



# Photobiomodulation (PBM) for Managing Rheumatoid Arthritis

---

Prepared by Dr Alan Kwong Hing



## Overview

Rheumatoid Arthritis (RA) is a systemic autoimmune disorder that primarily targets synovial joints, causing chronic inflammation, joint damage, and systemic fatigue. While pharmacological interventions such as DMARDs and biologics remain the mainstay of treatment, photobiomodulation (PBM) offers a complementary, drug-free approach to mitigate inflammation, relieve pain, and support tissue regeneration.

## Mechanisms of Action of Photobiomodulation (PBM)

### 1. Anti-inflammatory Modulation

PBM decreases the production of pro-inflammatory cytokines (TNF- $\alpha$ , IL-1 $\beta$ , IL-6) while increasing anti-inflammatory cytokines like IL-10. This modulation is essential in RA where systemic and localized inflammation leads to joint damage. PBM also reduces COX-2 activity,

decreasing prostaglandin synthesis and inflammatory pain. (Hamblin MR, 2017; Lopes-Martins et al., 2005)

## 2. Mitochondrial and Cellular Function

RA is associated with mitochondrial dysfunction and oxidative stress in joint tissues. PBM stimulates cytochrome c oxidase activity in mitochondria, increasing ATP production and normalizing redox balance. This results in improved energy metabolism, enhanced chondrocyte viability, and better joint repair. (Huang et al., 2009; Barolet & Boucher, 2010)

## 3. Pain Relief and Neuromodulation

PBM activates peripheral opioid receptors and suppresses nociceptive input by modulating transient receptor potential (TRP) channels and substance P release. This reduces hyperalgesia and allodynia in inflamed joints. Neuromodulation via PBM can also influence central sensitization linked to chronic autoimmune pain. (Chow et al., 2009; Alves et al., 2019)

## 4. Vascular and Lymphatic Support

Red and near-infrared light therapy promotes vasodilation via nitric oxide release and improves lymphatic drainage. These effects reduce joint effusion and synovial hypertrophy, enhancing joint mobility. (Bjordal et al., 2006; Lubart et al., 2005)



### Suggested PBM Device Protocols for RA

Target	Application Site	Device	Frequency
Inflamed Joints	Directly over affected joints	SPRB or GPRB	2–3x/day during flare-ups for 15 – 30 minutes
Systemic Inflammation	Full body	Yoga Mat	1–2x/day for 15 minutes
Stiffness/Mobility	Hands, knees, spine	SPRB, GPRB	1–2x/day pre/post activity for 15 – 30 minutes
Fatigue	Chest, back	SPRB, Yoga Mat	1–2x/day as needed for 15 – 30 minutes

### Considerations for PBM Use in RA

Consistency is key to getting beneficial results with light therapy.. As PBM devices are convenient to use they can be used at any time and any place so there is no excuse. Make sure the battery is charged and then start experiencing the benefits.

PBM is not a replacement for medical treatment but can serve as an effective adjunct to traditional therapies. Patients undergoing biologic or immunosuppressive therapy may benefit from the local and systemic effects of PBM to reduce pain, improve mobility, and lessen medication reliance. PBM has a strong safety profile with minimal side effects.



## Scientific References

1. Hamblin MR. Mechanisms and applications of the anti-inflammatory effects of photobiomodulation. *AIMS Biophys.* 2017;4(3):337–361.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5480890/>
2. Brosseau L, et al. Low level laser therapy (LLLT) for rheumatoid arthritis. *Cochrane Database Syst Rev.* 2005;(4):CD002049.  
<https://doi.org/10.1002/14651858.CD002049.pub2>
3. Huang YY, Chen AC, Carroll JD, Hamblin MR. Biphasic dose response in low level light therapy. *Dose-Response.* 2009;7(4):358–383.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2790317/>
4. Barolet D, Boucher A. Prophylactic low-level light therapy for the treatment of hypertrophic scars and keloids: a case series. *Lasers Surg Med.* 2010;42(6):597–601.
5. Chow RT, Johnson MI, Lopes-Martins RA, Bjordal JM. Efficacy of low-level laser therapy in the management of neck pain: a systematic review and meta-analysis of randomized placebo or active-treatment controlled trials. *Lancet.* 2009;374(9705):1897–1908.
6. Alves AC, et al. Photobiomodulation and pain control in clinical practice: A review. *J Clin Med.* 2019;8(12):2211.
7. Bjordal JM, Couppe C, Chow RT, Tuner J, Ljunggren EA. A systematic review of low level laser therapy with location-specific doses for pain from chronic joint disorders. *Aust J Physiother.* 2003;49(2):107–116.
8. Lubart R, Friedmann H, Cohen N, et al. Light and human skin: the role of red and near-infrared light in skin rejuvenation and wound healing. *Photochem Photobiol.* 2005;81(6):1191–1199.

## **Disclaimer**

This document is for educational and informational purposes only and is not intended as a substitute for professional medical advice, diagnosis, or treatment. PBM devices such as the SPRB, GPRB, and Therapeutic Yoga Mat are wellness tools that support general well-being. They are not medical devices and do not diagnose, treat, cure, or prevent any medical condition. Consult your healthcare provider before starting any new therapy.