Ophthalmology-2013

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference on
Clinical & Experimental Ophthalmology

April 15-17, 2013 Hilton Chicago/Northbrook, USA

New mechanisms and treatment modalities for retinal degenerative diseases

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Abstract

Retinal and macular degenerative diseases due to dysfunction of photoreceptors are a leading cause of blindness worldwide. Photoreceptors are highly polar and metabolically active ciliary neurons. They have a distinct inner segment and outer segment (OS). The OS is considered is an extension of a primary cilium and boasts of being a privileged compartment. The composition of the OS, with regards to the proteins and lipids, is distinct from the rest of the neuron. The OS is also composed of a coin-stack shaped arrangement of thousands of membranous discs loaded with the chromophore rhodopsin and other proteins involved in phototransduction cascade. Intriguingly, ~10% of the tip of the OS discs is shed every day and new discs are added at the base of the OS. The shedding is mediated by the interaction of the OS with the overlying retinal pigment epithelium (RPE). Owing to their involvement in development and maintenance of visual cascade, defects in the formation or composition of the OS or in the shedding by the RPE result in photoreceptor degenerative diseases. In this session, we will focus on recent advances in delineating the underlying mechanism of photoreceptor OS development and shedding pathways. Specifically, this session will present evidence for involvement of ciliary proteins in modulating OS composition and disc maintenance as well as ascertaining the role of potassium channel proteins in the RPE in photoreceptor survival and function. These studies will also assist in the development of rational treatment modalities for these blinding disorders.

Biography

Hemant Khanna, PhD is a faculty member at the Department of Ophthalmology UMASS Medical School (Worcester, MA) where his lab focuses on delineating the function of ciliary disease proteins in photoreceptors using mice and zebrafish as model systems. In addition to running a successful laboratory, Khanna is involved in teaching activities. He is a faculty member of the Graduate School of Biomedical Sciences at UMASS Medical School and actively participates in recruiting and training graduate students. Khanna has authored more than 30 peer-reviewed articles in international journals and has reviewed numerous grant applications and manuscripts. He also serves on the editorial board of Molecular Vision and International Journal of Ophthalmic Pathology and as Section Editor (Retina) of BMC Ophthalmology.