

Circuit Organization of Mouse Motor Cortex

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Live Webinar
via Zoom Conference



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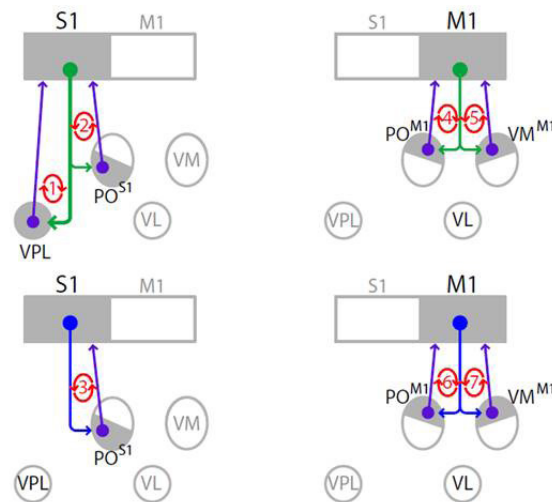
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Abstract

How do we control our hand movements? Our lab aims to understand the circuit-level mechanisms in the mouse's sensorimotor pathways controlling hand and forelimb movements. I'll discuss two lines of investigation. One is a bottom-up approach to characterize the cell-type-specific connections of forelimb motor and somatosensory cortex neurons both locally and remotely, particularly in thalamus, where results are showing both shared and divergent connectivity patterns in cortico-thalamo-cortical circuits across areas. The other is a top-down ethological approach, aiming to characterize at high spatiotemporal resolution how mice move their hands and digits during natural feeding behaviors. Analysis of high-speed, close-up video is revealing the kinematic building-blocks of dexterous food-handling movements, including a prominent role of the thumbs and ultra-fast stereotyped maneuvers.



1. Yamawaki N, Li X, Lambot L, Ren LY, Radulovic J, Shepherd GMG (2019) Long-range inhibitory intersection of a retrosplenial thalamocortical circuit by apical tuft-targeting CA1 neurons. *Nature Neuroscience* 22(4):618-626.
2. Barrett JM, Tapias MGR, Shepherd GMG (2020) Manual dexterity of mice during food-handling involves the thumb and a set of fast basic movements. *PLoS ONE* 15(1): e0226774.
3. Guo K, Yamawaki N, Barrett JM, Tapias MGR, Shepherd GMG (2020) Cortico-thalamo-cortical circuits of mouse forelimb S1 are organized primarily as recurrent loops. *Journal of Neuroscience* 40(14):2849-2858. PMID: 32075900.