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Dental pulp stem cells therapy overcome photoreceptor cell death and protects the retina in a rat model of sodium iodate-induced retinal degeneration

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ABSTRACT

Blindness and vision loss contribute to irreversible retinal degeneration, and cellular therapy for retinal cell replacement has the potential to treat individuals who have lost light sensitive photoreceptors in the retina. Retinal cells are well characterized in function, and are a subject of interest in cellular replacement therapy of photoreceptors and the retinal pigment epithelium. However, retinal cell transplantation is limited by various factors, including the choice of potential stem cell source that can show variability in plasticity as well as host tissue integration. Dental pulp is one such source that contains an abundance of stem cells. In this study we used dental pulp-derived mesenchymal stem cells (DPSCs) to mitigate sodium iodate ($NaIO_3$) insult in a rat model of retinal degeneration. Sprague-Dawley rats were first given an intravitreal injection of 3×10^5 DPSCs as well as a single systemic administration of $NaIO_3$ (40 mg/kg). Electroretinography (ERG) was performed for the next two months and was followed-up by histological analysis. The ERG recordings showed protection of DPSC-treated retinas within 4 weeks, which was statistically significant (* $P \leq .05$) compared to the control. Retinal thickness of the control was also found to be thinner (*** $P \leq .001$). The DPSCs were found integrated in the photoreceptor layer through immunohistochemical staining. Our findings showed that DPSCs have the potential to

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