

## 56.3013 **Brain mapping reveals potential functions of ipRGCs in modulating eye movements**

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Intrinsically-photosensitive retinal ganglion cells (ipRGCs) that express melanopsin are well-known for mediating non-visual functions such as entrainment of circadian rhythms and the pupillary light reflex. However, the cerebral neural correlates of ipRGC-specific signals in healthy humans remain largely unknown. Here, using functional magnetic resonance imaging (fMRI) and light stimuli designed to differentially activate melanopsin, we examined brain responses associated with ipRGCs photoreception in 14 healthy participants. In order to control for the involvement of rods and cones, we designed pairs of perceptually similar white lights (metamer-like lights) with high and low levels of melanopic excitation (High\_Mel versus Low\_Mel) while having minimal excitation differences for cones and rods. We discovered that, at high melanopic excitation (when ipRGCs were more excited), bilateral frontal eye field regions showed stronger activation. Multivariate pattern analyses (MVPA) further yielded distinct bilateral pattern activity in the inferior temporal gyri and caudate nuclei, both have been reported receiving inputs from the frontal eye fields. Enlightened by these findings, we hypothesized that ipRGCs may influence eye movements and therefore conducted an eye tracking experiment to test this hypothesis. The results showed that participants exhibited larger fixational eye movements in the horizontal dimension while ipRGCs were more activated. Taken together, these findings suggest that light flux detection by ipRGCs activate cerebral regions classically involved in attentional and ocular motor responses and lead to greater magnitudes of fixational eye movement.