Transfer of biologically significant information from one bacterial culture to another

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Introduction

Information processes in biosystems (cells and tissues) were studied by A.G. Gurvich, V.P. Kaznacheev and other researchers who showed Existence weak electromagnetic signals in the microwave range.

In our work, an attempt was made to study weak elec thromagnetic signals in biological objects in the long wavelength range. For this purpose, using the apparatus for bioresonance therapy "IMEDIS-BRT-A", we studied the phenomenon of transfer of a control signal (hereinafter US), in our case, an inhibitory signal, from a bacterial donor culture (a signal source carried by a weak electromagnetic field) to a bacterial culture -recipient (receiving the signal). Based on the experiments, the possibility of isolating an inhibitory signal leading to a statistically significant slowdown in bacterial reproduction in a recipient culture was shown.

Purpose of the study

1. Obtaining and studying the inhibitory signal, the carrier of which is a weak electromagnetic field, which includes in the microorganisms of the recipient culture the processes of reducing their cultural activity, which is manifested in the slowing down of its growth of the recipient culture.

2. Study of the operating modes of the device "IMEDIS-BRT-A".

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Materials and research methods

For the research, we used a broth culture of Escherichia coli strain J5-3 and a culture of Staphylococcus aureus strain 209. Glass standard bottles (mattresses) with a capacity of 500 ml, filled with a liquid LB medium of 250 ml, were used.

The transfer of US from the donor culture to the recipient culture was carried out using the IMEDIS-BRT-A apparatus and a system of special antenna-solenoids, the core of which was a culture of bacteria with a nutrient medium in a glass bottle.

The study was divided into series, each of which consisted of several identical experiments. For convenience of presentation, these series of experiments are conventionally divided into:

- main series, in which the actual phenomenon of the transfer of the US from culture was studied donor to the recipient culture.

- control series, in which the phenomenon of the transfer of RS from a donor culture to a culture the recipient was differentiated from the effects of influence devices for transmitting US, those. a transmission channel for weak electromagnetic signals linking these cultures.

Schematic diagram of each individual experiment from main series looked like this. Two bacterial cultures were used: a donor culture, which was subjected to chemical damage and destruction, and a recipient culture, on which the effect of the CA, presumably produced by the donor culture, was monitored. For the purpose of transferring the US, the donor culture and the recipient culture were interconnected with the help of transmission channel US, or an experimental circuit. The US transmission channel consisted of two (in some experiments - four) solenoid antennas (hereinafter referred to as antennas) wound on bottles containing bacterial cultures and the IMEDIS-BRT-A apparatus, to the nests of containers No. 2 and No. the antennas of the donor and recipient were connected, respectively. The role of the IMEDIS-BRT-A apparatus was reduced to the implementation of the process of bioresonance therapy, during which it became possible to transmit biologically significant information from the donor culture for its subsequent fixation by the recipient culture, as well as to allocate a certain bandwidth of the electromagnetic signal and, if necessary, to amplification of the transmitted signal.

The control of the experimental results in the experiment from the standard series was carried out with

by comparing the growth properties of the recipient culture and the donor culture with the growth properties of the control culture, which during the experiment did not interact with either the donor culture or the recipient culture. For this purpose, in particular, the donor culture and the recipient culture were incubated in the same thermostat, and the control culture in another. The incubation temperature of all three cultures was +37oC, incubation period - 6–7 hours (depending on the number of the standard series of experiments).

At the end of the period of logarithmic growth of the donor culture and the recipient culture, after 6 hours from the beginning of the experiment, the donor culture underwent chemical damage and destruction by chloroform. From the beginning of the chemical exposure, the channel for the transfer of US between the donor culture and the recipient culture was activated, and the presumptive transfer of the US from the donor culture to the recipient culture was carried out. Then, all three cultures participating in the experiment (donor culture, recipient culture and control) were titrated (diluted in a ratio of 1:10eight), were sown on Petri dishes, and after germination, the number of colony-forming factors in them was counted. To assess the change in the cultural properties (growth rate) of microorganisms of the recipient culture as a result of exposure to the US induced by the donor culture, the difference in the number of viable colonies formed in the Petri dish by the recipient culture and the control culture was used (in the tables below - the result of exposure) ... The number of colonies formed in the Petri dish by the donor culture was used to assess the purity of the experiment: under the conditions of its correctness, the growth of the donor culture, i.e. chemically damaged culture should have been absent.

The specified scheme was subjected to modifications from one series to another, depending on which features of the transmission of the EOS were investigated additionally:

1. In series 1–4 and 7–11, the transfer of US was carried out from one bottle with a culture donor per vial with the recipient culture. In series 5 and 6, the transfer was carried out using 4 antennas wound around the culture flasks and connected to the inputs, respectively: No. 2 for one flask of the donor culture and No. 1 for the recipient culture in 3 flasks. This modification of the standard experimental scheme was aimed at studying the efficiency of the EOS depending on the amount of electromagnetic energy transferred during its transmission (problem 3).

2. In series 1-7 and 11, both as a donor culture and as a culture-
the recipient used a broth culture of Escherichia coli. In series 8, a culture of Staphylococcus aureus was used as a donor culture and a recipient culture. In series 9 and 10, the role of donor culture and recipient culture was played by Staphylococcus aureus and Escherichia coli in series 9, and Escherichia coli and Staphylococcus aureus in series 10, respectively.

The purpose of this modification of the standard scheme of the RS experiment was to further study the dependence of the RS transfer phenomenon on the types of microorganisms participating in it (task 4).

3. In series 1, 2, 4, 5, 8, 9, 10, 11, the presumptive transmission of the RS was carried out in during the entire phase of preparation and processing of biomaterial, i.e. during the logarithmic growth phase of bacterial cultures and the period of chemical damage and destruction. In series 6–7, the presumptive transfer of RS was carried out only during the period of chemical damage and destruction of the donor culture.

The purpose of this modification of the standard experimental design was an additional study of the dependence of the EOS efficiency on the preliminary interaction / non-interaction of culture-donor and culture-recipient (task 5).

In the experiments from the control series, the task was set to differentiate (divide) the influence on the culture-recipient of the control signal of the culture-donor from the possible change in its (culture-recipient) growth rate, as a result of the interaction with the device, providing a channel for transmitting information, for example, the perception by it of any induced noise or interference that came through this channel (task 6).

To this end:

- in the 12th experimental series, the recipient culture was placed in a fully assembled antenna for transmitting the US, but the donor culture was placed in the transmitter

the signal did not fit. As a result, the recipient culture interacted with the channel for transmitting information from the donor culture, without a signal source from the donor culture;

- in the 13th experimental series, the recipient culture and the donor culture were placed at the ends of the channel for transmitting the US, i.e. in antennas connected to the nests of containers # 2 and # 1 of the IMEDIS-BRT-A apparatus for the donor culture and the recipient culture, respectively, but no chemical action on the donor culture was carried out during the experiment. As a result, the recipient culture could receive certain signals from the donor culture, but not the IS that arises in the process of chemical action on the latter.

The procedure for preparing the biological material and assessing the comparative growth rate of the recipient culture and the control culture were the same as in the standard series.

The results of the study for the series of experiments carried out are shown in tables 1-3.

Table 1

Main Series Results

Ex-peri-cop	Recipient culture: number of educated colonies per 1 ml of unstitched culture	Culture control: number of educated colonies per 1 ml of unstitched culture	Impact result DC: difference between number of colonies culturally educated recipient and culture-controlled
one	$5.4x10_{eight}$	$8.3x10_{eight}$	$- 5.4x10_{eight}$
2	$9.6x10_{eight}$	$4.2x10_{eight}$	$+ 5.4x10_{eight}$
3	$3.9x10_{eight}$	$5.4x10_{eight}$	$- 1.5x10_{eight}$
4	$3.7x10_{eight}$	$9.4x10_{eight}$	$- 5.7x10_{eight}$
five	$1.1x10_{nine}$	$1.2x10_{nine}$	$- 0.1x10_{eight}$
6	$8.3x10_{eight}$	$1.1x10_{nine}$	$- 1.8x10_{eight}$
7	$8.0x10_{eight}$	$1.1x10_{nine}$	$- 2.1x10_{eight}$
eight	$1.7x10_{eight}$	$2.1x10_{eight}$	$- 0.4x10_{eight}$
nine	$1.2x10_{eight}$	$1.8x10_{eight}$	$- 0.6x10_{eight}$
10	$5.9x10_{eight}$	$8.3x10_{eight}$	$- 2.4x10_{eight}$
eleven	$6.4x10_{eight}$	$7.2x10_{eight}$	$- 0.8x10_{eight}$
12	$1.6x10_{eight}$	$7.8x10_{eight}$	$- 6.2x10_{eight}$
13	$4.3x10_{eight}$	$1.5x10_{eight}$	$+ 2.8x10_{eight}$
fourteen	$8.8x10_{eight}$	$2.8x10_{eight}$	$+ 6x10_{eight}$
fifteen	$2.5x10_{eight}$	$3.3x10_{eight}$	$- 0.8x10_{eight}$
sixteen	$2.4x10_{eight}$	$2.0x10_{eight}$	$+ 0.4x10_{eight}$
17.1	$2.7x10_{eight}$	$3.4x10_{eight}$	$- 1.4x10_{eight}$
17.2	$2.2x10_{eight}$		$- 1.9x10_{eight}$
17.3	$5.6x10_{eight}$		$+ 2.2x10_{eight}$
18.1	$1.2x10_{eight}$	$4.2x10_{eight}$	$- 3x10_{eight}$
18.2	$2.6x10_{eight}$		$- 1.8x10_{eight}$
18.3	$9.5x10_{7}$		$- 4.7x10_{eight}$
19.1	$2.5x10_{eight}$	$6.8x10_{eight}$	$- 4.3x10_{eight}$
19.2	$3.5x10_{eight}$		$- 3.3x10_{eight}$
19.3	$3.6x10_{eight}$		$- 3.2x10_{eight}$
20.1	$5.9x10_{eight}$	$7.8x10_{eight}$	$- 1.9\ x10_{eight}$
20.2	$9.9x10_{eight}$		$+ 2.1x10_{eight}$
20.3	$8.0x10_{eight}$		$+ 0.2x10_{eight}$
21.1	$7.2x10_{eight}$	$1.4x10_{nine}$	$- 4.4x10_{eight}$
21.2	$4.8x10_{eight}$		$- 6.6x10_{eight}$
21.3	$4.3x10_{eight}$		$- 7.1x10_{eight}$

22.1	$2.4x10^{eight}$	$2.0x10^{eight}$	$+ 0.4x10^{eight}$
22.2	$1.1x10^{eight}$		$- 0.9x10^{eight}$
22.3	$3.5x10^{eight}$		$+ 1.5x10^{eight}$
23	$1.8x10^{eight}$	$2.0x10^{eight}$	$- 0.2x10^{eight}$
24	$1.2x10^{eight}$	$1.4x10^{eight}$	$- 0.2x10^{eight}$
25	$3.8x10^{eight}$	$3.8x10^{eight}$	0
26.1	$1.1x10^{nine}$	$1.2x10^{nine}$	$- 0.1x10^{eight}$
26.2	$9.6x10^{eight}$		$- 0.6x10^{eight}$
27.1	$1.0x10^{nine}$	$4.8x10^{nine}$	$- 3.8x10^{eight}$
27.2	$1.0x10^{nine}$		$- 3.8x10^{eight}$
28.1	$6.8x10^{eight}$	$1x10^{nine}$	$- 3.2x10^{eight}$
28.2	$7.6x10^{eight}$		$- 2.4x10^{eight}$
29.1	$2.3x10^{eight}$	$4.0x10^{eight}$	$- 1.7x10^{eight}$
29.2	$3.2x10^{eight}$		$- 0.8x10^{eight}$
30.1	$4.2x10^{eight}$	$9.8x10^{eight}$	$- 5.6x10^{eight}$
30.2	$3.4x10^{eight}$		$- 6.4x10^{eight}$
31.1	$9.2x10^{eight}$	$4.3x10^{nine}$	$- 5.1x10^{eight}$
31.2	$7.7x10^{eight}$		$- 6.6x10^{eight}$
32.1	$4.6x10^{eight}$	$6.2x10^{eight}$	$- 1.6x10^{eight}$
32.2	$4.2x10^{eight}$		$- 2x10^{eight}$
33.1	$2.2x10^{eight}$	$4.0x10^{eight}$	$- 1.8x10^{eight}$
33.2	$1.9x10^{eight}$		$- 2.1x10^{eight}$
34.1	$2.9x10^{eight}$	$4.2x10^{eight}$	$- 1.3x10^{eight}$
34.2	$2.6x10^{eight}$		$- 1.6x10^{eight}$

Experiments 1-5 - transfer of US from the vial with the donor culture (E. coli) to the vial with the recipient culture (E. coli) during the logarithmic phase of the culture growth (6 hours) and the period of chemical exposure to the donor culture (45 min.).

Experiments 6-7 - transfer of US from the vial with the donor culture (E. coli) to the vial with the recipient culture (E. coli) during the logarithmic growth phase of both cultures (7 hours) and the period of sterilization of the donor culture (45 min.).

Experiments 8-9 - transferring US from the vial with the donor culture (E. coli) to the vial with the recipient culture (E. coli) during the sterilization period of the donor culture (45 min.).

Experiments 10-16 - transfer of US from a vial with a culture-donor (E. coli) to test tube with the recipient culture (E. coli) during the logarithmic growth phase of both cultures (6 hours) and the sterilization period of the donor culture (45 minutes).

Experiments 17-19 - transfer of US from the vial with the donor culture (E. coli) to 3 vials with the recipient culture (E. coli) during the logarithmic growth phase of both cultures (6 hours) and the period of chemical exposure to the donor culture (45 min.).

Experiments 20-22 - transferring the US from the vial with the donor culture (E. coli) to 3 vials with the recipient culture (E. coli) during the sterilization period of the donor culture (45 min.).

Experiments 23-25 - transfer of US from the vial with the donor culture (E. coli) to the vial with the recipient culture (E. coli) during the period of chemical exposure to the donor culture (45 min.).

Thus, in the studied mode of exposure in recipient cultures, in 2 cases out of three, growth inhibition was observed within one logarithm.

Experiments 26-28 - transfer of the US from the vial with the donor culture (Staphylococcus aureus) to the vial with the recipient culture (Staphylococcus aureus) during the logarithmic growth phase of the donor culture (6 hours) and the period of its chemical destruction (45 min). NOTE: In this experiment, two copies of the donor culture vials, two copies of the recipient culture vials and two CD transmission channels were used. Growth and sterilization of both pairs of cultures (donor-recipient) occurred synchronously. Experiments 29-30 - transfer of US from the vial with the donor culture (Staphylococcus aureus) to the vial with the recipient culture (E. coli) during the logarithmic growth phase of the donor culture (6 hours) and the period of its chemical destruction (45 min.).
NOTE: Two copies of culture flasks were used in this experiment -

donor, two copies of vials with the culture-recipient and two channels of transmission of the US. Growth and sterilization of both pairs of cultures (donor-recipient) occurred synchronously.

Experiment 31 - transfer of US from the vial with the culture-donor (E. coli) to the vial with the culture-recipient (Staphylococcus aureus) during the logarithmic phase of the growth of the donor culture (6 hours) and the period of its sterilization (45 min.).

NOTE: In this experiment, two copies of culture donor vials, two copies of recipient culture vials and two EC transmission channels were used. Growth and sterilization of both pairs of cultures (donor-recipient) occurred synchronously.

Experiments 32–34 - transfer to the vial with the culture-recipient US from the vial with the culture-recipient, during the logarithmic phase of the E. coli culture growth (6 hours) and the sterilization period (45 min.) (Recording in MT mode).

Thus:

- in main series 1-5, 6-7, 8-9, 10-16, 17-19, 26-28, 29-30, 31, 32-34 there was an inhibition of the growth of the recipient culture within the same order of magnitude (one "logarithm");
- in the main series 20-22 inhibition of the growth of the recipient culture was observed only in half of the cases;
- in the main series 23-25 inhibition of the growth of the recipient culture was observed in 2 cases out of 3.

Results of control series 2, 3

table 2

Experiment type	Recipient culture	Culture control	Result channel impact for transmitting the US.
35.1. Broadcasting US from an empty antenna to a vial with E. coli	$3.6x10^{eight}$	$6.8x10^{eight}$	$- 3.2x10^{eight}$
35.2. Broadcasting US from an empty antenna to a bottle of St. aureus	$2.0x10^{eight}$	$5.6x10^{eight}$	$- 3.6x10^{eight}$

Result: inhibition of the growth of the recipient culture within one logarithm.

Transferring the US to a vial with a culture-recipient from an empty antenna

Table 3

Transferring the US to a vial with a recipient culture from a donor culture that has not been subjected to chemical attack and destruction

Experiment type	Recipient culture	Culture control	Impact result channel for transmission US.
36.1. The broadcasting of the CA from culture to culture is not exposed to chemical attack and destruction.	$2.0x10^{eight}$	$2.4x10^{eight}$	$- 0.4x10^{eight}$
36.2. Transmission of US from culture to culture not exposed to chemical attack and destruction.	$3.0x10^{eight}$	$3.8x10^{eight}$	$- 0.8x10^{eight}$

Conclusions:

1. In the performed experiments of the standard series, the phenomenon suppressing the growth of the recipient culture. This allows us to conclude that there is a control signal in the experimental circuit in the form of suppression of the growth of the recipient culture, the so-called. inhibitory signal. Additional

experiments to clearly differentiate the signal source.

2. The control signal of suppressing the growth of culture loses its steadiness (guaranteed efficiency) with a decrease in the transfer energy in the channel of its transmission (with an increase in the number of bottles to which electromagnetic oscillations are transmitted from the donor culture). This confirms the fact that it is transported by an electromagnetic field of a certain intensity.

3. In this work, the control signal of suppressing the growth of culture does not show pronounced species specificity (at least at the level of approximations of this study). It equally arises in the process of transfer from a bacterial donor culture belonging to one species to a recipient culture belonging to another species, without a significant change in the intensity of suppression of the growth of the recipient culture in comparison with a situation where the recipient culture belonged to the same species.

4. Modes of operation of the device "IMEDIS-BRT-A": "Automatic-fast" and "Drug testing" gave the same results.

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