Riley E. Perszyk, Ph.D.

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Atlanta, GA 30322
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Education:

Emory University, Atlanta, GA **2011-2018**
Ph.D., Biological and Biomedical Sciences, Molecular and Systems Pharmacology (MSP)

Georgia Institute of Technology, Atlanta, GA **2005-2009**
BS in Mechanical Engineering, Highest Honors

Research Experience:

Post Doctoral Research
Dr. Stephen Traynelis, Department of Pharmacology, Emory University **2020-2023**

Precision Biosystems Lab., Mechanical Engineering, Georgia Institute of Technology **2018-2020**
Dr. Stephen Traynelis, Department of Pharmacology, Emory University
Dr. Andrew Jenkins, Department of Anesthesiology, Emory University

Dissertation Research **2012-2018**
Dr. Stephen Traynelis, Department of Pharmacology, Emory University

Lab Rotations **2011-2012**
Dr. Stephen Traynelis, Dr. Nael McCarty, Dr. Shannon Gourley, Emory University

Research Assistant **2010-2011**
Dr. Andrew Jenkins, Department of Anesthesiology, Emory University

Fellowships:

Predoctoral fellow, Pharmacological Sciences Training Grant **2012-2013**
Emory University, NIH T32 GM008602

Teaching Experience:

EUSOM cl2027 (M1) – Medical Student level course
Membrane potentials small group discussion **2023**

IBS 514 - Cellular, Molecular, Developmental Neuroscience (Graduate level course)
Lecture Title – "Ion channels in cellular physiology" **2020**
Lecture Title – "Ion channels in cellular physiology" **2021**
Lecture Title – "Ion Channels – Evolution, Genetics, Overview" **2022**

Graduate Teaching Assistant (TA) – Emory University **2013**
Introduction to Pharmacology – Graduate course

Guest Lecturer, Introduction to Pharmacology (Graduate level course) **2013**
Lecture Title – "NMDA Receptor Modulator Screening: A Case Study"

Undergraduate Honors Thesis – Laboratory Mentor (Sotimehin A.) **2013**

Academic Honors:

Division Fellowship, Graduate Div. of Biological and Biomed. Sciences **2011-2016**
Emory University, GA, USA

Service:

MSP Student Seminar - Coordinator	**2013-2014**
MSP Recruitment – Committee Member	**2014**
MSP Alumni Symposium - Organizer	**2014**
Emory Spokes Council - Bicycling advocacy group - President	**2015-2018**
MSP Alumni Symposium – Committee Member	**2016**
SHARE: Druid Hills - Neighborhood advocacy group - Committee Member	**2016**
Georgia State Active Living Summit – Invited Panelist	**2017**

Skills:

Scientific: General Electrophysiology, Brain Slice Physiology, Kinetic Analysis, Single Channel Recording, Pharmacological Structure-Activity Relationship Analysis, Operant Conditioning, Pymol, Fluorescent Imaging (live, stained), Primary Neuronal Culture, Molecular biology, DNA and RNA synthesis, TEVC of oocytes

Analytical: Synaptic Transmission, Kinetic Model Simulations, Allostery Theory, Neuron Physiology/Intrinsic Properties, Voltage-gated Receptor Activity, Statistical Analysis (Prism, Origin, Matlab), Power Calculations

Programming: Matlab Programing, Standalone Applications, Batch Analysis, Labview Programing, R programming

Managerial: Data Management, Long Distance Collaboration, Mentorship, Project Management

Engineering: Dynamic System Analysis, Process Analysis, Mechanical System Prototyping

Publications (Peer Reviewed):

1. Hansen K.B., Tajima N., Risgaard R., **Perszyk R.E.**, Jorgensen L., Vance K.M., Ogden K.K., Clausen R.P., Furukawa H., and Traynelis S.F. (2013). Structural Determinants of Agonist Efficacy at the Glutamate Binding Site of NMDA Receptors. **Molecular Pharmacology**. DOI: 10.1124/mol.113.085803
2. DePoy, L. M., **Perszyk, R. E.**, Zimmermann, K. S., Koleske, A. J., & Gourley, S. L. (2014). Adolescent cocaine exposure simplifies orbitofrontal cortical dendritic arbors. **Frontiers in Pharmacology**, 5. DOI: 10.3389/fphar.2014.00228
3. Katzman B. M., **Perszyk R. E.**, Yuan H., Tahirovic Y. A., Sotimehin A. E., Traynelis S. F. and Liotta D. C. (2015). "A novel class of negative allosteric modulators of NMDA receptor function." **Bioorganic & Medicinal Chemistry Letters** 25(23): 5583-5588. DOI: 10.1016/j.bmcl.2015.10.046
4. **Perszyk R.E.**, DiRaddo J.O., Strong K.L., Low C.M., Ogden K.K., Khatri A., Vargish G.A., Pelkey K.A., Tricoire L., Liotta D.C., Smith Y., McBain C.J. and Traynelis S.F. (2016). "GluN2D-containing NMDA receptors mediate synaptic transmission in hippocampal interneurons and regulate interneuron activity." **Molecular Pharmacology**. DOI: 10.1124/mol.116.105130
5. **Perszyk R.E.**, Katzman B.M., Kusumoto H., Kell S., Epplin M.P., Tahirovic Y.A., Moore R.L., Menaldino D., Burger P., Liotta D.C. and Traynelis S.T. (2018). A series of positive and negative allosteric modulators of NMDA receptors share a binding site and can be interconverted by single methyl group modifications. **Elife**. DOI: 10.7554/eLife.34711.

6. Hansen K.B., Yi F., **Perszyk R.E.**, Furukawa H., Wollmuth L.P., Gibb A.J., and Traynelis S.F. (2018) Structure, function, and allosteric modulation of NMDA receptors. **J Gen Physiol**. DOI: 10.1085/jgp.201812032.
7. **Perszyk R. E.**, Swanger S. A., Shelley C., Khatri A., Fernandez-Cuervo G., Epplin M. P., Zhang J., Le P., Bülow P., Garnier-Amblard E., Gangireddy P. K. R., Bassell G. J., Yuan H., Menaldino D. S., Liotta D. C., Liebeskind L. S., Traynelis S. F. (2020) Biased modulation of a ligand-gated ion channel. **Nat. Chem. Biol**. DOI: 10.1038/s41589-019-0449-5.
8. **Perszyk RE**, Myers SJ, Yuan H, Gibb AJ, Furukawa H, Sobolevsky AI, Traynelis SF. (2020) Hodgkin-Huxley-Katz Prize Lecture: Genetic and pharmacological control of glutamate receptor channel through a highly conserved gating motif. **J Physiol**. DOI: 10.1113/JP278086.
9. Strong KL, Epplin MP, Ogden KK, Burger PB, Kaiser TM, Wilding TJ, Kusumoto H, Camp CR, Shaulsky G, Bhattacharya S, **Perszyk RE**, Menaldino DS, McDaniel MJ, Zhang J, Le P, Banke TG, Hansen KB, Huettner JE, Liotta DC, Traynelis SF. (2021) Distinct GluN1 and GluN2 Structural Determinants for Subunit-Selective Positive Allosteric Modulation of N-Methyl-d-aspartate Receptors. **ACS Chem Neurosci**. DOI: 10.1021/acschemneuro.0c00561.
10. **Perszyk RE**, Zheng Z, Banke TG, Zhang J, Xie L, McDaniel MJ, Katzman BM, Pelly SC, Yuan H, Liotta DC, Traynelis SF. The Negative Allosteric Modulator EU1794-4 Reduces Single-Channel Conductance and Ca2+ Permeability of GluN1/GluN2A N-Methyl-d-Aspartate Receptors. **Mol Pharmacol**. 2021 May;99(5):399-411. doi: 10.1124/molpharm.120.000218.
11. **Perszyk RE**, Yip MC, McConnell OL, Wang ET, Jenkins A, Traynelis SF, Forest CR. Automated Intracellular Pharmacological Electrophysiology for Ligand-Gated Ionotropic Receptor and Pharmacology Screening. **Mol Pharmacol**. 2021 Jul;100(1):73-82. doi: 10.1124/molpharm.120.000195.
12. **Perszyk RE**, Kristensen AS, Lyuboslavsky P, Traynelis SF. Three-dimensional missense tolerance ratio analysis. **Genome Res**. 2021 Aug;31(8):1447-1461. doi: 10.1101/gr.275528.121.
13. Hansen KB, Wollmuth LP, Bowie D, Furukawa H, Menniti FS, Sobolevsky AI, Swanson GT, Swanger SA, Greger IH, Nakagawa T, McBain CJ, Jayaraman V, Low CM, Dell'Acqua ML, Diamond JS, Camp CR, **Perszyk RE**, Yuan H, Traynelis SF. Structure, Function, and Pharmacology of Glutamate Receptor Ion Channels. **Pharmacol Rev**. 2021 Oct;73(4):298-487. doi: 10.1124/pharmrev.120.000131.
14. Han W, Yuan H, Allen JP, Kim S, Shaulsky GH, **Perszyk RE**, Traynelis SF, Myers SJ. Opportunities for Precision Treatment of GRIN2A and GRIN2B Gain-of-Function Variants in Triheteromeric N-Methyl-D-Aspartate Receptors. **J Pharmacol Exp Ther**. 2022 Apr;381(1):54-66. doi: 10.1124/jpet.121.001000.
15. Montanez-Miranda C, **Perszyk RE**, Harbin NH, Okalova J, Ramineni S, Traynelis SF, Hepler JR. Functional assessment of cancer-linked mutations in sensitive regions of RGS proteins predicted by 3DMTR analysis. **Mol Pharmacol**. 2023 Jan;103(1):21-37. doi: 10.1124/molpharm.122.000614. Epub 2022 Nov 16. PMID: 36384958.
16. Xie L, McDaniel MJ, **Perszyk RE**, Kim S, Cappuccio G, Shapiro KA, Muñoz-Cabello B, Sanchez-Lara PA, Grand K, Zhang J, Nocilla KA, Sheikh R, Armengol L, Romano R, Pierson TM, Yuan H, Myers SJ, Traynelis SF. Functional Effects of a Disease-Associated variants that alter the S1-M1 Linker of the NMDA receptor. **Cell Mol Life Sci**. 2023 Mar 31;80(4):110. doi: 10.1007/s00018-023-04705-y. PMID: 37000222.
17. Myers SJ, Yuan H, **Perszyk RE**, Zhang J, Kim S, Nocilla KA, Allen JP, Bain JM, Lemke JR, Lal D, Benke TA, Traynelis SF. Classification of missense variants in the N-methyl-d-aspartate receptor GRIN gene family as gain- or loss-of-function. **Hum Mol Genet**. 2023 Sep 16;32(19):2857-2871. doi: 10.1093/hmg/ddad104. PMID: 37369021; PMCID: PMC10508039.
18. Hanson JE, Yuan H, **Perszyk RE**, Banke TG, Xing H, Tsai MC, Menniti FS, Traynelis SF. Therapeutic potential of N-methyl-D-aspartate receptor modulators in psychiatry. **Neuropsychopharmacology**. 2023 Jun 27. doi: 10.1038/s41386-023-01614-3. PMID: 37369776.

19. D'Erasmo MP, Akins NS, Ma P, Jing Y, Swanger SA, Sharma SK, Bartsch PW, Menaldino DS, Arcoria PJ, Bui TT, Pons-Bennaceur A, Le P, Allen JP, Ullman EZ, Nocilla KA, Zhang J, **Perszyk RE**, Kim S, Acker TM, Taz A, Burton SL, Coe K, Fritzemeier RG, Burnashev N, Yuan H, Liotta DC, Traynelis SF. Development of a Dihydroquinoline-Pyrazoline GluN2C/2D-Selective Negative Allosteric Modulator of the N-Methyl-d-aspartate Receptor. **ACS Chem Neurosci**. 2023 Sep 6;14(17):3059-3076. doi: 10.1021/acschemneuro.3c00181. Epub 2023 Aug 11. PMID: 37566734; PMCID: PMC10485906.
20. Liu N, Li J, Gao K, **Perszyk RE**, Zhang J, Wang J, Wu Y, Jenkins A, Yuan H, Traynelis SF, Jiang Y. De novo CLPTM1 variants with reduced GABAA R current response in patients with epilepsy. **Epilepsia**. 2023 Aug 14. doi: 10.1111/epi.17746. Epub ahead of print. PMID: 37577761.
21. Song R, Zhang J, **Perszyk RE**, Camp CR, Tang W, Kannan V, Li J, Xu Y, Chen J, Li Y, Liang SH, Traynelis SF, Yuan H. Differential responses of disease-related GRIN variants located in pore-forming M2 domain of N-methyl-D-aspartate receptor to FDA-approved inhibitors. **J Neurochem**. 2023 Aug 30. doi: 10.1111/jnc.15942.. PMID: 37649269.

21. Yuchen Xu, Rui Song, Wenjuan Chen, Wenshu XiangWei, Sukhan Kim, Ruth K. Mizu, Manish Karamchandani, Chun Hu, Hirofumi Kusumoto, Sukhan Kim, **Riley E Perszyk**, Johannes R. Lemke, Scott J. Myers, Hongjie Yuan, Stephen F. Traynelis. De novo GRIN variants in M3 helix associated with neurological disorders control channel gating of NMDA receptor. ***In Revision***.
22. Wenshu Xiangwei, Hongjie Yuan, Nana Liu, Yuchen Xu, **Riley E. Perszyk**, Subhrajit Bhattacharya, Gil H. Shaulsky, Scott J. Myers, Tim Benke, Johannes Lemke, Yuwu Jiang, Stephen Traynelis. Clinical and functional consequences of GRIA variants in patients with neurological disease. ***In Revision***.
23. James P Allen, Cara Motz, Elisa Carrillo, **Riley E. Perszyk**, Steven Kell, Maki Kaneko, Catherine Quindipan, Sulagna Saitta, Roger L. Ladda, Cheng Zhu, Vasanthi Jayaraman, Tim Benke, Johannes Lemke, Scott J Myers, Stephen F Traynelis. Clinical features, functional consequences, and rescue pharmacology of missense GRID1 and GRID2 human variants. ***In Revision***.

Publications (Non-Peer Reviewed):

1. **Perszyk R.E.**. Revisiting NMDA receptor inhibitors that work differently hoping to treat brain injury and stroke. Atlas of Science (March 2016). *https://atlasofscience.org/revisiting-nmda-receptor-inhibitors-that-work-differently-hoping-to-treat-brain-injury-and-stroke/*
2. Hansen K.B., Yi F., **Perszyk R.E.**, Menniti F.S., Traynelis S.F. (2017) NMDA Receptors in the Central Nervous System. In: Burnashev N., Szepetowski P. (eds) NMDA Receptors. Methods in Molecular Biology, vol 1677. Humana Press, New York, NY
3. **Perszyk RE**, Yip MC, Jenkins A, Traynelis SF, Forest CR. " Robotic cell electrophysiological characterization for drug discovery" Robotics for Cell Manipulation and Characterization, edited by Yu Sun and Guanqiao Shan, Elsevier, anticipated Aug 1, 2022.

Scientific Talks:

1. GRI Virtual Conference (2022), The Search for GRI Drugs, “Overview of ionotropic glutamate receptor pharmacology”.

Abstracts (Oral):

1. **Perszyk R.E.** and Traynelis S.F. (2014) Modest chemical differences interconvert a class of negative allosteric NMDAR modulators to positive allosteric modulators. Department of Pharmacology Research in Progress.

2. **Perszyk R.E.** and Traynelis S.F. (2015) (+)-CIQ, the active enantiomer of CIQ, potentiates GluN2D-containing NMDA receptors in hippocampal interneurons. Department of Pharmacology Research in Progress.
3. **Perszyk R.E.** and Traynelis S.F. (2016) Investigating the actions of an NMDAR PAM in the inhibitory/excitatory balance of the CNS. Department of Pharmacology Research in Progress.
4. **Perszyk R.E.** and Traynelis S.F. (2017) Subtle differences in a series of NMDA receptor modulators confer opposing actions that share structural determinants of action. Department of Pharmacology Research in Progress.
5. **Perszyk R.E.**, Katzman B.M., Kusumoto H., Kell S., Tahirovic Y.A., Moore R.L., Menaldino D., Burger P., Liotta D.C. and Traynelis S.T (2017) Methyl groups interconvert a series of NMDA receptor allosteric modulators from positive to negative modulation that share a binding site. Division Student Advisory Council Symposium.

Abstracts (Poster):

1. **Perszyk R.E.**, Williams C.A., and Jenkins A. (2011) A conserved asparagine between loops A and E of anion ligand-gated channels is critical for GABA(A) receptor function. Biophysical Society Meeting (Baltimore).
2. **Perszyk R.E.**, Katzman B.M., Liotta D.C., and Traynelis S.F. (2013) A novel class of positive allosteric NMDA receptor modulators. Society for Neuroscience (San Diego).
3. **Perszyk R.E.**, Gangireddy P.K.R., Garnier-Amblard E.C., Swanger S.A., Fernandez-Cuervo G., Liebeskind L.S. and Traynelis S.F. (2014) Mechanism of action of a novel series of drug-like N-methyl-D-aspartate receptor positive allosteric modulators and their effects in hippocampal CA1 neurons. Society for Neuroscience (DC).
4. **Perszyk R.E.**, Gangireddy P.K.R., Garnier-Amblard E.C., Swanger S.A., Fernandez-Cuervo G., Liebeskind L.S. and Traynelis S.F. (2015) Mechanism of action of a novel series of drug-like N-methyl-D-aspartate receptor positive allosteric modulators and their effects in hippocampal CA1 neurons. Division Student Advisory Council Symposium.
5. **Perszyk R.E.**, DiRaddo J.O., Strong K.L, Low C.M., Tankovic A., Liotta D.C. and Traynelis S.F. (2015) (+)-CIQ, the active enantiomer of CIQ, potentiates GluN2D-containing NMDA receptors in hippocampal interneurons. Gordon Research Conference, Excitatory Synapses & Brain Function (Newport).
6. **Perszyk R.E.**, DiRaddo J.O., Strong K.L, Low C.M., Tankovic A., Liotta D.C. and Traynelis S.F. (2015) (+)-CIQ, the active enantiomer of CIQ, potentiates GluN2D-containing NMDA receptors in hippocampal interneurons. Ionotropic Glutamate Receptor Retreat (Albany).
7. **Perszyk R.E.** and Traynelis S.F. (2016) The inhibitory/excitatory balance of the hippocampus is influenced by NMDARs and modulated by NMDAR PAMs. Ionotropic Glutamate Receptor Retreat (Montreal).
8. **Perszyk R.E.,** Ogden K.K., Strong K.L, Liotta D.C. and Traynelis S.F. (2017) Channel open probability controls allosteric modulation of potency and efficacy. Division Student Advisory Council Symposium.
9. **Perszyk R.E.,** Ogden K.K., Strong K.L, Liotta D.C. and Traynelis S.F. (2017) Channel open probability controls allosteric modulation of potency and efficacy. Biophysical Society Meeting (New Orleans).
10. **Perszyk R.E.**, Katzman B.M., Tahirovic Y.A., Moore R.L., Kell S., Burger P., Menaldino D., Liotta D.C. and Traynelis S.T (2017) A Series of positive and negative allosteric modulators of NMDA receptor act at the same binding site. Ionotropic Glutamate Receptor Retreat (New Haven).
11. **Perszyk R.E.**, Strong K.L., Epplin M.P., Menaldino D., McDaniel M.J., Kusumoto H., Ogden K.K., Zhang J., Le P., Liotta D.C., Traynelis S.F. (2017) Stereoselective actions of a positive allosteric modulator of NMDA receptors reflect unique structural determinants of action. Society for Neuroscience (DC).

12. **Perszyk R.E.**, Yip M., Jenkins A., Traynelis S. F., and Forest C. (2018) Automation of Patch-Clamp Electrophysiology to Accelerate Pharmacological Assays. Ionotropic Glutamate Receptor Retreat (Pittsburg).
13. **Perszyk R. E.**, Swanger S. A., Shelley C., Khatri A., Fernandez-Cuervo G., Epplin M. P., Zhang J., Le P., Bülow P., Garnier-Amblard E., Gangireddy P. K. R., Bassell G. J., Yuan H., Menaldino D. S., Liotta D. C., Liebeskind L. S., Traynelis S. F. (2019) Biased modulation of a ligand-gated ion channel. Ionotropic Glutamate Receptor Retreat (Montreal).
14. **Perszyk R. E.**, Swanger S. A., Shelley C., Khatri A., Fernandez-Cuervo G., Epplin M. P., Zhang J., Le P., Bülow P., Garnier-Amblard E., Gangireddy P. K. R., Bassell G. J., Yuan H., Menaldino D. S., Liotta D. C., Liebeskind L. S., Traynelis S. F. (2020) Biased modulation of a ligand-gated ion channel. Winter Conference for Brian Research (Big Sky).
15. **Perszyk RE**, Kristensen AS, Lyuboslavsky P, Traynelis SF. (2021) Three-dimensional missense tolerance ratio analysis. Society for Neuroscience (Virtual).
16. **Perszyk R.E.,** Ogden K.K., Strong K.L, Liotta D.C. and Traynelis S.F. (2017) Channel open probability controls allosteric modulation of potency and efficacy. Ionotropic Glutamate Receptor Retreat (Chicago).

Grant Support Awards:

2023: Uplifting Atheletes Young Investigator Draft: 1 Year Duration

General Audience Speaking Opportunities:

1. "Neuroplasticity in Every Day Life". Pecha Kucha, Atlanta, Vol. 33. Aug. 27 2017. https://www.pechakucha.org/cities/atlanta

Patents:

1. **R.E. Perszyk**, M.C. Yip, A. Jenkins, S. Traynelis, C.R. Forest, Cell handling for pharamacological screening, Invention Disclosure filed, Apr 2021 with Georgia Tech Office of Technology Licensing (GTRC 8717). Provisional Patent 63/174,846 filed Apr 14, 2021.