The National Academies of SCIENCES ENGINEERING MEDICINE

Forum on NEUROSCIENCE and NERVOUS SYSTEM DISORDERS

Environmental Neuroscience: Advancing the Understanding of How Chemical Exposures Impact Brain Health and Disease—A Virtual Workshop

June 25, 2020 via Zoom

All times below are EDT

Hosted by the National Academies' Forum on Neuroscience and Nervous System Disorders
In Collaboration with the Board on Environmental Studies and Toxicology

Workshop Objectives: This public workshop will bring together experts and key stakeholders from academia, government, industry, and non-profit organizations to explore the current knowledge landscape and future opportunities in neurotoxicology. Invited presentations and discussions will be designed to:

- Provide an overview of what is known about neurotoxic exposures and how they lead to neurodevelopmental and neurodegenerative disorders;
- Explore how new technologies can be harnessed to identify previously-unknown neurotoxic chemicals;
- Consider whether algorithms can be developed to better predict the effects of cumulative exposures and interactions across the life-span on brain health; and
- Discuss research gaps and collaborative opportunities between neuroscientists and environmental health scientists.

10:00-10:15am Welcome and opening remarks

Frances Jensen, University of Pennsylvania *Neuroscience Forum Co-chair*

Walter Koroshetz, National Institute of Neurological Disorders and Stroke, *Neuroscience Forum Member and Workshop Co-chair*

10:15-10:40am Opening talk—Chemical exposures: The ignored environmental risk factor for neurodegenerative diseases and neurodevelopmental disorders

Deborah Cory-Slechta, University of Rochester, *Workshop Co-chair*

Session I: What are the Neurotoxicants?

Discussion questions:

- What neurotoxicants should we be concerned about?
- How can they be measured?
- How to measure their effects on populations, on individuals?

10:40-10:45am Session overview

Deborah Cory-Slechta, University of Rochester, *Workshop Co-chair and session moderator*

10:45-11:00am Exposure to neurotoxic chemicals and neurodevelopmental disease

Tracey Woodruff, University of California, San Francisco

11:00-11:15am Environmental contributors to neurodegeneration: Why not measure everything?

Gary Miller, Columbia University

11:15-12:00pm Panel discussion and Q&A

The two speakers above will be joined by panelists:

Jennifer McPartland, Environmental Defense Fund

Brenda Eskenazi, University of California, Berkeley

12:00-12:30pm Break

Session II: Biology of Toxicant Interaction with the Nervous System

Discussion question:

- What is known about the biology of how "common" exposures to chemical and particulate toxicants might alter nervous system development or contribute to neurodegeneration?

12:30-12:35pm Session overview

David Jett, National Institute of Neurological Disorder and Stroke, *Session moderator*

12:35-12:50pm Exploiting genetics to identify environmental risks for autism

Mark Zylka, University of North Carolina, Chapel Hill

12:50-1:05pm LRRK2 activation as a common mechanism of environmental toxicant-induced Parkinson's disease

J. Timothy Greenamyre, University of Pittsburgh

1:05-1:20pm Environmental gerogens in the Alzheimer's disease exposome: Air pollution and cigarettes

Caleb Finch, University of Southern California

1:20-2:15pm Panel discussion and Q&A

The three speakers above will be joined by panelists:

Helena Hogberg, Johns Hopkins University

Tomás Guilarte, Florida International University

2:15-2:30pm Break

Session III: Chemical Toxicants as Drivers of Abnormal Neurodevelopment and Neurodegeneration

Discussion questions:

- What is the level of evidence for chemical toxicants as drivers of abnormal neurodevelopment and neurodegeneration?
- What research is needed to launch prevention efforts: either treatments or policy changes?

2:30-2:35pm Session overview

Walter Koroshetz, National Institute of Neurological Disorders and Stroke, *Workshop co-chair and session co-moderator*

Allison Willis, University of Pennsylvania, *session co-moderator*

2:35-2:50pm A developmental perspective on early-life exposures to neurotoxicants

David Bellinger, Boston Children's Hospital

2:50-3:05pm In utero endocrine-disrupting chemical (EDC) exposure may reprogram the adult mouse brain: A role for epigenetics

Marisa Bartolomei, University of Pennsylvania

3:05-3:20pm Translational research on the role of developmental pesticide exposure and ADHD

Jason Richardson, Florida International University

3:20-3:35pm Using gene-environment interactions and omics approaches to understand neurodegenerative disease etiology

Beate Ritz, University of California, Los Angeles

3:35-3:50pm Exposure to air pollution and risk of Alzheimer's disease

Andrew Petkus, University of Southern California

3:50-4:05pm Identification and validation of ALS environmental risk factors

Eva Feldman, University of Michigan

4:05-4:30pm Panel discussion and Q&A

Panel composed of speakers above

4:30-4:45pm Break

Session IV: Future Directions

Discussion questions:

- What are the critical research gaps, next steps, and promising areas for future action?
- What opportunities are there for collaboration among neuroscientists and environmental health scientists?

4:45-4:50pm Reflections from the workshop co-chairs

Walter Koroshetz, National Institute of Neurological Disorders and Stroke

Deborah Cory-Slechta, University of Rochester

4:50-5:15pm "Lightning round" remarks *(5 minutes each)*

Stanley Barone, Environmental Protection Agency

Ray Dorsey, University of Rochester Medical Center

Carl Hill, Alzheimer's Association

Devon Payne-Sturges, University of Maryland

Richard Woychik, National Institute of Environmental Health Sciences

5:15pm Additional discussion with speakers, panelists, and audience members

5:30pm Adjourn workshop

Planning Committee

Deborah Cory-Slechta, Department of Environmental Medicine, University of Rochester Medical School, *Co-Chair*

Walter Koroshetz, National Institute of Neurological Disorders and Stroke, National Institutes of Health, *Co-Chair*

Patrick Breysse, National Center for Environmental Health / Agency for Toxic Substances and Disease Registry, Centers for Disease Control and Prevention

Ray Dorsey, Department of Neurology, University of Rochester Medical School

Carl Hill, Alzheimer's Association

Frances Jensen, Department of Neurology, University of Pennsylvania Perelman School of Medicine

David Jett, National Institute of Neurological Disorders and Stroke, National Institutes of Health

Cindy Lawler, National Institute of Environmental Health Sciences, National Institutes of Health

Gary Miller, Department of Environmental Health Sciences, Columbia University Mailman School of Public Health

Trevor Penning, Department of Systems Pharmacology & Translational Therapeutics, University of Pennsylvania Perelman School of Medicine

Allison Willis, Department of Neurology, University of Pennsylvania Perelman School of Medicine