

Treatment of peripheral vestibular dysfunction using photobiomodulation

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Abstract. Gentamicin, which is still used in modern medicine, is a known vestibular toxic agent, and various degrees of balance problems have been observed after exposure to this pharmacologic agent. Photobiomodulation is a candidate therapy for vertigo due to its ability to reach deep inner ear organs such as the cochlea. Previous reports have suggested that photobiomodulation can improve hearing and cochlea function. However, few studies have examined the effect of photobiomodulation on balance dysfunction. We used a rat model to mimic human vestibulopathy resulting from gentamicin treatment and evaluated the effect of photobiomodulation on vestibular toxicity. Slow harmonic acceleration (SHA) rotating platform testing was used for functional evaluation and both qualitative and quantitative epifluorescence analyses of cupula histopathology were performed. Animals were divided into gentamicin only and gentamicin plus laser treatment groups. Laser treatment was applied to one ear, and function and histopathology were evaluated in both ears. Decreased function was observed in both ears after gentamicin treatment, demonstrated by low gain and no SHA asymmetry. Laser treatment minimized the damage resulting from gentamicin treatment as shown by SHA asymmetry and recovered gain in the treated ear. Histology results reflected the functional results, showing increased hair cell density and epifluorescence intensity in laser-treated cupulae. © 2017 Society of Photo-Optical Instrumentation Engineers (SPIE) [DOI: [10.1117/1.JBO.22.8.088001](https://doi.org/10.1117/1.JBO.22.8.088001)]

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