



Experience of the Mathematically Optimal Healing Based on the Sound Therapy

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Abstract

Now it is known that the human intellect can work not only as the operating or control system, but and as measurement tool. Measurement of intellectual abilities, physiological and physical (for example energy) characteristics of human body with help of intellect gives inherent opportunities to more accurately eliminate many pathological changes in the human organ-ism and find the optimal solutions for treatment processes (Iserlis, 2020). Described below method allows to unite the possibility a human intellect to works as measurement tool and a physical treatment system using mathematical method of optimization for healing such serious disease as arterial hypertension, with perspective of other health problems optimal solutions. Sound healing has a rich tradition that flourished thousands of years ago in many ancient cultures and is now being brought back to the forefront of alternative methods of healing. It's been known since ancient times that drumming, singing and dancing may produces healing effects on the body, mind, and spirit, because it can reduce stress, induce deep relaxation, help release negative feelings, decrease chronic pain, and boost immunity. The ancient Sumerian, Chinese and Indian civilizations has contributed to the development of the various healing modalities in the world including sound therapy.

Keywords: Human intellect; Sound healing; Physical treatment; Indian civilization; Sound therapy

Introduction

Ancient Egyptian healers played musical instruments like pipes and cello to calm their patients, relieve them of anxiety and insomnia. The teachings of the ancient Greek philosopher Pythagoras of Samos became the basis not only for discoveries in the field of mathematics and astronomy, but also for the theory of music in terms of its impact on the human body. He discovered the so-called sacred correlation of sound tones (the "perfect fifth") as, the most consonant, harmonious, and healing intervals. It is also known that Esculapius, the Greek physician, cured sciatica and other diseases of the nerves by blowing a loud trumpet in the presence of the patient. On the American and African continents, shamans decreased ailments with the rhythmic sound of drums and tambourines. The Tibetans and people in some Asian countries have long used singing bowls for a variety of medical practices, yoga, meditation, and relaxation. Until now, sound processing is extremely popular in China, India and other countries.

Common sound therapy instruments include drums, gongs, chimes, Tibetan singing bowls, crystal bowls, voice tuning etc. Among the pioneers and preachers of sound therapy here are Dr. Royal Raymond Rife, who about one hundred years ago produced a frequency generator, and used different kind of sounds to destroy bacteria, viruses, mold, and other pathogens responsible for many illness, including cancer; Dr. Jenny Hans (the Swiss physician and natural scientist who coined the term cymatics to describe acoustic effects of sound wave phenomena); Jeffrey D. Thompson (the Founder / Director of the Center for Neuroacoustic Research in Carlsbad, California); Olav Skille (president of the International Society for VibroAcoustics (ISVA), director of Research and Development at the TRILAX Center in Steinkjer, Norway); Dr. Peter Guy Manners (an English Osteopath); Dr. Alfred Tomatis (a French otolaryngologist and inventor, author of the Tomatis method or Audio-Psycho-Phonology (APP); Mandara Cromwell (Doctor of Cymatic Medicine and President of Cyma Technologies); Donna Carey and Marjorie de Muynck (co-founders of the Kairos Institute of Sound Healing and the co-creators of the Acutonics System of Healing and Education); Barbara Hero (Founder/Director of the International Lambdoma Research Insti-tute); Jonathan Goldman (president of Spirit Music and Director of the Sound Healers Association); Dr. Mitchel Gaynor (Director of Medical Oncology at the New York Presbyterian Hospital and popular author of outstanding books about sound healing), and many others [1].

Sound Healers Association (SHA) was founded in 1982 as an organization dedicated to the research and awareness of the uses of sound and music as therapeutic and transformational modalities. Now (June 2021) this Association has about 4000 members and 250 sound healers. Many years thousands people throughout the planet united for Annual WORLD SOUND HEALING DAY to create on the Earth collective energy of compassion and love. In the USA and other countries has created many Sound therapy learning centers: Center of Light Institute of Sound Healing and Shamanic studies, Sound Therapy Center, Seattle Sound Temple, and so on. There is founded by M. Cromwell the International Sound Therapy Association (ISTA), in Atlanta (GA) as a nonprofit organization dedicated to increasing the public's awareness of the power of sound in our environment and its healing effects. In 2009, Cyma Technologies innovated a device it the AMI 750 that would transport healing frequencies through the soles of the feet, in the form of sound energy flowing along the meridian pathways, as referenced in the ancient texts of Chinese medicine (Cyma Technologies | AMI De-vices)

Thanks to the methods innovated by the French doctor Alfred Tomatis was developed an educational program that aims to stimulate the brain through the auditory system in order to re-store listening. By treating the music and the voice in a very particular way, the Tomatis Method helps children and adults to improve their quality of listening. In the United States music therapy is being used to treat amnesia, depression, schizophrenia, etc. The present state of research reveals promising effects of targeted infrasound in cancer therapy. A University of College London Hospital NHS Foundation study showed that sound wave therapy helped to reduce side effect on prostate cancer treatment. About 25 years ago, The Kairos Institute of Sound Healing in New Mexico developed and patented the Acutonics Tuning Forks Healing System. Being based on theories of traditional Chinese medicine, this system is in great demand in large cities of Canada, such as Calgary, Edmonton and Vancouver, as well as in Asia

and the Europe. For faster and deeper pain relieve is developed the several a clinical grade therapeutic ultrasound devices (Physiotherapy Ultra-sound Therapy Machines). In recent years, interest in sound therapy has led to the emergence of a large number of Audio-Visual Entrainment (AVE) systems and Mind Machines (Iserlis).

Classification of sound therapy' methods

Usually, sound healing is understood as the use of sounds in the audible range of a healthy person (from 16-20 Hz to 15-20 kHz). Frequencies below 20 Hz are commonly referred to as infrasonic, and frequencies above 20,000 Hz are called ultrasonic. Analysis of plenty existed methods of the sound therapy allow to make some classification:

- By used frequency: infrasonic (inaudible), audible sound, ultrasonic (inaudible)
- By used sound signals form: sine, square, triangle, sawtooth.
- By type of amplitude-frequency characteristic: - with fading amplitude; with growing up amplitude, amplitude-modulated; frequency-modulated, etc.
- By used instrument: human voice, gongs, drums, whistling pipes, string instrument (harp, lira, etc.), bells, tuning-fork, different types of singing bowls, electronic vibro-acoustic devices, etc.
- By content: pure tones, different kind of music (for example Mozart effect, Tomatis method), mantras, prays, etc.
- By principles of affect: via brain (mind machines), via chakras (chakra healing), via some parts of body
- By the place and use of sounds: via ears, via ears and skin, via soles of legs
- By used physical effects: bio-resonance, binaural bits, amplitude or frequency modulation
- By using additional intellectual impact: from pure sounds to methods based on the Goldman formula ("Frequencies plus Intent equal Healing") (Goldman, 1998)
- By types of healed ailments: from the physical such as gastrointestinal, gynecological, respiratory, musculoskeletal, and neurological to psycho-spiritual and psychological distress.

There is a point of view in traditional medicine, that sound healing and any vibrational treatment is based upon hypothesis stating that the exogenous application of certain frequencies stimulates the recovery of the central nervous system (CNS), self-organization and the coordination of CNS effect on the functional state of the organs and systems of the human organism by means of regulating the functioning of its neuroendocrine structures. In this regard, the results of serious experiments, which proved the influence of different types of music on red blood cells, are very interesting (Reid). Some attempts to explain the processes of sound treatment are outlined in the administrative article of the Healer Journal "How to Use Sound to Heal: Understanding the Principles of Resonance in the Human Body" [2].

Chakras and Aura

From the point of view of biophysics, the human body is a complex oscillatory system, consisting of many interconnected components, and having many oscillation sources (for example, heart, lungs, muscles), functioning at different frequencies. This system is oscillatory not only at the macro level (vibrating organs), but also at the micro level - level of wave genetics (Garyaev). Obviously, a human organism belongs to the class of non-autonomous oscillatory systems

that have autonomous energy sources and are exposed to the external environment. A feature of this system is that information about the states of this system is transmitted by means of oscillations, and this, as experience shows, allows anyone to have a fairly simple key to this system to describe its states. On the other hand, a human is a complex energy system, with several sources (internal and external) of energy as well as with many energy nodes (centers), which are usually called chakras. Many healers claim to be able to feel, to see, or to evaluate a level of functioning the swirling energy of chakras. There are theories according to which the chakra system is part of the energy-information field surrounding the human body, called the aura (Adams, Alcantara, Uhl, etc).

Dr. Hiroshi Motoyama, founder and president of the California Institute for Human Science proved chakras existence through some physical experiments (Motoyama). Although many different healing traditions have evaluated and interpreted the chakras in different ways, we use the model most accepted today: the primary seven or nine chakra systems, that run along the midline of the body, from the base of the spine to the crown of the head. The word "chakra" in Sanskrit translates as "wheel" or "disk". According to Hinduism, the chakras are vortexes of energy that participate in energy exchange within a physical and subtle bodies of man and in his connections with the outside world. They resemble small funnels that absorb certain vital energy from the environment. There is information that chakras control the intake of about 80% of the energy used to ensure the operation of internal organs, the rest of the energy the body receives after processing food, air and other sources. Chakras can be in the different conditions from blocked to overactive. As many authors testify, their state is important for how we feel. They affect the nervous system and all internal organs, as well as our emotional and spiritual well-being. By balancing the chakras, imbalances in the physical body can be compensated and harmonized (Goldman, 2002). According to many Eastern teaching and Western research, this is known that chakras have resonant frequencies, different for different peoples. Due to the resonance of frequency of sound source with the corresponding chakras frequencies, the vibrational balance can be restored in them, and as a result, the energy of the whole organism can be recuperated [3].

This makes it possible to create a new method of sound therapy oriented on chakras conditions and having some advantages over other methods. It is known (Goldman, 2002), that there is a direct relationship between the chakras and the associated with them parts of body, for example, the Heart chakra associated with the heart and the lungs, the Throat chakra - with organs of hearing, speaking, and singing. On the other hand, chakras can affect some of the general functions of the human organism. For example, the Root chakra associated with energy of survival and with grounding to the physical plane, the Sacral chakra - with sexual energy and with the life force, the Solar Plexus chakra plays an important role in the development of personal power, the Throat chakra with will power, and the Crown chakra - with some brain functions (Goldman, 1998). Imbalances in chakras lead to imbalances in the human body and vice-versa. Often, by aligning and balancing a chakra associated with an organ that is experienced disfunction, it is possible to make this organ again healthy. Almost all organs in our body operate at an infrasonic frequency. The average frequency of the whole organism is 6 Hz, head -20-30 Hz, abdominal cavity and chest -5-8 Hz, heart -4-6 Hz, stomach -2-3 Hz. The rhythm of the intestine is 2-4 Hz of the kidneys -6-8 Hz, of the ves-tibular apparatus from 0.5 to 13 Hz. etc. It can be assumed (some measurements have shown that) that the resonant

frequencies of the chakras (obviously different for different people) lie in the range of 100-1000 Hz, which obviously exceeds the levels of the frequencies of the human body [4].

Optimal Chakras Healing

Today, we have sufficient knowledge to create an effective method of non-drug treatment of many diseases, which allows us to obtain an optimal result in accordance with all the laws of mathematics. Among the existing trends of the sound treatment, mentioned above in the classification, so-called chakra healing seems to be very perspective. The essence of treatment through the chakras consists of exposing the patient to a spectrum of sound vibrations with a frequency commensurate with the resonance frequencies of the chakras. Within this trend, the energy of the life force called prana or chi in Eastern medicine is affected by creating an unhindered, balanced flow of energy through the chakras and other parts of the physical and subtle bodies of the human body. To assess the state of health we can use both widely accepted in medicine indicators of vital functions - characteristics by which you can judge the state of vital systems and (or) functions of the body for example: body temperature, heart rate or pulse, respiration rate or blood pressure or diagnostic parameters, such as, for example, characteristics of blood and urine measured by appropriate instruments.

In particular, for this goal can be used radiesthesia methods, which include methods of receiving answer on a question to subconscious mind or a method of subjective (by operator) measurement of all necessary parameters using pendulum (or other devices) through mechanisms of operators subconscious mind with the help of appropriate charts or scales. Commonly used radiesthesia tools may include not only the pendulum, but and L shaped swivel rods, forked sticks, and so on. Among different methods of the radiesthesia seems to be more perspective the Method of vibration series innovated by prominent Russian scientist Dr. L. G. Puchko. This method has been used in research to measure both physical body state parameters, such as blood pressure, blood volume pumped by the heart, and platelet count, as well as parameters characterizing intellectual brain characteristics - the g-factor, willpower, intuition, creativity, and even the amount of energy flow (Vital Energy Index). The second group of parameters was measured in relation to the original values (Iserlis). Some of these parameters can be calibrated by comparison with measured parameters, and for those that cannot be calibrated, there are ways to estimate their accuracy. In the first case, the author calculated, for example, the number of platelets and compared it with the results of laboratory measurements. The difference was not excessively big. In the second case, the scatter of the measured parameters was evaluated and when it was not exceeded 1-3 percent, the measurements were considered to be plausible (Iserlis). Practical use of the methodology developed by Puchko L.G. allow revealing pathological abnormalities of the organism that are invisible and cannot be registered by any other means (Puchko).

Measurement of Resonance Frequencies of Chakras

The use of the method of vibrational characteristics makes it possible to measure resonance frequencies for all chakras of a person. Their knowledge is necessary to select the zero point of the search for the optimum. In this case, the accuracy of measuring the resonance frequencies does not significantly affect the final result of the treatment. Figure 1 shows a R-chart designed with help of the method of vibration series for measuring resonant frequencies for chakras for

operator (doctor) and client (patient). Triangle with different signs inside is access code for a client (patient). In the process of measuring the desired parameter using a pendulum (or frame), some operators can do it without using an access code, replacing it by touching any part of the client's body [5].

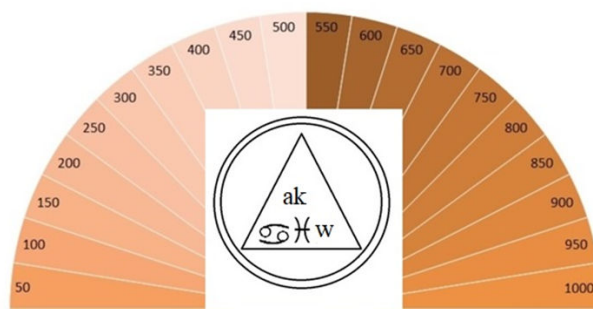


Figure 1: R-chart for measurement of chakras resonant frequencies.

List of resonant frequencies of chakras allow to select parameters of zero point, needed for beginning in process of optimization. Selection of number of sound channels and zero-point parameters depends on disease and health condition of patient. For the first time, it makes sense to use 2 and 3 sound channels and calculate the parameters of the zero point as frequency values for 3 or 4 upper chakras (depending on the number of vertices of the original simplex). The method of vibrational characteristics can be used for measurement of any diagnostic parameters which cannot be measured by medical devices.

Optimization of Treatment

The effectiveness of the use of sound therapy depends on the quality of the sounds used, which is different for different patients, diseases, and symptoms. Generally, the quality of sounds depends on the number of sound channels, and the values of frequencies, amplitudes, phases, and form of oscillation for each sound source, as well as the duration and repeatability of sound procedures. In principle, it is not easy to find the required set of sound quality parameters in each individual case, if you use the methods of regular search of options or trial and error methods. For these purposes, you can use mathematical methods that allow you to calculate or adjust sound quality parameters to the individual needs of a person during his treatment. If we use optimization methods, then this task can be solved quite simply and efficiently, if to build a local digital mathematical model of any process of interest, which can simulate real process with incomplete knowledge of the studied phenomena and be refined using successive iterations (measurements) that ensure the search for the optimum [1].

Mathematically, this can be formulated as follows: to find such values of a set of parameters of controlled actions (sounds), in which there is an increase (or decrease) in the values of the so-called target (goal) function, determining the effectiveness of these actions, under condition that all parameters of human body functioning are within the norm. If you repeat this procedure many times, you can achieve the optimal value of the target function - its extreme or determine what prevents in achieving this extreme. The following analogy can be given to understand what a local mathematical model is. Let's say you need to climb to the top of a mountain that is not visible because of the forest. You can build a mathematical model of the mountain and use it

to find the shortest path to the top. And you can get approximately the same result if you move along the surface of the mountain up the side of the mountain. There are many mathematical methods that allow searching for the optimum of target (goal) function using for iterations computational operations. The simplest and well-proven way for such approach is the use the Nelder-Mead method, sometimes named also as “downhill simplex method”, or “amoeba method”. This is a commonly applied numerical direct search method used to find the minimum or maximum of a goal function in a multidimensional space. As research has shown, this method was highly effective in the process of optimizing the intellectual abilities of a man (Iserlis).

Basic Procedures of Optimization

Very popular among practitioners the basic Nelder-Mead algorithm is quite simple to understand and to use (even for 6 grade student). It described in the Scholarpedia and another literature, and it does not make sense to describe it again in small article. To better understand its essence, we only concern some main parts of this method. Simplex is the convex geometric figure constructed in a k-dimensional geometric space on a set of points (k+1), as on vertices (Figure 2). For each sound channel the initial simplex formed on the basis of variables of zero-point. The values of the coordinates of the vertices of the simplex at the zero point can be calculated on the basis of the values of the resonant frequencies of chosen chakras different for different sound channels. For example, if object of treatment is heart dis-ease, then zero point defined by values of 4, 5 and 6 chakras. Here are possible and other variants.

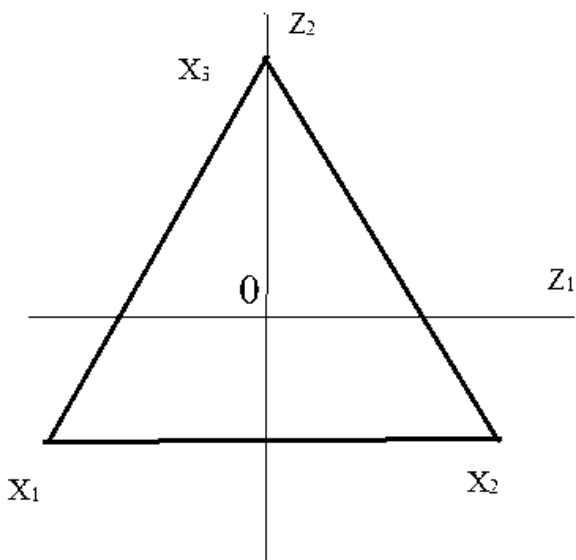


Figure 2: Regular simplex in 2-dimensional space. A center of simplex has coordinates of zero point z_{10} and z_{20} .

Method of optimization includes the following procedures:

- Creation of the initial simplex, which is a complex of initial values of varied parameters, located on the vertices of this simplex
- Measurement or calculation of values of goal function and important parameters of treatment process for above mentioned vertices of this simplex
- Analysis of described above parameters quality and choosing a worst vertex of the simplex

- Calculation of parameter for vertex of simplex opposite to a worst vertex.
- Measurement or calculation of new value of goal function and important parameters of process (in our case-health) for a new vertex
- Consecutive step-by-step calculation of new values of varied parameters in the vertices of new simplex for moving to optimal values of the goal function
- Making a decision on the end of the treatment optimization process.

In many cases for effective treatment provision it makes sense to take as goal function an average vital energy moving through each chakra -Vital Energy Index (VEI). As shown by the results of experiments, VEI is little dependent on such acoustic phenomena as beating, entrainment and resonance. In acoustics, a beat is an interference between two sounds of slightly different frequencies, perceived as periodic variations in volume whose rate is the difference between the two frequencies. Entrainment is defined as the tendency for oscillating bodies to lock into phase so that they vibrate in harmony. It is also defined as a self-synchronization of two or more rhythmic cycles. Resonance is the phenomenon of increased amplitude that occurs when the frequency of a periodically applied force (or a Fourier component of it) is equal or close to a natural frequency of the system on which it acts. For assessment of health condition of the organism can be used as in normal medical practice such diagnostic test parameters like as Systolic and diastolic blood pressure, blood test parameters and others in depending concrete disease as it is doing during and after any physiotherapy sessions. For the treatment of diseases of the joints and the spine, it is possible to measure (measure, not evaluate) the level of pain, for the treatment of diseases of the blood - indicators of blood composition, etc. I emphasize - measure, not evaluate.

Theoretically, to choose the concrete chakras as an object for sound treatment, it is necessary to know the diagnosis and the associated chakras that can have an impact on healing. Unfortunately, now it is difficult to find reliable and consistent data allowing to connect specific diseases with specific chakras. It is known the first chakra connected with survival, vitality, third chakra with problem inside of gastrointestinal tract, liver, and kidneys, fourth chakra with hypertension, fifth chakra -with problems of lymphatic system, and sixth chakra with insomnia (Goldman). Mathematical optimization of the treatment process based on comparison of the results of each iteration in process of optimum search and counting parameters for next iteration. The result of any session can be evaluated, for example, by measuring ether energy flows through each chakra with the help of a pendulum in the way described in the book (Iserlis), or by measuring with help of medical equipment values of diagnostic test parameters.

Measurement of energy flows for chakras allows to formulate and solve mathematical optimization of treatment of one or several diseases simultaneously. The formulation of a treatment optimization problem, for example, may be as follows: by a step-by-step search to find an optimal set of sound frequencies for each channel, at which the average power transmitted through the chakras is maximal. At each iteration of frequency selection restrictions should be followed. What may be such limitations, for example, for sound - individually intolerable frequencies, negative frequency values obtained by calculation; for homeostasis parameters: general well-being (if it became worse, the selected sound combination is discarded), blood pressure, pulse. This can refer to any parameter characterizing the patient's condition, if it is difficult to measure by laboratory devices, it

can be measured by means of a pendulum and constructed R-carts as it demonstrated in the book (Iserlis).

Selection of a sound generator, number of sound channels and parameters of sound signals

Today this can be done with the help of a computer or smart phone connected to the In-ternet. There are a lot of audio frequency generators on the Internet, and to find the most convenient one, it is necessary to use a browser (to search “online tone generator”). Many browsers allow having several sound channels at the same time. Online sound generator must have opportunity to a choose and change frequency, waveform, volume, and duration of session. When two tones vibrate together, they act as a combination of tones, because they created also a third and fourth tone. The last tones are composed of the difference and the summation between two tones that sound. If for example, one tone is vibrating at 300Hz and another tone is vibration at 400H, of two combination tones that are created one is vibrating at 100 Hz (the difference between two tones) and the other is vibrating at 700Hz (summation between these two tones)(Mitchell). In addition, each tone can be accompanied by harmonics. Therefore, sound channels from sound generator create the area of the sound spectrum where the sound energy is most highly concentrated.

Result of Healing

Patient is men of 83 years old, in anamneses has arterial hypertension during more than 10 years before he has arterial hypotension. At last year systolic blood pressure started to change in the diapason 150- 230 mmHg with prescribed medications and without any other symptoms. Before a treatment measurement demonstrate that he has next resonant frequencies of chakras (Hz):

Chakra number	Resonant frequency, Hz
1	215
2	315
3	341
4	449
5	502
6	620
7	725

Table 1: Resonant frequencies of chakras.

As zero-point were taken values of 4 chakra (for first sound channel), 5 chakra (for se-cond sound channel), and 6 chakra (for third sound channel). Treatment had 2 rounds, first round with 3 sound channels included about 100 sessions by 10-15 min one or several times per day, after about 10 days break second round -with other zero-point and using only 2 sound channels, which included about 20 sessions. About after 3 months of this treatment the patient got rid from arterial hypertension.

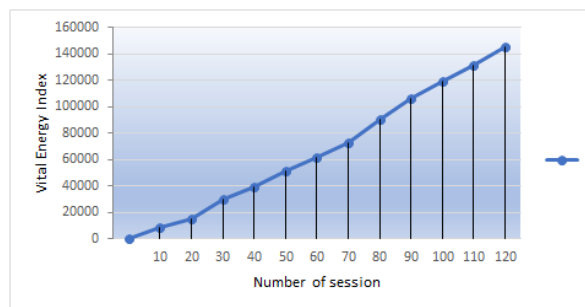


Figure 3: Results of treatment.

On the Figure 3 is demonstrated values of the Vital Energy index (VEI) after treatment ses-sions. VEI was measured with help of pendulum by method described in the book (Iserlis). The first and second round sessions were terminated when blood pressure returned to normal without the use of prescribed blood pressure medications. The decision for a second round was made when blood pressure rose again. It is very interesting that the Vital Energy Index (VEI) is mathematically a smooth function. The Nelder-Mead method has one drawback - it cannot find the global extremum of the function being optimized. Fortunately, in our case, it looks like the VEI does not have many extremes.

Conclusion

The proposed method is one from class of the physiotherapy methods in which any phys-iotherapy action calculates basing on mathematic methods. It is obvious that one experiment on one person even with about a thousand measure-ments is not enough to talk about a new method of treatment. We can only say that the infor-mation presented in the article can help in the development of sound therapy methods not only for various types of hypertensions, but also for a wider class of diseases. According to information from the United States Centers for Disease Control and Prevention, about 108 million U.S. adults have high blood pressure (hypertension where only just 24 percent have their hypertension under control and 19 percent of them take drugs that worsen their condition (Searing). It means that using of sound therapy can bring a huge effect only for hypertension healing in our country. The popularity of sound therapy methods suggests that the prediction of the famous American psychic Edgar Cayce that sound treatment will be the medicine of the future may come true in the not -too-distant reality.

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