



Indian Institute of Science
Centre for BioSystems Science and Engineering

BSSE Seminar

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Biological Sciences Building



Patient-specific iPSC-derived eye organoids for ocular disease

Dr. Indumathi Mariappan, Ph D

Scientist, Center for Ocular Regeneration, LV Prasad Eye Institute, Hyderabad

ABSTRACT

For tissue type that do not carry any proven adult stem cells, the pluripotent stem cells (PSCs) such as the ESCs and iPSCs serve as alternative stem cell sources. These PSCs can be differentiated to generate almost any cell types of the body. Recent reports have demonstrated the possibility of generating complex, three dimensional tissues from PSCs *in vitro*. In our lab, we have established a method of generating three dimensional retinal and corneal organoids from human PSCs. The eye field primordial (EFP) clusters that emerged from differentiating PSCs developed into whole eye ball-like, self-organized, three dimensional miniature structures consisting of retinal primordia (RP), corneal primordia (CP), primitive eye lid-like outer covering, lens and other adnexal tissues in a step-wise maturation process within 15 weeks. These organoids recapitulate the early developmental events *in vitro* and displayed similar anatomical features and marker expression profiles as that of adult tissues and offers an alternative tissue source for regenerating different parts of the eye. Such miniature organoids derived from patient-specific stem cells are very useful tools for drug screening and disease modeling studies *in vitro*.