

**David H. Root, Ph.D.**  
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[Google Scholar Profile](#)

University of Colorado  
 Department of Psychology and Neuroscience  
**Assistant Professor**  
**Boettcher Investigator** 2018-present

#### Education:

Rutgers University, Piscataway, NJ 2012  
**Ph.D.**, Psychology (Behavioral Neuroscience)

Seton Hall University, South Orange, NJ 2006  
**M.S.**, Experimental Psychology (Behavioral Neuroscience)

Western New England College, Springfield, MA 2004  
**B.S.**, Psychology (Mathematics)

#### Research Experience:

National Institute on Drug Abuse, Baltimore, MD 2012-2018  
**Postdoctoral Fellow** – PI: Marisela Morales

Rutgers University, Piscataway, NJ 2007-2012  
**Pre-doctoral student** – PI: Mark O. West

Seton Hall University, South Orange, NJ 2004-2006  
**Pre-master's student** – PI: Michael Vigorito

Western New England College, Springfield, MA 2003-2004  
**Pre-bachelor's student** – PI: Sheralee Tershner

#### Active Grants:

NARSAD Young Investigator Award, Brain & Behavior Research Foundation 2020-2022  
 \$70,000 direct

CO-Pilot, Colorado Clinical and Translational Sciences Institute 2019-2020  
 \$30,000 direct

Webb-Waring Biomedical Research Award, Boettcher Foundation 2018-2021  
 \$225,000 direct

#### Inactive Grants:

**F31**, National Institute on Drug Abuse (DA 026252) 2009-2012

**T32**, National Institute on Mental Health (MH 019957) 2007

**Awards:**

Conan Kornetsky Fellow <b>Winter Conference on Brain Research</b>	2020
Boettcher Investigator <b>Boettcher Foundation</b>	2018
NIH Summer Mentor Award <b>National Institutes of Health</b>	2015, 2016, 2017
Special Poster Session <b>Winter Conference on Brain Research</b>	2014 & 2015
Fellows Award in Research Excellence <b>National Institutes of Health</b>	2013
Travel Award <b>Motivational Neuronal Networks Conference</b>	2010
Young Investigator Award <b>Society on NeuroImmune Pharmacology</b>	2006

**Teaching Experience:**

NRSC 5110 Introduction to Neuroscience II – One lecture <b>University of Colorado</b>	2019-present
NRSC 5100 Introduction to Neuroscience I – One lecture <b>University of Colorado</b>	2018-present
NRSC 4032 Neurobiology of Learning and Memory - Lecturer <b>University of Colorado</b>	2019-present
NRSC 4841 Independent Study in Neuroscience <b>University of Colorado</b>	2019-present
NRSC 6841 Neuroscience Ph.D. Breadth requirement - Lecturer <b>University of Colorado</b>	2018-present
NRSC 7102 Topics in Neuroscience: Modern Neuroscience Methods – Creator, Lecturer <b>University of Colorado</b>	2018-present
Methods of Neuroscience - Co-creator, Lecturer <b>National Institute on Drug Abuse</b>	2015

**Mentoring Experience:**

<b>University of Colorado</b> <b>Undergraduate:</b> Mentored five students. Undergraduate awards: Five UROP awards, one McNair scholar, one MASP scholar, one BSI scholar. Served on five honor's thesis committees.	2018-present
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**Graduate:** Mentored one student. Served on five master's, doctoral, or comprehensive exam committees.

**National Institute on Drug Abuse**

2012-2018

Mentored three Postbaccalaureate students. Advised eight summer research assistants with poster presentations. One winner of the NIDA outstanding poster award.

**Service:**

Ad hoc Journals: Neuron, Biological Psychiatry, Neuropsychopharmacology, Journal of Neuroscience, eNeuro, Brain Structure & Function, European Journal of Neuroscience, Behavioural Brain Research, Schizophrenia Bulletin, Neurobiology of Learning and Memory, Experimental Neurology, Physiology & Behavior, Addiction Biology, Neuropharmacology, Acta Physiologica

**Grant Review:**

French National Research Agency

2013-2015

Czech Science Foundation

2013

United States-Israel Binational Science Foundation

2018

**Journals:**

McGovern DJ, **Root DH**. (2019). Ventral pallidum: a promising target for addiction intervention. *Neuropsychopharmacology*, 44:2151-2152

Phillips AG, McGovern DJ, Lee S, Ro K, Huynh DT, Elvig SK, Fegan KN, **Root DH**. (2019). Oral prescription opioid-seeking behavior in male and female mice. *Addiction Biology*. 2019 Sep 5:e12828.

**Root DH**, Zhang S, Barker DJ, Miranda-Barrientos J, Liu B, Wang H-L, Morales M. (2018b). Selective brain distribution and distinctive synaptic architecture of dual glutamatergic-GABAergic neurons. *Cell Reports*, 23(12):3465-3479. PMID: 29924991. [Pubmed](#)

- NIDA "Featured" Paper – November 2018

**Root DH**, Estrin DJ, Morales M. (2018a). Aversion or salience signaling by ventral tegmental area glutamate neurons. *iScience*, 2:51-62. [Pubmed](#)

Barker DJ, Miranda-Barrientos J, Zhang S, **Root DH**, Wang H-L, Liu B, Calipari ES, Morales M. (2017). Lateral preoptic area exhibits divergent control of the lateral habenula. *Cell Reports*, 21(7):1757-1769. [Pubmed](#)

- NIDA "Featured" Paper – April 2018

Zahm DS & **Root DH**. (2017). Review of the cytology and connections of the lateral habenula, an avatar of adaptive behaving. *Pharmacology, Biochemistry and Behavior*, 162:3-21. [Pubmed](#)

**Root DH**, Wang HL, Liu B, Barker DJ, Mod L, Szocsics P, Silva AC, Magloczky Z, Morales M. (2016). Glutamate neurons are intermixed with midbrain dopamine neurons in nonhuman primates and humans. *Scientific Reports*, 6:30615. [Pubmed](#)

- NIDA "Featured" Paper – December 2016

Barker DJ, **Root DH**, Zhang S, Morales M. (2016). Multiplexed Neurochemical Signaling in the Ventral Tegmental Area : Glutamatergic, GABAergic, and Dopaminergic Partnerships. *Journal of Chemical Neuroanatomy*, 73:33-42. [Pubmed](#)

- NIDA "Reviews to Read" – July 2016

Barker DJ, Striano BM, Coffey KC, **Root DH**, Pawlak AP, Kim OA, Kulik J, Fabbriatore AT, West MO. (2015). Sensitivity to self-administered cocaine within the lateral preoptic-rostral lateral hypothalamic continuum. *Brain Structure & Function*, 220(3):1841-1854. [Pubmed](#)

**Root DH**, Zaborszky L, Melendez RI, Napier TC. (2015b). The ventral pallidum: Subregion-specific functional anatomy and roles in motivated behaviors. *Progress in Neurobiology*, 130:29-70. [Pubmed](#)

**Root DH**, Hoffman AF, Good CH, Zhang S, Gigante ED, Lupica CR, Morales M. (2015a). Norepinephrine activates dopamine D4 receptors in the rat lateral habenula. *Journal of Neuroscience*, 35(8):3460-3469. [Pubmed](#)

- NIDA “Featured” Paper – August 2015

**Root DH**, Mejias-Aponte CA, Zhang S, Wang HL, Hoffman AF, Lupica CR, Morales M. (2014b). Single mesohabenular axons release both glutamate and GABA. *Nature Neuroscience* 17(11):1429-1622. [Pubmed](#)

- NIDA “Hot” Paper – November 2014
- Nature Neuroscience Featured Paper
- Research Highlight, Yates D (2014) Nature Neuroscience Reviews 15:700-701
- News and Views, Uchida N (2014) Nature Neuroscience 17:1432-1434

**Root DH**, Mejias-Aponte CA, Qi J, Morales M. (2014a). Role of glutamatergic projections from ventral tegmental area to lateral habenula in aversive conditioning. *Journal of Neuroscience*, 34(42):13906-13910. [Pubmed](#)

Striano BM, Barker DJ, Pawlak AP, **Root DH**, Fabbriatore AT, Coffey KC, Stamos JP, West MO. (2014). Olfactory tubercle neurons exhibit slow-phasic firing patterns during cocaine self-administration. *Synapse*, 68(7):321-323. [Pubmed](#)

Morales M & **Root DH**. (2014). Glutamate neurons within the midbrain dopamine regions. *Neuroscience* 282:60-68. [Pubmed](#)

**Root DH**. (2013b). The ventromedial ventral pallidum subregion is necessary for outcome-specific Pavlovian-Instrumental Transfer. *Journal of Neuroscience*, 33(48):18707-18709. [Pubmed](#)

Barker DJ, Simmons SJ, Servilio LC, Bercovicz D, Ma S, **Root DH**, Pawlak AP, West MO. (2014). Ultrasonic Vocalizations: evidence for an affective opponent process during cocaine self-administration. *Psychopharmacology*, 231(5):909-918. [Pubmed](#)

- Featured in The Daily Record, The Examiner, RutgersNews

Coffey KR, Diamond A, Barker DJ, Ma S, **Root DH**, West MO. (2014). A Procedure for Implanting Organized Arrays of Microwires for Single-Unit Recordings in Awake, Behaving Animals, *Journal of Visualized Experiments*, 84:e51004. [Pubmed](#)

Barker DJ, Bercovicz D, Servilio LC, Simmons SJ, Ma S, **Root DH**, Pawlak AP, West MO. (2014). Rat Ultrasonic Vocalizations Demonstrate that the Motivation to Contextually Reinstate Drug-Seeking Behavior does not Necessarily Involve a Hedonic Response. *Addiction Biology*, 19(5):781-790. [Pubmed](#)

Ma S, Pawlak AP, Cho J, **Root DH**, Barker DJ, West MO. (2013). Amphetamine’s dose-dependent effects on dorsolateral striatum sensorimotor neuron firing. *Behavioural Brain Research*, 244:152-161. [Pubmed](#)

Coffey KR, Barker DJ, Ma S, **Root DH**, Martinez L, Horvitz JC, West MO (2013). Effects of Varying Reinforcement Probability on Pavlovian Approach Behavior and Ultrasonic Vocalizations in Rats. *Behavioural Brain Research*, 237:256-262. [Pubmed](#)

**Root DH**, Ma S, Barker DJ, Megehee L, Striano BM, Ralston CM, Fabbriatore AT, West MO. (2013a). Differential roles of ventral pallidum subregions during cocaine self-administration behaviors. *J Comp Neurol*, 521(3):558-588. [Pubmed](#)

**Root DH**, Fabbriatore AT, Pawlak AP, Barker DJ, Ma S, West MO. (2012). Slow phasic and tonic activity of ventral pallidal neurons during cocaine self-administration. *Synapse*, 66(2):106-127. [Pubmed](#)

McGinty VB, Hayden BY, Heilbronner ST, Dumont EC, Graves SM, Mirrione MM, du Hoffman J, Sartor GC, Espana RA, Millan EZ, Difeliceantonio AG, Marchant NJ, Napier, TC, **Root DH**, Borgland SL, Treadway MT, Floresco SB, McGinty JF, Haber S. (2011). The Reward Circuit: Emerging, Reemerging, and Forgotten Brain Areas: Notes from the 2010 Motivational and Neural Networks Conference. *Behavioural Brain Research*, 225(1):348-357. [Pubmed](#)

**Root DH**, Barker DJ, Ma S, Coffey KR, West MO. (2011). Evidence for skilled cocaine self-administration in rats. *Psychopharmacology*, 217(1):91-100. [Pubmed](#)

Barker DJ, **Root DH**, Ma S, Jha S, Megehee L, Pawlak AP, West MO. (2010). Dose dependent differences in short ultrasonic vocalizations emitted by rats during cocaine self-administration. *Psychopharmacology*, 211:435-442. [Pubmed](#)

**Root DH**, Tang CC, Ma S, Pawlak AP, West MO. (2010b). Absence of cue-evoked firing in rat dorsolateral striatum neurons. *Behavioural Brain Research*, 211(1):23-32. [Pubmed](#)

**Root DH**, Fabbriatore AT, Ma S, Barker DJ, West MO. (2010a). Rapid phasic activity of ventral pallidal neurons during cocaine self-administration. *Synapse*, 64(9):704-713. [Pubmed](#)

- [Faculty of 1000 Biology Comment](#), 23 Apr 2010

Tang CC, **Root DH**, Duke DC, Zhu Y, Teixeira K, Ma S, Barker DJ, West MO. (2009). Decreased firing of striatal neurons related to licking during acquisition and overtraining of a licking task. *Journal of Neuroscience*, 29(44):13952-13961. [Pubmed](#)

**Root DH**, Fabbriatore AT, Barker DJ, Ma S, Pawlak AP, West MO. (2009b). Evidence for habitual and goal-directed behavior following devaluation of cocaine: a multifaceted interpretation of relapse. *PLoS One*, 4(9):e7170. [Pubmed](#)

**Root DH**, Barker DJ, Ma S. (2009a). Duality of salience in dopamine neurons. *Proceedings of the National Academy of Sciences*, 106(12):E84. [Pubmed](#)

Silvestri AJ & **Root DH**. (2008). Effects of REM Deprivation and an NMDA Agonist on the Extinction of Conditioned Fear. *Physiology & Behavior*, 93:274-281. [Pubmed](#)