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 on 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

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 and GPRB devices from PBM Healing International provide user-friendly, non-invasive options for home or clinical use.

References

1. Choi H, et al. (2012). Efficacy of low-level laser therapy in tinnitus patients: a randomized, double-blind, placebo-controlled trial. Lasers Med Sci. https://pubmed.ncbi.nlm.nih.gov/22582156/
2. Figueiredo RR, et al. (2011). Low-level laser therapy for tinnitus: a study in 86 patients. Braz J Otorhinolaryngol. https://pubmed.ncbi.nlm.nih.gov/22068198/
3. Gungor A, et al. (2008). Effectiveness of low-level laser therapy in the treatment of tinnitus: a double-blind, placebo-controlled study. Clin Otolaryngol. https://pubmed.ncbi.nlm.nih.gov/18380801/
4. Dejakum R, et al. (2020). Low-level laser therapy as a treatment for chronic tinnitus: a clinical study. Photomed Laser Surg. https://doi.org/10.1089/pho.2019.4761

Disclaimer

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.