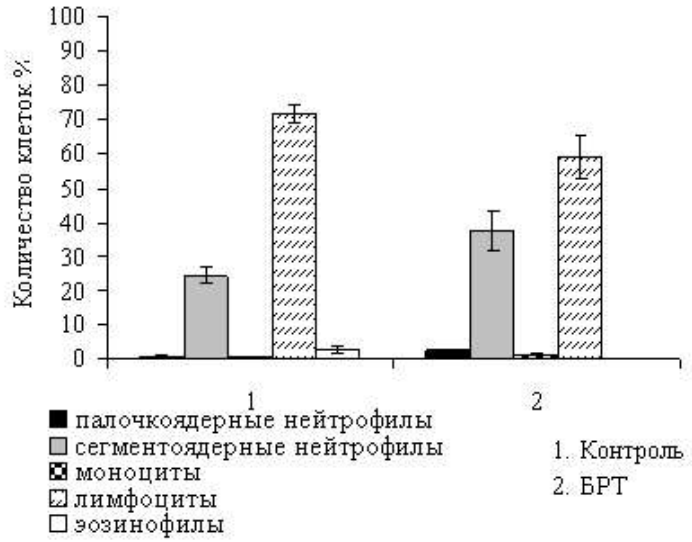


Rice. 1b.The effect of BRT (every other day for a week) on the ratio of cell types of peripheral blood leukocytes in intact mice (group No. 4a)

At the same time, it should be noted that in the control group (No. 1), mild eosinophilia is observed within the normal range. After BRT, eosinophilia was almost not detected on blood smear preparations from mice of the experimental group (No. 4a) (Fig. 1b). From the results obtained, it follows that BRT sessions, which were performed on animals with low leukocyte counts within the normal range (group No. 4a), every other day for one week, cause a change in the leukocyte blood count due to an increase in the number of certain types (neutrophils) of cells (Fig. 1b).
What picture was revealed in the group of animals, the indicator of the total number of leukocytes, which is equal to 14150 ± 1558 (group 4b)? As can be seen from Fig. 1c, a high indicator of the total number of leukocytes decreases within the normal range after BRT sessions (Fig.1c). The percentage of cells of the blood formula also changes (Fig. 1d).



Rice. 1c.The effect of BRT (every other day for a week) on the change in the number of peripheral blood leukocytes in intact mice (group No. 4b)

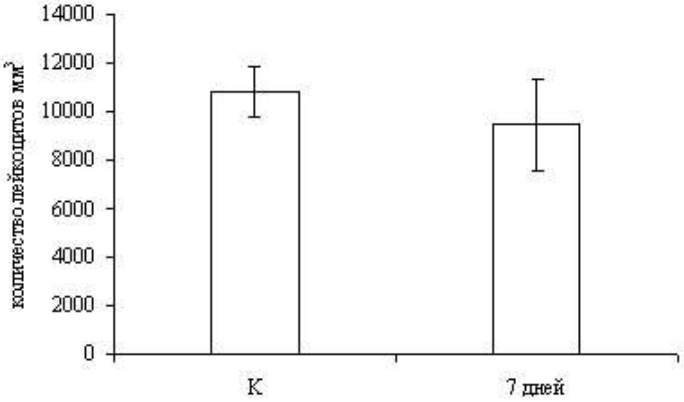


Rice. 1d.The effect of BRT (every other day for a week) on the ratio of cell types of peripheral blood leukocytes in intact mice (group No. 4b)

From the results obtained, it follows that BRT sessions have a regulatory effect on the total number of leukocytes in the peripheral blood of white mice. However, after BRT sessions, the percentage of different types of leukocytes changes in both groups. The change in the percentage of different types of leukocytes is caused by an increase in the number of neutrophils.
Our results were achieved when BRT was performed every other day for a week. In the next series of experiments, BRT was performed daily for one week (group No. 5).

A task 1b. Determine the change in the number of leukocytes in white mice before and after BRT every day for one week...

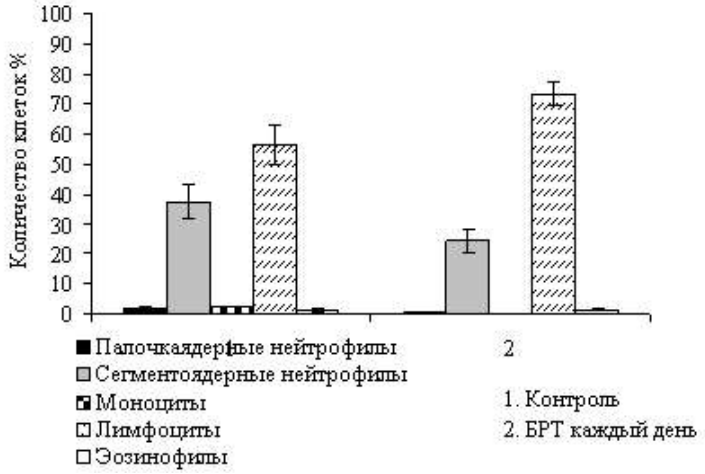
It turned out that daily therapy does not cause a significant change in the total number of leukocytes in the peripheral blood of white mice (Fig. 2a).



Rice. 2a.The effect of BRT (every day for 7 days) on the change in the number of peripheral blood leukocytes in intact mice (group No. 5)

However, the analysis of blood smears of animals of this series of the experiment (group No. 5) showed that in the blood of animals of the control group the percentage of neutrophils and lymphocytes is not much, but still differs from the typical one. 7 days after BRT, the percentage of different types of leukocytes changes (Fig. 2b). In particular, the number of neutrophils significantly decreases and the% of lymphocytes increases. Such

a change in the ratio of cell types (shift of the formula to the right - lymphocytic side) indicates that the normalization of the blood formula is taking place (Fig. 2b).



Rice. 2b.Influence of BRT (every day for 7 days) on the change in the ratio of cell types of peripheral blood leukocytes in intact mice

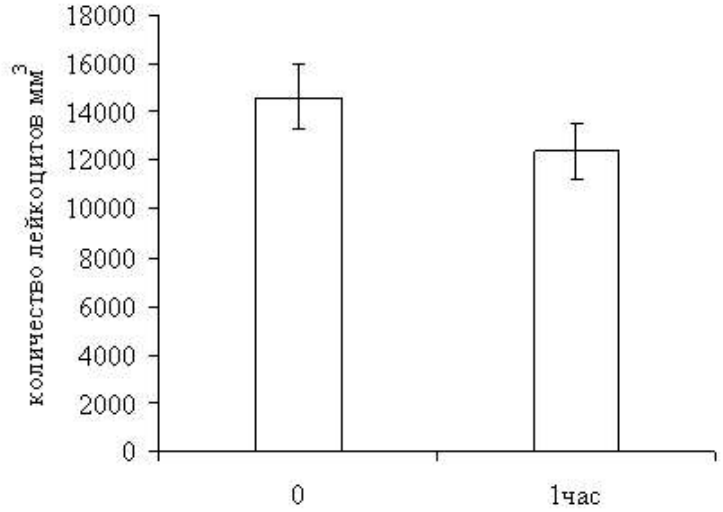
From the results obtained, it follows that repeated BRT (every day for 7 days) regulates the blood formula of intact animals by correcting the percentage of different types of leukocytes.

A task 1c. To investigate the effect of disposable BRT on the composition of the leukocyte formula in intact animals.

In this series of experiments, we used intact sexually mature mice (group No. 6) and rats (group No. 7), as well as seven-day-old rat pups (group No. 8). Before the start of BRT, all animals were bled from their tails. Then BRT was performed for 20 min. and an hour later, blood was taken again. A separate group of animals (group No. 1b) served as an additional control, from which blood was taken twice with an interval of 1 hour without BRT.

Studies of the first and second groups (tasks 1a and 1b) showed that between individuals there is a scatter in the indicators of the total number of leukocytes. Based on this, the animals of group No. 6 were divided into two subgroups. Group No. 6a - animals (mice) with high rates (on average 14000-16000 mm^3 blood) and group 6b - animals with different indicators (tables 1 and 2, respectively).

We have shown that an hour after BRT, the leukocyte count of the peripheral blood of intact animals is corrected. In particular, it was found that in group No. 6a, an hour after BRT, a high indicator (cf. indicator 14638 1380), the number of leukocytes in the blood of mice (group No. 6a) is on average close to normal (12363 1164). The results of this group in the form of diagrams are presented in Fig. 3a.



Rice. 3a.The effect of BRT (20 min.) On the change in the total number of peripheral blood leukocytes in intact mice (subgroup No. 6a)

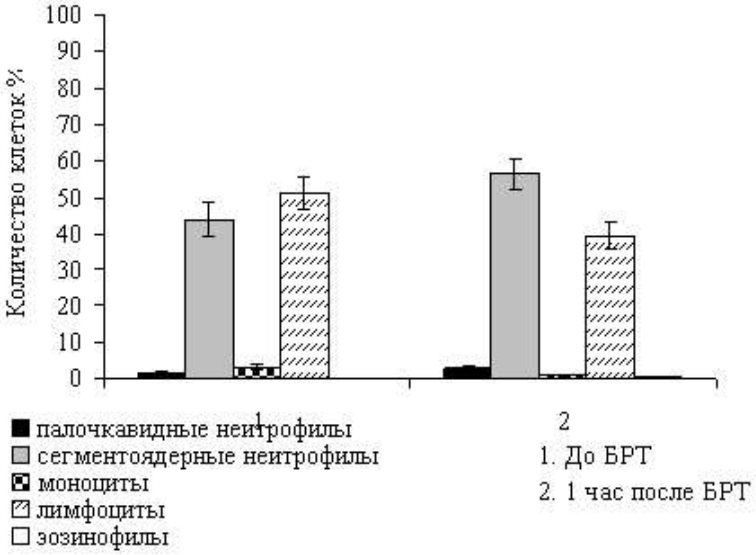
A similar small but significant decrease in the total number of leukocytes was achieved after three BRT sessions in group 4a (see Fig. 1c).

As for the percentage of different types of cells, as can be seen from Fig. 3b, the results obtained in this series of experiments (Fig. 3b) are also similar to group No. 4 (Fig. 1d). 1 hour after one BRT session, the percentage of neutrophils and lymphocytes changes. In particular, it changes due to an increase in the number of mature neutrophils.

Table # 1

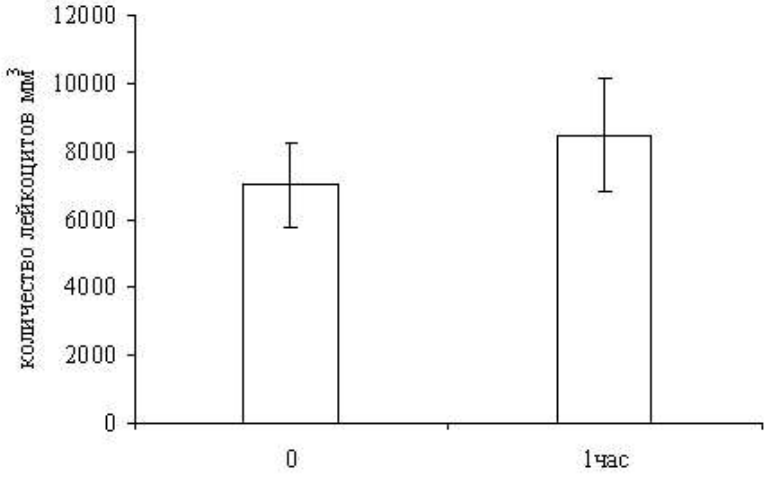
Change in the number of leukocytes in white mice (subgroup No. 6a) after BRT

No.	to BRT	an hour after BRT
one	10850	8050
2	14650	10800
3	8900	6050
4	19000	15800
five	26700	26800
6	10850	5050
7	17350	10550
eight	15450	10100
nine	18550	12950
10	31300	20550
eleven	18200	8850
12	7100	12150
13	16100	12800
fourteen	14500	9950
fifteen	12050	7400
sixteen	8350	13400
17	13900	12400
18	8500	9500
nineteen	9500	16000
twenty	10850	18100
Wed index	14638 1380	12363 1164



Rice. 3b.Influence of BRT (20 min.) On the change in the ratio of cell types of peripheral blood leukocytes in intact mice

After a preliminary blood test, we selected a subgroup (No. 6b) of mice, the total number of leukocytes of which corresponded to the lower limit of the norm (7021 1256). Studies have shown that one BRT session does not cause a change in the total number of leukocytes in the blood of animals of subgroup No. 6b (Fig. 4a).



Rice. 4a.The effect of BRT (20 min) on the change in the total number of peripheral blood leukocytes in intact mice (subgroup No. 6b)

Table 2 shows the indicators of the total number of leukocytes of animals of subgroup No. 6b before and after BRT.

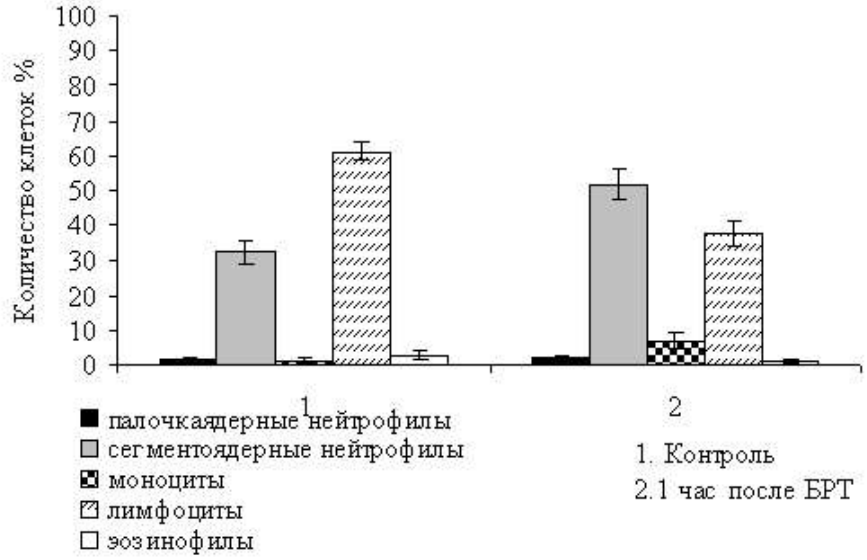
table 2

Change in the number of leukocytes in white mice (subgroup No. 6b) after BRT (one-time therapy for 20 min.)

No.	to BRT	an hour after BRT
one	4550	5350
2	3775	6850
3	9700	6300
4	6100	7100
five	4700	5150
6	3550	11650
7	15100	8500
eight	7690	11150
nine	7250	14200
10	7800	8550
Wed index	7021 1256	8480 1647

However, it should be noted that changes in blood smears were also found in this group (Fig. 4b). As can be seen from the figure, changes occur due to an increase in the number of mature neutrophils. In particular, the number of mature neutrophils significantly increases by approximately 20% (Fig. 4b).

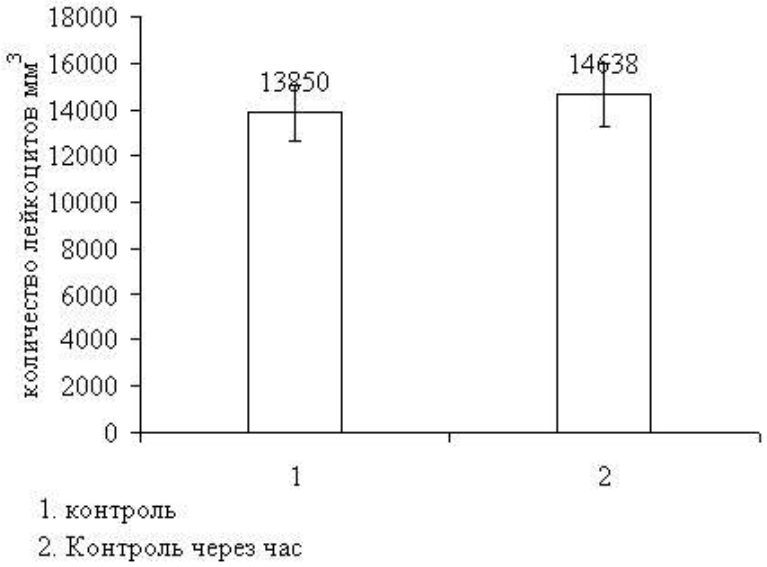
Analysis of the results of group No. 6 (a and b) revealed that after a one-time BRT for an hour in the blood of intact mice, there is a change in the percentage of different types of leukocytes. Similar results were obtained by us in groups No. 4 and No. 5 (several sessions of BRT). In addition, we decided to exclude the possible negative impact of the blood collection process itself, despite the fact that the procedure was performed under ether anesthesia.



Rice. 4b.The effect of BRT (20 min.) On the change in the ratio of cell types in the peripheral blood of intact mice (subgroup No. 6b)

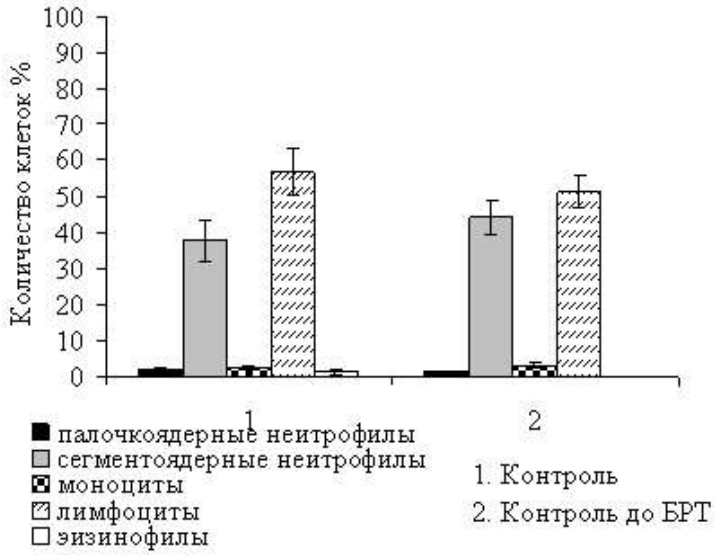
A task 1d. To investigate changes in the leukocyte formula of peripheral blood in intact mice after a single blood collection.

To assess the leukocyte formula in animals of this group (group No. 1b), blood was taken from the terminal part of the tail twice with an interval of 1 hour. Fig. 5a, it follows that the total number of leukocytes does not change in the period (1 hour) between the first and repeated blood sampling (Fig. 5a).



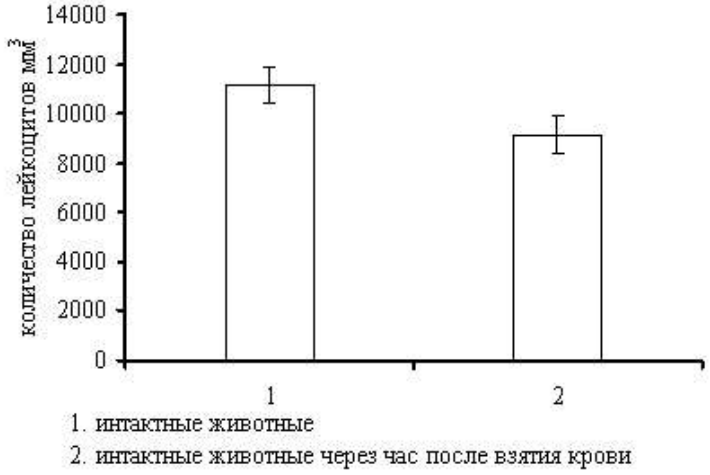
Rice. 5a.Changes in the number of leukocytes in the peripheral blood of intact mice (group No. 1b)

No changes were also revealed in the composition of cell types (Fig. 5b).



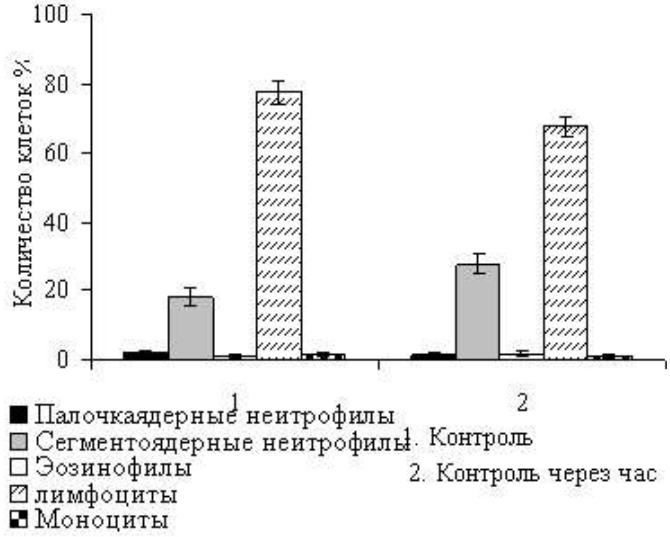
Rice. 5 B.Change in the ratio of different types of leukocytes in the peripheral blood of intact mice (group No. 1b.)

Similar results were obtained in the case of using adult white rats in the experiment (group No. 2b). It was found that the total number of leukocytes in an hour after taking blood for analysis does not change (Fig. 6a). At the same time, there is no change in the percentage of different types of leukocytes (Fig. 6b).



Rice. 6a.Changes in the number of leukocytes in the peripheral blood of intact rats (group No. 2b)

Based on the results obtained in mice, to study the effect of BRT on the leukocyte formula, the subsequent series of experiments were carried out on adult rats.

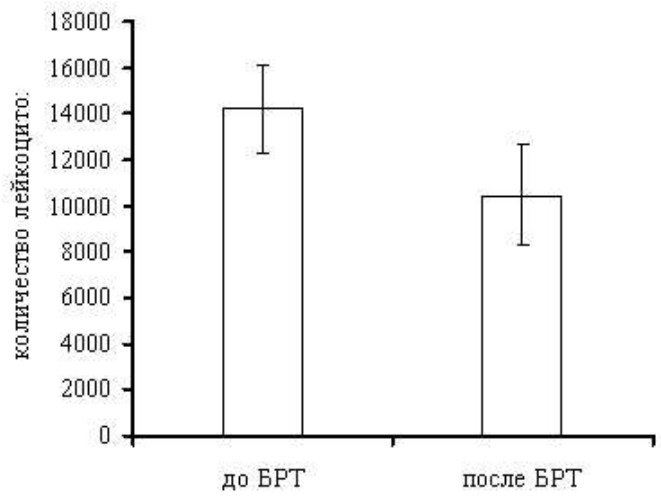


Rice. 6b.Changes in the ratio of different types of leukocytes in the peripheral blood of intact rats (group No. 2b)

A task 1d. To investigate the effect of one-time BRT on the composition of the leukocyte formula in intact white rats.

A preliminary blood test showed that individual animals in the population differ significantly in terms of the total number of leukocytes. Based on this, adult rats were divided into two groups: group No. 7 (rats with mixed parameters, see Table 3) and group No. 8 (rats of the same female with almost the same parameters, see Table.
4). In addition, seven-day old rat pups were used (group No. 3b - rat pups of one female with low indices, see Table 5).

For analysis, the blood of animals of all groups was examined before and one hour after BRT. Studies have shown that the total number of leukocytes does not change in comparison with the control in the group of animals with mixed blood counts (Fig. 7a and Table 3).



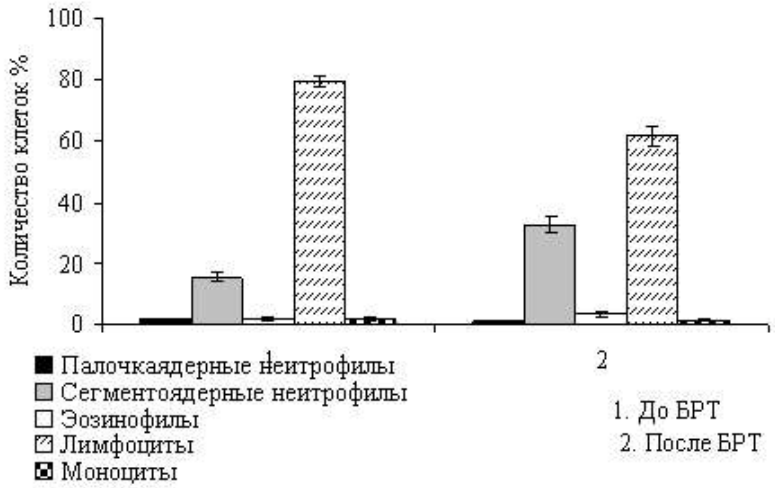
Rice. 7a.Changes in the number of leukocytes in the peripheral blood of intact rats (group No. 7) before and after BRT

Table 3

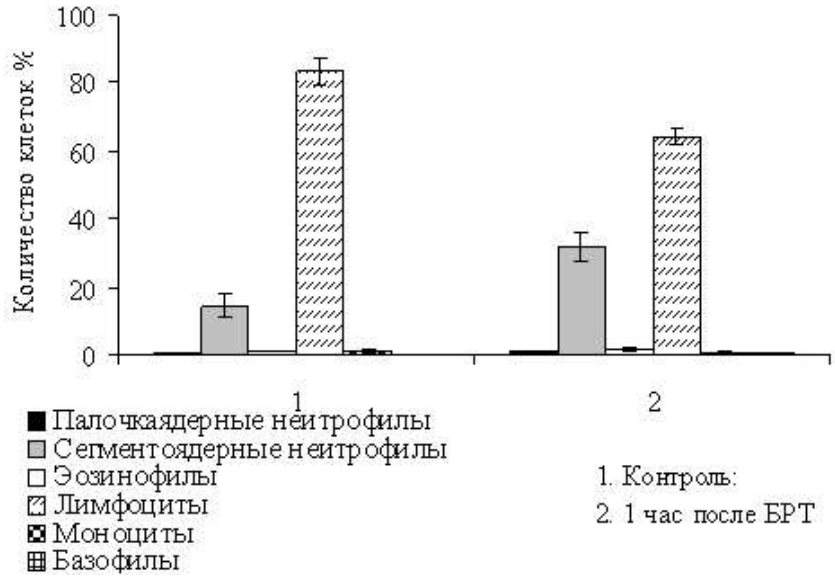
Change in white blood cell count in white rats one hour after BRT

No.	to BRT	an hour after BRT
one	13150	4700
2	17600	8150
3	11400	5800
4	9800	8200
five	10950	5000
6	8800	15150
7	10850	7500
eight	10300	7800
nine	15000	9150
10	16250	4450
eleven	17800	12550
12	11400	9600
13	13200	8750
fourteen	15000	3700
fifteen	9800	6250
sixteen	18600	13900
17	10600	3100
18	11,700	18250
nineteen	33600	48950
twenty	18800	8100
Wed index	14230 1880	10458 2209

However, when examining blood smears of animals of this group, we showed a change in the percentage of leukocytes. The change in this case also occurs due to an increase in the number of mature neutrophils (Fig. 7b).



Rice. 7b.The effect of BRT (20 min.) On the change in the ratio of cell types of peripheral blood leukocytes in intact rats.



Rice. 8a.The effect of BRT on the change in the ratio of cell types of peripheral blood leukocytes in intact rats

An increase in the number of mature neutrophils was also detected in group No. 8 (Fig. 8a). In contrast to the previous group, in this series of experiments it was found that an hour after BRT, the total number of leukocytes significantly decreases. As can be seen from tables 3 and 4, the average in both cases is high.

Table 4

Change in white blood cell count in white rats one hour after BRT
(one session for 20 min.)

No.	to BRT	1 hour after BRT
one	12750	850
2	9950	7650
3	11350	8350
4	11250	7900
five	13700	6550
6	16900	7700
Wed index	12650 1002	7700 252

The regulatory effect of BRT is also manifested in group No. 7 (Fig. 7a), but it is unreliable due to the variation that exists between individuals. In group No. 8, as can be seen from Table 4, the indicators in rats (offspring of one female) are approximately equally high.

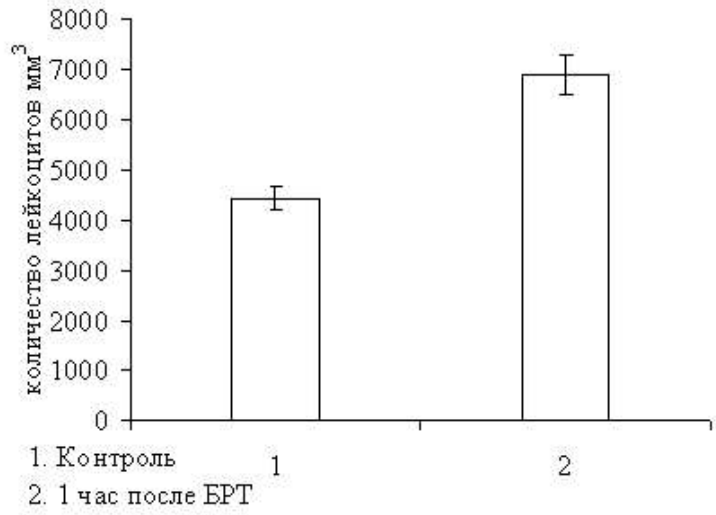
Similar results were also obtained on mice with high rates (Fig. 3a). The regulatory effect of BRT was also confirmed in a series of experiments in which newborn rat pups of the same litter were used. In group No. 3b, as can be seen from Table 5, the indicator of the total number of leukocytes in the blood of rat pups averages 4425 229 in mm^3 blood.

Table 5

Change in the number of leukocytes in seven-day-old rats one hour after BRT

No.	to BRT	1 hour after BRT
one	4300	8000
2	5350	5250
3	4800	6800
4	4050	7050
five	4250	7250
6	3800	7000
Wed index	4425 229	6891 370

An hour after BRT, the number of leukocytes increases significantly.



Rice. nine.Changes in the number of leukocytes in the peripheral blood of intact rats (group No. 3b) before and after BRT

CONCLUSIONS

The results obtained when studying the effect of BRT on the number of leukocytes in the peripheral blood of intact animals indicate that:
1. BRT helps to normalize the blood count;
2. BRT sessions (both single and multiple) stimulate an increase in the number of mature neutrophils in the peripheral blood of intact animals.
3. During the BRT session (s), the initial parameters of the leukocyte count of the peripheral blood should be taken into account.

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