Kartik S. Pradeepan

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Education

2018 – Present	Ph.D. in Neuroscience, Western University Thesis: Investigation of human stem cell-derived network development using in vitro multielectrode arrays Themes: computational neuroscience, stem cell-derived disease models, electrophysiology
2013 – 2018	B.Sc. Honors Double Major in Physiology and Genetics, Western University

Scholarships, Awards, & Honors

2021-2024	Postgraduate Scholarship – Doctoral (PGS-D) Program: NSERC ($63,000 CAD)
2021	Ontario Graduate Scholarship ($15,000 CAD, declined)
2019 & 2022	Axion Biosystems Travel Award ($1,000 USD)
2018	Thales Student Innovation Case Competition Grand Prize ($20,000 CAD) Problem: Design an AI capable of automatically finding opinion clusters and analyzing pieces of evidence. Solution: Opinion Galaxies: A ML Network Approach to Big Data in Medical Research
2017	Laurene Paterson Estate Scholarship ($1000 CAD)
2016 - 2018	Dean's Honor list

Peer-Reviewed Publications

[3] Mok, R.S., Zhang, W., Sheikh, T.I., **Pradeepan, K. S.**, Fernandes, I.R., DeJong, L.C., Benigno, G., Hildebrandt, M.R., Mufteev, M., Rodrigues, D.C., Wei, W., Piekna, A., Liu, J., Muotri, A.R., Vincent, J.B., Muller, L., Martinez-Trujillo, J., Salter, M.W., Ellis, J., (2022). Wide spectrum of neuronal and network phenotypes in human stem cell-derived excitatory neurons with Rett syndrome-associated MECP2 mutations. Translational Psychiatry, 12(450). https://doi.org/10.1038/s41398-022-02216-1

[2] Corrigan, B.W., Gulli, R.A., Doucet, G., Roussy, M., Luna, R., **Pradeepan, K. S.**, Sachs, A.J., Martinez-Trujillo, J. (2022) Distinct neural codes in primate Hippocampus and Lateral Prefrontal Cortex during associative learning in virtual environments. Neuron, S0896-6273(22)00361-0, https://doi.org/10.1016/j.neuron.2022.04.016

[1] McCready, F.P., Gordillo-Sampedro, S., **Pradeepan, K. S.**, Martinez-Trujillo, J., Ellis, J. (2022) Multielectrode Arrays for Functional Phenotyping of Neurons from Induced Pluripotent Stem Cell Models of Neurodevelopmental Disorders. Biology, 11(2):316, https://doi.org/10.3390/biology11020316.

Publications In Progress

[3] **Pradeepan, K. S.**, McCready, F., Wei, W., Ellis, J., Martinez-Trujillo, J., (2023). Calcium dependent reverberating super bursts in human Rett Syndrome excitatory neuronal networks. Biorxiv (2023). https://doi.org/10.1101/2023.09.12.557388. *Manuscript submitted to Biological Psychiatry Global Open Science.*

[2] Corrigan, B.W., Feyerbend, M., Gulli, R.A., Jimenez-Sosa, M.S., Abbass, M., Sunstrum, J.K., Matovic, S., Roussy, M., Luna, R., Mestern, S.A., Mahmoudian, B., Vijayraghavan, S., Igarashi, H., Kuebler, E.S., **Pradeepan, K.S.**, Assis, W.J., Pruszynski, A., Tripathy, S., Staiger, J., Gonzalez-Burgos, G., Neef, A., Treue, S., Everling, S., Inoue, W., Martinez-Trujillo, J.C. (2023). Intrinsic spike frequency adaptation shapes response diversity of macaque lateral prefrontal cortex neurons. *Manuscript in prep.*

[1] Kuebler, E.S., Feyerabend, M., Mestern, S.A., Jimenez-Sosa, M.S., Sunstrum, J.K., Corrigan, B.W., Mahmoudian, B., Roussy, M., **Pradeepan, K.S.**, Assis, W.J., Poulin, J.M.D., Gulli, R.A., Luna, R.., Igarashi, H., Vijayraghavan, S., Pruszynski, A., Everling, S., Treue, S., Tripathy, S.J., Inoue, W., Poulter, M.A., Martinez-Trujillo, J. (2024). A method for identifying cell types in mammalian neocortex during in vivo and ex vivo electrophysiological experiments. *Manuscripts in prep.*

Other Scientific Writings

[5] **Pradeepan, K. S.** (2022). Invisible injuries: Diagnosing concussions in young male athletes. *The Dorsal Column*. https://songsuwo.ca/thedorsalcolumn/vol3-iss3-kartik-pradeepan

[4] **Pradeepan, K. S.** (2021). Confronting trauma – How MDMA may be helping patients with severe PTSD. *The Dorsal Column*. https://songsuwo.ca/thedorsalcolumn/vol2-iss3-kartik-pradeepan

[3] **Pradeepan, K. S.** (2020). The uncertainty of Rett Syndrome. *The Dorsal Column*. https://songsuwo.ca/thedorsalcolumn/vol1-iss3-kartik-pradeepan

[2] **Pradeepan, K. S.** (2019). “Hand-in-hand” – How the brain handles a missing body part. *The Dorsal Column*. https://songsuwo.ca/thedorsalcolumn/vol1-iss1-kartik-pradeepan

[1] **Pradeepan K. S.** (2019) Present state of brain-machine interfaces. Health Science Inquiry, 10(1). https://doi.org/10.29173/hsi17

Conferences and Presentations (*presenter)

International

[6] *Fernandes, S., **Pradeepan, K. S.**, Lin, Y., Zhang, L., Wang, M., Martinez-Trujillo, J., Marchetto, M.C., Gage, F.H., (2023, Nov). Diversity of network burst patterns in astrocyte-enriched brain organoids. [Poster presentation]. Society for Neuroscience 2023 Meeting, Washington, DC, USA.

[5] ***Pradeepan, K. S.**, Mok, R., McCready, F., Zhang, W., Salter, M., Ellis, J., Martinez-Trujillo, J., Muller, L., (2022, Nov). Emergence of reverberating bursts in human stem cell derived neuronal networks of Rett Syndrome. [Poster presentation]. Society for Neuroscience 2022 Meeting, San Diego, CA, USA.

[4] ***Pradeepan, K. S.**, Benigno, G., Zhang, W., Mok, R., Martinez-Trujillo, J., Muller, L., Salter, M., Ellis, J., (2022, May). Modeling from single cell electrophysiology to neuronal network interactions in human induced pluripotent stem cell derived Rett Syndrome and isogenic controls. [Poster presentation]. Gordan Research Conference for Fragile X and Autism-Related Disorders, Barga, Lucca, Italy.

[3] ***Pradeepan, K. S.**, Benigno, G., Zhang, W., Mok, R., Martinez-Trujillo, J., Muller, L., Salter, M., Ellis, J., (2022, May). Modeling from single cell electrophysiology to neuronal network interactions in human induced pluripotent stem cell derived Rett Syndrome and isogenic controls. [Oral presentation]. Gordan Research Seminar for Fragile X and Autism-Related Disorders, Barga, Lucca, Italy.

[2] ***Pradeepan, K. S.**, Benigno, G., Mok, R., Martinez-Trujillo, J., Muller, Ellis, J., (2021, Nov). Computational modelling of iPSC-derived Rett Syndrome Neuronal Networks. [Virtual poster]. Society for Neuroscience 2021 Meeting.

[1] ***Pradeepan, K. S.**, McCready, F., Martinez-Trujillo, J., Ellis, J., (2019, Oct). Developmental population- level differences in iPSC-derived excitatory networks of SHANK2 ASD. [Dynamic poster presentation]. Society for Neuroscience 2019 Meeting, Chicago, IL, USA.

National and Regional

[13] **Pradeepan, K. S.,** Fernandes, S., Marchetto, M.C., Gage, F.H., Martinez-Trujillo, J., (2023, Nov). Hyperactive and disordered network activity in a human astrocyte-enriched cerebral organoid model of Alzheimer’s Disease. [Poster presentation]. Western Organoid Workshop 2023, London, ON, Canada.

[12] ***Pradeepan, K. S.**, McCready, F., Wei, W., Ellis, J., Martinez-Trujillo, J., (2023, May). A hyperexcitability phenotype in human stem cell derived neuronal networks of Rett Syndrome. [Oral presentation]. Developmental Disabilities Research Day 2023, London, ON, Canada.

[11] ***Pradeepan, K. S.**, Mok, R., McCready, F., Zhang, W., Salter, M., Ellis, J., Martinez-Trujillo, J., Muller, L., (2023, May). Emergence of reverberating bursts in human stem cell derived neuronal networks of Rett Syndrome. [Poster presentation]. Canadian Association for Neuroscience 2023 Meeting, Montreal, QC, Canada.

[10] *Martinez-Trujillo, J., **Pradeepan, K. S.,** Ellis, J., (2023, Feb). Integrating single neurons and circuits in stem cell derived neuronal networks: A systems neuroscience perspective. [Oral presentation]. UCTV Breaking News in Stem Cells, CA, USA.

[9] ***Pradeepan, K. S.**, Benigno, G., Zhang, W., Mok, R., Martinez-Trujillo, J., Muller, L., Salter, M., Ellis, J., (2022, June). Modeling from single cell electrophysiology to neuronal network interactions in human induced pluripotent stem cell derived Rett Syndrome and isogenic controls. [Oral presentation] Developmental Disabilities Research Day 2022, London, ON, Canada.

[8] *Martinez-Trujillo, J., **Pradeepan, K. S.,** Ellis, J., (2022, Jan). Using stem cell derived models to understand the pathogenesis of Rett Syndrome. [Oral presentation]. Schulich School of Medicine & Dentistry Developmental Disabilities Rounds.

[7] ***Pradeepan, K. S.**, Benigno, G., Mok, R., Martinez-Trujillo, J., Muller, L., Ellis, J., (2021, May). Electrophysiological characterization of Rett Syndrome in iPSC-derived neuronal networks using computational network modeling. [Virtual poster]. Canadian Association for Neuroscience 2021 Meeting.

[6] ***Pradeepan, K. S.**, Mok, R., Benigno, G., Martinez-Trujillo, J., Ellis, J., Muller, L., (2021, May). Electrophysiological characterization and neuronal network modelling of Rett Syndrome in iPSC-derived neuronal networks. [Virtual poster presentation]. London Health Research Day 2021.

[5] *Martinez-Trujillo, J., **Pradeepan, K. S.**, Benigno, G., Muller, L., (2020, May). Electrophysiological characterization of human stem cell derived networks of excitatory neurons in Rett Syndrome. [Oral presentation]. Developmental Disabilities Research Day 2020, London, ON, Canada.

[4] ***Pradeepan, K. S.**, Khaki, M., Mok, R., Martinez-Trujillo, J., Ellis, J., (2019, May). Analyzing the electrophysiological effects of Rett Syndrome on neuronal network development using machine learning. [Poster presentation]. Developmental Disabilities Research Day 2019, London, ON, Canada.

[3] ***Pradeepan, K. S.**, Khaki, M., Mok, R., Martinez-Trujillo, J., Ellis, J., (2019, May). Analyzing the electrophysiological effects of Rett Syndrome on neuronal network development using machine learning. [Poster presentation]. at Clinical Neurological Sciences Research Day 2019, London, ON, Canada.

[2] ***Pradeepan, K. S.**, Khaki, M., Mok, R., Martinez-Trujillo, J., Ellis, J., (2019, May). Analyzing the electrophysiological effects of Rett Syndrome on neuronal network development using machine learning. [Poster presentation]. Canadian Association for Neuroscience 2019 Meeting, Toronto, ON, Canada.

[1] ***Pradeepan, K. S.**, Khaki, M., Mok, R., Martinez-Trujillo, J., Ellis, J., (2019, Apr). Analyzing the electrophysiological effects of Rett Syndrome on neuronal network development using machine learning. [Poster presentation]. Neuroscience Research Day 2019, London, ON, Canada.

Teaching Experience (Instructorships, Guest Lectureships, Teaching Assistantships [TA])

2023	Introduction to Psychology as a Social Science (Dr. Shelley Cross-Mellor, TA)	Brescia College
2022 – 2023	Human Physiology (Dr. Pierre Thibeault, TA)	Western University
2021 – 2022	Human Physiology (Dr. Christine Bell, TA)	Western University
2020 – 2021	Mammalian Physiology (Professor Tom Stavraky, TA)	Western University
2019	Physiology of Senses (Dr. Tutis Vilis, TA)	Western University

Other Research Experience

2016 – 2018	Dr. Jamie Kramer's Neuroepigenetics Lab Project: Primer design and optimizing gene knockdown using qPCR in *drosophila* transgenic RNAi lines	Western University

Select Work Experience

2022 –	Freelancer Providing electrophysiological data analytics to disease modeling labs to produce functional characterization of neurodevelopmental and neurodegenerative disorders.	–
2022	Consulting Team Lead Client: London Community Foundation Led and collaborated with a team of four consultants to develop a recruitment, retention, and engagement strategy for London Community Foundation.	University Consulting Group
2022	Consultant Client: Athletes for Hope Worked with a team of five consultants to design and implement an expansion plan from USA into Canada for Athletes for Hope.	University Consulting Group

Select Community and Volunteer Experience

2022	University Consulting Group: Consultant, Team Lead Led teams of 5+ consultants across pro-bono engagements with major North American non-profit organizations, including Athletes for Hope (to expand into Canada) and London Community Foundation (to improve post-COVID recruitment, retention, and engagement strategy).
2022	University Graduate Program Reviewer Collaborated with internal and external faculty to conduct a comprehensive review and provide recommendations to the graduate program.
2020-2022	Society of Neuroscience Graduate Students Presentation Workshop Chair Mentored graduate students and organized workshops on effective scientific communication for the neuroscience program.
2019-2022	Society of Graduate Students Neuroscience Councillor Advocated and communicated between SOGS and the neuroscience program.
2019 – 2021	Robarts Association of Trainees and Students Council Represented for trainees at Robarts Research Institute in London Ontario.

Projects

2022 –	Burst Reverberation Toolbox

Designed a novel algorithm to detect and classify complex network bursts. Packaged into a GUI for non-coding scientists. Currently used by researchers at the University of Toronto (Hospital for Sick Children), University of California San Diego (Salk Institute), Florida International University, Radboud UMC (Donders Center of Medical Neurosciences).

2022 – **Neural Statistics Compiler for Axion Biosystems MEA data**
Developed and packaged an ETL data pipeline into a GUI for non-coding scientists to wrangle, manipulate, and analyze high-throughput electrophysiological data from Axion Biosystems multielectrode array system.

2022 – **NDD-Ephys-dB**
Full-stack developer for the human neurodevelopmental disorder electrophysiology database. An accessible multielectrode array and patch-clamp database to promote data-sharing of published results and data-mining by computational neuroscientists.

2019 – 2020 **Primate Cell Type Database Prototype**
Full-stack developer for the Primate Cell Type Database. The database hosts electrophysiological and morphological data generated by Drs. Julio Martinez-Trujillo and Wataru Inoue's lab at Western University. Prototyped created for the Neuronex Working Memory grant.

Relevant Academic Courses

Data Science	Scientific Computing	Biomedical Applications of Neural Networks	Introduction to Neural Networks
	Data Science for the Life Sciences	Programming for the Life Sciences	
Medical Science	Advanced Genetics	Cellular and Molecular Neurobiology	Mutagenesis & Repair
	Human Molecular Biology	Regulation of Gene Expression	Motor Neurophysiology
	Developmental Biology	Organogenesis in Mammals	Physiology of Stem Cell Function
	Stem Cells & Regenerative Medicine	Homeostasis and Stress	Healthcare Law