Sean J. O'Sullivan

647 Channing Ave
Palo Alto, CA 94301
(610) 547-5327
sjo003@stanford.edu

EDUCATION

Sidney Kimmel Medical College of Thomas Jefferson University 7/2013-5/2021
Philadelphia, PA
MD/PhD
PhD Neuroscience GPA 4.0 Defended: Spring 2019

Pennsylvania State University 2012
Brandywine, PA
Premedical Sciences Program, GPA 3.98

University of Pittsburgh 5/2010
Pittsburgh, PA
Bachelor of Science in Neuroscience
Minor in Chemistry and French
GPA 3.74, *Magna Cum Laude*

EXAMINATIONS

USMLE Step 1: passed with a score of 240 8/2015
USMLE Step 2 CK: passed with a score of 227 9/2020
USMLE Step 2 CS: cancelled

AWARDS AND HONORS

Sidney Kimmel Medical College
Distinction in Scholarly Inquiry 2020
Longitudinal Integrated Clerkship at Atlantic Health Systems 2019-2020
Jefferson College of Life Science Alumni Association Graduate Student Travel Fellowship 2019
National Institute on Alcohol Abuse and Alcoholism Ruth L. Kirschstein National Research Service Award Institutional Research Training Grant (T32) 2016-2017, 2018-2019
AOA Research Symposium – Runner-up best poster 2016
AOA Research Symposium – Podium Presentation 2015
Hobart Amory Hare Honor Society 2014-present
Mignon W. Dubbs and Alfred W. Dubbs Fellowship 2013-present

Penn State University
Dean's List 2011-2012
Certificate of Recognition for Outstanding Academic Achievement 2012

University of Pittsburgh
Neuroscience Departmental Honors 2010
Chancellor's Undergraduate Research Fellowship 2009
Dean's List 2006-2010
Dean's Star 2008

RESEARCH EXPERIENCE

Stanford University School of Medicine, Palo Alto, CA 5/2021-6/2022
Brain Stimulation Lab
Principle Investigator: Dr. Nolan Williams, MD; Department of Psychiatry and Human Behavior
Projects

- Inpatient clinical trials
  - Leader of Phase II Trial treating acute manic episodes with transcranial magnetic stimulation (TMS)
  - Supporting Phase II Trial treating borderline personality disorder with TMS
  - Supporting Phase III Trial treating acute suicidality with TMS
- Outpatient studies
  - Leader of study investigating acetyl-L-carnitine as a biomarker of treatment resistant depression and predictor of response to TMS
  - Supporting Phase I Trial treating traumatic brain injury in military veterans with psychedelic intervention ibogaine

Highlights

- Substantial time spent on Stanford Inpatient Psychiatric Service interacting with attending physicians, residents, and patients.
- Reviewing medical records to assess study eligibility of psychiatric inpatients
- Applying accelerated intermittent theta burst repetitive TMS (Stanford Neuromodulation Therapy [SNT]) to psychiatric patients
- Measuring participant response to TMS with TMS-EEG
- Working with T1 MRI and resting-state fMRI images to determine brain connectivity and functional TMS targets for treatment
- Administering assessments to study participants that include Structured Clinical Interview for DSM Disorders, Mini International Neuropsychiatric Interview, and depression, mania and borderline scales including MADRS and HAM-D 17
- Writing clinical protocols and amendments for IRB approval

Thomas Jefferson University, Philadelphia PA 8/2015–4/2021
Daniel Baugh Institute for Functional Genomics and Computational Biology
Principle Investigator: Dr. James S. Schwaber PhD; Director of Daniel Baugh Institute
Dissertation – *The Effect of Alcohol and Opioid Withdrawal on Single-Cell Glia and Neuronal Gene Expression in the Visceral Emotional Neuraxis* Defended: April 4, 2019
www.jefferson.edu/about/news-and-events/2019/8/the--inflammation--of-opioid-use.html

Projects

- Gene expression in single neurons, microglia, and astrocytes in the central nucleus of the amygdala in opioid withdrawal
- Gene expression in single neurons and microglia in the nucleus tractus solitarius in alcohol withdrawal
- Role of gut microbiome dysbiosis in drug addiction via negative reinforcement
- Gene expression in single neurons in the suprachiasmatic nucleus following phase shift
- Diurnal gene expression differences in the amygdala and nucleus tractus solitarius in both control and alcohol-dependent rats
- MicroRNA influence on gene networks in rat model of hypertension

Highlights

- Rodent work – feeding, surgery, experimental models, and tissue harvesting

- Molecular biology – laser capture microdissection, RT-qPCR, Western blot, immunohistochemistry, confocal imaging
- Computational biology – statistical and multivariate analyses of high dimensional datasets with R, Cytoscape, Matlab, and Multiple Experiment Viewer

Major Scientific Conferences Attended

Society for Neuroscience (SfN)	2017, 2019
Experimental Biology (EB)	2019
American Academy of Neurology (AAN) Annual Meeting	2019
National Institute of Drug Abuse (NIDA) Genetics Consortium	2018

Fox Chase Cancer Center, Philadelphia PA 2012-2013
Department of Psychosocial and Biobehavioral Medicine
Principle Investigator: Dr. Suzanne M. Miller, PhD; Director, Patient Empowerment and Decision Making; Editor and Chief, Translational Behavioral Medicine, Society of Behavioral Medicine
Research Assistant

- Developed a data-driven website designed to guide and educate prostate cancer survivors on side effects following treatments
- Responsibilities: identify eligible subjects using electronic medical record, interview prostate cancer patients post-treatment, transcribe interviews, support user testing of website, modify website based on feedback, communicate with team members from multiple sites on findings and website development, meeting minutes

Principle Investigator: Dr. Sui-Kuen Azor Hui, PhD, MSPH
Research Assistant

- Early-stage development of project aimed at increasing enrollment of ethnic minorities in cancer prevention clinical trials through Employee Wellness Programs

University of Pittsburgh, Pittsburgh PA 2008-2010
Department of Neuroscience
Principle Investigator: Jon W. Johnson, PhD; Professor of Neuroscience and Psychiatry
Undergraduate student researcher
Thesis - *Inhibition of the of N-methyl D-Aspartate Receptor by Memantine is Dependent on Agonist Duration* Defended: April, 2010

- Electrophysiology, cell culture, and transfection
- Whole-cell voltage-clamp experiments on genetically modified human embryonic kidney (HEK) cells
- Investigated mechanism of inhibition of memantine on *N*-methyl-D-aspartate (NMDA) receptors
- Responsibilities: performing transfections, electrophysiology recording experiments, data collection and organization, maintaining and troubleshooting equipment, calibrating equipment, analyzing and presenting findings in lab meetings and research conferences

PUBLICATIONS

O'Sullivan, S.J., Srivastava, A., Vadigepalli R, Schwaber JS. (2022) Investigating Drivers of Antireward in Addiction Behavior with Anatomically Specific Single-Cell Gene Expression Methods. J Vis Exp. 186

O'Sullivan, S.J. (2021) Understanding the regulation of transcription in mental illness. OMB Genetics. 5(4): 7

O'Sullivan, S.J., McIntosh-Clarke D, Park J, Vadigepalli R, Schwaber JS. (2021) Single Cell Scale Neuronal and Glial Gene Expression and Putative Cell Phenotypes and Networks in the Nucleus Tractus Solitarius in an Alcohol Withdrawal Time Series. Front Syst Neurosci. 15: 739

O'Sullivan, SJ. (2021) Single-cell systems neuroscience: A growing frontier in mental illness. Biocell. 10.32604

O'Sullivan, SJ. (2021) The interoceptive antireward pathway and gut dysbiosis in addiction. J Psychiatry Depress Anxiety. 10.24966/PDA-0150/100040

O'Sullivan, S.J. & Schwaber JS. (2021) Similarities in alcohol and opioid withdrawal syndromes suggest common negative reinforcement mechanisms involving the interoceptive antireward pathway. Neurosci Biobehav Rev. 125(6): 355.

O'Sullivan, S.J. & Lazar E.L. (2021) Medicalese and its Discontents. In Revision.

O'Sullivan, S.J., Reyes, B.A.S., Vadigepalli, R., Van Bockstaele, E.J., Schwaber, J.S. (2020) Combining Laser Capture Microdissection and Microfluidic qPCR to Analyze Transcriptional Profiles of Single Cells: A Systems Biology Approach to Opioid Dependence. J Vis Exp. 10: 3791/60612.

Staehle, M.M., **O'Sullivan, S.J.**, Vadigepalli, R., Kernan, K., Gonye, G.E., Ogunnaike, B.A., Schwaber, J.S. (2020) Diurnal patterns of gene expression in the dorsal vagal complex and the central nucleus of the amygdala – non-rhythm-generating brain regions. Front Neurosci. 10: 375.

O'Sullivan, S.J., Malahias, E., Park, J., Srivastava, A., Reyes, B.A.S., Gorky, J., Vadigepalli, R., Van Bockstaele, E.J., Schwaber, J.S. (2019) Single-cell glia and neuron gene expression in the central amygdala in opioid withdrawal suggests inflammation with correlated gut dysbiosis. Front Neurosci. 13: 665.

Park, J., Zhu, H., **O'Sullivan, S.J.**, Ogunnaike, B.A., Weaver, D.R., Schwaber, J.S., Vadigepalli R. (2016) Single-Cell Transcriptional Analysis Reveals Novel Neuronal Phenotypes and Interaction Networks Involved in the Central Circadian Clock. Front Neurosci. 10: 481.

POSTER PRESENTATIONS

O'Sullivan, S.J., Park, J., Malahias, E., Reyes, B.A., Van Bockstaele, E.J., Schwaber, J.S. "Opioid Withdrawal Shifts Amygdalar Transcriptome and is Correlated with Gut Dysbiosis," Society for Neuroscience, Fall 2019.

O'Sullivan, S.J., Park, J., Malahias, E., Reyes, B.A., Van Bockstaele, E.J., Schwaber, J.S. "Opioid Withdrawal Shifts Amygdalar Transcriptome and is Correlated with Gut Dysbiosis," American Academy of Neurology, Spring 2019.

O'Sullivan, S.J., Schuck, R., Tonnesen, S., Sallade, G., Osisek, E., Ubhi, A., "Bridging the Gaps: Team 6 Hotspotting Experience," Student Hotspotting Wrap-Up Capstone, Spring 2019

O'Sullivan, S.J., McIntosh-Clark, D., Park, J., Vadigepalli, R., Schwaber, J.S. "Single Neuron and Microglia Gene Expression Networks Demonstrate Cellular Subphenotype Shifts and Altered

Glial-Neuronal Signaling in Solitary Nucleus During Alcohol Withdrawal: A Time Series," Experimental Biology 2019, Spring 2019.

O'Sullivan, S.J., Malahias, E., Gorky, J., Park, J., Schwaber, J.S., Reyes, B.A., Van Bockstaele, E.J., Schwaber, J.S. "Transcriptional Analysis of Single Neurons and Glia in the Amygdala in Morphine-dependence and following 24 hours of Morphine Withdrawal," Thomas Jefferson University, Sigma Xi Student Research Day, Spring 2018.

O'Sullivan, S.J., Reyes, B.A., Van Bockstaele, E.J., Schwaber, J.S. "Sex Differences in Gene Expression in the Amygdala in Morphine Dependence and Withdrawal," Society for Neuroscience, Fall 2017.

O'Sullivan, S.J., Park, J., Malahias, E., Reyes, B.A., Van Bockstaele, E.J., Schwaber, J.S. "Opioid Withdrawal Shifts Amygdalar Transcriptome and is Correlated with Gut Dysbiosis," National Institutes of Health, National Institute of Drug Abuse (NIDA) Genetics Consortium, Spring 2017.

O'Sullivan, S.J., Park, J., Malahias, E., Reyes, B.A., Van Bockstaele, E.J., Schwaber, J.S. "Single-cell analysis of Amygdala in Opiate Exposure and Withdrawal Correlates to Gut Dysbiosis," Thomas Jefferson University, Sigma Xi Student Research Day, Spring 2016.

O'Sullivan, S.J., Malahias, E., Gorky, J., Park, J., Schwaber, J.S. "Neuroinflammation and Gut Dysbiosis following Morphine Exposure and Withdrawal: Implications in Addition," Thomas Jefferson University, AOA Research Symposium, Spring 2016. Runner up.

O'Sullivan, S.J., Park, J., Zhu, H., Schwaber, J.S., Vadigepalli, R. "Gene Expression Profiles of Suprachiasmatic Nucleus Neurons Provide Insight into the Master Clock," Thomas Jefferson University, Sigma Xi Student Research Day, Spring 2015.

O'Sullivan, S.J., Johnson, J.W. "Dependence on Agonist Application Duration of *N*-methyl D-Aspartate Receptor Inhibition by Memantine," University of Pittsburgh, Honors College Undergraduate Research Fair, Spring 2010.

PODIUM PRESENTATIONS

O'Sullivan, S.J., Park, J., Zhu, H., Schwaber, J.S., Vadigepalli, R. "Reexamining Neuronal Subtypes in the Master Clock; I Dream of Gene Networks," Thomas Jefferson University, AOA Research Symposium, Spring 2015.

VOLUNTEER EXPERIENCE

Jefferson Student Hotspotting Program 2018-2019
https://www.jefferson.edu/about/news-and-events/2019/7/student-hotspotters-work-to-reduce-healthcare-costs.html

The Attic Youth Center 2019
Fundraising Captain for LGBTQ at risk youth

Steven Kline Wellness Center - FQHC in North Philadelphia 2016-2019
Clinic volunteer

JeffHOPE 2014-2015

Finance Secretary
Student-run free clinic in homeless shelters in Philadelphia
Director and Producer
JeffHOPE promotional video: https://www.youtube.com/watch?v=ubNkf35yKQ0

Refugee Health Partners 2015
Finance Secretary
Student-run free clinic for refugees in Philadelphia

Fox Chase Cancer Center 2012
Operating Room Volunteer
Specimen transport
Women's Cancer Center Volunteer
Supported patients with check-in, transportation, and directions

WORK EXPERIENCE

Thomas Jefferson University, Instructor in Medical Genetics 2017
The Princeton Review, MCAT Instructor in Biology and Chemistry 2012-2019
ESL Teacher – Giraffe American English School, Taiwan 2010-2011
Associate Producer *Bates Haunting* (feature film) 2010-2012

ACTIVITIES

American Medical Association 2017-2018
Lobbied elected representatives to preserve the Affordable Care Act

Jefferson Leadership Live 2017-2018

Physician Executive Leadership 2015-2017
Attended Wharton Healthcare Business Conference (3), Audited classes at Wharton (2)

Jefferson Physician Scientist Association 2016-2018
Secretary

Clowns for Medicine 2014
Screening of feature film *Patch Adams*

CERTIFICATES

Cardiopulmonary resuscitation and automated external defibrillator – JeffSTAT EMS TC
Outstanding Academic Achievement – Pennsylvania State University
Conceptual Foundations of Medicine – University of Pittsburgh
Certification for English Language Teaching to Adults (CELTA) – University of Cambridge

PERSONAL AND OTHER INTERESTS

ACHA Ice Hockey at University of Pittsburgh 2006-2009
Study abroad – Aix-en-Provence, France 2009
Ashtanga yoga practitioner 2016-present

Recoverable Signature

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Sean O'Sullivan

MD/PhD

Signed by: 578af8e9-e179-4cb8-b1d8-85c92c1107df