An Introduction to Impact of Bio-Resonance Technology in Genetics and Epigenetics

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Abstract		According to the WHO, chronic diseases have major economic and social impacts. Despite the increasing scientific efforts to identify the etiology and mechanisms of chronic diseases and to treat them, the prevalence of these diseases in the world is expanding. One concept describing the etiology and mechanisms of chronic diseases is based on “Epigenetic Changes”. Epigenetic changes are permanent changes in gene expression due to Chromatin conformation changes that do not involve any change in DNA sequence. Depending on the time-scale these changes can be persistent through DNA replication. In the eukaryotic nucleus, the nuclear chromatin cluster has electric oscillation capacity. The natural frequency of an oscillating chromatin region is determined by the physical properties of DNA-protein complexes in that region, which can be changed by its epigenetic state and associated protein factors. These changes can be detected using Bio-resonances method and therefore be used to early detection of chronic diseases. It works on the basis of spectral analysis of magnetic fields of living organisms which enables therapist to differentiate normal from abnormal conditions. It is proposed that the electromagnetic waves as epigenetic factors could effect on chromatin dynamic changes and activate or suppress biochemical processes in organism and play a critical role in development or treatment of chronic diseases. This chapter has attempted to demonstrate the opinions of the authors on this issue and its relationship with genetic, epigenetic and also its application in medicine.
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Chapter 16
An Introduction to Impact of Bio-Resonance Technology in Genetics and Epigenetics

Mohammad Ebrahimi, Sabokhi Sharifov, Maryam Salili and Larysia Chernosova

Contents

Abstract According to the WHO, chronic diseases have major economic and social impacts. Despite the increasing scientific efforts to identify the etiology and mechanisms of chronic diseases and to treat them, the prevalence of these diseases in the world is expanding. One concept describing the etiology and mechanisms of chronic diseases is based on "Epigenetic Changes". Epigenetic changes are permanent changes in gene expression due to Chromatin conformation changes that do not involve any change in DNA sequence. Depending on the time-scale these changes can be persistent through DNA replication. In the eukaryotic nucleus, the nuclear chromatin cluster has electric oscillation capacity. The natural frequency of an oscillating chromatin region is determined by the physical properties of DNA-protein complexes in that region, which can be changed by its epigenetic state and associated protein factors. These changes can be detected using Bio-resonances method and therefore be used to early detection of chronic diseases. It works on the

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Keywords Bioresonance therapy · Biophoton · Epigenetics · Genetic

16.1 Introduction

If one searches the Internet about Bioresonance, he or she may find the definition of Bioresonace as a pseudo-scientific medical concept. Pseudoscience describe as a claim or practice which is presented as scientific, but does not adhere to a valid scientific method and lacks supporting evidence or acceptability. In contrast, science is "a set of methods designed to understand, describe and interpret and aimed at building a testable body of knowledge open to rejection or confirmation". Does the Bioresonance really have the Pseudoscience or it has the scientific character? Medical literature provides the following differences between science and pseudoscience:

1. The primary goal of science is to achieve a more complete and more integrated understanding of the physical world. But, Pseudoscience is more likely to be determined by ideological, cultural, or even commercial goals.
2. As a rule, most of the scientific areas are the subjects of intense study and research which result in the continual expansion of knowledge in the discipline. The field of Pseudoscience has evolved very little since it was first established. The small amount of research and experimentation that has been carried out is generally done more to justify the belief than to extend it. (Nearly every new finding raises new questions that beg exploration. There is little evidence of this in the pseudoscience.)
3. Scientific explanations must be stated in clear, unambiguous terms. But, pseudoscientific explanations tend to be unclear and ambiguous, often invoking scientific terms in uncertain contexts.
4. Scientific ideas and concepts must stand or fall on their own facts, based on existing knowledge and on scientific evidence. Pseudoscientific concepts tend to be made by individual egos and personalities, almost always by individuals who are not in contact with mainstream science.
5. Science is a process in which each principle must be tested in the crucible of experience and remains subject to being questioned or rejected at any time. But for pseudoscience, the major beliefs and principles of the field are often not falsifiable, and are unlikely ever to be altered or shown to be wrong. (Allchin 2004; Martin 1994; Phelan 2001).

In relation to the above-mentioned, in general, in the basic and clinical level, numerous positive studies have been derived from Bioresonace method that has been conducted by international and scientific workgroups. (Gernert 2008; Grass and Kasper 2008; Imaizumi et al. 1984; Kobayashi et al. 1999; Mansfield 2005; Popp et al. 1984; Quickenden and Que Hee 1974; Tilbury and Cluickenden 1988; OJu and Gogoleva 2000; Gogoleva 2001; Islamov et al. 2002; Huang et al. 2005; Nienhaus and Galle 2006; Rahlfs and Rozehnal 2008; Schuller and Galle 2007; Adamo et al. 1989; Pihtili et al. 2009; Chen et al. 2010;Prelević 2011). However, few researchers did not confirm the therapeutic effectiveness of the bioresonance method (Schöni et al. 1997). Therefore, the continuous controversial debates in this field are going on. In this review article, we discuss the scientific aspects of Bioresonance and Biophoton technology in relation to Genetic and Epigenetic Science.

16.1.1 History of Electrophysiology, Bioresonance and Biophoton

Most people are now familiar with ECG, EEG and MRI Scans. None of these diagnostic apparatuses would work if we were not energetic organisms.

Carlo Matteucci was a physicist and neurophysiologist who was a pioneer in the study of Bioelectricity. *Carlos Matteucci*, in the 1830's, proved that an electrical current is generated by injured tissues.

*Emil du Bois-Reymond*was a physician and physiologist, he is known as the father of experimental Electrophysiology because of the discovery of "Nerve reaction potential". In1843, *Dubois-Reymondin* constructed a galvanometer for detecting electrical current and used the terms "Muscular current" and "negative variation" for first time.

Nikola Tesla in 1920 developed the Tesla coil during his experimentations with high frequency phenomena. A Tesla coil is an electrical resonant transformer circuit. It is used to produce high-voltage, low-current, high frequency alternating-current electricity. Tesla coil is used in the production of the Multi-Wave Oscillator apparatus (MWO). (Carlson 2005; Roland Hans Penner 1995).

Tesla collaborated with French engineer, *Georges Lakhovsky* to complete The Multi-Wave Oscillator. *Tesla* and *Lakhovsky* thought the nucleus of the cell with its "filament strands" is similar to an electronic oscillating circuit, capable of sending and receiving vibratory information. *Lakhovsky* believed that every cell in the body has its own rate of internal vibration. He postulated that all living cells (plants, people, bacteria, parasites, etc.) possess resonance. *Lakhovsky* proposed that not only do all living cells produce and radiate oscillations of very high frequencies, but also they receive and respond to oscillations imposed upon them from outside sources.

According to *Lakhovsky*, the approach to stand microbial vibrational disturbance in body is to produce harmonic broad spectrum radio frequency electromagnetic waves and send them into the system and then, through the principle of sympathetic

vibration, each cell in body responds to external vibrations to which it has a harmonic likeness. Therefore, the healthy cells would be more resistant to vibrational attack from virus and bacteria.

This method resulted in the invention of the Multi-Wave Oscillator (MWO) apparatus. The MWO and other similar devices continued to be used in clinics throughout Europe, but the technology seems to have been almost forgotten in America. MWO's have been documented to be of value in treating cancer, arthritis, and other illnesses. *Lakhovsky's* article and patents can be found online at:http://www.rexresearch.com/lakhov/lakhusps.htm.

In 1920, *RR Rife* who was an American inventor had finished building the world's first universal microscope. *Rife* was an optical engineer and technician with great skills. With this unbelievable microscope, He could see a live virus for the first time. *Rife* carefully identified the individual spectroscopic characteristic (reflected or absorbed) of each microbe, using a split spectroscope attachment. In his study, he gradually rotated block quartz prisms in order to focus a single wavelength light upon the examined micro-organism. In this way, he established that every molecule oscillates at its own distinct frequency. *Rife* claimed to have documented a "Mortal Oscillatory Rate" for various pathogenic organisms, and to be able to destroy the organisms by vibrating them at this particular rate. (Rosenow 1965; Montgomery 2003; Wade 1994).

In 1937, *Harold Burr* a Professor of Anatomy at the Yale University began a series of experiments to find characteristics of the bio-magnetic field of living organisms. *Dr. Burr* discovered that all living things—from men to animals and plants—have electro-dynamic fields, which can be measured and mapped with standard voltmeters. *Dr. Burr* was able to demonstrate a specific technique for measuring the microvolt levels in living organisms. (Burr et al. 1936).

In 1939, *Semyon Valentina Kirlian*, a Russian inventor and researcher, discovered an approach for visualizing bio-fields in living organisms. It is known as *Kirlian* photography. In this method if an object on a photographic plate is connected to a high-voltage source, an image is produced on the photographic plate. The technique has been variously known as "electrography", "electrophotography", "corona discharge photography".

Kirlian photography involves emitting a high frequency, high voltage, ultra-low current to the object being photographed. It travels through and reacts with the complex systems of living organisms. This influx of electrical energy amplifies and makes the organisms biologically visible. The subject and the film interact to produce a corona of multi-frequency energy waves, which are captured by the camera (Andrew et al. 1979). Although acupuncture therapy began in China in the seventeenth century, it has been under investigation since the 1900s in the West. In 1951, a Russian researcher *Jean Niboyet* found out that acupuncture points have a lower skin resistance than other points of the body (Helene et al. 2002).

In 1953, *Dr Reinhold Voll*, a German medical doctor, developed an electronic testing device for finding acupuncture points electrically. He was successful in finding acupuncture points and demonstrating that these points have different resistance from the adjacent tissues when facing an electrical current. *Dr. Voll* made up

a diagnostic system based on electro-conductivity of acupuncture points. He also introduced a special scale to interpret the results efficiently.

He found out that, for example, patients with lung cancer have abnormal readings on the acupuncture points referred to as lung points.

He also was successful in combining the ancient acupuncture knowledge with western medicine in order to introduce electro-acupuncture as a novel method. According to *Voll*, the resistance of the acupuncture point is the measuring scale of energy in a particular organ and an indicator of its ability to function. This method makes measuring and registering of the condition and function of the body organs possible.

The overall function of a person can be recorded in this way and the source of the cause can be located. The system that has been developed on the basis of these findings is called "Electro Acupuncture according to *Voll*" (Voll 1975, 1978; Peter 1984).

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In 1941, *Albert Szent-Gyorgyi*, who won the Nobel Prize in Physiology in 1937 published an article entitled, "Towards a New biochemistry," Which suggested that energy, in living systems, may be transmitted by conduction bands.

He suggested that the double bonds in the protein backbone provide free or mobile electrons and these electrons (energy) can move through proteins. He proposed that these electrons belong to the whole system and not to one or two atoms. A great number of molecules can join together to form an energy continuum, along which, energy may travel. This is a "whole-system" perspective on energy transfer, and offers a basis for a variety of bio-energy diagnostics and therapies (Szent-Gyorgyi 1960).

Professor *Kim Bong Han* (1960) was a North Korean medical surgeon at Pyongyang Medical University. He discussed "the primo-vascular system" in reports that were published during the early 1960s. *Kim* was able to show the existence of neuro-anatomical basis of acupuncture meridians by injecting radioactive phosphorous (P32) into acupuncture points on a rabbit's abdomen and tracing its flow.

He traced the uptake of the substance into the nearby tissue and discovered that the isotope was actively taken up along a fine duct-like tubule system (approximately 0.5–1.5 microns in diameter). The energy conduit followed the path of the classical acupuncture meridians. Later, researchers in South Korea replicated Han's work. They discovered novel threadlike structures in the cerebral ventricles of rabbits that are proposed as sites of quantum communication. (Soh et al. 2013; Avijgan and Avijgan 2013).

Dr. Helmut Schimmel (1960) designed a simplified form of *Dr Voll's* device, which is known as the Vegatest or the "Photon Resonance Test". The original technique started in 1953 by *DrVoll*, was a complex procedure involving measuring hundreds of acupuncture points. But, with the Vegatest, all measurements are carried out using one single acupuncture point instead of hundreds, as the system is based on measuring against test ampoules rather than against the organ-linked points themselves (Schimmel and Penzer 1997; Katelaris et al. 1991).

In the 1950's, *Dr. George Goodheart*, discovered that the muscles of the body, in the presence of certain substances, would become either weaker or stronger. This

finding is part of a diagnostic system called "Applied Kinesiology". Its basic idea is that every organ dysfunction is accompanied by a specific muscle weakness, which enables diseases to be diagnosed through muscle-testing procedures. Based on this phenomenon, a simple arm or leg check can monitor the body's response to any given substance (Haas et al. 1994).

Dr. Hunt is a retired Professor in the UCLA Department of Physiological Sciences. She was the first to discover the relationship between variations in bio-energy patterns and human behavior. Dr. Hunt began to quantify human bio-energy, and found that it contains information related to physiological and conscientious levels of human body. In 1970's, she recorded the electrical energy from the body's surface (Hunt 1996).

In 1977, *Dr. Franz Morell* and an electronics engineer *Mr. Erich Rasche* developed the "MORA-Therapie", (for MOrell and RAsche), which is a medical device for bioresonance therapy. The MORA system, which is one of the bioresonance modification devices can analyze the healthy oscillations, amplify them and returns them to the patient's body. Abnormal oscillations are omitted and changed via a process of filtration and wave inversion (Herrmanna and Galleb 2001; Chen et al. 2010; Schöni et al. 1997).

Scientific observations showed that salamanders are able to regenerate limbs, while frogs, that are only one evolutionary stage before salamanders, have lost this potential. In 1980, Dr. *Robert O. Becker* tried to find the reason for these differences. He measured the electrical differences between the two animals at the end of a limb and found that both showed a positive potential. However, the salamander's limb stump soon reversed in polarity to a negative potential, which gradually returned to zero over the days that the limb re-grew. When *Becker* artificially used a negative potential on the frog's healing limb stump, the frog grew a new limb. *Dr. Becker* also predicted that living organisms could be influenced by external electromagnetic fields as the fields interacted with the direct currents that flow within the organism (Becker 1963, 1972; Becker et al. 1962, 1974).

During the last years of the Russian Soviet Union, the country's space medical program concentrated on sending men into space for long periods of time. These cosmonauts were in space with no access to medical services. This led to the Russian Government having to develop electronic devices to treat their cosmonauts' health issues in space. Using principles of Bioresonance therapy they developed a device called the Skenar. This is a small, computerized electro-therapy device that sends an electric impulse into the body, reads the impulse coming back from the body and then alters the next impulse it sends out to the body. This is repeated until the body reaches a state of electrical normality. The Skenar is certified by the European Common Market for pain control. In the US the Skenar is also registered with the FDA as a biofeedback device for muscular disorders (Dunwell 2011; Grinberg 1996; Nozdrachev 1996; Zavitaev 1996).

Dr. Bruce Lipton is an American developmental biologist, is best known for promoting the idea that genes and DNA can be manipulated by the person's beliefs. Dr. *Br. Lipton* began examining the principles of quantum physics and how to integrate them into the understanding of the cell's information processing systems and

internal bio-signaling. He's spent his life studying human biology and behavior. He produced breakthrough findings on the cell membrane, which revealed this outer layer of the cell was an organic homologue of a computer chip, the cell's equivalent of brain. His research at Stanford University's School of Medicine, between 1987 and 1992, showed that the environment, co-operating though the membrane, controlled the behavior and physiology of the cell, turning genes on and off. His discoveries, which ran counter to the established scientific view that life is controlled by the genes, presaged one of today's most important fields of study, the science of Epigenetics. Results derived from these studies defined the molecular pathways connecting the mind and body. According to *Dr. Lipton*, gene activity can change on a daily basis. If the perception in your mind is reflected in the chemistry of your body, and if your nervous system reads and interprets the environment and then controls the blood's chemistry, then you can literally change the fate of your cells by altering your thoughts. Many subsequent papers by other researchers have since validated his concepts and ideas (Lipton and Konigsberg 1972; Lipton and Jacobson 1974; Konigsberg et al. 1975; Lipton 1977, 1998; Lipton and Schultz 1979; Lipton et al. 1991).

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It is now recognized that the environment, can control the activity of our genes. Environment controls gene activity through a process known as epigenetic control.

Today many medical centers use electro-diagnostic devices to improve diagnostic and select their recommended treatments. Bioresonance is named in different terminology. The diagnostic procedure is most commonly referred to as Electroacupuncture according to *Voll* (EAV) or Electro Dermal Screening (EDS), but some practitioners call it bioelectric functions diagnosis (BFD), bio resonance therapy (BRT), bio-energy regulatory technique (BER), Biocybernetic Medicine (BM), computerized electro dermal screening (CEDS), computerized electro dermal stress analysis (CDCSA), electro dermal testng (EDT), limbic stress assessment (LSA), meridian energy analysis (MEA), or point testing.

Recently, the term INFORMATIVE MEDICINE has established itself as a very appropriate description of the complementary medical therapy. This means, that in contrast to the classical medicine, healing is achieved here through INFORMATION FROM BODY rather than material substances.

16.2 What is the Logic of Bio-Energy Methods?

Some of the complementary and alternative medical device and approaches are based in part on energetic aspects of life. Bioresonance testing is based on the science of biophysics (see below and Fig. 16.1).

Bioresonance therapy (BRT) is based upon the knowledge that the entire body is held together at the subatomic level by waves and photons.

Every material is made up of atoms, whether it is a virus, bacteria or a human being. Atoms themselves are made up of subatomic particles—protons, neutrons and electrons. All subatomic particles share a fundamental property: They have "in-

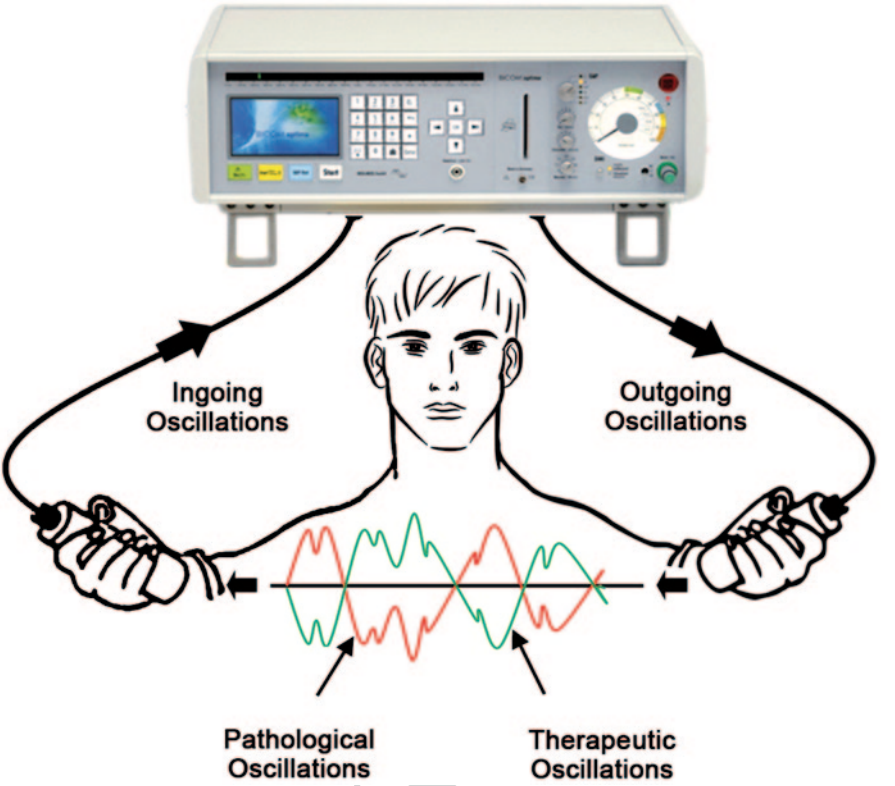

Fig. 16.1 Schematic diagrams of Bioresonance therapy

trinsic angular momentum," or spin. This means they rotate in one direction, just like a planet. Physicists discovered that subatomic particles behave like energy and radiate energy into their surroundings in specific patterns, called waves.

Subatomic particles have dual characteristics as both particles and wave forms. Subatomic particles vibrate at different rates or frequencies based in part on changes in temperature and thermodynamics. In their waveform state, quantum particles emit a frequency vibration that extends indefinitely. In this state, subatomic particles are present in all space in what is known as superposition. In the superposition state, they are also in contact with every other subatomic particle in the universe. This interconnection provides a huge amount of information transfer between all of the building blocks of our universe, including our own body. Each bacterium, each virus, organic substance has its own specific resonant frequency. (Cottingham and Greenwood 2007).

One kind of biological resonance is sunlight. If light, as the electro-magnetic oscillation of a defined frequency touches skin, it triggers regulatory reactions, such as pigmentation or the formation of vitamin D. Light's effect on the circadian rhythms of all or most animals has been well documented. Clearly, that huge num-

ber of other frequencies encountered during life also has some kind of effect on the organism. (Baehr et al. 1999; Holick 2004).

Researchers have been able to study the distinct wave patterns of normally-functioning body systems and organs as well as the oscillations of allergens, viruses, bacteria, and toxins.

Dr. Franz Morell is the father of bioresonance therapy. At the beginning of 1953 Dr. *Morell* was a member of the group investigating electro-acupuncture testing under the direction of *Dr. Voll*. *Voll* discovered that by making measurements of skin resistance at acupuncture points, diagnoses about the condition of the meridian energies could be made. He also revealed that this technique could be used to test allergic reactions to allergens. This is a way of testing the effects of harmful substances, allergens as well as drugs on the body. This test and therapy method is known as electro-acupuncture.

Morell developed electro-acupuncture further by discovering that the reversal of polarity in a body or material oscillations using the appropriate type of device led to "obliteration phenomena" in the body. This resulted, for example, in a form of allergy therapy which was practiced as "allergy obliteration". This rotation of the information on an allergy or a body's own oscillation is known as inversion (Herrmanna and Galleb 2001; Chen et al. 2010).

Biophotons were discovered in 1992, when the Russian embryologist *Alexander G.Gurwitsch* (1874–1954) performed an experiment with onion roots. He found that some effect from the dividing cells at the tip of one root stimulated the division of cells in the other root and called it "mitogenetic radiation" (Beloussov 1997).

Gurwitsch was persuaded that this radiation is an expression of morphogenetic fields within the organism that structure and organize the life processes in the cell and the organism. In developmental biology, a morphogenetic field is a group of cells able to respond to discrete, localized biochemical signals leading to the development of specific morphological structures or organs. Later, many other researchers, included *Popp* and his colleagues all over the world have not only demonstrated the existence and ubiquity of biophoton emission beyond any reasonable doubt, but also established its properties, developed and tested a number of hypotheses about its possible biological functions, done a lot of theoretical work towards explanation of biophoton theory and started to develop a number of practical applications for the use of biophoton measurements of microorganisms, plants, animals and humans.

Popp noted that a healthy cell stores light the longest. A healthy cell radiates coherent light, while a diseased cell radiates chaotic light. A large increase in biophoton flux during mitosis arises from the generation of a large amount of information, while an increase at the time of death is due to the usual thermodynamic cooling that occurs at the sudden destruction of a large amount of information. (Cohen and Popp 1997; Popp et al. 2002).

A biophoton is a photon of non-thermal origin in the visible and ultraviolet spectrum emitted from a biological system. The term biophoton used in this narrow sense should not be confused with the broader field of biophotonics, which studies the general interaction of light with biological systems.

Biochemical reaction via biotransformation phases and oxidative stress by reactive oxygen and nitrogen species and/or catalysis by enzymes is a common event in the biomolecular microenvironment. Such reactions can lead to the formation of triplet excited species, which release photons upon returning to a lower energy level in a process analogous to phosphorescence (Giuseppe and Waldemar 1995).

The study done by *Ankush Prasad* and *Pave Pospısil* revealed that the oxidation of linoleic acid by hydroxyl radical and intrinsic lipoxygenase results in the ultra-weak photon emission (Prasad and Pospısil 2011).

Actually, the human body emits biophotons, also known as ultra-weak photon emissions (UPE), with a visibility 1000 times lower than the sensitivity of our naked eye. While not visible to us, these particles of light or waves are part of the visible electromagnetic spectrum (380–780 nm) and are detectable via sophisticated modern instrumentation (Schwabl and Klima 2005; Niggli et al. 2005).

Seemingly biophotons are used by the cells of many living organisms to communicate, that facilitates energy/information transfer which is several orders of magnitude faster than chemical diffusion. According to Yan Sun and his collogues, "Cell to cell communication by biophotons have been demonstrated in plants, bacteria, animals, neutrophil granulocytes and kidney cells (Sun et al. 2010).

Researchers were able to demonstrate different spectral light stimulation at one end of the spinal sensory or motor nerve roots resulted in a significant increase in the biophotonic activity at the other end". Researchers interpreted their finding to suggest that light stimulation can generate biophotons that conduct along the neural fibers, probably as neural communication signals. The change of biophotonic activity is noticeable under physiological and pathological conditions. For example, mechanical, thermal and chemical stresses, mitochondrial respiration, the cell cycle and cancer growth lead to these biophotonic activities (Sun et al. 2010; Tilbury 1992; Slawinski et al. 1992; Niggli 1993; Amano et al. 1995; Kataoka et al. 2001; Nakano 1989; Yoon 2005).

While Reactive oxygen species (ROS) and radical theory of biophoton origin is relatively simple and easily understandable due to more or less common biochemical approach, DNA theory of biophoton origin is much more complex (Fig. 16.2).

Popp discovered that photons provided the vehicle for which information was transmitted. They transmit information within a cell and between cells. Popp demonstrated that DNA of living cells is the major source of biophoton storages and emissions. In this theory the DNA helix in cell nucleus is considered to be quantum electrodynamic cavity that is constantly excited by metabolic activity of cell.

According to the biophoton theory developed on the base of these discoveries, the biophoton light is stored in the cells of organism-more precisely, in the DNA molecules of their nuclei—and a dynamic web of light constantly released and absorbed by the DNA may connect cell organelles, cells, tissues and organs within the body, and serve as the organisms main communication network and as the principal regulating instance for all life process. Popp believed that cancer cells can be detected by the biophoton emission of the cancerous cells and these cells can potentially

Fig. 16.2 Sources of electromagnetic waves. Biophotons and electromagnetic waves are emitted by the human body and can be released through oxidative reaction, DNA configuration changing, mental intention, and may modulate fundamental processes within cell-to-cell communication and DNA

be destroyed by biophotons. *Popp* discovered cells of an organism communicate by chemical-massager molecule or by light (Gisel 2009; Popp et al. 1984).

A Bonghan duct, also known as a primo vessel, was identified by *Bonghan Kim* in the 1960s, is a thread-like structure found on the surface of mammalian organs, blood vessels, lymphatic vessels and under the skin (Stefanov and Kim 2012). *Bonghan* ducts renamed as Primo vascular system (PVS) by the Seoul National University (SNU) research group in 2002 (Soh et al. 2011). More recently, the vessels were isolated and observed using confocal laser scanning microscopy (CLSM) and transmission electron microscopy (TEM), showing they were movable on the endocardium of the bovine atrium and ventricle (Lee and Bae 2011). The liquid carried within the PVS consists of various microparticles, such as DNA, proteins, and hormones. It is proposed that the PVS is a circulatory system in which microparticles, such as extracellular DNA (eDNA) and microvesicles, are floating and interacting (Lee and Lee 2013).

Experiment conducted by *Bonghan Kim* and *Sang-Hyun Park* showed that PVS has electrical signals similar to those from smooth-muscle-like cells.

In 1791 *Galvan* observed that injured tissue would generate electrical currents which was steady state or DC (direct current) in character (Piccolino 1998). *Burr* (1972) established, with the aid of voltmeters and electrodes, that every living

organism possesses what he has termed as L-field (life-field)—a voltage difference between two points on, or close to, the surface of the living form. A complete listing of *Burr's* articles can be found in the Yale Journal of Biology and Medicine (Burr 1957).

Emission of photons in the visible range by animal cells and tissues has been described for a variety of organs and by many researchers. With the use of photomultiplier tubes, emissions of photons in the visible range have been already detected from the liver, heart, lung, nerves, skin and muscles (Kim et al. 2003; Cadenas 1967; Blokha 1968; Cohen and Popp 1997).

Modern research has confirmed the observations of *Burr*. Not only does every event in the body, either normal or pathological, produce electrical changes, it also produces alterations of the magnetic fields in the spaces around the body. This can guide to possible diagnostic applications in connection with bioresonance.

16.3 Epigenetics and Bioresonance

Epigenetic changes are continual changes in gene expression that do not involve any change in DNA sequence. They may last for varying times-within a long-lived cell, from cell to cell during development, or sometimes from parents to offspring. *Arthur Riggs* and colleagues defined Epigenetics as "the study of mitotically and/or meiotically heritable changes in gene function that cannot be explained by changes in DNA sequence". (Russo et al. 1996). In parallel to the term "genome" that defines the complete set of genetic information contained in the DNA of an organism, "epigenome" generally refers to the complete set of characteristics of epigenetic pathways in an organism. Researchers have identified four types of epigenetic pathways: DNA methylation, histone modification, nucleosome remodeling, and noncoding RNA-mediated pathways.

These epigenetic pathways intertwine with each other to regulate expression of genes and it is likely that other pathways beyond these four known ones be discovered in the future. (Van Vliet et al. 2007). Normal and abnormal physiological responses to environmental stimuli may be mediated by epigenetic mechanisms. Epigenetic states are reversible and can be modified by environmental factors.

The three-dimensional conformation of chromosomes in the nucleus is important for many cellular processes, including the regulation of gene expression, DNA replication, and chromatin structure (Cremer and Cremer 2001).

Oscillation is the repetitive variation, typically in time, of a central value (often a point of equilibrium) or between two or more different states. Familiar examples include a swinging pendulum and AC power. Oscillations occur not only in physical systems but also in biological systems, from human society to the brain Oscillations occur when a system is disturbed from a position of stable equilibrium. This displacement from equilibrium changes periodically over time. Thus, Oscillations are said to be periodic, and display periodic motions in human and animal cells

and organs that connect with neighboring organs and environment. The harmonic oscillator has a single degree of freedom. More complicated systems have more degrees of freedom, for example two masses and three springs (each mass being attached to fixed points and to each other). In such cases, the behavior of each variable influences of the others. This leads to a coupling of the oscillations of the individual degrees of freedom. For example, two pendulum clocks (of identical frequency) mounted on a common wall will tend to synchronize. Coupled oscillators are oscillators connected in a way that energy can be transferred between them. As the number of degrees of freedom becomes arbitrarily large, a system approaches continuity; examples include a string or the surface of a body of water. Such systems have an infinite number of normal modes and their oscillations occur in the form of waves that can characteristically propagate. In the eukaryotic nucleus, DNA is packed into a periodic nucleoprotein complex, known as chromatin. The nuclear chromatin organized as clustered and has electric oscillation capacity. The coupling strengths of chromatin regions are determined by physical interactions among chromatin-associated proteins, the electromagnetic fields around the oscillating chromosomal regions, and the hydrogen and other bonds linking different chromatin regions within the same chromosome. The natural frequency of an oscillating chromatin region is determined by the physical properties of DNA-protein complexes in that region, which can be changed by its epigenetic state and the protein factors associated with it (Zhao and Zhan 2012). On the other hand, experiments confirmed that Biophotons can be absorbed by natural chromophores such as porphyrin rings, flavi1nic, pyridinic rings, lipid chromophores and caromatic amino acids, etc. (Gao and Xing 2009; Mazhul' and Shcherbin 1999).

We now know that the photon can exchange between the bio-systems. It also was shown that the excision exchange supposedly constitutes the effective system of signaling and regulation of the bio-system development. It seems that such signaling to the large extent regulates the homogeneity of bio-system growth, preventing the large fluctuations of its global form and defines its morphogenesis.

Experimental results show that under the different stress conditions the photon rates from bio-system can rise in short time significantly, probably, as the consequence of intensive internal signaling (Mayburov 2009).

Experiment conducted by *Peter P. Gariaev* and co-workers in Moscow confirmed that the chromosomes and DNA produce "laser radiations". They suggested (1) that there are genetic "texts", similar to natural context-dependent texts in human language; (2) that the chromosome apparatus acts simultaneously both as a sender and receiver of these genetic texts, respectively decoding and encoding them; (3) the chromosome continuum acts like a dynamical holographic gate, which displays weak laser light and electro-acoustic fields. The distribution of the character frequency in genetic texts is fractal, so the nucleotides of DNA molecules are able to form holographic pre-images of biostructures (Gariaev 2001). He supposed that genetic information, except for the coding form, exists in a quantum (wave) form. This model enables a fundamentally different way to cure people who suffered from cancer, viral diseases, bacterial infections, and degenerative processes in organs and tissues. The disruption of the electromagnetic energy system can disrupt DNA tran-

scription; suppress T-cell and NK-cell activity all leading to chronic degenerative diseases, depression, and other problems. Electrons absorb and emit photons, which is why the DNA electrons are storage houses for biophotons. It is believed that the specific vibratory rate of each biophoton is what activates specific gene sequencing via resonance. It has been documented that DNA repair can be activated by using a frequency of *528 hz*. At that precise frequency the clustered water molecules that surround the DNA structure form a perfect six-sided hexagon.

16.4 Conclusion

All cells have small electrically powered pumps inside of them. Healthy cells, according to Nobel Prize winner *Otto Warburg*, have cell voltages of 70–90 millivolts. Bioelectric signals are generated by specific ion channels and pumps within cell membranes. The segregation of charges achieved by ion fluxes through such transporter proteins gives rise to a trans-membrane voltage potential (McCaig and Rajnicek 2005).

AQ9

Meanwhile, all living cells of plants, animals and humans constantly emit ultra-weak biophotons in the optical range of the spectrum, which is associated with their physiological states. The intensity of biophotons is in direct correlation with, organ energy metabolism, organ activity, organ blood flow, organ health status and oxidative processes (Kobayashi et al. 1999).

AQ10

The biophoton light is stored in the cells, almost exclusively inside the DNA molecules, managing processes, alike a dynamic web of light, which is constantly released and absorbed. *Frohlich* argued that as organisms are made up of strong bipolar molecules packed rather densely together, electric and elastic forces can constantly interact. Cells and organisms display their own rhythms of activity that are partly internally regulated, but they also respond to external energy (Fröhlich 1980).

Bio-mechanical resonance is created when a small periodic stimulus of the same natural vibration period of a cell, tissue, or even a molecule, is used to produce a large amplitude vibration of the cell, tissue, or molecule.

Biophysicists view the body as an interconnected bio-energetic organism. The key to understanding bioresonance lies in understanding the fact that all vital processes in the organism are influenced and controlled by electromagnetic oscillations. These electromagnetic oscillations are super-ordinate to the biochemical processes and control them. Cell associations and organs oscillate in particular frequency ranges. Thus, an oscillation spectrum arises in the organism.

Electrons also absorb and emit photons, which is why the electron rich DNA is storage house for biophotons. It is now thought that the unique vibratory rate of each biophoton is what activates specific gene sequencing through what is known as resonance. The vibratory energy of biophotons are able to induce responses in other biophotons—within the same cell and neighboring cells—in fact, throughout the entire organism.

DNA, RNA, ribosomes, and mitochondria are all proton, electron and photon apparatuses. Photons have the ability to knock electrons out of their atomic and molecular orbits. They are able to direct electrons to where they are needed to run metabolic processes. Enzymes capture and transfer electrons and protons along a path to various protein molecules in order to activate each protein's specific function.

The nuclear chromatin has electric oscillation capacity and biophotons can be absorbed and emitted by chromosomes. It is known that cells receive, store, and emit quantum packets of light-photons. From a biological standpoint, the term "biophoton" is more appropriate. Electrons also absorb and emit photons, which is why the electron rich DNA is storage house for biophotons. Calculations show that the helix form of the DNA molecule exhibits the ideal geometric form of a hollow resonator that allows it to store light very effectively. *Blank M* Supposed that DNA seems to possess the two structural characteristics of fractal antennas, electronic conduction and self-symmetry. (Blank and Goodman 2011).

The DNA is directly attached to the nucleus, specifically at the Telomeres—which is one of the reasons telomeres are so important, they receive and amplify the initial electric current received at the nuclear membrane—and at heterochromatin (highly condensed areas of DNA).

Molecular rearrangements in DNA are affected through epigenetic modifications. Direct methylation of CpG residues as well as many different modifications modifiable to histones produces molecular rearrangements of nucleotide segments that will produce differential electron orbital configurations. A very important feature of the molecular encoding of electromagnetic information within the atomic structure of DNA is the role played by Transposons. It is the Transposons that direct RNA-mediated DNA epigenetic regulation (Fedoroff 2012).

It is showed that weak electromagnetic (EM) fields interact with gene promoter in DNA can lead to the stimulation of protein synthesis. Scientific evidence confirmed that weak electromagnetic fields have effect on electron transfer on DNA molecule that may change the transcription and translation process in cells (Blank and Goodman 2008).

It is now thought that the unique vibratory rate of each biophoton is what activates specific gene sequencing through what is known as resonance. The vibratory energy of biophotons is able to induce responses in other biophotons—within the same cell and without to neighboring cells—in fact, throughout the entire organism.

Changes in environmental factors can lead to variation in electric oscillation in chromosome which in turn may result to the fluctuations in epigenetic pattern of organism.

Disease can be considered as the disturbance of biochemical sequences and electromagnetic oscillations order in the body, which is triggered by exogenous and endogenous stimuli. It is at the energetic and vibrational level that the physical processes shape the transfer of energy and the flow of bio-energetic information in the living system.

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