Innovative Digital Medical Technologies: History, Development, Trends (Retrospective Data Review 1995 -2024)

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Received: March 21, 2025
Published: April 08, 2025

Abstract. The article is devoted to the study of the role of bioresonance therapy as a promising method in medicine. Bioresonance therapy is a method of influencing the body using electromagnetic waves of certain frequencies, aimed at correcting and optimizing physiological processes. The work considers the theoretical foundations of bioelectronic medicine, its application in various medical fields, as well as its use to improve health and enhance athletic performance. Analysis of existing studies shows the effectiveness of bioresonance therapy in diagnostics, disease correction, improvement of the psycho-emotional state and recovery from diseases. Despite the broad prospects, the method requires further research for a deeper understanding of its impact and the development of optimal approaches in clinical practice. The article emphasizes the importance of integrating bioresonance therapy into complex treatment. Additionally, attention is drawn to the safety profile and non-invasiveness of bioresonance therapy, which provides significant advantages compared to traditional medical interventions. Current findings suggest its potential role in personalized medicine, as individual electromagnetic patterns could be used to tailor therapeutic strategies. Further investigations are also needed to establish standardized protocols, enhance reproducibility, and validate results across larger patient populations, thus ensuring its wider acceptance within the healthcare community.

Keywords: innovative digital medical technologies, alternative medicine, complementary medicine, modern medicine, conventional medicine, quantum medicine, biomedicine, bioquantum medicine, bioresonance therapy, frequency therapy, frequency-wave therapy, pulsed electromagnetic field therapy, electric field therapy, electro-capacitive cancer therapy, tumor treating fields, radio frequency therapy.

Introduction. In recent years, there has been a trend of increasing interest in innovative digital medical technologies. Demand for their medical use is also growing. In the last decade of 2014-2024, we note a significant increase in the number of scientific studies on the topic of the work and its increasing demand both in the scientific and in the practical plane. The history of innovative digital medical technologies beginning from alternative methods of treatment disorders. Among them are traditional conventional, complementary, traditional, frequency-wave, frequency, bioresonance, quantum methods and many others. So traditional medicine throughout the world is either a mainstay of health care or an adjunct to that care.

Traditional medicine is an important and often underestimated part of the healthcare system. In some countries, traditional or alternative medicine may be called complementary medicine. Traditional and complementary medicine is an important and often overlooked part of health care. Traditional and complementary medicine exists in almost every country in the world. Demand for its services is increasing. The quality, safety, effectiveness, accessibility of traditional and complementary medicine has been confirmed in practice. Many countries are now recognizing the need to develop a coherent, integrated approach to combined medical care, incorporating innovative technologies [1].

In recent decades, there has been a rapid development of innovative digital medical technologies, especially in light of global challenges associated with the spread of pathogenic infections and the growth of resistance of microorganisms to antibiotics. In particular, after the COVID-19 pandemic, interest in physiotherapeutic methods using digital technologies has increased [1, 2]. In recent years, there has been a growing demand for the use of these technologies in medical practice, which is due to their high efficiency and scientific validity. Most of the listed methods have a solid scientific basis and official recognition in the healthcare system. According to the World Health Organization, for the period 2014-2024, there was a significant increase in the number of

scientific studies devoted to innovative medical technologies, which confirms their relevance and demand [1]. At the initial stages of implementation, new therapeutic methods are often considered as alternative or complementary forms of medical care. However, their high-tech and innovative nature at the first stages of research and clinical trials do not allow them to be classified as traditional medicine. According to the 2019 WHO report, traditional and complementary medicine plays a significant role in the healthcare of most countries in the world. The demand for such methods continues to grow. The quality, safety and effectiveness of such approaches are confirmed by many years of clinical practice, which contributes to their integration into comprehensive health care strategies [3].

More and more countries are gradually realizing the contribution of traditional and complementary medicine to improving the health and well-being of patients. In particular, understanding the importance of such areas as quantum medicine allows us to make a qualitative leap in the development of modern medical technologies. In the previous works of the author of the article, bioresonance therapy was considered as an innovative method of bioquantum medicine [4], application of innovative digital medical technologies of bioquantum medicine and therapy in elimination of allergy symptoms [5], plasma medicine as an innovative method of diagnosis and treatment of chronic wounds and oncological diseases [6].

The relevance of the topic is increasing against the background of covid, post-covid and chronic post-covid disorders, as well as other common diseases [7-18].

The purpose of the study was to conduct research intended to fill the gap of lack of a detailed retrospective review of the history of the development of innovative digital medical technologies using the example of bioquantum medicine, bioresonance, frequency and frequency-wave therapy.

Materials and methods. This study was conducted using a systems approach during the period from March 2024 to March 2025. The research methodology was based on the theoretical principles of medical and pharmaceutical law in the field of evidence-based medicine, evidence-based pharmacy, risk management and therapy safety.

A literature review was conducted for the period from 1995 to 2024. The article considers scientific sources of the world's leading scientists. The literature search was carried out using the following keywords: innovative digital medical technologies, alternative medicine, complementary medicine, modern medicine, conventional medicine, quantum medicine, biomedicine, bioquantum medicine, bioresonance therapy, frequency therapy, frequency-wave therapy, pulsed electromagnetic field therapy, electric field therapy, electro-capacitive cancer therapy, tumor treating fields, radio frequency therapy.

The study used the following research methods: retrospective, administrative, managerial, organizational and legal, normative, documentary, comparative, graphical analysis. The study complies with the basic concepts of evidence-based medicine. The study of the article is a fragment of research works of Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" and Danylo Halytsky Lviv National Medical University on the topic "Diagnosis, treatment, pharmacotherapy of inflammatory, traumatic and onco-thoracic pathology using instrumental methods" (state registration number 0125U000071, implementation period 2025-2031) and "Multidisciplinary research of post-traumatic stress disorders during war among patients (primarily combatants)" (state registration number 0124U002540, implementation period 2024-2029); and “Interdisciplinary scientific and methodological research in the field of pharmaceuticals and veterinary medicine: innovations, modernization, technologies, regulation” (state registration number 0125U000598, implementation period 2025-2031).

Results and discussion.

The WHO strategy on alternative medicine, complementary medicine for 2014-2023 was developed in response to the World Health Assembly resolution (WHA62.13). The WHO strategy on alternative medicine, complementary medicine has key objectives (Fig. 1).

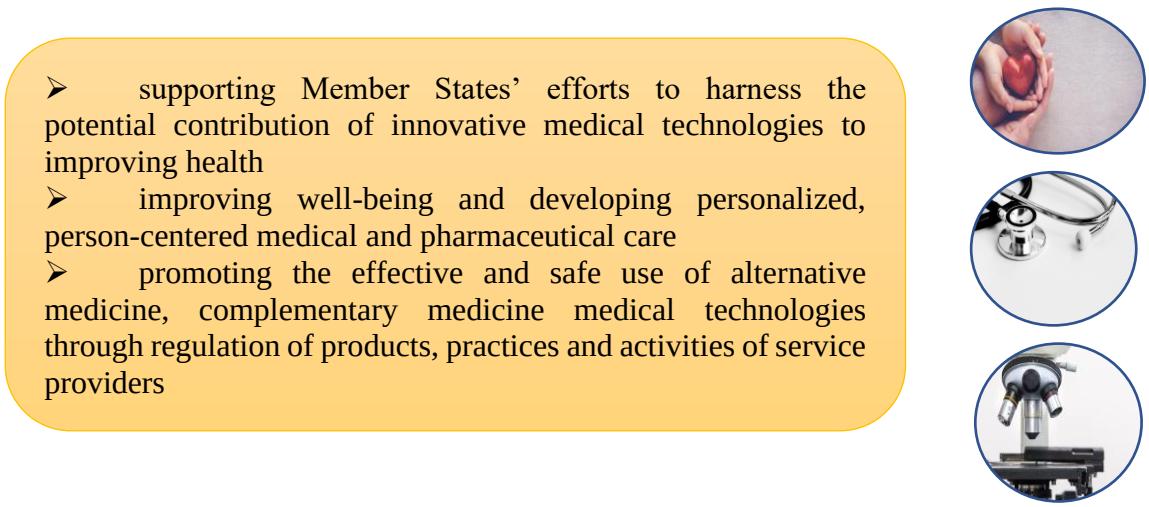

Fig. 1. The main objectives of the WHO strategy in the field of alternative medicine, complementary medicine [1].

The global goal is to support Member States in developing proactive policies and implementing a set of activities that will enhance the role of alternative medicine, complementary medicine in maintaining public health [1, 3, 19].

These goals will be achieved through the implementation of strategic objectives:

1. Creating a knowledge base and developing national policies;
2. Improving safety, quality and efficiency through regulation;
3. Promoting universal health coverage by integrating alternative medicine, complementary medicine into national health systems.

The strategy contains an overview of the state of alternative medicine, complementary medicine in the world and in Member States (Fig. 2).

Fig. 2. Objectives of the WHO strategy.

Fig. 3 shows the unfinished business of the WHO strategy in the field of alternative medicine, complementary medicine.

During this time, significant progress has been achieved in its implementation, but there are still unresolved issues related to [1]:

- development and application of policies, norms and rules;
- integration of new methods into national health systems at all levels of health care;
- safety, quality and accessibility of health services;
- qualifications of practitioners;
- evaluation of the effectiveness of treatment methods;
- control of advertising and regulation of complaints in the field of alternative medicine;
- scientific research and development;
- training and advanced training of specialists;
- exchange of information and regulation of reliable sources for consumers.

Fig. 3. Improving the WHO strategy in the field of alternative medicine, complementary medicine.

Scientists have found that effective achievement of health goals requires focusing on three key strategies.

- ✓ The first strategy is to create a knowledge base that will ensure active management of alternative medicine, complementary medicine through the development of national policies that can recognize their role and potential.
- ✓ The second strategy is aimed at strengthening quality control, improving the safety and effectiveness of the use of these medical areas, which is achieved through strict regulation of products, practice and training of qualified specialists.
- ✓ The third strategy includes the integration of alternative medicine, complementary medicine into the health care system, which helps improve access to medical services and improve the quality of treatment, allowing patients to make informed decisions about their health.

In many countries around the world - politicians, health professionals, pharmaceuticals and the public are faced with a number of problems related to the safety, effectiveness, quality and regulation of innovative, alternative and complementary medicine.

Interest in these areas is not limited to products only. Recently, there has been an increasing focus on practice, which emphasizes the importance of creating a clear regulatory framework and raising awareness. In response to these challenges, the World Health Organization has conducted a comprehensive analysis of the role of alternative medicine and complementary medicine in various countries around the world.

Alternative medicine, complementary medicine, in the early stages of emergence, are, in fact, the result of progressive, and not yet accepted by conventional medicine, innovative developments, and make a significant contribution to the development of the health care system and pharmaceuticals, and provide the opportunity to maintain dynamic development and prospects. These areas are constantly merging into the main health care and pharmaceutical systems.

In a number of countries, the terms alternative medicine, complementary medicine are used to define a variety of medical practices that are not part of the official health care system, but at the same time have significant potential and demand [20-23].

The difference between traditional and modern (conventional) medicine lies in the approaches to treatment and the use of methods. The traditional medicine is focused on cultural and spiritual practices, using treatment methods based on ancient knowledge and experience of various peoples. It uses, for example, herbal medicine, massages, and practices related to spiritual and psychosocial healing. In contrast, conventional medicine is based on scientific research and evidence-based methods, using drugs, surgical interventions and modern technologies to treat diseases and injuries [24].

Traditional medicine, alternative medicine, complementary medicine are important components of the healthcare and pharmaceutical systems. Especially when it comes to the prevention and treatment of chronic, COVID, post-COVID, long-term, comorbid diseases [7, 12, 18, 25].

Many countries strive to expand access to essential medical and pharmaceutical services, as consumer expectations for the quality of health care are growing. At the same time, the costs of health care and pharmaceutical provision are increasing. The budgets of most countries either remain the same or are reduced, which creates additional challenges for the effective provision of medical and pharmaceutical care [26].

In the 21st century, traditional medicine, alternative medicine, complementary medicine are experiencing a renaissance. Monitoring health trends is one of the key functions of WHO, playing an important role in supporting countries in developing evidence-based policies and strategic plans. In this context, global progress in the field of traditional medicine, alternative medicine, and complementary medicine over the past two decades is reviewed, based on inputs from 179 WHO Member States. The results show that more and more countries are recognizing the importance of these areas in their national health systems. For example, by 2018, 98 countries had developed national policies on traditional medicine, 109 countries had adopted national laws or regulations, and 124 countries had enacted legislation on herbal medicines [27–34].

Traditional medicine, alternative medicine, complementary medicine should be part of a holistic and people-centered health care system, where treatment services are harmoniously combined with preventive measures. An example of successful integration of such approaches is Switzerland, where such practices have long been part of the health care system [19, 35].

Currently, WHO is actively developing norms and standards based on reliable data in order to support Member States in providing safe, qualified and effective services Traditional medicine, alternative medicine, complementary medicine, as well as their successful integration into health systems to achieve universal health coverage and sustainable development goals [1, 3, 19, 36].

One of the significant areas of innovative developments in the field of complementary medicine is the field of so-called "quantum medicine". This term has its origins in the concept of "quantum biology", which considers living systems from the standpoint of quantum theory. Quantum biology uses the principles of quantum mechanics to describe biological processes such as the absorption of electromagnetic radiation of a certain frequency, the conversion of chemical energy into motion, magnetoreception in animals, and Brownian motors in cellular processes. These processes play a key role in the functioning of living organisms at the molecular level [37-40].

Predictions regarding the emergence of such a science were made by the famous scientist A. L. Chizhevsky, who claimed that: “From quantum physics and chemistry, “quantum biophysics” and “quantum biochemistry” should be born, and on their basis “quantum physiology”, “quantum biology” and, ultimately, “quantum medicine” should develop”.

The term “quantum medicine” was introduced into scientific circulation in 1994 by Academician of the Ukrainian Academy of Sciences S. P. Sitko, as part of the implementation of the fundamental concepts of “quantum physics of the living” [41-43].

The author of the article studied the history of bioresonance technology as a method of frequency-wave exposure. This technology is part of the developing field of quantum (bioquantum, bioelectronic) medicine. According to medical subject headings on Pubmed, bioresonance therapy was indexed under the complementary therapy between 1989-2014. Since 2014, it is indexed under magnetic field therapy [44]. Let us move on to a retrospective analysis of scientific literature since 1995 on the topic of the article. A number of articles discuss such concepts as a bioresonance device and the book by Hans Brueggemann "Bioresonanz- und Multiresonanz-Therapie", as well as various types of bioresonance therapy, including MORA therapy and BICOM therapy using BICOM Optima devices [25, 26, 38]. In 1997, the use of bioresonance therapy for the treatment of allergies in the context of alternative medicine was described [45]. A highly sensitive measuring amplifier (the "BIT device") was constructed to detect possible electromagnetic biosignals in the frequency range from 100 Hz to 100 kHz. Despite the use of the "BIT device" in the maximum gain mode, no endogenous electromagnetic biosignals were detected in the subjects, only the well-known EMG signals. At the same time, when the BIT device was operating in the feedback mode, electromagnetic oscillations in the range of 1.7-2.9 kHz were generated and oscillographically recorded, caused by the "BIT - Human" oscillatory system dependent on the impedance of the human body. The biological effects of these impedance-dependent oscillations were investigated in a simple, randomized, double-blind study. Three anamnestic healthy subjects were exposed to 20-fold exposure to certain oscillations. The physiological effects of the exposure were measured using pulse plethysmography. Nonlinear time series analysis showed significant changes in the pulse dynamics in one of the participants. Linear analysis of heart rate variability did not reveal statistically significant changes [39].

The use of bioresonance therapy in rheumatoid arthritis was described in 1999 [40]. The medical term "bicom-bioresonance therapy" appeared in the literature in 2000 [36].

However, at that time, in the process of development and improvement of frequency and frequency-wave technologies, including bioresonance, openly negative publications about new digital medical technologies began to appear in scientific journals in 2004 and 2006 [46, 47].

Alternative medicine, bioresonance therapy and computer programs were described in 2007 in the Scopus database [24]. The next author studied the diagnosis of enteropathy caused by cow's milk using bioresonance [48].

In view of the modern knowledge of bioresonance and bioenergetics, the correlations between the frequencies of the human voice and the energetic balance of the human body are becoming increasingly obvious. Bioresonance therapies cause noticeable changes in the energetic balance of the human organism. In this regard, an experimental study of the so-called pure frequencies observed under certain conditions when using bioresonant vocal sounds is presented [49].

Medicine based on natural sciences explains the action of drugs through the chemical bond between the molecules of the drug and the body. Some insurance companies cover all medical procedures included in the Hufeland catalog of special therapeutic methods. Many of these methods contradict the above-mentioned mechanism: homeopathy and anthroposophical medicine use substances in which the drug is not present in the form of matter. Bioenergetic methods such as electroacupuncture according to Voll (EAV) and bioresonance act on the body not from the inside, but from the outside [50, 51].

These methods claim to replace "chemical processes" with "wave" and "information" effects via electromagnetic waves. The explanation of such processes, proposed in Hufeland's catalogue using quantum physics and quantum medicine, is discussed and directions for further research are suggested [52].

Another study describes the use of bioresonance in the food industry [53].

The concept of bioelectromagnetism covers electromagnetic-sensitive processes occurring during the fundamental interaction of energy fields with matter. Living matter has a dynamic, chemical and energetic structure, but above all, intense information activity. Bioelectromagnetism has been gradually revealed and understood throughout human history. J. Bernstein determined the bioelectric properties of the cell, Wagner calculated the electrical conductivity and permeability of cells based on Maxwell's field equations. Other authors discovered "mitogenetic radiation" or "dark luminescence" or "ultraweak bioluminescence", and F. A. Popp founded the "biophoton theory". In turn, Hirata and Nakatani discovered points with different electrical conductivity on the skin surface, and Voll invented the electrodermal testing system [54].

The practical application of bioelectromagnetism is realized through medical devices based on bioresonance, which are useful in diagnostics and treatment, which is confirmed by 17 studies (involving 902 patients) published in 1999-2006 [55].

The study of oscillatory bioresonance and its control in the system of calcium ion oscillations under the influence of low-frequency and high-frequency signals was carried out in a number of studies [35, 56, 57].

Only recently has the critical importance of the interaction of electromagnetic fields in biology and medicine been recognized. The concept that organisms contain mechanisms for generating biologically useful electrical signals is not new and dates back to the discovery of "damage currents" by Matteucci in the 19th century.

The modern version is that combinations of magnetic fields of ion cyclotron resonance help regulate biological information. The next step in medicine is to identify and apply those parameters of electromagnetic signaling that promote well-being, while reducing dependence on biochemical repair and pharmaceuticals [58].

Over the last twenty years, bioenergetic information transfer has been recognized as a new scientific approach that can contribute to improving therapies in the treatment of a number of diseases using the so-called bioresonance therapy.

The authors of one study evaluated the antibacterial effect of water samples transferred with electronic information of vancomycin, a known drug against methicillin-resistant Staphylococcus aureus, using a bioresonance device on bacterial cultures [59]. The results showed that when bioresonance information about vancomycin (4.0 and 8.0 μg/ml) was transferred to water samples, the growth of cultured methicillin-resistant Staphylococcus aureus was significantly ($p<0.05$) inhibited (up to 35%) compared to cultures treated with electrotransfer into water or cultured only in the medium (0% growth inhibition). This in vitro study suggests that water samples transferred by electroporation with vibration-resistant vancomycin information are capable of inhibiting the growth of axenic cultures of methicillin-resistant S. aureus.

This article presents information on selected alternative medicine methods in the Czech health care system, which can be defined as modern diagnostic and therapeutic methods [60].

The use of bioresonance therapy and homeopathy in dentistry was described by the authors in the section "Alternative Medicine" [61]. In 2017, the use of bioresonance therapy in cardiology was also described [62].

Bioresonance methods were reviewed by the authors in veterinary medicine [63] and studied in magnetic flux density in 2018 [64]. The aim of this study was to study the role of magnetic flux density, using harmonic excitation signals with the same frequencies. The resulting magnetic flux density of the applied electromagnetic field was set to lower values. The rationale for this approach is to partially verify the theory of ion parametric resonance and to minimize possible errors associated with the use of non-uniform electromagnetic fields, which may be the cause of discrepancies between different research groups. A retrospective analysis of the literature on alternative and complementary medicine shows that every year there is an increasing interest in treatment methods that include not only physical but also psychological health of a person. In recent decades, researchers have noted the impact of technology on public health, which has generated an increased interest in a natural lifestyle and alternative treatment methods. Alternative medicine, as a rule, includes methods and practices that are not included in the framework of traditional medicine, offering patients various approaches to treatment aimed at restoring harmony between body and soul. An example is the use of a holistic approach, which, as a number of studies have shown, puts the patient as a holistic person in the center of attention. This approach covers not only anatomy and physiology, but also mental health, behavior, mentality and other aspects, which makes treatment more multifaceted and individualized. All these aspects are considered through the lens of alternative methods, including bioresonance therapy, homeopathy and other modalities that have been studied and documented in the scientific literature [65, 66].

An analysis of the literature showed that there was a significant increase in the use of complementary medicine in Switzerland from 2012 to 2017. The study analyzed various socio-demographic, lifestyle and health determinants that influence patients' choice of alternative therapies. This includes traditional approaches such as acupuncture, homeopathy and herbal medicine, as well as more modern methods such as bioresonance therapy, shiatsu and osteopathy [67].

Key factors determining the choice of complementary medicine were gender, nationality, age and lifestyle. Women and patients of certain nationalities used these methods more often, while factors such as smoking and obesity were associated with a rejection of complementary methods. At the same time, a healthy lifestyle, including regular consumption of fruits and vegetables, as well as physical activity, contributed to the choice of complementary medicine.

Thus, the study highlights the importance of a healthy lifestyle as one of the main factors contributing to the use of alternative therapies. This may have significant implications for public health, especially in the context of prevention programs and improving the general health of the population.

Historical analysis shows that the concept of resonance has deep roots, dating back to the 17th century, when it was first explored by scientists such as Galileo Galilei and Christiaan Huygens. Despite the importance of this phenomenon for the theory of mechanical vibrations, the authors note the lack of a rigorous and complete definition of the term. Galileo, studying a pendulum, provided the first description of resonance, while Huygens expanded the concept by investigating sympathetic resonance using two pendulums on a common support [68]. Resonance has become a key concept in various fields of science and technology, especially in the context of orbital resonances, which played an important role in understanding the evolution of the solar system in the 18th and 19th centuries. Internal resonances, such as those in Earth mechanics, have also proven significant for further research. Analysis of classical harmonic resonance presented in the works of researchers revealed its importance in the development of technology, which emphasizes its fundamental role in mechanics and other sciences. The study conducted by the authors is aimed at studying the effect of bioresonance on depressive-like behavior in mice induced by chronic mild stress. The developed stress model allowed for behavioral tests, which demonstrated that mice subjected to long-term bioresonance

therapy showed a shorter time of immobility in the forced swim test compared to groups exposed to stress without therapy [69].

Data on the possible effectiveness of bioresonance therapy for the correction of depressive-like behavior in animals are described [70].

The concept of integrative medicine, which encompasses alternative methods of treatment, has proven itself as an effective patient-oriented approach. This approach can be of significant benefit to patients whose physical symptoms remain unexplained from the point of view of conventional medicine. Incorporation of bioresonance therapy into such methods allows for individualized treatment, taking into account the unique characteristics of each patient.

The widespread use of bioresonance therapy indicates its demand in the medical services market. Research conducted by the authors also shows the potential of frequency resonance methods for diagnostics, in particular for the detection of bacteria such as Bifidobacterium and Helicobacter pylori. The use of frequency resonance affects the biological environment, which opens new horizons in the field of diagnosis and treatment [71, 72].

The literature describes the use of the bioresonance method as a part of bioelectronic medicine, which is a promising direction for scientific research in medicine, medicine, and sports medicine. The search for effective methods that can normalize metabolic processes at the tissue level in athletes is an important task for supporting their health and performance. Bioelectronic medicine, known as bioresonance therapy, has become an important tool for correcting metabolism in tissues in vivo.

It is directly at the forefront of medical innovation and has significant potential for treating illness. The development of mechanisms of neural control of biological processes and the development of technologies for modulating neural circuits open up the possibility of establishing electronic therapy instead of traditional drug methods. The theoretical basis for the use of bioelectronic medicine is based on modern biophysical knowledge, such as the magnetoelectrochemical theory of speech exchange, the frequency-wave biophysical model of the human body, as well as the study of specific frequency characteristics of molecules, cells and tissues [73].

The diagnostic capabilities of bioelectronic medicine, in particular bioresonance therapy, provide a unique opportunity for a comprehensive assessment of the body's condition. This technique allows for an objective instrumental assessment of various parameters, which is important for optimizing health, treating depression, neurological, mental, pulmonary, drug addiction, dental diseases, and post-traumatic stress syndrome [14, 15, 74-77]. One of the key aspects is the ability of bioresonance therapy to analyze the functioning of organs and body systems by comparing their frequencies with normal values. This makes it possible to identify pathological deviations at the preclinical stage, which contributes to early diagnosis and prevention of diseases. The technology also allows for the verification of microbiome components and the identification of pathological agents, which helps in the precise localization of problems in the body.

In addition, bioresonance diagnostics can assess the quality of nutrition, identifying nutritional deficiencies and allowing you to select the necessary nutrients to optimize your diet. If necessary, individual selection of pharmacological drugs is also carried out. An important element is the analysis of the psycho-emotional state of patients, which helps to take into account individual characteristics.

The diagnostic capabilities of bioelectronic medicine, in particular bioresonance therapy, open up broad prospects for the correction of various aspects of health. One of the main advantages of this technique is the ability to optimize the functioning of organs and systems of the body, as well as to neutralize pathological processes at the preclinical stage. This allows you to carry out preventive work and prevent the development of diseases in the early stages. Bioresonance therapy is also effective in correcting the microbiome, where its effect helps to destroy pathological agents, maintaining the balance of beneficial microorganisms in the body. It is also important that the technique helps optimize lymphatic drainage and recovery in the musculoskeletal system, which is especially important for diseases of the musculoskeletal system [33].

Thus, bioelectronic medicine and bioresonance therapy methods are a promising area for application in sports, given their ability not only to diagnose, but also to effectively correct various aspects of health.

Conclusions. The use of bioresonance therapy, as a promising method within the framework of bioelectronic medicine, has proven itself as an important tool in modern medicine, especially in the field of sports medicine. Retrospective analysis showed that bioresonance therapy has significant diagnostic and therapeutic potential, allowing to optimize physiological processes, promptly detect pathologies and improve overall health. A review of studies confirms the effectiveness of bioresonance therapy not only for solving specific medical problems, such as depressive-like behavior in experimental models and microbiological imbalances, but also for enhancing athletic performance and recovery in athletes. As various studies have shown, bioresonance can correct dysfunctions of organs and systems, eliminate pathogens in the microbiome, and improve lymphatic drainage and recovery in the musculoskeletal system. The therapy also has a positive effect on the psycho-emotional state of athletes, helping to cope with stress and develop psychological stability. Its integration into the healthcare system can be an important addition to traditional treatment methods, offering holistic solutions for physical and psycho-emotional health. Further experimental studies are needed to more accurately determine the optimal frequency protocols and long-term results. The prospects for bioresonance therapy are optimistic, offering a safe, effective and non-invasive approach to improving overall health and well-being. Bioresonance therapy is an effective and promising method. Retrospective analysis of studies confirms its ability to optimize physiological processes, improve disease diagnostics and correct pathologies at preclinical stages. The use of bioresonance therapy demonstrates significant potential for improving the health of patients. Bioresonance therapy can be used as an additional method in a comprehensive approach to the treatment and prevention of diseases, contributing to improved health and increased physical performance. It has proven its effectiveness in various fields of medicine, including homeopathy, cardiology, dentistry and veterinary medicine. Technological advances in bioelectronic medicine, including the use of bioresonance therapy, open up new possibilities for diagnosing and treating diseases, which can significantly affect the development of both conventional and alternative medicine. In order to more fully evaluate the long-term results of bioresonance therapy, it is necessary to continue scientific research, including experimental work that will help clarify the optimal frequency modes and confirm the effectiveness of the method in various clinical scenarios.

Conflict of interest. The author confirm that they are the authors of this work and approve it for publication. The authors also certify that the obtained data and research were conducted in compliance with the requirements of moral and ethical principles based on medical and pharmaceutical law, respectively, and in the absence of any relationships that could be interpreted as conflict and/or potential conflict of interest.

Funding. This research wasn't funded by any private or governmental body.

Data availability statement. The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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