The National Academies of

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Advances in Causal Understanding for Human Health Risk Based Decision Making

March 6-7, 2017

The National Academies of Sciences, Engineering, and Medicine

2101 Constitution Ave NW, Washington, DC 20418

Lecture Room

This Workshop Will Be Webcast

Planning Committee Members:

Kim Boekelheide, Brown University
Weihsueh Chiu, Texas A&M University
Gary Ginsberg, Connecticut Department of Public Health
Kristi Pullen Fedinick, Natural Resource Defense Council
Reza Rasoulpour, Dow AgroSciences

Draft Agenda with Discussion Questions

Session 1: An Overview of Causal Thinking and New Ways to Connect Data

9:00 am *Welcome and Opening Remarks*– Kim Boekelheide, Brown University, Standing Committee Co-Chair
9:30 am *Causal Inference: New Data, An Old Problem* - Jon Samet, USC Institute for Global Health
10:10 am *Causal Inference from Data* - Philip Stark, UC Berkeley
10:50 am *Causal Models in Epidemiology* - Paolo Vineis, Imperial College London

11:30 am Lunch

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Session 2: Case Studies of Current Approaches for Determining Causality – Moderator: Kevin Elliott, Michigan State University

This session will introduce the different causal models, statistical framework for determining causality, and how these are being applied in different areas. It will address such questions as: What was the genesis of these models and criteria? What are the strengths and limitations of these models and criteria? How are complex systems and multi-causality being studied in other contexts?

12:30 pm *The Key Characteristics of Carcinogens* - Martyn Smith, UC Berkeley School of Public Health
12:50 pm Mary Beth Terry, Columbia University Mailman School of Public Health
1:10 pm Jessie Buckley, Johns Hopkins Bloomberg School of Public Health
1:30 pm Eric Tchetgen Tchetgen, Harvard T.H Chan School of Public Health

1:50 pm Panel discussion with speakers

- How far can these associations be taken in a population health context?
- How can associations be strengthened? What are the limitations and strengths of the current approaches?
- How much information is needed before decision can be made to limit an exposure or take other actions?

2:10 pm Break

Session 3: Exploring novel research tools – Moderators: Maragaret Karagas, Dartmouth College & Chirag Patel, Harvard Medical School

This session will explore new and different data streams that could serve as useful frameworks for identifying networks

and organizing information about the underlying biology. It will address such questions as: What kind of data and tools are researchers using to determine causality and how does that translate into the decision making process? Do the existing causal models cover the type of data generated by novel data streams? This session will aim to get the researcher's perspective on how to integrate data and move the field forward

2: 15 pm Vince Cogliano, U.S. Environmental Protection Agency
2:45 pm *The AOP Framework and Causality: Meeting Chemical Risk Assessment Challenges in the 21st Century* - Gerald Ankley, U.S. Environmental Protection Agency
3: 15 pm Richard Scheines, Carnegie Mellon University
3:45 pm Kristen Beck, IBM Watson (remote)

4:15 pm Panel Discussion

Gary Ginsberg, Connecticut Department of Public Health
Martyn Smith, Berkeley School of Public Health
Kathryn Guyton, International Agency for Research on Cancer
Reza Rasoulpour, Dow Agro Sciences
Stan Barone, U.S. Environmental Protection Agency
Meredith Williams, California Department of Toxic Substance Control

Discussion Questions:

- What information is needed to put into the system in order to identify pathways?
- What are the right questions to ask when designing these studies/collecting data?
- What should population studies be using from basic science (e.g., NHANES) to better inform their data collection and conclusions?
- Are molecular data only good for hypothesis generation? Can they be used for prediction and determining risk, rather than just biological plausibility?
- How do we generate reasonable hypothesis in an agnostic fashion? Where do they come from? How do we test these hypotheses? What constitutes enough information to say that the test of the hypothesis implies causality?

5:15 pm Adjourn Day 1

<u>Session 4: Highlighting gaps and Opportunities - moderator: Gary Miller, Emory University</u>

This session will present various scenarios which will be debated by speakers in order to identify the gaps and opportunities for integrating novel data streams and thinking for determining causality. This session will be in the form of debate-style talks with active discussion.

9:00 am Welcome to Day 2

9:10 am Debate Scenario 1: Mercury and Cardiovascular Health

- Gary Ginsberg, Connecticut Department of Public Health
- Melissa Perry, George Washington University

9:45 am Debate Scenario 2: Alkylphenol/ Read Across

- Lesa Aylward, Summit Toxicology, LLP
- Patrick McMullen, ScitoVation

10:20 am Debate Scenario 3: Turning on the "Gold Standard"

- Reza Rasoulpour, Dow AgroSciences
- Norbert Kaminski, Michigan State University

10:55 am Discussion to Identify Unifying Themes

Panel discussion with speakers

- What are we missing that could strengthen these arguments?
- Are existing decision frameworks flexible enough to incorporate new tools/new thinking?
- How do we adjust current frameworks or are new frameworks needed? What further research is needed?

11:55 am Closing Remarks

12:00 pm Adjourn Meeting

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