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Biophoton Therapy Restores Hemorheology in Chronic Stroke: Live Blood Evidence of Microvascular Recovery

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ABSTRACT

Background: Chronic stroke is associated with long-term impairments in microvascular circulation, blood rheology, and cellular metabolism, which collectively limit recovery. Biophoton generators emit ultraweak, coherent photons that may restore mitochondrial function, enhance red blood cell morphology, and improve systemic perfusion.

Methods: A 70-year-old male with chronic ischemic stroke underwent 24 days of continuous exposure to Tesla BioHealer® devices. Capillary blood samples were collected on Days 0, 2, 14, 17, and 24 and analyzed using darkfield live blood microscopy. Five hematologic parameters RBC aggregation, fibrin thread density, membrane integrity, plasma debris, and immune or platelet activity were semi-quantitatively scored (0–4), yielding a raw severity score (0–20) and a composite blood health score (0–10).

Results: At baseline, the patient exhibited severe rouleaux formation, dense fibrin networks, and distorted erythrocyte morphology (composite score = 2.0). By Day 24, >80% of RBCs were freely separated with clear plasma and no detectable fibrin, yielding a composite score of 9.5 and a >90% reduction in the raw severity score. These findings suggest significantly improved blood fluidity, oxygen delivery capacity, and microvascular integrity.

Conclusions: Biophoton therapy produced rapid, sustained improvements in blood morphology and rheology in a chronic stroke patient. These hematologic changes may reflect systemic recovery mechanisms observed in larger clinical studies, including improved cerebral perfusion and neurofunctional restoration. Controlled trials are warranted to further evaluate biophoton therapy as a noninvasive adjunct for stroke rehabilitation.

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Introduction

Chronic stroke is a leading cause of long-term disability worldwide, often resulting in persistent motor deficits, cognitive impairment, and reduced quality of life. Despite progress in acute stroke care and rehabilitation, many patients exhibit limited functional recovery due to enduring microvascular dysfunction, chronic inflammation, and impaired mitochondrial metabolism [1]. Existing therapeutic strategies tend to focus on symptom management and offer limited capacity to restore underlying cellular and vascular integrity [2].

Biophoton generators represent a novel class of noninvasive therapeutic devices that emit ultraweak, coherent light within the optical and near-infrared spectrum. This emission is hypothesized to interact with mitochondrial systems and other cellular components, modulating biological function at the quantum level [3,4]. Preclinical and clinical studies have indicated that such photonic stimulation may enhance mitochondrial bioenergetics, reduce oxidative stress, and improve microvascular blood flow by restoring red blood cell (RBC) morphology and reduce aggregation [4-6].

In neurological disorders such as Parkinson's disease, Alzheimer's disease, traumatic brain injury, and chronic stroke, biophoton therapy has shown early promise in modulating key physiological parameters relevant to recovery. Specifically, live blood analysis has suggested that biophoton exposure can reduce erythrocyte clumping, eliminate fibrin microthreads, and improve plasma clarity changes that may translate into improved oxygen and nutrient delivery to ischemic brain tissue [6].

Recent clinical research has validated the neurotherapeutic potential of biophoton generator therapy in chronic stroke. In a randomized, triple-blind, placebo-controlled study involving 46 chronic stroke patients, significant improvements were observed in validated clinical metrics including the Stroke Impact Scale (SIS), neurological examinations, and quality-of-life surveys following just two to four weeks of biophoton exposure. Quantitative EEG (qEEG) and event-related potential (ERP) analyses further confirmed enhanced cortical activation, cognitive processing speed, and neuroplasticity. Brain imaging using 3D non-linear scanning demonstrated rapid cortical reactivation within six days of therapy, reinforcing the capacity of biophoton stimulation to promote neurofunctional recovery, even in long-standing cases of cerebrovascular impairment [7-10]. These findings underscore the relevance of exploring biophoton-mediated improvements

in hematologic parameters that may underlie such systemic and neurological benefits.

As the global burden of chronic stroke grows, there is an urgent need for safe and scalable interventions that support long-term recovery. This case study explores the hematologic impact of biophoton generator therapy in a chronic stroke patient, using serial live blood analysis to evaluate changes in blood morphology and rheology as potential indicators of improved microcirculatory and metabolic function.

Materials and Methods

Study Design and Subject

This single-patient observational case study investigated the hematologic effects of biophoton generator therapy in a 70-year-old male with a history of chronic ischemic stroke. The patient's medical history remained stable throughout the intervention, and no changes were made to his prescribed medications during the study period.

Biophoton Therapy Intervention

The patient was continuously exposed to Tesla BioHealer® devices over a 24-day period. These generators were positioned near the body during sleep and rest and are designed to emit ultraweak, coherent photons in the optical and near-infrared spectrum. The emissions are intended to interact with mitochondrial pathways and support cellular energy metabolism.

Live Blood Sample Collection and Microscopy

Capillary blood samples were collected from the fingertip using a sterile lancet at five timepoints: Day 0 (March 25), Day 2 (March 27), Day 14 (April 7), Day 17 (April 11), and Day 24 (April 18). All samples were analyzed within 3 minutes of collection using darkfield microscopy at 1000× magnification with oil immersion. Live blood microscopy was used to evaluate qualitative and semi-quantitative changes in cellular morphology and blood quality.

Hematologic Scoring Criteria

Each blood sample was assessed based on five parameters:

1. RBC aggregation (rouleaux formation and clumping)
2. Fibrin thread density
3. RBC membrane damage or deformity
4. Plasma debris or turbidity
5. Immune or platelet activity

Each parameter was scored on a 5-point scale (0 = normal; 4 = severe), yielding a raw severity score ranging from 0 to 20. To facilitate interpretation, a composite blood health score was calculated using the formula:

Composite Score = 10 – (Raw Severity ÷ 2)

Ethics Statement

The patient provided written informed consent prior to participation. All procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Results

Serial darkfield live blood microscopy revealed progressive and marked hematologic improvement over the 24-day biophoton therapy period (Table 1, Figures 1-5). At baseline (Day 0), the patient's blood sample showed extensive abnormalities, including severe red blood cell (RBC) aggregation (rouleaux formation), dense fibrin thread presence, and distorted cell membranes (Figure 1). The plasma appeared turbid with significant debris, and platelet or immune cell activation was evident. The initial raw severity score was 16 (on a 0-20 scale), corresponding to a composite blood health score of 2.0.

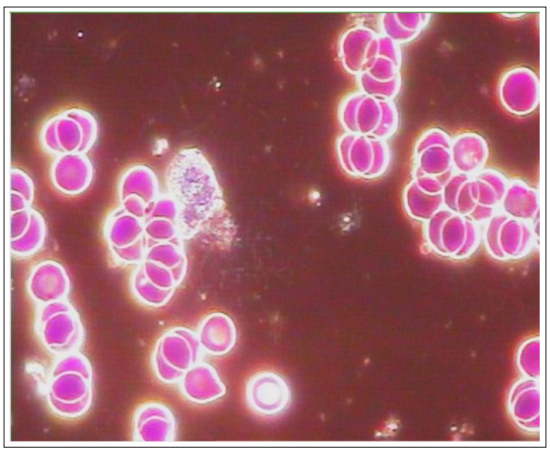

Figure 1: Baseline live blood sample prior to biophoton therapy (Day 0, March 25, 2025). Darkfield microscopy reveals severe red blood cell (RBC) aggregation in the form of rouleaux (stacking resembling coins), indicating impaired blood fluidity and increased viscosity. Multiple fibrin threads and membrane irregularities are present, along with visible plasma debris. These findings reflect compromised microcirculation and reduced oxygen delivery capacity hallmarks of chronic stroke-related hemorheologic dysfunction.

By Day 2, early signs of improvement were observed: rouleaux formations were shorter, fibrin density had decreased, and RBC boundaries were more defined (Figure 2). The raw score dropped to 10, with a composite score of 5.0.

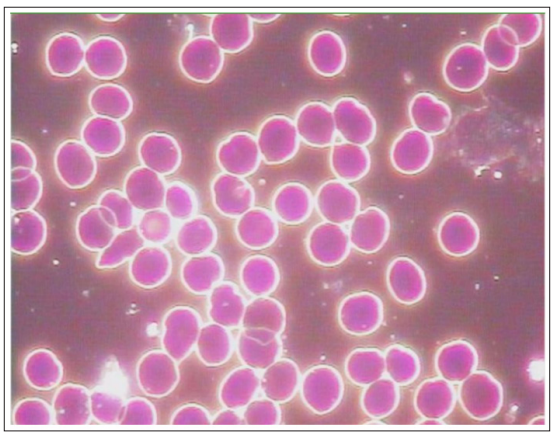

Figure 2: Live blood sample 2 days after initiation of biophoton therapy (Day 2; March 27, 2025). Dark-field microscopy shows early signs of hematologic improvement. While rouleaux formations and some RBC clumping persist, partial separation between cells is evident, and individual cell membranes begin to show more definition. Fibrin density is reduced compared to baseline, and plasma appears moderately clearer. These initial changes suggest a rapid response to biophoton exposure, potentially reflecting enhanced circulation, detoxification, or early restoration of cellular integrity.

On Day 14, further improvements included the near-complete resolution of fibrin threads, restoration of biconcave RBC morphology, and increased intercellular spacing (Figure 3). The raw score was reduced to 6, and the composite score increased to 7.0. Although Day 14 showed a slight transient increase in

rouleaux and platelet activity, the overall condition remained significantly improved compared to baseline, with a raw score of 7 and composite score of 6.5.

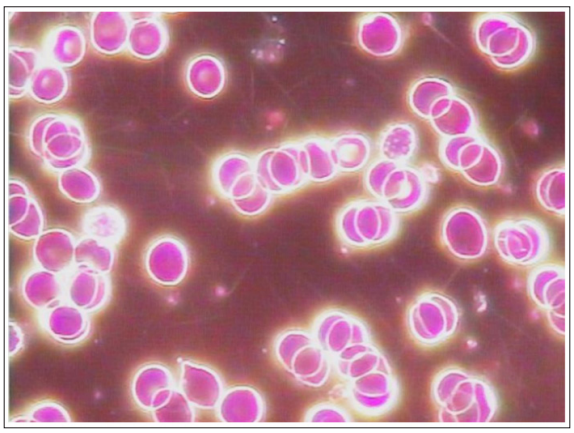

Figure 3: Live blood sample 14 days after initiation of biophoton therapy (Day 14; April 7, 2025). Dark-field microscopy reveals significant hematologic improvement. Most red blood cells (RBCs) display healthy, round, biconcave shapes with well-defined borders and increased spacing between cells, indicating reduced aggregation and improved cell morphology. Fibrin threads are rare, and plasma clarity has improved markedly. These findings suggest enhanced blood fluidity, improved oxygen transport capacity, and a shift toward healthier microcirculatory dynamics following sustained biophoton therapy.

By Day 17, red blood cells appeared predominantly free-floating and evenly distributed, with minimal rouleaux and healthy membrane integrity (Figure 4). Most RBCs exhibited their characteristic bioconcave shape, and only trace fibrin or plasma debris remained. A slight, transient increase in immune or platelet activity was noted, raising the raw score modestly to 7, with a composite score of 6.5. Despite this, blood rheology remained markedly improved compared to baseline.

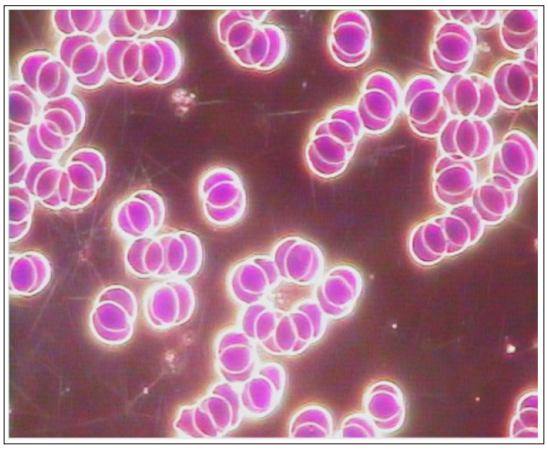

Figure 4: Live blood sample 17 days after initiation of biophoton therapy (Day 17; April 11, 2025). Dark-field microscopy at 1000× magnification demonstrates marked hematologic improvement compared with baseline. Most red blood cells (RBCs) appear as well-defined, biconcave discocytes with clear cell borders and ample spacing, indicating greatly reduced rouleaux formation and lower blood viscosity. Only isolated, thin fibrin strands are visible, and plasma clarity is substantially enhanced, with minimal particulate debris. These changes reflect improved hemorheology and suggest more efficient microvascular perfusion and oxygen delivery to tissues in the chronic-stroke patient.

By Day 24, the patient's blood sample exhibited near-complete normalization. Over 80% of RBCs were freely separated with healthy morphology, fibrin threads were absent, plasma clarity was restored, and no immune or platelet activation was detected (Figure 5). The final raw score was 1, representing a >90% reduction in hematologic abnormality, and the composite blood health score reached 9.5.

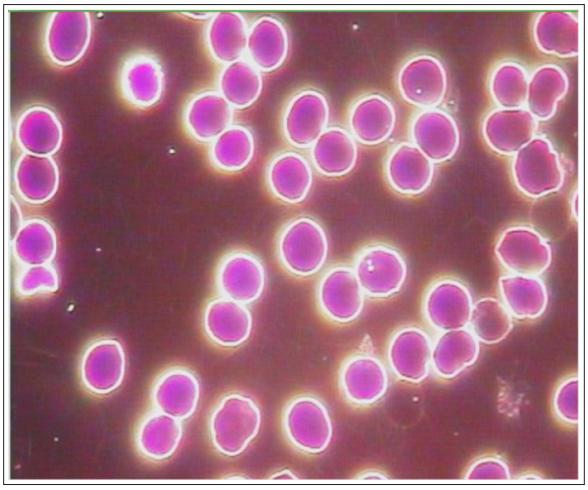

Figure 5: Live blood sample 3 weeks after initiation of biophoton therapy (Day 24; April 18, 2025). Dark-field microscopy demonstrates near-complete normalization of blood morphology. Red blood cells (RBCs) are fully separated, uniformly shaped, and surrounded by distinct luminescent halos indicative of strong membrane integrity. No rouleaux formation or fibrin threads are observed, and the plasma appears crystal clear with minimal debris. These findings reflect optimal blood rheology and suggest enhanced microvascular perfusion, oxygen delivery, and systemic circulation key factors supporting neural repair in chronic stroke recovery.

These findings suggest sustained improvement in blood rheology, cellular morphology, and microvascular flow potential, key indicators of enhanced tissue oxygenation, normalized supply of nutrients, and circulatory health.

Summary of the serial observations: Over the course of biophoton therapy with 4 generators, there is a clear trend of improved blood fluidity and cellular vitality. Initially aggregated and dysfunctional red blood cells became more mobile, better shaped, and well-separated, reflecting enhanced circulation.

This improvement in hemorheology would be directly beneficial to brain cells, especially in a chronic stroke patient, as it supports:

- Reoxygenation of ischemic regions
- Efficient nutrient transport
- Reduction of blood stagnation
- Potential support for neural repair and neuroplasticity

These findings are consistent with the hypothesis that biophoton exposure helps normalize blood dynamics, facilitating systemic healing and neurological recovery (7-9).

Table 1: Semi Quantitative Live Blood Scores Over 24 Days

Days of Biophoton Therapy	RBC Aggregation	Fibrin Threads	Membrane Defects	Plasma Debris	Immune/ Platelet	Raw Severity	Composite Score
0	4	4	3	3	2	16	2.0
2	3	2	2	1	2	10	5.0
14	2	1	1	1	1	6	7.0
17	2	1	1	1	2	7	6.5
24	1	0	0	0	0	1	9.5

Table 1: presents the progressive improvement of hematologic health in a chronic stroke patient over 24 days of biophoton therapy, using semi-quantitative scoring of five key blood parameters. Each parameter is scored on a scale from 0 (normal) to 4 (severe), and the total "Raw Severity" score is used to calculate a "Composite Blood Health Score" ranging from 0 (worst) to 10 (best), using the formula: Composite Score = 10 – (Raw Severity ÷ 2).

Table 2: Key Findings of Live Blood Fluidity during the 3-Week Biophoton Therapy

Day	Interpretation of Scores
Day 0 (Baseline)	The patient's blood showed severe pathology: maximum RBC aggregation (4), dense fibrin threads (4), and significant membrane damage and plasma debris. Raw score = 16, Composite = 2.0. This reflects poor blood flow, low oxygen delivery, and high inflammatory activity typical in chronic stroke.
Day 2	Early signs of improvement appeared: RBC aggregation and fibrin were reduced, with cleaner plasma and less membrane damage. Raw score decreased to 10, Composite = 5.0. Indicates a rapid response to biophoton exposure.
Day 14	Continued normalization: RBCs were better shaped, less aggregated, and plasma was clearer. Fibrin threads were nearly absent. Raw score = 6, Composite = 7.0. Shows marked recovery in blood fluidity and microcirculation.
Day 17	Minor fluctuation: slight increase in immune/platelet activity, possibly reflecting transient immune modulation or detox response. Raw score = 7, Composite = 6.5. Still far improved from baseline.
Day 24	Near-complete normalization: RBCs were fully separated with no fibrin, debris, or immune activation. Raw score = 1, Composite = 9.5. Reflects optimal blood rheology and oxygen delivery capacity.

Overall Trend

- Raw Severity Score decreased from 16 to 1 (a 93.75% reduction), indicating significant reduction in blood abnormalities.
- Composite Blood Health Score increased from 2.0 to 9.5, suggesting near-total recovery of blood quality.

These results illustrate a clear trajectory of systemic hematologic improvement consistent with enhanced microvascular function and metabolic restoration under biophoton therapy critical elements in post-stroke recovery.

Discussion

This case study demonstrates that biophoton generator therapy can rapidly and progressively normalize blood morphology in a patient with chronic ischemic stroke. At baseline, the patient exhibited hallmark features of compromised blood rheology severe RBC aggregation, dense fibrin networks, and membrane deformities consistent with the hyperviscous and inflammatory profile frequently observed in post-stroke patients [1,2]. Over the course of 24 days, live blood analysis revealed a >90% reduction in these abnormalities, culminating in nearly complete restoration of red cell separation, plasma clarity, and cellular integrity.

The observed hematologic improvements are consistent with proposed mechanisms of biophoton therapy, including resonance effects on mitochondrial function, restoration of cellular membrane potential, and normalization of plasma protein crosslinking [3-6]. Enhanced mitochondrial activity may contribute to improved RBC deformability and reduced oxidative stress, while coherent light exposure may modulate the zeta potential of erythrocyte membranes, discourage aggregation and improve microcirculatory flow [11-15].

Importantly, these changes occurred in the absence of any pharmacologic intervention or lifestyle modification, underscoring the potential of biophoton therapy to serve as a noninvasive adjunct for systemic physiologic restoration. The improvements in blood rheology particularly reduced rouleaux and fibrin density are clinically relevant, as they suggest enhanced oxygen and nutrient delivery to ischemic regions of the brain, potentially supporting neurorepair and plasticity.

The hematologic normalization observed in this case aligns with findings from recent clinical trials, where chronic stroke patients undergoing biophoton therapy demonstrated rapid and measurable improvements in neurological, cognitive, and systemic energy markers. In that study, participants receiving biophoton exposure showed statistically significant gains in SIS scores, qEEG biomarkers, and ERP latencies, as well as enhanced meridian energy and cortical reactivation on 3D non-linear scans [7]. These neurophysiological changes occurred concurrently with improved circulatory dynamics and energy coherence suggesting that the hematologic improvements seen in our subject, such as reduced rouleaux and restored plasma clarity, may contribute to or reflect broader systemic recovery mechanisms activated by biophoton therapy. Together, these observations support the hypothesis that optimizing blood rheology through biophoton exposure could play a foundational role in reversing the long-term deficits associated with chronic stroke.

However, this study is limited by its single-subject design and lack of concurrent neurological or metabolic outcome measures. While the blood morphology improvements are compelling, future investigations should incorporate objective neurofunctional assessments, such as perfusion imaging, stroke severity scales,

and mitochondrial biomarkers, to further validate these findings and elucidate therapeutic mechanisms.

Conclusion

Biophoton generator therapy was associated with rapid and sustained hematologic improvement in a patient with chronic ischemic stroke. Over a 24-day period, live blood analysis revealed a marked reduction in red blood cell aggregation, elimination of fibrin microthreads, and restoration of plasma clarity and cellular morphology suggesting enhanced microvascular perfusion and oxygen delivery capacity. These findings support the hypothesis that biophoton exposure may positively influence systemic circulation and cellular function through noninvasive, light-based modulation.

Although preliminary, this case provides compelling evidence for the potential role of biophoton therapy as a safe and nonpharmacologic adjunct in chronic stroke management. Larger, controlled studies incorporating clinical, neurological, and biochemical endpoints are warranted to further validate the therapeutic impact and underlying mechanisms of this emerging modality.

Conflict of Interest

James Z Liu and Helen Y Gu are co-inventors of the Tesla BioHealing ® biophoton generators and co-founders Tesla BioHealing Inc., the manufacturer of the biophoton generators used in this study. Ya Hu and Leon Chien have no competing interests and performed data collection and analysis.

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