# 第1113回生物科学セミナー

日時： **9月23日（金） 16:30−18:00**

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## 演題: Novel Inner Retinal Photoreceptors in Non-mammalian Vertebrates

The vertebrate retina contains three different types of photoreceptors: the visual photoreceptors cones and rods, and the intrinsically photosensitive retinal ganglion cells (ipRGCs) expressing the photopigment melanopsin (Opn4) that converged through evolution to regulate visual and non-image forming tasks (Valdez et al 2009, 2013; Diaz et al 2015). In the chicken, there are two Opn4 genes: *Opn4m* and *Opn4x,* the mammalian and Xenopus orthologs respectively. We have previously shown that the chicken retina expressed both proteins with Opn4m confined to the GC layer and Opn4x expressed in the GC layer at first and in horizontal cells (HCs) at later developmental stages (Verra et al. 2011). Embryonic RGC primary cultures expressing both Opn4s respond to light through a photocascade involving phospholipase C activation and calcium mobilization (Contin et al 2006, 2010). Here, we further characterize primary cultures of both *Opn4x* (+) populations of inner retinal cells (RGCs and HCs) and investigate their intrinsic photosensitivity as well as the visual cycle. For this, we obtained highly enriched Opn4x (+) cells by a chemical gradient (Morera et al 2012) and immunopanning, and assessed positive light responses by calcium fluorescence imaging as compared with dark controls. The expression of different circadian markers: clock genes *Bmal1, Clock, Per2* and *Cry1,* and the key melatonin synthesizing enzyme: arylalkylamine *N*-acetyltransferase, and non-visual photocascade components: *G protein q* and *Opn4x* appears very early in development. Positive light responsiveness were observed in both primary cultures fed exogenous all-trans retinal (atRal) as compared with dark controls. Moreover, RGCs were able to isomerize atRal into 11cRal in the presence of light and to further metabolize it to all-trans retinol and all-trans retinyl palmitate (Diaz et al 2016). Results support the idea of a light dependent mechanism for chromophore regeneration in addition to bistability and that non-visual Opn4 photoreceptors and endogenous clocks converge all together in these inner retinal cells in which ipRGCs and HCs acting as non-classical photoreceptors may cooperate to detect light that regulates diverse non-visual functions.

References


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