



Photobiomodulation (PBM) Research Studies for Various Conditions

1. CANCER THERAPY SIDE EFFECTS

- a. Burning Mouth Syndrome, dysphagia (trouble swallowing), oral dryness, taste alteration - <https://pbmfoundation.org/photobiomodulation-therapy-in-the-treatment-of-oral-mucositis-dysphagia-oral-dryness-taste-alteration-and-burning-mouth-sensation-due-to-cancer-therapy-a-case-series/>
- b. Oral Mucositis – inflammation of the lining of the mouth causing mouth sores, due to chemo.
 - i. <https://pbmfoundation.org/photobiomodulation-therapy-in-management-of-cancer-therapy-induced-side-effects/>
 - ii. <https://pbmfoundation.org/efficacy-of-photobiomodulation-in-reducing-pain-and-improving-the-quality-of-life-in-patients-with-idiopathic-burning-mouth-syndrome-a-systematic-review-and-meta-analysis/>
 - iii. <https://pbmfoundation.org/shining-a-light-on-mucositis/>
 - iv. <https://pbmfoundation.org/cost-effectiveness-of-photobiomodulation-therapy-for-the-prevention-and-management-of-cancer-treatment-toxicities-a-systematic-review/>
- c. Pharyngitis – inflammation of the of the back of the throat, known as the pharynx – see: <https://pbmfoundation.org/evaluating-the-supportive-care-costs-of-severe-radiochemotherapy-induced-mucositis-and-pharyngitis/>

2. INFLAMMATORY CONDITIONS

- a. Achilles tendonitis - <https://pbmfoundation.org/american-physical-therapy-association-guidelines-recommend-pbm-for-achilles-tendonitis/>
- b. Allergic Rhinitis = hay fever
 - i. Short Time Efficiency of Rhinophototherapy in Management of Patients with Allergic Rhinitis Resistant to Medical Therapy. <https://www.ncbi.nlm.nih.gov/pubmed/27921413>
 - ii. Narrow-band red light phototherapy in perennial allergic rhinitis and nasal polyposis. <https://www.ncbi.nlm.nih.gov/pubmed/9109708>

c. Arthritis –

- i. The Mechanisms and Efficacy of Photobiomodulation Therapy for Arthritis: A Comprehensive Review - <https://pubmed.ncbi.nlm.nih.gov/37762594/>
- ii. Low-level laser therapy in different stages of rheumatoid arthritis: a histological study - <https://pubmed.ncbi.nlm.nih.gov/22538842/>
- iii. [Effects of photobiomodulation and a physical exercise program on the expression of inflammatory and cartilage degradation biomarkers and functional capacity in women with knee osteoarthritis: a randomized blinded study](https://pubmed.ncbi.nlm.nih.gov/22538842/)

d. Asthma – caused by inflammation and narrowing of the airways in the lungs

- i. Transcutaneous systemic photobiomodulation reduced lung inflammation in experimental model of asthma by altering the mast cell degranulation and interleukin 10 level - <https://pubmed.ncbi.nlm.nih.gov/34146193/>
- ii. Beneficial effects of infrared light-emitting diode in corticosteroid-resistant asthma - <https://pubmed.ncbi.nlm.nih.gov/34743255/>

e. Bell's Palsy - The cause is not known, but it is thought to be related to inflammation or damage to the facial nerve.

- i. Chiropractic management of Bell palsy with low level laser and manipulation: a case report. <https://www.ncbi.nlm.nih.gov/pubmed/24396332>
- ii. A Nonrandomized Trial of the Effects of Near-Infrared Photobiomodulation Therapy on Bell's Palsy with a Duration of Greater Than 8 Weeks <https://pubmed.ncbi.nlm.nih.gov/37738368/>
- iii. Effectiveness of multiwave locked system laser on the treatment of patients with idiopathic Bell's palsy: a randomized double-blind placebo controlled trial - <https://pubmed.ncbi.nlm.nih.gov/35881208/>

f. Dermatitis -

i. Psoriasis:

1. <https://pubmed.ncbi.nlm.nih.gov/37181415/>
2. <https://pubmed.ncbi.nlm.nih.gov/36310510/>

ii. Hidradenitis suppurativa:

1. Impact of 970 Nm Photobiomodulation Therapy on Wound Healing in Cellular Models of Hidradenitis Suppurativa <https://pubmed.ncbi.nlm.nih.gov/32647934/>
2. Photobiomodulation therapy is able to decrease IL1B gene expression in an in vitro cellular model of hidradenitis suppurativa. - <https://www.ncbi.nlm.nih.gov/pubmed/31444612>

- g. Frozen Shoulder = adhesive capsulitis, causes pain and stiffness in the shoulder joint. <https://pbmfoundation.org/systematic-review-of-surgical-and-conservative-interventions-for-frozen-shoulder-found-strong-evidence-for-pbm/>
- h. Tennis Elbow – inflammation of the tendons on the outside of the elbow caused by repetitive motion. <https://pbmfoundation.org/clinical-guidelines-for-tennis-elbow-likely-to-be-beneficial-for-short-term-pain-relief-improvement-of-function/>

3. PAIN MANAGEMENT -

- a. General Pain: <https://pbmfoundation.org/a-growing-body-of-evidence-supports-the-modulation-of-pain-by-light-exposure/>
- b. Chronic Pain
 - i. Chronic Pain & Inflammation in general - <https://pbmfoundation.org/photobiomodulation-has-beneficial-effects-on-chronic-pain-and-inflammation-2/>
 - ii. Fibromyalgia (FM) - chronic condition that causes widespread pain, fatigue, and sleep disturbances. See: <https://pbmfoundation.org/whole-body-photobiomodulation-therapy-for-fibromyalgia-a-feasibility-trial>
 - iii. Knee Pain: <https://pbmfoundation.org/photobiomodulation-as-an-adjunctive-treatment-to-physiotherapy-for-reduction-of-anterior-knee-pain-in-combat-soldiers-a-prospective-double-blind-randomized-pragmatic-sham-controlled-trial/>
 - iv. Low Back Pain - <https://pbmfoundation.org/american-college-of-physicians-guidelines-include-a-strong-recommendation-for-low-level-laser-therapy-as-a-non-invasive-treatments-for-acute-subacute-chronic-low-back-pain/>
 - v. Neck Pain –
 - 1. <https://pbmfoundation.org/pbm-reduces-pain-immediately-after-treatment-in-acute-neck-pain-and-for-up-to-22-weeks-in-patients-with-chronic-neck-pain/>
 - 2. <https://pbmfoundation.org/bone-and-joint-task-force-recommends-pbm-for-neck-pain/>
 - vi. Neuropathy -
 - 1. Treatment of diabetic foot ulcers in a frail population with severe co-morbidities using at-home photobiomodulation laser therapy: a double-blind, randomized, sham-controlled pilot clinical study - <https://pubmed.ncbi.nlm.nih.gov/34052927/>

2. Effects of 660- and 980-nm low-level laser therapy on neuropathic pain relief following chronic constriction injury in rat sciatic nerve - <http://www.ncbi.nlm.nih.gov/pubmed/24634001>
- vii. **Myofascial Pain Syndrome (MPS)** is a chronic pain disorder that affects the muscles and surrounding fascia, leading to ongoing or longer-lasting muscle pain. - <https://pbmfoundation.org/gtfmisp-global-task-force-on-musculoskeletal-pain-recommend-laser-for-myofascial-pain-syndrome/>
- viii. **Trigeminal Neuralgia** –
 1. The Effect of Low-level Laser Therapy on Trigeminal Neuralgia: A Review of Literature - <https://pubmed.ncbi.nlm.nih.gov/25024832/>
 2. <https://pubmed.ncbi.nlm.nih.gov/38544777/>

4. REDUCING OPIOID USE & ADDICTION

- a. Dr. Jennifer Flora & Shepherd University announces use of Transcranial PBM therapy to combat opioid disorders - https://www.journal-news.net/journal-news/shepherd-announces-use-of-transcranial-pbm-therapy-to-combat-opioid-disorders/article_81464cd3-ddbf-52f8-9ea4-756b63c87252.html
- b. See also: <https://pbmfoundation.org/ending-opioids-by-photobiomodulation/>

5. TREATING COVID-19

- a. **General Covid Symptoms:**
 - i. <https://pbmfoundation.org/near-infrared-light-improves-covid-outcomes/>
 - ii. <https://pbmfoundation.org/light-as-a-cure-in-covid-19-a-challenge-for-medicine/>
 - iii. <https://pbmfoundation.org/rationale-for-1068-nm-photobiomodulation-therapy-pbmt-as-2-a-novel-non-invasive-treatment-for-covid-19/>
 - iv. <https://pbmfoundation.org/whole-organ-transdermal-photobiomodulation-pbm-of-covid-19-a-50-patient-case-study/>
 - v. <https://pbmfoundation.org/early-cases-of-acute-infectious-respiratory-syndrome-treated-with-photobiomodulation-diagnosis-and-intervention-two-case-reports/>
 - vi. <https://pbmfoundation.org/probable-positive-effects-of-the-photobiomodulation-as-an-adjunctive-treatment-in-covid-19-a-systematic-review/>
 - vii. <https://pbmfoundation.org/first-successful-pbm-treatment-for-covid-19/>
- b. **Covid Brain Fog:**
 - i. <https://pbmfoundation.org/patients-with-covid-19-brain-fog-benefit-from-photobiomodulation-therapy/>
 - ii. <https://pbmfoundation.org/use-of-either-transcranial-or-whole-body-photobiomodulation-treatments-improves-covid-19-brain-fog/>

6. NEUROLOGICAL CONDITIONS & COGNITIVE FUNCTION

a. ALZHEIMER'S –

- i. <https://pbmfoundation.org/a-new-light-therapy-approach-may-improve-alzheimers-symptoms/>
- ii. <https://jneuroinflammation.biomedcentral.com/articles/10.1186/s12974-022-02617-5#Fig7>
- iii. <https://scitechdaily.com/alzheimers-mystery-solved-angry-immune-cells-in-brain-and-spinal-fluid-identified-as-culprit/amp/>

b. APHASIA – ASSOCIATED WITH STROKE –

See Transcranial Research Papers: <https://sunpowered.com/research>

c. BRAIN INJURY/TBI (Traumatic Brain Injury):

- i. https://www.youtube.com/watch?v=gF_uPNB5JWU
- ii. <https://www.youtube.com/watch?v=axdJ2fvoKp8>

d. CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- i. See Transcranial Research Papers: <https://sunpowered.com/research>

e. COGNITIVE FUNCTION

- i. Improve Short-Term Memory - <https://pbmfoundation.org/non-invasive-laser-light-therapy-could-improve-short-term-memory-by-up-to-25-percent/>
- ii. See Transcranial Research Papers: <https://sunpowered.com/research>

f. DEMENTIA –

- i. <https://pbmfoundation.org/transcranial-near-infrared-light-stimulations-improve-cognition-in-patients-with-dementia/>
- ii. <https://pbmfoundation.org/photobiomodulation-with-near-infrared-light-helmet-in-a-pilot-placebo-controlled-clinical-trial-in-dementia-patients-testing-memory-and-cognition/>
- iii. <https://pbmfoundation.org/effects-of-home-photobiomodulation-treatments-on-cognitive-behavioral-function-cerebral-perfusion-and-resting-state-functional-connectivity-in-patients-with-dementia/>

g. PARKINSON'S

- i. <https://padiracinnovation.org/News/2021/05/photobiomodulation-a-proof-of-concept-study-in-parkinson-disease>
- ii. <https://www.sciencedirect.com/science/article/pii/B9780128159460000405>

iii. <https://pubmed.ncbi.nlm.nih.gov/30824206/>

h. STROKE – See Transcranial Research Papers: <https://sunpowerled.com/research>

i. OTHER/GENERAL NEUROLOGICAL CONDITIONS:

i. <https://pbfoundation.org/preclinical-studies-of-transcranial-photobiomodulation-in-the-neurological-diseases/>

ii. <https://pbfoundation.org/effect-of-near-infrared-pulsed-light-on-the-human-brain-using-electroencephalography/>

iii. <https://pbfoundation.org/experts-review-progress-in-using-photobiomodulation-therapy-to-treat-diverse-brain-disorders/>

iv. See also Covid Brain Fog – above under Covid

7. IMMUNE SYSTEM: <https://www.rejuvcryo.com/the-science/2020/3/18/article-use-photobiomodulation-red-light-therapy-to-improve-immune-system-function-the-energy-blueprint-offered-in-encinitas-amp-carlsbad-at-rejuvcryo>

8. COLLAGEN PRODUCTION –

a. The Effects In Vitro of Photobiomodulation Over Fibroblasts and Extracellular Matrix - <https://www.ncbi.nlm.nih.gov/pubmed/31820475>

b. Photobiomodulation at 660 nm promotes collagen synthesis via downregulation of HIF-1 α expression without photodamage in human scleral fibroblasts in vitro in a hypoxic environment - <https://pubmed.ncbi.nlm.nih.gov/37074407/>

9. HAIR GROWTH –

a. Role of Low-Level Light Therapy (LLLT) in Androgenetic Alopecia - <https://pubmed.ncbi.nlm.nih.gov/35283601/>

b. Lasers, lights, and compounds for hair loss in aesthetics - <https://pubmed.ncbi.nlm.nih.gov/35190067/>

c. Results of low-level laser therapy in the treatment of hair growth: An Egyptian Experience - <https://pubmed.ncbi.nlm.nih.gov/33713522/>

d. Guidelines for the diagnosis and treatment of male-pattern and female-pattern hair loss, 2017 version. - <https://www.ncbi.nlm.nih.gov/pubmed/29863806>

10. FERTILITY SUPPORT –

a. Photobiomodulation Therapy for Male Infertility <https://pubmed.ncbi.nlm.nih.gov/32483749/>

b. Effectiveness of low level laser therapy for treating male infertility. <https://www.ncbi.nlm.nih.gov/pubmed/29806585>

- c. Personal Overview of the Application of LLLT in Severely Infertile Japanese Females.
<https://www.ncbi.nlm.nih.gov/pubmed/24610987>

11. DECREASING INSOMNIA - Effects of Intravascular Photobiomodulation on Insomnia, Muscle Soreness, and Biochemistry Profiles: An Eight-Year Retrospective Cohort

<https://pubmed.ncbi.nlm.nih.gov/37374210/>

12. SPORTS & STRENGTH TRAINING

- a. **Strength Training** – <https://pbmfoundation.org/what-is-the-best-moment-to-apply-phototherapy-when-associated-to-a-strength-training-program-a-randomized-double-blinded-placebo-controlled-trial-phototherapy-in-association-to-strength-training/>
- b. **Post-Exercise Recovery** – <https://pbmfoundation.org/pre-exercise-infrared-low-level-laser-therapy-810-nm-in-skeletal-muscle-performance-and-postexercise-recovery-in-humans-what-is-the-optimal-dose-a-randomized-double-blind-placebo-controlled-clin/>

13. WOUND HEALING & INJURY RECOVERY

- a. **Bone Fractures** – See: <https://pbmfoundation.org/clinical-and-radiological-assessment-of-the-effect-of-low-level-laser-therapy-on-delayed-bone-fractures-healing/>
- b. **Burn Ulcers** – See: <https://pbmfoundation.org/effects-of-photobiomodulation-and-split-thickness-skin-grafting-in-the-prognosis-of-wound-healing/>
- c. **Burn Wounds** –
 - i. See: <https://pbmfoundation.org/new-insight-into-how-light-therapy-can-speed-up-burn-wound-healing/>
 - ii. See: <https://pbmfoundation.org/photobiomodulation-therapy-assists-rapid-recovery-from-burns/>
 - iii. <https://pbmfoundation.org/accelerated-burn-wound-healing-with-photobiomodulation-therapy-involves-activation-of-endogenous-latent-tgf-%ce%b21-2/>
- d. **Diabetic Ulcers** –
 - i. Effects of low level laser therapy on the prognosis of split-thickness skin graft in type 3 burn of diabetic patients: a case series. -
<https://www.ncbi.nlm.nih.gov/pubmed/26868033>
 - ii. Low-Level Laser Therapy (LLLT) in Diabetes Mellitus for Wound Healing: Surgical Wound, Diabetic Ulcer and Burns -
https://link.springer.com/chapter/10.1007/15695_2018_117
- e. **Other Wounds** - [Noninvasive red and near-infrared wavelength-induced photobiomodulation: promoting impaired cutaneous wound healing](#)

14. EYES:

- a. Dry Eyes - Effects of Low-level Light Therapy at 740 nm on Dry Eye Disease In Vivo - <https://www.jkslms.or.kr/journal/view.html?doi=10.25289/ML.2019.8.2.50>
- b. Macular Degeneration - Dry AMD:
<https://www.healio.com/news/ophthalmology/20240116/video-photobiomodulation-shows-positive-24month-results-in-patients-with-dry-amd>
- c. Retinal Degeneration - Janis Eells - Unblinded by the Light: Light Therapy in Eye Disease (2016)

15. DENTAL, JAW, MOUTH & EAR ISSUES

- a. Dental pain
 - i. The prophylactic effect of photobiomodulation therapy on pain perception due to infiltration injection: a randomized clinical trial - <https://pubmed.ncbi.nlm.nih.gov/38170234/>
 - ii. Low-level Laser Therapy to Alleviate Pain of Local Anesthesia Injection in Children: A Randomized Control Trial - <https://pubmed.ncbi.nlm.nih.gov/38268643/>
 - iii. Use of photobiomodulation (880nm) for anesthesia puncture pain reduction: a split-mouth case report - <https://pubmed.ncbi.nlm.nih.gov/38031986/>
 - iv. Painless injections-a possibility with low level laser therapy. - <https://www.ncbi.nlm.nih.gov/pubmed/31338422>
 - v. Effect of Photobiomodulation on the Depth of Local Anesthesia during Endodontic Treatment of Teeth with Symptomatic Irreversible Pulpitis - <https://pubmed.ncbi.nlm.nih.gov/37622619/>
 - vi. See also the Intra-Oral Probe Clinical Application Guide: <https://sunpowered.com/manual>
- b. Regrowing Teeth - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10045842/>
- c. Tinnitus –
 - i. Efficacy of Low-Level Laser Therapy in Subjective Tinnitus Patients with Temporomandibular Disorders. - <http://online.liebertpub.com/doi/10.1089/pho.2016.4240>
 - ii. Low level laser effect in treatment of patients with intractable tinnitus due to sensorineural hearing loss. - <https://www.ncbi.nlm.nih.gov/pubmed/25653802>
- d. TMJ/TMD -
 - i. Comparative evaluation of the early effects of the low-level laser therapy versus intra-articular steroids on temporomandibular joint acute osteoarthritis in rats: A

histochemical, molecular and imaging evaluation. -

<https://www.ncbi.nlm.nih.gov/pubmed/30648360>

- ii. Photobiomodulation therapy in the treatment of radiotherapy-related trismus of the head and neck - <https://pubmed.ncbi.nlm.nih.gov/37935876/>
- iii. The Effect of Photobiomodulation on Temporomandibular Pain and Functions in Patients With Temporomandibular Disorders: An Updated Systematic Review of the Current Randomized Controlled Trials - <https://pubmed.ncbi.nlm.nih.gov/37744015/>



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