Photobiomodulation (PBM) for Knee Pain: Evidence and Protocols

What is Photobiomodulation?

Photobiomodulation (PBM), or red light therapy, uses specific wavelengths of red and near-infrared light to stimulate cellular metabolism, reduce oxidative stress, and modulate inflammation. Light energy is absorbed by mitochondria, enhancing ATP production and accelerating tissue repair.

For knee pain—whether from osteoarthritis, sports injuries, meniscal damage, or post-surgical recovery—PBM offers a non-invasive, drug-free therapy that improves mobility

and reduces pain. It is especially beneficial for patients with degenerative joint disease, overuse injuries, or inflammation in the patellar and periarticular tissues.

☑ Clinical Benefits for Knee Pain

1. Osteoarthritis (OA) of the Knee
- A 2022 meta-analysis of 15 RCTs confirmed PBM significantly reduces pain and improves function in knee OA patients. [Live link](https://pubmed.ncbi.nlm.nih.gov/35966761/)
- An RCT using near-infrared light therapy reported a 40–60% reduction in WOMAC pain and stiffness scores after 4 weeks of treatment. [Live link](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8464846/)

2. Patellofemoral Pain Syndrome (PFPS)
- PBM has shown significant improvements in anterior knee pain, range of motion, and quadriceps flexibility. [Live link](https://pubmed.ncbi.nlm.nih.gov/30592438/)

3. Post-Surgical Rehabilitation (ACL, Meniscus)
- Clinical studies demonstrate reduced inflammation and faster return to activity following knee arthroscopy and ACL repair when PBM is used adjunctively. [Live link](https://pubmed.ncbi.nlm.nih.gov/34343466/)

Mechanistic Evidence

PBM downregulates pro-inflammatory cytokines (e.g., IL-1β, TNF-α) and promotes tissue oxygenation by increasing local blood flow. It also stimulates collagen synthesis and cartilage metabolism, aiding in joint preservation. Functional MRI and thermal imaging studies show increased circulation and reduced joint swelling after PBM. [Live link](https://pubmed.ncbi.nlm.nih.gov/34616916/)

Suggested Protocols: SPRB & GRPB

1. SPRB – For targeted joint treatment
   - Wavelength: 660 nm (red) 50% + 850 nm (near-infrared) 50%
   - Application: Strap the device across the anterior or medial aspect of the knee depending on location of pain
   - Duration: 15 minutes per session; repeat up to 2× for severe cases
   - Frequency: 3× daily during flare-ups; 3–5× weekly for maintenance
   - Benefit: Reduces inflammation, stimulates cartilage repair, improves joint lubrication

2. GRPB – For full knee coverage and adjacent muscle groups
- Wavelengths: 660 nm (1/3) + 850 nm (2/3)
- Application: Wrap or drape device to cover anterior, medial, and lateral regions of the knee simultaneously
- Duration: 15–20 minutes per session
- Frequency: 1–2× daily as needed

- Benefit: Ideal for widespread joint or ligament pain, especially in arthritic knees or athletes recovering from strain

For systemic support, apply GRPB to hamstrings or quadriceps post-treatment to enhance muscle function and reduce kinetic chain tension.

📌 Monitoring & Safety Tips

- Use the device directly on clean skin and avoid treatment over open wounds. The device can be covered with clothes once applied over the knee

- If heat is felt during treatment, pause for 30 minutes before reapplication.

- If needed you can use the device above and below the sore area

- PBM is safe and effective for home or clinic use with minimal risk of adverse effects.

Conclusion

Photobiomodulation is a proven therapy for managing knee pain caused by osteoarthritis, injury, or post-surgical inflammation. With strong clinical backing and user-friendly application, SPRB and GRPB devices can be used to relieve pain, improve mobility, and support long-term joint health. Its ease of use, safety profile, and effectiveness make PBM a cornerstone modality in knee pain care.

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.