

Optic vesicle

Optic vesicles are outgrowings of the brain which make contact with the surface ectoderm and this contact induces changes necessary for further development of the eye. ... The optic vesicles then develop into the optic cup with the inner layer forming the retina and the outer portion forming the retinal pigment epithelium.

During embryogenesis, optic vesicles develop from the diencephalon via a multistep process of organogenesis. Using induced pluripotent stem cell (iPSC)-derived human brain organoids, we attempted to simplify the complexities and demonstrate formation of forebrain-associated bilateral optic vesicles, cellular diversity, and functionality. Around day 30, brain organoids attempt to assemble optic vesicles, which develop progressively as visible structures within 60 days. These optic vesicle-containing brain organoids (OVb-organoids) constitute a developing optic vesicle's cellular components, including primitive corneal epithelial and lens-like cells, retinal pigment epithelia, retinal progenitor cells, axon-like projections, and electrically active neuronal networks. OVb-organoids also display synapsin-1, CTIP-positive myelinated cortical neurons, and microglia. Interestingly, various light intensities could trigger photosensitive activity of OVb-organoids, and light sensitivities could be reset after transient photobleaching. Thus, [brain organoids](#) have the intrinsic ability to self-organize forebrain-associated primitive sensory structures in a topographically restricted manner and can allow interorgan interaction studies within a single organoid ¹⁾.

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