



Richard Roth

Instructor, Neurosurgery

Bio

ACADEMIC APPOINTMENTS

- Instructor, Neurosurgery

Publications

PUBLICATIONS

- **Remodelling of corticostriatal axonal boutons during motor learning.** *Nature*
Sheng, M., Lu, D., Roth, R. H., Hwang, F. J., Sheng, K., Ding, J. B.
2025
- **Motor learning drives region-specific transcriptomic remodeling in the motor cortex and dorsal striatum.** *bioRxiv : the preprint server for biology*
Sun, Y., Roth, R. H., Hwang, F. J., Wang, S., Ding, J. B.
2025
- **Color-neutral and reversible tissue transparency enables longitudinal deep-tissue imaging in live mice.** *bioRxiv : the preprint server for biology*
Keck, C. H., Schmidt, E. L., Roth, R. H., Floyd, B. M., Tsai, A. P., Garcia, H. B., Cui, M., Chen, X., Wang, C., Park, A., Zhao, S., Liao, P. A., Casey, et al
2025
- **Thalamic integration of basal ganglia and cerebellar circuits during motor learning.** *bioRxiv : the preprint server for biology*
Roth, R. H., Muniak, M. A., Huang, C. J., Hwang, F. J., Sun, Y., Min, C., Mao, T., Ding, J. B.
2024
- **A fast and responsive voltage indicator with enhanced sensitivity for unitary synaptic events.** *Neuron*
Hao, Y. A., Lee, S., Roth, R. H., Natale, S., Gomez, L., Taxis, J., O'Neill, P. S., Villette, V., Bradley, J., Wang, Z., Jiang, D., Zhang, G., Sheng, et al
2024
- **Achieving optical transparency in live animals with absorbing molecules.** *Science (New York, N.Y.)*
Ou, Z., Duh, Y. S., Rommelfanger, N. J., Keck, C. H., Jiang, S., Brinson, K., Zhao, S., Schmidt, E. L., Wu, X., Yang, F., Cai, B., Cui, H., Qi, et al
2024; 385 (6713): eadm6869
- **Oligodendrocytes and myelin limit neuronal plasticity in visual cortex.** *Nature*
Xin, W., Kaneko, M., Roth, R. H., Zhang, A., Nocera, S., Ding, J. B., Stryker, M. P., Chan, J. R.
2024
- **Cortico-basal ganglia plasticity in motor learning.** *Neuron*
Roth, R. H., Ding, J. B.
2024

- **Stimulus-dependent synaptic plasticity underlies neuronal circuitry refinement in the mouse primary visual cortex.** *Cell reports*
Lopez-Ortega, E., Choi, J. Y., Hong, I., Roth, R. H., Cudmore, R. H., Hugarir, R. L.
2024; 43 (4): 113966
- **Adolescent oligodendrogenesis and myelination restrict experience-dependent neuronal plasticity in adult visual cortex.** *bioRxiv : the preprint server for biology*
Xin, W., Kaneko, M., Roth, R. H., Zhang, A., Nocera, S., Ding, J. B., Stryker, M. P., Chan, J. R.
2023
- **A positively tuned voltage indicator for extended electrical recordings in the brain.** *Nature methods*
Evans, S. W., Shi, D., Chavarha, M., Plitt, M. H., Taxis, J., Madruga, B., Fan, J. L., Hwang, F., van Keulen, S. C., Suomivuori, C., Pang, M. M., Su, S., Lee, et al
2023; 20 (7): 1104-1113
- **Motor learning selectively strengthens cortical and striatal synapses of motor engram neurons.** *Neuron*
Hwang, F., Roth, R. H., Wu, Y., Sun, Y., Kwon, D. K., Liu, Y., Ding, J. B.
2022
- **Visualizing synaptic plasticity in vivo by large-scale imaging of endogenous AMPA receptors.** *eLife*
Graves, A. R., Roth, R. H., Tan, H. L., Zhu, Q., Bygrave, A. M., Lopez-Ortega, E., Hong, I., Spiegel, A. C., Johnson, R. C., Vogelstein, J. T., Tward, D. J., Miller, M. I., Hugarir, et al
2021; 10
- **AMPA Receptors Exist in Tunable Mobile and Immobile Synaptic Fractions In Vivo.** *eNeuro*
Chen, H., Roth, R. H., Lopez-Ortega, E., Tan, H., Hugarir, R. L.
2021
- **An optimized CRISPR/Cas9 approach for precise genome editing in neurons.** *eLife*
Fang, H., Bygrave, A. M., Roth, R. H., Johnson, R. C., Hugarir, R. L.
2021; 10
- **From Neurons to Cognition: Technologies for Precise Recording of Neural Activity Underlying Behavior.** *BME frontiers*
Roth, R. H., Ding, J. B.
2020; 2020: 7190517
- **Cortical Synaptic AMPA Receptor Plasticity during Motor Learning** *NEURON*
Roth, R. H., Cudmore, R. H., Tan, H. L., Hong, I., Zhang, Y., Hugarir, R. L.
2020; 105 (5): 895+
- **Lamina-specific AMPA receptor dynamics following visual deprivation in vivo** *ELIFE*
Tan, H. L., Roth, R. H., Graves, A. R., Cudmore, R. H., Hugarir, R. L.
2020; 9
- **An ultrasensitive biosensor for high-resolution kinase activity imaging in awake mice.** *Nature chemical biology*
Zhang, J. F., Liu, B. n., Hong, I. n., Mo, A. n., Roth, R. H., Tenner, B. n., Lin, W. n., Zhang, J. Z., Molina, R. S., Drobizhev, M. n., Hughes, T. E., Tian, L. n., Hugarir, et al
2020
- **Single-fluorophore biosensors for sensitive and multiplexed detection of signalling activities** *NATURE CELL BIOLOGY*
Mehta, S., Zhang, Y., Roth, R. H., Zhang, J., Mo, A., Tenner, B., Hugarir, R. L., Zhang, J.
2018; 20 (10): 1215+
- **Dynamic imaging of AMPA receptor trafficking in vitro and in vivo** *CURRENT OPINION IN NEUROBIOLOGY*
Roth, R. H., Zhang, Y., Hugarir, R. L.
2017; 45: 51–58
- **Homer1a drives homeostatic scaling-down of excitatory synapses during sleep** *SCIENCE*
Diering, G. H., Nirujogi, R. S., Roth, R. H., Worley, P. F., Pandey, A., Hugarir, R. L.
2017; 355 (6324): 511+

- **Synaptic Organization of the Neuronal Circuits of the Claustrum** *JOURNAL OF NEUROSCIENCE*
Kim, J., Matney, C. J., Roth, R. H., Brown, S. P.
2016; 36 (3): 773-784