

- Adler, R. (1946). A Study of Locking Phenomena in Oscillators. *Proc. IRE* 34, 351–357. doi: 10.1109/jrproc.1946.229930
- Aller, M. I., and Wisden, W. (2008). Changes in expression of some two-pore domain potassium channel genes (KCNK) in selected brain regions of developing mice. *Neuroscience* 151, 1154–1172. doi: 10.1016/j.neuroscience.2007.12.011
- Benschop, L., Poppa, T., Medani, T., Shahabi, H., Baeken, C., Leahy, R. M., et al. (2021). Electrophysiological scarring in remitted depressed patients: Elevated EEG functional connectivity between the posterior cingulate cortex and the subgenual prefrontal cortex as a neural marker for rumination. *Journal of Affective Disorders* 281, 493–501. doi: 10.1016/j.jad.2020.12.081
- Ben-Shalom, R., Keeshen, C. M., Berrios, K. N., An, J. Y., Sanders, S. J., and Bender, K. J. (2017). Opposing Effects on Na V 1.2 Function Underlie Differences Between SCN2A Variants Observed in Individuals With Autism Spectrum Disorder or Infantile Seizures. *Biological Psychiatry* 82, 224–232. doi: 10.1016/j.biopsych.2017.01.009
- Bigos, K. L., Mattay, V. S., Callicott, J. H., Straub, R. E., Vakkalanka, R., Kolachana, B., et al. (2010). Genetic Variation in CACNA1C Affects Brain Circuitries Related to Mental Illness. *Arch Gen Psychiatry* 67, 939. doi: 10.1001/archgenpsychiatry.2010.96
- Bittner, K. C., Grienberger, C., Vaidya, S. P., Milstein, A. D., Macklin, J. J., Suh, J., et al. (2015). Conjunctive input processing drives feature selectivity in hippocampal CA1 neurons. *Nat Neurosci* 18, 1133–1142. doi: 10.1038/nn.4062
- Bittner, K. C., Milstein, A. D., Grienberger, C., Romani, S., and Magee, J. C. (2017). Behavioral time scale synaptic plasticity underlies CA1 place fields. *Science* 357, 1033–1036. doi: 10.1126/science.aan3846
- Blanchard, J., and Sawers, S. J. A. (1983). The absolute bioavailability of caffeine in man. *Eur J Clin Pharmacol* 24, 93–98. doi: 10.1007/bf00613933
- Booth, V., and Rinzel, J. (1995). A minimal, compartmental model for a dendritic origin of bistability of motoneuron firing patterns. *J Comput Neurosci* 2, 299–312. doi: 10.1007/bf00961442
- Bosman, L. W. J., Heinen, K., Spijker, S., and Brussaard, A. B. (2005). Mice Lacking the Major Adult GABA_A Receptor Subtype Have Normal Number of Synapses, But Retain Juvenile IPSC Kinetics Until Adulthood. *Journal of Neurophysiology* 94, 338–346. doi: 10.1152/jn.00084.2005
- Bragin, A., Engel, J., Wilson, C. L., Fried, I., and Buzsaki, G. (1999). High-frequency oscillations in human brain. *Hippocampus* 9, 137–142. doi: 10.1002/(SICI)1098-1063(1999)9:2<137::AID-HIPO5>3.0.CO;2-0
- Bremner, J. D., Licinio, J., Darnell, A., Krystal, J. H., Owens, M. J., Southwick, S. M., et al. (1997). Elevated CSF corticotropin-releasing factor concentrations in posttraumatic stress

disorder. *Am J Psychiatry* 154, 624–629. doi: 10.1176/ajp.154.5.624

Brix, J., Wettemann, H., Scheel, O., Feiner, F., and Matthes, R. (2001). Measurement of the individual exposure to 50 and 16 2/3 Hz magnetic fields within the Bavarian population. *Bioelectromagnetics* 22, 323–332. doi: 10.1002/bem.57

Brownlee, M. (2001). Biochemistry and molecular cell biology of diabetic complications. *Nature* 414, 813–820. doi: 10.1038/414813a

Brunel, N., and Van Rossum, M. C. W. (2007). Quantitative investigations of electrical nerve excitation treated as polarization: Louis Lapicque 1907 · Translated by: *Biol Cybern* 97, 341–349. doi: 10.1007/s00422-007-0189-6

Brunet, A., Saumier, D., Liu, A., Streiner, D. L., Tremblay, J., and Pitman, R. K. (2018). Reduction of PTSD Symptoms With Pre-Reactivation Propranolol Therapy: A Randomized Controlled Trial. *AJP* 175, 427–433. doi: 10.1176/appi.ajp.2017.17050481

Bueno-Junior, L. S., Simon, N. W., Wegener, M. A., and Moghaddam, B. (2017). Repeated Nicotine Strengthens Gamma Oscillations in the Prefrontal Cortex and Improves Visual Attention. *Neuropsychopharmacol* 42, 1590–1598. doi: 10.1038/npp.2017.15

Bundesamt für Strahlenschutz (BfS) (2023). Stromnetz – Bahnstrom.

Bundesamt für Strahlenschutz. Available at:

https://www.bfs.de/DE/themen/emf/nff/anwendung/strom-verkehr/stromnetz-bahnstrom_node.html

Buzsáki, G., Buhl, D. L., Harris, K. D., Csicsvari, J., Czéh, B., and Morozov, A. (2003). Hippocampal network patterns of activity in the mouse. *Neuroscience* 116, 201–211. doi: 10.1016/S0306-4522(02)00669-3

Buzsáki, G., and Draguhn, A. (2004). Neuronal Oscillations in Cortical Networks. *Science* 304, 1926–1929. doi: 10.1126/science.1099745

Cabungcal, J.-H., Steullet, P., Kraftsik, R., Cuenod, M., and Do, K. Q. (2013). Early-Life Insults Impair Parvalbumin Interneurons via Oxidative Stress: Reversal by N-Acetylcysteine. *Biological Psychiatry* 73, 574–582. doi: 10.1016/j.biopsych.2012.09.020

Cai, D. J., Aharoni, D., Shuman, T., Shobe, J., Biane, J., Song, W., et al. (2016). A shared neural ensemble links distinct contextual memories encoded close in time. *Nature* 534, 115–118. doi: 10.1038/nature17955

Cash, S., and Yuste, R. (1999). Linear Summation of Excitatory Inputs by CA1 Pyramidal Neurons. *Neuron* 22, 383–394. doi: 10.1016/s0896-6273(00)81098-3

Cembrowski, M. S., Bachman, J. L., Wang, L., Sugino, K., Shields, B. C., and Spruston, N. (2016a). Spatial Gene-Expression Gradients Underlie Prominent Heterogeneity of CA1 Pyramidal Neurons. *Neuron* 89, 351–368. doi: 10.1016/j.neuron.2015.12.013

Cembrowski, M. S., Wang, L., Sugino, K., Shields, B. C., and Spruston, N. (2016b). Hipposeq: a comprehensive RNA-seq database of gene expression in hippocampal principal neurons. *eLife* 5. doi: 10.7554/elife.14997

Chan, Y. L., Saad, S., Pollock, C., Oliver, B., Al-Odat, I., Zaky, A. A., et al. (2016). Impact of maternal cigarette smoke exposure on brain inflammation and oxidative stress in male mice offspring. *Sci Rep* 6. doi: 10.1038/srep25881

Chen, J., Lipska, B. K., Halim, N., Ma, Q. D., Matsumoto, M., Melhem, S., et al. (2004). Functional Analysis of Genetic Variation in Catechol-O-Methyltransferase (COMT): Effects on mRNA, Protein, and Enzyme Activity in Postmortem Human Brain. *The American Journal of Human Genetics* 75, 807–821. doi: 10.1086/425589

Chen, X., and Johnston, D. (2005). Constitutively Active G-Protein-Gated Inwardly Rectifying K⁺ Channels in Dendrites of Hippocampal CA1 Pyramidal Neurons. *J. Neurosci.* 25, 3787–3792. doi: 10.1523/jneurosci.5312-04.2005

Chen, Y. Y., Aponik-Gremillion, L., Bartoli, E., Yoshor, D., Sheth, S. A., and Foster, B. L. (2021). Stability of ripple events during task engagement in human hippocampus. *Cell Reports* 35, 109304. doi: 10.1016/j.celrep.2021.109304

Clem, R. L., and Huganir, R. L. (2010). Calcium-Permeable AMPA Receptor Dynamics Mediate Fear Memory Erasure. *Science* 330, 1108–1112. doi: 10.1126/science.1195298

Cook, C. M., and Persinger, M. A. (1997). Experimental Induction of the “Sensed Presence” in Normal Subjects and an Exceptional Subject. *Percept Mot Skills* 85, 683–693. doi: 10.2466/pms.1997.85.2.683

Coull, J. A. M., Beggs, S., Boudreau, D., Boivin, D., Tsuda, M., Inoue, K., et al. (2005). BDNF from microglia causes the shift in neuronal anion gradient underlying neuropathic pain. *Nature* 438, 1017–1021. doi: 10.1038/nature04223

Crowe, S. F., Barot, J., Caldow, S., D’Aspromonte, J., Dell’Orso, J., Di Clemente, A., et al. (2011). The effect of caffeine and stress on auditory hallucinations in a non-clinical sample. *Personality and Individual Differences* 50, 626–630. doi: 10.1016/j.paid.2010.12.007

Currin, C. B., and Raimondo, J. V. (2022). Computational models reveal how chloride dynamics determine the optimal distribution of inhibitory synapses to minimise dendritic excitability. *PLoS Comput Biol* 18, e1010534. doi: 10.1371/journal.pcbi.1010534

Czeh, B., Simon, M., Van Der Hart, M. G., Schmelting, B., Hesselink, M. B., and Fuchs, E. (2005). Chronic Stress Decreases the Number of Parvalbumin-Immunoreactive Interneurons in the Hippocampus: Prevention by Treatment with a Substance P Receptor (NK1) Antagonist. *Neuropsychopharmacol* 30, 67–79. doi: 10.1038/sj.npp.1300581

Daly, E. J., Singh, J. B., Fedgchin, M., Cooper, K., Lim, P., Shelton, R. C., et al. (2018). Efficacy and Safety of Intranasal Esketamine Adjunctive to Oral Antidepressant Therapy in

Treatment-Resistant Depression: A Randomized Clinical Trial. *JAMA Psychiatry* 75, 139. doi: 10.1001/jamapsychiatry.2017.3739

De Lucena, D., Fernandes, B. S., Berk, M., Dodd, S., Medeiros, D. W., Pedrini, M., et al. (2009). Improvement of Negative and Positive Symptoms in Treatment-Refractory Schizophrenia: A Double-Blind, Randomized, Placebo-Controlled Trial With Memantine as Add-On Therapy to Clozapine. *J. Clin. Psychiatry* 70, 1416–1423. doi: 10.4088/jcp.08m04935gry

Di Chiara, G., and Imperato, A. (1988). Drugs abused by humans preferentially increase synaptic dopamine concentrations in the mesolimbic system of freely moving rats. *Proc. Natl. Acad. Sci. U.S.A.* 85, 5274–5278. doi: 10.1073/pnas.85.14.5274

Di Forti, M., Quattrone, D., Freeman, T. P., Tripoli, G., Gayer-Anderson, C., Quigley, H., et al. (2019). The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): a multicentre case-control study. *Lancet Psychiatry* 6, 427–436. doi: 10.1016/S2215-0366(19)30048-3

Diamond, J. S. (2001). Neuronal Glutamate Transporters Limit Activation of NMDA Receptors by Neurotransmitter Spillover on CA1 Pyramidal Cells. *J. Neurosci.* 21, 8328–8338. doi: 10.1523/jneurosci.21-21-08328.2001

Dickey, C. W., Verzhbinsky, I. A., Jiang, X., Rosen, B. Q., Kajfez, S., Eskandar, E. N., et al. (2022). Cortical Ripples during NREM Sleep and Waking in Humans. *J Neurosci* 42, 7931–7946. doi: 10.1523/JNEUROSCI.0742-22.2022

Dimpfel, W., Schober, F., and Spüler, M. (1993). The influence of caffeine on human EEG under resting condition and during mental loads. *Clin Investig* 71. doi: 10.1007/bf00180102

Ding, F., O'Donnell, J., Xu, Q., Kang, N., Goldman, N., and Nedergaard, M. (2016). Changes in the composition of brain interstitial ions control the sleep-wake cycle. *Science* 352, 550–555. doi: 10.1126/science.aad4821

Donato, F., Rompani, S. B., and Caroni, P. (2013). Parvalbumin-expressing basket-cell network plasticity induced by experience regulates adult learning. *Nature* 504, 272–276. doi: 10.1038/nature12866

Dougherty, K. A., Islam, T., and Johnston, D. (2012). Intrinsic excitability of CA1 pyramidal neurones from the rat dorsal and ventral hippocampus. *The Journal of Physiology* 590, 5707–5722. doi: 10.1113/jphysiol.2012.242693

Doyon, N., Prescott, S. A., Castonguay, A., Godin, A. G., Kröger, H., and De Koninck, Y. (2011). Efficacy of Synaptic Inhibition Depends on Multiple, Dynamically Interacting Mechanisms Implicated in Chloride Homeostasis. *PLoS Comput Biol* 7, e1002149. doi: 10.1371/journal.pcbi.1002149

Dunkley, B. T., Sedge, P. A., Doesburg, S. M., Grodecki, R. J., Jetly, R., Shek, P. N., et al. (2015). Theta, Mental Flexibility, and Post-Traumatic Stress Disorder: Connecting in the

Parietal Cortex. *PLoS ONE* 10, e0123541. doi: 10.1371/journal.pone.0123541

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA) (2015). Scientific Opinion on the safety of caffeine. *EFS2* 13. doi: 10.2903/j.efsa.2015.4102

English, D. F., Peyrache, A., Stark, E., Roux, L., Vallentin, D., Long, M. A., et al. (2014). Excitation and Inhibition Compete to Control Spiking during Hippocampal Ripples: Intracellular Study in Behaving Mice. *J. Neurosci.* 34, 16509–16517. doi: 10.1523/jneurosci.2600-14.2014

Epsztein, J., Brecht, M., and Lee, A. K. (2011). Intracellular Determinants of Hippocampal CA1 Place and Silent Cell Activity in a Novel Environment. *Neuron* 70, 109–120. doi: 10.1016/j.neuron.2011.03.006

Ewell, L. A., Fischer, K. B., Leibold, C., Leutgeb, S., and Leutgeb, J. K. (2019). The impact of pathological high-frequency oscillations on hippocampal network activity in rats with chronic epilepsy. *eLife* 8, e42148. doi: 10.7554/eLife.42148

Fawcett, J. W., Fyhn, M., Jendelova, P., Kwok, J. C. F., Ruzicka, J., and Sorg, B. A. (2022). The extracellular matrix and perineuronal nets in memory. *Mol Psychiatry* 27, 3192–3203. doi: 10.1038/s41380-022-01634-3

Fazzari, P., Paternain, A. V., Valiente, M., Pla, R., Luján, R., Lloyd, K., et al. (2010). Control of cortical GABA circuitry development by Nrg1 and ErbB4 signalling. *Nature* 464, 1376–1380. doi: 10.1038/nature08928

Feigin, V. L., Parmar, P. G., Barker-Collo, S., Bennett, D. A., Anderson, C. S., Thrift, A. G., et al. (2014). Geomagnetic Storms Can Trigger Stroke: Evidence From 6 Large Population-Based Studies in Europe and Australasia. *Stroke* 45, 1639–1645. doi: 10.1161/strokeaha.113.004577

Fernández-Ruiz, A., Oliva, A., Nagy, G. A., Maurer, A. P., Berényi, A., and Buzsáki, G. (2017). Entorhinal-CA3 Dual-Input Control of Spike Timing in the Hippocampus by Theta-Gamma Coupling. *Neuron* 93, 1213-1226.e5. doi: 10.1016/j.neuron.2017.02.017

Fink, C. G., Gliske, S., Catoni, N., and Stacey, W. C. (2015). Network Mechanisms Generating Abnormal and Normal Hippocampal High-Frequency Oscillations: A Computational Analysis. *eneuro* 2, ENEURO.0024-15.2015. doi: 10.1523/ENEURO.0024-15.2015

Forner-Phillips, N. A., Mills, C., and Ross, R. S. (2020). Tendency to ruminate and anxiety are associated with altered alpha and beta oscillatory power dynamics during memory for contextual details. *Cogn Affect Behav Neurosci* 20, 698–716. doi: 10.3758/s13415-020-00797-2

Frick, D., and Miles, R. (2000). EPSP Amplification and the Precision of Spike Timing in Hippocampal Neurons. *Neuron* 28, 559–569. doi: 10.1016/s0896-6273(00)00133-1

Fujisawa, S., and Buzsáki, G. (2011). A 4 Hz Oscillation Adaptively Synchronizes Prefrontal,

VTA, and Hippocampal Activities. *Neuron* 72, 153–165. doi: 10.1016/j.neuron.2011.08.018

Gaisenok, O., Gaisenok, D., and Bogachev, S. (2025). The Influence of Geomagnetic Storms on the Risks of Developing Myocardial Infarction, Acute Coronary Syndrome, and Stroke: Systematic Review and Meta-analysis. *Journal of Medical Physics* 50, 8–13. doi: 10.4103/jmp.jmp_122_24

Gajšek, P., Ravazzani, P., Grellier, J., Samaras, T., Bakos, J., and Thuróczy, G. (2016). Review of Studies Concerning Electromagnetic Field (EMF) Exposure Assessment in Europe: Low Frequency Fields (50 Hz–100 kHz). *IJERPH* 13, 875. doi: 10.3390/ijerph13090875

Gangwisch, J. E., Hale, L., Garcia, L., Malaspina, D., Opler, M. G., Payne, M. E., et al. (2015). High glycemic index diet as a risk factor for depression: analyses from the Women's Health Initiative. *The American Journal of Clinical Nutrition* 102, 454–463. doi: 10.3945/ajcn.114.103846

Gelman, A., and Rubin, D. B. (1992). Inference from Iterative Simulation Using Multiple Sequences. *Statist. Sci.* 7. doi: 10.1214/ss/1177011136

Giustino, T. F., and Maren, S. (2015). The Role of the Medial Prefrontal Cortex in the Conditioning and Extinction of Fear. *Front. Behav. Neurosci.* 9. doi: 10.3389/fnbeh.2015.00298

Giustino, T. F., Ramanathan, K. R., Totty, M. S., Miles, O. W., and Maren, S. (2020). Locus Coeruleus Norepinephrine Drives Stress-Induced Increases in Basolateral Amygdala Firing and Impairs Extinction Learning. *J Neurosci* 40, 907–916. doi: 10.1523/JNEUROSCI.1092-19.2019

Glausier, J. R., and Lewis, D. A. (2011). Selective Pyramidal Cell Reduction of GABA_A Receptor α1 Subunit Messenger RNA Expression in Schizophrenia. *Neuropsychopharmacol* 36, 2103–2110. doi: 10.1038/npp.2011.102

Godfrey, K. E. M., Gardner, A. C., Kwon, S., Chea, W., and Muthukumaraswamy, S. D. (2018). Differences in excitatory and inhibitory neurotransmitter levels between depressed patients and healthy controls: A systematic review and meta-analysis. *Journal of Psychiatric Research* 105, 33–44. doi: 10.1016/j.jpsychires.2018.08.015

Golding, N. L., Mickus, T. J., Katz, Y., Kath, W. L., and Spruston, N. (2005). Factors mediating powerful voltage attenuation along CA1 pyramidal neuron dendrites. *The Journal of Physiology* 568, 69–82. doi: 10.1111/j.physiol.2005.086793

Goldman, D. E. (1943). POTENTIAL, IMPEDANCE, AND RECTIFICATION IN MEMBRANES. *Journal of General Physiology* 27, 37–60. doi: 10.1085/jgp.27.1.37

Goyal, A., Miller, J., Qasim, S. E., Watrous, A. J., Zhang, H., Stein, J. M., et al. (2020). Functionally distinct high and low theta oscillations in the human hippocampus. *Nat Commun* 11. doi: 10.1038/s41467-020-15670-6

- Gulyás, A. I., Megías, M., Emri, Z., and Freund, T. F. (1999). Total Number and Ratio of Excitatory and Inhibitory Synapses Converging onto Single Interneurons of Different Types in the CA1 Area of the Rat Hippocampus. *J. Neurosci.* 19, 10082–10097. doi: 10.1523/jneurosci.19-22-10082.1999
- Hall, J., Whalley, H. C., McKirdy, J. W., Romanik, L., McGonigle, D., McIntosh, A. M., et al. (2008). Overactivation of Fear Systems to Neutral Faces in Schizophrenia. *Biological Psychiatry* 64, 70–73. doi: 10.1016/j.biopsych.2007.12.014
- Halnes, G., Mäki-Marttunen, T., Keller, D., Pettersen, K. H., Andreassen, O. A., and Einevoll, G. T. (2016). Effect of Ionic Diffusion on Extracellular Potentials in Neural Tissue. *PLoS Comput Biol* 12, e1005193. doi: 10.1371/journal.pcbi.1005193
- Hamilton, J. P., Farmer, M., Fogelman, P., and Gotlib, I. H. (2015). Depressive Rumination, the Default-Mode Network, and the Dark Matter of Clinical Neuroscience. *Biological Psychiatry* 78, 224–230. doi: 10.1016/j.biopsych.2015.02.020
- Han, B., Tang, J., Zhao, G. Z., Wang, L. F., Dong, Z. Y., and Xu, Y. C. (2023). Seasonal and Interannual Variations in the Schumann Resonance Observed in the ELF Electromagnetic Networks in China. *JGR Atmospheres* 128. doi: 10.1029/2023jd038602
- Han, J.-H., Kushner, S. A., Yiu, A. P., Hsiang, H.-L. (Liz), Buch, T., Waisman, A., et al. (2009). Selective Erasure of a Fear Memory. *Science* 323, 1492–1496. doi: 10.1126/science.1164139
- Harvey, C. D., Collman, F., Dombeck, D. A., and Tank, D. W. (2009). Intracellular dynamics of hippocampal place cells during virtual navigation. *Nature* 461, 941–946. doi: 10.1038/nature08499
- Helfrich, R. F., Schneider, T. R., Rach, S., Trautmann-Lengsfeld, S. A., Engel, A. K., and Herrmann, C. S. (2014). Entrainment of Brain Oscillations by Transcranial Alternating Current Stimulation. *Current Biology* 24, 333–339. doi: 10.1016/j.cub.2013.12.041
- Hengen, K. B., Lambo, M. E., Van Hooser, S. D., Katz, D. B., and Turrigiano, G. G. (2013). Firing Rate Homeostasis in Visual Cortex of Freely Behaving Rodents. *Neuron* 80, 335–342. doi: 10.1016/j.neuron.2013.08.038
- Herreras, O. (2016). Local Field Potentials: Myths and Misunderstandings. *Front. Neural Circuits* 10. doi: 10.3389/fncir.2016.00101
- Herrmann, C. S., Rach, S., Neuling, T., and Strüber, D. (2013). Transcranial alternating current stimulation: a review of the underlying mechanisms and modulation of cognitive processes. *Front. Hum. Neurosci.* 7. doi: 10.3389/fnhum.2013.00279
- Higgins, J. P. T., and Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine* 21, 1539–1558. doi: 10.1002/sim.1186
- Hirano, Y., and Uhlhaas, P. J. (2021). Current findings and perspectives on aberrant neural

oscillations in schizophrenia. *Psychiatry Clin Neurosci* 75, 358–368. doi: 10.1111/pcn.13300

Hodgkin, A. L., and Katz, B. (1949). The effect of sodium ions on the electrical activity of the giant axon of the squid. *The Journal of Physiology* 108, 37–77. doi: 10.1113/jphysiol.1949.sp004310

Hu, J., Zhang, Y., Huang, C., Feng, X., He, S., Zhang, Y., et al. (2022). Interleukin-6 trans-signalling in hippocampal CA1 neurones mediates perioperative neurocognitive disorders in mice. *British Journal of Anaesthesia* 129, 923–936. doi: 10.1016/j.bja.2022.08.019

Hu, W., Zhang, M., Czéh, B., Flügge, G., and Zhang, W. (2010). Stress Impairs GABAergic Network Function in the Hippocampus by Activating Nongenomic Glucocorticoid Receptors and Affecting the Integrity of the Parvalbumin-Expressing Neuronal Network. *Neuropsychopharmacol* 35, 1693–1707. doi: 10.1038/npp.2010.31

Huang, S., Dong, W., Lin, X., Xu, K., Li, K., Xiong, S., et al. (2024). Disruption of the Na⁺/K⁺-ATPase-purinergic P2X7 receptor complex in microglia promotes stress-induced anxiety. *Immunity* 57, 495–512.e11. doi: 10.1016/j.immuni.2024.01.018

Inoue, W., Baimoukhametova, D. V., Füzesi, T., Cusulin, J. I. W., Koblinger, K., Whelan, P. J., et al. (2013). Noradrenaline is a stress-associated metaplastic signal at GABA synapses. *Nat Neurosci* 16, 605–612. doi: 10.1038/nn.3373

Iwata, T., Yanagisawa, T., Ikegaya, Y., Smallwood, J., Fukuma, R., Oshino, S., et al. (2024). Hippocampal sharp-wave ripples correlate with periods of naturally occurring self-generated thoughts in humans. *Nat Commun* 15. doi: 10.1038/s41467-024-48367-1

Ji, D., and Dani, J. A. (2000). Inhibition and Disinhibition of Pyramidal Neurons by Activation of Nicotinic Receptors on Hippocampal Interneurons. *Journal of Neurophysiology* 83, 2682–2690. doi: 10.1152/jn.2000.83.5.2682

Jiang, X., Gonzalez-Martinez, J., Cash, S. S., Chauvel, P., Gale, J., and Halgren, E. (2020). Improved identification and differentiation from epileptiform activity of human hippocampal sharp wave ripples during NREM sleep. *Hippocampus* 30, 610–622. doi: 10.1002/hipo.23183

Jin, H., Yang, C., Jiang, C., Li, L., Pan, M., Li, D., et al. (2022). Evaluation of Neurotoxicity in BALB/c Mice following Chronic Exposure to Polystyrene Microplastics. *Environ Health Perspect* 130. doi: 10.1289/ehp10255

Jones, S. R., and Fernyhough, C. (2009). Caffeine, stress, and proneness to psychosis-like experiences: A preliminary investigation. *Personality and Individual Differences* 46, 562–564. doi: 10.1016/j.paid.2008.10.032

Jurgens, H. A., Amacherla, K., and Johnson, R. W. (2012). Influenza Infection Induces Neuroinflammation, Alters Hippocampal Neuron Morphology, and Impairs Cognition in

Adult Mice. *J. Neurosci.* 32, 3958–3968. doi: 10.1523/jneurosci.6389-11.2012

Kaila, K. (1994). Ionic basis of GABA_A receptor channel function in the nervous system. *Prog Neurobiol* 42, 489–537. doi: 10.1016/0301-0082(94)90049-3

Kang, H. J., Voleti, B., Hajszan, T., Rajkowska, G., Stockmeier, C. A., Licznerski, P., et al. (2012). Decreased expression of synapse-related genes and loss of synapses in major depressive disorder. *Nat Med* 18, 1413–1417. doi: 10.1038/nm.2886

Kanofsky, J. D., and Sandyk, R. (1991). Magnesium Deficiency in Chronic Schizophrenia. *International Journal of Neuroscience* 61, 87–90. doi: 10.3109/00207459108986275

Kasper, S., Gastpar, M., Müller, W. E., Volz, H.-P., Möller, H.-J., Dienel, A., et al. (2010). Silexan, an orally administered Lavandula oil preparation, is effective in the treatment of ‘subsyndromal’ anxiety disorder: a randomized, double-blind, placebo controlled trial. *International Clinical Psychopharmacology* 25, 277–287. doi: 10.1097/yic.0b013e32833b3242

Kassem, M. S., Lagopoulos, J., Stait-Gardner, T., Price, W. S., Chohan, T. W., Arnold, J. C., et al. (2013). Stress-Induced Grey Matter Loss Determined by MRI Is Primarily Due to Loss of Dendrites and Their Synapses. *Mol Neurobiol* 47, 645–661. doi: 10.1007/s12035-012-8365-7

Kay, R. W. (1994). Geomagnetic Storms: Association with Incidence of Depression as Measured by Hospital Admission. *Br J Psychiatry* 164, 403–409. doi: 10.1192/bjp.164.3.403

Keerthy, B. N., Sreepada, S. S. S., Naik, S. S., Bose, A., Hanumegowda, R., Mehta, U. M., et al. (2021). Effects of a single session of cathodal transcranial direct current stimulation primed intermittent theta-burst stimulation on heart rate variability and cortical excitability measures. *IJPP* 65, 162–166. doi: 10.25259/ijpp_339_2020

Kelly, M. M., Jensen, K. P., and Sofuoglu, M. (2015). Co-occurring tobacco use and posttraumatic stress disorder: Smoking cessation treatment implications: Tobacco Use in Posttraumatic Stress Disorder. *Am J Addict* 24, 695–704. doi: 10.1111/ajad.12304

Keramidis, I., McAllister, B. B., Bourbonnais, J., Wang, F., Isabel, D., Rezaei, E., et al. (2023). Restoring neuronal chloride extrusion reverses cognitive decline linked to Alzheimer’s disease mutations. *Brain* 146, 4903–4915. doi: 10.1093/brain/awad250

Kim, B., and Im, H. (2021). Chronic nicotine impairs sparse motor learning via striatal fast-spiking parvalbumin interneurons. *Addiction Biology* 26. doi: 10.1111/adb.12956

Kim, C. S., Brager, D. H., and Johnston, D. (2018). Perisomatic changes in h-channels regulate depressive behaviors following chronic unpredictable stress. *Mol Psychiatry* 23, 892–903. doi: 10.1038/mp.2017.28

Kim, C. S., and Johnston, D. (2015). A1 adenosine receptor-mediated GIRK channels contribute to the resting conductance of CA1 neurons in the dorsal hippocampus. *Journal of*

Neurophysiology 113, 2511–2523. doi: 10.1152/jn.00951.2014

Kim, W. B., and Cho, J.-H. (2020). Encoding of contextual fear memory in hippocampal–amygdala circuit. *Nat Commun* 11. doi: 10.1038/s41467-020-15121-2

Kirschvink, J. L. (1996). Microwave absorption by magnetite: a possible mechanism for coupling nonthermal levels of radiation to biological systems. *Bioelectromagnetics* 17, 187–194. doi: 10.1002/(SICI)1521-186X(1996)17:3<187::AID-BEM4>3.0.CO;2-#

Kirschvink, J. L., Kobayashi-Kirschvink, A., and Woodford, B. J. (1992). Magnetite biominerilization in the human brain. *Proc. Natl. Acad. Sci. U.S.A.* 89, 7683–7687. doi: 10.1073/pnas.89.16.7683

Kitamura, T., Ogawa, S. K., Roy, D. S., Okuyama, T., Morrissey, M. D., Smith, L. M., et al. (2017). Engrams and circuits crucial for systems consolidation of a memory. *Science* 356, 73–78. doi: 10.1126/science.aam6808

Kitayama, T. (2020). The Role of Astrocytes in the Modulation of K⁺-Cl⁻-Cotransporter-2 Function. *IJMS* 21, 9539. doi: 10.3390/ijms21249539

Klaus, K., Butler, K., Gutierrez, H., Durrant, S. J., and Pennington, K. (2018). Interactive effects of early life stress and CACNA1C genotype on cortisol awakening response. *Biological Psychology* 136, 22–28. doi: 10.1016/j.biopsych.2018.05.002

Koutsoukos, E., Angelopoulos, E., Maillis, A., Papadimitriou, G. N., and Stefanis, C. (2013). Indication of increased phase coupling between theta and gamma EEG rhythms associated with the experience of auditory verbal hallucinations. *Neuroscience Letters* 534, 242–245. doi: 10.1016/j.neulet.2012.12.005

Kowalczyk, T., Caban, B., and Bocian, R. (2013). Theta rhythm recorded in the hippocampal formation in vitro. *Postepy Hig Med Dosw* 67, 617–630. doi: 10.5604/17322693.1058537

Krnjević, K., Morris, M. E., and Reiffenstein, R. J. (1982). Stimulation-evoked changes in extracellular K⁺ and Ca²⁺ in pyramidal layers of the rat's hippocampus. *Can J Physiol Pharmacol* 60, 1643–1657. doi: 10.1139/y82-243

Kroener, S., Mulholland, P. J., New, N. N., Gass, J. T., Becker, H. C., and Chandler, L. J. (2012). Chronic Alcohol Exposure Alters Behavioral and Synaptic Plasticity of the Rodent Prefrontal Cortex. *PLoS ONE* 7, e37541. doi: 10.1371/journal.pone.0037541

Kurki, S. N., Srinivasan, R., Laine, J., Virtanen, M. A., Ala-Kurikka, T., Voipio, J., et al. (2023). Acute neuroinflammation leads to disruption of neuronal chloride regulation and consequent hyperexcitability in the dentate gyrus. *Cell Reports* 42, 113379. doi: 10.1016/j.celrep.2023.113379

Lasser, K., Boyd, J. W., Woolhandler, S., Himmelstein, D. U., McCormick, D., and Bor, D. H. (2000). Smoking and Mental Illness: A Population-Based Prevalence Study. *JAMA* 284, 2606. doi: 10.1001/jama.284.20.2606

- Law, A. J., Lipska, B. K., Weickert, C. S., Hyde, T. M., Straub, R. E., Hashimoto, R., et al. (2006). Neuregulin 1 transcripts are differentially expressed in schizophrenia and regulated by 5' SNPs associated with the disease. *Proc. Natl. Acad. Sci. U.S.A.* 103, 6747–6752. doi: 10.1073/pnas.0602002103
- Lee, H. H. C., Deeb, T. Z., Walker, J. A., Davies, P. A., and Moss, S. J. (2011). NMDA receptor activity downregulates KCC2 resulting in depolarizing GABA_A receptor-mediated currents. *Nat Neurosci* 14, 736–743. doi: 10.1038/nn.2806
- Lee, H. H. C., Walker, J. A., Williams, J. R., Goodier, R. J., Payne, J. A., and Moss, S. J. (2007). Direct Protein Kinase C-dependent Phosphorylation Regulates the Cell Surface Stability and Activity of the Potassium Chloride Cotransporter KCC2. *Journal of Biological Chemistry* 282, 29777–29784. doi: 10.1074/jbc.m705053200
- Leonard, S., Mexal, S., and Freedman, R. (2007). Genetics of Smoking and Schizophrenia. *Journal of Dual Diagnosis* 3, 43–59. doi: 10.1300/j374v03n03_05
- Li, S., Wang, C., Wang, W., Dong, H., Hou, P., and Tang, Y. (2008). Chronic mild stress impairs cognition in mice: From brain homeostasis to behavior. *Life Sciences* 82, 934–942. doi: 10.1016/j.lfs.2008.02.010
- Liu, A. A., Henin, S., Abbaspoor, S., Bragin, A., Buffalo, E. A., Farrell, J. S., et al. (2022a). A consensus statement on detection of hippocampal sharp wave ripples and differentiation from other fast oscillations. *Nat Commun* 13, 6000. doi: 10.1038/s41467-022-33536-x
- Liu, X., Ramirez, S., Pang, P. T., Puryear, C. B., Govindarajan, A., Deisseroth, K., et al. (2012). Optogenetic stimulation of a hippocampal engram activates fear memory recall. *Nature* 484, 381–385. doi: 10.1038/nature11028
- Liu, X., Terada, S., Ramezani, M., Kim, J.-H., Lu, Y., Grosmark, A., et al. (2022b). E-Cannula reveals anatomical diversity in sharp-wave ripples as a driver for the recruitment of distinct hippocampal assemblies. *Cell Reports* 41, 111453. doi: 10.1016/j.celrep.2022.111453
- Loizeau, N., Haas, D., Zahner, M., Stephan, C., Schindler, J., Gugler, M., et al. (2024). Extremely low frequency magnetic fields (ELF-MF) in Switzerland: From exposure monitoring to daily exposure scenarios. *Environment International* 194, 109181. doi: 10.1016/j.envint.2024.109181
- Lopes, J. P., Pliássova, A., and Cunha, R. A. (2019). The physiological effects of caffeine on synaptic transmission and plasticity in the mouse hippocampus selectively depend on adenosine A1 and A2A receptors. *Biochemical Pharmacology* 166, 313–321. doi: 10.1016/j.bcp.2019.06.008
- Lubenov, E. V., and Siapas, A. G. (2009). Hippocampal theta oscillations are travelling waves. *Nature* 459, 534–539. doi: 10.1038/nature08010
- Lubin, F. D., Roth, T. L., and Sweatt, J. D. (2008). Epigenetic Regulation of *bdnf* Gene

Transcription in the Consolidation of Fear Memory. *J. Neurosci.* 28, 10576–10586. doi: 10.1523/jneurosci.1786-08.2008

Luby-Phelps, K. (1999). “Cytoarchitecture and Physical Properties of Cytoplasm: Volume, Viscosity, Diffusion, Intracellular Surface Area,” in *International Review of Cytology*, (Elsevier), 189–221. doi: 10.1016/s0074-7696(08)60527-6

Luo, J., and Lin, S. (2025). Association between microplastics exposure and depressive symptoms in college students. *Ecotoxicology and Environmental Safety* 295, 118142. doi: 10.1016/j.ecoenv.2025.118142

M. Aghajan, Z., Schuette, P., Fields, T. A., Tran, M. E., Siddiqui, S. M., Hasulak, N. R., et al. (2017). Theta Oscillations in the Human Medial Temporal Lobe during Real-World Ambulatory Movement. *Current Biology* 27, 3743-3751.e3. doi: 10.1016/j.cub.2017.10.062

MacKenzie, G., and Maguire, J. (2015). Chronic stress shifts the GABA reversal potential in the hippocampus and increases seizure susceptibility. *Epilepsy Research* 109, 13–27. doi: 10.1016/j.eplepsyres.2014.10.003

Magee, J. C. (1999). Dendritic Ih normalizes temporal summation in hippocampal CA1 neurons. *Nat Neurosci* 2, 508–514. doi: 10.1038/9158

Magee, J. C., and Cook, E. P. (2000). Somatic EPSP amplitude is independent of synapse location in hippocampal pyramidal neurons. *Nat Neurosci* 3, 895–903. doi: 10.1038/78800

Maher, B. A., Ahmed, I. A. M., Karloukovski, V., MacLaren, D. A., Foulds, P. G., Allsop, D., et al. (2016). Magnetite pollution nanoparticles in the human brain. *Proc. Natl. Acad. Sci. U.S.A.* 113, 10797–10801. doi: 10.1073/pnas.1605941113

Major, G., Polsky, A., Denk, W., Schiller, J., and Tank, D. W. (2008). Spatiotemporally Graded NMDA Spike/Plateau Potentials in Basal Dendrites of Neocortical Pyramidal Neurons. *Journal of Neurophysiology* 99, 2584–2601. doi: 10.1152/jn.00011.2008

Malik, R., and Johnston, D. (2017). Dendritic GIRK Channels Gate the Integration Window, Plateau Potentials, and Induction of Synaptic Plasticity in Dorsal But Not Ventral CA1 Neurons. *J. Neurosci.* 37, 3940–3955. doi: 10.1523/jneurosci.2784-16.2017

Marcelin, B., Liu, Z., Chen, Y., Lewis, A. S., Becker, A., McClelland, S., et al. (2012). Dorsalventral Differences in Intrinsic Properties in Developing CA1 Pyramidal Cells. *J. Neurosci.* 32, 3736–3747. doi: 10.1523/jneurosci.5870-11.2012

Masino, S. A., Li, T., Theofilas, P., Sandau, U. S., Ruskin, D. N., Fredholm, B. B., et al. (2011). A ketogenic diet suppresses seizures in mice through adenosine A1 receptors. *J. Clin. Invest.* 121, 2679–2683. doi: 10.1172/JCI57813

Mauney, S. A., Athanas, K. M., Pantazopoulos, H., Shaskan, N., Passeri, E., Berretta, S., et al.

(2013). Developmental Pattern of Perineuronal Nets in the Human Prefrontal Cortex and Their Deficit in Schizophrenia. *Biological Psychiatry* 74, 427–435. doi: 10.1016/j.biopsych.2013.05.007

McCall, J. G., Siuda, E. R., Bhatti, D. L., Lawson, L. A., McElligott, Z. A., Stuber, G. D., et al. (2017). Locus coeruleus to basolateral amygdala noradrenergic projections promote anxiety-like behavior. *eLife* 6, e18247. doi: 10.7554/eLife.18247

McHugo, M., Rogers, B. P., Avery, S. N., Armstrong, K., Blackford, J. U., Vandekar, S. N., et al. (2022). Increased amplitude of hippocampal low frequency fluctuations in early psychosis: A two-year follow-up study. *Schizophrenia Research* 241, 260–266. doi: 10.1016/j.schres.2022.02.003

McHugo, M., Talati, P., Armstrong, K., Vandekar, S. N., Blackford, J. U., Woodward, N. D., et al. (2019). Hyperactivity and Reduced Activation of Anterior Hippocampus in Early Psychosis. *AJP* 176, 1030–1038. doi: 10.1176/appi.ajp.2019.19020151

Medina, I., Friedel, P., Rivera, C., Kahle, K. T., Kourdougli, N., Uvarov, P., et al. (2014). Current view on the functional regulation of the neuronal K⁺-Cl⁻ cotransporter KCC2. *Front. Cell. Neurosci.* 8. doi: 10.3389/fncel.2014.00027

Méndez-González, M. P., Rivera-Aponte, D. E., Benedikt, J., Maldonado-Martínez, G., Tejeda-Bayron, F., Skatchkov, S. N., et al. (2020). Downregulation of Astrocytic Kir4.1 Potassium Channels Is Associated with Hippocampal Neuronal Hyperexcitability in Type 2 Diabetic Mice. *Brain Sciences* 10, 72. doi: 10.3390/brainsci10020072

Mertens, J., The Pharmacogenomics of Bipolar Disorder Study, Wang, Q.-W., Kim, Y., Yu, D. X., Pham, S., et al. (2015). Differential responses to lithium in hyperexcitable neurons from patients with bipolar disorder. *Nature* 527, 95–99. doi: 10.1038/nature15526

Migliore, R., Lupascu, C. A., Bologna, L. L., Romani, A., Courcol, J.-D., Antonel, S., et al. (2018). The physiological variability of channel density in hippocampal CA1 pyramidal cells and interneurons explored using a unified data-driven modeling workflow. *PLoS Comput Biol* 14, e1006423. doi: 10.1371/journal.pcbi.1006423

Milior, G., Di Castro, M. A., Sciarria, L. P., Garofalo, S., Branchi, I., Ragazzino, D., et al. (2016). Electrophysiological Properties of CA1 Pyramidal Neurons along the Longitudinal Axis of the Mouse Hippocampus. *Sci Rep* 6. doi: 10.1038/srep38242

Mitsushima, D., Sano, A., and Takahashi, T. (2013). A cholinergic trigger drives learning-induced plasticity at hippocampal synapses. *Nat Commun* 4. doi: 10.1038/ncomms3760

Moabedi, M., Aliakbari, M., Erfanian, S., and Milajerdi, A. (2023). Magnesium supplementation beneficially affects depression in adults with depressive disorder: a systematic review and meta-analysis of randomized clinical trials. *Front. Psychiatry* 14, 1333261. doi: 10.3389/fpsyg.2023.1333261

- Mocking, R. J. T., Harmsen, I., Assies, J., Koeter, M. W. J., Ruhé, H. G., and Schene, A. H. (2016). Meta-analysis and meta-regression of omega-3 polyunsaturated fatty acid supplementation for major depressive disorder. *Transl Psychiatry* 6, e756–e756. doi: 10.1038/tp.2016.29
- Mulert, C., Kirsch, V., Pascual-Marqui, R., McCarley, R. W., and Spencer, K. M. (2011). Long-range synchrony of gamma oscillations and auditory hallucination symptoms in schizophrenia. *International Journal of Psychophysiology* 79, 55–63. doi: 10.1016/j.ijpsycho.2010.08.004
- Murthy, S., Kane, G. A., Katchur, N. J., Lara Mejia, P. S., Obiofuma, G., Buschman, T. J., et al. (2019). Perineuronal Nets, Inhibitory Interneurons, and Anxiety-Related Ventral Hippocampal Neuronal Oscillations Are Altered by Early Life Adversity. *Biological Psychiatry* 85, 1011–1020. doi: 10.1016/j.biopsych.2019.02.021
- Nehlig, A. (2018). Interindividual Differences in Caffeine Metabolism and Factors Driving Caffeine Consumption. *Pharmacological Reviews* 70, 384–411. doi: 10.1124/pr.117.014407
- Nemeroff, C. B., Widerlöv, E., Bissette, G., Walléus, H., Karlsson, I., Eklund, K., et al. (1984). Elevated Concentrations of CSF Corticotropin-Releasing Factor-Like Immunoreactivity in Depressed Patients. *Science* 226, 1342–1344. doi: 10.1126/science.6334362
- Ness, T. V., Remme, M. W. H., and Einevoll, G. T. (2016). Active subthreshold dendritic conductances shape the local field potential. *The Journal of Physiology* 594, 3809–3825. doi: 10.1113/JP272022
- Nickolaenko, A., and Hayakawa, M. (2014). *Schumann Resonance for Tyros: Essentials of Global Electromagnetic Resonance in the Earth–Ionosphere Cavity*. Tokyo: Springer Japan. doi: 10.1007/978-4-431-54358-9
- Nishimura, T., Tsai, I.-J., Yamauchi, H., Nakatani, E., Fukushima, M., and Hsu, C. Y. (2020). Association of Geomagnetic Disturbances and Suicide Attempts in Taiwan, 1997–2013: A Cross-Sectional Study. *IJERPH* 17, 1154. doi: 10.3390/ijerph17041154
- Noguchi, A., Yamashiro, K., Matsumoto, N., and Ikegaya, Y. (2023). Theta oscillations represent collective dynamics of multineuronal membrane potentials of murine hippocampal pyramidal cells. *Commun Biol* 6, 398. doi: 10.1038/s42003-023-04719-z
- Nomoto, M., Ohkawa, N., Inokuchi, K., and Oishi, N. (2023). Requirement for hippocampal CA3 NMDA receptors in artificial association of memory events stored in CA3 cell ensembles. *Mol Brain* 16. doi: 10.1186/s13041-023-01004-2
- Norman, Y., Raccah, O., Liu, S., Parvizi, J., and Malach, R. (2021). Hippocampal ripples and their coordinated dialogue with the default mode network during recent and remote recollection. *Neuron* 109, 2767–2780.e5. doi: 10.1016/j.neuron.2021.06.020
- Nuñez, A., and Buño, W. (2021). The Theta Rhythm of the Hippocampus: From Neuronal and

Circuit Mechanisms to Behavior. *Front. Cell. Neurosci.* 15. doi: 10.3389/fncel.2021.649262

Ogawa, S., Tsuchimine, S., and Kunugi, H. (2018). Cerebrospinal fluid monoamine metabolite concentrations in depressive disorder: A meta-analysis of historic evidence. *Journal of Psychiatric Research* 105, 137–146. doi: 10.1016/j.jpsychires.2018.08.028

Ordak, M., Matras, J., Muszynska, E., Nasierowski, T., and Bujalska-Zadrożny, M. (2017). Magnesium in schizophrenia. *Pharmacological Reports* 69, 929–934. doi: 10.1016/j.pharep.2017.03.022

Ostroumov, A., Thomas, A. M., Kimmey, B. A., Karsch, J. S., Doyon, W. M., and Dani, J. A. (2016). Stress Increases Ethanol Self-Administration via a Shift toward Excitatory GABA Signaling in the Ventral Tegmental Area. *Neuron* 92, 493–504. doi: 10.1016/j.neuron.2016.09.029

Overstreet, L. S., Kinney, G. A., Liu, Y.-B., Billups, D., and Slater, N. T. (1999). Glutamate Transporters Contribute to the Time Course of Synaptic Transmission in Cerebellar Granule Cells. *J. Neurosci.* 19, 9663–9673. doi: 10.1523/jneurosci.19-21-09663.1999

Ozen, S., Sirota, A., Belluscio, M. A., Anastassiou, C. A., Stark, E., Koch, C., et al. (2010). Transcranial Electric Stimulation Entrain Cortical Neuronal Populations in Rats. *J. Neurosci.* 30, 11476–11485. doi: 10.1523/JNEUROSCI.5252-09.2010

Pagani, M., Di Lorenzo, G., Monaco, L., Daverio, A., Giannoudas, I., La Porta, P., et al. (2015). Neurobiological response to EMDR therapy in clients with different psychological traumas. *Front. Psychol.* 6. doi: 10.3389/fpsyg.2015.01614

Palmer, C. M., Gilbert-Jaramillo, J., and Westman, E. C. (2019). The ketogenic diet and remission of psychotic symptoms in schizophrenia: Two case studies. *Schizophrenia Research* 208, 439–440. doi: 10.1016/j.schres.2019.03.019

Paniagua, J. M., Jiménez, A., Rufo, M., Gutiérrez, J. A., Gómez, F. J., and Antolín, A. (2007). Exposure to extremely low frequency magnetic fields in an urban area. *Radiat Environ Biophys* 46, 69–76. doi: 10.1007/s00411-006-0081-0

Partonen, T., Haukka, J., Viilo, K., Hakko, H., Pirkola, S., Isometsä, E., et al. (2004). Cyclic time patterns of death from suicide in northern Finland. *Journal of Affective Disorders* 78, 11–19. doi: 10.1016/s0165-0327(02)00236-7

Pazos, M., Mendoza, B., Sierra, P., Andrade, E., Rodríguez, D., Mendoza, V., et al. (2019). Analysis of the effects of geomagnetic storms in the Schumann Resonance station data in Mexico. *Journal of Atmospheric and Solar-Terrestrial Physics* 193, 105091. doi: 10.1016/j.jastp.2019.105091

Peng, T.-R., Lin, H.-H., Tseng, T.-L., Huang, Y.-H., Tsai, P.-Y., Lin, C.-Y., et al. (2024). Efficacy of N-acetylcysteine for patients with depression: An updated systematic review and meta-analysis. *General Hospital Psychiatry* 91, 151–159. doi:

10.1016/j.genhosppsych.2024.10.018

Perkins, D. O., Jeffries, C. D., and Do, K. Q. (2020). Potential Roles of Redox Dysregulation in the Development of Schizophrenia. *Biological Psychiatry* 88, 326–336. doi: 10.1016/j.biopsych.2020.03.016

Perlman, G., Tanti, A., and Mechawar, N. (2021). Parvalbumin interneuron alterations in stress-related mood disorders: A systematic review. *Neurobiology of Stress* 15, 100380. doi: 10.1016/j.ynstr.2021.100380

Pessoa, L., and Adolphs, R. (2010). Emotion processing and the amygdala: from a “low road” to “many roads” of evaluating biological significance. *Nat Rev Neurosci* 11, 773–782. doi: 10.1038/nrn2920

Pfeffer, T., Keitel, C., Kluger, D. S., Keitel, A., Russmann, A., Thut, G., et al. (2022). Coupling of pupil- and neuronal population dynamics reveals diverse influences of arousal on cortical processing. *eLife* 11. doi: 10.7554/elife.71890

Phelps, E. A., and LeDoux, J. E. (2005). Contributions of the Amygdala to Emotion Processing: From Animal Models to Human Behavior. *Neuron* 48, 175–187. doi: 10.1016/j.neuron.2005.09.025

Picciotto, M., Addy, N., Mineur, Y., and Brunzell, D. (2008). It is not “either/or”: Activation and desensitization of nicotinic acetylcholine receptors both contribute to behaviors related to nicotine addiction and mood. *Progress in Neurobiology* 84, 329–342. doi: 10.1016/j.pneurobio.2007.12.005

Pickering, G., Mazur, A., Trousselard, M., Bienkowski, P., Yaltsewa, N., Amessou, M., et al. (2020). Magnesium Status and Stress: The Vicious Circle Concept Revisited. *Nutrients* 12, 3672. doi: 10.3390/nu12123672

Pieraut, S., Lucas, O., Sangari, S., Sar, C., Boudes, M., Bouffi, C., et al. (2011). An Autocrine Neuronal Interleukin-6 Loop Mediates Chloride Accumulation and NKCC1 Phosphorylation in Axotomized Sensory Neurons. *J. Neurosci.* 31, 13516–13526. doi: 10.1523/jneurosci.3382-11.2011

Pignatelli, M., Ryan, T. J., Roy, D. S., Lovett, C., Smith, L. M., Muralidhar, S., et al. (2019). Engram Cell Excitability State Determines the Efficacy of Memory Retrieval. *Neuron* 101, 274-284.e5. doi: 10.1016/j.neuron.2018.11.029

Pikovsky, A., Rosenblum, M., and Kurths, J. (2001). *Synchronization: A Universal Concept in Nonlinear Sciences.*, 1st Edn. Cambridge University Press. doi: 10.1017/cbo9780511755743

Povysheva, N. V., and Johnson, J. W. (2012). Tonic NMDA receptor-mediated current in prefrontal cortical pyramidal cells and fast-spiking interneurons. *Journal of Neurophysiology* 107, 2232–2243. doi: 10.1152/jn.01017.2011

- Priestley, J. B., Bowler, J. C., Rolotti, S. V., Fusi, S., and Losonczy, A. (2022). Signatures of rapid plasticity in hippocampal CA1 representations during novel experiences. *Neuron* 110, 1978–1992.e6. doi: 10.1016/j.neuron.2022.03.026
- Qiao, H., Li, M.-X., Xu, C., Chen, H.-B., An, S.-C., and Ma, X.-M. (2016). Dendritic Spines in Depression: What We Learned from Animal Models. *Neural Plasticity* 2016, 1–26. doi: 10.1155/2016/8056370
- Quadir, S. G., Danyal Zaidi, S., Cone, M. G., and Patel, S. (2024). Alcohol Withdrawal Alters the Inhibitory Landscape of the Prelimbic Cortex in an Interneuron- and Sex-specific Manner. doi: 10.1101/2024.11.19.624401
- Radetz, A., and Siegel, M. (2022). Spectral Fingerprints of Cortical Neuromodulation. *J. Neurosci.* 42, 3836–3846. doi: 10.1523/jneurosci.1801-21.2022
- Radley, J. J., Sisti, H. M., Hao, J., Rocher, A. B., McCall, T., Hof, P. R., et al. (2004). Chronic behavioral stress induces apical dendritic reorganization in pyramidal neurons of the medial prefrontal cortex. *Neuroscience* 125, 1–6. doi: 10.1016/j.neuroscience.2004.01.006
- Rahmanzadeh, R., Eftekhari, S., Shahbazi, A., Khodaei Ardakani, M., Rahmanzade, R., Mehrabi, S., et al. (2017). Effect of bumetanide, a selective NKCC1 inhibitor, on hallucinations of schizophrenic patients; a double-blind randomized clinical trial. *Schizophrenia Research* 184, 145–146. doi: 10.1016/j.schres.2016.12.002
- Rangel-Gomez, M., Alberini, C. M., Deneen, B., Drummond, G. T., Manninen, T., Sur, M., et al. (2024). Neuron–Glial Interactions: Implications for Plasticity, Behavior, and Cognition. *J. Neurosci.* 44, e1231242024. doi: 10.1523/jneurosci.1231-24.2024
- Raps, A., Stoupel, E., and Shimshoni, M. (1992). Geophysical Variables and Behavior: LXIX. Solar Activity and Admission of Psychiatric Inpatients. *Percept Mot Skills* 74, 449–450. doi: 10.2466/pms.1992.74.2.449
- Rashid, A. J., Yan, C., Mercaldo, V., Hsiang, H.-L. (Liz), Park, S., Cole, C. J., et al. (2016). Competition between engrams influences fear memory formation and recall. *Science* 353, 383–387. doi: 10.1126/science.aaf0594
- Raver, S. M., Haughwout, S. P., and Keller, A. (2013). Adolescent Cannabinoid Exposure Permanently Suppresses Cortical Oscillations in Adult Mice. *Neuropsychopharmacol* 38, 2338–2347. doi: 10.1038/npp.2013.164
- Reato, D., Rahman, A., Bikson, M., and Parra, L. C. (2010). Low-Intensity Electrical Stimulation Affects Network Dynamics by Modulating Population Rate and Spike Timing. *J. Neurosci.* 30, 15067–15079. doi: 10.1523/jneurosci.2059-10.2010
- Reijmers, L. G., Perkins, B. L., Matsuo, N., and Mayford, M. (2007). Localization of a Stable Neural Correlate of Associative Memory. *Science* 317, 1230–1233. doi: 10.1126/science.1143839

- Rivera, C., Li, H., Thomas-Crusells, J., Lahtinen, H., Viitanen, T., Nanobashvili, A., et al. (2002). BDNF-induced TrkB activation down-regulates the K⁺-Cl⁻ cotransporter KCC2 and impairs neuronal Cl⁻ extrusion. *The Journal of Cell Biology* 159, 747–752. doi: 10.1083/jcb.200209011
- Rivera, C., Voipio, J., Thomas-Crusells, J., Li, H., Emri, Z., Sipilä, S., et al. (2004). Mechanism of Activity-Dependent Downregulation of the Neuron-Specific K-Cl Cotransporter KCC2. *J. Neurosci.* 24, 4683–4691. doi: 10.1523/jneurosci.5265-03.2004
- Rodríguez-Camacho, J., Salinas, A., Carrión, M. C., Portí, J., Fornieles-Callejón, J., and Toledo-Redondo, S. (2022). Four Year Study of the Schumann Resonance Regular Variations Using the Sierra Nevada Station Ground-Based Magnetometers. *JGR Atmospheres* 127. doi: 10.1029/2021jd036051
- Rose, J. E., Mukhin, A. G., Lokitz, S. J., Turkington, T. G., Herskovic, J., Behm, F. M., et al. (2010). Kinetics of brain nicotine accumulation in dependent and nondependent smokers assessed with PET and cigarettes containing ¹¹C-nicotine. *Proc. Natl. Acad. Sci. U.S.A.* 107, 5190–5195. doi: 10.1073/pnas.0909184107
- Rosenkranz, J. A., and Grace, A. A. (2002). Cellular Mechanisms of Infralimbic and Prelimbic Prefrontal Cortical Inhibition and Dopaminergic Modulation of Basolateral Amygdala Neurons *In Vivo*. *J. Neurosci.* 22, 324–337. doi: 10.1523/jneurosci.22-01-00324.2002
- Ross, J. A., and Van Bockstaele, E. J. (2021). The Locus Coeruleus- Norepinephrine System in Stress and Arousal: Unraveling Historical, Current, and Future Perspectives. *Front. Psychiatry* 11. doi: 10.3389/fpsyg.2020.601519
- Rosso, I. M., Crowley, D. J., Silveri, M. M., Rauch, S. L., and Jensen, J. E. (2017). Hippocampus Glutamate and N-Acetyl Aspartate Markers of Excitotoxic Neuronal Compromise in Posttraumatic Stress Disorder. *Neuropsychopharmacol* 42, 1698–1705. doi: 10.1038/npp.2017.32
- Rosso, I. M., Weiner, M. R., Crowley, D. J., Silveri, M. M., Rauch, S. L., and Jensen, J. E. (2014). INSULA AND ANTERIOR CINGULATE GABA LEVELS IN POSTTRAUMATIC STRESS DISORDER: PRELIMINARY FINDINGS USING MAGNETIC RESONANCE SPECTROSCOPY: Research Article: Insula GABA in PTSD. *Depress Anxiety* 31, 115–123. doi: 10.1002/da.22155
- Roth, T. L., Lubin, F. D., Funk, A. J., and Sweatt, J. D. (2009). Lasting Epigenetic Influence of Early-Life Adversity on the BDNF Gene. *Biological Psychiatry* 65, 760–769. doi: 10.1016/j.biopsych.2008.11.028
- Roux, L., Hu, B., Eichler, R., Stark, E., and Buzsáki, G. (2017). Sharp wave ripples during learning stabilize the hippocampal spatial map. *Nat Neurosci* 20, 845–853. doi: 10.1038/nn.4543
- Rowland, L. M., Summerfelt, A., Wijtenburg, S. A., Du, X., Chiappelli, J. J., Krishna, N., et al. (2016). Frontal Glutamate and γ-Aminobutyric Acid Levels and Their Associations With

Mismatch Negativity and Digit Sequencing Task Performance in Schizophrenia. *JAMA Psychiatry* 73, 166. doi: 10.1001/jamapsychiatry.2015.2680

Rumpel, S., LeDoux, J., Zador, A., and Malinow, R. (2005). Postsynaptic receptor trafficking underlying a form of associative learning. *Science* 308, 83–88. doi: 10.1126/science.1103944

Ryan, T. J., Roy, D. S., Pignatelli, M., Arons, A., and Tonegawa, S. (2015). Engram cells retain memory under retrograde amnesia. *Science* 348, 1007–1013. doi: 10.1126/science.aaa5542

Sada, N., Lee, S., Katsu, T., Otsuki, T., and Inoue, T. (2015). Targeting LDH enzymes with a stiripentol analog to treat epilepsy. *Science* 347, 1362–1367. doi: 10.1126/science.aaa1299

Sætra, M. J., Einevoll, G. T., and Halnes, G. (2021). An electrodiffusive neuron-extracellular-glia model for exploring the genesis of slow potentials in the brain. *PLoS Comput Biol* 17, e1008143. doi: 10.1371/journal.pcbi.1008143

Saloner, R., Cherner, M., Sundermann, E. E., Watson, C. W.-M., Iudicello, J. E., Letendre, S. L., et al. (2020). COMT val158met genotype alters the effects of methamphetamine dependence on dopamine and dopamine-related executive function: preliminary findings. *Psychiatry Research* 292, 113269. doi: 10.1016/j.psychres.2020.113269

Saroka, K. S., Vares, D. E., and Persinger, M. A. (2016). Similar Spectral Power Densities Within the Schumann Resonance and a Large Population of Quantitative Electroencephalographic Profiles: Supportive Evidence for Koenig and Pobachenko. *PLoS ONE* 11, e0146595. doi: 10.1371/journal.pone.0146595

Sátori, G., Neska, M., Williams, E., and Szendrői, J. (2007). Signatures of the day-night asymmetry of the Earth-ionosphere cavity in high time resolution Schumann resonance records. *Radio Science* 42, 2006RS003483. doi: 10.1029/2006RS003483

Schieferstein, N., Del Toro, A., Evangelista, R., Imbroisci, B., Swaminathan, A., Schmitz, D., et al. (2024). Propagation of sharp wave-ripple activity in the mouse hippocampal CA3 subfield *in vitro*. *The Journal of Physiology* 602, 5039–5059. doi: 10.1113/jp285671

Schiller, J., Major, G., Koester, H. J., and Schiller, Y. (2000). NMDA spikes in basal dendrites of cortical pyramidal neurons. *Nature* 404, 285–289. doi: 10.1038/35005094

Schnell, C., Janc, O. A., Kempkes, B., Callis, C. A., Flügge, G., Hülsmann, S., et al. (2012). Restraint Stress Intensifies Interstitial K⁺ Accumulation during Severe Hypoxia. *Front. Pharmacol.* 3. doi: 10.3389/fphar.2012.00053

Schumann, W. O., and König, H. (1954). über die Beobachtung von ?atmospherics? bei geringsten Frequenzen. *Naturwissenschaften* 41, 183–184. doi: 10.1007/bf00638174

Schüz, J., Grigat, J.-P., Störmer, B., Rippin, G., Brinkmann, K., and Michaelis, J. (2000).

Extremely low frequency magnetic fields in residences in Germany. Distribution of measurements, comparison of two methods for assessing exposure, and predictors for the occurrence of magnetic fields above background level. *Radiation and Environmental Biophysics* 39, 233–240. doi: 10.1007/s004110000068

Schwabe, L., and Wolf, O. T. (2012). Stress Modulates the Engagement of Multiple Memory Systems in Classification Learning. *J. Neurosci.* 32, 11042–11049. doi: 10.1523/jneurosci.1484-12.2012

Sethi, S., Wakeham, D., Ketter, T., Hooshmand, F., Bjornstad, J., Richards, B., et al. (2024). Ketogenic Diet Intervention on Metabolic and Psychiatric Health in Bipolar and Schizophrenia: A Pilot Trial. *Psychiatry Research* 335, 115866. doi: 10.1016/j.psychres.2024.115866

Shaffer, F., and Ginsberg, J. P. (2017). An Overview of Heart Rate Variability Metrics and Norms. *Front. Public Health* 5. doi: 10.3389/fpubh.2017.00258

Shan, D., Lucas, E. K., Drummond, J. B., Haroutunian, V., Meador-Woodruff, J. H., and McCullumsmith, R. E. (2013). Abnormal expression of glutamate transporters in temporal lobe areas in elderly patients with schizophrenia. *Schizophrenia Research* 144, 1–8. doi: 10.1016/j.schres.2012.12.019

Shan, S., Zhang, Y., Zhao, H., Zeng, T., and Zhao, X. (2022). Polystyrene nanoplastics penetrate across the blood-brain barrier and induce activation of microglia in the brain of mice. *Chemosphere* 298, 134261. doi: 10.1016/j.chemosphere.2022.134261

Shaposhnikov, D., Revich, B., Gurfinkel, Y., and Naumova, E. (2014). The influence of meteorological and geomagnetic factors on acute myocardial infarction and brain stroke in Moscow, Russia. *Int J Biometeorol* 58, 799–808. doi: 10.1007/s00484-013-0660-0

Shaw, J., Boyd, A., House, M., Woodward, R., Mathes, F., Cowin, G., et al. (2015). Magnetic particle-mediated magnetoreception. *J. R. Soc. Interface.* 12, 20150499. doi: 10.1098/rsif.2015.0499

Shaw, S. B., Nicholson, A. A., Ros, T., Harricharan, S., Terpou, B., Densmore, M., et al. (2023). Increased top-down control of emotions during symptom provocation working memory tasks following a RCT of alpha-down neurofeedback in PTSD. *NeuroImage: Clinical* 37, 103313. doi: 10.1016/j.nicl.2023.103313

Sheffield, M. E. J., and Dombeck, D. A. (2015). Calcium transient prevalence across the dendritic arbour predicts place field properties. *Nature* 517, 200–204. doi: 10.1038/nature13871

Shimazu, T., Hirshey, M. D., Newman, J., He, W., Shirakawa, K., Le Moan, N., et al. (2013). Suppression of Oxidative Stress by β -Hydroxybutyrate, an Endogenous Histone Deacetylase Inhibitor. *Science* 339, 211–214. doi: 10.1126/science.1227166

Shin, L. M., and Liberzon, I. (2010). The Neurocircuitry of Fear, Stress, and Anxiety Disorders. *Neuropsychopharmacol* 35, 169–191. doi: 10.1038/npp.2009.83

- Sibille, J., Pannasch, U., and Rouach, N. (2014). Astroglial potassium clearance contributes to short-term plasticity of synaptically evoked currents at the tripartite synapse. *The Journal of Physiology* 592, 87–102. doi: 10.1113/jphysiol.2013.261735
- Siskind, D., Siskind, V., and Kisely, S. (2017). Clozapine Response Rates among People with Treatment-Resistant Schizophrenia: Data from a Systematic Review and Meta-Analysis. *Can J Psychiatry* 62, 772–777. doi: 10.1177/0706743717718167
- Slutsky, I., Abumaria, N., Wu, L.-J., Huang, C., Zhang, L., Li, B., et al. (2010). Enhancement of Learning and Memory by Elevating Brain Magnesium. *Neuron* 65, 165–177. doi: 10.1016/j.neuron.2009.12.026
- South, S. M., Kohno, T., Kaspar, B. K., Hegarty, D., Vissel, B., Drake, C. T., et al. (2003). A Conditional Deletion of the NR1 Subunit of the NMDA Receptor in Adult Spinal Cord Dorsal Horn Reduces NMDA Currents and Injury-Induced Pain. *J. Neurosci.* 23, 5031–5040. doi: 10.1523/jneurosci.23-12-05031.2003
- Spruston, N., and Johnston, D. (1992). Perforated patch-clamp analysis of the passive membrane properties of three classes of hippocampal neurons. *Journal of Neurophysiology* 67, 508–529. doi: 10.1152/jn.1992.67.3.508
- Stefanelli, T., Bertollini, C., Lüscher, C., Muller, D., and Mendez, P. (2016). Hippocampal Somatostatin Interneurons Control the Size of Neuronal Memory Ensembles. *Neuron* 89, 1074–1085. doi: 10.1016/j.neuron.2016.01.024
- Steullet, P., Cabungcal, J.-H., Coyle, J., Didriksen, M., Gill, K., Grace, A. A., et al. (2017). Oxidative stress-driven parvalbumin interneuron impairment as a common mechanism in models of schizophrenia. *Mol Psychiatry* 22, 936–943. doi: 10.1038/mp.2017.47
- Sun, X., Bernstein, M. J., Meng, M., Rao, S., Sørensen, A. T., Yao, L., et al. (2020). Functionally Distinct Neuronal Ensembles within the Memory Engram. *Cell* 181, 410-423.e17. doi: 10.1016/j.cell.2020.02.055
- Syková, E., and Nicholson, C. (2008). Diffusion in Brain Extracellular Space. *Physiological Reviews* 88, 1277–1340. doi: 10.1152/physrev.00027.2007
- Tada, H., Nishimura, T., Nakatani, E., Matsuda, K., Teramukai, S., and Fukushima, M. (2014). Association of geomagnetic disturbances and suicides in Japan, 1999–2010. *Environ Health Prev Med* 19, 64–71. doi: 10.1007/s12199-013-0355-5
- Talley, E. M., Solórzano, G., Lei, Q., Kim, D., and Bayliss, D. A. (2001). CNS Distribution of Members of the Two-Pore-Domain (KCNK) Potassium Channel Family. *J. Neurosci.* 21, 7491–7505. doi: 10.1523/jneurosci.21-19-07491.2001
- Tarleton, E. K., Littenberg, B., MacLean, C. D., Kennedy, A. G., and Daley, C. (2017). Role of magnesium supplementation in the treatment of depression: A randomized clinical trial. *PLoS ONE* 12, e0180067. doi: 10.1371/journal.pone.0180067

- Tesli, M., Skatun, K. C., Ousdal, O. T., Brown, A. A., Thoresen, C., Agartz, I., et al. (2013). CACNA1C Risk Variant and Amygdala Activity in Bipolar Disorder, Schizophrenia and Healthy Controls. *PLoS ONE* 8, e56970. doi: 10.1371/journal.pone.0056970
- Thayer, J. F., Åhs, F., Fredrikson, M., Sollers, J. J., and Wager, T. D. (2012). A meta-analysis of heart rate variability and neuroimaging studies: Implications for heart rate variability as a marker of stress and health. *Neuroscience & Biobehavioral Reviews* 36, 747–756. doi: 10.1016/j.neubiorev.2011.11.009
- Thut, G., Schyns, P. G., and Gross, J. (2011). Entrainment of Perceptually Relevant Brain Oscillations by Non-Invasive Rhythmic Stimulation of the Human Brain. *Front. Psychology* 2. doi: 10.3389/fpsyg.2011.00170
- Torborg, C. L., Berg, A. P., Jeffries, B. W., Bayliss, D. A., and McBain, C. J. (2006). TASK-Like Conductances Are Present within Hippocampal CA1 Stratum Oriens Interneuron Subpopulations. *J. Neurosci.* 26, 7362–7367. doi: 10.1523/jneurosci.1257-06.2006
- Tripathy, S. J., Savitskaya, J., Burton, S. D., Urban, N. N., and Gerkin, R. C. (2014). NeuroElectro: a window to the world's neuron electrophysiology data. *Front. Neuroinform.* 8. doi: 10.3389/fninf.2014.00040
- Tse, Y. C., Nath, M., Larosa, A., and Wong, T. P. (2021). Opposing Changes in Synaptic and Extrasynaptic N-Methyl-D-Aspartate Receptor Function in Response to Acute and Chronic Restraint Stress. *Front. Mol. Neurosci.* 14. doi: 10.3389/fnmol.2021.716675
- Tsukahara, T., Masuhara, M., Iwai, H., Sonomura, T., and Sato, T. (2015). Repeated stress-induced expression pattern alterations of the hippocampal chloride transporters KCC2 and NKCC1 associated with behavioral abnormalities in female mice. *Biochemical and Biophysical Research Communications* 465, 145–151. doi: 10.1016/j.bbrc.2015.07.153
- Tucker, S. J. (1998). Molecular determinants of KATP channel inhibition by ATP. *The EMBO Journal* 17, 3290–3296. doi: 10.1093/emboj/17.12.3290
- Tuckwell, H. C. (1988). *Introduction to Theoretical Neurobiology*., 1st Edn. Cambridge University Press. doi: 10.1017/cbo9780511623202
- Uhlhaas, P. J., and Singer, W. (2010). Abnormal neural oscillations and synchrony in schizophrenia. *Nat Rev Neurosci* 11, 100–113. doi: 10.1038/nrn2774
- Valenti, O., Lodge, D. J., and Grace, A. A. (2011). Aversive Stimuli Alter Ventral Tegmental Area Dopamine Neuron Activity via a Common Action in the Ventral Hippocampus. *J. Neurosci.* 31, 4280–4289. doi: 10.1523/jneurosci.5310-10.2011
- Van Moorselaar, I., Slottje, P., Heller, P., Van Strien, R., Kromhout, H., Murbach, M., et al. (2017). Effects of personalised exposure on self-rated electromagnetic hypersensitivity and sensibility – A double-blind randomised controlled trial. *Environment International* 99, 255–262. doi: 10.1016/j.envint.2016.11.031

- Vassos, E., Pedersen, C. B., Murray, R. M., Collier, D. A., and Lewis, C. M. (2012). Meta-Analysis of the Association of Urbanicity With Schizophrenia. *Schizophrenia Bulletin* 38, 1118–1123. doi: 10.1093/schbul/sbs096
- Vijayraghavan, S., Wang, M., Birnbaum, S. G., Williams, G. V., and Arnsten, A. F. T. (2007). Inverted-U dopamine D1 receptor actions on prefrontal neurons engaged in working memory. *Nat Neurosci* 10, 376–384. doi: 10.1038/nn1846
- Villoresi, G., Ptitsyna, N. G., Tiasto, M. I., and Iucci, N. (1998). [Myocardial infarct and geomagnetic disturbances: analysis of data on morbidity and mortality]. *Biofizika* 43, 623–631. PMID: 9783069
- Voipio, J., and Kaila, K. (2000). GABAergic excitation and K(+) -mediated volume transmission in the hippocampus. *Prog Brain Res* 125, 329–338. doi: 10.1016/S0079-6123(00)25022-X
- Wang, S., Han, Q., Wei, Z., Wang, Y., Xie, J., and Chen, M. (2022). Polystyrene microplastics affect learning and memory in mice by inducing oxidative stress and decreasing the level of acetylcholine. *Food and Chemical Toxicology* 162, 112904. doi: 10.1016/j.fct.2022.112904
- Weickert, C. S., Fung, S. J., Catts, V. S., Schofield, P. R., Allen, K. M., Moore, L. T., et al. (2013). Molecular evidence of N-methyl-D-aspartate receptor hypofunction in schizophrenia. *Mol Psychiatry* 18, 1185–1192. doi: 10.1038/mp.2012.137
- Wild, A. R., Bollands, M., Morris, P. G., and Jones, S. (2015). Mechanisms regulating spill-over of synaptic glutamate to extrasynaptic NMDA receptors in mouse substantia nigra dopaminergic neurons. *Eur J of Neuroscience* 42, 2633–2643. doi: 10.1111/ejn.13075
- Winklhofer, M., and Kirschvink, J. L. (2010). A quantitative assessment of torque-transducer models for magnetoreception. *J. R. Soc. Interface*. 7. doi: 10.1098/rsif.2009.0435.focus
- Yeung, J. H. Y., Palpagama, T. H., Wood, O. W. G., Turner, C., Waldvogel, H. J., Faull, R. L. M., et al. (2021). EAAT2 Expression in the Hippocampus, Subiculum, Entorhinal Cortex and Superior Temporal Gyrus in Alzheimer's Disease. *Front. Cell. Neurosci.* 15. doi: 10.3389/fncel.2021.702824
- Yilmaz, M., Yalcin, E., Presumey, J., Aw, E., Ma, M., Whelan, C. W., et al. (2021). Overexpression of schizophrenia susceptibility factor human complement C4A promotes excessive synaptic loss and behavioral changes in mice. *Nat Neurosci* 24, 214–224. doi: 10.1038/s41593-020-00763-8
- Yin, D.-M., Chen, Y.-J., Lu, Y.-S., Bean, J. C., Sathyamurthy, A., Shen, C., et al. (2013). Reversal of Behavioral Deficits and Synaptic Dysfunction in Mice Overexpressing Neuregulin 1. *Neuron* 78, 644–657. doi: 10.1016/j.neuron.2013.03.028
- Ylinen, A., Bragin, A., Nadasdy, Z., Jando, G., Szabo, I., Sik, A., et al. (1995). Sharp wave-associated high-frequency oscillation (200 Hz) in the intact hippocampus: network

and intracellular mechanisms. *J. Neurosci.* 15, 30–46. doi: 10.1523/jneurosci.15-01-00030.1995

Yolland, C. O., Hanratty, D., Neill, E., Rossell, S. L., Berk, M., Dean, O. M., et al. (2020). Meta-analysis of randomised controlled trials with *N*-acetylcysteine in the treatment of schizophrenia. *Aust N Z J Psychiatry* 54, 453–466. doi: 10.1177/0004867419893439

Yoshioka, M., Matsumoto, M., Togashi, H., and Saito, H. (1996). Effect of conditioned fear stress on dopamine release in the rat prefrontal cortex. *Neuroscience Letters* 209, 201–203. doi: 10.1016/0304-3940(96)12631-8

Yu, Z., Chen, N., Hu, D., Chen, W., Yuan, Y., Meng, S., et al. (2020). Decreased Density of Perineuronal Net in Prelimbic Cortex Is Linked to Depressive-Like Behavior in Young-Aged Rats. *Front. Mol. Neurosci.* 13, 4. doi: 10.3389/fnmol.2020.00004

Zemankovics, R., Káli, S., Paulsen, O., Freund, T. F., and Hájos, N. (2010). Differences in subthreshold resonance of hippocampal pyramidal cells and interneurons: the role of h-current and passive membrane characteristics. *The Journal of Physiology* 588, 2109–2132. doi: 10.1113/jphysiol.2009.185975

Zhang, J., Wu, X., Feng, Y., Xie, X., Fan, Y., Yan, S., et al. (2016). Salvianolic acid B ameliorates depressive-like behaviors in chronic mild stress-treated mice: involvement of the neuroinflammatory pathway. *Acta Pharmacol Sin* 37, 1141–1153. doi: 10.1038/aps.2016.63

Zhang, Y., Zhang, X., Liu, N., Ren, S., Xia, C., Yang, X., et al. (2021). Comparative Proteomic Characterization of Ventral Hippocampus in Susceptible and Resilient Rats Subjected to Chronic Unpredictable Stress. *Front. Neurosci.* 15. doi: 10.3389/fnins.2021.675430

Zilli Vieira, C. L., Alvares, D., Blomberg, A., Schwartz, J., Coull, B., Huang, S., et al. (2019). Geomagnetic disturbances driven by solar activity enhance total and cardiovascular mortality risk in 263 U.S. cities. *Environ Health* 18. doi: 10.1186/s12940-019-0516-0