

# Dayan Knox Curriculum Vitae

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Associate Professor, 217 Wolf Hall, Department of Psychological and Brain Sciences, University of Delaware, Newark DE. [dayank@udel.edu](mailto:dayank@udel.edu)

## Research Interests

Peripheral hormones and central ascending arousal systems contribute to emotional learning and memory. These systems are also sensitive to stress, and under certain circumstances, may contribute to emotional memory processes that contribute to psychiatric disorders (e.g. PTSD, substance abuse). My research interests concern exploring how stress-induced changes in peripheral hormonal, ascending arousal, and emotional circuit systems contribute to stress-induced effects that model specific symptoms in psychiatric disorders.

## Employment

- 5/20 – present Associate professor in Psychological and Brain Sciences at the University of Delaware
- 08/20 – present Affiliated professor in the Sociotechnical Systems Center at the University of Delaware
- 09/12 – 5/20 Assistant professor in Psychological and Brain Sciences at The University of Delaware
- 3/12 – 7/12 Research faculty in the Psychiatry Department at the University of Michigan

## Education

- 10/05 – 02/12 Post doctorate fellow in the Psychiatry Department at the University of Michigan
- 09/03 – 09/05 Ph.D. in Psychology, The Ohio State University
- 09/01 – 08/03 Master's in Psychology, The Ohio State University
- 09/97 – 05/01 Undergraduate major in Psychology at North Carolina Central University

## Summary (collected using GoogleScholar):

H-index – 17      i-10 index – 21      Total citations - 1361

## Peer reviewed products (\* denotes graduate student under my mentorship, • denotes undergraduate student under my mentorship):

1. Examining Mechanisms via which Traumatic Stress Leads to Post Traumatic Stress Disorder Using Animal Models: Advantages, Pitfalls, and Future Directions. (2022). Eds. **Knox, D.**, Sabban, E., Morinobu, S. Frontiers Inc.
2. Shultz, B\*., Farkash, A. •., Collins, B. •., Mohammadmirzaei, N.\*, and **Knox., D.** (2022). Fear learning-induced changes in AMPAR and NMDAR expression in the fear circuit. Learning & Memory, 29(3): 83-92.

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3. **Knox, D.**, Stout-Oswald, S. A., Tan, M., George, S. A., and Liberzon, I. (2021). Maternal separation induces sex-specific differences in sensitivity to traumatic stress. Frontiers in Behavioral Neuroscience, 15: ecollection.
4. Mohammadmirzaei, N\*., Biddle, M\*., Hekmatayar, K., Cai, X., Kulkarni, P., and **Knox, D.** (2021). The Effect of Traumatic Stress on the Mu-Opioid Receptors and Connectivity Within Reward Circuits. Biological Psychiatry, 89(9): S197.
5. **Knox, D.** (2021). Issues with Using Animal Models to Examine Sex Differences in Developing PTSD. Biological Psychiatry, 89(9): S48-S49.
6. Ferland-Beckham, C., Chaby L.E., Daskalakis, N.P., **Knox, D.**, Liberzon, I., Lim, M.M., McIntyre, C., Perrine, S.A., Risbrough, V.B., Sabban, E.L., Jeromin, A., and Haas, M. (2021). Systematic Review and Methodological Considerations for the Use of Single Prolonged Stress and Fear Extinction Retention in Rodents. Frontiers in Behavioral Neuroscience. 15: 652636.
7. **Knox, D.**, Della Valle, R\*. Mohammadmirzaei, N.\*, Shultz, B.\*, Biddle, M., Farkash, A.\* , Chamness, M., and Moulton, E.\*. (2021). PI3K-Akt signaling in the basolateral amygdala facilitates traumatic stress enhancements in fear memory. International Journal Of Neuropsychopharmacology. 24(3):229-238. Citations - 2
8. Della Valle, R\*. Mohammadmirzaei, N.\*, and **Knox, D.** (2019). The role of sensory cortex, thalamic nuclei, and the periaqueductal gray in mediating changes in emotional memory in the single prolonged stress model of post traumatic stress disorder. Learning & Memory. 26 (10): 403-411. Citations – 3.
9. Kimmelman-Shultz, B.\* , Mohammadmirzaei, N.\* Caplan, J., and **Knox, D.** (2019). Using near-infrared fluorescence and high resolution scanning to measure protein expression in the rodent brain. J. Vis. Exp. (147): e59685. Citations – 0
10. Moulton, E.\* , Chamness, M.\* , and **Knox, D.** (2018). Characterizing changes in glucocorticoid receptor internalization in the fear circuit in an animal model of post traumatic stress disorder. PLOS One 13(12): e0205144. Citations – 1.
11. Staib, J.M.\* , DellaValle, R.\* , and **Knox, D.** (2018). Medial septum and diagonal bands of Broca cholinergic projections to the ventral hippocampus facilitate auditory fear memory. Neurobiology of Learning and Memory 152: 71-79. Citations – 8.
12. **Knox, D.**, Stanfield, B.R.\* , Staib, J.M.\* , David, N.P., DePietro, T.\* , Chamness, M.\* , Schneider, E. K.\* , Keller, S.M.\* , and Lawless, C.\* (2018). Using c-Jun to map learning-specific neural circuits via which single prolonged stress disrupts extinction retention. Behavioural Brain Research 341: 189-197. Citations – 8.
13. **Knox, D.**, Stanfield, B.R.\* , Staib, J.M.\* , David, N.P., Keller, S.M.\* , and DePietro, T.\* (2016). Neural circuits via which single prolonged stress exposure leads to extinction retention deficits. Learning & Memory 23:(12): 689-698. Citations – 21.
14. **Knox, D.** (2016). The role of basal forebrain cholinergic neurons in fear and extinction memory. Neurobiology of Learning and Memory 133: 39-52. Citations – 33.
15. **Knox, D.** and Keller, S.M.\* (2016). Cholinergic neuronal lesions in the medial septum and vertical limb of the Diagonal Bands of Broca induce contextual fear memory generalization and impair acquisition of fear extinction. Hippocampus 26(6): 718-726. Citations – 24.

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16. Keller, S.M.\*, Schreiber, W.B.\*, Stanfield, B.R. •, **Knox, D.** (2015). Inhibiting corticosterone synthesis during fear memory formation exacerbates cued fear extinction memory deficits within the single prolonged stress model. Behavioural Brain Research 287: 182 - 186. *Citations – 16.*
17. Keller, S.M.\*, Schreiber, W.B.\*, Staib, J.M. •, **Knox, D.** (2015). Sex differences in the single prolonged stress model. Behavioural Brain Research 286: 29-32. *Citations – 33.*
18. George, S.A., Stout, S., Tan, M., **Knox, D.**, Liberzon, I. (2013). Early handling attenuates enhancement of glucocorticoid receptors in the prefrontal cortex in an animal model of post-traumatic stress disorder. Biology of Mood and Anxiety Disorders 3(1): 22. *Citations – 17.*
19. Eagle, A., **Knox, D.**, Roberts, M.M., Mulo, K., Liberzon, I., Galloway, M.P., and Perrine, S.A. (2013). Single prolonged stress enhances hippocampal glucocorticoid receptor and phosphorylated protein kinase B levels. Neuroscience Research 75, 130-137. *Citations – 35.*
20. George, S.A., **Knox, D.**, Curtis, A., Aldridge, J.W., Valentino, R., and Liberzon, I. (2013). Altered noradrenergic activity in an animal model of PTSD. European Journal of Neuroscience 37, 901-909. *Citations – 80.*
21. **Knox, D.**, Nault, T., Henderson, C., and Liberzon, I. (2012). Glucocorticoid Receptors And Extinction Retention Deficits In The Single Prolonged Stress Model. Neuroscience, 223: 163-173. *Citations – 63.*
22. **Knox, D.**, Fitzpatrick, C.J., George, S.A., Abelson, J.A., and Liberzon, I. (2012). Unconditioned fear is enhanced in an appetitive context. Neurobiology of Learning and Memory: (97)4: 386 - 392. *Citations – 8.*
23. **Knox, D.**, George, S.A., Fitzpatrick, C.J., Rabinak, C., Maren, S., and Liberzon, I. (2012). Single prolonged stress disrupts retention of extinguished fear in rats. Learning & Memory, 19(2): 43 - 49. *Citations – 106.*
24. Liberzon, I and **Knox, D.** (2012). Expanding Our Understanding Of Neurobiological Mechanisms Of Resilience By Using Animal Models. Neuropsychopharmacology, 37(2): 317 - 318. *Citations – 45.*
25. Fitzpatrick, C., **Knox, D.**, and Liberzon, I. (2011). Inactivation of the prelimbic cortex enhances TMT-induced freezing. Behavioural Brain Research: 221(1): 320 – 323. *Citations – 13.*
26. **Knox, D.**, Perrine, S, George, S., Galloway, M., and Liberzon, I. (2010). Single prolonged stress decreases glutamate, glutamine, and creatine concentrations in the rat medial prefrontal cortex. Neuroscience Letters, 480(1): 16 – 20. *Citations – 75.*
27. **Knox, D.** and Berntson, G. G. (2008). Cortical modulation by nucleus basalis magnocellularis corticopetal cholinergic neurons during anxiety-like states are reflected by decreases in delta. Brain Research 1227: 142 – 157. *Citations – 7.*
28. **Knox, D.**, Holly B., Norman, J. G., and Berntson G. G., (2008). Nucleus basalis magnocellularis and substantia innominata corticopetal cholinergic lesions attenuate freezing induced by predator odor. Behavioral Neuroscience 122(3): 601-610. *Citations – 5.*

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29. **Knox, D.**, and Berntson, G. G., (2006). Effect of nucleus basalis magnocellularis cholinergic lesions on fear-like and anxiety-like behavior. Behavioral Neuroscience **120(2)**: 307-312. *Citations – 27.*
30. Lorzano, D.L., Norman, J. G., **Knox, D.**, Wood, B. L., Miller, B. D., Emery, C. F., and Berntson, G. G. (2006). Where to B in dZ/dt. Psychophysiology **44(1)**: 113-119. *Citations – 151.*
31. **Knox, D.**, Berntson, G. G., and Sarter, M. (2004). Visceral afferent bias on cortical processing: role of adrenergic afferents to the basal forebrain cholinergic system. Behavioral Neuroscience **118(6)**: 1455-1459. *Citations – 22.*
32. Berntson, G. G., Shafi, R., **Knox, D.** and Sarter, M. (2003). Blockade of epinephrine priming of the cerebral auditory evoked response by cortical cholinergic deafferentation. Neuroscience **116**: 179-86. *Citations – 58.*

## Meta-analysis of subset of published journals:

Journal	No. or articles	Cite Score	Rank
Biological Psychiatry	2	12.81	14/277 in Neuroscience Journals
Neuropsychopharmacology	1	6.22	10/494 in Psychiatry and Mental Health
Hippocampus	1	3.59	23/93 in Cognitive Neuroscience
Psychophysiology	1	3.54	7/59 in Neuropsychology
Neuroscience	2	3.46	33/111 in General Neuroscience
Neurobiology of Learning and Memory	3	3.25	22/135 in Experimental Psychology
Behavioural Brain Research	4	3.16	16/70 in Behavioral Neuroscience
PLOS One	1	3.02	20/185 in Biological Sciences
Learning and memory	3	2.96	12/59 in Neuropsychology
European Journal of Neuroscience	1	2.69	59/111 in General Neuroscience
Behavioral Neuroscience	3	2.34	34/70 in Behavioral Neuroscience

## Research Funding and Awards

### Current Research

*Title:* Paradoxical effects of estrogen in stress susceptibility

*Award number:* 1P20GM103653

*Granting Agency:* NIH/COBRE

*Description of award:* The goal of this project is to show that stress susceptibility in females can be caused by variation in estrogen receptor activity driven by the sex hormone cycles in females.

*Role:* Target Investigator

*Principal Investigator:* Dr. Melissa Harrington

*Award period:* 9/1/17 – 8/31/21

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Amount: \$936,567

*Title:* Using magnetic resonance imaging to examine traumatic stress-induced changes in the reward circuit

*Award number:* 1P20GM103653

*Granting Agency:* NIH/COBRE

*Description of award:* The goal of this project is to determine if traumatic stress alters the volume of neural substrates that comprise the reward circuit as well as functional connectivity within the reward circuit.

*Role:* Research Investigator

*Principal Investigator:* Dr. Melissa Harrington

*Award period:* 3/19/19 – 2/28/20

Amount: \$12,000

## Completed Research

*Title:* Using multi-photon confocal microscopy to examine neurobiological mechanisms of emotions and stress-induced changes in emotional reactivity

*Award number:* P20GM103446

*Granting Agency:* NIH/INBRE

*Description of award:* The goal of this project is to use the microscopy core facilities at the Delaware Biotechnical Institute to examine neurobiological mechanisms via which stress leads to changes in emotional reactivity. The grant funds training for lab members to learn how to perform multiphoton and confocal microscopy, calcium imaging, and retrograde labeling using various types of fluorescence technology.

*Role:* Research Investigator

*Principal Investigator:* Dr. Jeffrey Caplan & Dr. Melissa Duncan

*Award period:* 6/21/17 – 6/18/18

Amount: \$3,500

*Title:* The roles of glucocorticoid receptors and phosphoinositol-3 kinase signaling in mediating extinction memory deficits in the SPS model.

*Award number:* 1P20GM103653

*Granting Agency:* NIH/COBRE

*Description of award:* The goal of this project is to demonstrate that stress exposure can have dualistic effects, with some neurobiological effects being adaptive and other effects being maladaptive.

*Role:* Research Investigator

*Principal Investigator:* Dr. Melissa Harrington

*Award period:* 1/16/15 – 5/30/18

Amount: \$230,000

*Title:* Traumatic stress exposure induces long-term extinction deficits by enhancing glucocorticoid receptor interactions with kinases in the ventral hippocampus

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*Granting Agency:* University of Delaware Research Foundation

*Description of award:* This is a private foundation at the University of Delaware that awards funding to young research investigators in the natural sciences on a competitive basis.

*Role:* Principal Investigator.

*Award period:* 6/1/14 – 5/31/16

*Amount:* \$35,000

*Title:* Medial Prefrontal Cortex And HPA Axis Roles In Generation Of PTSD-Like, Symptoms, In SPS Model (W81XWH-08-1-0661)

*Granting Agency:* Department of Defense

*Description of award:* This was an RFP for basic science research examining the neurobiology of PTSD. Funding levels for this RFP was estimated to be at 3 % of total grant applications received by the Department of Defense.

*Role:* Co-Investigator

*Principal Investigator:* Dr. Israel Liberzon

*Award period:* 9/1/08 – 9/30/12

*Amount:* \$600,000

## Teaching Experience

### Teaching in a classroom setting

*University of Delaware:*

NSCI430, Integrative Neuroscience II (Capstone class)

NSCI429, Integrative Neuroscience I (Capstone class)

PSYC667, Neurobiology of memory

PSYC314, Brain and Behavior

NSCI320, Introduction to Neuroscience

*Ohio State University:*

Fall 2003 – Winter 2005

Psych 100, Introduction to Psychology (in the winter and fall quarters)

### Mentoring

*University of Delaware, Department of Psychological and Brain Sciences*

Time period: Fall 2012 - present

Description: As an Assistant Professor at the University of Delaware I am responsible for organizing research activity in my laboratory. My responsibilities involve mentoring graduate and undergraduate students in the lab, teaching students molecular and behavioral laboratory techniques, and supervising all research projects. I also run a summer internship program where students from high school, University of Delaware, and Universities across the country participate. I currently have one graduate student, six undergraduate students, and two laboratory technicians in my laboratory. Some of the past students and their current positions are listed below.

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## *Prior students in the lab and immediate outcomes after leaving/graduating from the lab*

<b>Student</b>	<b>Role and performance in lab</b>	<b>Outcome after graduating/leaving lab</b>
Abigail Farkash Graduation: 2020	Undergraduate researcher and lab manager. Contributed to two peer-reviewed publications (1 <sup>st</sup> author on one)	Medical student at Rosalind Franklin Medical School Chicago IL
Emily Moulton Graduation: 2018	Undergraduate researcher and lab manager. Contributed to two peer-reviewed publication (1 <sup>st</sup> author on one)	Research technician at Nemours Hospital
Brianna Shultz: Graduation: 2017	Undergraduate researcher and lab manager. Contributed to three peer-reviewed publications (1 <sup>st</sup> author on two)	Business Development Manager at Analytical Biological Services Inc.
Harshita Kandarpa Graduation: 2018	Undergraduate in the lab	Medical student at Philadelphia College Osteopathic Medicine
Matt Navarro Graduation: 2018	Undergraduate in the lab	Medical student in The Warren Alpert Medical School of Brown University
Marisa Chamness Graduation: 2017	Undergraduate researcher and lab manager. Contributed to two peer-reviewed publications.	Graduate student at Arcadia University in Genetics Counseling.
Elizabeth Schneider Graduation: 2017	Undergraduate researcher. Contributed to one peer-reviewed publication	Student in Physician's assistant program at Philadelphia College of Osteopathic medicine
Thomas DePietro Graduation: 2017	Undergraduate research. Contributed to two peer-reviewed publications.	Member of the US Navy and medical student at Philadelphia College of Osteopathic medicine.
Jennifer Staib Graduation: 2016	Undergraduate researcher and lab manager. Contributed to four peer-reviewed publications, one of which she was a 1 <sup>st</sup> author.	Graduate student in Neuroscience program at the University of Pennsylvania.
Briana Stanfield Graduation: 2015	Undergraduate researcher and lab manager. Contributed to three peer-reviewed publications.	Graduate student in the Center for molecular and behavioral neuroscience program at Rutgers University, Newark.
Melanie Scchichitano Graduation: 2015	Undergraduate in the lab	Graduate student in SUNNY Old Westbury in counselling.

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## *Students in the summer internship program*

<b>Student</b>	<b>Academic institution the individual belonged too</b>
Adith Thyagarajan Summer 2019	Wilmington Charter High School
Ludan Gbaye Summer 2019	Wake Forest University
Sudesh Jaisi Summer 2019	Wilmington Charter High School
Samichhya Aryal Summer 2018	Case Western University
Keerthana Chintalapati Summer 2018	Wilmington Charter High School (gained entrance into Washington University St. Louis MO).
Tami Ajeigbe Summer 2017	Wilmington Charter High School
SooJi Kim Summer 2017	Northeastern University
Samantha Leite Summer 2016	Purdue University
Zoe Corner Summer 2015	Wake Forest University
Molly Roberts Summer 2015	West Chester University

## *Student awards*

Doctoral award poster presentation: Poster award for doctoral award student that gave the best poster presentation at the University of Delaware

2021 – Negin Mohammadmirzaei

Doctoral award: Competitive award for graduate students in their third year across the University of Delaware.

2020 – Negin Mohammadmirzaei

Graduate student scholar award: Competitive award for graduate students who are non-traditional based on ethnicity and socioeconomic status.

2017 – Rebecca Della Valle

University undergraduate travel award: Competitive award for undergraduates seeking funding to present research findings at international conferences

2019 - Abigail Farkash and Bailey Collins

2016 - Jennifer Staib, Thomas DePietro, Marisa Chamness, Emily Moulton



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## *Thesis and dissertation committee memberships*

- Spring 2022 Served as chair of the Masters committee (4+1) for Matthew Biddle, University of Delaware Title: The role of estrogen receptor manipulation on persistent fear memory induced by traumatic stress exposure
- Spring 2022 Served as chair of the Masters (4+1) committee for Donna Wood, University of Delaware Title: Identifying a Behavioral Paradigm Where SPS Effects on Persistent Fear Memory Can Be Consistently Observed in Female Rats
- Spring 2021 Served as chair of the committee for Anushka Mazumdar, University of Delaware Title: The mechanism through which PI3K-Akt signaling in the BLA mediates SPS effects on fear memory
- Spring 2017 Served as a member on the masters committee of Daniel White, Delaware State University Title: Behavioral Consequences of Point Mutations in the Vesicular Acetylcholine Transporter
- Spring 2016 Served as chair of the committee for Jennifer Staib, University of Delaware Title: The Role Of Cholinergic Projections To The Hippocampus From The Medial Septum In Cued And Contextual Fear Extinction Memory Deficits
- Spring 2015 Served as chair of the committee for Brianna Stanfield, University of Delaware Title: The Role of Glucocorticoid Binding During Fear Conditioning In SPS-Induced Extinction Retention Deficits
- Spring 2015 Served on the dissertation committee of Henry Hallock, University of Delaware Title: PREFRONTAL-THALAMO-HIPPOCAMPAL CIRCUIT CONTRIBUTIONS TO SPATIAL WORKING MEMORY
- Spring 2014 Served on the dissertation committee of C. Beth Ready (Spring 2014) Title: An Examination of Meaning Making Processes in Trauma-Focused Cognitive-Behavioral Therapy for Childhood Trauma

## **Invited talks and symposiums**

- 09/21 Sex differences in modeling traumatic stress effects, Pavlovian Society, Ann Arbor MI.
- 04/21 10/20 Basal forebrain cholinergic neurons and emotional memory. Neuroscience brownbag, Systems and behavioral neuroscience, UVA, VA.
- 09/20 The role of basal forebrain cholinergic neurons in emotional memory, Pavlovian Society, Burlington VT. (chair)
- 09/20 Stress and diversity in academia, Pavlovian Society, Burlington VT. (participant)

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- 3/18 Something new about stress and emotional memory. Neuroscience seminar, Temple University, Philadelphia PA.
- 9/15 The effects of traumatic stress on fear extinction. Pavlovian Society, Portland OR
- 9/13 Animal models of fear and extinction learning. *Social Psychology Brown Bag Series.* Department of Psychology, University of Delaware, Newark DE.
- 5/13 The role of central arousal systems in fear memory processes. *Research talk.* Laboratory of Dr. Rita Valentino at the University of Pennsylvania, Philadelphia PA.
- 3/13 Secondary characteristics of fear memory. *Biology seminar.* Department of Biology, Delaware State University, Dover DE.

## **Recent Conference Posters**

- 2021 Mohammadmirzaei, M. and Knox, D. Pavlovian Society, Ann Arbor MI. Sex Differences in the effects of traumatic stress on the Mu-opioid receptors, brain volume and connectivity within reward circuits.
- 2021 Biddle, M. and Knox, D. Pavlovian Society, Ann Arbor MI. Estrogen receptor activation and susceptibility to traumatic stress in an animal model of PTSD.
- 2019 Biddle, M. and Knox, D. Society for Neuroscience, Chicago IL. Estrogen receptor activation and susceptibility to traumatic stress in an animal model of PTSD.
- 2019 Kimmelman-Shultz, B., Mohammadmirzaei, N., Farkash, A., Collins, B., and Knox, D. Society for Neuroscience, Chicago IL. Using high resolution near infrared imaging to measure fear-learning induced changes in AMPA/NMDA ratios throughout the fear circuit.
- 2019 Mohammadmirzaei, N. and Knox, D. Society for Neuroscience, Chicago IL. The effect of traumatic stress on Mu opioid receptor dynamics in brain regions associated with emotional learning and addiction.
- 2018 Della Valle, R.B., Mohammadmirzaei, N., Moulton, E., Chamness, M., and Knox, D., Society for Neuroscience, San Diego CA. The role of amygdala PI3K-Akt signaling in facilitating persistent fear memory in an animal model of PTSD.
- 2018 Mohammadmirzaei, N., Della Valle, R.B., Knox, D. Pavlovian Society, Iowa City IA. Effects of traumatic stress on fear and extinction memory in the conditioned suppression paradigm.
- 2017 Della Valle, R.B., Moulton, E., Chamness, M, Knox, D. Society for Neuroscience, Washington DC. Single prolonged stress causes changes in neural activation within the PAG and Amygdala during fear conditioning

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- 2017 Della Valle, R., Chamness, M., Moulton, E., and Knox, D. Pavlovian Society, Philadelphia PA. Single prolonged stress enhances Akt signaling in the amygdala during fear memory formation.
- 2017 Mohammadmirzaei, N., Della Valle, R., Knox, D. Pavlovian Society, Philadelphia PA. Traumatic stress alters neural activity during fear and extinction learning and memory in non-sensory thalamic nuclei.
- 2017 Moulton, E, Chamness, M., Knox, D. Pavlovian Society, Philadelphia PA. Examining the effects of single prolonged stress on glucocorticoid receptor internalization in emotional circuits in the brain.
- 2016 Staib, J.M., DellaValle, R., Knox, D. Society for Neuroscience, San Diego CA. The role of cholinergic input from the medial septum in cued and contextual fear extinction memory.
- 2016 Knox, D. DePietro, T., Staib, JM., Chamness, M., Moulton, E. Society for Neuroscience, San Diego CA. The role of Akt signaling in persistent fear expression in a rodent model of post-traumatic stress disorder.

## **Honors**

- 2019 Selected as a candidate to serve on the psychology committee of the national sciences and engineering research council of Canada. The duty of committee members is to review grant applications by graduate students and postdoctoral fellows.
- 2019 Selected by the University of Delaware to meet with Francis Collins (NIH director) to discuss ongoing research projects (<https://www.udel.edu/udaily/2019/march/francis-collins-nih-national-institutes-health-director-campus-chris-coons/>).
- 2016 Nominated by University of Delaware for the Edward Mallinkrodt award, which is a competitive nationwide award for junior investigators. Eligible universities get to nominate only one application.
- 2015 Nominated by University of Delaware for the Ralph E. Powell award, which is a competitive multidisciplinary science award for junior investigators in Oak Ridge Associated Universities in the United States.
- 2013 Invited by the American Psychological Association Directorate to publish a brief highlight of my research in the monthly Psychological Science Agenda
- 2011 Honored at McNair/SROP annual conference at Michigan State University for excellence in academics

## **Service and Professional Membership**

- Member of the MHBA study section of Veterans Affairs Department
- Chair of the MHBA study section of Veterans Affairs Department (December 2022)
- Ad hoc adviser for Cohen's Veterans Bioscience (October 2018)

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- Reviewer for BRLE study section of the NIH (October 2018)
- Reviewer for IOS modulation study section of the NSF (October 2017)
- Reviewer for SPC Study section of the NIH (October 2017)
- Reviewer for PMDA study section of the NIH (February 2017).
- External reviewer for the medical research council (MRC) of the United Kingdom (March 2017).
- External reviewer for the National Science Centre of Poland (October 2017).
- Reviewer for Behavioural Brain Research, Biological Psychiatry, Brain, Behavior, and Immunity, Emotion Review, European Journal of Neuroscience, Current opinions in behavioral science, eNeuro, Frontiers in Behavioral Neuroscience, International Journal of Neuroscience, Journal of Neurochemistry, Journal of Neuroscience Research, Learning & Memory, Molecular and Cellular Biochemistry, Neurobiology of Stress, Neuropharmacology, Neuropsychopharmacology, Neuroscience, PLOS, Psychoneuroendocrinology, Psychophysiology, Psychiatric Research, Psychopharmacology, Translational Psychiatry.
- Member of the Society for Neuroscience and Pavlovian Society
- Member of the Graduate Studies Committee at the University of Delaware.

## **Neuroscience Techniques**

### **Behavioral**

- Extensive experiencing in using MedPC software.
- Extensive experience designing and performing fear conditioning, extinction and recovery paradigms using fear conditioned freezing or operant suppression.
- Extensive experience in using unconditioned defense behavioral paradigms (e.g. elevated plus maze, open field, predator odor generated defense behaviors, light-enhanced startle)
- Extensive experience in using animals models of post traumatic stress disorder (e.g. single prolonged stress)

### **Molecular**

- Extensive experience in performing *in situ* hybridization of nucleic acid in brain tissue
- Extensive experience in performing stereotaxic surgery for placement of probes in distinct brain regions (e.g. placing cannulas or electrodes in the prefrontal cortex)
- Extensive experience in quantification of proteins in brain tissue using the Western Blot and immunocytochemistry
- Experience in using ELISA for protein, ACTH, and catecholamine quantification
- qRT-PCR to assay RNA in brain tissue
- Confocal fluorescence microscopy and near infrared imaging with double and triple labeling of proteins in brain tissue immunocytochemistry and retrograde labeling of neurons
- Use of DREADDs in basal forebrain cholinergic neurons in ChAT::cre rats to manipulate basal forebrain cholinergic neurons

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## **Electrophysiological/neural activity**

- Extensive experience in acquiring local field potentials, sensory evoked potentials, and psychophysiological recordings in behaving rats and analyzing these types of data (e.g. spectral analysis of LFP)
- Extensive experience in making glass electrodes for single unit electrophysiology, and analyze single unit electrophysiological data in Spike 2.0
- Neuroimaging techniques in rats and humans
- Currently have the capability to implement patch clamp electrophysiology