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Stem Cell-Derived Retinal Cells for Vision Restoration**Isabelle Laurent**

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Age-related macular degeneration (AMD) and inherited retinal diseases remain among the leading causes of irreversible blindness worldwide. Current therapeutic approaches primarily slow disease progression but are unable to replace damaged retinal cells. Advances in pluripotent stem cell technology have created opportunities to generate retinal pigment epithelial (RPE) cells capable of restoring retinal function. This presentation reviews recent progress in differentiating induced pluripotent stem cells into functional retinal cells suitable for transplantation. Laboratory studies have demonstrated successful integration of transplanted RPE cells into damaged retinal tissue, where they promote photoreceptor survival, reduce inflammatory responses, and improve visual function.

Biomaterial scaffolds have further enhanced transplantation efficiency by providing structural support and improving

cell survival after implantation. Early clinical studies indicate encouraging safety profiles with measurable improvements in visual acuity for selected patients. Current challenges include long-term graft survival, immune compatibility, manufacturing consistency, and regulatory approval. Emerging technologies including gene editing, retinal organoids, and personalized stem cell therapies may overcome these limitations. Stem cell-derived retinal replacement represents one of the most promising regenerative approaches for treating currently incurable causes of blindness and has the potential to significantly improve visual outcomes for millions of patients.

Biography

Isabelle Laurent is an ophthalmology researcher specializing in retinal degeneration and stem cell-based vision restoration. Her laboratory focuses on retinal tissue engineering and translational regenerative medicine.