Wiring the Eye to Brain for Binocular Vision: Lessons from the Albino Visual System

September 17

Tuesday, 12:30 pm

Weekly Colloquium

Billings Building
Rosedale Conference Room

Speaker: Carol Ann Mason, Ph.D.
Professor of Pathology and Cell Biology, Neuroscience and Ophthalmic Science (in Ophthalmology)
Principal Investigator and Chair of Interschool Planning at Columbia's Zuckerman Institute

Host: Yutaka Yoshida, Ph.D.

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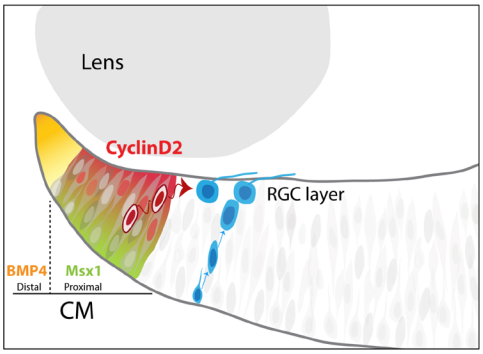
Abstract

In higher vertebrates, proper binocular vision depends on the extension of retinal ganglion cell (RGC) axons to the same (ipsilateral) and opposite (contralateral) side of the brain. Our past work has identified a molecular program of transcription and axon guidance factors that determine the ipsilateral and contralateral RGC pathways through the optic chiasm and to thalamic targets in the mouse brain. We now aim to uncover the spatiotemporal features of the generation of these two RGC subpopulations. We use the albino as a comparative model, because hypopigmentation of the retinal pigment epithelium (RPE) is linked to a shift in RGC fate from ipsi- to contralateral during the establishment of the binocular circuit and therefore altered stereo vision. The potential role of the melanin-containing retinal RPE in these processes will be discussed.

Mouse retinal neurogenesis in the ciliary margin zone



Marcucci et al., Cell Reports, 2016

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2. Marcucci, F., Murcia-Belmonte, V., Wang, Q., Coca, Y., Ferreiro-Galve, S., Kuwajima,, T., Khalid, S., Ross, M., Mason, C., and Herrera, E. (2016) The ciliary margin zone of the mammalian retina generates retinal ganglion cells. Cell Reports 17: 3153–3164. PMID: 28009286 PMCID: PMC5234854
3. Iwai-Takekoshi, L., Balasubramanian, R., Sitko, A., Khan, R., Weinreb, S., Robinson, .K, and Mason, C. (2019) Activation of Wnt signaling reduces ipsilaterally projecting retinal ganglion cells in pigmented retina. Development. Nov 2;145(21). pii: dev163212. doi: 10.1242/dev.163212. PMID: 30254141

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