

Mitotic activity of various organs of sexually mature rats and mice after partial hepatectomy as a result of bioresonance exposure endogenous electromagnetic fields O. L.

Boqueria¹, N.T. Salia¹, D.V. Dzidziguri²

(¹ NTSSSH them. A.N. Bakuleva, Moscow, ² TSU named after Yves. Javakhishvili (Tbilisi))

Mitotic activity of various organs of adult rats and mice after partial hepatectomy as a result of bioresonance influence of endogenous electromagnetic fields

OL Bokeria¹, NT Salia¹, DV Dzidziguri² AN

Bakulev SCCVS (Moscow, Russia)

² Iv.Djavakhishvili TSU (Tbilisi, Georgian)

SUMMARY

The work is devoted to the study of the effect of bioresonance exposure to endogenous electromagnetic fields on the mitotic activity of various organs of white rats and mice.

Determined that bioresonance impact endogenous electromagnetic fields (endogenous bioresonance therapy) stimulates cell division in the proliferating tissues of experimental animals. The proliferative activity of hepatocytes increases in the parenchyma of the regenerating liver after partial hepatectomy. The cell mitotic index also increases in the growing organ of white rats (seven-day-old rat pups) after RFS.

Key words: mitotic activity, proliferative activity, endogenous electromagnetic fields.

RESUME

We studied the effects of bioresonance influence of endogenous electromagnetic fields on the mitotic activity of various organs of white rats and mice. It was found that endogenous bioresonance influence by electromagnetic fields (endogenous bioresonance therapy) stimulates cell division in proliferating tissues of experimental animals. Proliferative activity of hepatocytes increases in the parenchyma of regenerating liver after partial hepatectomy. The mitotic index of cells also increases in a growing organ of white rats (seven days rats) after bioresonance influence.

Keywords: mitotic activity, proliferative activity, endogenous electromagnetic fields.

Many tissues and organs have the ability to regenerate in higher organisms. Currently, it is assumed that the entire regeneration process consists in the interaction between cells, growth factors, a number of hormones and some other biologically active substances [1, 2, 3]. A similar process was observed in the clinic after organ resection. However, the achievement

the preoperative organ mass depends on both the volume of resection and the severity of the concomitant disease [4]. Proceeding from this, the study of the mechanisms of regulation of the regenerative capacity of organs and tissues and methods of controlling these processes opens up prospects for the creation of scientific foundations for stimulating the proliferative activity of organs.

Currently, the literature contains information indicating a wider introduction into medical practice of new technologies using physical factors. It has been shown, for example, the influence of low-intensity electromagnetic fields on the processes of cell proliferation and the possibility of their directed control by creating fields of complex structure [5, 6]. This predetermines the need for further in-depth study of the mechanisms of action of new methods of treatment that stimulate the processes of repair in wounds, including with the use of morphological research methods. Our earlier cytological and immunohistochemical studies have shown that endogenous bioresonance therapy stimulates the wound healing process, both the epithelialization process and the process of cell proliferation in the wound area [7].

The aim of this work was to study the effect of bioresonance exposure to endogenous electromagnetic fields on the mitotic activity of various organs of sexually mature rats and mice after partial hepatectomy.

Materials and methods

The experiments were carried out on white outbred rats (weighing 120–140 g), white mice (40–50 g) (n = 84), and seven-day-old white rats (weighing 8–10 g) (n = 28). 2 series of experiments were carried out.

I series of experiments. Experimental model: partial hepatectomy according to the Higgins and Anderson method (Higgins et al., 1931). The animals were divided into two groups. Group I - control (sexually mature white rats and mice after partial hepatectomy). Group II - experimental (animals, after partial hepatectomy, which underwent bioresonance exposure for 1 hour).

II series of experiments - proliferating tissues of a growing organism (seven-day-old white rats). The animals were also divided into two groups. Group I - control (intact animals). Group II - experimental, animals that received bioresonance exposure for 1 hour.

Bioresonance exposure to electromagnetic fields of endogenous origin was carried out using a hardware-software complex "IMEDIS-EXPERT" developed by "IMEDIS" (Russia) using a device for magnetic therapy (UMT) "loop", inside which an experimental group of animals was placed. The bioresonance effect was carried out in the mode of endogenous bioresonance therapy [8].

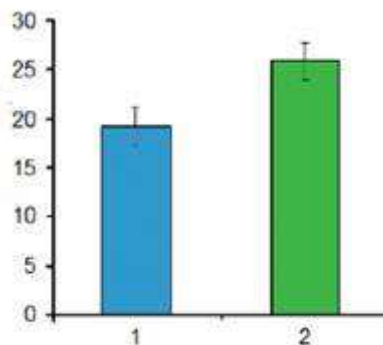
Studied: liver, kidneys and brain of seven-day-old white rats. The material for examination in a light microscope was fixed in a Carnois fixative; the filling was carried out in a 5% wax-paraffin mixture. Sections no more than 5 µm thick were stained with hematoxylin-eosin. The histological preparations were examined under the LOMO light microscope. For each variant of the experiment, we calculated

3000–5000 cells and mitotic activity were recalculated per 1000 cells. Thus, the indicators of the colchicine mitotic index in ppm (MI%) were obtained.

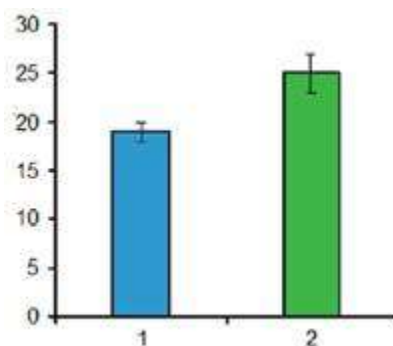
Research results and discussion

It is known that resection of an organ stimulates the proliferative activity of cells of all types present in the liver of white rats. The first mitoses are observed 24 hours after surgery. The peak of mitotic activity usually appears 32 h after liver resection [9, 10].

Our studies have shown that the bioresonance effect stimulates the proliferation of hepatocytes in the regenerating liver of white rats. The mitotic activity of parenchymal cells increases by 35% (Fig. 1, 2).



Rice. 1. Influence of BRV on the mitotic activity of the regenerating liver sexually mature white rats. 1. Control group (32nd hour after liver resection); 2. Experimental group (32nd hour after liver resections + BRV sessions).



Rice. 2. Influence of BRV on the mitotic activity of the regenerating liver sexually mature white mice. 1. Control group (48th hour after liver resection); 2. Experimental group (48th hour after liver resections + BRV sessions).

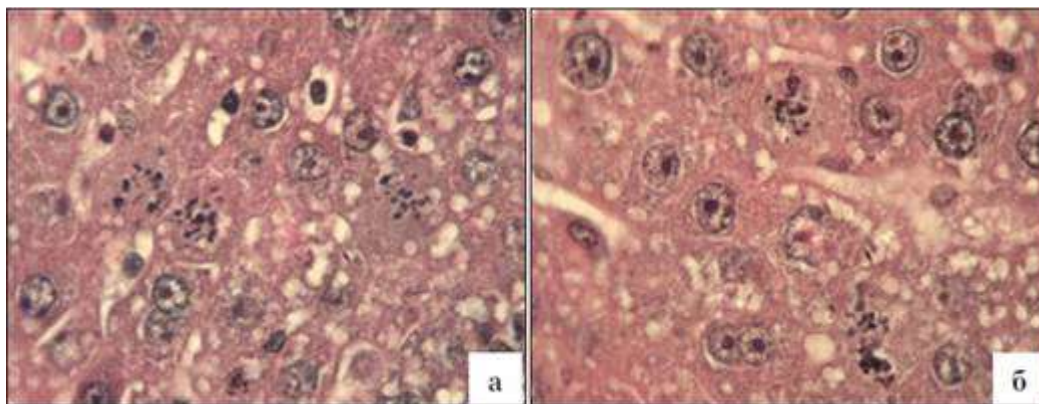
The liver of white mice has a high proliferative activity. However, unlike in rats, the peak of mitotic activity appears only 48 hours after surgery (Dzidziguri, 1997). We have found that bioresonance exposure (BRV) to electromagnetic fields of endogenous origin also stimulates mitosis in the liver tissue of white mice. Liver mitotic index

adult white mice, increases after partial organ resection (Fig. 2).

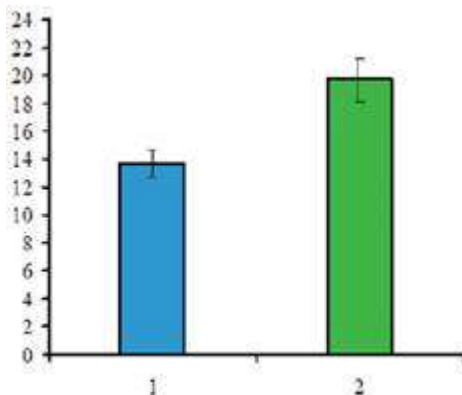
To establish the effect of endogenous bioresonance therapy on the proliferation process, we also studied the change in the mitotic index of cells in the growing organs of white rats at the early stage of postnatal development. For this purpose, we used tissues of the liver, kidneys and brain of seven-day-old rats, whose growth, on average, ends in the second half of the first month after birth.

Seven-day-old rat pups underwent RFS for one hour, after which the tissues of the three indicated organs were fixed and paraffin sections were prepared to assess the mitotic index before and after RFS.

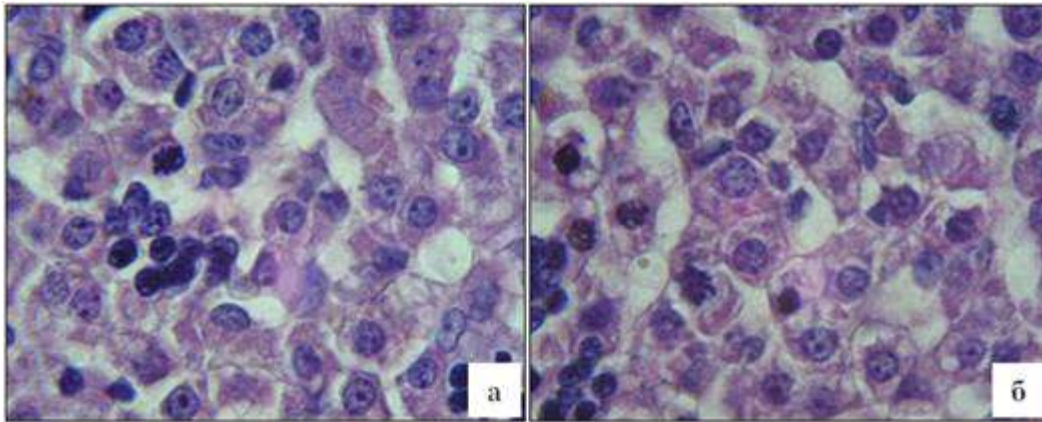
As a result of the studies, it was found that the index of the mitotic index of the liver of growing intact rats is 14 ‰ and increases in the experimental group by 70% after bioresonance exposure, which is 20 ‰ (Fig. 4).



Rice. 3. Mitotic figures in the parenchyma of the regenerating liver of sexually mature white rats. a - control group - 32 hours after liver resections (5x90). b - experimental group - 32nd hour after liver resections + BRV sessions (5x90).



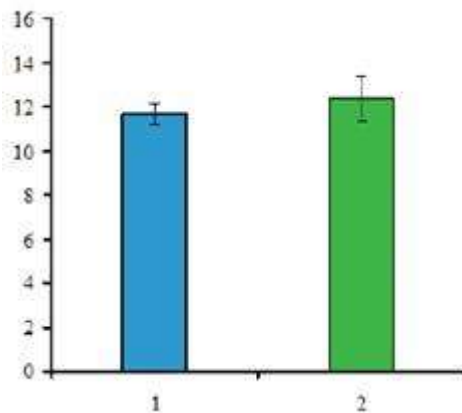
Rice. 4. Influence of RFS on the mitotic activity of liver cells in seven-day-old rats. 1. Control; 2. Experience.



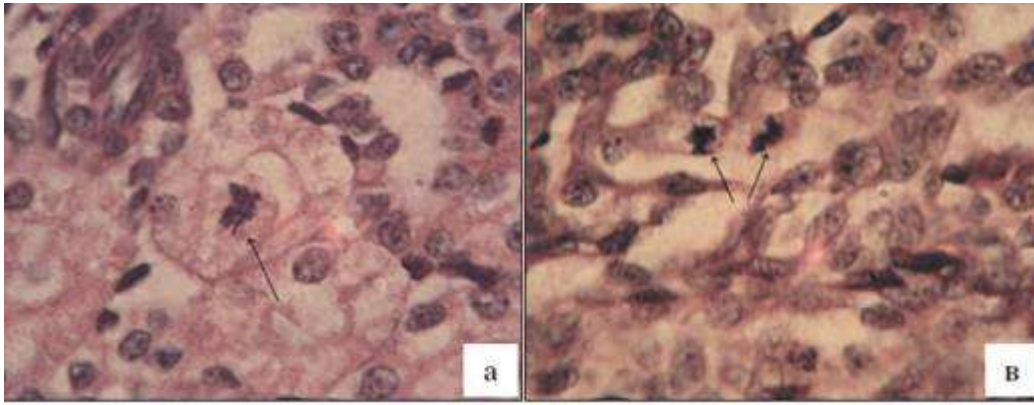
Rice. 5. Mitotic figures in the liver of seven-day-old white rats. a - controlgroup - intact animals (5x90); b - experimental group - animals after sessions BRV (5x90).

The bioresonance effect is not observed in the renal tissue. As follows from Fig. 6, the mitotic activity of kidney cells in animals of the experimental group does not change in comparison with the control values (Fig. 6).

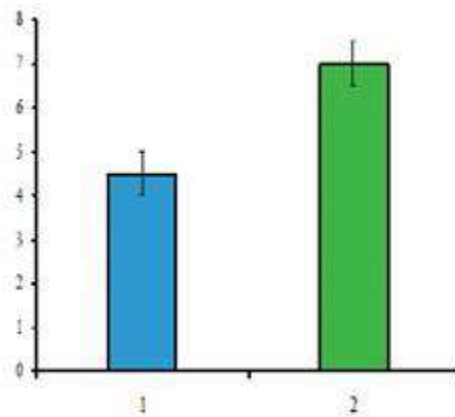
A comparative study of the bioresonance effect on the mitotic activity of cells in various parts of the brain of seven-day-old rats was also carried out. In particular, the tissue of the cortex and the limbic system was examined. It was found that the number of mitotic cells in the cortex does not change after baseline BRT. At the same time, the mitotic index of cells significantly increases in the tissues of the limbic system (Fig. 8).



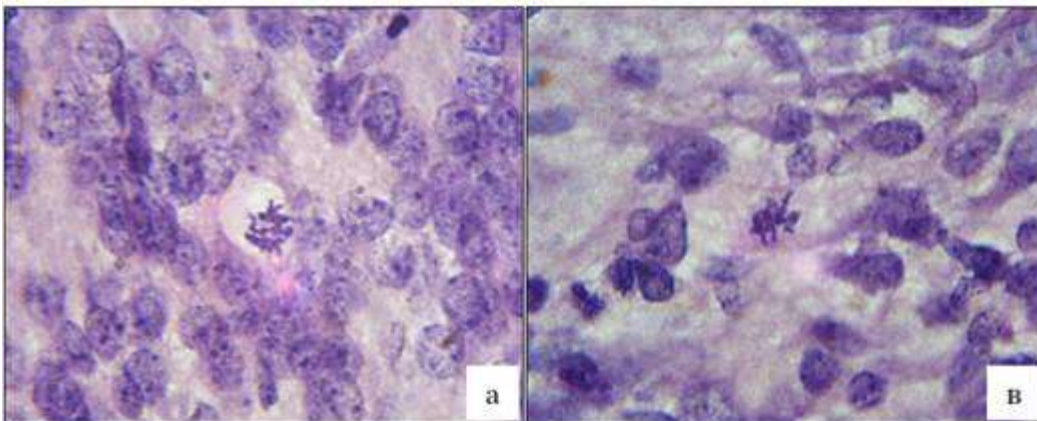
Rice. 6. Influence of RFS on the mitotic activity of kidney cells in seven-day-old rats.
1. Control; 2. Experience.



Rice. 7. Mitoses in the kidney of seven-day-old white rats. a - control group -5x90. v - experimental group - 5x90.



Rice. 8. Mitotic activity in the limbic system of the brain of seven-day-old rats before and after BRV. 1. Control; 2. Experience.



Rice. 9. Mitotic figures in the brain tissue of seven-day-old white rats. a - control group - 5x90. c - experimental group (after BRV) - 5x90.

From the results obtained, it follows that BRV stimulates cell division in tissues with high proliferative activity. In particular, the bioresonance effect, which is well expressed in the case of liver cells, is not reflected

on the division of kidney cells in white rats. As you know, hepatocytes, in comparison with nephrocytes, have a greater potential for division. As for the cells of the brain tissue, mitoses in the tissues of the limbic system increase presumably due to the cambial cells prevailing in this part of the brain [11].

Thus, our experimental studies on a partial hepatectomy model made it possible to establish that bioresonance exposure to endogenous electromagnetic fields stimulates cell division of proliferating tissues (in a growing organ, at the initial stage of postnatal development and after resection).

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Author's address

Ph.D. Salia N.T.

NTSSSH them. A.N. Bakuleva (Moscow)

natsalia@mail.ru

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