



AB010. A retinoraphe projection regulates looming-induced defensive behavior

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Abstract: Animals promote their survival by avoiding rapidly approaching objects that indicate threats. It is believed that looming cues are detected by retinal ganglion cells (RGCs) that project to the superior colliculus (SC). However, the exact type of RGC that transmits looming-related signals remains unclear. Here we identify a specific transient type of RGCs that controls mouse looming-evoked defensive response by sending axonal collaterals to the dorsal raphe nucleus (DRN) and SC. Looming signals transmitted by DRN-projecting RGCs activate DRN GABA neurons and in turn inhibit serotonin neurons. Moreover, optogenetically stimulating serotonin neurons reduces looming-evoked defensive behaviors. Thus, a dedicated population of RGCs detects rapidly approaching visual threats and their input to the DRN controls a serotonergic self-gating mechanism that regulates innate defensive responses. Our study provides new insights into how DRN and SC work in concert to extract and translate visual threats into defensive behavioral responses.

Keywords: Defensive responses; dorsal raphe; retinal ganglion cells (RGCs)

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