Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

Advances in Applied Science Research, 2017, 8(1):50-61

ISSN : 0976-8610
CODEN (USA): AASRFC

The Darkness Brings Light in the Field of Bio-Communication Through Melatonin Production

Muhammad Naveed[1,2]*, Mohammad Raees[1], Muhammad Kashif[1] and Irfan Liaqat[1]

[1]*Department of Biochemistry and Biotechnology, University of Gujrat, Pakistan*
[2]*Department of Biotechnology, University of Gujrat, Sialkot Campus, Pakistan*

ABSTRACT

An interesting field of biophysics dealing with the electromagnetic waves emission correlating emphasis on the effect of darkness on an organism to organism communication. Multiple theories established narrating the production of electromagnetic waves within an organism by several means like the change in membrane potential, DNA excitation and relaxation, change in amino acids, the formation of water ions and generation of reactive oxygen species (ROS). Darkness favorably provides the basis of generation, amplification, and reception of bio-electromagnetic waves that is disturbed in the light. One of the active key players involved in these waves generation is melatonin, produced by the pineal gland of the brain, controls the intensity and frequency of wave emission. Melatonin is captive in maintaining the suitable conditions for a proper bio-communication by activating and regulating the number of molecules and signaling cascades in the cells. The propagated bio-electromagnetic waves are then receipted by the bio-organism interested in communication and these waves target the cellular, subcellular machinery, and molecular level cascades of the recipient. Talking about that, these emitted waves target similar biomolecules of the receiver and creating an environment for proper communication. Different epigenetic factors like aiding food and effect of moon cycle (lunar cycle) can also contribute in bio-communication, therefore, crucially examined. The changes that a body undergoes with this conceiving like molecular pathways involved, metabolic chemistry changes can be taken into account through photo-proteins (e.g. some types of cytochromes) and quantum bioinformatics bases. The appliance of study could be a major quantum leap in the era where the need of electromagnetic devices could be minimized and a breaking dawn towards a new horizon.

Keywords: Bio-communication, Melatonin production, Bio-electromagnetic waves, Epigenetic factors, Molecular pathways, Quantum bioinformatics

INTRODUCTION

The biophysics is charismatic, full of secret and a rapid problem tackling field. The word biophysics is the combination of two terms, Bio-Physics which is a self-elaborating term that deals with living organisms or cells but with the help of physics concepts and instruments. For a longer time, all around the globe, a huge mass of electronic devices has been developed which produce electromagnetic waves to send and receive information and to communicate with one another and are proved to make lives much comforting and relieving. But the problem arises when a huge amount of the information or data transfer comes in handy because through these devices, it is limited and is cost shaking. Generation of these electromagnetic waves and by means of these waves transferring of data have been under observation for the longer time [1,2] which now have some experimental proofs. These proofs explain that by proper utilization and regulation of the electromagnetic waves that are produced within one's body, it can be possible to communicate with others and transferring huge amount of data in no time won't be a dream anymore [2].

It has already been affirmed that bio-organisms generate electromagnetic waves within their bodies [3-5]. The frequency

of these waves lies in a very broad spectrum ranging from kHz to visible region [4,6]. The principle of communication involves three same crucial steps as in alternative communication devices i.e. generation of electromagnetic waves, propagation and then, reception. Different types of electromagnetic waves can be generated in bio-organisms that may also vary from organism to organism and even from cell to cell [2,7]. Regardless of that, the main focus of this review is the emission of these electromagnetic waves from humans. The darkness should never be considered less than a blessing of God to accomplish the number of different regulations and function of human body. Relating to this blessing of God with this review, Darkness greatly favors the generation and propagation of these electromagnetic waves.

As the waves are generated according to the nature of biochemical reactions [8,9] therefore those waves can be captured and deciphered to tackle the information they contain like waves origin of emission, emitted in response to which reaction or change [10]. The use of these waves in order of information transfer may be beneficial in the treatment of diseases [9] by spiritual methods or can be harmful like black magic aura effects [11]. There are various biochemical processes that take part in the generation and reception of electromagnetic waves in the body [4] like DNA conformational changes during excitation and relaxation, Protein's structural components alteration like types of amino acids and chromophores, membranes potential changes [1,12] water structural changes (generation of ions) and reactive oxygen species (ROS) generation, etc. [13,14].

The key player of this whole game is the pineal gland (also known as the third eye) that is located in the mid of the brain with cone shaped, cherry red color [15]. This third eye is generally linked with spiritual acquaintance like near death visual experiences and emotion controlling [16]. The melatonin, a hormone produced by the pineal gland, chiefly control and regulates the frequency of electromagnetic waves emitting from the body by controlling the types and intensity of emotions. In order to convey a proper message, the activation of this third eye is way important. There are different spiritual methods, meditations and exercises have been brought to light to activate the pineal gland. It'd be best to mention that in the activation of the third eye, darkness plays a major role because the level of melatonin production in darkness is 30-70 folds high comparing to light that in turn favors the production of electromagnetic waves [17].

As the emitted waves are electromagnetic in nature so the propagation of these waves is way similar to the propagation of light waves or the waves in electronic devices like radio, etc. [18]. The light interrupts the generation and propagation of emitted electromagnetic waves, therefore, a hurdle in bio-communication (Figure 1) [19,20]. This finding evidently proves why darkness is favorable for communication.

Along with the darkness, meditation and exercises, there are some other factors that are proved to be helpful in the activation of the pineal gland and waves controlling like scents, [21,22] foods and days of the lunar cycle. If not properly taken into account, these factors can also interfere with the fair communication. Figure 2 specific beats of music can also be a contributing factor in the awakening of the third eye [23,24]. This study can help us to understand the protein expression, metabolism pathways undergoing changes in response to a specific stimulus and another cellular, subcellular, molecular and genetic process with the ease, not requiring the laborious and time taking in the laboratories anymore. This can also provide the grass-root information about quantum bioinformatics.

MECHANISMS INVOLVED IN THE GENERATION OF ELECTROMAGNETIC WAVES FROM THE BIO-ORGANISMS

The exact mechanism of electromagnetic waves generation is yet unclear. But there are multiple biochemical and

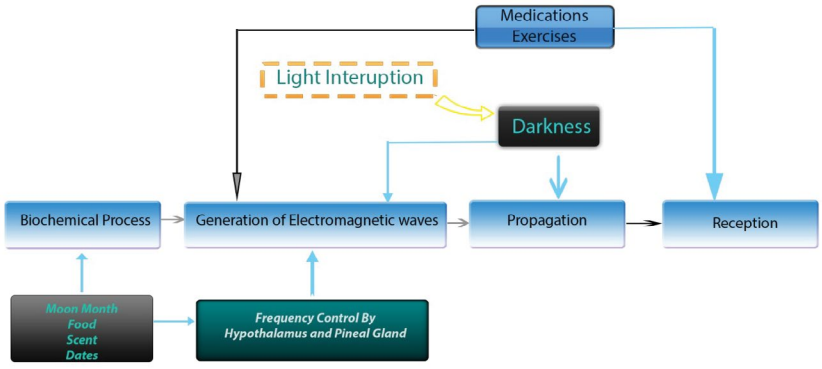


Figure 1: Relation of epigenetic factors with generation, propagation and reception of electromagnetic waves

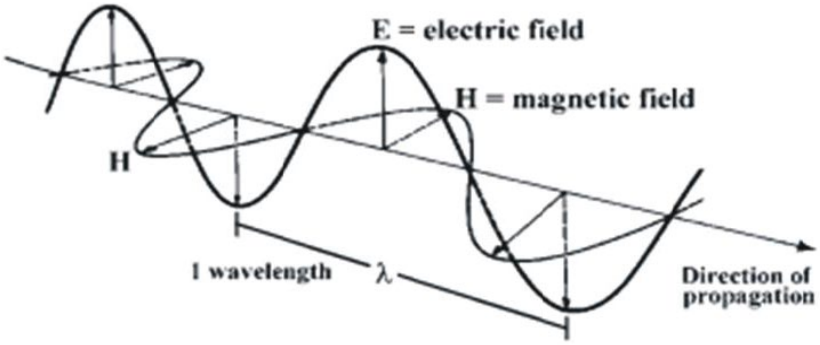


Figure 2: Light and emitted biophotons both are electromagnetic in nature and can interact with each other to disturb the propagation of emitted biophotons

sub-cellular processes which evidently take part into waves generation [25,26] like the membrane potential changes [27], DNA conformational changes [28], water structural changes near the membrane in the cytosol, protein structural contents and conformational changes, ROS (reactive oxygen species) production during various biochemical reactions and the production or formation of different kinds of chromophores in the cells or body of Bio-organisms (Figure 3).

Whatever the mechanism or biomolecule involve in the generation; the basics of generation are same and based upon the fundamental rules of quantum physics and plank's quantum theory [29,30]. The simplest rule is that when one electron drops from higher energy level to lower energy level, it will emit photons [30]. In the case of Bio-organisms, there are biomolecules that play the part of excitation of molecules gaining the thermal or non-thermal energy from the environment [31]; and then de-excitation will result in the emission of electromagnetic waves. On the other hand, the static charge produces the static electric field in the cell, but when the charges move; they produce the oscillating or changing electric field [27]. The oscillating electric field produces the magnetic field and in this way, the other mechanism is accomplished. By looking at the mechanism deeply we will introduce to the concept that both of the mechanism are basically same [32] (Figure 4).

MEMBRANE POTENTIAL CHANGES PARTICIPATING IN ELECTROMAGNETIC WAVES EMISSION

One of the widely accepted theories about the generation of electromagnetic waves is the membrane potential changes theory, i.e., is the polarization and depolarization or neuron firing [33]. This is not a single theory but there are multiple theories that are linked to membrane to understand the wave emission [34-36].

One theory about the membrane theories is that there is a thalamic-rhythmic-generator, a phenomenon which occurs near the thalamus in the brain [12]. A number of electrons and ions are present in the cell [37] the movement of these charged particles will generate the electric field and the change in an electric field will result in the generation of magnetic field. So in this way, there will be the generation of electromagnetic waves simply. The specialized cells for this purpose are thalami-cortical neurons, which present on the border of thalamus and cortex in the brain [33]. The movement of calcium ions is linked with this phenomenon in that aspect when there is increased concentration of Ca^{2+} ions there is decreased emission of waves [33,38,39].

The other theory of electromagnetic field generation relates to the electrosoliton. The electrosoliton is the electrical counterpart of the soliton. The soliton is a self-reinforcing solitary wave (a wave packet or pulse) that maintains its shape while it propagates. Electrosolitons can be viewed as moving charges that provide transport of charge in biological systems and can be considered as an important contender of electromagnetic field generation in the microwave frequency region [40]. Still, two other theories related to the membrane may be related to membrane potential or not will be discussed under the protein heading.

DNA EXCITATION AND RELAXATION, ANOTHER SOURCE OF ELECTROMAGNETIC WAVES EMISSION

Popp et al. have done efficient work to withdraw the proofs about the biophoton or electromagnetic waves emission from the DNA [28]. According to Popp, the DNA is the major source of wave emission. There are excimer and

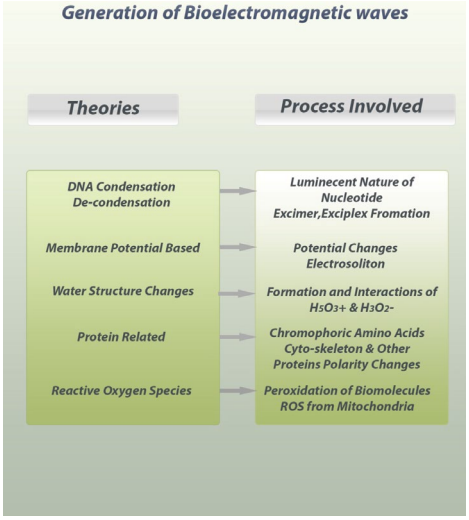
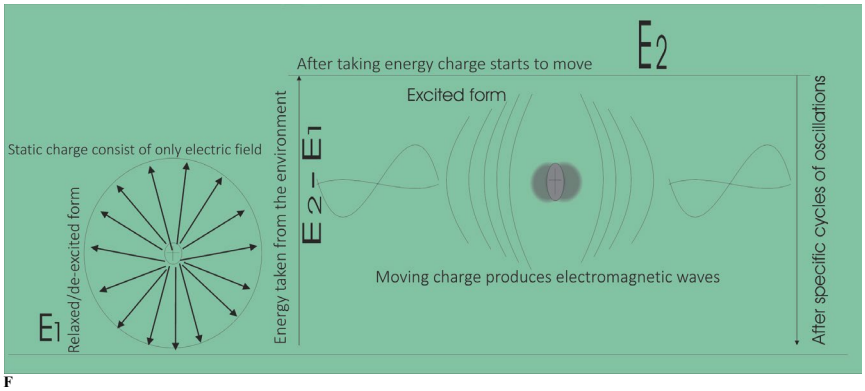


Figure 3: Biomolecule linked processes involved in generation of electromagnetic waves



F

Figure 4: The interconnection of two processes involved in generation of bioelectromagnetic waves; after excitation by energy taken from micro or macro environment, the molecules start to move emitting the waves. After specific cycles of oscillations molecules drop back to relaxed state

exciplex formation of DNA molecules in the nucleus, which results in the exact stable DNA supercoiled structure [41-44]. On the relaxation of coiled conformation will result in the emission of waves [45] as performed by the Popp when unwound the DNA helix by ethidium bromide [28,46]. Popp described nucleotides as luminescent due to which it takes energy from the environment and emit waves [28,47,48].

CHANGES IN PROTEIN CONFORMATION, STRUCTURAL RESIDUES AND POLARITY LEADING TO ELECTROMAGNETIC WAVES EMISSION

As the proteins contain at least 20 types of amino acids, some of them are aromatic or ring containing e.g. Histidine, tryptophan, tyrosine etc. These ring containing amino acids acts as a chromophore to absorb the light or energy from the micro-subcellular environment or macro out of the body environment [49]. These chromophoric residues absorb the energy of one wavelength and emit another. Therefore the change in the structure and conformation will emit the different kinds of waves [50,51].

The other model of wave's emission from proteins is related to the membrane. The microtubules that are connected to the plasma membrane are polar proteins [35,52]. The change in polarity produces the electric field as mentioned above in the case of membrane potential [53,54]. The polarity is changed during the biochemical reactions or with the passage of phases of cell cycle like the shrinkage of microtubules during mitosis [35,52,55].

Also, a majority of the transmembrane proteins are polar in nature; they can also change their polarity to produce waves [35,56]. This concept is again connected with membranes [57].

WATER IONS FORMATION AND INTERACTION WITH BIOMOLECULES RESULTS IN THE GENERATION OF ELECTROMAGNETIC WAVES

Cytosol contains almost 90% of water which provides the base of life forming the most vital cytoplasm [58]. The change of water structure into ions like $H_5O_2^+$ and $H_3O_2^-$ make tend the medium toward more polarizability which could be possible for metastable dynamic states formation [59]. The analysis of the water-ion macromolecule system in membrane structures shows that cellular water exists in a physical state sufficiently ordered to exclude solutes [34,60]. The evidence for this comes from a cooperative interaction between the majorities of ion-absorbing sites that replace K^+ by Na^+ ions. The sigmoidal nature of the equilibrium distribution isotherm of cellular K^+ and Na^+ is analogous to critical or collective phenomena in general. Some evidence that collective interactions can produce macroergic effects leading to electronic excitation comes from experiments with water-induced luminescence of dry seeds or spores of fungi [50,61].

Voeikov is another scientist that believes that there is a nontrivial role of cellular water in the generation of the electronically excited electromagnetic field. It was experimentally shown that various low energy physical processes such as ultrasound agitation, passing water through capillary tubes and external microwave electromagnetic fields can influence UPE generation in water. Two scientists, Preparata and Del Giudice have theoretically shown that liquid water is effectively composed of two phases: A gas phase and a “coherent domain” phase. Coherent domains behave as reservoirs of quasi-free electrons which can be released just by modest excitation. Separation of these two phases of water is likely to occur near interfaces, such as membranes, hydrophilic surfaces, polar molecular backbones, etc. [61,62]. Indeed, it was experimentally shown by many authors that water near interfaces exhibits quite different properties than bulk water. These include solvent exclusion, higher viscosity, lowered thermal motion of molecules, separation of charge, different spectroscopic properties, etc. [63].

PEROXIDATION OF BIOMOLECULES AND FORMATION OF REACTIVE OXYGEN SPECIES (ROS), HIGHLY LINKED WITH BIOPHOTON EMISSION

The Peroxidation of biomolecules like lipids, proteins, nucleic acids etc. lead to chromophoric molecules formation and also the generation of ROS [64,65]. Peroxidation of biomolecules forms the excited singlet and triplet radicals e.g. excited carbonyls from lipids and proteins. Also, the Peroxidation of protein’s amino acids can form excited radicals [66,67]. These radicals give rise to the production of ROS like H_2O_2, $^1O_2$, etc. [14,68,69]. These ROS productions are responsible for the mutation in DNA and can be the causative agent for cancer [70,71].

The other very important pathway of ROS production is through the respiratory chain in the mitochondria by the complexes I, II, and III of mitochondrial membrane [70,72,73].

The ROS are excited species, when the drops to a relaxed state after de-excitation; there will be the emission of biophotons or electromagnetic waves [74,75] To understand the question, why the darkness is very well suited for the bio-communication? There are two most important logics here in the paper. One belongs to the generation of waves and described here and the second will be described under the propagation heading.

PRODUCTION OF MELATONIN REGULATED BY DARKNESS CONTROLS THE WAVE’S FREQUENCY

The pineal gland aka the third eye is located in the mid of brain just at the middle of both eyes [15,76]. The evidential studies have elaborated the secret role of pineal gland in spiritual phenomena. The spiritual role of the pineal gland is due to its ability to aid the generation and reception of electromagnetic waves by producing two important hormones. DMT (N-Trimethyl tryptamine) and Melatonin are the hormones produced by pineal gland. DMT is a spirit hormone and involves majorly in the near-death experiences and other spiritual phenomena. Melatonin production is the main reason to choose the darkness for the proper bio-communication. There are two important biochemical processes occur during the darkness [16,77].

One is the production of melatonin which controls the frequency of waves and the other are the biosignalling process within the pineal gland that aid in the generation of theories mentioned above [78,79]. During the darkness i.e. when the retinal cells detect the absence of light, the signal is sent to the hypothalamus through retino-hypothalmus channel

[80]. Where the superchiasmatic nucleus (SCN) and paraventricular nucleus (PVN) are, present and process the signal, and send it to hindbrain to the spinal cord to pre-ganglionic and post-ganglionic fibers (Figure 5). Then the cascade of the biochemical reactions starts by activating the beta-adrenergic or alpha-adrenergic protein coupled receptors to increase the level of cAMP. The concentration of cAMP controls the majority of enzymes involved in the electromagnetic wave generation [81,82] (Table 1).

cAMP-dependent processes involve in the DNA condensation/decondensation, carticotropin and carticotropin releasing a hormone to release the stressed conditions, serotonin dopamine production in for mood change, epinephrine for energy production in fight and flight reactions, thyroid and parathyroid hormones for proper metabolism, etc.[83,84] (Table 2). By looking upon the combination of the controlled mechanisms involved cAMP-dependent pathway, it is clear that the majority of mechanisms involve in the generation of electromagnetic waves by changing the mood, frequency or type of emotions and thus the frequency of emitted wavexs [85]. On the other hand, these mechanisms involve in relaxation or excitation of DNA, change of polarity of proteins and change of membrane potential by controlling the ratio of different ions, change the cytosolic composition in a proper way to aid the cytosolic emission of electromagnetic waves [86,87].

The second face of this darkness stimulated cascade is the production of melatonin. The melatonin acts on SCN of the hypothalamus and can change the mood or type of emotions and the intensity of emotions [17,88], both of which can control the frequency and intensity of generated waves. Therefore the pineal gland is considered very important in the bio-communication [17,88-90].

Table 1: Some enzymes and other proteins regulated by cAMP-dependent phosphorylation by PKA

Enzyme/protein	Sequence phosphorylated	Pathway/process regulated
Glycogen synthase	RASCTSSS	Glycogen synthesis
phosphorylase *b* kinase α subunit β subunit	 VEFRRLSI RTKRSGSV	Glycogen breakdown
Pyruvate kinase (rat liver)	GVLRRASVAZL	Glycolysis
Pyruvate dehydrogenase complex (type L)	GYLRRASV	Pyruvate to Acetyl-CoA
Hormone-sensitive lipase	PMRRSV	Triacylglycerol mobilization and fatty acid oxidation
Phosphofructokinase-2/fructose 2,6-bisphosphatase	LQRRRGSSIPQ	Glycolysis/gluconeogenesis
Tyrosine hydrorylase	FIGRRQSL	Synthesis of L-dopa, Dopamine, norepinephrine, and epinephrine
Hisone HI	AKRKASGPPVS	DNA condensation
Histone H2B	KKAKASRKESYSVYVYK	DNA condensation
Cardiac phospholamban (cardiac pump regulator)	AIRRAST	Intracellular [Ca2]
Protein phosphatase - I inhibitor- I	IRRRRPTP	Protein dephosphorylation
PEA consensus sequences*	xR[RK]Ix[ST]B	Many

Table 2: Some signals that use cAMP as second messenger

Corticotropin (ACTH)
Corticotropin-releasing hormone (CRH)
Dopamine [Dl, D2]
Epinephrine (β-adrenergic)
Follicle-stimulating hormone (FSH)
Glucagon
Histamine [H2]
Luteinizing hormone (LH)
Melanocyte-stimulating hormone (MSH)
Odorants (many)
Parathyroid hormone
Prostaglandins El, E2 (PGE1, PGE2)
Serotonin [5-HT-la, 5-HT-2]
Somatostatin
Tastants (sweet, bitter)
Thyroid-stimulating hormone (TSH)

Note: Receptor subtypes in square brackets and can transducer different cascades or mechanism

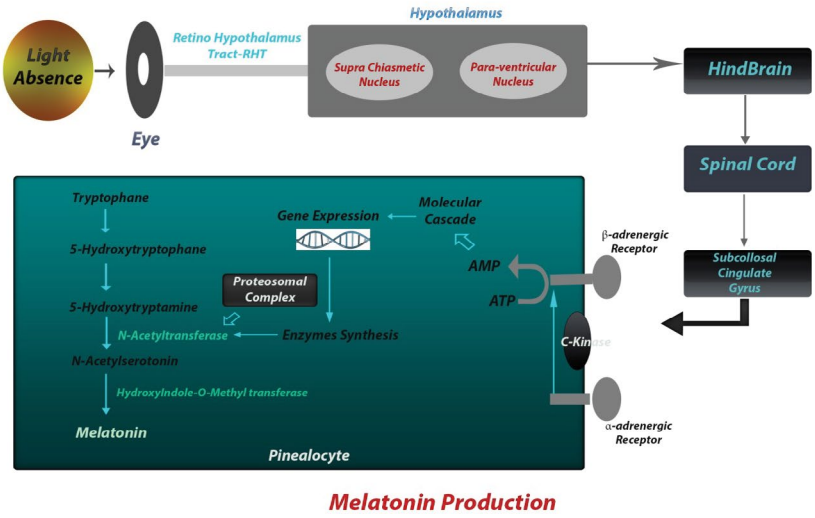


Figure 5: Light/darkness regulates the melatonin production pathway. Darkness favors the production

PROPAGATION OF ELECTROMAGNETIC WAVES

The second step of bio-communication obviously is the propagation or spread of waves to the target organism. The generated waves propagate with the exact same mechanism as the mechanism followed by the radio waves of radio or TV stations, which are artificially generated by conductors. The electric field help in the generation of magnetic field in the area at the front and the same procedure is repeated for the magnetic field which produces an electric field (at a perpendicular angle) at the front in the second part of the complete cycle. And the whole cycle is repeated multiple times to propagate the electromagnetic waves [18] (Figure 2).

LIGHT INTERRUPTS THE BIO-COMMUNICATION IN DIFFERENT WAYS

The second logic to choose the darkness is the light interruptions during the day time. As the light is also electromagnetic (Figure 2) wave, therefore it can interact or resonate with waves emitted from Bio-organisms in both positive and negative ways [19,20].

Light interruptions occur at mainly two points. First is the open air disturbance in which light any of seven wavelengths of white lights can interact with emitted waves (As both are electromagnetic waves) [18] And can change or block the information transfer. Secondly, the presence of light blocks the production of melatonin (Figure 5), the tool of frequency and wavelength modulations and energy control [85,91,92].

RECEPTION OF ELECTROMAGNETIC WAVES TARGETS THE MOLECULAR AND CELLULAR REACTIONS

Recent studies have focused on the effect of electromagnetic waves like radio, mobile, visible and UV radiations on the molecular and cellular mechanism. The studies confirm that electromagnetic waves target the biochemical and cellular reactions in the cell [93,94]. This is the same mechanism of reception of emitted waves from bioorganisms. Reception of waves targets the biomolecules which are also involve in the generation like the DNA excitation or relaxation and conformational change with the absorption of waves, change of polarity of polar proteins and water ions and thus changing the conformation of respective molecule, Peroxidation and generation of ROS (and their excitation), change in physiological ratio and functioning of ions and thus changing the membrane-related processes [95]. The other mechanisms involve the targeting of photoproteins (e.g. some types of cytochromes). The photo-proteins detect the electromagnetic wave and change the conformation and can move from one site to another after the conformational change. Photoproteins may be membrane bound/transmembrane enzymes or cytosolic proteins [96]. Also, the one electromagnetic field coming from one organism can change the electromagnetic field in a respective organism when oscillating [93].

RIGHT WAYS TO COMMUNICATE

To communicate properly there are some epigenetic agents or environmental training. The use of proper food, proper scents can enhance generation and reception abilities of an organism [97]. Because the scents and foods control the mood change and hence the frequency of emitted waves [91]. So the use of scents and foods will be according to the type of information one organism want to transfer [23,24]. Some types of chemical supplement which are relevant to generation or reception of electromagnetic waves can be used, i.e., pyrroloquinoline Quinone which is neuroprotective (hence beneficial for the third eye) and also an antioxidant agent for reactive oxygen species [98,99].

The environmental exercises like Muslim's religious exercises, yoga and other means of meditation help in to improve the generation and reception abilities. Also, these exercises awaken the third eye and help in the production of spiritual hormones for proper communication [21,22]. There is an important effect of the lunar cycle on the physiology of the body and thus on the generation and reception of waves. Therefore the lunar dates should be kept in the mind to communicate properly [100-102].

CONCLUSION

Summing it up all, darkness favors the biocommunication in a great many ways and is considered as aiding factor for the proper organism to organism communication. The darkness advantages over the light in terms that light disturbs the propagation of waves while darkness favors the propagation and also darkness favors the production of melatonin that in turn stimulates the electromagnetic waves generation and tight regulation. The protein expression, metabolic pathways changing chemistry, molecular level, cellular and sub-cellular pathways and physiological functionalities that are varying due to the electromagnetic waves reception coming from outsourcing can be studied using electromagnetic waves that are being emitted in turn. With the appliance of this study, this could be way more advance in the sharing of enormously huge data transfer, thoughts sharing using electrical energy synergized with mechanical and chemical energy. To communicate successfully, aiding and countering epigenetic factors (food, scents, meditations and lunar cycle) and other parameters must be taken into account. By keeping in mind the different epigenetic factors that can interrupt the communication and achieve experimental proofs and successful trails, this theory can escort us to a new horizon where electronic, electromagnetic devices can be ruled out and conveying the message or information would be way safer, fast and advance just by using the body's built-in electromagnetic waves generator.

FUTURE PERSPECTIVES

The marking knowledge provides the basis for the mysterious studies like aura neighboring effects, black magic, numerology and spiritual powers. Advantages of this communication over the alternative sources can be elaborated in the means that the type of information which cannot be transferred yet can be transferred by the means of bio-communication. With the appliance of this study, there'll be no need for complicated steps (DNA extraction, DNA amplification, etc.) involved in genome study in order to gather information for a particular disease or metabolic pathway. This can be done with the study of biophotons emission of that particular region using in-silico approaches and could be a way more relieving in studying the details about the molecular assessment of a disease in no time and a fruitful step to future.

REFERENCES

[1] Blake T. Biophoton emissions from cell cultures: Biochemical evidence for the plasma membrane as the primary source. *Gen Physiol Biophys*, **2011,** 30: 301-309.

[2] Bajpai RP. Quantum coherence of biophotons and living systems. *Indian J Exp Biol*, **2003,** 41: 514-527.

[3] http://www.emf-portal.de/

[4] Challis L. Mechanisms for interaction between rffields and biological tissue. *Bioelectromagnetics*, **2005,** 26: S98eS106.

[5] Jelínek F. Experimental investigation of electromagnetic activity of yeast cells at millimeter waves. *Electromagn Biol Med*, **2005,** 24: 301e308.

[6] Cifra M. Study of electromagnetic oscillations of yeast cells in kHz and GHzregion. Czech Technical University in Prague, **2009**.

[7] Kucera O. Technical aspects of measurement of cellular electromagnetic activity. *Eur Biophys J*, **2010,** 39: 1465e1470.

[8] http://www.basic.northwestern.edu/g-buehler/cellint0.htm

[9] Gao X. Molecular mechanisms of cell proliferation induced by low power laser irradiation. *J Biomed Sci*, **2009,** 16.

[10] Bókkon I. Estimation of the number of biophotons involved in the visual perception of a single-object image: Biophoton intensity can be considerably higher inside cells than outside. *J Photochem Photobiol B Biol*, **2010,** 100: 160-166.

[11] Foletti A. Cellular ELF signals as a possible tool in informative medicine. *Electromagn Biol Med*, **2009,** 28: 71-79.

[12] Sun Y. Biophotons as neural communication signals demonstrated by in situ biophoton autography. *Photochem Photobiol Sci*, **2010,** 9: 315-322.

[13] Laager F. Sources and functions of ultra-weak photon emission. In: The School of Physics**.** Seoul National University, **2008**.

[14] Winkler R. Ultraweak and induced photon emission after wounding of plants. *Photochem Photobiol Sci*, **2009,** 85: 962-965.

[15] Simonneaux V. Generation of the melatonin endocrine message in mammals: A review of the complex regulation of melatonin synthesis by norepinephrine, peptides and other pineal transmitters. *Pharmacol Rev*, **2003,** 55: 325-395.

[16] Rick Strassman. DMT: The spirit molecule. Park Street Press Rochester, **2001**.

[17] Harpsøe NG. Clinical pharmacokinetics of melatonin: A systematic review. *Eur J Clin Pharmacol*, **2015,** 71: 901-909.

[18] Redmayne M. The relationship between adolescents' wellbeing and their wireless phone use: A cross-sectional study. *Environ Health*, **2013,** 12.

[19] El-Helaly M. Oxidative stress, melatonin level, and sleep insufficiency among electronic equipment repairers. *Indian J Occup Environ Med*, **2010,** 14: 66-70.

[20] Yogesh S. Mobile usage and sleep patterns among medical students. *Indian J Physiol Pharmacol*, **2014,** 58: 100-103.

[21] Harris AS. The effects of day-time exogenous melatonin administration on cardiac autonomic activity. *J Pineal Res*, **2001,** 31: 199-205.

[22] Lynch G. Mechanisms of white matter change induced by meditation training. *Front Psychol*, **2014,** 5.

[23] Jorgensen RA. Epigenetics: Biology's quantum mechanics. *Front Plant Sci*, **2011,** 2.

[24] Xiuxiu Wang. Recent progress of traditional Chinese medical science based on theory of biophoton. *Front Optoelectron*, **2014,** 7: 28-36.

[25] Creath K. A look at some systemic properties of self-bioluminescent emission. *Proc SPIE*, **2008,** 7057: 705-708.

[26] Srobar F. Occupation-dependent access to metabolic energy in Fröhlic systems. *Electromagn Biol Med*, **2009**, 28: 194e200.

[27] Binhi V, Rubin A. Magnetobiology: The kT paradox and possible solutions. *Electromagn Biol Med*, **2007,** 26: 45e62.

[28] Popp FA. Integrative biophysicse biophotonics. Kluwer Academic Publishers, **2003**.

[29] Amat A. The electricfield induced by light can explain cellular responses to electromagnetic energy: A hypothesis of mechanism. *J Photochem Photobiol B Biol*, **2006,** 82: 152-160.

[30] Beloussov LV. Biophotonics and Coherent Systems in Biology. Springer, **2007**.

[31] Balzano Q. Erratum RF nonlinear interactions in living cells-i: Non-equilibrium thermodynamic theory. *Bioelectromagnetics*, **2007,** 28: 47.

[32] Gerry C. Introductory quantum optics. Cambridge University Press, Cambridge, **2005**.

[33] Beneduci A. Review on the mechanisms of interaction between millimeter waves and biological systems 35e80. *Bioelectrochemistry Research Developments*. **2008**.

[34] Del Giudice E. Role of water in the living organisms. *Neural Network World*, **2009,** 19: 355-360.

[35] Gu B. Mechanics of microtubules modeled as orthotropic elastic shells with transverse shearing. *Acta Mechanica*, **2009,** 207: 195-209.

[36] Popescu G. Coherence properties of red blood cell membrane motions. *Physical Review E*, **2007,** 76.

[37] Beirowski B. Concepts for regulation of axon integrity by enwrapping glia. *Front Cell Neurosci*, **2013,** 7: 256.

[38] Lisi A. Resonance as a tool to transfer information to living systems: The effect of 7 Hz calcium ion energy resonance on human epithelial cells (HaCaT) differentiation. *Cambridge Proc*, **2008,** 902-906.

[39] Lisi A. Resonance as a tool to transfer informations to living systems. *Hangzhou Proc*, **2008,** 540-544.

[40] Michal Cifraa. Electromagnetic cellular interactions. *Prog Biophys Mol Biol*, **2010**, 1-24.

[41] Beloussov V. Biophotonics and coherent systems. Moscow, **2000**.

[42] Trushin M. Light-mediated "conversation" among microorganisms. *Microbiol Res*, **2004,** 159: 1-10.

[43] Mesquita MV. Considerations on undistorted-progressive x-waves and Davydov solitons, FröhlicheBoseeEinstein condensation, and Cherenkov-like effect in biosystems. *Braz J Phys*, **2004,** 34: 489-503.

[44] Montagnier L. Electromagnetic signals are produced by aqueous nanostructures derived from bacterial DNA sequences. Interdisciplinary sciences. *Computational Life Sciences*, **2009**, 1: 81-90.

[45] Montagnier L. DNA waves and water. *J Phys*, **2011**.

[46] Mesquita MV. Large-scale quantum effects in biological systems. *Int J Quantum Chem*, **2005,** 102: 1116-1130.

[47] Medvedeva AA. The variability of early development of vertebrates in their interactions in the optical range of electromagnetic radiation. Moscow State University, **2008**.

[48] Volodyaev. A partial verification of the Gurvich A mitogenetic effect. In: Saratov Fall Meeting, **2009**, International school for junior scientists and students on optics. *Laser Phys Biophys*, **2009**.

[49] Pirogova E. Use of infrared and visible light radiation as modulator of protein activity. *Estonian Journal of Engineering*, **2008.** 14: 107-123.

[50] Anwijk RV. Bio-photons and bio-communication. *Journal of Scientific Exploration*, **2001,** 15: 183-197.

[51] Woolf NJ. Nanoneuroscience: Structural and functional roles of the neuronal cytoskeleton in health and disease. Springer Verlag, **2010.**

[52] Gov N. Dynamics of membranes driven by actin polymerization. *Biophys J*, **2006,** 90: 454-469.

[53] Cifra M. Electric field generated by axial longitudinal vibration modes of microtubule. *BioSystems*, **2010,** 100: 122-131.

[54] Pokorny J. Viscous effects on polar vibrations microtubules. *URSI GA Delhi Proc*, **2005**.

[55] Wang C. Dynamic behaviors of microtubules in cytosol. *J Biomech*, **2009,** 42: 1270-1274.

[56] Gov N. Membrane undulations driven by force fluctuations of active proteins. *Phys Rev Lett*, **2004,** 93.

[57] Wang C. Circumferential vibration of microtubules with long axial wavelength. *J Biomech*, **2008,** 41: 1892-1896.

[58] Bono I. Emergence of the coherent structure of liquid water. *Water*, **2012,** 4: 510-532.

[59] Pollack G. Molecules, water, and radiant energy: New clues for the origin of life. *Int J Mol Sci*, **2009,** 10: 1419-1429**.**

[60] Del Giudice. Collective molecular dynamics of a floating water bridge. *Water J*, **2010,** 2: 69-82.

[61] Chai B. Effect of radiant energy on near-surface water. *J Phys Chem B*, **2009,** 113: 13953-13958.

[62] Del Giudice E. Role of the electromagnetic field in the formation of domains in the process of symmetry-breaking phase transitions. *Phy Rev A,* **2006**.

[63] Teissie J. Biophysical effects of electricfields on membrane water interfaces: A mini review. *EurBiophys J*, **2007,** 36: 967-972.

[64] Lubart R. Low-energy laser irradiation promotes cellular redox activity. *Photomedicine and Laser Therapy*, **2005,** 23: 3-9.

[65] Paul Held. An introduction to reactive oxygen species measurement of ROS in cells. *White Paper*, **2015**.

[66] Vladimirov YA. Free radicals and cell chemiluminescence. *Biochem (Moscow)*, **2009,** 74: 1545-1566.

[67] Wang Ch. Spontaneous and visible light-induced ultraweak photon emission from rat eyes. *Brain Res*, **2011,** 1369: 1-9.

[68] Gutscher M. Proximitybased Protein Thiol Oxidation by H2O2-scavenging Peroxidase. *J Biol Chem*, **2009,** 284: 31532-31540.

[69] Van Wijk R. An introduction to human biophoton emission. *Forsch Komplementarmed Klass Naturheilkd,* **2005,** 12: 77-83.

[70] Mayburov SN. Photons production and communications in biological systems. *Moscow Proc*, **2009**, 1937-1941.

[71] Voeikov VL. Biological oxidation: Over a century of hardship for the concept of active oxygen. *Cellular and Molecular Biology*, **2005,** 51: 663-675.

[72] Majid Rahnama. Emission of mitochondrial biophotons and their effect on electrical activity of membrane via microtubules. *J Integr Neurosci*, **2010**.

[73] Murphy. How mitochondria produce reactive oxygen species. *Biochem J*, **2009,** 417: 1-13.

[74] Borodin I. Using the effect of photo-induced variability of optical properties of chlorophyll-containing tissues for diagnosing the functional state of plants. *Russian Agricultural Sciences*, **2008,** 34: 357-359.

[75] Dam-Vizi V. Bioenergetics and the formation of mitochondrial reactive oxygen species. *Trends Pharmacol Sci*, **2006,** 27: 639-645.

[76] Arendt J. Melatonin and the pineal gland: Influence on mammalian seasonal and circadian physiology. *Reviews of Reproduction*, **1998,** 3: 13-22.

[77] Samuel Sagan. Principles and method of the work. In: Awakening the third eye, **2007**.

[78] David L Nelson. Lehninger principles of biochemistry, New York, **2008**.

[79] Henrique Souza-Teodoro. Adenosine triphosphate inhibits melatonin synthesis in the rat pineal gland. *J Pineal Res*, **2016**.

[80] HJ Burgess. Effects of bright light and melatonin on sleep propensity, temperature and cardiac activity at night. *J Appl Physiol*, **2001,** 91: 1214-1222.

[81] GC Brainard. Action spectrum for melatonin regulation in humans: Evidence for a novel circadian photoreceptor. *J Neurosxi*, **2001,** 21: 6405-6412.

[82] M Mila Macchi. Human pineal physiology and functional significance of melatonin. *Front Neuroendocrinol*, **2004,** 25: 177-195.

[83] Escribá PV. G protein–coupled receptors, signaling mechanisms and pathophysiological relevance. *Biochim Biophys Acta Biomembr*, **2007,** 1768.

[84] Kobilka BK. G protein coupled receptor structure and activation. *Biochim Biophys Acta*, **2006,** 1769: 794-807.

[85] Oh JH. Analysis of circadian properties and healthy levels of blue light from smartphones at night. *Sci Rep*, **2015,** 5: 11325.

[86] Garbers DL. Membrane guanylyl cyclase receptors: An update. *Trends Endocrinol Metab*, **2006,** 17: 251-258.

[87] HM Duvernoy. The human pineal gland. Relationships with surrounding structures and blood supply. *Neurol Res*, **2000,** 22: 747-790.

[88] Andersen LP. A systematic review of peri-operative melatonin. *Anaesthesia*, **2014,** 69: 1163-1171.

[89] Seyed Mohammad Javad MortazaVI. Is it Blue Light or Increased Electromagnetic Fields which Affects the Circadian Rhythm in People who Use Smartphones at Night. *Iran J Public Health,* **2016,** 45: 405-406.

[90] Soafara Andrianome. Disturbed sleep in individuals with idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF): Melatonin assessment as a biological marker. *Bioelectromagnetics*, **2016**.

[91] Singh S, Effect of occupational EMF exposure from radar at two different frequency bands on plasma melatonin and serotonin levels. *Int J Radiat Biol*, **2015,** 91: 426-434.

[92] Steven M Hill. Circadian/melatonin disruption by dim light at night drives paclitaxel resistance in breast cancer via activation of stat3. *AACR J*, **2016**.

[93] Funk RHW. Effects of electromagneticfields on cells: Physiological and therapeutical approaches and molecular mechanisms of interaction. *Cells Tissues Organs,* **2006,** 182: 59-78.

[94] Banjai RP. Biophotons and alternative therapies. *Indian J Exp Biol,* **2008,** 46: 259-432.

[95] Hawkins D. Phototherapy da treatment modality for wound healing and pain relief. *Afr J Biomed Res*, **2007,** 10: 2.

[96] Berson, DM. Strange vision: Ganglion cells as circadian photoreceptors. *Trends Neurosci*, **2003,** 26: 314-320.

[97] Sharma, DS. Relationship of neurotransmitters with stress and sleep. *Indian J Res*, **2015,** 4.

[98] Muhammad N. The life history of pyrroloquinoline quinone (PQQ): A versatile molecule with novel impacts on living systems. *Mol Biol*, **2016,** 1: 1-5.

[99] Naveed M. Evaluation of glucose dehydrogenase and pyrroloquinoline quinine (PQQ) mutagenesis that renders functional inadequacies in host plants. *J Microbiol Biotechnol*, **2015,** 25: 1349-1360.

[100] Gerald Jerome Maarman. Effects of uric acid and melatonin exposure on mitochondrial complex-I respiration, triglyceride accumulation and aconitase activity in skeletal muscle cells. *FASEB J*, **2016,** 30: 1.

[101] Naveed M. In-silico analysis of non-synonymous-SNPs of STEAP2: To provoke the progression of prostate cancer. *Open Life Sci*, **2016**, 11: 402-416.

[102] Naveed M. Bioinformatics based structural characterization of glucose dehydrogenase (gdh) gene and growth promoting activity of *Leclercia* sp. QAU-66. *Braz J Microbiol*, **2014,** 45: 603-611.