



Photobiomodulation (PBM) for Burn Healing: Evidence and Protocols

What is Photobiomodulation?

Photobiomodulation (PBM), also known as low-level light therapy (LLLT), utilizes red and near-infrared light to accelerate tissue repair, reduce inflammation, and improve microcirculation. PBM is especially effective in the management of burn injuries due to its ability to promote cell proliferation, enhance collagen remodeling, and reduce oxidative stress.

Burns—whether thermal, chemical, or radiation-induced—can lead to prolonged inflammation, pain, and scarring. PBM offers a non-invasive, drug-free therapy that supports healing across all burn stages and is suitable for clinical or home care using SPRB and GRPB devices.

Clinical Benefits for Burn Healing

1. Accelerated Wound Closure

- A 2020 systematic review found that PBM significantly shortened the healing time of second-degree burns in human and animal studies. [Live link](<https://pubmed.ncbi.nlm.nih.gov/32781970/>)
- Studies using 660 nm red light showed faster re-epithelialization and reduced edema in burn wounds. [Live link](<https://pubmed.ncbi.nlm.nih.gov/29293109/>)

2. Reduced Pain and Inflammation

- PBM significantly reduces pro-inflammatory cytokines and improves patient comfort when used on acute burn sites. [Live link](<https://pubmed.ncbi.nlm.nih.gov/25384652/>)

3. Scar Prevention and Cosmetic Outcomes

- PBM has been shown to reduce hypertrophic scarring and promote organized collagen formation, improving cosmetic appearance post-burn. [Live link](<https://pubmed.ncbi.nlm.nih.gov/35428082/>)

Mechanistic Evidence

PBM works by stimulating mitochondrial activity and ATP production, which enhances fibroblast proliferation, angiogenesis, and extracellular matrix remodeling. It downregulates TNF- α , IL-1 β , and IL-6, while upregulating anti-inflammatory mediators such as IL-10. Improved blood flow and oxygenation in the burn area support faster healing and tissue regeneration. [Live link](<https://pubmed.ncbi.nlm.nih.gov/31810400/>)

Suggested Protocols: SPRB & GRPB

1. SPRB – For localized burn treatment

- Wavelength: 660 nm (red) 50% + 850 nm (near-infrared) 50%
- Application: Place device gently over the wound dressing or intact surrounding skin near the burn
- Duration: 15 minutes per session; repeat up to 3× daily in acute phases
- Frequency: Daily use while in acute healing phase and then 4-5 x weekly for optimal tissue support after healing
- Benefit: Enhances epithelial repair and pain control in small or medium-sized burns

2. GRPB – For extensive or systemic burn recovery

- Wavelengths: 660 nm (1/3) + 850 nm (2/3)
- Application: Lay belt flat near affected body area or wrap limb if circumferential burn
- Duration: 15 minutes per session; repeat up to 3× daily in acute phases
- Frequency: 1–3× daily as tolerated and depending on severity and then 4-5 x weekly for optimal tissue support after healing
- Benefit: Deep tissue penetration for systemic anti-inflammatory and regenerative effects

PBM should not be applied directly over open wounds or unhealed third-degree burns unless under clinical supervision. Always use over dressings or intact skin.

Monitoring & Safety Tips

- Avoid direct contact with raw or weeping wounds.
- PBM is safe when used over sterile dressings or closed skin.
- Consistent daily use over weeks enhances epithelialization and scar prevention.

Conclusion

Photobiomodulation is a clinically validated adjunct therapy for burn care, offering faster healing, reduced pain, and improved tissue outcomes. When applied using SPRB or GRPB devices, PBM promotes healing from the surface to deeper dermal layers, making it a safe and effective option for both acute care and long-term recovery in burn patients.

Disclaimer

The information provided in this document is for educational and informational purposes only. It is not intended as a substitute for professional medical advice, diagnosis, or treatment. Individuals should always consult with a licensed physician or qualified healthcare provider before beginning any new therapy, including the use of photobiomodulation (PBM) devices.

PBM devices such as the SPRB and GPRB are wellness tools designed to support general health and well-being. They are not medical devices and are not intended to diagnose, treat, cure, or prevent any disease or medical condition. No medical claims are made or implied. Results may vary based on individual factors, and PBM should not be considered a replacement for appropriate medical care.