GENERATION OF PURE RETINAL CELLS FROM HUMAN PLURIPOTENT STEM CELLS

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The Invention

UW-Madison researchers have developed a novel protocol for generating nearly pure retinal progenitors (PAX6/VSX2 positive cells) without contamination by forebrain cells. Retinas develops from precursors of forebrain cells, and the inventors recently discovered that BMP (bone morphogenetic protein) pathway-related genes are differentially expressed in the developing retinal and forebrain neural progenitors by comparing their expression profile using single cell RNA-Seq datasets. In examining the role of the BMP pathway in retinal differentiation, the inventors found that continued inhibition of the BMP pathway, which is commonly used for neural differentiation, blocks retinal differentiation. Addition of BMP after neural induction by TGF-beta alone in the first week significantly enhances the retinal differentiation. After a series of analyses, the inventors identified the optimal stage for application of BMPs, the duration of BMP administration and the dosage of BMPs. Thereby, the inventors developed a novel protocol for generating nearly pure retinal progenitors (PAX6/VSX2 positive cells) without the contamination of forebrain cells by first guiding the stem cells to primitive ectoderm cells with TGFb inhibitor in the first 6 days followed by differentiation to retinal progenitors with BMPs. The retinal progenitors can be further differentiated into the terminally differentiated retinal cells: ganglion, amacrine, and photoreceptor cells. The differentiation of retinal cells in vitro using our newly developed method has been validated by single cell RNA-seq and immunostaining.

Additional Information

For More Information About the Inventors
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Tech Fields
- Pluripotent Stem Cells : Differentiation
- Therapeutics & Vaccines : Ocular

For current licensing status, please contact Andy DeTienne at adetienne@warf.org or 608-960-9857