

# Stanford

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## John Huguenard

Professor of Neurology, of Neurosurgery and, by courtesy, of Molecular and Cellular Physiology

Neurology & Neurological Sciences

### CONTACT INFORMATION

#### • Alternate Contact

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### Bio

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### ACADEMIC APPOINTMENTS

- Professor, Neurology & Neurological Sciences
- Professor (By courtesy), Molecular & Cellular Physiology
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

### ADMINISTRATIVE APPOINTMENTS

- Chair, Neuroscience Program Admissions Committee, Stanford University, (2002-2005)
- Professional Advisory Board, Epilepsy Foundation, (2003- present)
- Director, Neuroscience Graduate Program, Stanford University, (2006-2013)
- Board of Directors, American Epilepsy Society, (2009-2011)

### HONORS AND AWARDS

- Javits Merit Award, NINDS/NIH (2004-2011)
- Research Recognition Award, American Epilepsy Society (2007)
- Faculty Award for Outstanding Service to Graduate Students, Stanford University School of Medicine (2010)
- Fellow of the AAAS, American Association for the Advancement of Science (2015)

### PROFESSIONAL EDUCATION

- Ph.D., Duke University, Pharmacology (Neuroscience) (1983)

### LINKS

- Huguenard Lab Website: <https://huguenardlab.stanford.edu/>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

What are the neuronal mechanisms that underlie network oscillatory synchrony in the thalamocortical system? Such oscillations are related to cognitive processes, normal sleep activities and certain forms of epilepsy. Our approach is an analysis of the cells and microcircuits that make up thalamic and cortical circuits. We also use computational approaches to build physiologically constrained network models to test and improve our understanding of the circuit. Accordingly, we have been able to identify genes whose products, mainly ion channels, play key roles in the regulation of thalamocortical network responses.

Currently, projects focus on: Development of excitatory connections in neocortex, with an emphasis on AMPA receptor alterations in the early postnatal period -- Molecular pharmacology of inhibitory GABA-A receptors in the thalamus -- and the role of receptor phosphorylation in regulating inhibitory function -- Analysis of progression and destabilization of widespread thalamic network activity using large microelectrode arrays -- The roles of neuropeptides, especially NPY, SST, and VIP in regulating thalamic and cortical function -- Reorganization of neocortical connectivity following injury -- Roles of specific GABA-B receptors in regulating pre- and postsynaptic function.

The laboratory uses experimental techniques ranging from biophysical studies of single ion channels to in vivo recording to purely theoretical studies of network synchrony. Our toolbox includes: --Use of mutant mouse models for analysis of gene function in circuit behavior. For example, knockout and knockin mice have been used to identify the specific GABA-A receptor isoforms that are critical for the therapeutic actions of benzodiazepines in thalamus -- patch clamp recording methods for single channels and whole cell currents, with both isolated neurons and those in situ in brain slices -- multi-unit, multi-site extracellular recording techniques -- immunohistochemical techniques for cell identification and protein localization -- molecular & genetic approaches for in situ hybridization of specific transcripts -- targeted antisense oligodeoxynucleotide knockdown of specific gene products -- microscopic techniques for computerized neuronal reconstruction (NeuroLucida) -- laser uncaging of photo-labile glutamate derivatives for circuit analysis -- single cell intracellular perfusion for modification of e.g., phosphorylation state -- paired intracellular recordings for analysis of single-axon synaptic connections -- fluorometric detection of calcium indicator dyes in cells and circuits -- local perfusion within slice micro-regions for pharmacological analysis -- computer-based modeling of single cell and circuit behaviors.

## Teaching

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### COURSES

#### 2019-20

- Analysis Techniques for the Biosciences Using MATLAB: NENS 230 (Aut)

#### 2018-19

- Analysis Techniques for the Biosciences Using MATLAB: NENS 230 (Aut)

#### 2017-18

- Analysis Techniques for the Biosciences Using MATLAB: NENS 230 (Aut)

### STANFORD ADVISEES

#### Doctoral Dissertation Reader (AC)

Eliza Adams, Stephen Evans, Themasap Khan, Sasi Madugula, Renzhi Yang

#### Postdoctoral Faculty Sponsor

Gabrielle Devienne, Brielle Ferguson, Michelle Fogerson, Jacob Hull, Austin Reese

#### Postdoctoral Research Mentor

Omer Revah

## GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Molecular and Cellular Physiology (Phd Program)
- Neurosciences (Phd Program)

## Publications

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### PUBLICATIONS

- **Current Controversy: Spikes, Bursts, and Synchrony in Generalized Absence Epilepsy: Unresolved Questions Regarding Thalamocortical Synchrony in Absence Epilepsy.** *Epilepsy currents*  
Huguenard, J.  
2019; 19 (2): 105–11
- **Differentiation and maturation of oligodendrocytes in human three-dimensional neural cultures.** *Nature neuroscience*  
Marton, R. M., Miura, Y., Sloan, S. A., Li, Q., Revah, O., Levy, R. J., Huguenard, J. R., Pa#ca, S. P.  
2019
- **Reliability of human cortical organoid generation.** *Nature methods*  
Yoon, S. J., Elahi, L. S., Pa#ca, A. M., Marton, R. M., Gordon, A., Revah, O., Miura, Y., Walczak, E. M., Holdgate, G. M., Fan, H. C., Huguenard, J. R., Geschwind, D. H., Pa#ca, et al  
2019; 16 (1): 75–78
- **Shank and Zinc Mediate an AMPA Receptor Subunit Switch in Developing Neurons** *FRONTIERS IN MOLECULAR NEUROSCIENCE*  
Ha, H. T., Leal-Ortiz, S., Lalwani, K., Kiyonaka, S., Hamachi, I., Mysore, S. P., Montgomery, J. M., Garner, C. C., Huguenard, J. R., Kim, S. A.  
2018; 11
- **Anatomically Defined and Functionally Distinct Dorsal Raphe Serotonin Sub-systems.** *Cell*  
Ren, J., Friedmann, D., Xiong, J., Liu, C. D., Ferguson, B. R., Weerakkody, T., DeLoach, K. E., Ran, C., Pun, A., Sun, Y., Weissbourd, B., Neve, R. L., Huguenard, et al  
2018
- **Shank and Zinc Mediate an AMPA Receptor Subunit Switch in Developing Neurons.** *Frontiers in molecular neuroscience*  
Ha, H. T., Leal-Ortiz, S., Lalwani, K., Kiyonaka, S., Hamachi, I., Mysore, S. P., Montgomery, J. M., Garner, C. C., Huguenard, J. R., Kim, S. A.  
2018; 11: 405
- **Absence seizure susceptibility correlates with pre-ictal  $\beta$  oscillations.** *Journal of physiology, Paris*  
Sorokin, J. M., Paz, J. T., Huguenard, J. R.  
2017
- **Assembly of functionally integrated human forebrain spheroids** *NATURE*  
Birey, F., Andersen, J., Makinson, C. D., Islam, S., Wei, W., Huber, N., Fan, H. C., Metzler, K. R., Panagiotakos, G., Thom, N., O'Rourke, N. A., Steinmetz, L. M., Bernstein, et al  
2017; 545 (7652): 54-?
- **Breathing control center neurons that promote arousal in mice** *SCIENCE*  
Yackle, K., Schwarz, L. A., Kam, K., Sorokin, J. M., Huguenard, J. R., Feldman, J. L., Luo, L., Krasnow, M. A.  
2017; 355 (6332): 1411-1415
- **Regulation of Thalamic and Cortical Network Synchrony by Scn8a.** *Neuron*  
Makinson, C. D., Tanaka, B. S., Sorokin, J. M., Wong, J. C., Christian, C. A., Goldin, A. L., Escayg, A., Huguenard, J. R.  
2017
- **Bidirectional Control of Generalized Epilepsy Networks via Rapid Real-Time Switching of Firing Mode.** *Neuron*  
Sorokin, J. M., Davidson, T. J., Frechette, E., Abramian, A. M., Deisseroth, K., Huguenard, J. R., Paz, J. T.  
2017; 93 (1): 194-210
- **Tapping the Brakes: Cellular and Synaptic Mechanisms that Regulate Thalamic Oscillations** *NEURON*

- Fogerson, P. M., Huguenard, J. R.  
2016; 92 (4): 687-704
- **Catching a wave.** *eLife*  
Fogerson, P. M., Huguenard, J. R.  
2016; 5
  - **Two classes of excitatory synaptic responses in rat thalamic reticular neurons.** *Journal of neurophysiology*  
Deleuze, C., Huguenard, J. R.  
2016; 116 (3): 995-1011
  - **LSPS/Optogenetics to Improve Synaptic Connectivity Mapping: Unmasking the Role of Basket Cell-Mediated Feedforward Inhibition.** *eNeuro*  
Brill, J., Mattis, J., Deisseroth, K., Huguenard, J. R.  
2016; 3 (4)
  - **Early postnatal switch in GABAA receptor  $\alpha$ -subunits in the reticular thalamic nucleus.** *Journal of neurophysiology*  
Pangratz-Fuehrer, S., Sieghart, W., Rudolph, U., Parada, I., Huguenard, J. R.  
2016; 115 (3): 1183-1195
  - **Enhanced phasic GABA inhibition during the repair phase of stroke: a novel therapeutic target** *BRAIN*  
Hiu, T., Farzampour, Z., Paz, J. T., Wang, E. H., Badgely, C., Olson, A., Micheva, K. D., Wang, G., Lemmens, R., Tran, K. V., Nishiyama, Y., Liang, X., Hamilton, et al  
2016; 139: 468-480
  - **Satb2 Regulates the Differentiation of Both Callosal and Subcerebral Projection Neurons in the Developing Cerebral Cortex.** *Cerebral cortex*  
Leone, D. P., Heavner, W. E., Ferenczi, E. A., Dobрева, G., Huguenard, J. R., Grosschedl, R., McConnell, S. K.  
2015; 25 (10): 3406-3419
  - **Optogenetics: 10 years after ChR2 in neurons-views from the community** *NATURE NEUROSCIENCE*  
Adamantidis, A., Arber, S., Bains, J. S., Bamberg, E., Bonci, A., Buzsaki, G., Cardin, J. A., Costa, R. M., Dan, Y., Goda, Y., Graybiel, A. M., Haeusser, M., Hegemann, et al  
2015; 18 (9): 1202-12
  - **Functional cortical neurons and astrocytes from human pluripotent stem cells in 3D culture.** *Nature methods*  
Pasca, A. M., Sloan, S. A., Clarke, L. E., Tian, Y., Makinson, C. D., Huber, N., Kim, C. H., Park, J., O'Rourke, N. A., Nguyen, K. D., Smith, S. J., Huguenard, J. R., Geschwind, et al  
2015; 12 (7): 671-678
  - **Functional cortical neurons and astrocytes from human pluripotent stem cells in 3D culture.** *Nature methods*  
Pasca, A. M., Sloan, S. A., Clarke, L. E., Tian, Y., Makinson, C. D., Huber, N., Kim, C. H., Park, J., O'Rourke, N. A., Nguyen, K. D., Smith, S. J., Huguenard, J. R., Geschwind, et al  
2015; 12 (7): 671-678
  - **Albumin induces excitatory synaptogenesis through astrocytic TGF- $\beta$ /ALK5 signaling in a model of acquired epilepsy following blood-brain barrier dysfunction** *NEUROBIOLOGY OF DISEASE*  
Weissberg, I., Wood, L., Kamintsky, L., Vazquez, O., Milikovsky, D. Z., Alexander, A., Oppenheim, H., Airdizzone, C., Becker, A., Frigerio, F., Vezzani, A., Buckwalter, M. S., Huguenard, et al  
2015; 78: 115-125
  - **Electrical synapses connect a network of gonadotropin releasing hormone neurons in a cichlid fish** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Ma, Y., Juntti, S. A., Hu, C. K., Huguenard, J. R., Fernald, R. D.  
2015; 112 (12): 3805-3810
  - **Microcircuits and their interactions in epilepsy: is the focus out of focus?** *NATURE NEUROSCIENCE*  
Paz, J. T., Huguenard, J. R.  
2015; 18 (3): 351-359
  - **Seizing upon mechanisms for impaired consciousness.** *Neuron*  
Farzampour, Z., Huguenard, J.  
2015; 85 (3): 453-455

- **Cholinergic control of gamma power in the midbrain spatial attention network.** *journal of neuroscience*  
Bryant, A. S., Goddard, C. A., Huguenard, J. R., Knudsen, E. I.  
2015; 35 (2): 761-775
- **Optogenetics and Epilepsy: Past, Present and Future** *EPILEPSY CURRENTS*  
Paz, J. T., Huguenard, J. R.  
2015; 15 (1): 34-38
- **Functional cortical neurons and astrocytes from human pluripotent stem cells in 3D cultures.** *Nature Methods*  
Pasca, A. M., Sloan, S., Clarke, L. E., Tian, Y., Makinson, C., Huber, N., Kim, C., Park, J., O'Rourke, N., Nguyen, K., Smith, S. J., Huguenard, J., Geschwind, et al  
2015: 671-78
- **Endozepines.** *Advances in pharmacology (San Diego, Calif.)*  
Farzampour, Z., Reimer, R. J., Huguenard, J.  
2015; 72: 147-164
- **Attentional flexibility in the thalamus: now we're getting SOMwhere.** *Nature neuroscience*  
Makinson, C. D., Huguenard, J. R.  
2014; 18 (1): 2-4
- **Frequency-dependent, cell type-divergent signaling in the hippocamposeptal projection.** *journal of neuroscience*  
Mattis, J., Brill, J., Evans, S., Lerner, T. N., Davidson, T. J., Hyun, M., Ramakrishnan, C., Deisseroth, K., Huguenard, J. R.  
2014; 34 (35): 11769-11780
- **Parallel Midbrain Microcircuits Perform Independent Temporal Transformations** *JOURNAL OF NEUROSCIENCE*  
Goddard, C. A., Huguenard, J., Knudsen, E.  
2014; 34 (24): 8130-8138
- **A local glutamate-glutamine cycle sustains synaptic excitatory transmitter release.** *Neuron*  
Tani, H., Dulla, C. G., Farzampour, Z., Taylor-Weiner, A., Huguenard, J. R., Reimer, R. J.  
2014; 81 (4): 888-900
- **Spatially Reciprocal Inhibition of Inhibition within a Stimulus Selection Network in the Avian Midbrain.** *PLoS one*  
Goddard, C. A., Mysore, S. P., Bryant, A. S., Huguenard, J. R., Knudsen, E. I.  
2014; 9 (1)
- **Modulation of Short-Term Plasticity in the Corticothalamic Circuit by Group III Metabotropic Glutamate Receptors** *JOURNAL OF NEUROSCIENCE*  
Kyuyoung, C. L., Huguenard, J. R.  
2014; 34 (2): 675-687
- **Spatially reciprocal inhibition of inhibition within a stimulus selection network in the avian midbrain.** *PLoS one*  
Goddard, C. A., Mysore, S. P., Bryant, A. S., Huguenard, J. R., Knudsen, E. I.  
2014; 9 (1)
- **Parallel midbrain microcircuits perform independent temporal transformations.** *The Journal of neuroscience : the official journal of the Society for Neuroscience*  
Goddard, C. A., Huguenard, J., Knudsen, E.  
2014; 34 (24): 8130-38
- **Astrocytes potentiate GABAergic transmission in the thalamic reticular nucleus via endozepine signaling** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Christian, C. A., Huguenard, J. R.  
2013; 110 (50): 20278-20283
- **Sniffer patch laser uncaging response (SPLURgE): an assay of regional differences in allosteric receptor modulation and neurotransmitter clearance** *JOURNAL OF NEUROPHYSIOLOGY*  
Christian, C. A., Huguenard, J. R.  
2013; 110 (7): 1722-1731
- **Endogenous Positive Allosteric Modulation of GABA(A) Receptors by Diazepam binding inhibitor** *NEURON*

- Christian, C. A., Herbert, A. G., Holt, R. L., Peng, K., Sherwood, K. D., Pangratz-Fuehrer, S., Rudolph, U., Huguenard, J. R.  
2013; 78 (6): 1063-1074
- **Reemerging role of cable properties in action potential initiation** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Ma, Y., Huguenard, J. R.  
2013; 110 (10): 3715-3716
  - **Closed-loop optogenetic control of thalamus as a tool for interrupting seizures after cortical injury** *NATURE NEUROSCIENCE*  
Paz, J. T., Davidson, T. J., Frechette, E. S., Delord, B., Parada, I., Peng, K., Deisseroth, K., Huguenard, J. R.  
2013; 16 (1): 64-U98
  - **Sleep and Epilepsy: A Summary of the 2011 Merritt-Putnam Symposium** *EPILEPSY CURRENTS*  
DeWolfe, J. L., Malow, B., Huguenard, J., Stickgold, R., Bourgeois, B., Holmes, G. L.  
2013; 13 (1): 42-49
  - **Glutamate biosensor imaging reveals dysregulation of glutamatergic pathways in a model of developmental cortical malformation** *NEUROBIOLOGY OF DISEASE*  
Dulla, C. G., Tani, H., Brill, J., Reimer, R. J., Huguenard, J. R.  
2013; 49: 232-246
  - **A call for transparent reporting to optimize the predictive value of preclinical research** *NATURE*  
Landis, S. C., Amara, S. G., Asadullah, K., Austin, C. P., Blumenstein, R., Bradley, E. W., Crystal, R. G., Darnell, R. B., Ferrante, R. J., Fillit, H., Finkelstein, R., Fisher, M., Gendelman, et al  
2012; 490 (7419): 187-191
  - **Mechanism for Hypocretin-mediated sleep-to-wake transitions** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Carter, M. E., Brill, J., Bonnavion, P., Huguenard, J. R., Huerta, R., de Lecea, L.  
2012; 109 (39): E2635-E2644
  - **Enhanced NMDA Receptor-Dependent Thalamic Excitation and Network Oscillations in Stargazer Mice** *JOURNAL OF NEUROSCIENCE*  
Lacey, C. J., Bryant, A., Brill, J., Huguenard, J. R.  
2012; 32 (32): 11067-11081
  - **R U OK? The Novel Therapeutic Potential of R Channels in Epilepsy** *EPILEPSY CURRENTS*  
Paz, J. T., Huguenard, J. R.  
2012; 12 (2): 75-76
  - **Influence of a Subtype of Inhibitory Interneuron on Stimulus-Specific Responses in Visual Cortex** *CEREBRAL CORTEX*  
Mao, R., Schummers, J., Knoblich, U., Lacey, C. J., Van Wart, A., Cobos, I., Kim, C., Huguenard, J. R., Rubenstein, J. L., Sur, M.  
2012; 22 (3): 493-508
  - **Gamma Oscillations Are Generated Locally in an Attention-Related Midbrain Network** *NEURON*  
Goddard, C. A., Sridharan, D., Huguenard, J. R., Knudsen, E. I.  
2012; 73 (3): 567-580
  - **Increased Excitatory Synaptic Input to Granule Cells from Hilar and CA3 Regions in a Rat Model of Temporal Lobe Epilepsy** *JOURNAL OF NEUROSCIENCE*  
Zhang, W., Huguenard, J. R., Buckmaster, P. S.  
2012; 32 (4): 1183-1196
  - **Glutamate biosensor imaging reveals dysregulation of glutamatergic pathways in a model of developmental cortical malformation.** *Neurobiology of disease*  
Dulla, C. G., Tani, H., Brill, J., Reimer, R. J., Huguenard, J. R.  
2012; 49C: 232-46
  - **Neocortical excitation/inhibition balance in information processing and social dysfunction** *NATURE*  
Yizhar, O., Fenno, L. E., Prigge, M., Schneider, F., Davidson, T. J., O'Shea, D. J., Sohal, V. S., Goshen, I., Finkelstein, J., Paz, J. T., Stehfest, K., Fudim, R., Ramakrishnan, et al  
2011; 477 (7363): 171-178

- **A new mode of corticothalamic transmission revealed in the Gria4(-/-) model of absence epilepsy** *NATURE NEUROSCIENCE*  
Paz, J. T., Bryant, A. S., Peng, K., Fenno, L., Yizhar, O., Frankel, W. N., Deisseroth, K., Huguenard, J. R.  
2011; 14 (9): 1167-U225
- **Reorganization of Inhibitory Synaptic Circuits in Rodent Chronically Injured Epileptogenic Neocortex** *CEREBRAL CORTEX*  
Jin, X., Huguenard, J. R., Prince, D. A.  
2011; 21 (5): 1094-1104
- **Martinotti Cells: Community Organizers** *NEURON*  
Lee, C. K., Huguenard, J. R.  
2011; 69 (6): 1042-1045
- **Enhanced Infragranular and Supragranular Synaptic Input onto Layer 5 Pyramidal Neurons in a Rat Model of Cortical Dysplasia** *CEREBRAL CORTEX*  
Brill, J., Huguenard, J. R.  
2010; 20 (12): 2926-2938
- **Differential effects of Na plus -K plus ATPase blockade on cortical layer V neurons** *JOURNAL OF PHYSIOLOGY-LONDON*  
Anderson, T. R., Huguenard, J. R., Prince, D. A.  
2010; 588 (22): 4401-4414
- **Astrocytes as Gatekeepers of GABA(B) Receptor Function** *JOURNAL OF NEUROSCIENCE*  
Beenhakker, M. P., Huguenard, J. R.  
2010; 30 (45): 15262-15276
- **Desynchronization of Neocortical Networks by Asynchronous Release of GABA at Autaptic and Synaptic Contacts from Fast-Spiking Interneurons** *PLOS BIOLOGY*  
Manseau, F., Marinelli, S., Mendez, P., Schwaller, B., Prince, D. A., Huguenard, J. R., Bacci, A.  
2010; 8 (9)
- **Focal Cortical Infarcts Alter Intrinsic Excitability and Synaptic Excitation in the Reticular Thalamic Nucleus** *JOURNAL OF NEUROSCIENCE*  
Paz, J. T., Christian, C. A., Parada, I., Prince, D. A., Huguenard, J. R.  
2010; 30 (15): 5465-5479
- **Glutamine Is Required for Persistent Epileptiform Activity in the Disinhibited Neocortical Brain Slice** *JOURNAL OF NEUROSCIENCE*  
Tani, H., Dulla, C. G., Huguenard, J. R., Reimer, R. J.  
2010; 30 (4): 1288-1300
- **Maintenance of Thalamic Epileptiform Activity Depends on the Astrocytic Glutamate-Glutamine Cycle** *JOURNAL OF NEUROPHYSIOLOGY*  
Bryant, A. S., Li, B., Beenhakker, M. P., Huguenard, J. R.  
2009; 102 (5): 2880-2888
- **Resting Our Cortices by Going DOWN to Sleep** *NEURON*  
Mignot, E., Huguenard, J. R.  
2009; 63 (6): 719-721
- **Who let the spikes out?** *NATURE NEUROSCIENCE*  
Dulla, C. G., Huguenard, J. R.  
2009; 12 (8): 959-960
- **Synergistic Roles of GABA(A) Receptors and SK Channels in Regulating Thalamocortical Oscillations** *JOURNAL OF NEUROPHYSIOLOGY*  
Kleiman-Weiner, M., Beenhakker, M. P., Segal, W. A., Huguenard, J. R.  
2009; 102 (1): 203-213
- **Neurons that Fire Together Also Conspire Together: Is Normal Sleep Circuitry Hijacked to Generate Epilepsy?** *NEURON*  
Beenhakker, M. P., Huguenard, J. R.  
2009; 62 (5): 612-632
- **Robust Short-Latency Perisomatic Inhibition onto Neocortical Pyramidal Cells Detected by Laser-Scanning Photostimulation** *JOURNAL OF NEUROSCIENCE*  
Brill, J., Huguenard, J. R.

2009; 29 (23): 7413-7423

- **A gain in GABA(A) receptor synaptic strength in thalamus reduces oscillatory activity and absence seizures** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Schofield, C. M., Kleiman-Weiner, M., Rudolph, U., Huguenard, J. R.  
2009; 106 (18): 7630-7635
- **Sequential Changes in AMPA Receptor Targeting in the Developing Neocortical Excitatory Circuit** *JOURNAL OF NEUROSCIENCE*  
Brill, J., Huguenard, J. R.  
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- **The Endocannabinoid 2-Arachidonoylglycerol Is Responsible for the Slow Self-Inhibition in Neocortical Interneurons** *JOURNAL OF NEUROSCIENCE*  
Marinelli, S., Pacioni, S., Bisogno, T., Di Marzo, V., Prince, D. A., Huguenard, J. R., Bacci, A.  
2008; 28 (50): 13532-13541
- **Normal sleep homeostasis and lack of epilepsy phenotype in GABA(A) receptor alpha 3 subunit-knockout mice** *NEUROSCIENCE*  
Winsky-Sommerer, R., Knapman, A., Fedele, D. E., Schofield, C. M., Vyazovskiy, V. V., Rudolph, U., Huguenard, J. R., Fritschy, J., Tobler, I.  
2008; 154 (2): 595-605
- **Absence seizures in C3H/HeJ and knockout mice caused by mutation of the AMPA receptor subunit Gria4** *HUMAN MOLECULAR GENETICS*  
Beyer, B., Deleuze, C., Letts, V. A., Mahaffey, C. L., Boumil, R. M., Lew, T. A., Huguenard, J. R., Frankel, W. N.  
2008; 17 (12): 1738-1749
- **Imaging of glutamate in brain slices using FRET sensors** *JOURNAL OF NEUROSCIENCE METHODS*  
Dulla, C., Tani, H., Okumoto, S., Frommer, W. B., Reimer, R. J., Huguenard, J. R.  
2008; 168 (2): 306-319
- **Intrinsic excitability of cholinergic neurons in the rat parabigeminal nucleus** *JOURNAL OF NEUROPHYSIOLOGY*  
Goddard, C. A., Knudsen, E. I., Huguenard, J. R.  
2007; 98 (6): 3486-3493
- **GABA affinity shapes IPSCs in thalamic nuclei** *JOURNAL OF NEUROSCIENCE*  
Schofield, C. M., Huguenard, J. R.  
2007; 27 (30): 7954-7962
- **Thalamic synchrony and dynamic regulation of global forebrain oscillations** *TRENDS IN NEUROSCIENCES*  
Huguenard, J. R., McCormick, D. A.  
2007; 30 (7): 350-356
- **PKC and polyamine modulation of GluR2-deficient AMPA receptors in immature neocortical pyramidal neurons of the rat** *JOURNAL OF PHYSIOLOGY-LONDON*  
Shin, J., Shen, F., Huguenard, J.  
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- **Giant spontaneous depolarizing potentials in the developing thalamic reticular nucleus** *JOURNAL OF NEUROPHYSIOLOGY*  
Pangratz-Fuehrer, S., Rudolph, U., Huguenard, J. R.  
2007; 97 (3): 2364-2372
- **Gender and age differences in expression of GABA(A) receptor subunits in rat somatosensory thalamus and cortex in an absence epilepsy model** *NEUROBIOLOGY OF DISEASE*  
Li, H., Huguenard, J. R., Fisher, R. S.  
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- **Recurrent circuits in layer II of medial entorhinal cortex in a model of temporal lobe epilepsy** *JOURNAL OF NEUROSCIENCE*  
Kumar, S. S., Jin, X., Buckmaster, P. S., Huguenard, J. R.  
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- **Modulation of epileptiform activity by glutamine and system A transport in a model of post-traumatic epilepsy** *NEUROBIOLOGY OF DISEASE*  
Tani, H., Bandrowski, A. E., Parada, I., Wynn, M., Huguenard, J. R., Prince, D. A., Reimer, R. J.  
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