

Research Library

A curated index of peer-reviewed studies conducted with Vielight photobiomodulation technology.

30+PEER-REVIEWED
STUDIES**36**INTERNATIONAL
PATENTS**800+**TRIAL
PARTICIPANTS**100+**COUNTRIES
SERVED

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Brain Injury & Trauma

TBI, concussion, repetitive head impact

Repetitive head impact and traumatic brain injury share a common pathophysiology: neuroinflammation, mitochondrial dysfunction, and disrupted brain network connectivity. The studies below — conducted at the University of Utah, Brigham Young University, VA Salt Lake City, UCLA, Mount Sinai, and affiliated institutions — examined whether intranasal-transcranial photobiomodulation could measurably change those underlying processes in athletes, veterans, and people with concussion history.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Brain protection across a 16-week football season Lindsey, Wilde et al. · 2026 University of Utah, Brigham Young University <i>Journal of Neurotrauma</i> Blinded RCT · n = 26	Diffusion MRI markers of brain inflammation and axonal stress	Across the season, the active group showed no significant rise in brain inflammation markers . In the sham group, inflammation climbed with cumulative head impacts. Deep-brain regions most vulnerable to rotational hits were spared in the active group.	Open
Cognitive outcomes in chronic mild TBI Liebel et al. · 2025 University of Utah, BYU, Mount Sinai <i>Photobiomodulation, Photomedicine, and Laser Surgery</i> Open trial · n = 44	Verbal memory, executive function, attention, processing speed	After 8–10 weeks of every-other-day sessions, 14–36% of participants showed reliable improvement in attention, memory, and processing speed. Very few showed any decline. Largest published trial reporting significant cognitive gains in this population.	Open
Cerebellar–cortical connectivity in ex-athletes (fMRI) Wilde et al. · 2025 University of Utah, UCLA, Mount Sinai <i>Photobiomodulation, Photomedicine, and Laser Surgery</i> fMRI trial · n = 30	Cerebellum–brain network connectivity via fMRI	Ex-athletes with TBI history showed researcher-reported improvements in cerebellar–cerebral network connectivity. The cerebellum is central to motor control and connects extensively to regions targeted by the therapy.	Open

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Reaction time and motor function in mild TBI Johnson et al. · 2024 University of Utah, VA Salt Lake City <i>Photobiomodul. Photomed. Laser Surg.</i> Clinical trial · n = 43	Reaction time, grip strength, reactive balance	After 8–10 weeks of at-home use, participants with mild TBI showed researcher-reported improvements in reaction time, grip strength, and balance. Effect sizes were large for both reaction time ($g = 0.75$) and reactive balance ($g = 0.63$).	Open
Photobiomodulation in chronic TBI (scientific review) Lim et al. · 2024 Vielight Inc. <i>Cells (MDPI)</i> Scientific review · n = —	Cellular mechanisms and clinical outcomes across published TBI studies	Reviewed evidence supports photobiomodulation as a promising approach for chronic TBI, particularly in suspected CTE. No significant adverse effects reported. Outcomes depend on wavelength, dose, and pulse frequency.	Open
Concussion recovery in a hockey player (case study) Chao et al. · 2020 University of California, VA USA <i>Frontiers in Neurology</i> Case study · n = 1	Brain volume, connectivity, memory, attention, headache frequency	A 23-year-old hockey player with concussion symptoms showed researcher-reported improvements in brain volume, connectivity, memory, attention, and processing speed after 8 weeks of self-administered home treatment. Headaches decreased.	Open
Former football players with possible CTE (case series) Naeser et al. · 2023 VA Boston Healthcare System, Boston University, Harvard Medical School <i>J Alzheimer's Disease Reports</i> Case series · n = 4	Cognition, mood, behavior, fMRI brain connectivity, N-acetyl-aspartate (NAA) levels	Four former football players with possible chronic traumatic encephalopathy completed a photobiomodulation protocol that incorporated Vielight technology. Participants showed researcher-reported improvements in cognition, mood, and behavior. MRI scans revealed increased brain connectivity and higher NAA levels , suggesting therapeutic effects on brain tissue.	Open

ONGOING RESEARCH

STUDY	INSTITUTION	DESIGN N	STATUS
Mild-to-moderate TBI in veterans (pilot sham RCT) Two 5-week treatment periods; pre- and post-treatment fMRI imaging endpoints	Boston VA Research Institute, University of California	Pilot sham RCT n = 20	Active NCT04230577
Chronic mTBI in service members (DOD-funded) Drug-free intervention for service members and first responders with chronic mTBI	University of Utah, New York University	Large-scale trial n = 300	In progress (DOD-funded, \$4.6M grant) Led by Dr. Elisabeth Wilde and Dr. Carrie Esopenko

Cognitive Decline & Neurodegeneration

Alzheimer's, dementia, MCI, Parkinson's

Age-related cognitive decline, mild cognitive impairment, and neurodegenerative disease share underlying processes — reduced cerebral blood flow, mitochondrial dysfunction, and compromised brain network connectivity. The studies below examined photobiomodulation's effects on these mechanisms across populations ranging from healthy older adults to patients with moderate-to-severe Alzheimer's disease.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Mild-to-moderate dementia (Harvard case series) Saltmarche, Naeser et al. · 2017 Harvard Medical School, Boston University School of Medicine <i>Photomedicine and Laser Surgery</i> Case series · n = 5	Cognition (ADAS-cog, MMSE), sleep quality, anxiety, caregiver-reported function	After 12 weeks of treatment with the Vielight Neuro Gamma, all five participants with mild-to-moderate dementia showed significant researcher-reported cognitive improvements , with additional reported gains in sleep quality and reductions in anxiety.	Open
Home photobiomodulation in dementia (pilot, fMRI) Chao et al. · 2019 University of California, VA USA <i>Photobiomodul. Photomed. Laser Surg.</i> Pilot trial · n = 8	ADAS-cog, NPI, cerebral perfusion, default-mode network connectivity	After 12 weeks of home-based treatment, participants showed improvements in ADAS-cog and NPI scores , along with researcher-reported increases in cerebral perfusion and default-mode network connectivity on fMRI.	Open
Mild cognitive impairment (sham RCT) Neda et al. · 2024 University of Toronto, St. Michael's / Unity Health <i>Alzheimer's & Dementia</i> Sham RCT · n = 14	MoCA, cognitive performance, brain connectivity, mitochondrial function, blood biomarkers	After 6 weeks, the active group showed greater Montreal Cognitive Assessment gains than placebo (3.20 vs 1.97 points) , along with researcher-reported improvements in brain connectivity, mitochondrial function, and favorable changes in blood biomarkers linked to Alzheimer's pathology.	Open

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Parkinson's disease motor function (open trial) Liebert et al. · 2021 University of Sydney <i>BMC Neurology</i> Open trial · n = 12	Mobility, fine motor skills, balance, cognition, 10-meter walking speed	After 12 weeks, participants showed researcher-reported improvements in mobility, motor skills, balance, and cognition. 10-meter walking speed rose from 1.12 to 1.70 m/s – about 50% faster. Benefits lasted up to one year with continued home use. No adverse effects reported.	Open
Alzheimer's disease mechanisms (scientific review) Lim · 2024 Vielight Inc. <i>Frontiers in Neurology</i> Scientific review · n = —	Synthesis of mechanisms targeting genetic, mitochondrial, and protein-aggregation drivers of AD	Reviewed evidence supports photobiomodulation as a candidate intervention addressing multiple Alzheimer's pathways: mitochondrial dysfunction, neuroinflammation, and protein accumulation. Authors propose EEG-guided personalization to improve outcomes.	Open
Brain network effects of single-session itPBM (fMRI, healthy young adults) El Khoury et al. · 2019 University of Sydney <i>Neuroscience</i> Sham-controlled fMRI · n = 24	Resting-state and task-evoked brain activity (fMRI) after single 810 nm Vielight session vs sham	Independent University of Sydney study found clear differences in evoked brain activity between active and sham Vielight sessions during finger-tapping tasks , supporting that 810 nm transcranial photobiomodulation modulates functional brain networks. Cited by Vielight in the Alzheimer's/Dementia category for its brain-network relevance. <i>Authors confirmed no association with Vielight; device purchased commercially.</i>	Open

ONGOING RESEARCH

STUDY	INSTITUTION	DESIGN N	STATUS
Moderate-to-severe Alzheimer's (Phase 3 RCT) Two 12-week treatment phases, 20 min/day × 6 days/week; assessments at 12 and 24 weeks	University of Toronto, St. Michael's Hospital + 12 sites (Canada & US)	Phase 3 RCT n = 228	In progress NCT03484143
Alzheimer's biomarkers (UCSF/VA clinical trial) 16-week protocol; biomarkers of inflammation, neurodegeneration, neurotrophic factors	University of California, VA USA	Clinical trial n = —	Results analysis NCT03405662
Adults at Alzheimer's family-history risk (Phase 3) Adults 65–89 with cognitive complaints and AD family history; protocol incorporates Vielight technology	University of Florida, University of Arizona, NIA	Phase 3 RCT n = 168	Active NCT04018092
Mild cognitive impairment recruiting (Toronto) Adults 50+ noticing memory changes (no formal diagnosis); home photobiomodulation	University of Toronto, Unity Health (St. Michael's)	Recruiting n = 60	Recruiting NCT06618807
Parkinson's dose-finding trial (multi-site, Australia) Escalating treatment over 12 weeks across Brisbane, Sydney, Adelaide	University of Sydney, University of Queensland	Multi-site n = —	Registered (in progress) ANZCTR 373999

Mental Health & Trauma Response

PTSD, Gulf War Illness, first-responder stress

Post-traumatic stress and chronic stress-related illness involve persistent dysregulation of brain networks tied to emotion, threat appraisal, and recovery. The studies below examined intranasal-transcranial photobiomodulation in populations under unusual stress loads: firefighters, Gulf War veterans, and people with prolonged trauma exposure.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Active-duty firefighter PTSD (open pilot) Tate, Lindsey, Wilde · 2025 University of Utah, VA Salt Lake City <i>Photobiomodul. Photomed. Laser Surg.</i> Open pilot · n = 16	PTSD symptom severity (PCL-5), cognitive function, sleep, mood	After 8 weeks of 3–4 sessions per week, active-duty firefighters' PCL-5 PTSD symptom severity scores dropped from 28.9 to 17.4 – about a 40% reduction. Authors reported moderate-to-large effect sizes for mood, post-traumatic stress symptoms, pain interference, and reintegration readiness.	Open
Gulf War Illness in veterans (case reports) Chao et al. · 2019 University of California, VA USA <i>Military Medicine</i> Case reports · n = 2	Fatigue, pain, cognitive dysfunction, GWI criteria	After 12 weeks of every-other-day sessions, one veteran no longer met clinical criteria for Gulf War Illness. The second showed significant reductions in fatigue, pain, and cognitive symptoms.	Open
Gulf War Illness clinical trial (VA Boston) VA Boston Healthcare System (Naeser, Martin et al.) · 2019 VA Boston Healthcare System <i>Clinical trial NCT01782378</i> Clinical trial · n = 47	Cognitive function (thinking, memory), cerebral blood flow, PTSD symptoms	VA Boston Healthcare System conducted a trial of LED light therapy in 47 Gulf War veterans, with Vielight intranasal photobiomodulation technology used as part of the study protocol. The protocol was designed to support cognitive function and improve cerebral blood flow. Painless and non-invasive; all devices approved by the VABHS safety committee; the treatment was classified by the FDA as low-risk.	Open

Cognitive Performance & Neuromodulation

Healthy-brain enhancement, creativity, brain dynamics

Beyond clinical populations, researchers have examined photobiomodulation's effects on healthy adults — creative thinking, neural oscillations, brain fluid dynamics, and network connectivity. These studies establish the mechanism of action and quantify the technology's effects in brains without diagnosed impairment, relevant for performance, executive function, and biohacker audiences.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Intranasal vs transcranial delivery (MRI) Motsenyat et al. (Baycrest team) · 2025 Baycrest Hospital, University of Toronto <i>Brain Stimulation</i> MRI trial · n = 45	Cerebrospinal fluid dynamics (BOLD fMRI); intranasal vs transcranial delivery	In healthy adults aged 20–32, intranasal photobiomodulation matched the brain fluid dynamic effects of transcranial delivery using only ~1/20th the power density (5–9 mW/cm ² intranasal vs 100–200 mW/cm ² transcranial). Effects measurable within 4 minutes. Intranasal delivery bypasses the melanin barrier that reduces transcranial efficacy in darker skin tones.	Open
Divergent thinking in healthy adults (sham RCT) Peña et al. · 2023 University of Deusto, Montpellier, Penn State <i>Creativity Research Journal</i> Sham RCT · n = 58	Verbal and visual divergent thinking; idea fluency and originality	Active stimulation produced researcher-reported improvements in verbal and visual divergent thinking compared with sham. Effect size was large for originality and fluency (partial eta-squared ≈ 0.24) , indicating the device targets the brain's default mode network — central to creative cognition.	Open
EEG neural oscillations in healthy adults Zomorodi et al. · 2019 University of Toronto, CAMH <i>Nature Scientific Reports</i> Clinical study · n = 20	EEG connectivity in alpha and gamma bands	In healthy adults, the device produced researcher-reported improvements in brain network connectivity, with boosted global efficiency in alpha and gamma bands across roughly 90% of tested connectivity densities . No comparable changes under sham. First Vielight study to demonstrate true neuromodulation.	Open

ONGOING RESEARCH

STUDY	INSTITUTION	DESIGN N	STATUS
Cortical oscillations in healthy adults (crossover RCT) 10 Hz transcranial + intranasal stimulation; theta, alpha, beta, gamma changes	Vielight Inc.	Crossover RCT n = 25	Pre-publication —

Post-Viral & Recovery Cognition

Long COVID brain fog, post-chemotherapy cognitive impairment

Post-viral and post-treatment cognitive impairment — sometimes called brain fog — affects millions after COVID-19 infection and chemotherapy. The studies below tested whether intranasal-transcranial photobiomodulation could restore cognitive function in these recovery populations.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Long COVID cognitive impairment (sham RCT, Lancet) Lim et al. · 2026 Vielight Inc. <i>The Lancet eClinicalMedicine</i> Blinded sham RCT · n = 43	Cognitive function, brain fog symptoms, quality-of-life measures	Home-based active itPBM (Vielight Neuro RX Gamma, 8 weeks) was safe and feasible. The primary composite cognitive endpoint showed a non-significant trend favoring active ($p=0.088$); pre-specified subgroup of participants under 45 years showed significant gains over sham ($p=0.028$) and attention tasks improved across timepoints. Authors call for larger trials.	Open
Post-chemotherapy cognitive impairment (retrospective cohort) Godaert et al. · 2026 Valenciennes General Hospital, Université des Antilles (Martinique) <i>Supportive Care in Cancer</i> Retrospective cohort · n = 31	FACT-Cog scores (perceived cognitive impairment, quality-of-life impact)	Women with chemobrain ($n=31$) showed FACT-Cog cognitive scores rise from 63.3 to 101.2 ($p < 0.001$) after a 10-week course with the Vielight Neuro Duo 4 in Gamma mode (1 session/week). 93.5% of participants showed clinically meaningful improvement; 29% reached normalized scores. <i>17 of 31 (55%) also received simultaneous whole-body PBM in a NovoTHOR cabin — a confound for isolating the Vielight Neuro Duo effect.</i>	Open

Cellular & Mechanism Research

How and why photobiomodulation works at the cellular level

The studies below examined what happens inside cells when exposed to specific near-infrared wavelengths. Findings provide the mechanistic foundation for clinical effects observed in human trials: mitochondrial activity, microtubule dynamics, and cellular metabolism. Important for clinical and academic audiences evaluating the science.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Cell viability in normal vs cancer models (810 nm / 10 Hz) University of Alberta team · 2025 University of Alberta, Vielight Inc. <i>Photobiomodulation Research and Applications</i> Cellular study · n = —	Cell viability and metabolic activity at 810 nm pulsed 10 Hz in normal vs cancer cell lines	Cellular research using Vielight technology at 810 nm pulsed at 10 Hz reported differential effects on cell viability and proliferation in normal vs cancer cell models. <i>Preliminary cellular research, not a cancer treatment.</i>	Open
Tubulin protein structure under near-infrared light (Raman spectroscopy) Di Gregorio et al. · 2024 U. Alberta, Politecnico di Torino, Vielight Inc., FU Berlin <i>Nanomaterials (MDPI)</i> Spectroscopy · n = —	Alpha-helix to beta-sheet transition in tubulin proteins (Raman spectroscopy)	Photobiomodulation decreased alpha-helix content and increased beta-sheets in tubulin, potentially affecting microtubule stability. Findings have implications for Alzheimer's and other neurodegenerative diseases where tubulin/microtubule integrity is compromised.	Open
Microtubule polymerization rates (lab study) Staelens et al. · 2022 U. Alberta, Princeton, Politecnico di Torino, Vielight Inc. <i>Frontiers in Medical Technology</i> Lab study · n = —	Tubulin polymerization rates, microtubule dynamics, cellular response	Near-infrared light influenced tubulin polymerization — slowing it at lower concentrations and accelerating it at higher ones. Provides mechanistic insight for optimizing photobiomodulation treatments in neurodegenerative disease.	Open

Antimicrobial & Infection Research

Viral recovery, blue-light antimicrobial work

Beyond brain-focused research, Vielight technology has been studied for antimicrobial and viral recovery applications. This category covers the Phase 3 viral recovery trial conducted with the Vielight RX Plus (licensed by Health Canada as a Class II medical device), plus Harvard-led blue-light antimicrobial research.

PUBLISHED STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Viral recovery in moderate-to-severe COVID-19 (Phase 3 RCT) Lim et al. · 2024 Vielight Inc. (multi-site) <i>Photobiomodul. Photomed. Laser Surg.</i> Phase 3 RCT · n = 294	Recovery time, respiratory symptoms, headaches, chest congestion, body aches, taste	World's largest published photobiomodulation clinical trial. Sped recovery for patients with 0–7 days of symptoms , with reductions in respiratory issues, headaches, chest congestion, body aches, and taste disturbances. Hypothesized mechanism: cytokine modulation. Device is Health Canada licensed.	Open
Photoactivated tetracyclines against MRSA (lab + animal) Harvard Medical School team · 2018 Harvard Medical School <i>Scientific Reports</i> Lab + animal · n = —	Bacterial inactivation including MRSA and E. coli	Tetracyclines activated by light, with potassium iodide added, killed bacteria including MRSA even without oxygen. Prevented bacterial regrowth in a mouse wound model.	Open
Pseudomonas keratitis with antimicrobial blue light (lab + animal) Harvard Medical School team · 2017 Harvard Medical School <i>Investigative Ophthalmology & Visual Science</i> Lab + animal · n = —	Bacterial load reduction in corneal Pseudomonas aeruginosa infection	Single exposure of antimicrobial blue light significantly reduced bacterial levels in the cornea, though infection recurred after 24 hours. Suggests aBL as a promising treatment for keratitis with repeated dosing.	Open

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Candida albicans with antifungal blue light (lab + animal) Harvard Medical School team · 2016 Harvard Medical School <i>Virulence</i> Lab + animal · n = —	Antifungal activity against C. albicans (yeast)	Candida albicans was 42× more susceptible to blue light than human cells, with no significant resistance development after repeated exposures. A single exposure reduced fungal burden in infected mouse burns by ~98%.	Open

APPENDIX

Emerging Research

Areas with limited published data — protocols and early studies

The studies below represent areas where Vielight technology has been evaluated but where published evidence is currently limited to single studies or formal protocols. They are included for completeness of the research portfolio.

EMERGING STUDIES

STUDY	WHAT WAS MEASURED	KEY FINDING	READ
Autism spectrum disorder in children (retrospective study) Pallanti et al. · 2022 Istituto di Neuroscienze (Italy) <i>Children (MDPI)</i> Retrospective study · n = 21	ASD severity, behavior, parental stress, cognitive rigidity, sleep	Children aged 5–15 using the device daily for 6 months (alternating Alpha and Gamma protocols) showed researcher-reported reductions in ASD severity, noncompliant behavior, parental stress, and cognitive rigidity, plus improvements in attentional function and sleep quality.	Open
Schizophrenia open-label trial protocol Japanese clinical research team · 2026 National Center of Neurology and Psychiatry (Japan) <i>Neuropsychiatric Disease and Treatment</i> Protocol · n = —	Primary: safety and tolerability. Secondary: neurocognitive function, social functioning, EEG, cerebral blood flow	Published protocol for an open-label, single-arm trial of transcranial and intranasal photobiomodulation in Japanese patients with schizophrenia, registered with the Japan Registry of Clinical Trials (jRCT032240756). No efficacy data available; trial in progress.	Open