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Biophoton Therapy in Lyme Disease: Neurophysiological and Bioenergetic Improvements Over 4 Weeks - A Case Report

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ABSTRACT

Background: Lyme disease frequently results in persistent neurological dysfunction even after standard antibiotic therapy, with symptoms including cognitive impairment, fatigue, and impaired vigilance. Biophoton therapy, a non-invasive intervention that emits ultra-weak photons, has been proposed to restore mitochondrial function, support systemic bioenergetics, and improve neural efficiency.

Methods: We present a case study of a 54-year-old female patient with chronic Lyme disease who underwent continuous biophoton therapy for four weeks using two Tesla BioHealers. Neurophysiological outcomes were assessed at baseline, Week 2, and Week 4 using quantitative EEG (qEEG), event-related potentials (ERPs), and behavioral reaction times. Patient-reported outcomes (SF-36) and pulmonary function (spirometry) were also measured. Systemic energy balance was evaluated using Bio-Well gas discharge visualization technology to quantify organ-specific and integral energy changes.

Results: The patient demonstrated progressive improvement in quality of life (SF-36: ~1,200 baseline to ~3,300 at Week 2) and pulmonary function (spirometry: ~150 baseline to ~430 at Week 2). EEG findings showed early normalization of posterior alpha activity, reduced theta/beta ratio, and sustained improvement in reaction time (470 ms baseline to 411 ms a Week 4). ERP analysis revealed a transient improvement in visual processing latency at Week 2. Bio-Well assessments indicated a systemic shift from fragmented and depleted energy at baseline to coherent, balanced energy fields by Week 4. All organs with baseline energy below 4 Joules ($\times 10^{-2}$) increased above this threshold, with a mean overall energy gain of +0.73 per organ.

Conclusion: Biophoton therapy was associated with multidimensional improvements in cortical efficiency, systemic energy balance, and functional outcomes in a patient with chronic Lyme disease. These findings highlight the potential of biophoton therapy as a novel non-invasive intervention for post-infectious neurological dysfunctions, warranting further validation in controlled clinical studies.

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Introduction

Lyme disease, caused by the spirochete *Borrelia burgdorferi*, is a multisystemic infection that frequently involves the central nervous system, leading to a clinical syndrome termed Lyme neuroborreliosis (LNB) [1]. Neurological manifestations of LNB include cognitive dysfunction, impaired attention, memory deficits, fatigue, and mood disturbances, which can persist even after antibiotic treatment and contribute to long-term disability [2-4]. These neurocognitive impairments are often associated with alterations in electrophysiological markers such as cortical over-arousal, abnormal vigilance regulation, and slowed information processing [4-5].

Emerging evidence highlights the role of mitochondrial dysfunction and bioenergetic imbalance in the pathophysiology of persistent Lyme symptoms. Biophotons, defined as ultra-weak photon emissions from living cells, are increasingly recognized as important mediators of cellular communication, metabolic regulation, and neural signaling. Prior studies have shown that externally applied biophoton-emitting devices can enhance mitochondrial function, improve systemic energy distribution, and support neural recovery [6-8].

Clinical observations suggest that biophoton therapy may improve neurological and systemic symptoms across a spectrum of chronic conditions, including Alzheimer's disease, Parkinson's disease, stroke, traumatic brain injury, diabetes, and chronic pain disorders [9-26]. However, rigorous neurophysiological evidence in the context of Lyme disease remains limited. Quantitative EEG (qEEG) and electrophysiological biomarkers such as event-related potentials (ERPs) provide sensitive tools for assessing cortical arousal, attentional control, and cognitive processing speed [27]. Complementary measures such as Bio-Well energy assessments further enable the evaluation of systemic bioenergetic trends, offering a multidimensional perspective on therapeutic effects.

The present case study investigates the neurophysiological and systemic energy effects of biophoton therapy in a female patient with Lyme disease over a four-week treatment period. By integrating qEEG, ERP, behavioral metrics, and Bio-Well organ energy mapping,

this study provides novel insights into the potential role of biophoton therapy in restoring cortical efficiency, enhancing energetic balance, and improving quality of life in patients with post-infectious neurological dysfunction.

Materials and Methods

Patient and Study Design

A 54-year-old female patient diagnosed with chronic Lyme disease was enrolled in this case study. The intervention consisted of daily exposure to two Tesla BioHealers, applied continuously for four weeks. Neurophysiological and systemic energy assessments were conducted at baseline, Week 2, and Week 4 to evaluate treatment effects.

Measurement of Quality of Life

Quality of life was assessed using the Short Form-36 Health Survey (SF-36), a validated questionnaire widely applied in clinical and research settings to evaluate patient-reported health status across multiple domains. The SF-36 includes eight subscales physical functioning, role limitations due to physical health, role limitations due to emotional problems, vitality, emotional well-being, social functioning, pain, and general health perceptions. Scores from each domain were aggregated to generate a total composite score, with higher values indicating better perceived health and functional capacity. The patient completed the SF-36 at baseline, Week 1, and Week 2 to track changes in self-reported quality of life throughout the course of biophoton therapy.

Spirometry Measurement Device

Pulmonary function was assessed using the Microlife Digital Peak Flow Meter with FEV_1 & Tracking Software (Microlife AG, Switzerland). This portable, battery-operated digital spirometer is designed for home and clinical use to monitor respiratory performance. The device measures two key lung function parameters: (1) Peak Expiratory Flow (PEF): the maximum flow achieved during a forced expiration starting from full lung inflation. Peak Expiratory Flow (PEF): Measurement range: 50 to 900 L/min. Accuracy: ±10% or ±20 L/min (whichever is greater). Resolution: 1 L/min (2) Forced Expiratory Volume in 1 Second (FEV_1): the volume of air exhaled in the first second of a forced breath.

EEG Recording and Analysis

Electroencephalographic (EEG) data were collected using the BrainView system with a standard 21-channel configuration according to the international 10–20 system. Quantitative EEG (qEEG) and event-related potentials (ERPs) were recorded during eyes-closed and eyes-open resting conditions. Key metrics included posterior alpha peak frequency, theta/beta ratio, frontal alpha asymmetry, alpha ratio (closed/open), and ERP components (P2 and P3b latencies). Behavioral reaction time was measured simultaneously. Data were analyzed against normative electrophysiological databases, with z-scores used to quantify deviations.

Bio-Well Energy Assessments

Systemic bioenergetic profiles were obtained using the Bio-Well device, which measures gas discharge visualization (GDV) from fingertips to infer energy distribution across organ systems. Parameters analyzed included total integral energy, organ-specific energy levels, left-right symmetry, and coherence of the energy field. Comparative analyses were conducted between baseline and Week 4 to identify shifts in systemic energy balance.

Outcome Measures

The primary neurophysiological endpoints included normalization of posterior alpha frequency, reduction in the theta/beta ratio, and improvements in event-related potential (ERP) latencies and behavioral reaction times. Secondary outcomes focused on systemic bioenergetic balance, as assessed by Bio-Well integral measures, and organ-specific energy changes reflecting shifts in physiological coherence.

Results

Clinical Outcomes. Patient-reported quality of life, measured by the SF-36 questionnaire, improved steadily over the treatment period. Total scores increased from approximately 1,200 at baseline to 2,200 at Week 1 and 3,300 at Week 2, reflecting marked gains in physical functioning, vitality, and overall well-being (Figure 1). Pulmonary function testing showed parallel improvement, with spirometry values rising from ~150 at baseline to ~380 at Week 1 and ~430 at Week 2, indicating enhanced respiratory capacity.

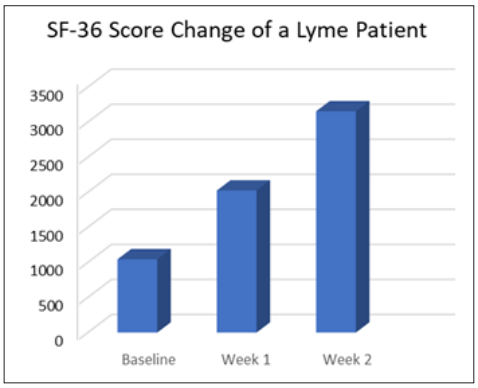

Figure 1: SF-36 Score Changes in a Patient with Lyme Disease over Two Weeks of Biophoton Therapy. The Bar Graph Illustrates Progressive Improvement in Quality of Life, as Measured by the SF-36 Questionnaire, from Baseline through Week 1 and Week 2. Scores Increased Substantially from Baseline (~1,200) to Week 1 (~2,200) and further to Week 2 (~3,300), Indicating Marked and Continuous Patient-Reported Health Improvement

Pulmonary Function

Spirometry assessments demonstrated consistent improvement in respiratory capacity over the treatment period. At baseline, forced expiratory readings were approximately 150 units, reflecting reduced pulmonary efficiency. By Week 1, values increased markedly to ~380, and by Week 2 reached ~430, representing nearly a threefold improvement compared with baseline. This steady upward trajectory indicates that biophoton therapy was associated with enhanced lung function and respiratory resilience, which may contribute to improved energy availability and reduced fatigue in the patient.

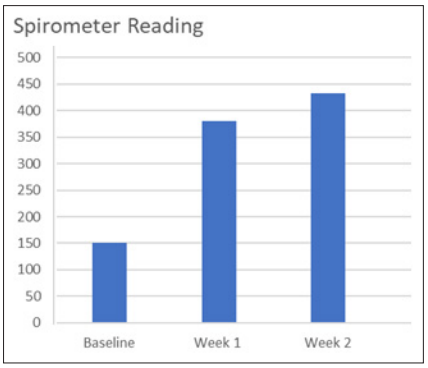

Figure 2: Spirometry Readings in a Patient with Lyme Disease before and after Two Weeks of Biophoton Therapy. Pulmonary Function Improved Progressively from Baseline (~150) to Week 1 (~380) and Week 2 (~430). The Steady Increase in Spirometer Values Indicates Enhanced Respiratory Capacity and Lung Function following Treatment

EEG Findings

Baseline qEEG revealed widespread deviations from normative values, particularly in frontal and parietal cortices, consistent with cortical over-arousal and impaired vigilance regulation. By

Week 2, partial normalization was evident, including a reduction in posterior alpha hyperarousal and improvements in attentional control, as reflected by stabilization of the theta/beta ratio (0.65). At Week 4, additional gains were observed in vigilance regulation, as demonstrated by an elevated alpha ratio (>2.0).

ERP analysis showed substantial improvements in visual processing, with P2 latency decreasing from 200 ms at baseline to 144 ms a Week 2, before regressing to 256 ms a Week 4. Auditory processing latency remained stable overall, despite a transient delay at Week 2. Working memory, assessed by P3b latency, showed mild prolongation (420 ms baseline to 456 ms a Week 2 and 444 ms a Week 4). In contrast, behavioral reaction time demonstrated sustained improvement, decreasing from 470 ms at baseline to 413 ms a Week 2 and 411 ms a Week 4.

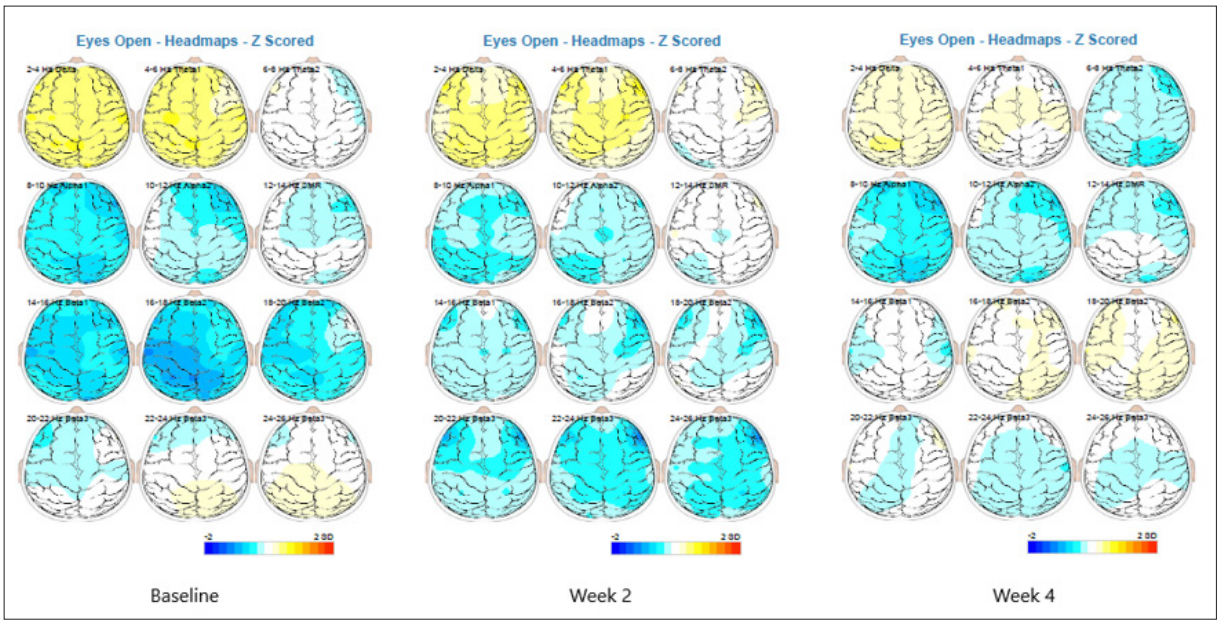

Figure 3: Quantitative EEG (qEEG) Z-Scored Headmaps (eyes open) of a Lyme DISEASE Patient Across Baseline, Week 2, and Week 4 of Biophoton Therapy. The Maps Illustrate Frequency-Specific Cortical Activity Deviations from Normative Databases, with Warmer Colors (yellow-red) Indicating Elevations above the Norm and Cooler Colors (blue) Reflecting Reductions. At Baseline, Widespread Deviations were Observed, Particularly in Frontal and Parietal Regions. By Week 2, Cortical activity Showed Partial Normalization with Reduced Deviations, and by Week 4 further Improvements were Evident, Suggesting Progressive Restoration of Cortical Function over the Treatment Period

Table 1: EEG Metric Baseline Week 2 Week 4 Interpretation

EEG Metric	Baseline	Week 2	Week 4	Interpretation
Posterior Peak Frequency (Eyes Closed, Hz)	11.8	11.1	11.0	Normalized from hyper-aroused alpha
Posterior Peak Frequency (Eyes Open, Hz)	12.3	11.1	11.1	Stabilized cognitive arousal
Theta/Beta Ratio (Eyes Open)	0.62	0.65	0.51	Improved attentional control
Frontal Alpha Asymmetry (% Open Eyes)	-5%	-2%	-15%	Elevated asymmetry at Week 4
Alpha Ratio (Closed/Open)	1.59	—	2.25	Improved vigilance regulation
Visual Processing (P2 Latency, ms)	200	144	256	Peak improvement at Week 2
Auditory Processing (P2 Latency, ms)	132	176	132	Transient delay at Week 2
Working Memory (P3b Latency, ms)	420	456	444	Slight regression at Week 2 and 4
Reaction Time (ms)	470	413	411	Marked and sustained improvement

Biophoton therapy was associated with early improvements in attentional processing and posterior alpha normalization at Week 2. However, working memory latency remained impaired, and by Week 4, although some vigilance regulation improved, new abnormalities in frontal alpha asymmetry and visual processing latency appeared.

Bio-Well Energy Assessments

Bio-Well analyses revealed significant systemic and organ-level energy improvements over the four-week treatment. At baseline, the patient's energy field was fragmented and asymmetric, with pronounced depletion in kidney/adrenal, spleen-pancreas, and nervous system meridians. By Week 4, the energy field became more coherent and balanced, with increased integral energy and improved left–right symmetry (Table 2).

Table 2: Comparative Trends of Organ Energy Changes

Aspect	Baseline	Week 4	Change
Aura/Field Shape	Fragmented, irregular	Continuous, smoother	Major improvement
Kidney/Adrenal	Severely depleted	Strengthened	Improved systemic energy
Liver/Gallbladder	Scattered, unstable	Balanced, reduced scattering	Improved detox/processing
Spleen-Pancreas	Suppressed	Normalized	Improved immune-digestive reserve
Brain/Nervous System	Asymmetry present	More symmetrical	Correlates with qEEG gains
Integral Energy	Low	Higher	Improved vitality
Left–Right Symmetry	Poor	Improved	Greater systemic balance

Organ-specific trends showed that most systems exhibited net energy gains, with an average increase of +0.73 per organ. Notably, all organs with baseline energy values below 4 Joules ($\times 10^{-2}$) increased above this threshold by Week 4. The most pronounced improvements were observed in the digestive system (rectum, ileum, coccyx/pelvis minor zone), respiratory system (throat, mammary glands), and endocrine system (thyroid, pancreas, adrenals). Conversely, modest decreases were noted in the eyes, spleen, and certain spinal zones. (Table 3).

Table 3: Detailed Organ/System Energy Changes from Baseline to Week 4

System	Organ	Baseline (Joules (x 10^{-2})	Week 4 (Joules (x 10^{-2})	Energy Gained (Joules (x10^{-2})
Head	Head	4.87	5.16	+0.29
	Eyes	5.54	4.31	-1.23
	Ears, nose, maxillary sinus	5.53	4.19	-1.34
	Jaw, Teeth	6.39	5.61	-0.78
Cerebral zone	Cortex	5.25	4.39	-0.86
	Vessels	3.63	4.85	+1.22
Endocrine system	Hypothalamus	5.56	4.92	-0.64
	Epiphysis	4.25	4.46	+0.21
	Pituitary gland	5.15	6.25	+1.10
	Thyroid gland	5.51	7.03	+1.52
	Pancreas	4.35	5.94	+1.59
	Adrenals	3.57	5.48	+1.91
	Spleen	5.56	4.28	-1.28
Cardiovascular system	Cardiovascular system	4.45	5.31	+0.86
	Cardiovascular system	5.22	5.71	+0.49
	Heart	4.80	5.72	+0.92
	Coronary vessels	4.15	4.98	+0.83
Respiratory system	Respiratory system	5.28	6.41	+1.13
	Throat, larynx, trachea	6.03	7.63	+1.60
	Mammary glands	4.37	6.04	+1.67
	Thorax zone	5.45	5.56	+0.11
Musculoskeletal system	Spine – cervical zone	5.39	4.48	-0.91
	Spine – thorax zone	6.30	4.26	-2.04
	Spine – lumbar zone	6.56	4.74	-1.82
	Sacrum	6.06	7.82	+1.76
	Coccyx, Pelvis minor zone	5.27	9.62	+4.35
Digestive system	Digestive system	4.78	6.07	+1.29
	Colon – descending	5.23	4.78	-0.45
	Colon – sigmoid	4.66	5.84	+1.18
	Rectum	4.01	9.02	+5.01
	Blind gut	7.05	9.51	+2.46
	Colon – ascending	6.33	5.59	-0.74

	Colon – transverse	5.08	4.86	-0.22
	Duodenum	3.43	5.53	+2.10
	Ileum	3.15	7.84	+4.69
	Jejunum	4.81	6.31	+1.50
	Liver	3.89	5.18	+1.29
	Gallbladder	4.37	5.10	+0.73
	Appendix	6.09	6.42	+0.33
	Abdominal zone	5.62	5.50	-0.12
Urogenital system	Urogenital system (1)	3.96	4.96	+1.00
	Urogenital system (2)	3.51	4.91	+1.40
	Kidneys	4.40	5.01	+0.61
Nervous system	Nervous system	5.96	6.35	+0.39
Immune system	Immune system	5.96	5.72	-0.24
Mean	—	5.01	5.72	+0.73

Summary of Energy Change. The analysis shows that most organs and systems demonstrated positive energy gains from baseline to Week 4, with only a minority exhibiting reductions. Importantly, all organs with baseline energy levels below 4 Joules ($\times 10^{-2}$) increased to values above this threshold by Week 4. The most notable improvements were observed in the digestive system (rectum, ileum, coccyx/pelvis minor zone), respiratory system (throat, mammary glands), and endocrine organs (thyroid, pancreas, adrenals). A smaller subset of regions, such as the eyes, spleen, and selected spinal zones, displayed modest decreases. On average, the net overall energy gain was +0.73 per organ, reflecting a favorable systemic trend toward enhanced energetic balance and function. This finding is particularly significant for patients with Lyme disease, as low energy is one of the most debilitating factors impacting quality of life.

Discussion

This case study demonstrates that biophoton therapy was associated with progressive improvements in neurophysiological and systemic energy parameters in a patient with chronic Lyme disease. Improvements were observed across patient-reported outcomes, respiratory function, EEG biomarkers, and Bio-Well energy assessments, suggesting multidimensional therapeutic effects, which are consistent to the other clinical outcomes of using biophoton generators to treat a variety of disorders [9-26].

At baseline, the patient exhibited cortical over-arousal, impaired vigilance, and slowed processing speed, consistent with the well-documented neurocognitive deficits of Lyme neuroborreliosis. By Week 2, marked gains were evident, including normalization of posterior alpha frequency, reduced attentional dysregulation (theta/beta ratio), and faster reaction times. By Week 4, vigilance regulation improved further, as indicated by an increased alpha ratio, while sustained gains in behavioral performance were maintained. Although some measures, such as P3b latency and frontal alpha asymmetry, showed persistent abnormalities, these findings may reflect compensatory cortical adaptations rather than deterioration.

The Bio-Well assessments provided complementary evidence of systemic energy restoration. The transition from a fragmented, asymmetric baseline energy field to a more coherent, balanced profile at Week 4 suggests improved regulation of autonomic and immune functions. Importantly, all organs with baseline energy levels below 4 Joules ($\times 10^{-2}$) reached functional thresholds after therapy, and the average energy gain of +0.73 per organ reflected a systemic shift toward bioenergetic normalization. This is clinically significant, as fatigue and reduced energy capacity are among the most debilitating symptoms in chronic Lyme disease.

The observed effects may be explained by biophoton-mediated enhancement of mitochondrial activity and cellular communication. Mitochondrial dysfunction has been implicated in the persistence of post-infectious fatigue syndromes, including Lyme disease. By supporting mitochondrial bioenergetics and restoring systemic energy balance, biophoton therapy may address a root contributor to ongoing neurological dysfunction.

Our findings are consistent with prior clinical observations of biophoton therapy improving neurodegenerative and chronic disease outcomes [9-15]. The improvements in attentional control and vigilance observed here align with reports of enhanced cognitive regulation in other non-invasive neuromodulatory interventions, such as meditation and neurofeedback. However, this case study represents preliminary evidence, and further controlled trials are necessary to confirm efficacy, optimize dosing, and determine the durability of effects.

Limitations

This study is limited by its single-case design and the absence of control condition. Placebo effects, practice effects on cognitive testing, and spontaneous symptom fluctuation cannot be fully excluded. Additionally, while Bio-Well provides a novel bioenergetic assessment, its interpretation alongside traditional neurological outcomes warrants further validation.

Impact Statement

This case study highlights the potential of biophoton therapy as a non-invasive approach to address persistent neurological and systemic symptoms in chronic Lyme disease. By integrating EEG, ERP, spirometry, quality-of-life metrics, and Bio-Well assessments, the study demonstrates improvements in cortical efficiency, pulmonary function, and systemic energy balance. These multidimensional gains suggest that biophoton therapy may restore both neural and metabolic resilience, offering a novel adjunctive option for patients with post-infectious neurological dysfunctions.

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