



National Institute of
Neurological Disorders
and Stroke

Office of Programs to
Enhance Neuroscience
Workforce Diversity

OPEN STAGE

webinar series

The Neural Exposome: How NINDS is supporting Exposomic Research

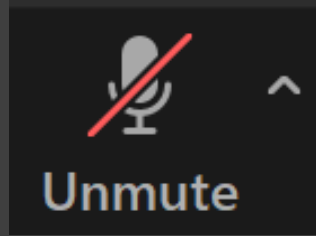


OCTOBER 23, 2023
1:00 PM - 2:00 PM ET

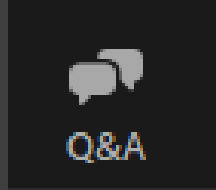
Register: <https://go.nih.gov/4KXBlnZ>

Meeting Reminders

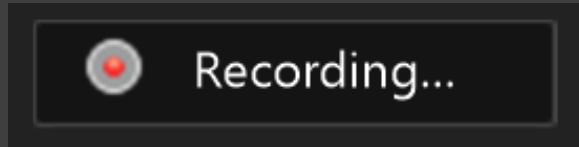
Attendees are muted



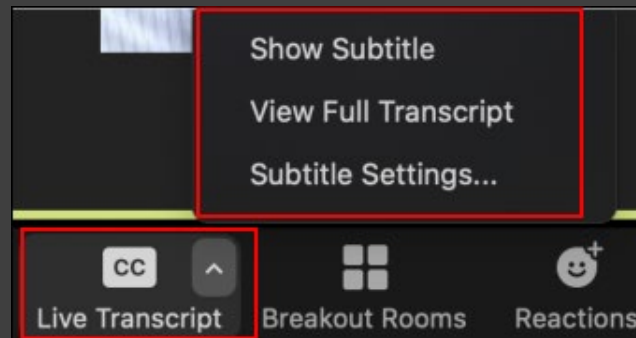
Submit questions in Q&A box



Presentation is being recorded



Live transcript available



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Listserv:
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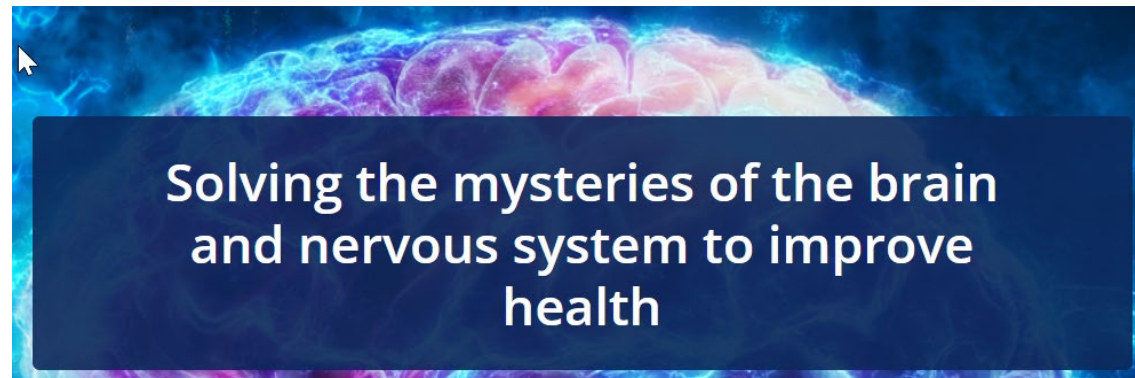
Email:
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National Institutes of Health National Institute of Neurological Disorders and Stroke

Mission is to seek fundamental knowledge about the brain and nervous system and to use that knowledge to reduce the burden of neurological disease for all people.



NIH NINDS Office of Neural Exposome and Toxicology (ONETOX)

Office of Neural Exposome and Toxicology

**The Neural
Exposome**

**Chemical Threats
(NIH CounterACT)**

**Chemical Safety
(Drug Safety;
Biohazards; DURC)**



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VISIT US



The Exposome



**Exposomic
Risk Factors**

- Genetics has provided insight into the etiologies of inherited disease
- **But most health risk factors cannot be explained by genetics alone**
- Exposome: environmental exposures affecting the genome (Wild, 2005)
- Now all nonheritable factors affecting gene expression across the lifespan are considered
- New frontier of biomedical research to complement the genome
- **Unlock a more holistic approach to disease prevention and more effective and personalized interventions**



NeuroView

A focus on the neural exposome

Amir P. Tamiz,¹ Walter J. Koroshetz,² Neel T. Dhruv,¹ and David A. Jett^{1,*}

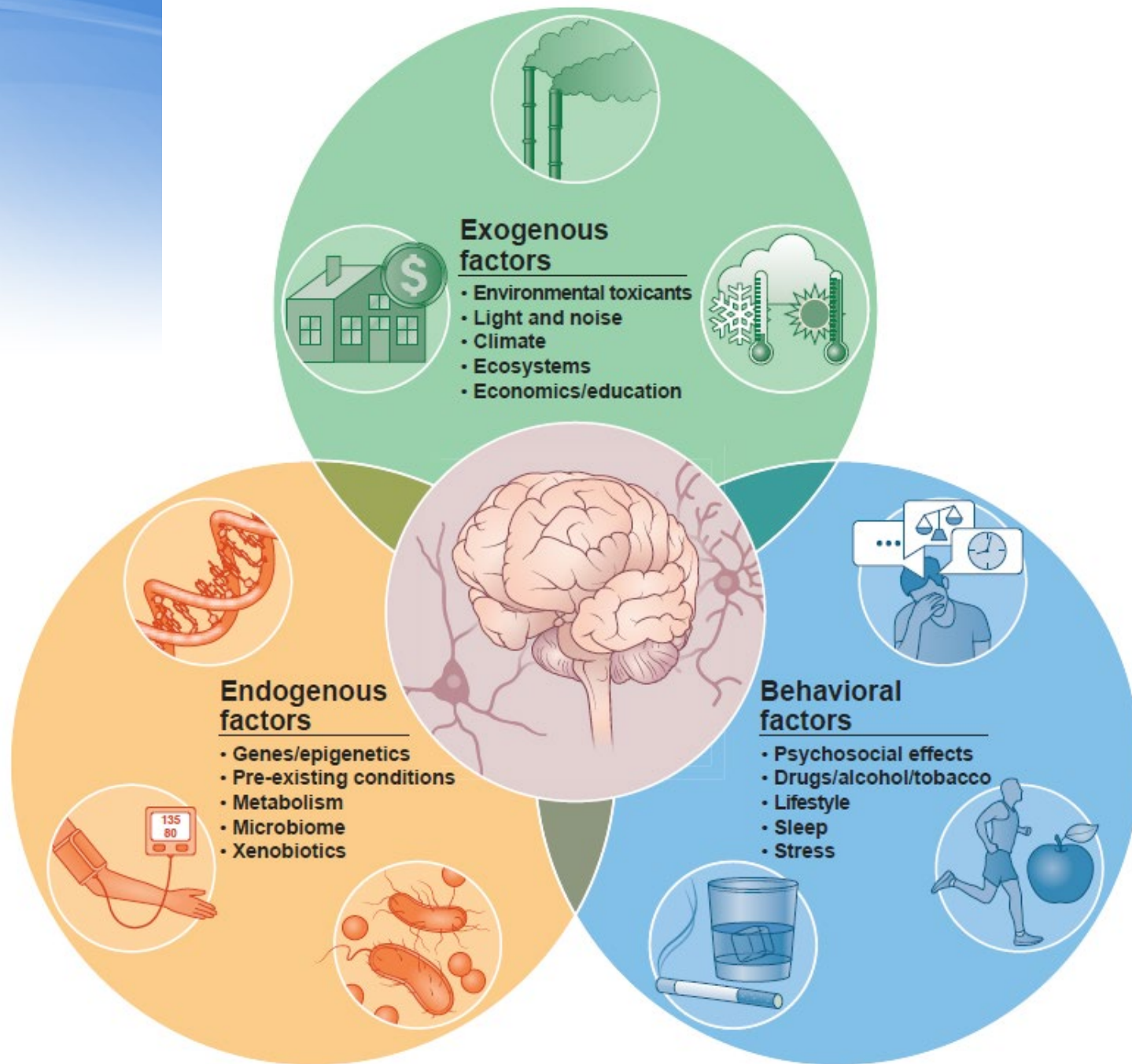
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²National Institute of Neurological Disorders and Stroke, NIH, 31 Center Drive, 8A31, Bethesda, MD 20892, USA

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<https://doi.org/10.1016/j.neuron.2022.03.019>

Many neurological disorders have complex etiologies that include **noninherited factors, collectively called the neural exposome**. The National Institute of Neurological Disorders and Stroke is developing a new office with **goals to advance our understanding of the multiple causes of neurological illness and to enable the development of more effective interventions**.



Can exposome research help us have a better understanding of how to fix health disparities ?



Black Americans are about two times more likely than White Americans to have Alzheimer's and other dementias.



Hispanic Americans are about one and one-half times more likely than White Americans to have Alzheimer's and other dementias.



By 2050, Asian Americans are projected to comprise nearly 8% of those aged 65 and older.



Native Americans have high rates of chronic conditions, including conditions that are suspected risk factors for Alzheimer's, such as obesity, diabetes and hypertension.



Almost two-thirds of those living with Alzheimer's are women.

<https://www.alz.org/professionals/public-health/public-health-topics/health-equity#:~:text=Black%20Americans%20are%20about%20two,have%20Alzheimer's%20and%20other%20dementias.>



Neural Exposome Funding Opportunities

Funded 12 projects

	Clinical Relevance of the Linkage between Environmental Toxicant Exposures and Alzheimer's Disease and Related Dementias	PAR-22-048		
	ECHO Program NOFOs			
	Climate Change and Health	NOT-ES-22-006		*
	Research on Biopsychosocial Factors of Social Connectedness and Isolation on Health, Wellbeing, Illness, and Recovery	PAR-21-349 PAR-21-350		*
	Role of Environmental Stress in the Health Inequities of Alzheimer's Disease-Related Dementias	RFA-NS-24-024		*
	Impact of the Microbiome Gut-Brain Axis on Alzheimer's Disease and Alzheimer's Disease Related Dementias	PAR-22-211		
	NINDS Mission Relevant Pain Research	NOT-NS-22-050		
	Administrative Supplements to Support research Infrastructure on Exposome Studies in Alzheimer's disease (AD) and AD-Related Dementias (ADRD)	NOT-AG-22-022		
	Center for Exposome Research Coordination to Accelerate Precision Environmental Health	RFA-ES-23-010		*

* Active , visit website for upcoming due dates

Neural Exposome Outreach and Collaboration

- Society for Neuroscience Event
- SOT Symposium
- Funding Opportunity Webinars
- Request for Information
- Workshops



SOCIETY *for*
NEUROSCIENCE

**THE NEURAL EXPOSOME
& WHY IT'S IMPORTANT TO YOU!**

NEUROSCIENCE 2022, SATELLITE MEETING
SAN DIEGO, CA

NOVEMBER 15, 2022
6:30PM - 8:00PM

MARRIOTT MARQUIS HOTEL
MARINA BALLROOM G

NIH National Institute of
Neurological Disorders
and Stroke



Wednesday, March 22, 8:00 AM to 10:45 AM, Room 205, Music City Center

S Symposium Session: Expanding Our Knowledge of Neurological Disease
Etiologies: Current Research on the Neural Exposome

Chair(s): David Jett, NIH/NINDS; and Cindy Lawler, NIEHS/NTP.

Primary Endorser: Neurotoxicology Specialty Section

NIH Request for Information (RFI) on Interdisciplinary Research Opportunities that Bridge Neuroscience and Environmental Health Science, NOT-NS-22-101

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Public Health Research and Surveillance Priorities from the East Palestine, Ohio Train Derailment: A Workshop

Summary

- Most disease and disorders cannot be explained by genes alone.
- A more holistic approach includes endogenous, exogenous, and behavioral factors collectively called the exposome.
- Many neurological diseases and disorders are now considering exposomic factors in intervention strategies.
- Will require new tools and data analyses.
- Complexity includes how to integrate the exposomic factors and how to interpret these factors across the lifespan.
- **Most health inequities are probably driven by exposomic factors.**

One of Our First Grantees: Erica Glasper, PhD



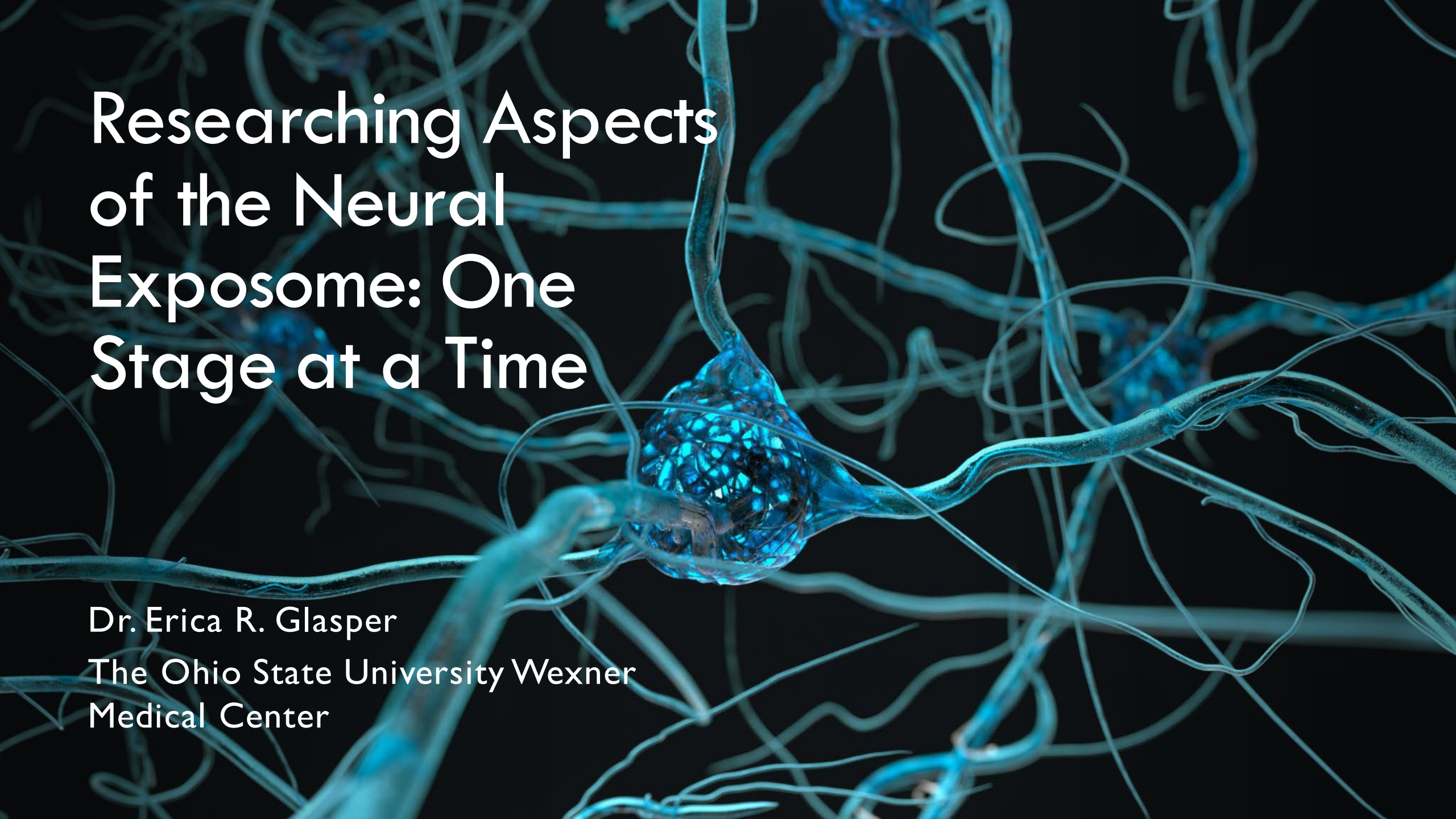
Associate Professor
Department of Neuroscience

Postdoctoral training: Princeton
Neuroscience Institute

Doctoral training: The Ohio
State University

From Social Disruption to Neural Compromise: Establishing Markers and Mediators

- PIs: Erica R. Glasper, PhD and Gretchen Neigh, PhD
- Research on Biopsychosocial Factors of Social Connectedness and Isolation on Health, Wellbeing, Illness, and Recovery
- Investigation into mechanistic link between social bond disruption and subsequent increases in neuroinflammation and compromised neural mitochondrial function



Researching Aspects of the Neural Exposome: One Stage at a Time

Dr. Erica R. Glasper
The Ohio State University Wexner
Medical Center

ERICA R. GLASPER, PH.D

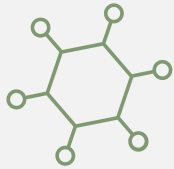
- ASSOCIATE PROFESSOR
 - DEPARTMENT OF NEUROSCIENCE
 - INSTITUTE FOR BEHAVIORAL MEDICINE RESEARCH
- CO-DIRECTOR, DISCOVERY PREP, NIGMS FUNDED POST-BACCALAUREATE RESEARCH PROGRAM
- FACULTY MENTOR
 - NEUROSCIENCE GRADUATE PROGRAM
 - BIOLOGICAL SCIENCES GRADUATE PROGRAM



The Ohio State University



Social Behavior



Hormones



Psychoneuroimmunology

**WHAT ARE
MY
RESEARCH
INTERESTS?**

Social Neuroscience, Behavior, & Health Lab



Goal: To understand how neuroendocrine & neuroimmune processes alter social behavior and health.

MY RESEARCH TRAINING



1998-2002, Psychology and Biology,
RANDOLPH-MACON COLLEGE

Advisor: Kelly G. Lambert



2002-2006: Psychobiology and Behavioral
Neuroscience, THE OHIO STATE UNIVERSITY

PhD Advisor: A. Courtney Devries



2006-2011: Behavioral Neuroscience,
PRINCETON UNIVERSITY

Postdoc Advisor: Elizabeth Gould



NIH FUNDING MECHANISMS PAVED THE WAY TOWARD MY SUCCESS


3 Summer Undergraduate Research Fellowships



NINDS Diversity Supplement



F31 (NINDS)

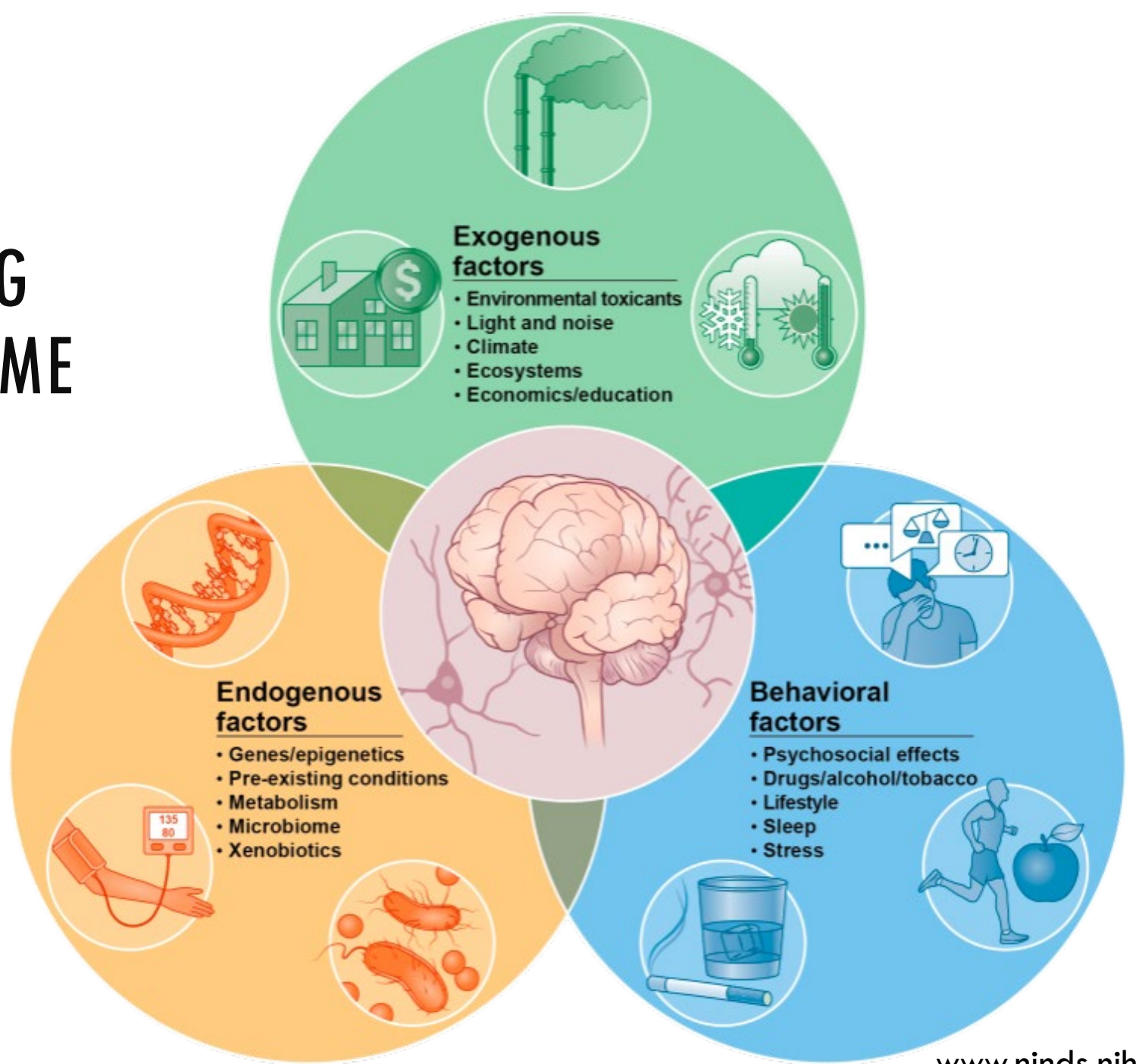


Merck-United Negro College Fund Postdoctoral Fellowship / F32 (NIA)



R01 (NINDS)

HAD I BEEN STUDYING THE NEURAL EXPOSOME MY ENTIRE CAREER?





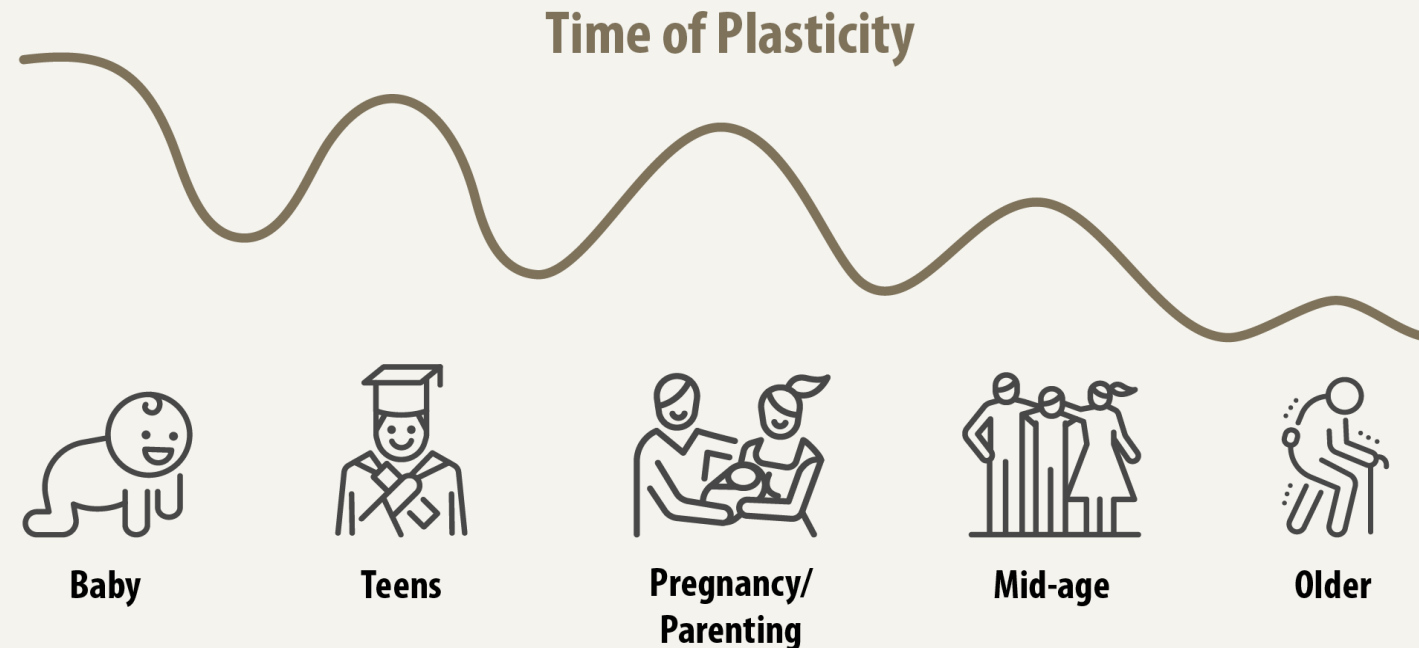
HORMONAL DRIVERS
of Plasticity

Steroid and Peptide Hormones
(Cortisol, Estrogens, Androgens, Oxytocin)

TYPES
of Plasticity

Spine/Synapses - Neurogenesis - Neurotransmitters

LEVEL
of Plasticity



BASIC SCIENCE APPROACH TO SOCIAL BONDING & LONELINESS

California mouse (*Peromyscus californicus*)

Genetically monogamous

Strong mate bonds and bonds with offspring

Negative behavioral and physiological response to pair bond dissolution



Image © Mark A. Chappell

Manipulation of social bonds in the laboratory can facilitate examination of the impact of bonding and bond dissolution on behavior and physiology

From Social Disruption to Neural Compromise: Establishing Markers and Mediators

Hypothesis: The neural-glia response engaged by social bond disruption increases neuroinflammation and compromises neural mitochondrial function through disruptions in OT signaling

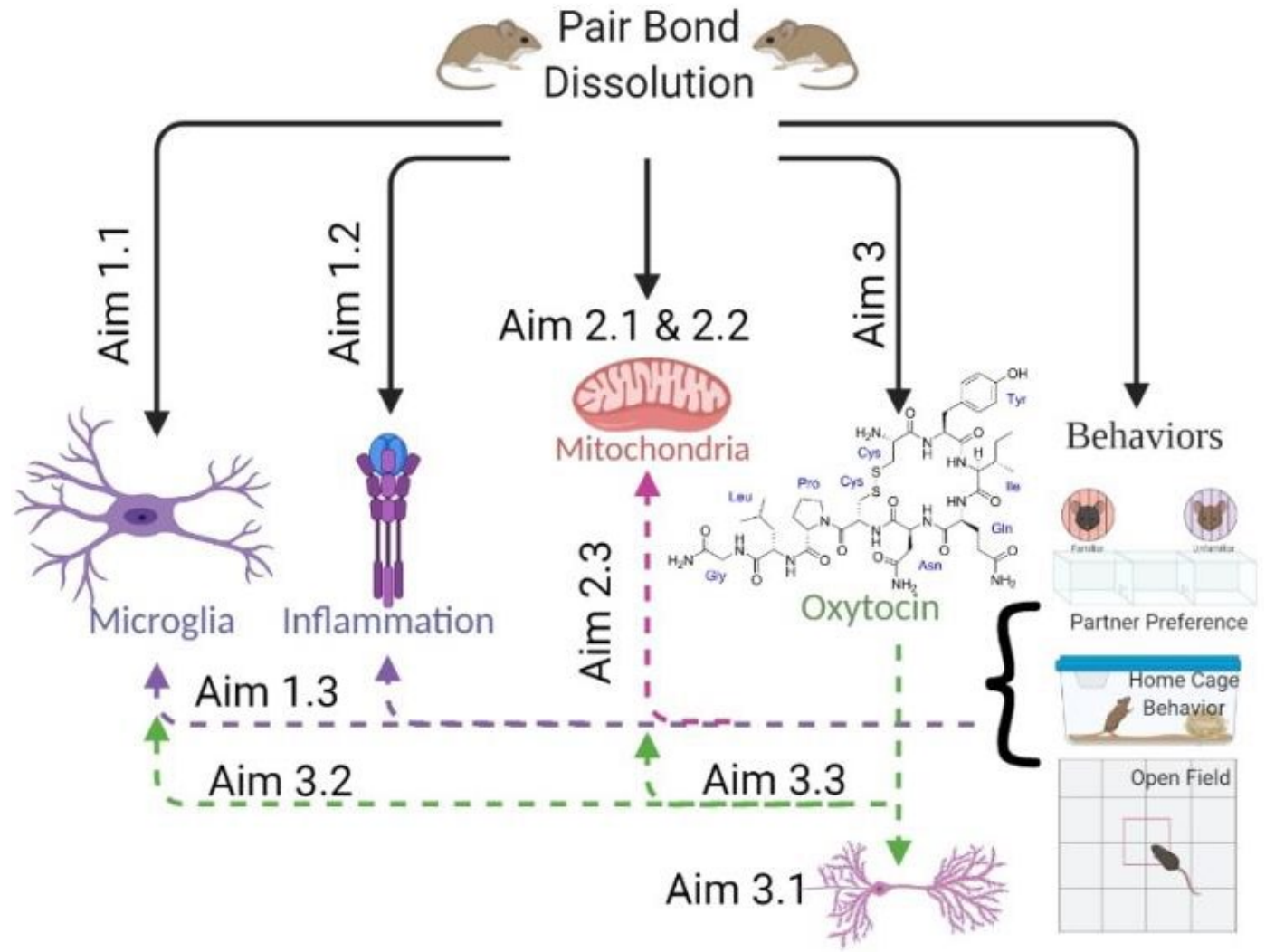
PIs:



Erica R. Glasper
The Ohio State University



Gretchen N. Neigh
Virginia Commonwealth University







Current Funding:



Acknowledgement

University of Maryland

Molly Hyer, PhD
Priyanka Agarwal, MS
Nicole Palin, MS
Allison Whitaker
Terrence Hunter
Luke Hallgarth
Neilesh Sud
Robyn Harper
Jhansi Katakam
Cyrus Ameri
Collin Kaufman
Amanda Holmes
Allison Whitaker
Samuel Doty, MD

The Ohio State University

Shakeera Walker, MS
Amber Valentino, MA
Janet Chen, MD
Zachary Weisenseel
JaNiya Ulysse
Emily Oakley
Noah Holmes
Rita Beyene
Jessie Bontatibus

University of Wisconsin-Madison

Farrah Madison, PhD

Virginia Commonwealth University

Gretchen Neigh, PhD

Opportunities for Exposome Research



Data

- > Human studies
- > Biobanks
- > Geospatial data
- > Wearables
- > Biomarkers

Tools

- > Data Bases (CTD)
- > Training
- > Analysis (HHEAR)
- > Screening
- > Omics technology

Team Science

- > Blueprint ICs
- > NIH programs
- > Consortia
- > CDC, EPA, DoD
- > Non-profits

A ladybug is shown next to a 1-millimeter-wide microchip, for scale. PHOTO: NORTHWESTERN UNIVERSITY