



Photobiomodulation for the Management of Tinnitus

Introduction

Tinnitus, the perception of sound without an external auditory stimulus, affects approximately 10–15% of the adult population globally. It can manifest as ringing, buzzing, or humming in one or both ears and is often associated with hearing loss, neurological dysfunction, or circulatory issues. Despite its prevalence, effective treatments are limited, leading many patients to seek complementary therapies.

Photobiomodulation (PBM), also known as low-level light therapy (LLLT), has emerged as a promising non-invasive intervention for tinnitus. By applying red or near-infrared (NIR) light to targeted regions of the ear and surrounding tissue, PBM may improve cellular function, circulation, and neural signaling, offering symptom relief in many cases.

Causes of Tinnitus

Tinnitus can arise from a variety of underlying conditions, including:

- Noise-induced hearing loss
- Age-related sensorineural degeneration (presbycusis)
- Middle ear infections or blockages (e.g., earwax, otitis media)
- Temporomandibular joint (TMJ) disorders
- Ototoxic medications (e.g., certain antibiotics, NSAIDs)
- Cardiovascular or circulatory problems
- Trauma to the head or neck
- Neurological diseases (e.g., multiple sclerosis, acoustic neuroma)

Conventional Treatment Options

Conventional approaches to tinnitus include:

- Sound therapy (masking, hearing aids)
- Cognitive-behavioral therapy (CBT)
- Tinnitus retraining therapy (TRT)
- Pharmacologic interventions (antidepressants, anxiolytics)
- Lifestyle modifications (reducing caffeine, stress management)
- Neuromodulation techniques (transcranial magnetic or electrical stimulation)

Mechanisms of PBM for Tinnitus Relief

PBM exerts its effects at the cellular and systemic levels:

- Mitochondrial stimulation: Red and NIR light (typically 630–850 nm) enhances cytochrome c oxidase activity in mitochondria, boosting ATP production and cellular energy availability.
- Improved microcirculation: PBM increases local blood flow, facilitating oxygen and nutrient delivery to cochlear and auditory structures.
- Neural repair and modulation: PBM can reduce inflammation and support neuroplasticity in auditory pathways, potentially normalizing abnormal firing patterns associated with tinnitus.
- Anti-inflammatory effects: Tinnitus linked to chronic inflammation or vascular dysfunction may benefit from PBM's ability to modulate pro-inflammatory cytokines.

Several studies have demonstrated that transmeatal and transcranial PBM may reduce tinnitus severity, especially in cases associated with noise-induced hearing loss or vascular insufficiency (Choi et al., 2012; Figueiredo et al., 2011).

PBM Protocols Using SPRB and GPRB



SPRB applied over the Mastoid

Device	Application Area	Position	Duration	Frequency	Notes
SPRB	Mastoid bone (behind each ear)	Pad placed directly on the mastoid process bilaterally	15 minutes up to 2x per use	1–3 times daily for 4–6 weeks then as needed	Can also be placed gently in front of the ear canal
GPRB	Neck (cervical region), upper spine, TMJ region	Wrap pad around back of neck and base of skull	15 minutes up to 3x per use	1–3 times daily as needed	Enhances circulation to auditory centers in brainstem and improves vagus nerve tone

The PBM Healing TMJ device is designed to deliver targeted red and near-infrared light therapy to the temporomandibular joint area, which anatomically lies adjacent to the ear canal and auditory structures. Because the device's wrap design covers the side of the face and extends over the ears, it can also be effectively used for tinnitus applications.



PBM TMJ device applied over both ears

By positioning the TMJ device so that the light pads cover the jaw joint and the region directly over the ears, PBM can target both TMJ-related tinnitus and cases where improved circulation and nerve function in the auditory system may be beneficial.

Recommended Protocol:

- Device - TMJ PBM Device
- Application Area -TMJ region with coverage over the ears
- Position - Secure pads over both jaw joints so that light also covers the area in front of and directly over the ears
- Duration - 15 minutes per session
- Frequency – 3 -4 times daily as needed for acute cases until symptoms subside, the 1 -2 x daily then as needed
- Notes - Particularly suitable for tinnitus associated with TMJ dysfunction or where jaw tension contributes to auditory symptoms

PBM Protocols Using the TMJ Device for Tinnitus

Conclusion

PBM represents a safe and promising adjunctive therapy for tinnitus sufferers, particularly in cases linked to hearing loss, TMJ dysfunction, or vascular insufficiency. By supporting mitochondrial function, enhancing circulation, and reducing neuroinflammation, PBM may alleviate symptoms and improve quality of life. The SPRB, GPRB and TMJ devices from PBM Healing International provide user-friendly, non-invasive options for home or clinical use.

References

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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.