Teratology Society 2019 Annual Meeting
Sea Changes in Birth Defects Research and Prevention
Sheraton San Diego Hotel and Marina
San Diego, California
June 22–26, 2019

Only sessions designated with CME are eligible for Continuing Medical Education credit.

Friday, June 21, 2019

3:00 PM–6:00 PM  Registration Open  Harbor Island Foyer

Saturday, June 22, 2019

7:30 AM–6:00 PM  Registration Open  Harbor Island Foyer

8:00 AM–8:30 AM  Education Course Coffee and Pastries  Harbor Island 2

(>Education Course Session 1 Registrants Only<)

8:30 AM–12:00 Noon  Education Course Session 1  Harbor Island 2

The Embryology and Teratology of the Reproductive System
(Separate Registration Required)

Organized by the Education Committee
Chairperson: Amy L. Williams, Exponent, Inc.

8:30 AM–8:40 AM  Welcome
Teratology Society President, Dana L. Shuey,
Incyte Corporation

8:40 AM–8:45 AM  Course Overview
Education Committee, Chairperson, Amy L.
Williams, Exponent, Inc.

8:45 AM–9:30 AM  Prenatal Development and Teratology of the Reproductive System
John M. DeSesso, Exponent, Inc.

9:30 AM–10:15 AM  Normal and Abnormal Postnatal Development of
the Female Reproduction System
Aileen F. Keating, Iowa State University

10:15 AM–10:30 AM  Break

10:30 AM–11:15 AM  Normal and Abnormal Postnatal Development of
the Male Reproductive System
L. Earl Gray, Jr., National Health and
Environmental Effects Research Laboratory, US
EPA

11:15 AM–12:00 Noon  Clinical Management of Reproductive System
Abnormalities
Kathy D. van Leeuwen, Phoenix Children’s
Hospital

12:00 Noon–1:30 PM  Lunch on Your Own
### 1:30 PM–5:00 PM Education Course Session 2
**The Principles of Teratology**  
(Separate Registration Required)

*Organized by the Education Committee*

*Chairperson: Amy L. Williams, Exponent, Inc.*

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<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker/Institution</th>
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<tr>
<td>1:30 PM–1:35 PM</td>
<td>Course Overview</td>
<td>Education Committee, Chairperson, Amy L. Williams, Exponent, Inc.</td>
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<tr>
<td>1:35 PM–2:13 PM</td>
<td>Timeline of Important Events in Embryo-Fetal Development</td>
<td>Gary Schoenwolf, University of Utah</td>
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<tr>
<td>2:13 PM–2:51 PM</td>
<td>Direct and Indirect Development Toxicity: Maternal, Placental, and Fetal Considerations</td>
<td>John M. Rogers, US Environmental Protection Agency</td>
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<tr>
<td>2:51 PM–3:29 PM</td>
<td>Teratogenic Mechanisms, Pathways, and Processes</td>
<td>Elaine M. Faustman, University of Washington</td>
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<tr>
<td>3:29 PM–3:44 PM</td>
<td>Break</td>
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<tr>
<td>3:44 PM–4:22 PM</td>
<td>Developmental and Reproductive Toxicity Assessments and Data Interpretation</td>
<td>Tacey E.K. White, Aclairo Pharmaceutical Development Group, Inc.</td>
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<tr>
<td>4:22 PM–5:00 PM</td>
<td>Detecting Signals of Concern in the Human Population</td>
<td>Christina D. Chambers, University of California–San Diego</td>
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### 2:00 PM–7:00 PM
**Speaker Ready Room**  
**Maritime Boardroom**

### 5:00 PM–7:00 PM
**Council 1 Meeting**  
**Committee Reports**  
**Seabreeze**

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**Sunday, June 23, 2019**

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<tr>
<td>7:00 AM–6:00 PM</td>
<td>Registration Open</td>
<td>Harbor Island Foyer</td>
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<tr>
<td>7:00 AM–4:00 PM</td>
<td>Speaker Ready Room</td>
<td>Maritime Boardroom</td>
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<tr>
<td>7:00 AM–8:00 AM</td>
<td>2020 Program Committee Meeting</td>
<td>Seabreeze</td>
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<tr>
<td>7:30 AM–8:00 AM</td>
<td>Morning Coffee (Joint with DNTS)</td>
<td>Harbor Island Foyer</td>
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<tr>
<td>8:00 AM–8:15 AM</td>
<td>President's Welcome</td>
<td>Harbor Island 2</td>
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</tbody>
</table>
8:15 AM–9:00 AM Josef Warkany Lecture Harbor Island 2
Developmental Toxicity of Perfluorinated Compounds: A Voyage from Animal Studies to Transfected Cells (L1)
(Joint with DNTS and OTIS)

Chairperson: Dana L. Shuey, Incyte Corporation
Lecturer: Barbara D. Abbott, US Environmental Protection Agency (Retired)

9:05 AM–12:05 PM Graduate Student and Postdoctoral Fellow Harbor Island 2
Platform Session 1
Organized by the Student Affairs Committee
Chairperson, Ida M. Washington, West Virginia University

Presenting author is underlined.

9:05 AM–9:10 AM Introduction
Ida M. Washington, West Virginia University

9:10 AM–9:30 AM 1 Elevated DNA Double-Strand Breaks Determined by Comet Assay in Fetal Brains of Brca1 Knockout Mice Exposed In Utero to Physiological or Ethanol-Enhanced Levels of Reactive Oxygen Species
Afsharian K1, Bhatia S1, Drake DM1, Wells PG1,2. 1Department of Pharmaceutical Sciences and the Centre for Pharmaceutical Oncology, University of Toronto, Toronto, ON, Canada, 2Department of Pharmacology and Toxicology, University of Toronto, Toronto, ON, Canada

Dandjinou M1,2, Sheehy O2, Vigod S3,4, Berard A1,2. 1Faculty of Pharmacy, University of Montréal, Montréal, QC, Canada. 2CHU Sainte-Justine Research Center, Montréal, QC, Canada. 3Women's College Hospital and Women's College Research Institute, Toronto, ON, Canada 4Faculty of Medicine, University of Toronto, Toronto, ON, Canada

Leedom VO1,2, Humphries B3, Zielke KC3, Kotagiri LM3. 1South Carolina Department of Health and Environmental Control, Columbia, SC, United States;2USC Arnold School of Public Health, Columbia, SC, United States;3SC Department of Health and Environmental Control, Columbia, SC, United States
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>10:10 AM–10:30 AM</td>
<td>Determining the Impact of Maternal Antibiotic Use on Inflammation of the Fetal Brain</td>
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<tr>
<td></td>
<td>Dawson EL¹, McDonald VA², Lebovitz Y³, Theus MH², Hrubec TC¹,². ¹Edward Via College of Osteopathic Medicine Virginia Campus, Blacksburg, VA, United States,²Virginia-Maryland College of Veterinary Medicine, Virginia Tech, Blacksburg, VA, United States</td>
</tr>
<tr>
<td>10:30 AM–10:45 AM</td>
<td>Concordance of <em>In Vitro</em> and <em>In Vivo</em> Gene Expression Dynamics for Specific Pathways of Interest for Developmental Neurotoxicity</td>
</tr>
<tr>
<td></td>
<td>Park JJ¹, Wegner SH¹, Workman T¹, Hermsen S², Wallace J¹, Stanaway IB¹, Kim HY¹, Griffith W¹, Hong S¹, Faustman EM¹. ¹University of Washington, Seattle, WA, United States,²Radboud University Medical Center, Nijmegen, Gelderland, The Netherlands</td>
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<tr>
<td>10:45 AM–11:05 AM</td>
<td>Break—Harbor Island Foyer</td>
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<tr>
<td>11:05 AM–11:25 AM</td>
<td>Establishing a Link between Microbiota and AHR in Zebrafish Neurobehavioral Development</td>
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<td>Bertotto LB¹, Wehmas L², Wood C², Carswell G², Howey XM¹, Gaballah S¹, Kvaniscka A¹, Chorley B², Tal T². ¹ORISE/US EPA, Research Triangle Park, NC, United States,²US Environmental Protection Agency, Research Triangle Park, NC, United States</td>
</tr>
<tr>
<td>11:25 AM–11:45 PM</td>
<td>Evaluation of Pre- and Postnatal Exposure to Boric Acid in the Hsd:Sprague Dawley⁰/⁰ SD⁰ Rat</td>
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<td>Watson A¹, Sutherland V¹, Cunny H¹, Miller L², Furr J², Collins B¹, Aillon K³, Smith L³, Vinke T³, Waidyanatha S¹, McIntyre B¹. ¹Division of the National Toxicology Program, National Institute of Environmental Health Sciences, Research Triangle Park, NC, United States,²Southern Research, Birmingham, AL, United States,³MRIGlobal, Kansas City, MO, United States</td>
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<tr>
<td>11:45 PM–12:05 PM</td>
<td>Multifactorial Inputs to Craniofacial Birth Defects</td>
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<td>Everson JL¹, Lipinski RJ², Eberhart JK¹. ¹University of Texas at Austin, Austin, TX, United States,²University of Wisconsin–Madison, Madison, WI, United States</td>
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<td>12:05 PM–1:30 PM</td>
<td>Lunch on Your Own</td>
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<td>12:05 PM –1:30 PM</td>
<td>Past Presidents’ and Honorees’ Luncheon (By Invitation Only) Seabreeze</td>
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<tr>
<td>12:30 PM–1:30 PM</td>
<td>Constitution and Bylaws Committee Meeting Room 514</td>
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<td>12:30 PM–1:30 PM</td>
<td>Membership Committee Meeting Marina 2</td>
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1:30 PM–2:00 PM  F. Clarke Fraser New Investigator Award  
Environmental Chemicals and Developmental Effects: Translating Bench Science to Public Health  
Chairperson: Nicole Churchill Kleinstreuer, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods, NIEHS  
Lecturer: Kembra L. Howdeshell, National Toxicology Program, NIEHS

2:00 PM–2:30 PM  James G. Wilson Publication Award  
Congenital heart disease complexity and childhood cancer risk  
Chairperson: Brian Enright, AbbVie Inc.  
Lecturer: R. Thomas Collins II, Stanford University School of Medicine

2:35 PM–5:30 PM  Ocean-Borne Risks to Pregnant Women and Their Babies Symposium  
(Joint with DNTS)  
Chairpersons: Elaine M. Faustman, University of Washington and Edward D. Levin, Duke University Medical Center

2:35 PM–3:10 PM  S1 Organic Chemicals in the Marine Environment and Their Relevance to Human Health  
Lihini I. Aluwihare, Scripps Institution of Oceanography

José F. Cordero, University of Georgia

3:45 PM–4:00 PM  Break—Harbor Island Foyer

4:00 PM–4:35 PM  S3 Domoic Acid Developmental Neurotoxicity: New Insights from Human and Animal Studies  
Elaine M. Faustman, University of Washington

4:35 PM–5:10 PM  S4 What Can Fish Tell Us About Developmental Neurotoxic Risks of the Sea?  
Edward D. Levin, Duke University Medical Center

5:10 PM–5:30 PM  Discussion

2:35 PM–5:30 PM  Environmental Exposures from Placenta to Birth: Effects on Immunity Symposium  
Chairpersons: Kristal A. Rychlik, Johns Hopkins Bloomberg School of Public Health and Fenna Sillé, Johns Hopkins Bloomberg School of Public Health

2:35 PM–3:10 PM  S5 The Placenta As a Driver of Early- and Later-Life Child Health  
Rebecca C. Fry, University of North Carolina–Chapel Hill
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<th>Time</th>
<th>Session</th>
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<th>Speaker(s)</th>
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<tr>
<td>3:10 PM–3:45 PM</td>
<td>S6</td>
<td>Can We Generalize to a Model of Teratogenic Actions of the Placenta, Using Lessons Learned from Established Viral and Other Teratogens?</td>
<td>Jennifer J. Adibi, University of Pittsburgh Graduate School of Public Health</td>
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<td>3:45 PM–4:00 PM</td>
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<td>Break—Harbor Island Foyer</td>
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<tr>
<td>4:00 PM–4:35 PM</td>
<td>S7</td>
<td>How Prenatal Maternal Exposure to a Stressor Can Alter Placental Functions: The Role of Fetal Immune System Programming</td>
<td>Cathy Vaillancourt, INRS-Institut Armand Frappier</td>
</tr>
<tr>
<td>4:35 PM–5:10 PM</td>
<td>S8</td>
<td>The Long-Term Impact of Prenatal Exposures on Vaccine Immunogenicity and Infectious Disease Risk</td>
<td>Fenna Sillé, Johns Hopkins Bloomberg School of Public Health</td>
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<td>5:10 PM–5:30 PM</td>
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<td>Discussion</td>
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<td>5:35 PM–6:00 PM</td>
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<td>Patricia Rodier Mid-Career Award for Research and Mentoring</td>
<td>Harbor Island 2 for Research and Mentoring</td>
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<td>From Neural Tube Defects to Environmental Contaminants (L2)</td>
<td>(Joint with DNTS)</td>
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<td></td>
<td>Chairpersons: Nicole Churchill Kleinstreuer, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods, NIEHS and Sonya K. Sobrian, Howard University College of Medicine</td>
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<td>Lecturer: Terry C. Hrubec, E. Via Virginia College of Osteopathic Medicine</td>
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<td>6:00 PM–8:00 PM</td>
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<td>Welcome Reception, Poster Session 1, and Exhibits Attended</td>
<td>Nautilus</td>
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<td>(Joint with DNTS)</td>
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<td>Teratology Society Posters P1–P39</td>
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<td>DNTS Posters TBA</td>
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<td>8:00 PM–8:30 PM</td>
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<td>New Associate and Regular Member &quot;Sundae&quot; Night Social</td>
<td>Seabreeze</td>
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Monday, June 24, 2019

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<td>Registration Open</td>
<td>Harbor Island Foyer</td>
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<td>7:00 AM–4:00 PM</td>
<td>Speaker Ready Room</td>
<td>Maritime Boardroom</td>
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<tr>
<td>7:00 AM–8:00 AM</td>
<td>Breakfast with the Teratology Mentors (Advance Signup Is Required)</td>
<td>Seabreeze 1</td>
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<td>7:00 AM–8:00 AM</td>
<td>Nominations and Elections Committee Meeting</td>
<td>Room 514</td>
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<tr>
<td>7:00 AM–8:00 AM</td>
<td>Publications Committee Meeting</td>
<td>Marina 2</td>
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<tr>
<td>7:00 AM–8:00 AM</td>
<td>Science Committee Meeting</td>
<td>Seabreeze 2</td>
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</table>
7:30 AM–8:00 AM  Morning Coffee  (Joint with DNTS)  Harbor Island Foyer

8:00 AM–9:00 AM  Keynote Lecture  Harbor Island 2
Environmental Influences on Child Health Outcomes (ECHO): A National Research Program (L3)  (Joint with DNTS and OTIS)

Chairperson: Christine Perdan Curran, Northern Kentucky University
Speakers: Carol J. Blaisdell, Environmental Influences on Child Health Outcomes, NIH and Amy Elliott, Avera Research Institute

9:05 AM–12:00 Noon  Perinatal Choline Supplementation and Risk of Neurodevelopmental Disorders Symposium  (Joint with DNTS)  Harbor Island 2

Chairpersons: Carl L. Keen, University of California–Davis and Helen J. K. Sable, University of Memphis

9:05 AM–9:15 AM  Introduction

9:15 AM–9:45 AM  S9  Choline and Brain Development: An Overview  Steven H. Zeisel, University of North Carolina–Chapel Hill


10:15 AM–10:30 AM  Break

10:30 AM–11:00 AM  S11  Can Choline Ameliorate the Neurodevelopmental Effects of Prenatal Exposure to Alcohol?  Christina D. Chambers, University of California–San Diego

11:00 AM–11:30 AM  S12  Perinatal Choline Supplementation Improves Social Behavior in Rodent Models of Autism  Tiffany J. Mellot, Boston University School of Medicine

11:30 AM–12:00 Noon  S13  How Targeted Choline Supplementation Reverses the Negative Neurocognitive and Genomic Impacts of Early-Life Iron Deficiency  Michael K. Georgieff, University of Minnesota

9:05 AM–12:00 Noon  Birth Defects Outcomes Across the Lifespan: Perspectives from Health Services Research Symposium  Harbor Island 1

Chairpersons: Russell S. Kirby, USF College of Public Health and Philip Lupo, Baylor College of Medicine

9:05 AM–9:25 AM  S14  Overview of Health Services Research for Birth Defects  Russell S. Kirby, USF College of Public Health
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<th>Topic</th>
<th>Speaker/Institution</th>
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<tr>
<td>9:25 AM–9:55 AM</td>
<td>S15</td>
<td>Opportunities for Economic Analysis of Birth Defects Outcomes and Health Services</td>
<td>Cynthia H. Cassell, Center for Global Health, CDC</td>
</tr>
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<td>9:55 AM–10:25 AM</td>
<td>S16</td>
<td>Surveillance of Congenital Heart Defects among Children, Adolescents, and Adults</td>
<td>Ali N. Zaidi, The Mount Sinai Children’s Heart Center</td>
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<td>10:25 AM–10:40 AM</td>
<td>Break</td>
<td>Break—Harbor Island Foyer</td>
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<tr>
<td>10:40 AM–11:10 AM</td>
<td>S17</td>
<td>The National Spina Bifida Patient Registry: Data on Procedures and Outcomes among Children and Adults with Spina Bifida</td>
<td>Beth Ward, National Center on Birth Defects and Developmental Disabilities, CDC</td>
</tr>
<tr>
<td>11:10 AM–11:40 AM</td>
<td>S18</td>
<td>Co-occurrence of Birth Defects and Pediatric Cancer: A Population Perspective</td>
<td>Jeremy Schraw, Baylor College of Medicine</td>
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<tr>
<td>11:40 AM–12:00 Noon</td>
<td>Discussion</td>
<td>Discussion</td>
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<td>12:00 Noon–2:00 PM</td>
<td>Lunch on Your Own</td>
<td>Lunch on Your Own</td>
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<td>12:00 Noon–1:30 PM</td>
<td>BDR Editorial Board Meeting</td>
<td>BDR Editorial Board Meeting</td>
<td>Marina 2</td>
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<tr>
<td>12:00 Noon–2:00 PM</td>
<td>Professional Development Workshop</td>
<td>Professional Development Workshop Irresponsible Conduct of Research: What Happens When Things Go Wrong</td>
<td>Harbor Island 2, Separate Registration Required, Boxed Lunch Provided</td>
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<tr>
<td>12:00 Noon–12:10 PM</td>
<td>Boxed Lunch Pick-Up</td>
<td>Boxed Lunch Pick-Up</td>
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<tr>
<td>12:10 PM–12:40 PM</td>
<td>W1</td>
<td>Social Responsibility, Unintentional Bias, Diversity, and Inclusion: The Important Role of Mentorship</td>
<td>Terry C. Hrubec, E. Via Virginia College of Osteopathic Medicine</td>
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<tr>
<td>12:40 PM–1:10 PM</td>
<td>W2</td>
<td>Data Management, Publication/Authorship, and Peer Review</td>
<td>Thomas B. Knudsen, National Center for Computational Toxicology, US EPA</td>
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<tr>
<td>1:10 PM–1:40 PM</td>
<td>W3</td>
<td>Financial Management/Collaboration: Conflict of Interest</td>
<td>Christina D. Chambers, University of California–San Diego</td>
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2:00 PM–2:30 PM  Agnish Fellowship Lecture  Harbor Island 2
Healthy Gametes for a Healthy Life
Chairperson, Amy L. Williams, Exponent, Inc.
Speaker: Barbara Hales, McGill University

2:35 PM–5:50 PM  Differences in Sex Development Symposium  Harbor Island 2
Organized by the Public Affairs Committee
Chairpersons: Susan L. Makris, National Center for Environmental Assessment, US EPA and Marcia L. Feldkamp, University of Utah

Introduction

2:40 PM–3:20 PM  S19 Normal Genital Development, Endocrine Disruptors and Hypospadias
Laurence S. Baskin, University of California–San Francisco

3:20 PM–4:00 PM  S20 Improving Outcomes in People with Disorders of Sex Development
Amy Wisniewski, University of Oklahoma Health Sciences Center

4:00 PM–4:15 PM  Break—Harbor Island Foyer

4:15 PM–4:55 PM  S21 Shared Decision-Making in Females with Disorders of Sex Development
Kathleen D. van Leeuwen, Phoenix Children’s Hospital

4:55 PM–5:35 PM  S22 The Potential Role of Xenobiotics in Disorders of Sex Development: Translational Aspects of Research in Animal Models
L. Earl Gray, National Health and Environmental Effects Research Laboratory, US EPA

5:35 PM–5:50 PM  Discussion

2:35 PM–5:50 PM  Integration of Human and Animal Data to Inform Medication Use in Pregnant Women: From Drug Labeling to Clinical Trials Symposium (Joint with OTIS)  Harbor Island 3
Chairpersons: Christina D. Chambers, University of California–San Diego and Marcy Stephens Powell, GlaxoSmithKline

Introduction

Keele Elise Wurst, GlaxoSmithKline
9:05 AM–12:00 Noon Establishing Scientific Confidence in Alternate Approaches Symposium

(Joint with DNTS)

*Organized by the Teratology Society Science Committee*

*Chairpersons: Nicole Churchill Kleinstreuer, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods, NIEHS and Jessica A. Palmer, Stemina Biomarker Discovery, Inc.*

9:05 AM–9:45 AM S27 **Federal Agency Activities to Identify and Implement Alternatives**

Nicole Churchill Kleinstreuer, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods, NIEHS

9:45 AM–10:25 AM S28 **In Vitro to In Vivo Extrapolation Using Maternal-Fetal Models**

Annie Lumen, US Food and Drug Administration

10:25 AM–10:40 AM **Break—Harbor Island Foyer**

10:40 AM–11:20 AM S29 **International Progress on Alternative Approaches for Developmental Neurotoxicity: Evaluation of Assay Batteries and Development of IATAs and AOPs**

Timothy J. Shafer, US Environmental Protection Agency

11:20 AM–12:00 Noon S30 **Integrated Testing Strategies for Developmental Neurotoxicity Testing**

Mamta Behl, National Toxicology Program, NIEHS

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9:05 AM–12:00 Noon Determining Causality in Teratology Symposium

(Joint with OTIS)

*Chairpersons: Nelson Pace, Exponent, Inc. and Sonja A. Rasmussen, University of Florida*

9:05 AM–9:15 AM **Introduction**

9:15 AM–9:50 AM S31 **Criteria for Assessing Causality in Teratology**

Sonja A. Rasmussen, University of Florida

9:50 AM–10:25 AM S32 **A Smoking Gun that Faced Opposition: The Causal Agent of Fetal Alcohol Spectrum Disorders**

Kenneth Lyons Jones, UCSD, CA MotherToBaby

10:25 AM–10:40 AM **Break—Harbor Island Foyer**

10:40 AM–11:15 AM S33 **The Application of Clinical Evidence in the Assessment of Teratogenicity**

John C. Carey, University of Utah
9:05 AM–12:00 Noon  Platform Session 2  Harbor Island 1

**Chairpersons:** Elise Madison Lewis, Charles River Laboratories and Ida M. Washington, West Virginia University

9:05 AM–9:15 AM  Introduction

9:15 AM–9:30 AM  9 Using Whole Embryo Culture to Address Risk to Patients Taking Dolutegravir

Posobiec LM¹, Chapman SP¹, Murzyn S¹, Rendemonti JE¹, Stanislaus DJ¹, Romach B². ¹GlaxoSmithKline Pharmaceuticals, Collegeville, PA, United States, ²Glaxosmithkline, Research Triangle Park, NC, United States

9:30 AM–9:45 AM  10 Plausible Causative Mechanism for Developmental Toxicity of Human Immunodeficiency Virus Integrase Inhibitor Dolutegravir

Cabrera RM, Souder JP, Tukeman G, Gorelick D, Finnell RH. Baylor College of Medicine, Houston, TX, United States

9:45 AM–10:00 AM  11 Unraveling Mechanisms of tris(1,3-dichloro-2-propyl) phosphate-Induced Epiboly Arrest in Zebrafish

Dasgupta S¹, Cheng V¹,², Mitchell CA¹,², Volz D¹. ¹Department of Environmental Sciences, University of California–Riverside, Riverside, CA, United States, ²Environmental Toxicology Graduate Program, University of California–Riverside, Riverside, CA, United States

10:00 AM–10:15 AM  12 Cell-Specific Responses to Hyperglycemic Levels Underlie Phenotypic Variability in Maternal Diabetes Associated Congenital Heart Defects

Mansfield C¹,², Manivannan S¹,², Cameron EM¹,², Garg V¹,²,³, Basu M¹,²,³. ¹Center for Cardiovascular Research, Nationwide Children's Hospital, Columbus, OH, United States, ²Heart Center, Nationwide Children's Hospital, Columbus, OH, United States, ³Department of Pediatrics, The Ohio State University, Columbus, OH, United States
  Tinker SC¹, Gilboa SM¹, Moore CA¹, Waller DK², Simeone RM¹, Kim SY¹, Jamieson DJ³, Botto LD⁴, Fisher S⁵, Reefhuis J¹. ¹Centers for Disease Control and Prevention, Atlanta, GA, United States;²The University of Texas Health Science Center at Houston, Houston, TX, United States;³Emory University School of Medicine, Atlanta, GA, United States;⁴University of Utah School of Medicine, Salt Lake City, UT, United States;⁵New York State Department of Health, Albany, NY, United States

10:30 AM–10:45 AM Break—Harbor Island Foyer

10:45 AM–11:00 AM 14 Genetic and Bioinformatic Approaches to Characterize Ethanol Teratogenesis
  Sidik A¹, Dixon GB², Eberhart JK¹. ¹The University of Texas at Austin, Austin, TX, United States;²The University of Texas at Austin, Austin, TX, United States

11:00 AM–11:15 AM 15 Ethanol-Initiated Brca1 Protein Reductions and Macromolecular Damage in the Brains of Brca1 Knockout Mice Contributing to Postnatal Behavioural Deficits
  Drake DM¹, Wells PG¹,². ¹Department of Pharmaceutical Sciences and the Centre for Pharmaceutical Oncology, University of Toronto, Toronto, ON, Canada;²Department of Pharmacology and Toxicology, University of Toronto, Toronto, ON, Canada

11:15 AM–11:30 AM 16 Neonatal Cord Blood miRNAs As Biomarkers of Neonatal Opioid Withdrawal Syndrome
  Mahnke AH¹, Leeman L², Luo L², Abdelfattah A¹, Shrestha S², Miranda RC¹, Bakhireva LN². ¹Texas A&M University Health Science Center, Bryan, TX, United States;²University of New Mexico Health Sciences Center, Albuquerque, NM, United States
11:30 AM–11:45 AM 17 The Impact of In Utero Prescription Opioid Exposure on Congenital Malformations
Straub L¹, Huybrechts KF¹, Hernandez-Diaz S², Mogun H¹, Bateman BT³,⁴. ¹Division of Pharmacoepidemiology and Pharmacoeconomics Brigham and Women’s Hospital, Harvard Medical School, Boston, MA, United States,²Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, MA, United States,³Division of Pharmacoepidemiology and Pharmacoeconomics, Department of Medicine, Brigham and Women’s Hospital and Harvard Medical School, Boston, MA, United States,⁴Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women’s Hospital and Harvard Medical School, Boston, MA, United States

11:45 AM–12:00 Noon 18 The Effects of Prenatal Stress on Postnatal Maternal Psychological Well-Being in Substance Using Populations
Beauchamp KG¹, Shrestha S¹, Garrison LM¹, Lowe J¹, Stephen JM², Bakhireva LN¹. ¹University of New Mexico Health Sciences Center, Albuquerque, NM, United States,²Mind Research Network, Albuquerque, NM, United States

12:00 Noon–1:30 PM Lunch and Learn Mini Course Harbor Island 1
Adverse Outcome Pathways (AOPs)
(Separate Registration Required)
Organized by the Education Committee
Chairperson: Amy L. Williams, Exponent, Inc.

12:00 Noon–12:10 PM Boxed Lunch Pick-Up

12:10 PM–12:35 PM An Introduction to Adverse Outcome Pathways
Dan Villeneuve, US Environmental Protection Agency

12:35 PM–1:00 PM Application of AOPs to Developmental Outcomes
Thomas B. Knudsen, US Environmental Protection Agency

1:00 PM–1:30 PM AOP Interactive Exercise

12:00 Noon–1:30 PM Lunch on Your Own
### Wiley Symposium

**Maternal Morbidity and Mortality: Causes, Disparities, and Solutions**

*Chairpersons: Suzan L. Carmichael, Stanford University and Mary Alice Smith, University of Georgia*

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<th>Time</th>
<th>Session</th>
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<th>Presenter</th>
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<tr>
<td>1:30 PM–1:45 PM</td>
<td>Introduction</td>
<td>Introduction</td>
<td><em>Emma Roberts, Northeastern University, Bouve College of Health Sciences</em></td>
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<tr>
<td>1:45 PM–2:20 PM</td>
<td>S35</td>
<td>Maternal Morbidity and Mortality: Risk Factors, Trends, and Disparities</td>
<td><em>Suzan L. Carmichael, Stanford University</em></td>
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<tr>
<td>2:20 PM–2:55 PM</td>
<td>S36</td>
<td>Quality Improvement Initiatives to Improve Maternal Health in California</td>
<td><em>Elliott K. Main, Stanford University</em></td>
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<td>2:55 PM–3:10 PM</td>
<td>Break</td>
<td>Break—Harbor Island Foyer</td>
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<tr>
<td>3:10 PM–3:45 PM</td>
<td>S37</td>
<td>Cardiovascular Disease and Preeclampsia: Impact on Maternal and Fetal Health</td>
<td><em>Afshan B. Hameed, University of California–Irvine</em></td>
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<tr>
<td>3:45 PM–4:20 PM</td>
<td>S38</td>
<td>Maternal Genotype and Fetal Sex Impact the Developmental Origins of Stress-Induced Hypertension</td>
<td><em>Terry K. Morgan, Oregon Health &amp; Science University</em></td>
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<td>4:20 PM–4:30 PM</td>
<td>Discussion</td>
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### Current Topics and Updates for Pregnancy Registries Workshop

*(Joint with OTIS)*

*Chairpersons: Deborah Covington, Pharmaceutical Product Development, Inc. and Lewis B. Holmes, MassGeneral Hospital for Children*

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<td>1:30 PM–1:35 PM</td>
<td>Introduction</td>
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<td>1:35 PM–2:00 PM</td>
<td>W5</td>
<td>Detection of an Early Signal for Neural Tube Defects with Exposure to Dolutegravir in Botswana</td>
<td><em>Rebecca Zash, Beth Israel Deaconess Medical Center</em></td>
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<td>2:00 PM–2:25 PM</td>
<td>W6</td>
<td>Management of Neural Tube Defect Signals in the Antiretroviral Pregnancy Registry: Efavirenz vs. Dolutegravir</td>
<td><em>Angela Scheuerle, University of Texas Southwestern Medical Center</em></td>
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</table>
2:25 PM–2:50 PM W7 The Xolair Pregnancy Registry (EXPECT): Perinatal Outcomes among Pregnant Women with Asthma Treated with Omalizumab (Xolair) Compared against Those of a Cohort of Pregnant Women with Moderate-to-Severe Asthma  
*Vic Spain, Genentech*

2:50 PM–3:05 PM Break—Harbor Island Foyer

3:05 PM–3:30 PM W8 First Cases in Small Cohorts: Random Error Playing Games with Us  
*Lewis B. Holmes, MassGeneral Hospital for Children*

3:30 PM–3:50 PM W9 Safety of Tetanus, Diphtheria, and Acellular Pertussis Vaccination in a Cohort of Pregnant Active Duty US Military Women  
*Hall C1,2, Abramovitz LM1,2, Bukowski AT1,2, Khodr ZG1,2, Gumbs GR1,2, Wells NY1,2, Conlin AMS2,3. 1Leidos, Inc., San Diego, CA, United States, 2Naval Health Research Center, San Diego, CA, United States, 3Innovative Employee Solutions, Inc., San Diego, CA, United States*

3:50 PM–4:10 PM W10 Five-Year Survival of Infants with Major Congenital Anomalies: A Registry-Based Study  
*Schneuer FJ1, Bell JC1, Shand A2, Walker K3, Badawi N1, Nassar N1. 1The Children’s Hospital at Westmead Clinical School, The University of Sydney, Sydney, NSW, Australia, 2Department of Maternal Fetal Medicine, Royal Hospital for Women, Randwick, NSW, Australia, 3Grace Centre for Newborn Care, The Children’s Hospital at Westmead, Sydney, NSW, Australia*

4:10 PM–4:30 PM W11 Prevalence and Predictors of Acetaminophen Use in Pregnancy  
*Bandoli G, Luo J, Johnson D, Chambers CC. University of California–San Diego, San Diego, CA, United States*

4:35 PM–6:00 PM Multidisciplinary Research Needs Workshop (W12) Harbor Island 2

*Chairpersons: Dana L. Shuey, Incyte and William Slikker, Jr., National Center For Toxicological Research, US FDA*

4:35 PM–4:50 PM Overview of Workshop Goals and Progress from 2018

4:50 PM–5:30 PM Concurrent Breakout Sessions
- Opioid Research
- *In Vivo* and *In Vitro* Placenta Models
- Modeling and Bioinformatics
- Recommendations from Task Force on Research Specific to Pregnant and Lactating Women (PRGLAC)
### Wednesday, June 26, 2019

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<tr>
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<th>Event</th>
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<tr>
<td>6:30 AM–7:30 AM</td>
<td>Teratology Society 38th Annual Volleyball Game</td>
<td>Lanai Lawn</td>
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<td>7:30 AM–2:30 PM</td>
<td>Registration Open</td>
<td>Harbor Island Foyer</td>
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<tr>
<td>7:30 AM–2:00 PM</td>
<td>Speaker Ready Room</td>
<td>Maritime Boardroom</td>
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<tr>
<td>7:30 AM–8:00 AM</td>
<td>Morning Coffee</td>
<td>Harbor Island Foyer (Joint with DNTS)</td>
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<td>8:00 AM–9:00 AM</td>
<td>Teratology Society and European Teratology Society Exchange Lecture</td>
<td>Harbor Island 2</td>
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<td></td>
<td>The New 3-Rs: Reproducibility and Rigor in Reproduction Studies</td>
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<td>Chairpersons: Manon Beekhuijzen, Charles River and Susan L. Makris, National Center for Environmental Assessment, US EPA</td>
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<tr>
<td>9:05 AM–12:00 Noon</td>
<td>HESI Symposium</td>
<td>Harbor Island 2</td>
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<td>Thyroid Hormone Assessments: Implications for Developmental and Reproductive Toxicology</td>
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<td>Chairpersons: Pragati Sawhney Coder, Charles River and Susan L. Makris, National Center for Environmental Assessment, US EPA</td>
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#### Teratology Society

**The Academic Perspective (L5)**
Seamus Giles, University College, Dublin, Ireland

**Teratology Society**

**The Industrial and Contract Research Perspective (L6)**
Donald G. Stump, Charles River

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<tr>
<td>9:05 AM–9:20 AM</td>
<td>Introduction</td>
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<td>Susan L. Makris, National Center for Environmental Assessment, US EPA</td>
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<tr>
<td>9:20 AM–9:55 AM</td>
<td>S39 The Thyroid Axis: Overview of Anatomy, Physiology, Regulation in Mammalian Systems</td>
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<td>Mary E. Gilbert, National Health and Environmental Effects Research Laboratory, US EPA</td>
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<tr>
<td>9:55 AM–10:30 AM</td>
<td>S40 Thyroid Homeostasis and Disruption in Humans</td>
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<td>T.I.M. Korevaar, Erasmus University</td>
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<td>10:30 AM–11:00 AM</td>
<td>Warkany Tea—Harbor Island Foyer</td>
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<tr>
<td>11:00 AM–11:30 AM</td>
<td>S41 HESI DART-ETS Thyroid Hormone Survey: Results and the Path Forward</td>
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<td>Pragati Sawhney Coder, Charles River</td>
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9:05 AM–10:30 AM Hot Topic Symposium Harbor Island 3
What Do We Need to Know about Climate Change and Effects on Maternal-Fetal Health?

Chairpersons: Christine Perdan Curran, Northern Kentucky University and Janet R. Hardy, ECC Population Health Group LLC

9:05 AM–9:10 AM Welcome and Overview

9:10 AM–9:30 AM S43 Temperature and Adverse Birth Outcomes in California: Compiling the Current Evidence
Rupa Basu, California EPA/Office of Environmental Health Hazard Assessment

9:30 AM–9:55 AM S44 The Risk of Congenital Heart Effects As a Result of Our Changing Climate
Marcia L. Feldkamp, University of Utah

9:55 AM–10:15 AM S45 TBA
Lisa A. Miller, UC Davis School of Veterinary Medicine

10:15 AM–10:30 AM Discussion

10:30 AM–11:00 AM Warkany Tea Harbor Island Foyer (Joint with DNTS)

11:00 AM–12:00 Noon Innovator Award Finalists Platform Session 3 Harbor Island 3

Chairperson: Nicole Churchill Kleinstreuer, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods, NIEHS

11:00 AM–11:20 AM 19 Bypassing the Brain Barriers: Identification of Serum microRNAs Reflective of Developmental Neurotoxicity
O’Shaughnessy KL, Bell KS, Gilbert ME. 1US Environmental Protection Agency, Research Triangle Park, NC, United States, 2Oak Ridge Institute for Science and Education, Oak Ridge, TN, United States

11:20 AM–11:40 AM 20 Computational Synthesis and Integration: Reconstructing Complex Systems for In Silico Testing
11:40 AM–12:00 Noon  Exome Sequencing Identifies ID1 As a Possible Risk Factor for Sacral Agenesis
Pitsava G\(^1\), Feldkamp ML\(^2\), Pankratz N\(^3\), Lane J\(^3\), Kay DM\(^4\), Shaw GM\(^5\), Reefhuis J\(^6\), Jenkins MM\(^6\), Almli LM\(^6\), Olshan AF\(^8\), Pangilinan F\(^9\), Brody LC\(^9\), Canfield M\(^10\), Romitti PA\(^11\), Mills JL\(^1\), UW Center for Mendelian Genomics\(^12\), NISC Comparative Sequencing Program\(^13\), The National Birth Defects Prevention Study\(^14\).
\(^1\)NICHD, NIH, Bethesda, MD, United States, \(^2\)University of Utah, Salt Lake City, UT, United States, \(^3\)University of Minnesota, Minneapolis, MN, United States, \(^4\)New York Department of Health, Albany, NY, United States, \(^5\)Stanford University, Stanford, CA, United States, \(^6\)NCBDDD, CDC, Atlanta, GA, United States, \(^7\)Carter Consulting Inc., Atlanta, GA, United States, \(^8\)University of North Carolina, Chapel Hill, NC, United States, \(^9\)NHGRI, NIH, Bethesda, MD, United States, \(^10\)DHS, Austin, TX, United States, \(^11\)University of Iowa, Iowa City, IA, United States, \(^12\)University of Washington, Seattle, WA, United States, \(^13\)National Institutes of Health, Rockville, MD, United States, \(^14\)Centers for Disease Control and Prevention, Atlanta, GA United States

12:00 Noon–1:30 PM  Lunch on Your Own

12:30 PM–1:30 PM  Awards Committee Meeting  Room 514

12:30 PM–1:30 PM  Education Committee Meeting  Marina 2

12:30 PM–1:30 PM  Finance Committee Meeting  Room 518

12:30 PM–1:30 PM  Public Affairs Committee Meeting  Marina 6

12:30 PM–1:30 PM  Student Affairs Committee Meeting  Room 515

1:30 PM–4:30 PM  Leveraging Zebrafish to Unravel Mechanisms of Developmental Toxicity Symposium
Chairpersons: Tamara L. Tal, US Environmental Protection Agency and David C. Volz, University of California–Riverside

1:30 PM–1:35 PM  Introduction

1:35 PM–2:10 PM  S46  The Developing Pancreas Is a Sensitive Target Organ of Toxicant Exposures
Alicia R. Timme-Laragy, University of Massachusetts–Amherst

2:10 PM–2:45 PM  S47  Endocrine Disruptors Cause Malformations and Functional Defects in the Zebrafish Heart via Membrane-Associated Receptor Pathways
Daniel A. Gorelick, Baylor College of Medicine

2:45 PM–3:00 PM  Break—Harbor Island Foyer
3:00 PM–3:35 PM S48 Triclosan-Resistant Host-Associated Microbiota Perform Xenobiotic Biotransformations in Larval Zebrafish
_Tamara L. Tal, US Environmental Protection Agency_

3:35 PM–4:10 PM S49 Dynamic Alterations in DNA Methylation Precede Tris(1,3-dichloro-2-propyl)phosphate-Induced Delays in Zebrafish Epiboly
_David C. Volz, University of California–Riverside_

4:10 PM–4:30 PM Discussion

1:30 PM–4:30 PM Platform Session 4  Harbor Island 1

_Chairpersons: Nicole Churchill Kleinstreuer, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods, NIEHS and Nelson D. Pace, Exponent, Inc._

1:30 PM–1:45 PM Introduction

1:45 PM–2:00 PM 22 Copper Associates with Differential Methylation in Placentae from Two US Birth Cohorts
_Kennedy EM¹, Everson TM¹, Punshon T², Jackson BP³, Hao K⁴, Lambertini L⁵, Chen J⁶, Karagas MR⁶, Marsit CJ¹,²,³ Department of Environmental Health, Rollins School of Public Health, Emory University, Atlanta, GA, United States, ²Department of Biological Sciences, Dartmouth College, Hanover, NH, United States, ³Department of Earth Sciences, Dartmouth College, Hanover, NH, United States, ⁴Department of Genetics and Genome Sciences, Icahn School of Medicine at Mount Sinai, New York, NY, United States, ⁵Department of Environmental Medicine and Public Health, Icahn School of Medicine at Mount Sinai, New York, NY, United States, ⁶Department of Epidemiology, Geisel School of Medicine, Dartmouth College, Lebanon, NH, United States, ⁷Children’s Environmental Health and Disease Prevention Research Center at Dartmouth, Dartmouth College, Lebanon, NH, United States_

2:00 PM–2:15 PM 23 Evaluation of the Available Male Reproductive Data for Nickel and Nickel Compounds
_Williams AL, DeSesso JM. Exponent, Inc., Alexandria, VA, United States_

2:15 PM–2:30 PM 24 Prenatal Exposure to Sodium Arsenite: Effects on Macrophages
_Rychlik KA, Illingworth E, Attreed S, Kashiwagi C, Howard T, Sillé FC. Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD, United States_
2:30 PM–2:45 PM  25  Effects of Trimester-Specific Prenatal Fluoride Exposure and Childhood IQ in a Canadian Birth Cohort  
Green RR¹, Lanphear BP², Flora D¹, Hornung R³, Ayotte P⁴, Muckle G⁴, Martinez-Mier EA⁵, Till C¹.  
¹York University, Toronto, ON, Canada, ²Simon Fraser University, Burnaby, BC, Canada  
³Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, United States, ⁴Laval University, Quebec City, QC, Canada. ⁵Indiana University, Indianapolis, IN, United States

2:45 PM–3:00 PM  26  Break—Harbor Island Foyer

3:00 PM–3:15 PM  26  Gestational Exposure to GenX Induces Adverse Responses in Maternal Weight Gain and Placental Health in CD-1 Mice  
Blake BE¹,², Cope H¹, Elmore S³, Mahler B³, Scott B³, Fenton SE¹,². ¹National Toxicology Program Laboratory, Division of the National Toxicology Program, NIEHS, Research Triangle Park, NC, United States; ²Curriculum in Toxicology and Environmental Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States.

3:15 PM–3:30 PM  27  Differential Transcript Usage in the Placenta Is Associated with Aberrant Fetal Growth  
Deyssenroth M¹, Peng S¹, Hao K¹, Marsit CJ², Chen J¹. ¹Icahn School of Medicine at Mount Sinai, New York, NY, United States, ²Emory University Rollins School of Public Health, Atlanta, GA, United States.

3:30 PM–3:45 PM  28  Identification of Shared Toxicity Phenotypes in Zebrafish Exposed to Structurally Similar PFAS  
Gaballah S¹, Swank A²,³, Howey XM¹, Schmid J³, Sobus J⁴, Strynar M⁴, Hines E⁵, Catron T¹, McCord J¹, Tal T⁶. ¹ORISE/US EPA, Research Triangle Park, NC, United States; ²US EPA, Research Triangle Park, NC, United States; ³US EPA/ORD/NHEERL/RCU, Research Triangle Park, NC, United States; ⁴US EPA/ORD/NERL/EMMD, Research Triangle Park, NC, United States; ⁵US EPA/ORD/NCEA, Research Triangle Park, NC, United States; ⁶US EPA/ORD/NHEERL/ISTD, Research Triangle Park, NC, United States.
3:45 PM–4:00 PM 29 Oral Fluconazole Use in Pregnancy and the Risk of Birth Defects

Zhu Y¹, Bateman BT¹, Hernandez-Diaz S², Gray KJ¹, Mogun H¹, Huybrechts KF¹. ¹Brigham and Women’s Hospital and Harvard Medical School, Boston, MA, United States;²Harvard T. H. Chan School of Public Health, Boston, MA, United States

4:00 PM–4:15 PM 30 Development after Prenatal Antiepileptic Drug Exposure: Nature, Nurture, or Both?

Huber-Mollema Y¹, Rodenburg R², Oort FU², Lindhout D³. ¹Stichting Epilepsie Instellingen Nederland, Heemstede, Noord-Holland, The Netherlands, ²University of Amsterdam, Amsterdam, Noord-Holland, The Netherlands, ³University Medical Center Utrecht, Utrecht, Utrecht, The Netherlands

4:15 PM–4:30 PM 31 Innovative High-Throughput Screens in Embryonic Stem Cells Report Stress-Forced Increased First Differentiated Lineage and Decreased Second Lineage, Stemness, and Warburg Anabolic Metabolism

Rappolee DA¹, Dutta S¹, Abdulhasan M², Gurdziel K¹, Li Q¹, Ruden D¹, Puscheck E¹. ¹Wayne State University, Detroit, MI, United States;²Reproductive Stress Inc, Grosse Pointe Farms, MI, United States

4:35 PM–6:30 PM Annual Meeting Awards Presentation and Business Meeting

Harbor Island 2

Graduate Student and Postdoctoral Fellow Travel Awards
Wilson Presentation Awards
Marie Taubeneck Award
FASEB DREAM Awards
James C. Bradford Memorial Student Poster Awards
Edward W. Carney Trainee Awards
Teratology Society Innovator Award
Birth Defects Research Distinguished Scholar Award
Edward W. Carney Distinguished Service Award
Recognition of Other Awards Presented throughout the Week
Annual Business Meeting

7:00 PM–9:00 PM Closing Celebration

Shoreline

Thursday, June 27, 2018

7:00 AM–9:30 AM Council 2 Meeting

Marina 2