

BIOGRAPHICAL SKETCH

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NAME: Milbocker, Katrina

eRA COMMONS USER NAME (credential, e.g., agency login): kmilbocker

POSITION TITLE: Postdoctoral Researcher

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
Villanova University, Villanova, PA	BS	06/2017	Comprehensive Science; Bioethics
University of Delaware, Newark, DE	MS	08/2020	Neuroscience
University of Delaware, Newark, DE	PHD	12/2022	Psychological and Brain Sciences: Behavioral Neuroscience
University of Delaware, Newark, DE	Postdoctoral Fellow	present	Biomedical Engineering

A. Personal Statement

My long-term research interests include investigating neurodevelopmental disorders, predominantly Fetal Alcohol Spectrum Disorders (FASD), using state-of-the-art preclinical Magnetic Resonance Elastography scanning validated with histopathological analysis of brain tissue to ultimately enhance therapeutic intervention. My academic training and research experience have provided me with an excellent background in multiple neuroscientific disciplines including molecular and cellular neurobiology, epigenetics, bioethics and the psychology of learning and memory. As an undergraduate student, I conducted research under the mentorship of Dr. Scott Lorch at the Children's Hospital of Philadelphia (CHOP)/University of Pennsylvania Research Institute on the intersectionality of race, socioeconomic status, and accessibility to quality healthcare on pediatric health outcomes disparities and occurrence of prenatal drug exposure. This resulted in the development of the CHOP Baby & Books program to support language development in preterm infants, first-author poster presentation at the 2017 Scientista Foundation Symposium for women in STEM, and ultimately inspired me to pursue a career in research. As a predoctoral student, my research aimed to uncover the underlying neuroanatomical and neuro-epigenetic alterations that result from prenatal alcohol exposure and early life adversity using rat models of FASD and early maltreatment. Mentorship under my primary academic advisor, Dr. Anna Klintsova, yielded comprehensive training in immunocytochemistry, fluorescent & electron microscopy, preclinical magnetic resonance imaging (diffusion) of anesthetized rats, animal husbandry, and data analysis. These skills combined with my training in RT-PCR and rodent behavior analysis from my secondary academic advisor, Dr. Tania Roth, were pivotal for the creation of several original immunocytochemical, PCR, microscopy, and scanning protocols that allowed me to investigate alterations to white matter structures in the rodent brain following prenatal drug exposure and early life adversity. I published several first-author publications describing the impact of fetal alcohol exposure on corpus callosum integrity across development. I was the first to show that adolescent exercise intervention supports white matter development in female rats with fetal alcohol exposure and that this phenomenon can be monitored with noninvasive neuroimaging. During my undergraduate and graduate careers, I received several academic awards which highlight the novelty of these findings, including a prestigious Trainee award from the FASD study group in 2021. As a postdoctoral researcher under the mentorship of Dr. Curtis Johnson, I have continued my training in neuroimaging by developing a high-resolution preclinical magnetic resonance elastography (MRE) protocol that is more sensitive to short-term alterations to white matter microstructure compared to conventional neuroimaging methods. Historically, preclinical MRE has been applied to mouse models of varying neurological disorders. My efforts to implement this technology in a rat model of FASD have resulted in several academic awards (Magnetic Resonance Elastography Study Group Trainee Abstract

Competition Award and the Enoch Gordis Recognition in Research in Biology, June 2023). Given my training in the skills required to complete the proposed Aims of our R01 grant application, I am confident that the experiments described will be performed in a timely fashion, with the appropriate controls, and all results will be routinely disseminated to the relevant patient populations and the public.

1. Milbocker KA, Williams LT, Caban-Rivera DA, Smith IF, Kurtz S, McGarry MDJ, Wattrisse B, Van Houten EEW, Johnson CL, Klintsova AY. Magnetic resonance elastography captures a transient benefit of exercise intervention on forebrain stiffness in a rat model of fetal alcohol spectrum disorders. *Alcohol Clin Exp Res (Hoboken)*. 2024 Mar;48(3):466-477. PubMed Central PMCID: PMC11162295.
2. Milbocker KA, Smith IF, Brengel EK, LeBlanc GL, Roth TL, Klintsova AY. Exercise in Adolescence Enhances Callosal White Matter Refinement in the Female Brain in a Rat Model of Fetal Alcohol Spectrum Disorders. *Cells*. 2023 Mar 23;12(7) PubMed Central PMCID: PMC10092997.
3. Milbocker KA, LeBlanc GL, Brengel EK, Hekmatyar KS, Kulkarni P, Ferris CF, Klintsova AY. Reduced and delayed myelination and volume of corpus callosum in an animal model of Fetal Alcohol Spectrum Disorders partially benefit from voluntary exercise. *Sci Rep*. 2022 Jun 23;12(1):10653. PubMed Central PMCID: PMC9226126.
4. Milbocker KA, Klintsova AY. Examination of cortically projecting cholinergic neurons following exercise and environmental intervention in a rodent model of fetal alcohol spectrum disorders. *Birth Defects Res*. 2021 Feb 1;113(3):299-313. PubMed Central PMCID: PMC8274426.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2023 -	Postdoctoral Researcher, Biomedical Engineering Department, University of Delaware, Newark, DE
2023 -	Member, Delaware Bioscience Association
2022 -	Member, Villanova University Alumni Association
2022 - 2023	Co-Founder and Director, University of Delaware Integrative Neuroscience Graduate Student Journal Club
2022 - 2022	Graduate Student Representative, Behavioral Neuroscience, Department of Psychological and Brain Sciences, University of Delaware, Newark, DE
2021 -	Student Member, International Society for Magnetic Resonance in Medicine
2019 -	Member, Villanova University Women's Professional Network
2019 - 2021	Student Member, European Society for Biomedical Research on Alcoholism
2018 -	Member, American Association of University Women
2018 - 2022	Co-Director and Founder, University of Delaware Graduate Chapter of the Scientista Foundation, Newark, DE
2018 - 2022	Associate Member, Eastern Psychological Association
2017 -	Student & Postdoc Member, Fetal Alcohol Spectrum Disorders Study Group
2017 -	Student & Postdoc Member, Research Society on Alcohol
2017 - 2022	Graduate Research Assistant, University of Delaware, Roth Lab, Newark, DE
2017 - 2022	Graduate Teaching Assistant, University of Delaware, Dept. Psych. and Brain Sciences/Undergraduate Advising Office, Newark, DE
2017 - 2022	Student Member, Society for Neuroscience
2017 - 2022	Graduate Research Assistant, University of Delaware, Klintsova Lab, Newark, DE
2014 - 2017	Undergraduate Research Assistant, Children's Hospital of Philadelphia, Center for Perinatal and Pediatric Health Disparities Research, Lorch Lab, Philadelphia, PA

Honors

2021 - 2022	Nominee, Dissertation Fellowship, University of Delaware
2021 - 2022	Core Access Award for use of Transmission Electron Microscope, Delaware INBRE
2020 - 2021	Magnetic Resonance Imaging Pilot Funding Renewal, University of Delaware NIH COBRE
2020 - 2020	Magnetic Resonance Imaging Pilot Funding Renewal, University of Delaware NIH COBRE

2019 - 2020	UD Scientista Foundation Annual Award, University of Delaware Graduate College
2019 - 2019	Magnetic Resonance Imaging Pilot Funding, University of Delaware NIH COBRE
2024	Educational Stipend , International Society for Magnetic Resonance in Medicine
2023	Educational Stipend, International Society for Magnetic Resonance in Medicine
2023	Third Place Award - Trainee Abstract Competition, Magnetic Resonance Elastography Study Group of the International Society for Magnetic Resonance in Medicine
2023	Enoch Gordis Research Recognition in Biology Award, Research Society on Alcohol
2022	Travel Award, International Society for Magnetic Resonance in Medicine
2022	Travel Award, International Society for Developmental Psychobiology
2019	Honorable Mention (Graduate Research Fellowship Program), National Science Foundation
2019	Conference Travel Award, Scientista Foundation
2019	New Graduate Organization Award, University of Delaware Center for Diversity
2019	Trainee Professional Development Award, Society for Neuroscience
2018	Summer Doctoral Fellowship, University of Delaware
2018	Woman of Promise Award, University of Delaware
2018	Graduate Student Scholarship, MicroBrightField Bioscience/NeuroRenew
2013	College Scholarship, Timmy O'Connell Foundation

C. Contribution to Science

- 1. Aerobic exercise in adolescence supports neurodevelopment in FASD:** As a result of my predoctoral research, I was the first to show that adolescent exercise intervention supports corpus callosum development in the female brain using a highly translational rat model of FASD. This was assessed using cutting-edge repeated MRI scanning on anesthetized rats from adolescence to adulthood as well as by histological examination of oligoglia and myelin density using unbiased stereology. This resulted in the submission of first-author empirical publications (3), review publications (3), field-specific conference presentations (24), and invited scientific talks (7). Additionally, I provided active mentorship to incoming graduate students (4) and undergraduate research assistants (12) in the Klintsova and Roth Labs resulting in 2 Master of Science in Neuroscience Theses and 4 Honors Senior Theses research projects. Mentees have received several awards (prestigious UD Burnaby Munson Fund for Undergraduate Research Award and UD Plasket Undergraduate Research Award) and financial support (UD Summer Scholars and UD Summer Fellows) to aid in their full participation in academic research.

 - Milbocker KA, Smith IF, Brengel EK, LeBlanc GL, Roth TL, Klintsova AY. Exercise in Adolescence Enhances Callosal White Matter Refinement in the Female Brain in a Rat Model of Fetal Alcohol Spectrum Disorders. *Cells*. 2023 Mar 23;12(7) PubMed Central PMCID: PMC10092997.
 - Milbocker KA, LeBlanc GL, Brengel EK, Hekmatyar KS, Kulkarni P, Ferris CF, Klintsova AY. Reduced and delayed myelination and volume of corpus callosum in an animal model of Fetal Alcohol Spectrum Disorders partially benefit from voluntary exercise. *Sci Rep*. 2022 Jun 23;12(1):10653. PubMed Central PMCID: PMC9226126.
 - Milbocker KA, Campbell TS, Collins N, Kim S, Smith IF, Roth TL, Klintsova AY. Glia-Driven Brain Circuit Refinement Is Altered by Early-Life Adversity: Behavioral Outcomes. *Front Behav Neurosci*. 2021;15:786234. PubMed Central PMCID: PMC8678604.
 - Milbocker KA, Klintsova AY. Examination of cortically projecting cholinergic neurons following exercise and environmental intervention in a rodent model of fetal alcohol spectrum disorders. *Birth Defects Res*. 2021 Feb 1;113(3):299-313. PubMed Central PMCID: PMC8274426.
- 2. Advancement of Rodent Magnetic Resonance Elastography (MRE) scanning:** As a postdoctoral researcher, I have made significant strides in developing rat Magnetic Resonance Elastography (MRE) scanning protocols to assess changes in brain mechanics across development in FASD and assess intervention effectiveness on supporting brain maturation. I have evaluated the mechanical properties of the forebrain and several subregions (corpus callosum, hippocampus, thalamus) in a rodent model of FASD (AE during the 3rd trimester equivalent). We first demonstrated that exercise in adolescence enhances callosal white matter refinement in the female brain in a rat model of FASD. This finding,

published in *Cells* (2023) and *Scientific Reports* (2022), suggests that targeted interventions during critical developmental periods can partially overcome alcohol-induced deficits in brain structure.

Using MRE, we next showed that forebrain stiffness is increased by aerobic activity in the FASD and control brain and this finding was published in *ACER* (2024). These contributions advance our understanding of the lasting effects of prenatal alcohol exposure on brain development and demonstrate the potential of exercise as a non-invasive intervention strategy. This work has implications for developing targeted therapies for individuals with FASD and potentially other neurodevelopmental disorders.

- a. Milbocker KA, Williams LT, Caban-Rivera DA, Smith IF, Kurtz S, McGarry MDJ, Wattrisse B, Van Houten EEW, Johnson CL, Klintsova AY. Magnetic resonance elastography captures a transient benefit of exercise intervention on forebrain stiffness in a rat model of fetal alcohol spectrum disorders. *ACER*. 2024 Mar 48;3.
3. Promotion of Women in STEM: In my first year as a doctoral student, I was recognized as a 2018 University of Delaware Woman of Promise due to my academic and research achievements which inspired me to co-found and co-direct the University of Delaware Graduate Scientista Foundation chapter at UD. Since its naissance, the graduate organization has received a New Graduate Organization Award from the University of Delaware Center for Diversity (2019) and funding from the University of Delaware Graduate College (2019). Using the organization as a platform to increase the inclusion of women in STEM, I have developed the undergraduate-graduate women in STEM mentorship program at UD, a monthly workshop on the intersectionality of race and gender inclusion for pre-professionals at UD, a seminar series for women in STEM (from high school to the workplace), and an active affiliation with the Delaware-based high school group, The STEM Organization of America. These efforts have led to the following awards: 2019 Society for Neuroscience Trainee Professional Development Award, 2019 Scientista Foundation Conference Travel Award, and a 2019 UD Biden Institute Woman of Power award. Within the Klintsova, Roth and Johnson labs I have mentored (6) predoctoral/Masters female students and (12) successful undergraduate female research assistants leading to the completion of three Honors Senior Theses and authorship on multiple posters presented at field-relevant academic conferences.
 - a. Milbocker K. Keeping Women in the STEM Pipeline: From University Studies to Career Leadership. University of Delaware Graduate Scientista Foundation Chapter Research Event; 2023 April.
 - b. Milbocker KA, LeBlanc GL, Brengel EK, Hekmatyar KS, Kulkarni P, Ferris CF, Klintsova AY. Reduced and delayed myelination and volume of corpus callosum in an animal model of Fetal Alcohol Spectrum Disorders partially benefit from voluntary exercise. *Sci Rep*. 2022 Jun 23;12(1):10653. PubMed Central PMCID: PMC9226126.
 - c. Milbocker KA, Campbell TS, Collins N, Kim S, Smith IF, Roth TL, Klintsova AY. Glia-Driven Brain Circuit Refinement Is Altered by Early-Life Adversity: Behavioral Outcomes. *Front Behav Neurosci*. 2021;15:786234. PubMed Central PMCID: PMC8678604.
 - d. Milbocker KA. Identifying & Overcoming Leaks in the Pipeline: A Four Phase Seminar Series for the Promotion of Women in STEM. Seminar Host and Moderator - University of Delaware Graduate Scientists Foundation Chapter; 2020; Newark, DE.