

The Principles and Applications of Bioresonance as a Holistic Approach in Medicine

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Abstract: In recent years, individuals have encountered increasing ecological, psychosocial, and various other forms of stress, which have significantly impacted public health. This rise in stressors can largely be attributed to rapid urbanization, industrialization, and environmental degradation, leading to heightened pollution, climate variability, social and behavioral changes, and habitat destruction. Given the current negative trends in health across all age groups within the population, there is an urgent need for innovative approaches to health improvement. In response to these challenges, there is a growing necessity to explore alternative and complementary medicine, as recommended by the World Health Organization (WHO), as a vital component of health improvement practices. Recently, breakthrough technologies at the intersection of biology, medicine, and physics have emerged in medical practice, resulting in the development of holistic, non-invasive treatment methods for a wide range of diseases. This article provides an overview of bioresonance technology, addressing its theoretical foundations as a holistic medical practice, analyzing the scientific evidence and ongoing controversies, and exploring its clinical applications.

Keywords: Bioresonance, Holistic Approach, Clinical Applications, Clinical Challenges.

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I. INTRODUCTION

Public health is increasingly threatened by a rise in ecological and psychosocial stressors, fueled by rapid urbanization, industrialization, and environmental degradation. The consequences—including greater pollution, climate change, and social shifts—are scientifically established contributors to numerous health issues, such as respiratory and cardiovascular diseases, metabolic disorders, and cancer. Chronic conditions like diabetes, hypertension, and autoimmune disorders are often prolonged and resistant to standard treatments, largely due to modifiable lifestyle factors. Poor diet, physical inactivity, and chronic stress create a vicious cycle that exacerbates these diseases. For example, unhealthy eating and sedentary habits disrupt blood glucose control in diabetics, while high sodium intake and a lack of exercise worsen hypertension. Furthermore, chronic stress elevates cortisol levels, impairing metabolic and cardiovascular function. This cycle is self-perpetuating; the fatigue and pain from an autoimmune disorder can prevent physical activity, leading to weight gain and higher risk for other conditions. This interconnectedness makes it challenging to manage these

conditions effectively with conventional medication alone, as medications may not address the underlying lifestyle factors contributing to disease progression [1-2].

The rise of emerging infectious diseases poses a significant global health threat, driven largely by human disruption of natural ecosystems. Urbanization, deforestation, and agricultural expansion are eroding the barriers between human and animal populations, increasing the risk of "zoonotic spillover"—where pathogens jump from animals to humans. High-profile outbreaks like COVID-19, Ebola, and Zika illustrate this dangerous convergence. The COVID-19 pandemic, suspected to originate from bats, demonstrates the global impact of a single spillover event. Similarly, Ebola outbreaks are intensified by deforestation and human encroachment into wildlife habitats. Even primarily mosquito-borne viruses like Zika are influenced by environmental changes and human behavior. These examples collectively underscore the inextricable link between human, animal, and environmental health, highlighting the urgent need for a holistic approach to disease prevention [3-4]. Additionally, the prevalence of immunodeficiency states, such as those seen in

HIV/AIDS and other conditions, has been rising, often linked to socio-economic factors, lack of access to healthcare, and the impact of chronic stress on the immune system. Allergic diseases, including asthma and food allergies, food intolerance have also seen a significant increase, with studies suggesting that environmental factors and lifestyle changes may play a role in this trend. Moreover, the limitations of Standard and Conventional medical treatment in managing chronic conditions have prompted a growing interest in integrative and holistic approaches to healthcare. These approaches emphasize the importance of lifestyle modifications, such as improved nutrition, regular physical activity, stress management techniques, and behavioral interventions, in conjunction with traditional medical treatments. Research supports the efficacy of such interventions, demonstrating that lifestyle changes can lead to significant improvements in health outcomes for individuals with chronic conditions. Furthermore, inappropriate psychological reactions, such as anxiety and depression, have surged in response to the compounded stressors of modern life, including economic instability and social isolation. These mental health issues can lead to a range of physical health problems, creating a complex interplay between psychological and physiological well-being [5-6]. Lastly, iatrogenic complications, which are adverse effects resulting from medical treatment, have become more common as healthcare systems increasingly rely on complex interventions. Risk factors for iatrogenic complication include having multiple chronic diseases, having multiple clinicians, taking multiple medications, and being hospitalized. Research highlights the importance of addressing these complications through improved patient safety measures and a more holistic approach to healthcare that considers the individual's overall well-being [7-8].

Environmental pollution, along with the continuous influx of various xenobiotics and the influence of electromagnetic waves—often referred to as *electrosmog*—leads to disruptions in cellular metabolism and places excessive strain on homeostatic and physiological systems. Over time, these systems become depleted and lose their ability to function properly. Scientific evidence suggests that exposure to these environmental stressors can impair cellular processes, undermine physiological regulation, and contribute to a variety of health issues. A significant pathogenic factor is the evolved inability of these systems to cope with the aggressive changes induced by human activity. Prolonged exposure to low doses of chemical, biological, and physical factors is especially concerning, as these elements can accumulate and amplify each other's effects, resulting in profound disturbances in the body's internal environment. This situation initiates an abnormal chain of cause-and-effect relationships, ultimately exacerbating endotoxemia and leading to secondary immunodeficiency and chronic inflammation. These conditions can further contribute to the development and progression of chronic disorders. Scientific evidence indicates that the interplay among these factors can create a cycle of declining health, as chronic

inflammation and immune dysfunction are closely linked to various long-term health issues, including autoimmune diseases, metabolic disorders, and cardiovascular conditions [9-11].

Given the current negative trends in the health status of all age groups within the population, there is a pressing need for new approaches to health improvement. The degradation of health among the working population, as well as the health issues observed in children and adolescents, can be attributed to ecological imbalances, chronic stress, uncontrolled medication and antibiotic use, poor nutrition, and other contributing factors, all of which have led to the contamination of the internal environment of individuals. Today, despite the introduction of innovative medical technologies and the use of newly synthesized chemical medications, the health of the population has not improved; rather, there is an observed increase in cardiovascular, allergic, oncological, degenerative, and other diseases. Furthermore, conventional treatment methods have proven ineffective, and established treatment standards are not yielding the desired results. In light of these challenges, there is a growing necessity to consider alternative and complementary medicine, as recommended by the World Health Organization (WHO), as an essential process for integration into health improvement practices [12-13].

Complementary medicine is grounded in the philosophy that health and well-being are best understood through a holistic lens, recognizing that individuals are complex systems where physical, emotional, mental, and spiritual processes are intricately interconnected. This perspective contrasts with a more reductionist approach often found in conventional medicine, which tends to focus on specific symptoms or diseases in isolation.

II. CONCEPTS OF HOLISTIC MEDICINE

The holistic perspective in complementary medicine encompasses several key concepts, including:

➤ *Interconnectedness of Body Systems*

Scientific research confirms that the body's systems—such as the nervous, endocrine, and immune systems—are deeply interdependent. A prime example is the hypothalamic-pituitary-adrenal (HPA) axis, the body's central stress response system. When activated by a stressor, the HPA axis releases hormones like cortisol, which can subsequently suppress immune function. This suppression increases the body's vulnerability to infection and disease. This demonstrates that an imbalance in one area can create ripple effects throughout the body. Consequently, holistic medicine emphasizes that supporting one aspect of health can positively influence others, underscoring the necessity of a comprehensive approach to wellness [14-15].

➤ **Mind-Body Connection**

The field of psychoneuroimmunology (PNI) provides a scientific framework for the bidirectional communication between the mind and body. This relationship is evident in phenomena such as "sickness behavior"—where cytokines released during an infection act on the nervous system to induce fatigue and social withdrawal, demonstrating how immune activity directly influences mental states. Conversely, chronic psychological stress and negative emotions can promote inflammation and physiological dysregulation, contributing to various disease states. Importantly, this pathway works in both directions; mind-body practices like meditation and mindfulness have been shown to mitigate stress, reduce inflammation, and improve overall health. This evidence underscores that mental and emotional well-being is inextricably linked to physical health [16].

➤ *Lifestyle and Environmental Factors*

Complementary medicine emphasizes the role of lifestyle choices—such as diet, exercise, and sleep—in overall health. Scientific studies have shown that a balanced diet rich in nutrients can enhance immune function, while regular physical activity can improve cardiovascular health and mental well-being. Environmental factors, including exposure to toxins and pollutants, are also recognized as influential in health outcomes, reinforcing the need for a comprehensive approach to health [17].

➤ *Gut-Brain Axis*

The gut microbiome, nervous system, and immune system are interconnected through the gut-brain axis. The gut microbiota can influence brain function and behavior via the vagus nerve, immune signaling, and the production of neurotransmitters like serotonin. Conversely, stress and emotional states can alter gut microbiota composition, affecting digestive health and immune responses [18-19].

➤ *Hormonal Regulation of Metabolism*

The endocrine system regulates metabolism through hormones like insulin, glucagon, and thyroid hormones. Dysregulation of these hormones can lead to metabolic disorders such as diabetes, which in turn can impact cardiovascular health, immune function, and nervous system function [20-21].

➤ *Integrative Approaches*

In addition to routine clinical and paraclinical methods, complementary medicine integrates therapeutic modalities such as acupuncture, herbal medicine, chiropractic care, and nutritional counseling. This approach aims to address the patient as a whole rather than targeting isolated symptoms. A growing body of evidence from clinical studies supports the efficacy of various complementary therapies in managing conditions like chronic pain and anxiety, particularly when used as an adjunct to conventional treatment [13].

➤ *Patient-Centered Care*

This holistic approach aligns with the principles of patient-centered care, which emphasizes the importance of understanding each patient's unique experiences, preferences, and values. Patient-centered care is an approach that focuses on the patient's unique healthcare requirements. Its primary goal is to empower patients to take an active role in their treatment. Research indicates that when patients are actively involved in their care and treatment decisions, they generally achieve better health outcomes and experience higher satisfaction with their healthcare. By focusing on the individual needs of patients, this approach fosters a collaborative environment that enhances the overall quality of care [22-23]. In recent years, breakthrough technologies at the intersection of biology, medicine, and physics have emerged in medical practice, resulting in the development of holistic, non-invasive treatment methods for a wide range of diseases. These approaches emphasize the individualization and optimization of medical intervention regimens based on the patient's functional state. Among these methods are various types of bioresonance techniques, which aim to assess and address the body's energetic imbalances to promote healing and overall well-being.

III. PRINCIPLE OF BIORESONANCE THERAPY

Bioresonance therapy ((BRT) is based on a theoretical model which proposes that molecules, cells, and tissues emit unique electromagnetic frequency patterns. According to this theory, these patterns can be measured, and deviations from a baseline, hypothesized to indicate pathology, can be "corrected" through the application of specific counter-frequencies.

The emergence of bioresonance therapy (BRT) can be traced back to the 1970s and is closely associated with the pioneering work of physicist Franz Morell and electrical engineering technician Erich Rasche. Their research stemmed from medical tests in electroacupuncture, a practice that explores the relationship between electrical signals and acupuncture points on the body. Morell and Rasche developed the concept of using electromagnetic frequencies to diagnose and treat various health conditions, leading to the creation of devices that could measure and manipulate these frequencies. Initially referred to as "MORA therapy," this innovative method quickly gained popularity across Europe, particularly in Germany, where it was embraced by practitioners seeking alternative approaches to health care. The method's appeal lay in its non-invasive nature and the promise of treating a wide range of ailments by addressing the energetic imbalances within the body. As interest in BRT grew, various manufacturers began producing specialized equipment designed for bioresonance applications, further facilitating its adoption in clinical settings [24]. Bioresonance therapy uses non-ionizing radiation to assess and treat health conditions by measuring the body's electromagnetic frequencies. However, the scientific community remains skeptical due to a lack of robust evidence

for its efficacy and safety, despite some studies suggesting potential benefits [25].

It has long been established that all living organisms, including humans, emit and interact with electromagnetic fields. This concept is grounded in the field of bioelectromagnetism, which investigates the electromagnetic phenomena associated with biological systems. A bioresonance machine functions by measuring the biomagnetic fields or electromagnetic frequencies emitted by an individual's body. This process allows the device to identify sources of disturbances or imbalances within the body's energetic system. The fundamental principle of a bioresonance machine is based on the understanding that cells function as complex systems composed of charged structures, with biomolecules acting as highly charged ions or even multipoles. Cellular systems are characterized by various distributions of charges and currents, which are induced by the transfer of charge through hydrogen bonds and other molecular deformations. The advanced technology of the bioresonance device utilizes a biorhythm program to differentiate between the oscillatory information of molecules that may stress the body and that which is beneficial to health. The human body exhibits discrete frequencies of molecular oscillations, which are determined by the strength of intermolecular forces. When connecting a patient to the bioresonance device, it is essential to ensure that no mechanical devices—such as smartphones, jewelry, clips, or any other electronic devices—are present, as these may interfere with the readings. Additionally, the electrodes used in the therapy are cleaned with 70% alcohol before and after each treatment session to maintain hygiene and prevent contamination.

Bioresonance therapy employs a specialized device that uses electrodes and sample cups to analyze and modulate the body's electromagnetic signals. During a session, input electrodes are placed on the surface of body, and a sample of a biological substance—such as saliva, blood, or hair—is positioned in an input cup. The system is designed to capture what are theorized to be pathological electromagnetic frequencies from these sources. These signals are then relayed to the device for processing. According to the therapy's principles, the device inverts these pathological frequencies into therapeutic ones. The corrected frequencies are then transmitted back to the patient, typically through an output electrode placed on the back or via a cup containing water, which is believed to act as a medium for the signal. An initial assessment of the body's energy state is often conducted, sometimes with an electroacupuncture device, to determine the therapy parameters. The overarching aim of this process is to identify and correct energetic imbalances, thereby promoting the body's self-healing capacity and overall well-being in a non-invasive manner. It is important to note that the proposed mechanisms and therapeutic claims of bioresonance lack validation through rigorous scientific study. Therefore, while the procedure is described by its practitioners, robust clinical

evidence is required to substantiate its efficacy and establish its role within evidence-based medical science [26-29].

IV. ELECTROMAGNETIC FIELDS IN BIOLOGICAL SYSTEMS

All living cells generate electromagnetic fields due to the movement of charged particles, such as ions, within and across cell membranes. The majority of cation channels, including those for calcium (Ca^{2+}), potassium (K^+), sodium (Na^+), and hydrogen (H^+), found in the membranes of all animal cells are classified as voltage-gated channels. These ion channels transition between open and closed states in response to changes in transmembrane voltage. Specifically, when the electrostatic force acting on their voltage sensors surpasses a certain critical threshold, the channels undergo conformational changes that allow ions to flow across the membrane. This mechanism is essential for various physiological processes, including the generation and propagation of action potentials in neurons and muscle cells. This drive is crucial for numerous functions, such as muscle contraction, neurotransmitter release, and the regulation of heart rhythm. Additionally, it plays a significant role in cellular signaling, maintaining homeostasis, and facilitating communication between cells, thereby contributing to the overall functioning of the nervous and muscular systems. The transmission of nerve impulses relies on the flow of ions like sodium and potassium across neuronal membranes, which generates propagating electrical potentials. Similarly, muscle contractions are initiated by the movement of ions, particularly calcium. These bioelectrical activities create endogenous electromagnetic fields that can be measured—for example, via electroencephalography (EEG) or electromyography (EMG)—and are well-established indicators of the functional state and health of specific tissues and organs [30-31].

V. RESONANCE AND FREQUENCY

Resonance is a phenomenon that occurs when an object or system is exposed to an external force or vibration that matches its natural frequency. When this alignment occurs, the object or system absorbs energy from the external force, resulting in an increase in the amplitude of its vibrations. This amplification effect can lead to significant oscillations, which are often observed in various physical systems, including mechanical structures, musical instruments, and biological systems. Resonance is a fundamental concept in both physics and biology, describing how similar vibrational frequencies can interact to amplify one another.

In disciplines that study physical systems, resonance refers to an amplification process that occurs when two objects with similar vibrational frequencies are brought into close proximity. When these objects resonate with one another, they can exchange energy, leading to a significant increase in the amplitude of their vibrations. This interaction results in a more

pronounced output, which can manifest as louder sounds in acoustic systems or enhanced oscillations in mechanical systems. Cells generate and sustain mechanical forces within their environment as an integral part of their normal physiology. They function as active materials capable of detecting mechanical stimuli through the activation of mechanosensitive signaling pathways. When subjected to physical cues, such as stretch, compression, or shear stress, cells respond by reorganizing their cytoskeleton and generating forces. This Mechanotransduction process allows cells to adapt to their mechanical environment, influencing various cellular functions, including migration, proliferation, and differentiation. The ability of cells to sense and respond to mechanical signals is crucial for maintaining tissue homeostasis and plays a significant role in processes such as wound healing, development, and the response to injury [32-33].

In the context of music, resonance plays a vital role in enhancing the intensity and richness of sound. When musical instruments are played, they generate vibrations at specific frequencies. If these frequencies coincide with the natural frequencies of nearby objects, such as the human body or other instruments, resonance occurs. This phenomenon of sympathetic vibration can significantly amplify the sound produced, resulting in a louder and more resonant auditory experience. For example, when a string instrument is played, the vibrations of the strings can cause the body of the instrument to vibrate as well, further enriching the sound. Similarly, when a singer produces a note that matches the resonant frequency of a nearby object, such as a glass or another instrument, the object may vibrate in response, enhancing the overall sound. This interplay of vibrations not only contributes to the quality of music but also creates a deeper emotional connection between the listener and the performance.

The concept of resonance is also applicable to the human voice. The vocal apparatus, including the vocal cords and the resonating chambers of the throat, mouth, and nasal passages, can enhance sound production through resonance. When a person sings or speaks, the vibrations generated by the vocal cords interact with these resonating chambers, resulting in a fuller and more powerful sound. The theory of resonance extends beyond mere amplification; it also provides insight into why music can evoke pleasurable sensations and emotional responses. The idea is that music resonates with our body's natural frequencies, creating a harmonious interaction that can be soothing and enjoyable. This resonance may explain why certain musical tones and rhythms can have a calming effect, often helping to lull young children to sleep. The sympathetic vibrations produced by musical instruments can align with the body's own vibrational patterns, fostering a sense of comfort and relaxation.

Bioresonance therapy operates on the principle of resonance, which occurs when an external frequency matches the natural frequency of a system. In the context of BRT, it is

believed that each cell, tissue, and organ in the body has its own unique electromagnetic frequency. When the body is healthy, these frequencies are in harmony. However, illness or dysfunction can lead to disturbances in these frequencies. BRT aims to identify and correct these disturbances by using devices that can detect the electromagnetic frequencies emitted by the body. The therapy involves:

➤ *Measurement*

The bioresonance device measures the electromagnetic frequencies emitted by the patient's body through electrodes placed on the skin.

➤ *Analysis*

The device analyzes these frequencies to identify imbalances or pathological signals that may indicate health issues.

➤ *Intervention*

The device then generates specific counter-frequencies that are believed to restore balance and promote healing. This is done by sending these corrective frequencies back to the body, theoretically allowing it to re-establish its natural resonance [34-36].

VI. THERAPEUTIC APPLICATIONS

Bioresonance therapy is an alternative treatment that employs electromagnetic waves to restore the body's bioelectric balance and stimulate self-healing processes. It aims to diagnose and treat various health conditions by analyzing the energy frequencies emitted by the body. This therapy is increasingly acknowledged in various medical disciplines, including allergology, neurology, Microbiology, Dermatology, Metabolic disorders, Gynecology, Cardiological, Psychology, oncology and gastrointestinal diseases. Bioresonance therapy is used for a variety of therapeutic applications, including:

➤ *Pain Management*

Bioresonance therapy is increasingly recognized for its potential in alleviating pain associated with fibromyalgia, migraines, various nervous system and rheumatic diseases. By utilizing electromagnetic waves, it aims to restore the body's bioelectric balance, potentially providing relief from chronic pain and improving overall well-being.

➤ *Allergology*

Some practitioners use BRT to help manage allergies by identifying and counteracting the frequencies related to allergens. Bioresonance therapy is actively employed to identify allergens and treat allergic reactions, particularly in cases of contact dermatitis, atopic dermatitis, and respiratory allergies. The effectiveness of bioresonance therapy, as a form of "quantum biofeedback therapy" for treating allergies, has been demonstrated through several outcomes: alleviation of symptoms in all patients, significant improvement in quality of

life, reduced recovery time and the absence of harmful side effects.

➤ *Psychology*

It is important to highlight the potential of bioresonance therapy in the treatment of mental and mood disorders. In one study involving mice exhibiting depressive-like behavior, prolonged exposure to bioresonance waves was found to reduce immobilization time in behavioral activity tests. Another study demonstrated that the outcomes of bioresonance therapy were more favorable than those of selective serotonin reuptake inhibitor (SSRI) medications. Based on these findings, it can be concluded that bioresonance therapy may effectively reduce the severity of symptoms in patients with recurrent depressive disorder experiencing moderate to mild episodes. This suggests the potential for using bioresonance therapy in the treatment of depression and anxiety disorders in humans.

➤ *Detoxification*

By identifying and neutralizing frequencies associated with toxins or pathogens, BRT aims to support the body's natural detoxification processes [24, 37-40].

VII. ESTABLISHED CRITERIA FOR MEDICAL DEVICE VALIDATION

The evidence of Bioresonance therapy is very heterogeneous. While proponents of bioresonance therapy claim various benefits, the scientific community remains divided on its efficacy. Critics argue that there is a lack of robust clinical evidence supporting the claims made by BRT practitioners. Many studies have methodological limitations, and the mechanisms by which BRT is said to work are not fully understood within the framework of established medical science [41].

For any medical device, including a bioresonance machine, to be approved for practical use in medicine, it must undergo a rigorous, multi-stage validation process to demonstrate its safety, efficacy, and clinical utility. Regulatory bodies like the U.S. Food and Drug Administration (FDA) and the European CE marking system under the Medical Device Regulation (MDR) require robust scientific evidence. The profound controversy surrounding bioresonance stems from its failure to meet these fundamental criteria.

For a bioresonance device to be considered a valid medical tool, it would need to fulfill the following critical requirements:

A. *Demonstrable Scientific Validity and a Plausible Mechanism of Action:*

The underlying scientific principles of the device should be biologically and physically plausible. Additionally, its proposed mechanism of action must be supported by empirical evidence obtained through rigorous scientific investigation.

B. *Analytical and Clinical Performance:*

The device's analytical and clinical performance must be thoroughly evaluated in terms of accuracy, reliability, and clinical utility.

➤ *Analytical Validity:*

Analytical validity refers to the ability of a diagnostic device to accurately and reliably measure the analyte or parameter it claims to detect. Ensuring high analytical validity is fundamental for establishing the clinical utility of the device. Key components include accuracy—reflecting how closely the test results match the true value or an accepted reference standard—and reliability, which refers to the consistency of measurements over time and across different conditions.

Critical aspects of analytical validity involve repeatability or precision, which assesses the device's ability to produce consistent results when the same sample is tested multiple times under identical conditions. High repeatability indicates stability and dependability during routine testing, typically evaluated through multiple measurements of the same sample, calculating the standard deviation or coefficient of variation (CV). Reproducibility, on the other hand, measures the agreement among results when the same sample is tested across different devices of the same model, operated by various users and in different locations. This ensures that the device performs consistently across diverse settings and operators, which is crucial for widespread clinical application. Reproducibility is assessed by testing identical samples across multiple devices and operators and analyzing the variability among the results.

➤ *Clinical Validity*

Clinical validity relates to the degree to which the measurement correlates with a specific clinical condition or outcome. Two key parameters in this context are sensitivity and specificity. Sensitivity refers to the device's ability to correctly identify individuals who have the disease (true positive rate). For example, in allergy detection, the device must accurately identify nearly all patients with a proven allergy. Specificity, conversely, pertains to correctly identifying individuals who do not have the disease (true negative rate), thereby reliably ruling out the condition in healthy individuals. A device with low specificity risks producing false positives, leading to unnecessary anxiety or treatment. The device's performance must be tested in a blinded study against an accepted, independent "gold standard" diagnostic method (e.g., for allergies, a skin prick test or IgE blood test). The results from the bioresonance device would be statistically compared to this standard to calculate its sensitivity and specificity.

C. *Clinical Utility*

The device must do more than just measure; it should provide a net benefit to patient health that outweighs any associated risks. Large-scale, randomized controlled trials (RCTs) are required. These trials must demonstrate that using the bioresonance device for diagnosis or treatment leads to

better health outcomes (e.g., reduced symptoms, improved survival, enhanced quality of life) compared to a control group receiving a sham device or standard care.

D. Safety and Risk Management

The device must be physically safe (e.g., no risk of electrical shock, burns) and its use must not pose a clinical risk. The primary safety concern with unvalidated diagnostic devices like bioresonance is the risk of misdiagnosis or overdiagnosis. A false positive can lead to unnecessary and potentially harmful treatments, while a false negative can provide false reassurance, causing a patient to delay seeking effective medical care for a serious condition.

E. Regulatory Approval and Quality Manufacturing

The device must be manufactured under a Quality Management System (like ISO 13485) and receive formal approval from a national regulatory body for specific medical claims. In many countries, including the United States, bioresonance devices have not received FDA approval for the diagnosis or treatment of any specific disease. They are often marketed as "wellness" or "relaxation" devices to circumvent medical device regulations, a practice that is itself controversial.

F. Operator Qualifications

The use of these devices should be limited to licensed and properly trained medical professionals who can accurately interpret results and reduce the risk of misdiagnosis or improper treatment [42-43].

VIII. CONCLUSION

In summary, bioresonance therapy is based on the principle that living organisms emit and interact with electromagnetic fields, which can be measured and manipulated to promote health. While the theoretical foundation of BRT is intriguing, further research is needed to validate its effectiveness and clarify the underlying mechanisms. As with any therapeutic approach, it is essential for patients to consult healthcare professionals and consider evidence-based treatments alongside complementary therapies. One of the key advantages of bioresonance therapy is its non-invasiveness and safety. This non-invasive nature makes it an appealing option for individuals who are needle-phobic, seeking "natural" therapies, or who have experienced adverse effects from conventional treatments. Practitioners often describe bioresonance as a holistic method that assesses and treats the "whole body's energy field." The goal is to identify and address what are theorized to be underlying energetic imbalances, rather than targeting a single, localized symptom. This approach is attractive to patients who feel conventional medicine has treated their condition in a fragmented way. Meanwhile, the gradual increase in the use of such devices within some medical practices underscores a pressing need for caution and clarity. It is imperative that physicians are explicitly warned to utilize

only medical devices that have received regulatory approval—such as clearance from the U.S. Food and Drug Administration (FDA) or its international equivalents—for specific diagnostic or therapeutic claims. The use of unapproved devices not only poses a direct risk of misdiagnosis and ineffective treatment but also carries significant ethical and legal liabilities.

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