



Cover legend: Descending, or "corticofugal" projections from the auditory cortex target the dorso-medial and lateral "shell" nuclei of the inferior colliculus (IC). Despite corticofugal fibers primarily releasing the excitatory transmitter glutamate, auditory cortex activity often inhibits IC neurons *in vivo*. We hypothesized that local GABAergic circuitry in the IC supports corticofugal driven inhibition. We tested this by measuring corticofugal transmission onto glutamatergic and GABAergic shell IC neurons. To this end, we crossed the transgenic mouse lines VGAT-ires-cre and Ai14 fl/fl, thereby expressing the red fluorescent protein tdTomato in GABAergic neurons.

This approach allowed targeting patch-clamp electrophysiology recordings in acute brain slices to GABAergic and presumptive glutamatergic IC neurons, while stimulating auditory corticofugal axons using optogenetics. Surprisingly, we found that corticofugal transmission is strongest onto IC glutamatergic neurons. However, IC glutamatergic neurons drove feedforward spiking onto GABAergic neighbors, such that auditory corticofugal activity engages a multisynaptic cascade to generate local inhibition. This confocal image shows the IC's VGAT+ neurons (GABAergic) labeled with tdTomato (red) and the VGAT- neurons (presumptive glutamatergic) as unlabeled "shadows". For more information, see the article by Oberle et al. (pages 5642–5655).

Cover image: Hannah M. Oberle, Alexander N. Ford, and Jordyn E. Czarny.

5589 This Week in The Journal

Journal Club

5590 The Contributions of the mTOR Complexes: How Does Regional and Temporal Heterogeneity Affect Myelination and Remyelination?

Saina Nemati, Bethany R. Kondiles, and Sarah Wheeler

Research Articles

CELLULAR/MOLECULAR

5593 mGluR5 from Primary Sensory Neurons Promotes Opioid-Induced Hyperalgesia and Tolerance by Interacting with and Potentiating Synaptic NMDA Receptors

Daozhong Jin (金道忠), Hong Chen (陈红), Meng-Hua Zhou (周孟华), Shao-Rui Chen (陈少瑞), and Hui-Lin Pan (潘惠麟)

5608 Modulation of SK Channels via Calcium Buffering Tunes Intrinsic Excitability of Parvalbumin Interneurons in Neuropathic Pain: A Computational and Experimental Investigation

Xinyue Ma, Loïs S. Miraucourt, Haoyi Qiu, Reza Sharif-Naeini, and Anmar Khadra

DEVELOPMENT/PLASTICITY/REPAIR

5623 Neuromechanical Strategies for Obstacle Negotiation during Overground Locomotion following Incomplete Spinal Cord Injury in Adult Cats

Charly G. Lecomte, Stephen Mari, Johannine Audet, Sirine Yassine, Angèle N. Merlet, Caroline Morency, Jonathan Harnie, Claudie Beaulieu, Louis Gendron, and Alain Frigon

SYSTEMS/CIRCUITS

5642 Recurrent Circuits Amplify Corticofugal Signals and Drive Feedforward Inhibition in the Inferior Colliculus

Hannah M. Oberle, Alexander N. Ford, Jordyn E. Czarny, Meike M. Rogalla, and Pierre F. Apostolides

5656 Parabrachial Nucleus Activity in Nociception and Pain in Awake Mice

Jesse A. Smith, Yadong Ji, Rebecca Lorsung, Macauley S. Breault, Jeffrey Koenig, Nathan Cramer, Radi Masri, and Asaf Keller

5668 Dynamic Recruitment of the Feedforward and Recurrent Mechanism for Black-White Asymmetry in the Primary Visual Cortex

Weifeng Dai (戴伟枫), Tian Wang (王天), Yang Li (李洋), Yi Yang (杨祎), Yange Zhang (张艳歌), Jian Kang (亢健), Yujie Wu (武宇洁), Hongbo Yu (俞洪波), and Dajun Xing (邢大军)

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- 5693 **Mouse Behavior on the Trial-Unique Nonmatching-to-Location (TUNL) Touchscreen Task Reflects a Mixture of Distinct Working Memory Codes and Response Biases**
Daniel Bennett, Jay Nakamura, Chitra Vinnakota, Elysia Sokolenko, Jess Nithianantharajah, Maarten van den Buuse, Nigel C. Jones, Suresh Sundram, and Rachel Hill
- 5710 **The Hippocampus Contributes to Temporal Discounting When Delays and Rewards Are Experienced in the Moment**
Virginie M. Patt, Renee Hunsberger, Dominoe A. Jones, and Mieke Verfaellie
- 5723 **Scene Perception and Visuospatial Memory Converge at the Anterior Edge of Visually Responsive Cortex**
Adam Steel, Brenda D. Garcia, Kala Goyal, Anna Mynick, and Caroline E. Robertson
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