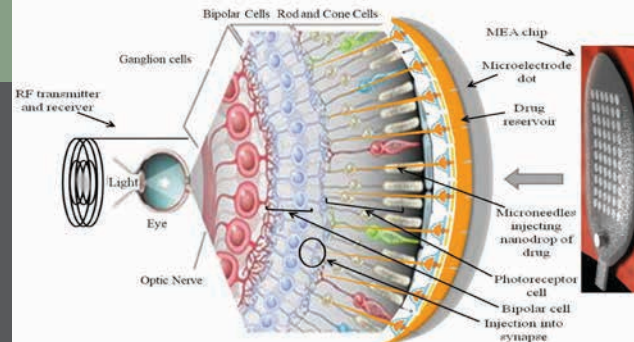


Chemoretina: Vision Restoration Using Voltage-Gated Sodium Channel Modulators



Problem Statement: Several hereditary degenerative diseases such as retinitis pigmentosa (RP), age-related macular degeneration (AMD) etc., cause structural and functional damage to neurons in the retina. Patients afflicted with these diseases gradually lose their vision and become legally blind within a short period. Of these diseases, RP is primarily characterised by progressive degeneration of photoreceptor cells leading to loss of phototransduction apparatus. Researchers from IIT Bombay have explored the possibility of stimulating retinal bipolar cells in an attempt to restore vision.

Uniqueness of the Solution: Studies on the intra-vitreous injection of a voltage-gated sodium channel blocker Lamotrigine show an electronegative electroretinogram (ERG) response in rats and goldfish, suggesting a signal disruption between photoreceptor and bipolar cells of the retina. Since functional vision loss is primarily due

to loss of signal transmission at the photoreceptor-bipolar cell level, the team explored the possibility of stimulating retinal bipolar cells (RBCs) in an attempt to restore vision. The researchers are presently determining RBC response to different types and patterns of light in a healthy retina and comparing them to their response in a degenerating retina. Since sodium currents form a significant component of visual signal transmission along the photoreceptor-bipolar-ganglion cell pathway, the researchers attempt to understand the effects of voltage-gated sodium channel modulators on RBC signalling. The study will help identify a suitable method to exploit sodium channels to re-induce signal transmission in cases of degeneration.

Current Status of Technology: Primary research is done. The researchers welcome partners to drive the feasibility tests towards human and animal trials.

Societal Impact: One in 750 adults and

13 in every 740 adults in rural central and south India, respectively, are affected by RP. The research team envisages a tremendous societal impact if their idea can be taken to the market level.

Patent(s): Filed

Relevant Industries: Healthcare, Medical Devices.

Faculty: Prof. Jayesh Bellare, Chemical Engineering.