

## **Human Dental Pulp Stem Cells (DPSCs) therapy in rescuing photoreceptors and establishing a sodium iodate-induced retinal degeneration rat model**

### **ABSTRACT**

Background: Different methods have been used to inject stem cells into the eye for research. We previously explored the intravitreal route. Here, we investigate the efficacy of intravenous and subretinal-transplanted human dental pulp stem cells (DPSCs) in rescuing the photoreceptors of a sodium iodate-induced retinal degeneration model. Methods: Three groups of Sprague Dawley rats were used: intervention, vehicle group and negative control groups (n = 6 in each). Intravenous injection of 60 mg/kg sodium iodate (day 0) induced retinal degeneration. On day 4 post-injection of sodium iodate, the rats in the intervention group received intravenous DPSC and subretinal DPSC in the right eye; rats in the vehicle group received subretinal Hank's balance salt solution and intravenous normal saline; while negative control group received nothing. Electroretinogram (ERG) was performed to assess the retinal function at day 0 (baseline), day 4, day 11, day 18, day 26, and day 32. By the end of the study at day 32, the rats were euthanized, and both their enucleated eyes were sent for histology. Results: No significant difference in maximal ERG a-wave ( $p = 0.107$ ) and b-wave, ( $p = 0.153$ ) amplitude was seen amongst the experimental groups. However, photopic 30 Hz flicker amplitude of the study eye showed significant differences in the 3 groups ( $p = 0.032$ ). Within the intervention group, there was an improvement in 30 Hz flicker ERG response of all 6 treated right eyes, which was injected with subretinal DPSC; while the 30 Hz flicker ERG of the non-treated left eyes remained flat. Histology showed improved outer nuclear layer thickness in intervention group; however, findings were not significant compared to the negative and vehicle groups. Conclusion: Combination of subretinal and intravenous injection of DPSCs may have potential to rescue cone function from a NaIO<sub>3</sub>-induced retinal injury model.

**Keyword:** Degenerated retina; Dental pulp; Electroretinography; Mesenchymal stem cell; Sodium iodate; Sprague-Dawley rats