

UNIVERSITY OF PENNSYLVANIA - PERELMAN SCHOOL OF MEDICINE
Curriculum Vitae

Date: 08/02/2023

Elizabeth A. Heller, PhD

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Philadelphia, PA 19104 USA

If you are not a U.S. citizen or holder of a permanent visa, please indicate the type of visa you have:
none (U.S. citizen)

Education:

1998	Diploma	Stuyvesant High School
2002	BA	University of Pennsylvania (magna cum laude, Biology)
2009	PhD	The Rockefeller University (Molecular Biology)

Postgraduate Training and Fellowship Appointments:

2009-2010	Postdoctoral Fellowship, Molecular Biology, The Rockefeller University
2010-2015	Postdoctoral Fellowship, Neuroscience, Icahn School of Medicine at Mount Sinai

Faculty Appointments:

2010	Visiting Assistant Professor, Department of Biology, Bard Rockefeller Semester in Science Program
2011-2013	Adjunct Assistant Professor, Department of Biology, Queens College, City University of New York
2016-2023	Assistant Professor of Pharmacology, University of Pennsylvania, Perelman School of Medicine
2023-present	Associate Professor of Pharmacology, University of Pennsylvania, Perelman School of Medicine

Hospital and/or Administrative Appointments:

2021-present	Founder, Rafias LLC
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Specialty Certification:

2016	Controlled Substance Registration, US DOJ DEA Schedule II-VI
2017	Controlled Substance Registration, US DOJ DEA Schedule I

Awards, Honors and Membership in Honorary Societies:

1998	New York City International Science and Engineering Fair, Honorable mention
1998	St. John's University Metro New York Science Fair, Second place
2001	Barry M Goldwater Scholarship nominee, The University of

	Pennsylvania
2002	Phi Beta Kappa, The University of Pennsylvania
2003	Women & Science Fellowship, The Rockefeller University
2012	NIDA Institutional Postdoctoral National Research Service Award (5T32DA007135-29)
2013	NIDA Individual Postdoctoral National Research Service Award (1F32DA035518-01)
2013	Icahn School of Medicine Postdoc Appreciation Award
2013	American College of Neuropsychopharmacology Travel Award
2014	NIDA Director's Travel Award, College on Problems of Drug Dependence Annual Meeting
2015	Keystone Symposia Scholarship, Neuroepigenetics
2015	Robin Chemers Neustein Postdoctoral Fellowship
2017	National Academy of Sciences Kavli Scholar, Korean-American Frontiers of Science Symposium
2019	National Academy of Sciences Kavli Scholar, Japanese-American-German Frontiers of Science Symposium
2023	Keynote Speaker, Annual Symposium of the Irvine Center for Addiction Neuroscience, University of California - Irvine, Irvine, CA

Memberships in Professional and Scientific Societies and Other Professional Activities:

International:

2016	Swiss National Science Foundation (External Grant Reviewer)
2022-Present	Mediterranean Neuroscience Society (Member)

National:

2002-Present	The Society for Neuroscience (Member)
2019-Present	American College of Neuropsychopharmacology (Associate Member)
2021-Present	Syngap1 Research Foundation (Scientific Advisory Board Member)
2022-2023	NIH/NIDA Avenir (DP1) Study Section (Member)
2023-2027	Member of the Career Development Education and Training Study Section (NIDA), National Institute on Drug Abuse Initial Review Group (NIDA)
2023-Present	NIH National Institutes of Drug Abuse Training Special Emphasis Panel (NIDA SEP), ZDA1 SKM - D (01) (Member)

Editorial Positions:

2016-Present	Ad-Hoc Reviewer: Addiction Biology, Behavioral Brain Research, Cell, European Journal of Neuroscience, Journal of Neuroscience, Nature Communications, Nature Neuroscience, Neurobiology of Disease,
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2022-2023 Translational Psychiatry
Associate Editor, Epigenetics

Academic and Institutional Committees:

2016 Rotation Exam Committee, Neuroscience Graduate Group, Perelman School of Medicine

2016 Faculty Search Committee, Department of Systems Pharmacology and Translational Therapeutics, University of Pennsylvania

2016-2019 Candidacy Exam and Thesis Committees - Dylan Marchione, BGS-PGG

2017-Present Pharmacology Graduate Group Admissions Committee

2018 Candidacy Exam Committee - Emily Fabyanic, BGS-PGG

2018 Rotation Exam Committee, Neuroscience Graduate Group, Perelman School of Medicine

2018-2021 Candidacy Exam and Thesis Committees - Theresa Patten, BGS-PGG

2018 Candidacy Exam Committee - Alex Wei, BGS-NGG

2018-2021 Thesis Committee - Khadija Wilson, PGG

2019-2021 Faculty Search Committee, Department of Systems Pharmacology and Translational Therapeutics, University of Pennsylvania

2019-2022 Candidacy Exam and Thesis Committees - Ana Petracovici, BGS-CAMB

2020 Dissertation Committee - Joseph Johnson, BGS-PGG

2020-Present Candidacy Exam and Thesis Committees - Emily Feierman

2021-Present Candidacy Exam and Thesis Committees - Desiree Alexander, BGS-CAMB

2021-2023 CAMB and PGG Faculty Member, Trainee Advocacy Alliance, Office of Research Diversity and Training

2021-Present Thesis Committee - Adrienne Jo, PGG

2021-Present Candidacy Exam and Thesis Committees - Marissa Maroni

2021-Present Candidacy Exam and Thesis Committees - Asmita Panthi, PGG

2021-Present Thesis Committee - Dayne Martinez, PGG

2022-Present Candidacy Exam and Thesis Committees - Aimee Juan, BGS-NGG

2022-Present Faculty Leader, Trainee Advocacy Alliance, IDEAL Research

2022-present PSOM University Research Foundation Biomedical Review Panel

2023-2027 Member of the Career Development Education and Training Study Section (NIDA), National Institute on Drug Abuse Initial Review Group (NIDA)

Major Academic and Clinical Teaching Responsibilities:

2006 High-School Mentor, Summer High School Outreach Program, Rockefeller University

2009 High-School Mentor, Summer High School Outreach Program, Rockefeller University

2013 High School Mentor, High School Outreach Program, Icahn School of Medicine at Mount Sinai

2013-2019 Lecturer "Biology of Addiction," Fieldston High School, Annual

2014 Undergraduate Mentor, Icahn School of Medicine at Mount Sinai

2016-Present	Co-director and Lecturer, Neuropharmacology (NGG 510), Biannual
2016-2021	Thesis Mentor, Marco Carpenter (PGG)
2016-2018	Postdoctoral Mentor, Qiwen Hu
2016-2020	Undergraduate Mentor, Penn Undergraduate Research Mentorship Fellow, Brandon Santhumayor (SAS, Biochemistry)
2016-2020	Postdoctoral Mentor, Ajinkya Sase
2016-2020	Postdoctoral Mentor, SongJun Xu
2017	Workshop Leader, Responsible Conduct in Research, Biomedical Graduate Studies
2017	Undergraduate Mentor, Undergraduate Independent Study (BIOL399), Rozalyn Wood (SAS, Biology)
2017	Undergraduate Mentor, Summer Undergraduate Internship Program, Presidential Scholar, Talya Kramer (SAS, Biological Basis of Behavior)
2017	Undergraduate Mentor, Jason Li (SAS, Undeclared)
2018	Lecturer, "Neuroepigenetics," Epigenetics of Human Health and Disease (BIOL/CAMB493)
2018	Lecturer, "Neuroepigenetics," Topics in Translational Neuroscience (NGG588)
2018-2019	Thesis Mentor, Anne Fosnocht (PGG)
2018	Undergraduate Mentor, Summer Undergraduate Internship Program, Tiffany Roach
2018	Undergraduate Mentor, Emilia Gocke (SAS, Biology)
2018-2022	Thesis Mentor, Delaney Fischer (NGG)
2018	Lecturer, "Neuroscience of drug abuse and addiction," CTSA Undergraduate Seminar Series
2019-2021	Co-director and Lecturer, CAMB713, Neuroepigenetics, Annual
2019-2020	Undergraduate Mentor, Mallory Harrower (SAS, Biological Basis of Behavior)
2019	Undergraduate Mentor, Juliet Lubwama
2019-Present	Thesis Mentor, NSF Graduate Research Fellow, Michael Murphy (NGG)
2020-Present	Lecturer, "Epigenetics of depression," Neuroscience Core III (NGG 573), Annual
2020-Present	Lecturer, "Epigenetics," Molecular Toxicology (GGPS/PHRM 590), Biannual
2020-2023	Postdoctoral Mentor, Shuo Zhang
2020-2021	Undergraduate Mentor, Independent Study (BIBB399), Nicole Harrington
2020-2023	Undergraduate Mentor, Penn Undergraduate Research Mentorship Fellow, Ericka Ekobeni (SEAS)
2021-Present	Postdoctoral Mentor, Julia Winter
2021-Present	Thesis Mentor, Genetics T32 Trainee, Keegan Krick (CAMB)
2021-2023	Undergraduate Mentor, Penn Undergraduate Research Mentorship Fellow, Chloe Han (SAS, Biochemistry)
2022-Present	Postdoctoral Mentor, UPenn Hartwell Fellow, Molly B Reilly
2022-Present	Undergraduate Mentor, Penn Undergraduate Research Mentorship

	Fellow, Emily Ng (SAS, Biology)
2022	Undergraduate Mentor, Summer Undergraduate Internship Program, Paola Eusebio
2022	"Developing the First Therapeutic for Cocaine Substance Use Disorder," Council for Discovery Science, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA
2022-Present	Thesis Mentor, NSF Graduate Research Fellow, Kiara Rodriguez (CAMB)
2023	Lecture, "Epigenetic regulation of Syngap1 and Stxbp1 in neurodevelopment," Intellectual and Developmental Disabilities Research Center, Children's Hospital of Pennsylvania and University of Pennsylvania, Philadelphia PA
2023-Present	Co-Director and Lecturer, Medical Pharmacology (PGG624) Annual
2023-Present	Director and Lecturer, PGG Candidacy Exam Writing Workshop
2023-Present	Thesis Mentor, Marisol Hooks (CAMB)
2023-Present	Thesis Mentor, Anna Leonard (NGG)
2023-Present	Undergraduate Mentor, Kechi Holmes

Lectures by Invitation:

Dec, 2013	"Epigenetic reprogramming of individual gene loci for the study of addiction and depression." The University of Pennsylvania, Biology Seminar Series. Philadelphia, PA. December 2013.
Dec, 2013	"Locus specific epigenetic reprogramming." 52nd Annual Meeting of the American College of Neuropsychopharmacology, "Hot Topics". Hollywood, Florida.
Jan, 2014	"Epigenetic editing of single loci for the study of addiction and depression." Columbia University Medical Center, Kavli Department of Neuroscience, Rene Hen Lab Meeting. New York, NY.
Feb, 2014	"Site-specific epigenetic reprogramming for the study of addiction and depression." Drexel University, Department of Neurobiology and Anatomy, Wen-Jun Gao Lab Meeting.
Apr, 2014	"Epigenetic editing of single loci for the study of addiction and depression." Molecular Imaging and Neuropathology Division/NYSPI Seminar Series. Columbia University Medical Center New York, NY.
Oct, 2015	"Cell-type specific epigenetic reprogramming of the Fosb gene controls depression-related behaviors," Society for Neuroscience Annual Meeting, Chicago, IL.
Oct, 2015	"Cell-type specific epigenetic reprogramming of the Fosb gene controls depression-related behaviors," Molecular and Cellular Cognition Society Annual Meeting, Chicago, IL.
Oct, 2015	"Locus-specific epigenetic Remodeling for the study of addiction and depression," Annual Behavioral and Cognitive Neuroscience Retreat, The University of Pennsylvania, Philadelphia, PA.
Dec, 2015	"Epigenetic editing of the Cdk5 locus for the study of stress and depression," American College of Neuropharmacology Annual Meeting,

- Hollywood, FL.
- Jul, 2016 "Elucidating the function of epigenetic remodeling in reward pathology," Medical University of South Carolina, Charleston, SC.
- Oct, 2016 "Elucidating the function of epigenetic remodeling in reward pathology", Brain Mind Institute, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland.
- Nov, 2016 "Elucidating the function of epigenetic remodeling in reward pathology", The Fels Institute for Cancer Research and Molecular Biology, Temple University School of Medicine, Philadelphia, PA.
- Jan, 2017 "Elucidating the function of epigenetic remodeling in reward pathology," MINS 33rd Annual Symposium, University of Pennsylvania.
- Feb, 2017 "Elucidating the function of epigenetic remodeling in reward pathology," Department of Pharmacology & Physiology, Drexel University/College of Medicine, Philadelphia, PA.
- Jul, 2017 "Chromatin-directed alternative splicing in brain reward regions," Gordon Research Conference on Drug Abuse & Addiction, Hong Kong.
- Sep, 2017 "Neuroepigenetic editing in reward pathology," Neuroscience Graduate Group Symposium, University of Utah, Snowbird, Utah. *Keynote speaker
- Dec, 2017 "Locus-specific epigenetic editing in reward pathology," International Conference on Epigenetics and Bioengineering (EpiBio), Miami Beach, FL.
- Feb, 2018 "Chromatin-directed alternative splicing in brain reward regions," Fusion Conference on Neuroepigenetics and Neuroepitranscriptomics, Cancun, Mexico
- Jul, 2018 "Chromatin-directed alternative splicing in brain reward regions," Forum for Neuroscience, Federation of European Neuroscience Societies (FENS) Annual Meeting, Berlin, Germany.
- Oct, 2018 "Targeted epigenetic editing in drug abuse," Max Planck Institute of Psychiatry, Munich, Germany.
- Oct, 2018 'Chromatin-directed alternative splicing in brain reward regions,' AICHE International Conference on Epigenetics and Bioengineering, San Francisco, CA *Co-director
- Jan, 2019 "Chromatin-mediated alternative splicing in brain reward regions," Duke University, Durham, NC
- Sep, 2019 "Epigenetic editing for the study of reward pathophysiology," Temple University, Philadelphia, PA
- Oct, 2019 "Epigenetic editing in reward pathology," NIDA NIAAA MiniConvention, Chicago, IL
- Oct, 2019 "Chromatin-mediated alternative splicing in brain reward regions," Nanosymposium, Society for Neuroscience Annual Meeting, Chicago, IL
- Nov, 2019 "Epigenetic editing in reward pathology," Carnegie Mellon University, Pittsburgh, PA
- Dec, 2019 "Chromatin-mediated alternative splicing of Srsf11 regulates cocaine

- reward behavior," American College of Neuropharmacology Annual Meeting, Orlando, FL
- Mar, 2020 "Chromatin-directed alternative splicing in brain reward regions," Fusion Conference on Neuroepigenetics and Neuroepitranscriptomics, Nassau, Bahamas
- Oct, 2020 "Epigenetic editing regulates alternative splicing of Srsf11 and cocaine reward behavior," EMBO|EMBL Neuroepigenetics: From Cells to Behaviour and Disease, Virtual
- Oct, 2020 "Epigenetic editing in reward pathophysiology," Virginia Commonwealth University, Virtual
- Oct, 2020 "Epigenetic editing regulates alternative splicing of Srsf11 and cocaine reward behavior," AICHE Epigenetics and Bioengineering Conference, Virtual
- Apr, 2021 "Epigenetic editing for the study of reward pathophysiology," Georgia State University, via Zoom
- Oct, 2021 "Epigenetic regulation of Nr4a1, a novel target in cocaine use disorder," World Wide Neuro, Neuroepigenetics Series, Virtual
- Nov, 2021 "Nr4a1 and chromatin bivalency in cocaine pathophysiology," World Wide Neuro - Addiction Series, Virtual
- Nov, 2021 "Chromatin-Mediated Alternative Splicing Regulates Reward Behavior," AICHE 5th International Conference on Epigenetics and Bioengineering (EpiBio), Virtual
- Dec, 2021 University of Iowa Iowa Neuroscience Institute Mini-Symposium, Virtual
- Dec, 2021 "Chromatin-mediated alternative splicing regulates cocaine reward," Department of Pharmacology Seminar Series, Weill Cornell Medical Center, New York, NY
- Dec, 2021 "Epigenetic editing for the study of reward neurobiology," NIH-NIDA Basic Research Division, Virtual
- Mar, 2022 "Chromatin-mediated alternative splicing regulates cocaine reward," Department of Anatomy and Neurobiology, University of Maryland School of Medicine, Baltimore, MD
- Mar, 2022 "Chromatin-mediated alternative splicing interrogated by CRISPR epigenetic editing in vivo," Stanford University Departments of Bioengineering, and Chemical and Systems Biology, Palo Alto, CA
- Apr, 2022 52nd Annual Meeting of the American Society for Neurochemistry, Roanoke, VA
- Apr, 2022 "Cell-Type Specific Molecular Biology of Addiction," Annual Meeting of the Society of Biological Psychiatry, New Orleans, LA
- Apr, 2022 "Chromatin-mediated alternative splicing interrogated by CRISPR epigenetic editing in vivo," Emory University Department of Cell Biology, Atlanta, GA
- May, 2022 "Epigenetic editing in reward pathology," Djavad Mowafaghian Centre for Brain Health (DMCBH), University of British Columbia, Vancouver, Canada
- Jun, 2022 "Nr4a1 for the regulation of cocaine reward," 8th Mediterranean

Dec, 2022	Neuroscience Society Meeting, Dubrovnik, Croatia "Epigenetic editing of Syngap1," Syngap Research Foundation Annual Roundtable, Houston, TX
Mar, 2023	"Epigenetic editing for the study of psychiatric and neurodevelopmental disease," Johns Hopkins University School of Medicine Department of Neuroscience, Baltimore, MD
Mar, 2023	"Chromatin regulation of alternative splicing," University of North Carolina School of Medicine Department of Pharmacology, Durham, NC
Apr, 2023	"Neuroepigenetic editing in reward pathophysiology," EMBO EMBL Symposium, Brain genome: regulation, evolution and function, Heidelberg, Germany
Apr, 2023	"Chromatin regulation of alternative splicing in the context of addiction," University of Texas - Austin, Austin, TX
Apr, 2023	"Epigenetic regulation of Syngap1," The Intellectual and Developmental Disabilities Research Center (IDDRRC), Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA
May, 2023	"Cocaine regulation of alternative splicing via changes in histone post-translational modifications," NIDA Genetics Epigenetics Cross Cutting Research Team Meeting, Bethesda, MD
Jul, 2023	"Chromatin regulation in addiction," UC Irvine Center for Addiction Neuroscience (ICAN) Symposium, Irvine, CA *Keynote Speaker
Jul, 2023	"Chromatin regulation in addiction," Annual Symposium of the Irvine Center for Addiction Neuroscience, University of California - Irvine, Irvine, CA *Keynote
Nov, 2023	"Cell-type specific epigenetic regulation of Nr4a1 attenuates cocaine reward behavior," Annual Meeting of the Society for Neuroscience, Washington DC
Jan, 2024	"Chromatin regulation of neuronal gene expression in psychiatric disease," Neuroscience and Pharmacology Department Seminar Series, University of Iowa, Iowa City, IA
Feb, 2024	"Chromatin regulation in cocaine addiction," Quantitative & Computational Biology Seminar, Lewis-Sigler Institute, Princeton University, Princeton, NJ

Organizing Roles in Scientific Meetings:

Nov, 2015	Co-Chair, Nanosymposium, Society for Neuroscience Annual Meeting Chicago, IL
Oct, 2018	Organizing Committee Member, 2nd Annual International Conference on Epigenetics and Bioengineering (EpiBio) San Francisco, CA
Oct, 2022	Organizing Committee Member, 6th Annual International Conference on Epigenetics and Bioengineering (EpiBio) Houston, TX
May, 2023	Co-Chair, University of Pennsylvania Department of Genetics Annual Symposium, "Epi/Genetics of Behavior"

Nov, 2023	Philadelphia, PA Chair, Symposium, "Cell-type specific epigenetic regulation of complex neurobiological diseases," Annual Meeting of the Society for Neuroscience Washington, DC
Nov, 2023	Chair, Panel "Non-canonical regulation of gene expression by drugs of abuse," NIDA Genetics and Epigenetics Cross-Cutting Research Team Meeting, Bethesda, MD
Apr, 2024	Chair, University of Pennsylvania Mahoney Institute of Neuroscience Annual Seminar Series and Symposium, "Year of Neuroimmunology" Philadelphia, PA

Grants:Current:

Chromatin mediated alternative splicing., Institute for RNA Innovation, 5/2023-4/2024 (Elizabeth A Heller, PI), \$50,000/annual direct costs (Role in grant: PI)

Editing the epigenome: Curing SYNGAP1 heterozygosity, 2023 Million Dollar Bike Ride Grant Program, Orphan Disease Center, 2/2023-1/2024 (Elizabeth A Heller, PI), \$59,134/annual direct costs (Role in grant: PI)

Epigenetic regulation of Cdk5 in stress and reward, National Institute of Mental Health/Nih/Dhhs, 12/2022-12/2027 (Elizabeth A Heller, PI), \$372,401/annual direct costs, 23% effort (Role in grant: PI)

Mechanisms underlying Tip60 HAT action in neuroprotection of cognitive function, NIH/NIDA, 10/2022-9/2027 (Felice Elefant, PI), \$5,016/annual direct costs, 2% effort (Role in grant: co-I)

Delineating the epigenetic and neural mechanisms by which early life scarcity alters motivated behavior, National Institute of Drug Abuse/Nih/Dhhs, 7/2022-6/2027 (Deborah Bangasser, PI: Mathieu Wimmer, Co-Investigator), \$41,332/annual direct costs, 8% effort (Role in grant: co-I)

Editing the epigenome: Curing STXBP1/MUNC18-1 heterozygosity, STXBP1 Foundation, 1/2022-12/2024 (Elizabeth A Heller, PI), \$78,530/annual direct costs, 4% effort (Role in grant: PI)

Epigenetic mechanisms of sustained transcription across cocaine abstinence, National Institute On Drug Abuse/Nih/Dhhs, 7/2021-5/2026 (Elizabeth A Heller, PI), \$423,380/annual direct costs, 28% effort (Role in grant: PI)

Syngap1 epigenetic regulation, Syngap Research Fund, 1/2021-12/2023 (Elizabeth A Heller, PI), \$65,000/annual direct costs, 4% effort (Role in grant: PI)

Past:

Nanoparticle-based, Nr4a1 agonist delivery to combat cocaine addiction, ITMAT's Pilot Grant program for Transdisciplinary Awards Program in Translational Medicine and Therapeutics/University of Pennsylvania, 2/2021-1/2022 (Elizabeth A Heller, PI: Andrew Tsourkas, Michael Mitchell, Co-Investigator), \$150,000/annual direct costs (Role in grant: PI)

Pharmacological activators Of Nr4a1 for the treatment of cocaine use disorders, National Institute On Drug Abuse/Nih/Dhhs, 1-U18-DA-052513-01, 9/2020-9/2021 (Elizabeth A Heller, PI), \$156,188/annual direct costs, 15% effort (Role in grant: PI)

Application of a novel method for neuronal cell-type specific simultaneous transcriptome and epigenome profiling in vivo in mice, 2019 At-Large Epigenetics Pilot Grant, Epigenetics Institute, University of Pennsylvania, 11/2019-11/2020 (Elizabeth A Heller, PI: Zhaolan Zhou, Co-Investigator), \$50,000/annual direct costs, 5% effort (Role in grant: PI, Grant was extended for a second year of funding.)

Light activated CRISPR epigenome editing In cocaine abuse, National Institute On Drug Abuse/Nih/Dhhs, DA046227, 3/2018-2/2020 (MaryKay Lobo, PI), \$65,491/annual direct costs, 5% effort (Role in grant: Collaborator)

Chromatin-mediated alternative splicing in reward pathophysiology, National Institute On Drug Abuse/Nih/Dhhs, 5DP1DA044250-05, 7/2017-6/2023 (Elizabeth A Heller, PI), \$300,000/annual direct costs, 28% effort (Role in grant: PI)

Behavioral And Epigenetic Changes Following Adolescent Oxycodone Exposure, National Institute On Drug Abuse/Nih/Dhhs, 5-R21-DA-044017-02, 7/2017-6/2019 (Julie A. Blendy, PI), \$150,000/annual direct costs, 5% effort (Role in grant: Co-PI)

Epigenetic regulation of gene expression following marijuana vapor delivery, University Research Foundation/University of Pennsylvania, 3/2017-2/2018 (Elizabeth A Heller, PI: Mariella DeBiasi, Co-Investigator), \$50,000/annual direct costs (Role in grant: co-PI)

Chromatin-Mediated Alternative Splicing In Transcription And Behavior, Whitehall Foundation, Inc., 2/2017-1/2021 (Elizabeth A Heller, PI), \$75,000/annual direct costs, 20% effort (Role in grant: PI, Grant is in a one-year no cost extension. Full budget period is reflected above.)

Epigenetic Regulation Of Cyclin-Dependent Kinase 5 In Depression, Brain & Behavior Research Foundation, 1/2017-1/2019 (Elizabeth A Heller, PI), \$35,000/annual direct costs, 10% effort (Role in grant: PI)

Neuroepigenetic Remodeling In Transcription And Behavior, Charles E. Kaufman Foundation, 9/2016-8/2018 (Elizabeth A Heller, PI), \$68,182/annual direct costs, 5% effort (Role in grant: PI)

Bibliography:Research Publications, peer reviewed (print or other media):

1. Graves LA, Heller EA, Pack AI, Abel T: Sleep deprivation selectively impairs memory consolidation for contextual fear conditioning. Learn Mem. 10(3): 168-76, May-Jun 2003. PMID: PMC202307
2. Selimi F, Cristea IM, Heller E, Chait BT, Heintz N: Proteomic studies of a single CNS synapse type: the parallel fiber/purkinje cell synapse. PLoS Biol. 7(4): e83, Apr 2009. PMID: PMC2672601
3. Heller EA, Zhang W, Selimi F, Earnheart JC, Åšlimak MA, Santos-Torres J, Ibañez-Tallon I, Aoki C, Chait BT, Heintz N: The biochemical anatomy of cortical inhibitory synapses. PLoS One 7(6): e39572, June 2012 Notes: doi: 10.1371/journal.pone.0039572.
4. Ferguson D, Koo JW, Feng J, Heller E, Rabkin J, Heshmati M, Renthal W, Neve R, Liu X, Shao N, Sartorelli V, Shen L, Nestler EJ: Essential role of SIRT1 signaling in the nucleus accumbens in cocaine and morphine action. J Neurosci. 33(41): 16088-98, Oct 2013. PMID: PMC3792451
5. Heller EA, Kaska S, Fallon B, Kennedy P, Nestler EJ, Mazei-Robison MS: Morphine and cocaine increase serum- and glucocorticoid-inducible kinase 1 activity in the ventral segmental area. J Neurochem. 132(2): 243-53, Jan 2014 Notes: doi: 10.1111/jnc.12925. PMID: PMC4241193
6. Walsh JJ, Friedman AK, Sun H, Heller EA, Ku SM, Juarez B, Burnham VL, Mazei-Robison MS, Ferguson D, Golden SA, Koo JW, Chaudhury D, Christoffel DJ, Pomeranz L, Friedman JM, Russo SJ, Nestler EJ, Han MH: Stress and CRF gate neural activation of BDNF in the mesolimbic reward pathway. Nat Neurosci. 17(1): 27-9, Jan 2014. PMID: PMC3984932
7. Cates HM, Thibault M, Pfau M, Heller E, Eagle A, Gajewski P, Bagot R, Colangelo C, Abbott T, Rudenko G, Neve R, Nestler EJ, Robison AJ: Threonine 149 phosphorylation enhances Δ FosB transcriptional activity to control psychomotor responses to cocaine. J Neurosci. 34(34): 11461-9, Aug 2014. PMID: PMC4138349
8. Koo JW, Lobo MK, Chaudhury D, Labonté B, Friedman A, Heller E, Peña CJ, Han MH, Nestler EJ: Loss of BDNF signaling in D1R-expressing NAc neurons enhances morphine reward by reducing GABA inhibition. Neuropsychopharm. 39(11): 2646-53, Oct 2014. PMID: PMC4207344
9. Heller EA, Cates HM, Peña CJ, Sun H, Shao N, Feng J, Golden SA, Herman JP, Walsh JJ, Mazei-Robison M, Ferguson D, Knight S, Gerber MA, Nievera C, Han MH, Russo SJ, Tamminga CS, Neve RL, Shen L, Zhang HS, Zhang F, Nestler EJ: Locus-specific epigenetic remodeling controls addiction- and depression-related behaviors. Nat

Neurosci. 17(12): 1720-7, Dec 2014. PMID: PMC4241193

10. Ferguson D, Shao N, Heller E, Feng J, Neve R, Kim HD, Call T, Magazu S, Shen L, Nestler EJ: SIRT1-FOXO3a regulate cocaine actions in the nucleus accumbens. J Neurosci. 35(7): 3100-11, Feb 2015. PMID: PMC4331629
11. Sun H, Damez-Werno DM, Scobie KN, Shao NY, Dias C, Rabkin J, Koo JW, Korb E, Bagot RC, Ahn FH, Cahill ME, Labonté B, Mouzon E, Heller EA, Cates H, Golden SA, Gleason K, Russo SJ, Andrews S, Neve R, Kennedy PJ, Maze I, Dietz DM, Allis CD, Turecki G, Varga-Weisz P, Tamminga C, Shen L, Nestler EJ: ACF chromatin-remodeling complex mediates stress-induced depressive-like behavior. Nat Med. 21(10): 1146-53, Oct 2015. PMID: PMC4598281
12. Cahill ME, Bagot RC, Gancarz AM, Walker DM, Sun H, Wang ZJ, Heller EA, Feng J, Kennedy PJ, Koo JW, Cates HM, Neve RL, Shen L, Dietz DM, Nestler EJ: Bidirectional synaptic structural plasticity after chronic cocaine administration occurs through Rap1 small GTPase signaling. Neuron 89(3): 566-82, Feb 2016. PMID: PMC4743039
13. Heller EA*, Hamilton PJ, Burek DD, Lombroso SI, Peña CJ, Neve RL, Nestler EJ: Targeted epigenetic remodeling of the Cdk5 gene in nucleus accumbens regulates cocaine- and stress-evoked behavior. J Neurosci. 36(17): 4690-7, Apr 2016 Notes: *Corresponding author Featured article. Highlighted in 'Editor's Picks' and Journal Club. PMID: PMC4846670
14. Bagot RC, Cates HM, Purushothaman I, Lorsch ZS, Walker DM, Wang J, Huang X, Schlüter OM, Maze I, Peña CJ, Heller EA, Issler O, Wang M, Song WM, Stein JL, Liu X, Doyle MA, Scobie KN, Sun HS, Neve RL, Geschwind D, Dong Y, Shen L, Zhang B, Nestler EJ: Circuit-wide transcriptional profiling reveals brain region-specific gene networks regulating depression susceptibility. Neuron 90(5): 969-83, May 2016. PMID: PMC4896746
15. Bagot RC, Cates HM, Purushothaman I, Vialou V, Heller EA, Yieh L, LaBonté B, Peña CJ, Shen L, Wittenberg GM, Nestler EJ: Ketamine and imipramine reverse transcriptional signatures of susceptibility and induce resilience-specific gene expression profiles. Biol Psychiatry. 81(4): 285-295, Feb 2017. PMID: PMC5164982
16. Lopez JP, Fiori LM, Cruceanu C, Lin R, Labonte B, Cates HM, Heller EA, Vialou V, Ku SM, Gerald C, Han MH, Foster J, Frey BN, Soares CN, Müller DJ, Farzan F, Leri F, MacQueen GM, Feilotter H, Tyryshkin K, Evans KR, Giacobbe P, Blier P, Lam RW, Milev R, Parikh SV, Rotzinger S, Strother SC, Lewis CM, Aitchison KJ, Wittenberg GM, Mechawar N, Nestler EJ, Uher R, Kennedy SH, Turecki G: MicroRNAs 146a/b-5 and 425-3p and 24-3p are markers of antidepressant response and regulate MAPK/Wnt-system genes. Nat Commun. 8: 15497, May 2017. PMID: PMC5477510

17. Hu Q, Kim EJ, Feng J, Grant GR, Heller EA: Histone posttranslational modifications predict specific alternative exon subtypes in mammalian brain. PLoS Comput Biol. 13(6): e1005602, Jun 2017. PMID: PMC5487056
18. Hamilton PJ, Burek DJ, Lombroso SI, Neve RL, Robison AJ, Nestler EJ, Heller EA: Cell-type-specific epigenetic editing at the Fosb gene controls susceptibility to social defeat stress. Neuropsychopharmacology 43(2): 272-284, Jan 2018. PMID: PMC5729576
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Editorials, Reviews, Chapters, including participation in committee reports (print or other media):

1. Hamilton PJ, Lim CJ, Nestler EJ, Heller EA.: Neuroepigenetic editing. Methods Mol Biol. Rots MG & Jeltsch A (eds.). 1767: 205-214, 2018. PMID: PMC5963503
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