



Photobiomodulation (PBM) for Hand Pain and Stiffness: Evidence and Protocols

What is Photobiomodulation?

Photobiomodulation (PBM), also referred to as red light therapy, uses red (660 nm) and near-infrared (850 nm) light to modulate cellular metabolism. PBM enhances mitochondrial activity, stimulates ATP production, reduces inflammation, and promotes tissue healing—making it ideal for small joint conditions such as hand pain and stiffness.



Common causes include arthritis, tendonitis, repetitive strain injury (RSI), carpal tunnel syndrome, and general overuse. PBM offers a drug-free, non-invasive therapy for reducing swelling, improving joint function, and supporting soft tissue recovery in the hands.

Clinical Benefits for Hand Pain and Stiffness

1. Osteoarthritis and Rheumatoid Arthritis of the Hand

- A 2021 systematic review concluded that PBM significantly reduced pain and morning stiffness in small joints of the hand in arthritis patients. [Live link](<https://pubmed.ncbi.nlm.nih.gov/33577779/>)
- Another study showed improved grip strength and reduced synovial inflammation in RA patients after 4 weeks of PBM. [Live link](<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8188261/>)

2. Carpal Tunnel Syndrome (CTS)

- An RCT involving 90 patients demonstrated that PBM improved median nerve conduction and reduced symptoms in CTS sufferers. [Live link](<https://pubmed.ncbi.nlm.nih.gov/29215310/>)

3. Tendonitis and Repetitive Strain

- PBM application to extensor and flexor tendons led to decreased pain and better functional recovery in cases of RSI. [Live link](<https://pubmed.ncbi.nlm.nih.gov/26544898/>)



Mechanistic Evidence

PBM modulates inflammatory mediators (\downarrow IL-6, TNF- α) and increases local nitric oxide production, improving blood flow and oxygen delivery to joint capsules and tendons. PBM also enhances fibroblast proliferation and collagen deposition—both critical in restoring fine motor function. [Live link](<https://pubmed.ncbi.nlm.nih.gov/32697794/>)

Suggested Protocols: SPRB & GRPB

1. SPRB – Ideal for localized hand treatment
 - Wavelength: 660 nm (red) 50% + 850 nm (near-infrared) 50%
 - Application: Wrap or lay the SPRB across the top of the hand, then repeat on the palm side
 - Duration: 15 minutes per side (total 30 minutes)
 - Frequency: 1–3 \times daily for acute pain, and then 3–5 \times per week for chronic management or more as needed
 - Benefit: Reduces stiffness and promotes healing in joints, tendons, and ligaments



2. GRPB – For systemic and bilateral treatment

- Wavelengths: 660 nm (1/3) + 850 nm (2/3)
- Application: Place both hands under the draped GRPB or wrap the belt around the forearms and wrists
- Duration: 15 minutes per side (total 30 minutes)
- Frequency: 1–3× daily for acute pain, and then 3–5× per week for chronic management or more as needed
- Benefit: Enhances circulation across multiple joints, suitable for arthritis or RSI affecting both hands

For enhanced systemic benefit, an additional session can be applied to the forearm or cervical region to promote improved nerve signaling to the hands.

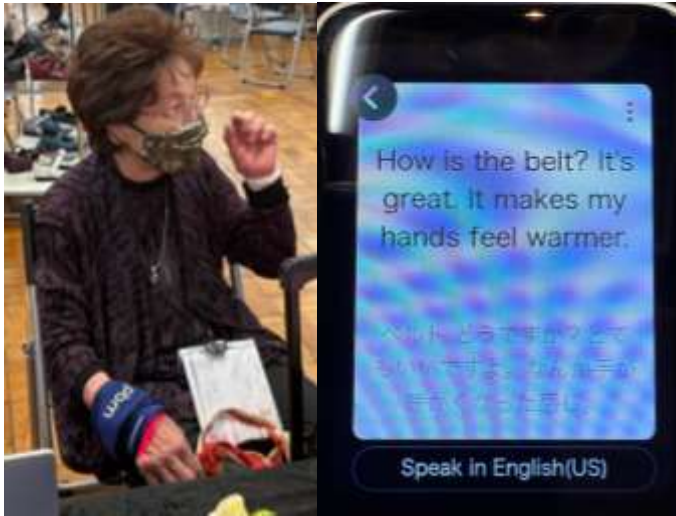
Monitoring & Safety Tips

- Keep hands clean and dry before treatment.
- If swelling is present, elevate hands during PBM session.
- PBM is safe for daily use with no known adverse effects in hand therapy applications.

Conclusion

Photobiomodulation provides a highly effective, evidence-backed treatment for hand pain and stiffness, from arthritis to carpal tunnel syndrome. Using SPRB and GRPB devices at home or in clinic, patients can achieve improved mobility, reduced inflammation, and better

quality of life with consistent use. Its safety, convenience, and growing clinical support make PBM a powerful tool for hand rehabilitation and chronic pain management.



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.