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Targeting of Central Nucleus Projections to Extramodular Zones of the Lateral Cortex of the Inferior Colliculus in Developing Mouse

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the Faculty of the Undergraduate
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PUBLIC PRESENTATION

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Abstract

The multimodal lateral cortex of the inferior colliculus (LCIC) exhibits a modular-extramodular micro-organization that is evident early in development. In addition to a set of neurochemical markers that reliably highlight its modular-extramodular organization, mature projection patterns in a variety of adult species suggest that major LCIC afferents also recognize and adhere to such a framework. This patch-matrix-like arrangement appears to segregate into distinct afferent streams, with somatosensory inputs targeting LCIC modules and auditory inputs targeting surrounding extramodular zones. Currently lacking is a detailed understanding of the development and shaping of multimodal LCIC afferents with respect to its modular-extramodular framework. The present study examines the ontogeny of one auditory input to the LCIC, that arising from the central nucleus of the inferior colliculus (CNIC), with respect to the neurochemical framework; and suggests an early specificity of patterned inputs to the LCIC that exhibit discrete modular-extramodular mapping characteristics. Projection adherence to the LCIC extramodular framework becomes increasingly clear over the early postnatal period, and readily apparent by hearing onset. Double-labeling studies confirm that bilateral projections from CNIC to LCIC occupy extramodular domains that surround LCIC glutamic acid decarboxylase (GAD)-positive layer 2 modules by hearing onset. Biocytin-labeled CNIC axons in living slice preparations avoid LCIC modules, terminating heavily in calretinin (CR)-positive extramodular zones. Determining how these emerging multimodal LCIC input arrays may interface with each other, as well as how they align with and are potentially influenced by similarly configured Eph-ephrin guidance patterns, is discussed.