Photobiomodulation (PBM) for Swelling Reduction: Evidence and Protocols

What is Photobiomodulation?

Photobiomodulation (PBM), also known as low-level laser or red light therapy, uses red (660 nm) and near-infrared (850 nm) light to reduce inflammation, stimulate lymphatic function, and promote tissue repair. It is widely used to manage swelling (edema) resulting from injury, surgery, lymphedema, or inflammatory conditions.

PBM works by improving blood and lymphatic flow, decreasing vascular permeability, and modulating inflammatory cytokines. These combined effects accelerate resolution of swelling and support faster recovery.

Clinical Benefits for Swelling Reduction

1. Post-operative Swelling
- PBM reduced post-surgical edema by 40–60% in dental, orthopedic, and cosmetic surgery patients. [Live link](https://pubmed.ncbi.nlm.nih.gov/30325826/)

2. Lymphedema
- PBM significantly reduced limb circumference and improved quality of life in patients with breast cancer–related lymphedema. [Live link](https://pubmed.ncbi.nlm.nih.gov/26547664/)

3. Trauma and Inflammatory Edema
- PBM demonstrated reduced tissue swelling and inflammation in animal models of acute trauma. [Live link](https://pubmed.ncbi.nlm.nih.gov/29022735/)

Mechanistic Evidence

PBM reduces swelling by:
- Stimulating nitric oxide (NO) release → vasodilation and improved lymphatic flow
- Decreasing vascular permeability → reduced fluid leakage into tissues
- Modulating cytokines → ↓ TNF-α, IL-1β, IL-6; ↑ IL-10
- Enhancing mitochondrial ATP → promoting cellular repair and immune balance
[Live link](https://pubmed.ncbi.nlm.nih.gov/35269851/)

Suggested Protocols: SPRB & GRPB

1. SPRB – Localized Swelling
   - Wavelength: 660 nm (red) 50% + 850 nm (near-infrared) 50%
   - Application: Apply over swollen area (e.g., ankle, hand, face)
   - Duration: 15 minutes per session x 2 uses if severe: then 2 – 3 x per day as needed
   - Frequency: 2 – 3 × daily during acute swelling; 4 – 5 × weekly for maintenance
   - Benefit: Reduces local edema and supports faster healing

2. GRPB – Systemic or Extensive Swelling
- Wavelengths: 660 nm (1/3) + 850 nm (2/3)
- Application: Wrap around large areas or near lymph nodes (groin, armpits)
- Duration: 15 minutes per session x 2 uses if severe: then 2 – 3 x per day as needed
- Frequency: 2 – 3 × daily during acute swelling; 4 – 5 × weekly for maintenance
- Benefit: Enhances lymphatic drainage and systemic anti-inflammatory effects

For enhanced systemic effects, additional sessions can be applied to the areas above and below the swelling to help create and stimulate a more generalized flow of fluids and hence overall effect

Monitoring & Safety Tips

- Ensure clean, dry skin before application.
- Avoid using over infected or open wounds unless advised by a healthcare provider.
- PBM is safe and well tolerated with no significant side effects reported.

- If there are any concerns please consult your healthcare provider for further usage guidelines

Conclusion

PBM is an effective, non-invasive solution to reduce swelling due to surgery, injury, or inflammation. Clinical studies support its ability to accelerate fluid clearance, reduce pain, and promote recovery. Devices like the SPRB and GRPB provide flexible and convenient at-home treatment options to manage both localized and systemic edema.

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.