

Quantum Events of Biophoton Emission Associated with Complementary and Alternative Medicine Therapies: A Descriptive Pilot Study

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ABSTRACT

Introduction: Biophoton emission (BPE) is a quantum event characterized by a relatively stable but ultra-low-rate emission of visible photons from living organisms. It has been associated with high energy processes such as: cell metabolism, growth, phagocytosis, neural activity, and oxidative stress. BPE has also been suggested to reflect the organism's global state of health as well as the response to stimulation including therapeutic interventions. If BPE changes occur as a result of various complementary and alternative medical interventions, this could prove useful to monitor both the patient's response to a specific treatment and global changes in their health status. This descriptive study attempts to identify BPE changes associated with three different chiropractic techniques that use different energetic approaches: mechanical, gravitational, and bioenergetic.

Materials and Methods: The BPE was measured at the neck and/or the lower back of 3 asymptomatic adult male volunteers. The measurements were made before and after different chiropractic interventions. The treatment techniques included a high velocity joint manipulation with the aid of a drop table, Sacro-Occipital Technique, and Bio-Energetic Synchronization Technique. Enough time was allotted for measurements in order to differentiate between natural fluctuation of the BPE and the changes induced by the interventions.

Results: All techniques induced small (up to 20%) but statistically significant changes ($p < 0.05$ in one case, $p < 0.001$ in the other two) in the BPE. Each technique demonstrated a different pattern of BPE change that may be specific to the technique.

Conclusion: The intensity of BPE is a noninvasive indicator of the health of the human body and is significantly altered in different ways by chiropractic interventions. Future research is necessary to explore more features of BPE and its utility as an indicator of health, as well as the theoretical and clinical significance of these findings.

INTRODUCTION

There is a growing body of research related to the light (electromagnetic radiation in the visible region) produced by living systems. This phenomenon is known as biophoton emission (BPE).^{1,2} The photons are quanta of electromagnetic energy and their absorption and emission obey the laws of quantum physics. The primary characteristic of BPE is its very low intensity of up to some hundred photons per second.^{3,4} *In vitro* measurements demonstrate that

BPE is correlated with cell metabolism, phagocytosis, neural activity, and oxidative stress.^{1,5} All of these involve intense energetic reactions important to cell functioning.^{2,5} *In vivo* measurements are therefore suggested to be a global indicator of health or sickness^{2,6} and correlations between BPE and different pathologies including hemiparesis,⁷ multiple sclerosis,³ cancer,^{6,8} and hyperlipidemia⁶ have been described.

Complementary and alternative medical (CAM) therapies are believed to affect the body in different ways through

varying hypothesized mechanisms to improve well being. The importance of balancing or fostering homeostasis in bodily processes is a central concept of CAM theories. It has also been proposed that the effects of CAM therapies are mediated by phenomena other than exclusively biochemical^{9,10} and therefore these phenomena, mainly energetic, need to be investigated.¹¹

Noninvasive measurements that can evaluate various changes in biological systems include chemical analyses of blood, urine and other products (as done classically) and energy measurements that might be more important for CAM. The more common noninvasive electromagnetic energy measurements include electrocardiogram (ECG), electroencephalogram (EEG), and thermography. These record slow variable electric fields produced by internal organs (heart, brain) and the electromagnetic energy released by the body as infrared radiation. The developing BPE measurements are similar to infrared recordings but address a different energy scale. The value of infrared photon energy is comparable to the value of the kinetic energy of thermal movement of molecules ($E = 0.132$ eV at 9350 nm), while the visible photons have higher energy values (range, 1.67–3.41 eV). Thus, the biophotons may be an important factor in the energetics and the physiology of a cell.² Moreover, the emission of individual photons as well as their coherence are aspects that are described only by quantum physics theory,^{2,12} making the BPE one of the first methods that may investigate quantum aspects of biological structures.^{11,13}

Among the CAM therapies that attempt to influence the body's physiology through energetic interventions are manipulative methods, acupuncture, and biofield therapies. Manipulative therapies include chiropractic and osteopathy and use mechanical energy, while acupuncture and biofield therapies use other types of energies.¹⁴ There is limited evidence that these therapies directly affect quantum molecular phenomena such as photon emission.^{2,6,7,12} The development of valid and reliable measurements of BPE^{2,13} also reveals the fact that BPE is affected by disease states and therapies applied. It was proposed that BPE may be affected by medical intervention,^{10–12} and more specifically by CAM therapies such as chiropractic.¹⁵ The purpose of this pilot clinical study is to evaluate BPE before and after 3 different energy-based procedures usually used by, but not limited to, chiropractic: mechanical kinetic in the form of a short lever high velocity (SLHV) thrust,¹⁶ gravitational,¹⁷ and biofield-based interventions (adjustments).¹⁸

MATERIALS AND METHODS

BPE was measured using a photomultiplier with a Hamamatsu H6180-1 photomultiplier and C8855 counting unit connected to a personal computer. The equipment and room setup followed protocols of previous studies that recorded BPE in humans.^{2,3,7,19}

The special dark room required for BPE measurements was created by modifying an existing radiologic film developing room. The dark count (background light) in the recording room was at the level of the instrument noise, 7–9 counts per second (cps), and was verified and recorded before each subject was tested. This ensured that any change recorded at the level of the subject was from the subject himself and not due to transient changes caused by residual light in the room.

The study protocol and the informed consent were approved by the Institutional Review Board for Human Subjects of Parker College of Chiropractic, Dallas. The subjects were 3 volunteer asymptomatic male Caucasian college students. The recordings were made in a manner similar to previous studies.^{3,7,19} Each subject was admitted into an entrance room for a resting period of up to 20 minutes to allow for natural phosphorescence and delayed luminescence to decay. In the recording room, they were placed in a prone position on a chiropractic table. The recordings were performed midline, over the spinous processes of the second cervical (C2) and fourth lumbar (L4) vertebrae. These levels were chosen because they are easy to identify by palpation using body landmarks,²⁰ making possible the placement and repositioning of the photomultiplier in the dark room without the need for further illumination. Whenever possible, the photomultiplier was left in place, even during chiropractic procedures, so that the possible variability due to the replacement of the instrument was eliminated. All subjects were left in the prone position throughout the period of pretesting, treatment and post-testing to minimize BPE fluctuation artifacts potentially created by subject movement or repositioning.

The techniques used were SLHV manipulation with a drop table,¹⁶ Sacro-Occipital Technique (SOT) blocking,¹⁷ and Bio-Energetic Synchronization Technique (BEST).¹⁸ The data were collected as cps and stored as Microsoft Excel 2002 spreadsheets. They were later analyzed using the statistical package of Excel. The statistical significance was assessed for a 95% confidence interval (CI) using the unpaired 2-tail *t*-test.

Case 1 (Age 27)

Only one table-drop-assisted SLHV manipulation (“adjustment”) was performed at the 4th cervical vertebra. The intervention consisted of posterior to anterior mechanical displacement with no rotation of the cervical spine. The values for luminescence at C2 and L4 levels were recorded before and after manipulation for 200 seconds.

Case 2 (Age 36)

“Blocking” in the prone position for a Category I was used as a part of SOT. The luminescence was recorded over the spinous processes of L4 and then of C2 for 5 minutes each. The blocks were then positioned to elevate the sub-

ject's pelvis asymmetrically, and then left in place for 10 minutes. Because the movement of the body during repositioning is greater at the lumbo-pelvic region, the photomultiplier remained at the C2 level during the treatment so that a continuous measurement was possible during the procedure. After removing the blocks the BPE was recorded for 5 more minutes at C2 and then at the L4 level.

Case 3 (Age 50)

BEST treatment technique was used with this subject. Because the technique involves multiple gentle finger contacts on the body, the BPE was recorded continuously at only one level. The L4 spinous process was chosen because the cervical measurements might have interfered with BEST procedures. The measurements started 200 seconds before the procedure, which took about 7 minutes. The BPE was measured for an additional 10 minutes after the intervention was performed.

RESULTS

The average values for BPE together with the standard deviation (SD), the values of first and last 100 seconds of the measurement, the percentage variation between recordings pre- and postadjustment, and the probability to reject the null hypothesis (unpaired *t*-test) as well as Q values were calculated for all cases (Table 1). The Q² or δ -value^{7,21} represents a measure of the degree of coherence of the signal. It is calculated as variance/mean⁻¹, with a value approaching zero meaning a fully coherent field.

The variations obtained were in both directions (increase and decrease) and were as high as 28% for BPE intensity. All changes were statistically significant from the values before the treatments, *p* < 0.001 in all cases except for C2 in case 2, which was *p* = 0.047. The variation in mean values is presented at both levels for case 1 (Fig. 1), at the level of C2 for case 2 (Fig. 2), and at the level of L4 for case 3 (Fig. 3). The

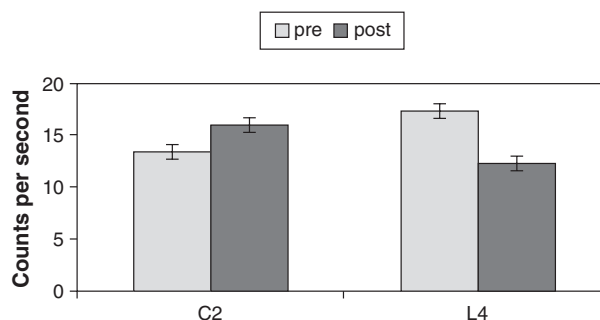


FIG. 1. Mean biophoton emissions (BPE) for every 200 seconds at the C2 and L4 vertebral levels for case 1, measure pre- and post-short lever high velocity manipulation.

decrease in Q value was greatest in case 1 at both locations C2 and L4. In case 2 the Q value increased at L4 and decreased at C2, whereas in case 3 it decreased slightly. However the Q values were all > 0.3, meaning an incoherent field or the presence of an incoherent field, and differed from the values reported for other regions of the body.^{2,7,19}

BPE displays fluctuation due to various factors.^{2,13} However, with enough recording data over short periods of time the BPE fluctuation is less than 5%.^{3,4,22} We verified (data not shown) that for our setup, using 100 seconds or more as recording time, the maximum variation was 4.5% for a person resting prone for 40 minutes, and that the subsequent recording intervals did not statistically differ from the first (95% CI).

DISCUSSION

There is no definitive interpretation of the biophotons produced by living bodies. Besides the correlation with biochemical processes, there is also a nonlocal effect involved in cellular regulation.^{2,11} This hypothesis has been expanded by a model of a supracellular structure created by the stationary electromagnetic field that exchanges energy and in-

TABLE 1. VALUES AND STATISTICS OF BIOPHOTON EMISSION (BPE)

Technique	Level	BPE values before adjustment				BPE value after adjustment				P	BPE variation
		First 100 s	Last 100 s	Mean BPE	Q before	First 100 s	Last 100 s	Mean BPE	Q after		
SLHV	C2	13.57	13.26	13.37 ± 5.35	1.14	16.12	15.80	15.96 ± 4.68	0.37	<0.001	19.41%
	L4	17.87	16.89	17.26 ± 5.74	0.90	12.42	12.28	12.35 ± 4.38	0.55	<0.001	-28.42%
SOT	C2	23.60	25.06	23.95 ± 6.36	0.69	25.01	24.69	24.81 ± 6.16	0.52	0.047	3.57%
	L4	22.07	20.01	21.33 ± 5.70	0.52	24.61	21.09	23.29 ± 6.19	0.64	<0.001	9.18%
BEST	C2	15.01	14.80	14.91 ± 4.97	0.66	15.56	17.21	16.68 ± 5.08	0.54	<0.001	11.90%

SLHV, short lever high velocity; SOT, Sacro-Occipital Technique; BEST, Bio-Energetic Synchronization Technique.

The average of the first 100 and last 100 seconds recorded are presented as well as the mean value and standard deviation (SD) for the entire measurement. The P value (unpaired 2-tailed *t*-test), the percentages of the variation of the BPE, and the Q values were calculated for the mean values of the entire measurement of the BPE before and after interventions.

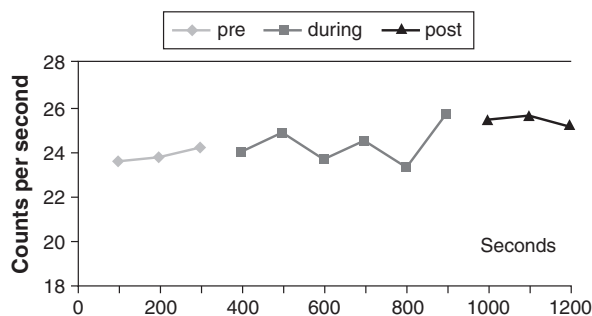


FIG. 2. Mean biophoton emissions for every 100 seconds at the C2 level for case 2, measured pre-, during, and post-treatment with Sacro-Occipital Technique pelvic blocking.

formation with the underlying tissue.^{2,12,15} Thus, the communication and correlation between different molecular and cellular processes may occur in the entire body at various distances through this electromagnetic field, which is partially described by the BPE. The results presented here suggest that BPE may be affected by CAM interventions. This implies that the energy of therapies used in this study is distributed for long distances, even to the opposite end of the body. Thus, the possibility that biophoton measurements may disclose a direct bioelectromagnetic connection between different parts of the body deserves further investigation. This might be a possible mechanism underlying therapies including chiropractic, osteopathy, acupuncture, reflex therapy, Reiki, among others.

It remains for further studies to quantify the natural and pathologic variation of BPE although limited data suggest that in particular conditions BPE intensity varies as much as 100%.^{3,6,7} The results presented here are smaller than that but greater than natural variation during a short period of time.

The variety of the intervention used may imply that a traditional chiropractic SLHV manipulation, a structural-type intervention like SOT, and a bioenergetic one like BEST may have in common a direct quantum effect on certain biological processes. The observed changes induced by these techniques were different, suggesting that their mechanism of action may also involve different pathways affecting the same basic processes of emitting biophotons.

The SLHV manipulation used in case 1 combines the kinetic energy of the dropping piece to that of the practitioner. Using this technique created a statistically significant change on BPE, not only locally but also distally (19.4% increase at the C2 level, 28.4% decrease at the L4 level). On average, there was a 7.5% decrease of BPE after the chiropractic manipulation. Thus, it can be speculated that the energy of intervention may have been used by the tissues more for structural changes than for energy-producing processes. In addition, the BPE was quite stable, both before and after the joint manipulation, which means the redistribution of energy occurred during the short period of the manipulation itself.

In case 2, pelvic blocking was applied as part of SOT, a procedure whereby gravitational energy (body weight) is allowed to change the relative position of the tissues of the body and hence affects their functions. As a result, there was an observed overall increase in body luminescence at both levels (9.1% at L4 and 3.5% at C2). The continuous measurements at the C2 level suggest that the BPE level displayed high fluctuation although its average remained almost constant during the blocking period whereas, after blocking, when balance was achieved and the blocks were removed, it increased and ultimately remained stable. Although the percent of the variation is low, the statistical analysis shows that the values are different ($p = 0.047$). The overall increase of BPE at both locations might suggest an intensification of high metabolic processes in the body that might be involved in the proposed cranio-sacral respiratory mechanism that constitutes the basis of SOT and others cranio-sacral therapies.¹⁷ Although our data did not permit us to distinguish between different sources of luminescence, it did serve as a monitor of the chiropractic intervention, signaled by the increased BPE and the decrease in its variability observed when balance was achieved.

BEST, used in the third case, seeks to redistribute the patient's energy of segmented areas "thus disrupting the bio-magnetic segmentation" and "allowing the natural balancing of the energy fields to occur."¹⁸ The process is guided through successive light contacts on the patient's body; it is hypothesized that the interaction between patient's and the doctor's biological fields will eventually lead to functional and structural changes. The results revealed a marked increase (11.9%) in the BPE that started at the end of the treatment and continued to rise thereafter. This supports the principles of the technique, which presupposes that healing mechanisms are balanced by BEST intervention and continue to work thereafter. Using only one location for recording could not provide sufficient information to determine if the same trend can be obtained in other parts of the body by applying the same process. However, it appears that light

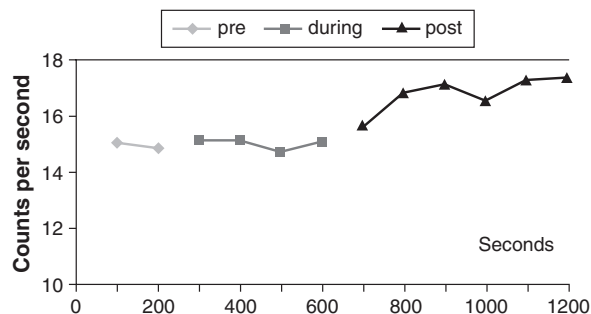


FIG. 3. Mean biophoton emissions for every 100 seconds at the C2 level for case 3, measured pre-, during, and post-treatment with Bio-Energetic Synchronization Technique.

touches at multiple distant areas actually induce strong reactions from the body that may be involved in healing mechanisms.

This study had limitations that need to be addressed in subsequent studies. No theory exists to explain the possible relationship between the proposed mechanisms of action of the therapies used and BPE. In addition, there are only limited data about the natural variation of the BPE for periods under an hour that may affect the recordings, especially related to body movements and duration of the experiment. The effect of movement is especially important for recording data in the hypotheses of calculating the Q values since the motion of the source can alter the coherence of the signal.¹⁹ The duration of experiments also may alter the results since there is a natural biorhythm of all biological processes and the hourly or diurnal variation of BPE have not been yet precisely described. The procedures used, especially SOT blocking, are part of the complex therapeutic approach that usually includes an entire set of interventions and not just a single manipulative thrust or blocking as used in this study, although each individual procedure has been noted to have its own therapeutic effect.¹⁷ The literature suggests that disease states induce high variations and/or asymmetries in the BPE.^{3,6} However, our subjects were asymptomatic and the treatment effect on BPE may be less profound than in symptomatic cases. In investigating pathologic cases, a correlation with other objective parameters such as skin temperature, heart rate, and oxygen consumption will be also useful. Measurement of left/right asymmetries will be of value, with the observation that there is a need for different protocols to ensure simultaneous measurements from both sides to reduce the interference from natural biorhythms and to address the asymmetries implied by the interventions.

CONCLUSION

The BPE at the spinal level recorded in three cases of different energy type CAM interventions indicated that the high energy producing processes in the body appear to be influenced by those procedures. The particular mechanisms of action may involve both direct energetic input into the local tissue and the body's reaction to that stimulation. The type of energy input used in these cases was mechanical kinetic, potential gravitational, and the bioelectromagnetic field of the therapist. All of these induced statistically significant changes of the BPE that were higher than the physiologic variation of the BPE. In the cases presented, the BPE changes were recorded both at close proximity to the intervention and at a distance. They also induced changes of Q value, a parameter related to the coherence of the photonic field that requires further evaluation. The study revealed that there is also a need for more studies to correlate the BPE with other physiological parameters including skin temperature, heart rate, and oxygen consumption in order to eluci-

date the intimate mechanism by which any therapeutic intervention alters the bioenergetics of the organism. It is necessary to have a database of precise quantitative relationships between BPE and pathological processes in the body so that BPE can reliably assess the evolution of diseases and the effect of therapy. Finally, it is important for studies of BPE to be expanded by analyzing the spectrum of the emission and its coherence. This study demonstrates that the quantum behavior of the high energy processes of the human body that constitute the source of BPE are altered in some way by energy-based interventions, such as those used by chiropractors and other CAM practitioners. Future research will have to explore the potential significance and the clinical applications of this finding.

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