Verification of Bio-Resonance Efficiency Method for Neutralization of Chosen Pathogens

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Research

Keywords: bio-resonance, pathogens neutralization, waveform generator, Zapper, unconventional medicine

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RESEARCH

Verification of bio-resonance efficiency method for neutralization of chosen pathogens

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Abstract

Bacground: The purpose of this study was to verify the effectiveness of the selected bio-resonance method under in-vitro conditions. The question of alternative therapies efficiency is very important in situation when traditional therapies may be not enough effective. In such situations, patients reach for alternative solutions and sometimes even physicians suggest their application.

Methods: In the article, the authors present results of a neutralization method efficiency of selected pathogens using selected bio-resonance method. The verification of the method was conducted with usage of a constructed generator. The generator strictly realized a signal described in the literature associated with the bio-resonance topic. The authors carried out tests in in-vitro laboratory conditions on material including both clinical and reference strains of both bacteria and fungi.

Results: According analysis of 24 test series of the bacterial and the fungi strains, the samples treated with the generator did not show a significant decrease of the pathogen population in relation to the comparative samples. Generally accepted standards in microbiology, describes a significant reduction of the pathogen population appears when the population size decrease at least about one order of magnitude in relation to the comparative samples.

Conclusions: As a result of the tests, the ineffectiveness of the tested method was demonstrated. This is an important result because this method is considered as effective in many environments, and patients based on this fact, often give up conventional treatment.

Keywords: bio-resonance; pathogens neutralization; waveform generator; Zapper; unconventional medicine

Backround

Electrotherapy is one of the fields of physical therapy. It uses the biological effect of electricity on the body, which is able to: stimulate nerves and muscles, relieve pain, accelerate the absorption of edema, support metabolism and support tissue regeneration. Wild range of application of bio-resonance methods seems to be confirmed by Islamov et al. [1], describing its influence on lymphocytes in rheumatoid arthritis therapy. On the other hand in a paper [2], the American Cancer Society warns about usage of such method in a cancer therapy, because of lack evidence that the bio-resonance therapy is effective in this area. Despite of it and due to a wide application of this method of treatment, physiotherapists, doctors and medical device constructors have to take into account a number of parameters to help the patient. Their helps to adopt the therapy to the individual needs of the patients.

Podchernyaeva et al. [3] describes influence of exogenous frequency exposure in the form of bio-resonance signal. The authors shows that low frequencies of this signal may affect on chosen human body cells, and they may be harmful for them. On the other hand, Jia et al. [4] describe the impact of mechanical bio-resonance on the trigeminal nerve. This bio-resonance is caused by the mechanical activity of internal organs and if it appears in a human body may have strong influence to the neural system. According to research of Zuzak et al. [5], the respondents perceived the effectiveness of Complementary and Alternative Medicine (CAM) therapies to be less effective than Conventional Medicine (CM) therapies,although 49% of these respondents stated that CAM therapies were more effective than CM in certain cases. These research was associated with children therapies and the respondents was their parents,and data set was collected on patients of pediatric emergency department in Zurich. About 7% of the respondents applied the bio-resonance therapy, and according the authors over half of this therapy cases was prescribed by physicians. 47% is a significant part of the respondents, but in scale of the single country even 7% is also significant factor. According this state, the effectiveness of a part of Alternative Medicine methods should be verified in laboratory conditions. Also Ventura et al. [6] analyzed similar problem in 4 family pediatric clinics, in Friuli Venezia Giulia, Italy. On the other hand, the attitudes of Turkish physicians toward CAM elucidate Izgu et al. [7]. According to them, the majority of physicians are skeptical about CAM. On the other hand, they have no research results that would confirm their doubts. Because of these facts we decided to check effectiveness of bio-resonance therapy in above mentioned laboratory conditions. Raposo [8] turns attention on the fact, that because of CAM popularity, reckless decisions undertaken by patients in the choice of CAM therapy may conduct to improper treatments. This publication says also that uncontrolled and unverified CAM may conducts to the risk of fraudulent practices.

In the presented paper, the authors focus on details of a method described in book "The cure for all diseases" [9]. The author of the book, H. R. Clark proposes a set of rectangular signal frequencies, which, according to the author may damage chosen pathogens, such like bacteria or fungus. In this method bacteria or fungus are associated with appropriate frequencies of the square shape signal. Under the influence of above mentioned, these two extreme opposite views related to bio-resonance therapy and lack of scientific evidence of its effectiveness, the authors decided to verify the selected method in laboratory conditions. In vitro methods appears to be the most objective methods, because we can avoid influence of an independent reaction of an immune system in the in vivo conditions.

State of the art

There are many electronic devices on the market that are intended for therapeutic or diagnostic tasks based on more or less credible theories. Recently, the market of unconventional medicine has been dominated by devices that use electricity, and more specifically, waveforms of periodic electrical signals of different frequencies. According to the devices authors, they are able to, in a non-invasive way for the human body, destroy virtually all pathogens that cause disease. One such device is the device known under the colloquial name Zapper, i.e. an electronic alternating current generator with a possibility of various frequencies adjusting (see Fig. 1).

The use of this device for therapeutic purposes has both its supporters and opponents. Medical circles strongly negate the effectiveness of this method, but it is surprising that in many cities around the world many people claim that this "invention" has often saved their health and even life, when conventional methods of treatment no longer brought effect. On the market, there are many other examples of the Zapper, but this one is presented as the origin of its successors.

Methods

The aim of the experiment was to verify the selected bio-resonance method used and considered effective in many non-conventional medicine centers. In order to verify the above method, the authors of the article designed and constructed an electronic generator generating the voltage signal described in the literature related to this method. They acted with this signal on samples containing microbial material. In this section, we focused on tools, test material and the test conditions. One of the main tool was a generator device. As material we understood chosen bacteria and fungi strains.

Generator device

To test the influence of dedicated frequencies of the rectangular signal on the chosen pathogens, the appropriate device was constructed (see Fig. 2). This device was based on a wave generator AD9833 which is able to generate useful sinusoidal and rectangular signals. According materials included in [9], the rectangular wave should have minimum value equal 0V and maximum value 5V, as well for sinusoidal as for rectangular signal. To augment the signal power an amplifier LM6171 was applied. Its characteristic feature is very wide range of transmitted frequencies, what was very important for signal frequencies above 1 MHz. A main unit of the device was microcontroller AVR, which allow to change the set and hold appropriate frequency and shape of the signal. A detailed electronic scheme of the device is presented in figure 3. There are presented all elements mentioned above, as also other additional elements for communication with operator, and the output signal variables adjustment. The generated signal was verified on an oscilloscope device, what proves effectiveness of the device for various signal frequencies.

These signals for frequency of 100 kHz are presented in Fig. 4 for rectangular and sinusoidal signal. According to Clark's method [9], the rectangular signal was preferred, and for this reason the authors of this article have chosen also this kind of signal.

Tests description

The pathogenic bacteria and fungi - growth conditions: Both reference strains (E. coli - ATCC 25922, S. aureus - ATCC 25923, C. albicans - ATCC 10231) as well as those isolated from patients with clinical manifestations of dermatitis (E. coli-3A / 1, S. aureus -2477, C. albicans-2475) were used in the study. Before the experiment, all bacterial strains were cultured in liquid TSB (tryptic soy broth, Oxoid,UK) and Candida were grown in liquid Sabouraud broth, overnight. After this time the cultures of bacteria and fungi were diluted in 5 ml suitable liquid media from $1x10^8$ Colony Forming Units (C.F.U/ml) to the final density of $1x10^6$ C.F.U/ml.

The samples were subjected to the voltage signal of chosen frequency in two series distributed in time.

Electrodes generating the appropriate frequency (selected for a specific species of microorganism: E. coli - 392.5 kHz, S. aureus - 381 kHz, Candida - 386 kHz) were inserted into the liquid cultures prepared as above. We used graphite electrodes due to their lack of reactivity in electrolytic processes (see Fig. 5). Many types of other electrodes, are oxidized during electrolysis, and they may cause contamination with various types of oxides. As a control we used the same liquid media containing examined bacteria and fungi at the density of $1x10^6$ C.F.U/ml and $1x10^8$ C.F.U/ml, not exposed to the electrode generating a voltage signal of a certain frequency.

The samples were subjected to the voltage signal of chosen frequency in two series distributed in time. The time interval between one series and the other was 10 min, while in turn each series was divided into the following three cycles: 3 times for a period of 3 minutes, and the interval between the periods was 5 minutes. After the test frequency was over, the electrodes were removed from the tubes, and then each sample was quantitated by decimal dilution according to the diagram below (Fig. 6 and 7).

Bacteria and fungi were seeded onto appropriate agar media i.e.: E. coli strains were passaged on MacConkey Agar (Oxoid, UK), S. aureus on Blood Agar (Oxoid, UK), C. albicans on Sabouraud Agar (Oxoid, UK). The plates were incubated overnight in aerobic conditions at 37°C and afterwards values of C.F.U/ml were determined.

For the experiment result and credible conclusions, the details of the experiment conditions were very important. As it was said maximum value of voltage for the rectangular shape of voltage signal was 5V. Average current was between 0.19 mA and 0.21 mA. Also the temperature of the mixture was measured. The authors used a thermal imaging camera to control its temperature. It was important, because therapy may be treated as effective when it is not harmful during in vivo conditions.

During the experiment, the temperature increased about 4°C, from about 29°C to about 33°C (see Fig. 8). It was very important for the experiment not to exceed 40°C, because in conditions with a temperature over 40°C it would be difficult to judge the reason of changes in the bacterial population. It was very important to isolate the factor of bio-resonance effect.

Results

During the experiment, the authors used chosen pathogens such as: Candida albicans, Escherichia coli and Staphylococcus aureus. Both, the reference and clinical strains of selected microorganisms were tested.

As the reference strain - a strain with phenotypic features and genome structure assumed as the most representative for a given species was chosen. Additionally, clinical strains isolated from patients with symptoms of dermatitis were used [10].

The result of the experiment, mentioned in the previous section, was described in this section. The authors chose only strain densities equal to 10^6 C.F.U/1ml and 10^8 C.F.U/1ml because these strains gave the best possibility of visual verification of colony number. As it was described before, the authors conducted two series of the experiment with 10 min gaps between them.

To better visualise the results, a bar graph was created, where each of the two samples exposed and not exposed to the generator signal were compared. The appropriate columns are numbered in relation to the numbers of sample pairs including the so called Experiment sample, where the sample is exposed to the chosen frequency signal, also as a Comparative sample. The pairs are indicated in Tables from 1 to 6 by the pair numbers from 1 to 24. According to standards in microbiology, a reduction of the pathogen population which indicates that the method is effective appears when the population size decreases at least about one order of magnitude. As may be observed in Fig. 9, there is no case where the difference in the compared "Experiment sample column" and "Comparative sample column" exceeds 10^1 C.F.U/ml.

Solution temperature rise (from about 29°C to about 33°C) during the experiment with generator testifies the interaction between the generator and the environment of the solutions. The temperature in the test-tubes does not exceed 33.5°C, what indicates that the temperature factor does not threaten the bacterial and fungal pathogens. In the case of decreasing of pathogens amount the researcher may be sure that it was not caused by the temperature factor. It is also important in vivo environment when temperature below 40°C is acceptable.

To verify of the results from statistical point of view, the Mann-Whitney test was conducted. In this test two 24-element result sets (see Table 1 to 6) were compared. We tested a null hypothesis stating that there is no effect of bio-resonance method against an alternative hypothesis that after application of bio-resonance the number of live microorganisms is smaller compared to the reference null conditions. For this reason the one-tailed test was performed and the significance level equal to 0.05 was assumed. The p-value of the Mann-Whitney test was equal to 0.23. This outcome indicates that there is no significant difference between the two groups, groups of so called experiment and comparative samples.

Discussion

According the best knowledge of the authors, all conditions required in the book [9] was fulfilled during laboratory tests. Throughout the analysis of results enclosed in the tables, from the Table 1 to the Table 6 and results presented in the Figure 9, as also the Mann-Whitney test, the following conclusions was formulated.

Based on analysis from the previous section, the samples treated with the generator did not show a significant decrease of the pathogen population in comparison to samples not treated with the generator. According to generally accepted standards in microbiology, a significant reduction of the pathogen population appears when the population size decrease at least about one order of magnitude.

The p-value of the Mann-Whitney test was equal to 0.23 highly over significance level equal to 0.05. Accordingly, this outcome indicates that there is no significant difference between the two groups, that is, the tested bio-resonance method is inefficient.

Based on above mentioned conclusions, a general conclusion can be put forward. This conclusion says that the method described in the book [9] is not effective. According to the initial assumption, this ineffectiveness concerns selected strains of fungi and bacteria. Nevertheless, due to the fact that the tests have been carried out

for both clinical and reference strains, a similar effect may be expected in bacterial or fungal infections.

In the course of our research, we did not come across any sources in the field of verifying the effectiveness of bio-resonance methods in a similar area with which we could argue or agree. Therefore, we hope that our work will be a signal to continue the verification process of this type of medical treatment.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

All authors confirm that they have approved the manuscript for submission to the European Journal of Medical Research.

Availability of data and materials

The dataset supporting the conclusions of this article is included within the article (and its additional files).

Competing interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Author's contributions

All authors participated in the design, interpretation of the studies and analysis of the data and review of the manuscript; PK conducted the experiments, TN developed the tools and wrote the manuscript, MS planned the experiment and wrote the manuscript.

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Figures

Figure 1 Dr. Clark's Zapper device, outside and inside view [9]

Tables

Figure 2 Waveform generator device

Figure 3 Waveform generator scheme

Figure 4 Time traces of the output rectangular an sinusoidal signals for frequency 100kHz

Figure 5 System during experiment

Figure 6 Scheme of preparation of bacterial strain suspensions

Figure 7 Cultured pathogen colonies

Figure 8 Thermal conditions under electrical activity (left), and without it (right)

Figure 9 Comparison of samples from the experiment and the comparative samples

Table 1 Candida albicans - reference strain number ATC10231

Strains density in C.F.U/ml	10^6			10^8		
Samples exposed/ non-exposed to the rect. signal	Pair No.	Frequency 386kHz	Comparative sample	Pair No.	Frequency 386kHz	Comparative sample
1st series of measurements 3x3min	1	$2.3x10^7$	$2.6x10^7$	3	$1.5x10^9$	$3.0x10^9$
2nd series of measurements 3x3min	2	$2.6x10^7$	$1.9x10^7$	4	$2.9x10^9$	$1.9x10^9$

Table 2 Candida albicans - clinical strain number 2475

Strains density in C.F.U/ml	10^6			10^8		
Samples exposed/ non-exposed to the rect. signal	Pair No.	Frequency 386kHz	Comparative sample	Pair No.	Frequency 386kHz	Comparative sample
1st series of measurements 3x3min	5	$4.0x10^7$	$6.0x10^7$	7	$4.0x10^9$	$7.4x10^9$
2nd series of measurements 3x3min	6	$6.8x10^7$	$5.6x10^7$	8	$6.7x10^9$	$4.0x10^9$

Table 3 Escherichia coli - reference strain number 25922ATC

Strains density in C.F.U/ml	10^6			10^8		
Samples exposed/ non-exposed to the rect. signal	Pair No.	Frequency 392.5kHz	Comparative sample	Pair No.	Frequency 392.5kHz	Comparative sample
1st series of measurements 3x3min	9	$4.0x10^6$	$5.0x10^6$	11	$1.2x10^9$	$1.5x10^9$
2nd series of measurements 3x3min	10	$5.0x10^6$	$8.0x10^6$	12	$9.0x10^8$	$1.5x10^9$

Table 4 Escherichia coli - clinical strain number 3A/1

Strains density in C.F.U/ml	10^6			10^8		
Samples exposed/ non-exposed to the rect. signal	Pair No.	Frequency 392.5kHz	Comparative sample	Pair No.	Frequency 392.5kHz	Comparative sample
1st series of measurements 3x3min	13	$5.0x10^7$	$5.7x10^7$	15	$1.6x10^9$	$6.4x10^9$
2nd series of measurements 3x3min	14	$1.7x10^7$	$5.5x10^7$	16	$1.6x10^9$	$1.4x10^9$

Table 5 Staphylococcus aureus - clinical strain number 2477

Strains density in C.F.U/ml	10^6			10^8		
Samples exposed/ non-exposed to the rect. signal	Pair No.	Frequency 381kHz	Comparative sample	Pair No.	Frequency 381kHz	Comparative sample
1st series of measurements 3x3min	17	$3.8x10^7$	$1.8x10^7$	19	$5.7x10^9$	$5.3x10^9$
2nd series of measurements 3x3min	18	$4.4x10^7$	$4.3x10^7$	20	$3.8x10^9$	$6.6x10^9$

Table 6 Staphylococcus aureus - reference strain number 25923ATCC

Strains density in C.F.U/ml	10^6			10^8		
Samples exposed/ non-exposed to the rect. signal	Pair No.	Frequency 381kHz	Comparative sample	Pair No.	Frequency 381kHz	Comparative sample
1st series of measurements 3x3min	21	$1.0x10^6$	$8.0x10^6$	23	$6.0x10^8$	$2.4x10^9$
2nd series of measurements 3x3min	22	$4.0x10^6$	$1.2x10^7$	24	$6.0x10^8$	$2.9x10^9$

Figures

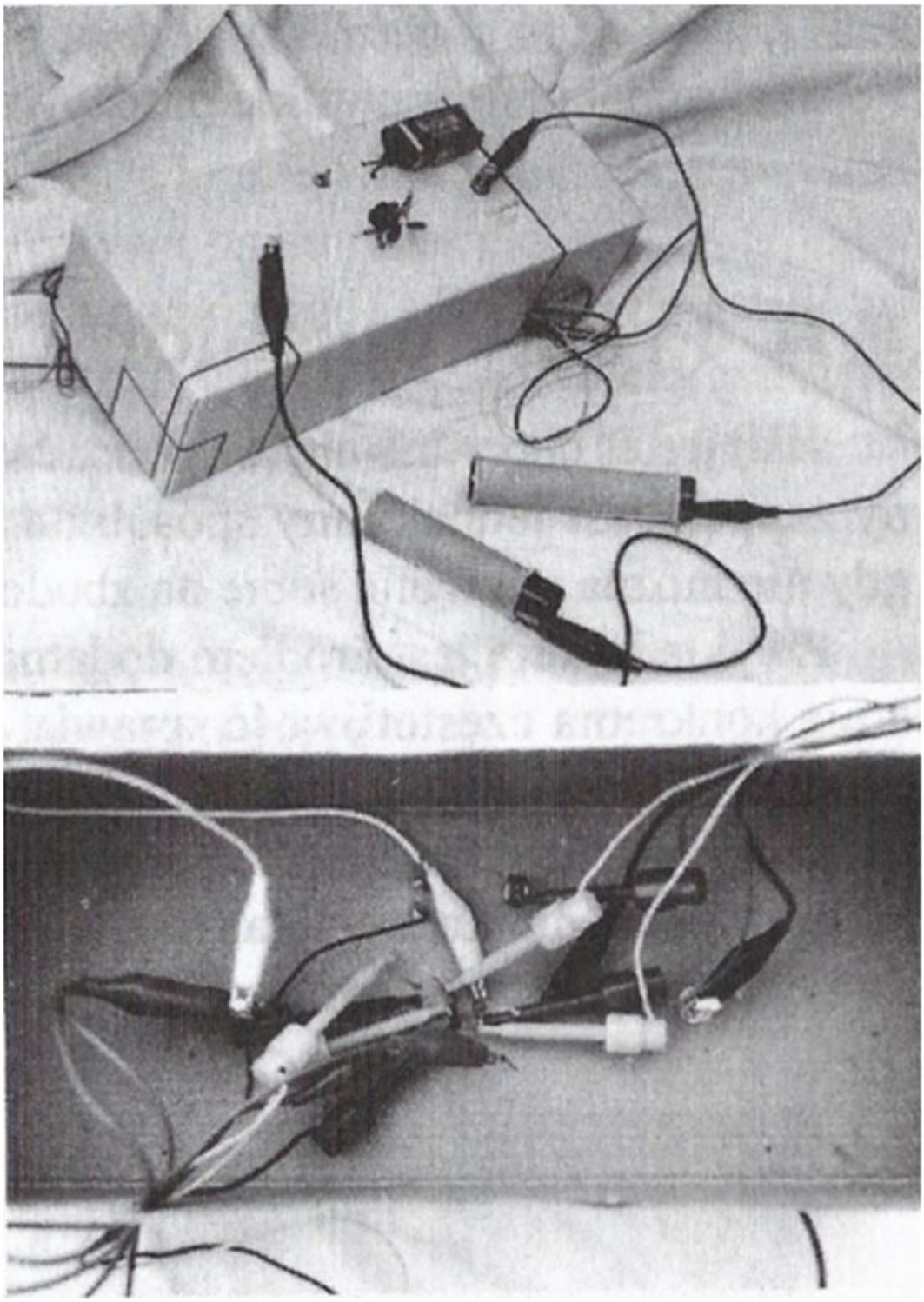

Figure 1

Dr. Clark's Zapper device, outside and inside view [9]

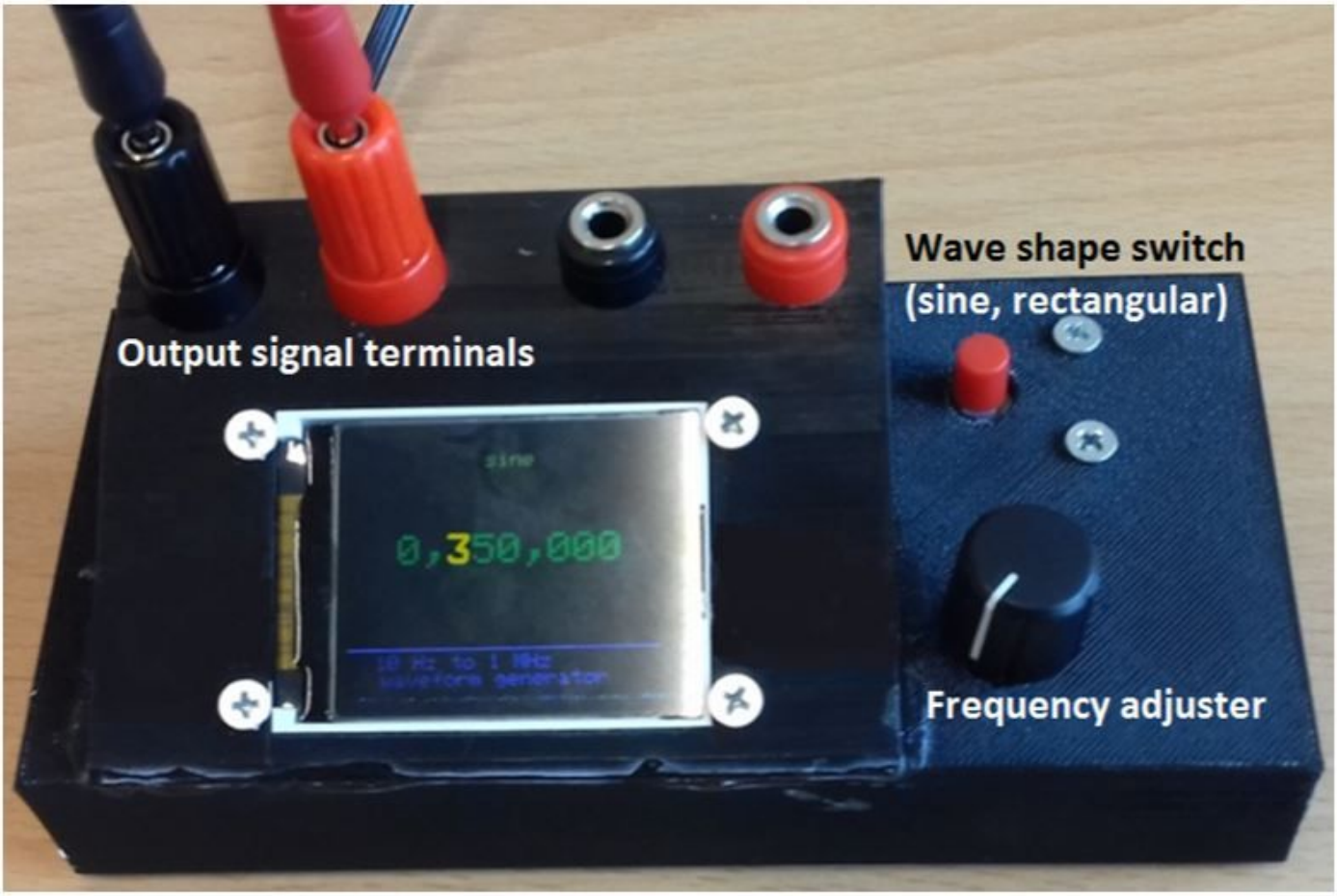

Figure 2

Waveform generator device

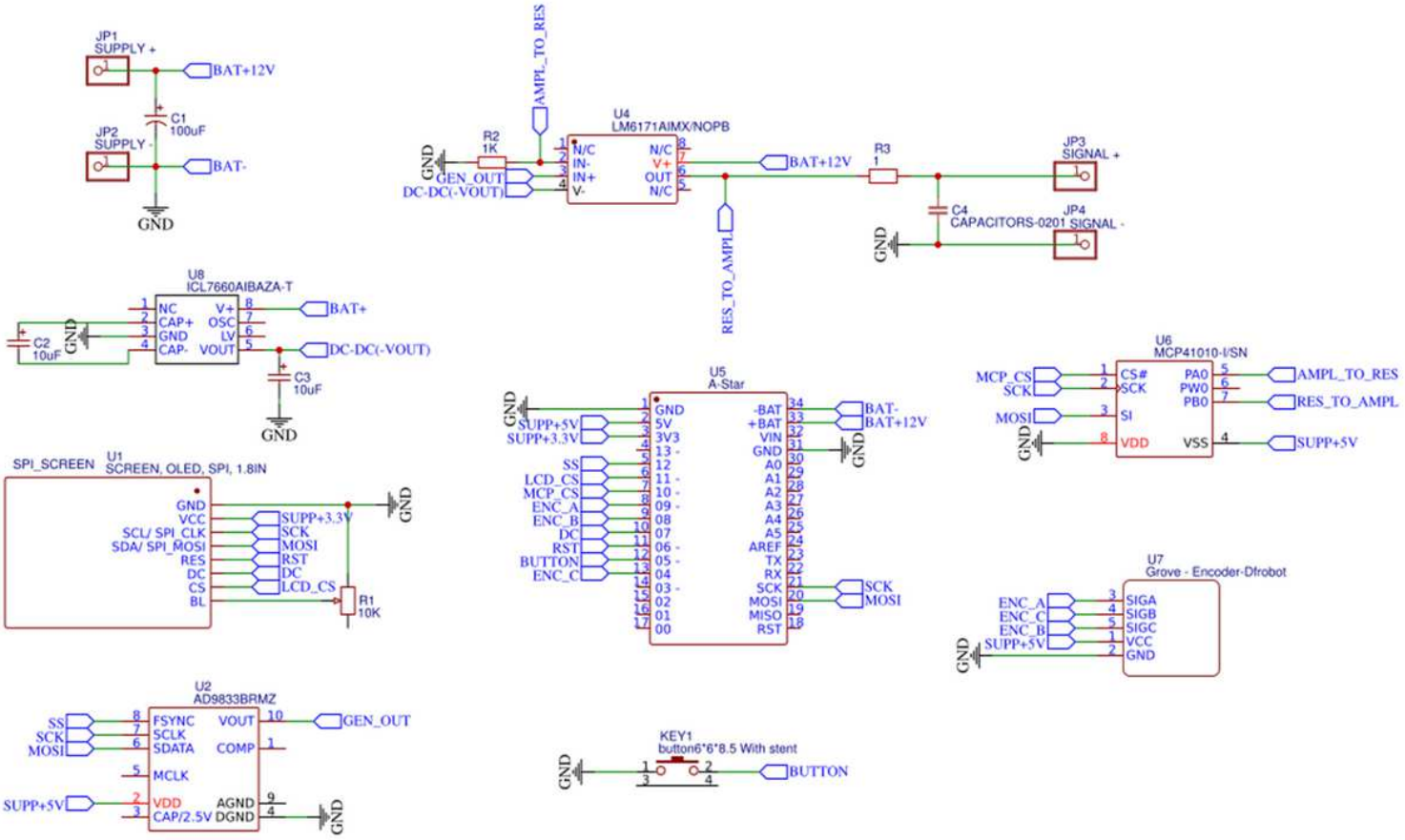

Figure 3

Waveform generator scheme

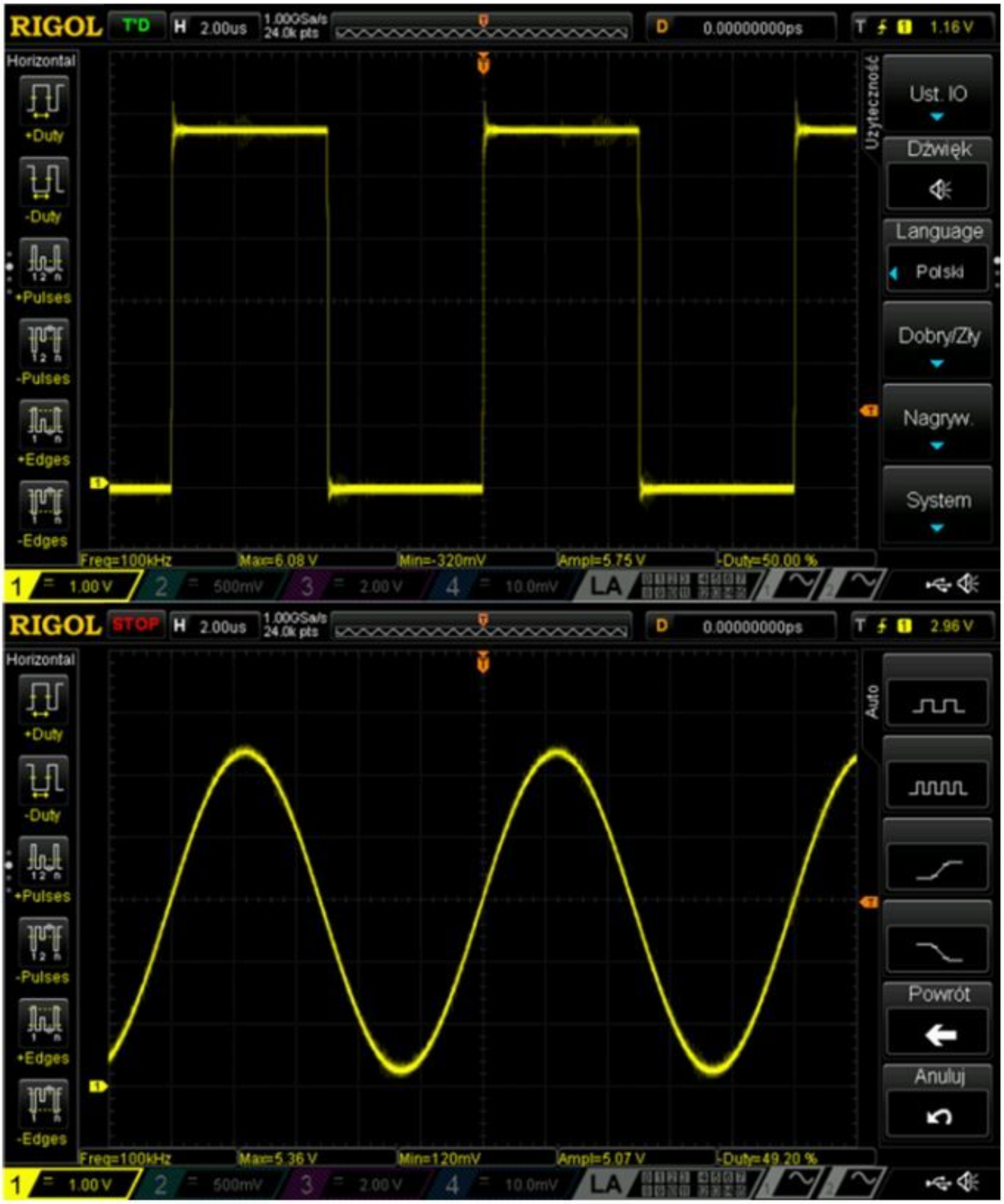

Figure 4

Time traces of the output rectangular an sinusoidal signals for frequency 100kHz

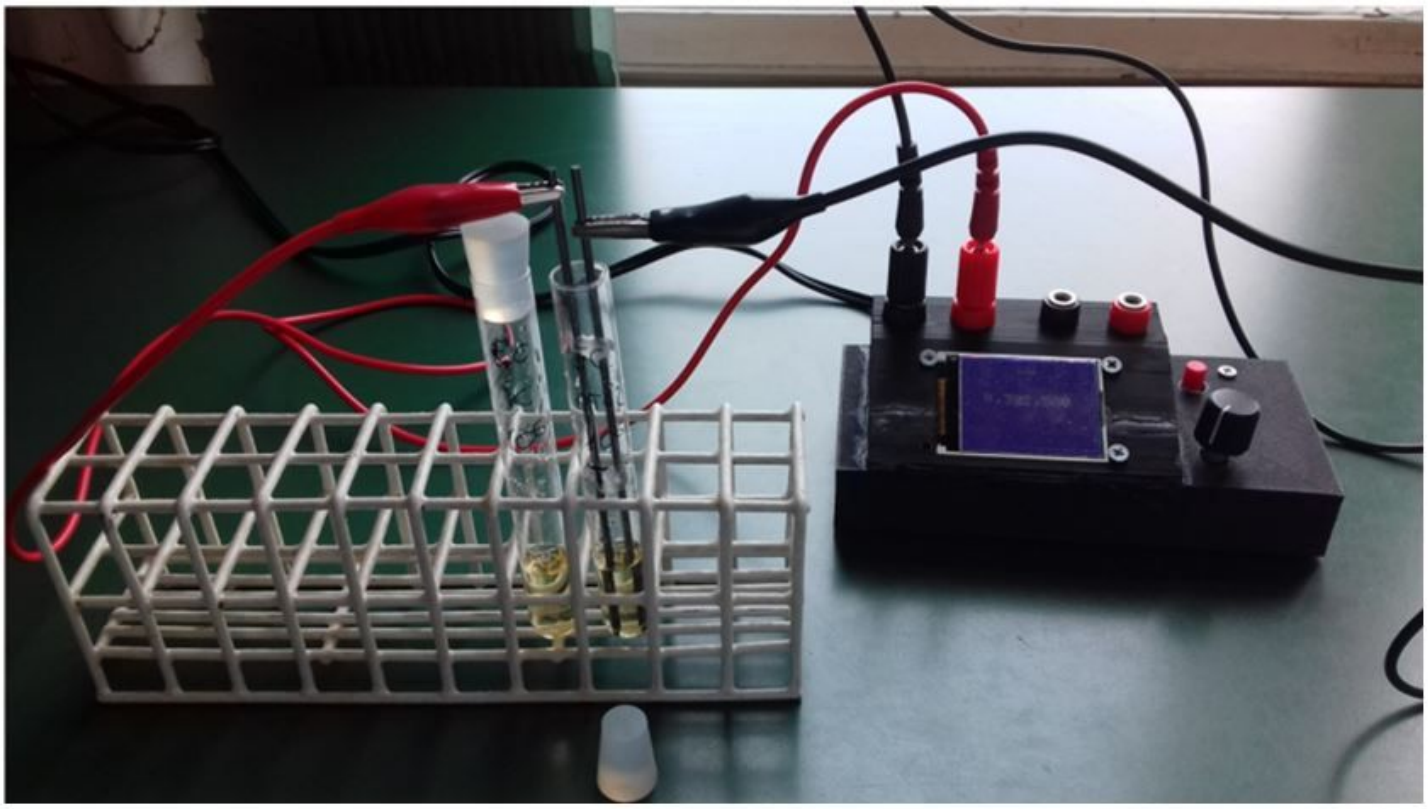

Figure 5

System during experiment

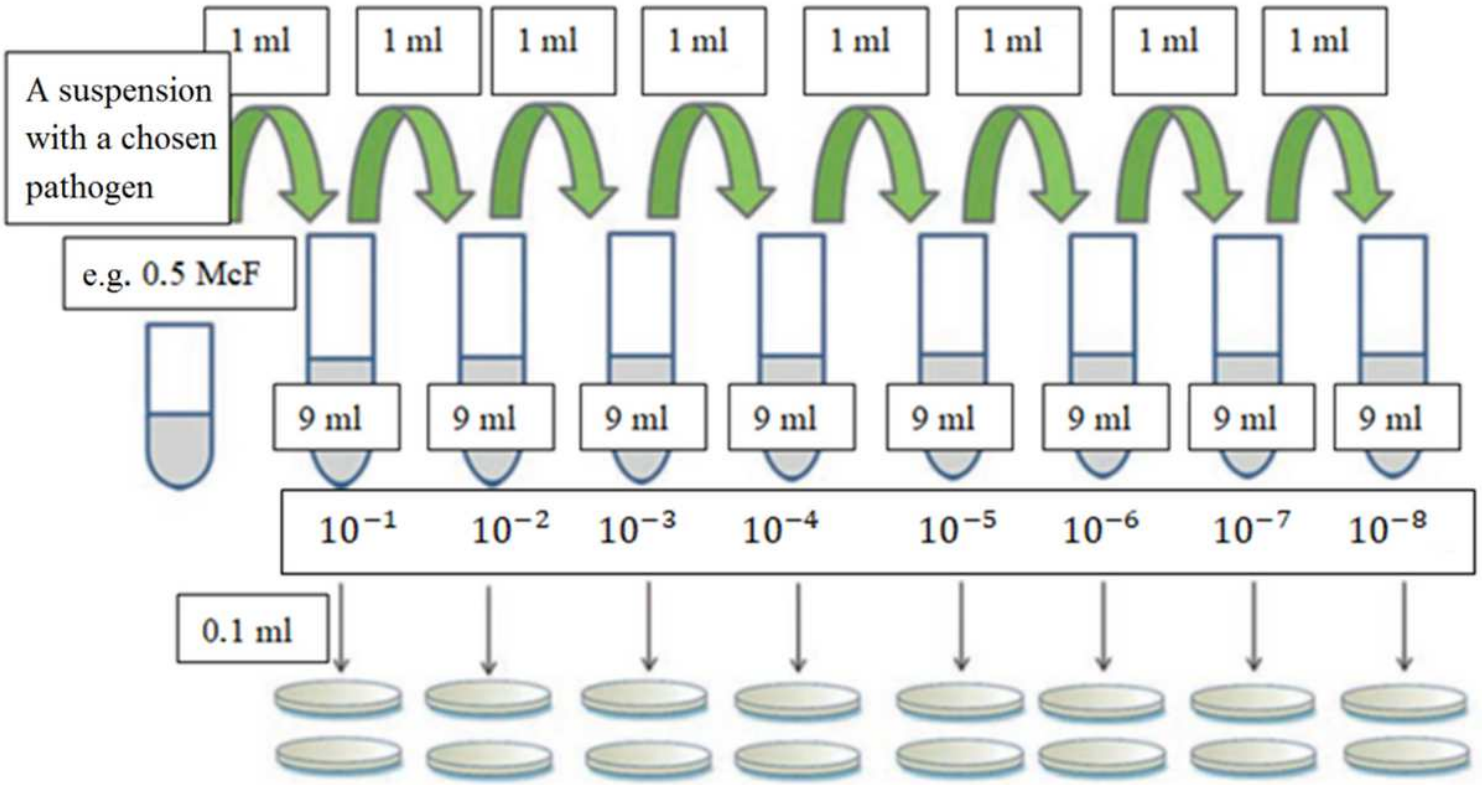

Figure 6

Scheme of preparation of bacterial strain suspensions

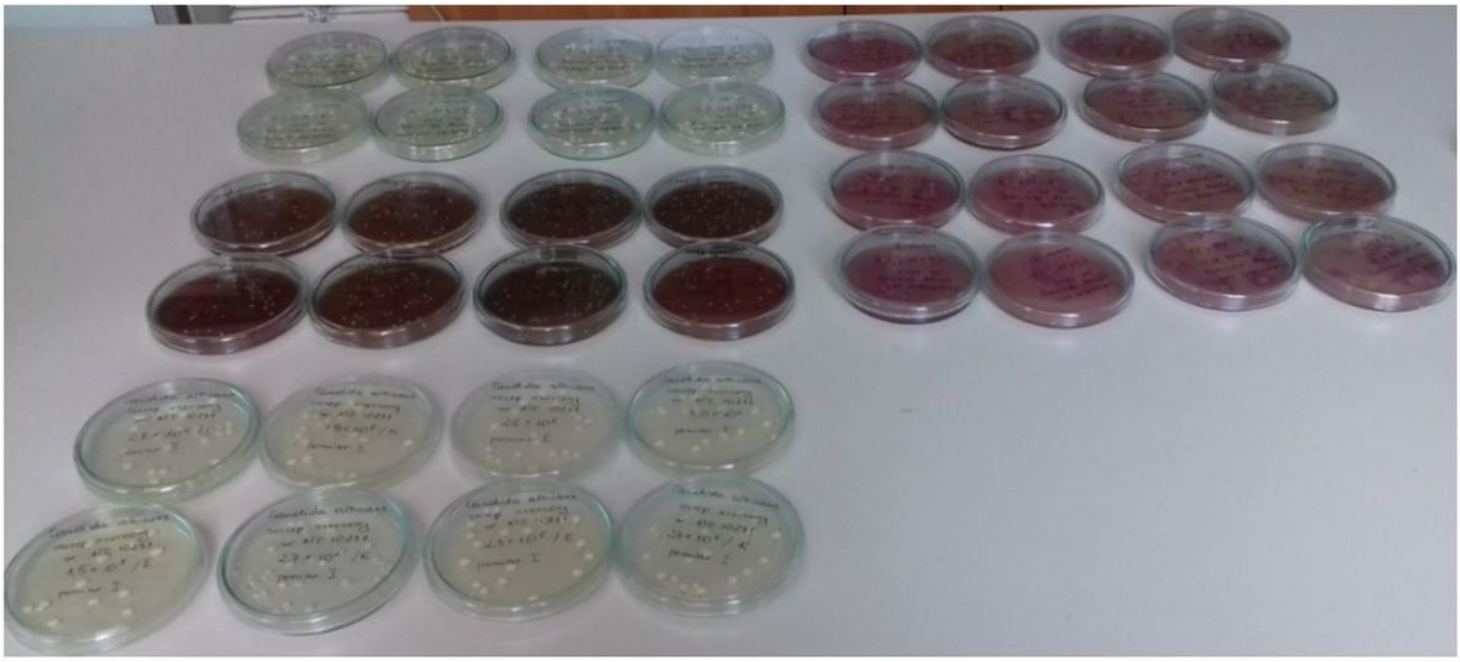

Figure 7

Cultured pathogen colonies

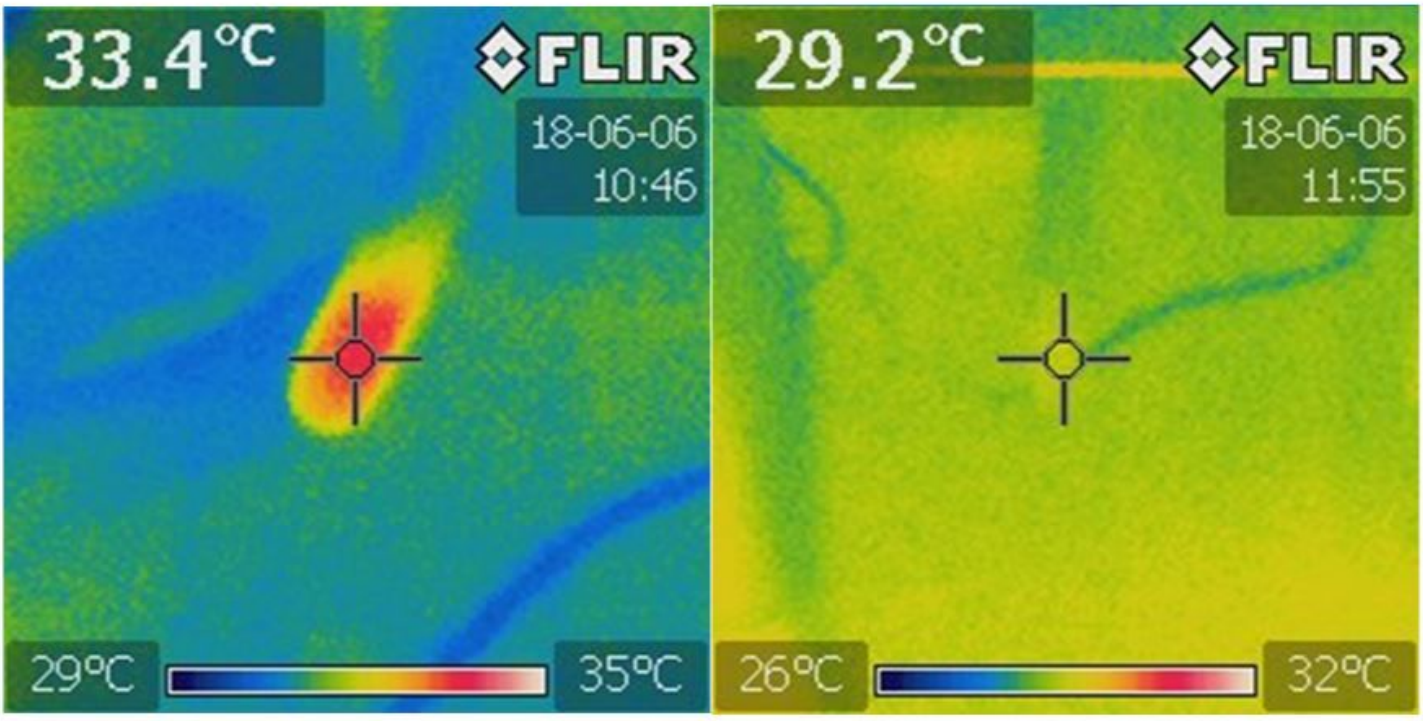

Figure 8

Thermal conditions under electrical activity (left), and without it (right)

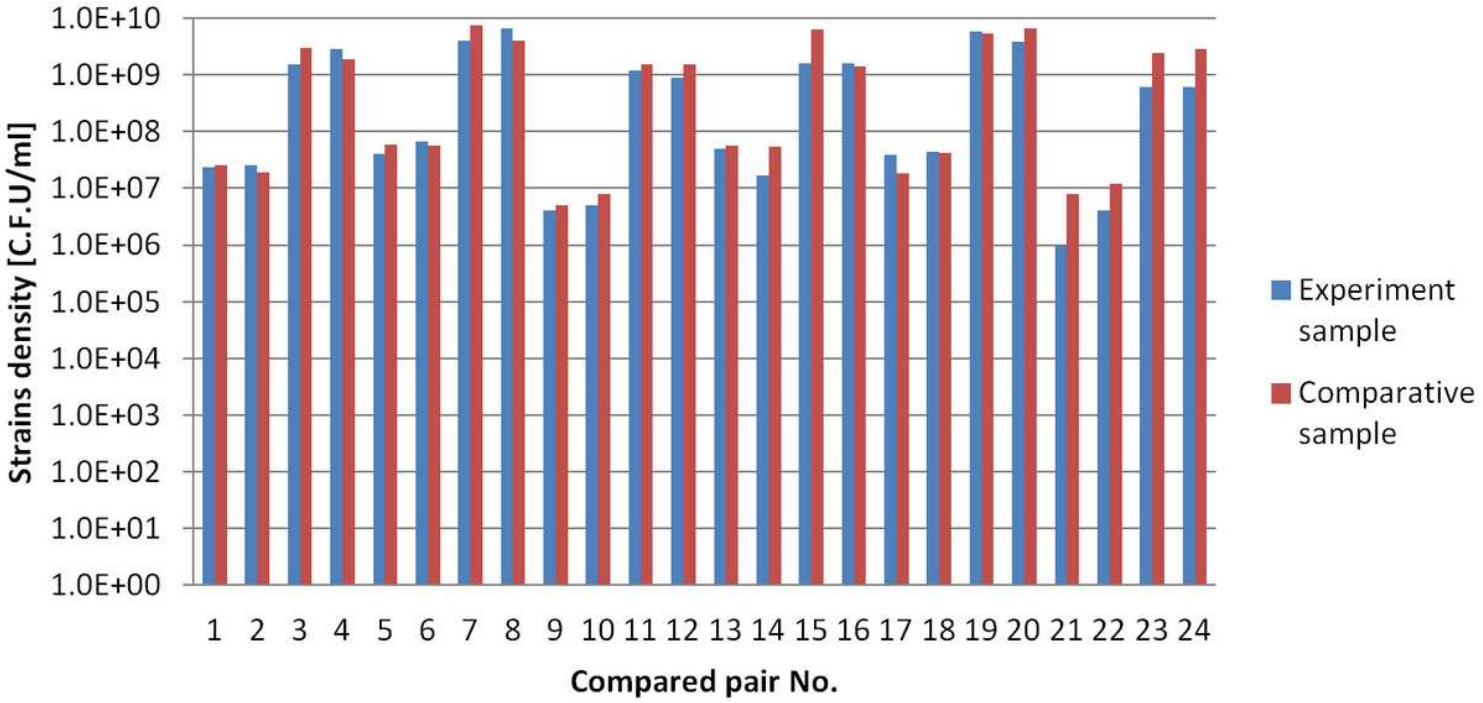

Figure 9

Comparison of samples from the experiment and the comparative samples