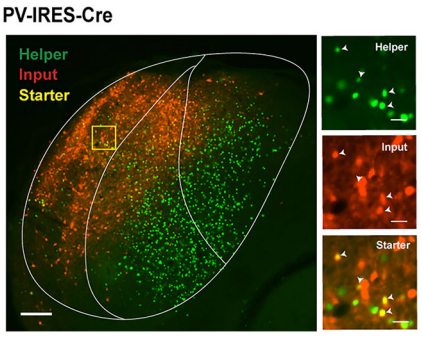
This Week in The Journal

Unraveling Inferior Colliculus Cell-Specific Circuits

Mengting Liu, Yixiao Gao, Fengyuan Xin, Ying Hu, Tao Wang et al.

(see article e1655232024)

Our brains process sensory stimuli via ascending neural pathways. The flow of information in these pathways impacts our internal states and behaviors. To process the sensation of sound, auditory information passes through the auditory midbrain, or inferior colliculus (IC), on its way to the forebrain. This is a key point in the pathway, and the role of the IC in various auditory brain functions is well explored. In this issue, Liu et al. examined the pathways ascending from the IC more thoroughly. They identified the IC neurons that express parvalbumin or somatostatin and explored how they are innervated by other brain regions, where they project to, and their intrinsic electrophysiological properties. They found that parvalbumin neurons were innervated by auditory inputs and somatostatin neurons received more inputs from the periaqueductal gray and superior colliculus, which are two sensorimotor brain regions. The authors also discovered that regardless of where the IC neurons were expressed, the main targets for these neurons were the primary and secondary auditory thalamic nuclei. They also found that parvalbumin neurons were more heterogeneous than somatostatin neurons: only around a quarter of parvalbumin neurons were inhibitory (while no somatostatin neurons were inhibitory) and displayed more variability in intrinsic properties and presynaptic size. Altogether, these findings reveal that parvalbumin and somatostatin expression in the IC has functionally distinct properties and roles in auditory pathways. This is informative for those studying the neural underpinnings of sound processing and suggests that genetic lines of mice allowing for cell-specific manipulations may be used to further unravel IC circuits.



The left panel shows a representative fluorescent image of the rabies virus–mediated retrograde monosynaptic tracing strategy used in a PV-IRES-Cre mouse. AAV-Helper (green) was injected into the IC, and the retrograde rabies virus was injected into the same IC location to enable the identification of input neurons (red) on the parvalbumin starter neurons (yellow).

Sex Differences in Rat Social Reward

Jonathan J. Chow, Kayla M. Pitts, Ansel Schoenbaum, Kaue M. Costa, Geoffrey Schoenbaum, and Yavin Shaham

(see article e1887232024)

Rodent research models have moved the needle forward in our understanding of social reward and the motivation to pursue social interaction. It was recently discovered that rats choose to pursue social interaction with peers over opioids or psychostimulants even after prolonged exposure to these drugs, which was a breakthrough that demonstrated how robust the experience of social reward is. However, gaps in knowledge remain. In this issue, Chow et al. investigated whether the motivation to interact socially differs when peers are of the opposite sex. They trained rats to lever press for access to the same- or opposite-sex peers while measuring reward-associated dopamine levels in two striatal brain regions that regulate motivated behavior: the nucleus accumbens core and the dorsomedial striatum. Only males were more motivated to pursue the opposite- than same-sex peer interactions, and dopamine levels differed in a sex- and striatal-dependent manner. Notably, in sexually naive rats, estrous cycle fluctuations had no effect on social interaction motivations. These findings advance our understanding of the sex differences in social reward.

This Week in The Journal was written by Paige McKeon

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