

Society for Birth Defects Research and Prevention 2021 Annual Meeting
Building Bridges in Birth Defects Research and Prevention: From Innovation to Application
June 24–July 1, 2021

All times shown are Eastern Daylight Time.

As of July 12, 2021

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

Thursday, June 24, 2021

- 11:00 AM–11:10 AM** **President's Welcome**
BDRP President, Elise Madison Lewis, Charles River Laboratories
- 11:10 AM–11:45 AM** **Josef Warkany Lecture (L1)**
Reactive Oxygen Species and DNA Damage/Repair in Developmental Disorders
CME
Chairperson: Elise Madison Lewis, Charles River Laboratories
Lecturer: Peter Wells, University of Toronto
- 11:45 AM–12:30 PM** **Robert L. Brent Lecture—Teratogen Update (L2)**
Identifying New Human Teratogens: Revisiting Shepard's Criteria
CME
Chairperson: Elise Madison Lewis, Charles River Laboratories
Lecturer: Sonja A. Rasmussen, University of Florida College of Medicine
- 12:30 PM–1:00 PM** **Break**
- 1:00 PM–3:30 PM** **Graduate Student and Postdoctoral Fellow Platform Session 1**
Organized by the Student Affairs Committee
Chairpersons: Paul B. Bushdid, Covance Laboratories Inc. and Laura Carlson, US Environmental Protection Agency

Presenting author is underlined.

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|-----------------|---|---|
| 1:00 PM–1:05 PM | | Introduction |
| 1:06 PM–1:24 PM | 1 | Enhanced Ethanol-initiated, Reactive Oxygen Species-dependent Embryopathies in Breast Cancer 1 (Brca1) Knockout Mouse Embryos in Culture
<i><u>Afsharian K, Wells PG.</u> University of Toronto, Toronto, ON, Canada</i> |
| 1:24 PM–1:42 PM | 2 | COVID-19 and Its Effects on the Newborn: A Rapid Review of Available Data
<i><u>Valladares DA, Kramer EF, Powell MM, Pomputius A, Rasmussen SA.</u> University of Florida, Gainesville, FL, United States</i> |

- 1:42 PM–2:00 PM 3 The Effects of Bisphenols on Endochondral Ossification in Murine Limb Bud Cultures
Iskandarani L¹, Hales BF², Robaire B².
¹Department of Pharmacology and Therapeutics, McGill University, Montreal, QC, Canada, ²McGill University, Montreal, QC, Canada
- 2:00 PM–2:18 PM 4 A Novel Molecular Basis for Breast Cancer 1 Protein (BRCA1) Protection of the Fetal Brain from Developmental Disorders Mediated by Reactive Oxygen Species
Drake DM, Wells PG. University of Toronto, Toronto, ON, Canada
- 2:18 PM–2:36 PM 5 Evaluation of Viral Entry and Cellular Passage of Zika Virus Immune Complexes in a Tissue Culture Model of the Maternal-Fetal Interface
Momben Abolfath S, Xu Y, He Y, Eller N, Norton M, Struble E. US Food and Drug Administration, Silver Spring, MD, United States
- 2:36 PM–2:54 PM 6 Exploring Airshed and Watershed Exposure Pathways as Mediators of the Association between Proximity to Surface Mining and Adverse Birth Outcomes in Central Appalachia
Ruktanonchai CW¹, McKnight M², Marr L¹, Krometis L-A¹, Buttlng L², Ranganathan S¹, Kolivras K¹, Gohlke J¹. ¹Virginia Tech, Blacksburg, VA, United States, ²Mitre, McLean, VA, United States
- 2:54 PM–3:12 PM 7 Sex and Strain-Dependent Effects of Prenatal Alcohol Exposure on Craniofacial and Brain Development in Mice
Boschen KE, Fish EW, Cannizzo MD, Dragicevich CJ, Peterson RL, Steensen MC, Parnell SE. University of North Carolina, Chapel Hill, NC, United States
- 3:12 PM–3:30 PM 8 Standardization and Validation of a Scalable Human Neural Rosette Microarray Assay for Assessment of Neural Tube Defect Risk and Developmental Neurotoxicity
Knight GT, Fedorchak N, Lundin B, Ashton RS. University of Wisconsin, Madison, WI, United States

3:30 PM–4:00 PM

Break

4:00 PM–5:00 PM

President's Welcome Social

Friday, June 25, 2021

- 11:00 AM–11:30 AM** **F. Clarke Fraser New Investigator Award (L3)**
Consequentialist Epidemiology of Birth Defects: Early Career Experiences and Key Findings from National and Global Research
Chairperson: Philip Lupo, Baylor College of Medicine
Lecturer: Vijaya Kancherla, Emory University
- 11:30 AM–12:00 Noon** **James G. Wilson Publication Award**
Exploratory analysis of machine learning approaches for surveillance of Zika-associated birth defects
Chairperson: Russell S. Kirby, USF College of Public Health
Lecturers: Richard Lusk, Deloitte Consulting, LLP; John Zimmerman, Deloitte Consulting, LLP and Nicole M. Roth, Centers for Disease Control and Prevention
- 12:00 Noon–12:30 PM** **Patricia Rodier Mid-Career Award for Research and Mentoring (L4)**
Manganese Overexposure during Development: Environmental and Genetic Effects
(Joint with DNTS)
Chairpersons: Philip Lupo, Baylor College of Medicine and Sonia Minnes, Case Western Reserve University
Lecturer: Michael T. Williams, Cincinnati Children's Research Foundation
- 12:30 PM–1:00 PM** **Agnish Fellowship Lecture (L5)**
Education, Service, and Career Paths in the Multidisciplinary Science of Birth Defects Causation and Prevention
Chairperson, Christina M. Carruthers, Janssen Pharmaceuticals
Lecturer: Ronald Hood, The University of Alabama
- 1:00 PM–1:30 PM** **Break**
- 1:30 PM–3:00 PM** **Multidisciplinary Research Needs Workshop**
Chairpersons: Dana L. Shuey, Incyte and William Slikker Jr., National Center for Toxicological Research, US FDA
- 1:30 PM–2:00 PM Overview of Workshop Goals and Progress
Dana L. Shuey, Incyte
- Research Priorities and Funding Opportunities
Daniel Mellon, Center for Drug Evaluation and Research, US FDA and Suzanne E. Fenton, National Institute of Environmental Health Sciences

2:00 PM–2:30 PM

Concurrent Breakout Sessions

Topic 1: Promises and Challenges of Human Induced Pluripotent Stem Cells (hiPSC), Organoids and Engineered 3D Models in Birth Defect Research

Discussion Lead: Thomas B. Knudsen, US Environmental Protection Agency

Scribe: William Slikker Jr., National Center for Toxicological Research, US FDA

Topic 2: Prenatal Diagnostics and Risk Factors for Preterm Birth, Low Birth Weight, Malformations, Maternal Mortality; Cultural, Ethnic, and Socioeconomic Factors

Discussion Lead: Christina D. Chambers, University of California San Diego

Scribe: Laura Dishaw, US Environmental Protection Agency

Topic 3: Single Cell -Omics Meta-Data/resources Available on Various Platforms for the Birth Defect Research Community: How to Utilize These Datasets

Discussion Lead: Madhumita Basu, Nationwide Children's Hospital

Scribe: Alan M. Hoberman, Charles River

2:30 PM–3:00 PM

Reassemble to Discuss Progress from Breakout Sessions

William Slikker Jr., National Center for Toxicological Research, US FDA

1:30 PM–3:00 PM

Professional Development Workshop

Organized by the Membership Committee and Student Affairs Committee

Chairpersons: Paul B. Bushdid, Covance Laboratories Inc. and Deirdre K. Tucker, Charles River Laboratories

1:30 PM–1:35 PM

Introduction

Paul B. Bushdid, Covance Laboratories Inc.

1:35 PM–1:55 PM

Career Options for Trainees

Tacey E.K. White, Aclairo Pharmaceutical Development Group, Inc.

1:55 PM–2:15 PM

Changing Professional Paths Mid-Career

Christine Perdan Curran, Northern Kentucky University

2:15 PM–2:35 PM

Balancing Career and Family

Terry C. Hrubec, E. Via Virginia College of Osteopathic Medicine

2:35 PM–2:55 PM

Career Challenges

Ida M. Washington, West Virginia University

2:55 PM–3:00 PM

Closing Remarks

Monday, June 28, 2021

11:00 AM–11:45 AM

Keynote Lecture (L6)

Pregnancy and the Perils of Precaution: Toward a New Paradigm for the Ethics of Including Pregnant People in Vaccine Research and Deployment
(Joint with OTIS)

Chairperson: Susan L. Makris, US Environmental Protection Agency

Speaker: Carleigh Krubiner, Center for Global Development and Johns Hopkins Berman Institute of Bioethics

11:45 AM–12:30 PM

BDRP and ETS Exchange Lecture

Covid-19 in Pregnancy and Lactation: US and European Perspectives on Research and Public Health
(Joint with OTIS)

Chairpersons: Susan Makris, US Environmental Protection Agency and Manon Beekhuijzen, Charles River

BDRP

Christina D. Chambers, University of California San Diego

ETS

David Baud, Centre Hospitalier Universitaire Vaudois (CHUV)

12:30 PM–1:00 PM

Break

1:00 PM–3:00 PM

Wiley Symposium

Approaches for Mechanistic Evidence Analysis in Hazard Evaluation of Reproductive Toxicology Data

Chairpersons: Xabier Arzuaga, US Environmental Protection Agency and Erin Yost, US Environmental Protection Agency

1:00 PM–1:05 PM

Introduction

Xabier Arzuaga, US Environmental Protection Agency

1:05 PM–1:25 PM

S1

The Hazards of Endocrine Disrupting Chemicals Partially Overlap with the Hazards of Reproductive Toxicants

Michele La Merrill, University of California, Davis

1:25 PM–1:45 PM

S2

A New Approach Methods-Based Integrated Assessment of Estrogenicity of Alkylphenols

Fabian Grimm, ExxonMobil Biomedical Sciences, Inc.

1:45 PM–2:05 PM

S3

Application of Key Characteristics in Support of Identifying Chemicals with Reproductive Hazard Traits

Lauren Zeise and Francisco Moran, California Environmental Protection Agency

2:05 PM–2:25 PM	S4	Application of the Key Characteristics Approach to Female Reproductive Hazard Identification: Benzo[a]pyrene as a Case Example <i>Ulrike Luderer, University of California, Irvine</i>
2:25 PM–2:45 PM	S5	Applying the Key Characteristics Approach to Evaluate Mechanistic Evidence for Qualitative and Quantitative Weight of Evidence to Support Risk Assessment: A Case Study with Benzo[a]Pyrene-Induced Male Reproductive Toxicity <i>Ingrid Druwe US Environmental Protection Agency</i>
2:45 PM–3:00 PM		Discussion

1:00 PM–3:00 PM

The Effects of Water Fluoridation on Neurodevelopment and Other Health Outcomes Symposium
(Joint with DNTS)

Chairpersons: Kembra L. Howdeshell, National Institute of Environmental Health Sciences and Kyla Taylor, National Institute of Environmental Health Sciences

1:00 PM–1:05 PM		Introduction <i>Kembra L. Howdeshell, National Institute of Environmental Health Sciences</i>
1:05 PM–1:30 PM	S6	Fluoride Intake and Exposure and Oral Health Effects <i>E. Angeles Martinez Mier, Indiana University School of Dentistry</i>
1:30 PM–1:55 PM	S7	Early-Life Exposures to Fluoride and Child Neurodevelopmental Outcomes <i>Christine Till, York University</i>
1:55 PM–2:20 PM	S8	Systematic Review of Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects <i>Kyla Taylor, National Institute of Environmental Health Sciences</i>
2:20 PM–2:45 PM	S9	Fluoride Exposure and Neuroendocrine Outcomes among Youth in the United States <i>Ashley Malin, Keck School of Medicine, University of Southern California</i>
2:45 PM–3:00 PM		Discussion

1:00 PM–3:00 PM

Neglected Diseases/Neglected Patients Symposium

Chairpersons: Jane Stewart, Apconix, Melissa S. Tassinari, Consultant, and Belen Tornesi, Medicine for Malaria Medicine

1:00 PM–1:05 PM		Introduction <i>Melissa S. Tassinari, Consultant</i>
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1:05 PM–1:30 PM	S10	Global Efforts for Eradication of Malaria: A Focus on Pregnant and Lactating Women <i>Belen Tornesi, Medicine for Malaria Medicine</i>
1:30 PM–1:55 PM	S11	The Use of a Humanized Mouse Model to Assess Antimalarial Efficacy and Identify Optimal Drugs Combinations <i>Claudia Demarta-Gatsi, Medicines for Malaria Venture</i>
1:55 PM–2:20 PM	S12	Working in Operationally Challenging Situations: How Do We Get Malarial Drugs to Pregnant Women in the Real World? <i>Bhargavi Rao, Médecins Sans Frontières (MSF) UK</i>
2:20 PM–2:45 PM	S13	Above All Do No Harm: How Can Pregnancy Outcomes for Malarial Patients Be Monitored and How Can Benefit-Risk Be Assessed? <i>Stephanie Dellicour, Liverpool School of Tropical Medicine</i>
2:45 PM–3:00 PM		Discussion

3:00 PM–3:30 PM

Break

3:30 PM–4:30 PM

Poster Session 1

Attended for Questions & Answers
Posters P1–P17 and LB1–LB3

- P1 Abstract Withdrawn
- P2 Congenital Infections in Twin Pregnancies: A Narrative Review
Daza M¹, Valencia D², Mulkey SB³, Mercado MM⁴, Moore CA². ¹Vysnova Partners, Bogotá, Colombia, ²Centers for Disease Control and Prevention, Atlanta, GA, United States, ³Children's National Hospital, Washington, DC, United States, ⁴Instituto Nacional de Salud, Bogotá, Colombia
- P3 Gestational Fluoride Exposure and Birth Outcomes: The MIREC Cohort
Goodman CV¹, Hall MK¹, Green R¹, Hornung R², Martinez-Mier EA³, Lanphear B⁴, Till C⁵. ¹Faculty of Health, York University, Toronto, ON, Canada, ²Retired, Loveland, OH, United States, ³Indiana University School of Dentistry, Indianapolis, IN, United States, ⁴Faculty of Health Sciences, Simon Fraser University, Burnaby, BC, Canada, ⁵York University, Toronto, Toronto, ON, Canada
- P4 Validation Studies to Assess Toxicological Endpoints of Group Housed Pregnant Rabbits for Use in Reproductive Toxicology Studies
Sheikh I, Clubb SK, Mooney K. Charles River Laboratories, Edinburgh, United Kingdom

- P5 Implementation of the Key Characteristics of Male Reproductive Toxicants to Synthesize Mechanistic Evidence: A Case Study of Benzo[a]pyrene
Blake BE¹, Arzuaga X², Druwe I¹. ¹US EPA, Research Triangle Park, NC, United States, ²US EPA, Washington, DC, United States
- P6 Epidemiology of Nonsyndromic, Orofacial Clefts in Texas: Differences by Cleft Type and Presence of Additional Defects
Navarro Sanchez ML¹, Agopian AJ¹, Swartz MD², Canfield MA³, Langlois PH³. ¹Department of Epidemiology, Human Genetics and Environmental Sciences, UTHHealth School of Public Health, Houston, TX, United States, ²Department of Biostatistics and Data Science, UTHHealth School of Public Health, Houston, TX, United States, ³Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States
- P7 Validation of Zebrafish Embryotoxicity Test (ZET) As a Qualified Alternative Assay For Its Regulatory Use
Alday A, Solis JC, Muriana A, Quevedo C. BBD BioPhenix-BIOBIDE, Donostia, Spain
- P8 Comparing Socio-Demographic Characteristics of Mothers Who Did and Did Not Participate in a Survey Related to the Prevention of Neural Tube Defects
Betancourt D¹, Shumate CJ¹, Canfield MA², Ethen MK¹, Navarro Sanchez ML³. ¹Texas Department of State Health Services, Austin, TX, United States, ²Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States, ³Department of Epidemiology, Human Genetics and Environmental Sciences, UTHHealth School of Public Health, Houston, TX, United States
- P9 Early Neonatal Mortality among Babies Born with Spina Bifida in Finland, 2000–2014
Kancherla V¹, Mowla S¹, Räisänen S², Gissler M³. ¹Emory University, Atlanta, GA, United States, ²Tampere University of Applied Sciences, Highland Heights, KY, United States, ³THL Finnish Institute of Health and Welfare, Helsinki, Finland
- P10 Moderate Prenatal Alcohol Exposure Increases Toll-Like Receptors Activity Detectable in Umbilical Cord Blood at Birth
Maxwell JR¹, Noor S¹, Pavlik N¹, Rodriguez D², Enriquez Marquez L², DiDomenico J¹, Bakhireva L². ¹University of New Mexico, Albuquerque, NM, United States, ²University of New Mexico, College of Pharmacy, Albuquerque, NM, United States
- P11 Epidemiology of Coloboma: Prevalence and Patterns in Texas, 1999–2014
Chambers T¹, Keyzer M¹, Benjamin RH², Shumate CJ³, Le M³, Canfield MA⁴, Lewis RA¹, Hufnagel RB⁵, Agopian AJ², Brooks BP⁵, Mitchell LE⁶, Lupo PJ⁷. ¹Baylor College of Medicine, Houston, TX, United States, ²Department of Epidemiology, Human Genetics and Environmental Sciences, UTHHealth School of Public Health, Houston, TX, United States, ³Texas Department of State Health Services, Austin, TX, United States, ⁴Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States, ⁵National Eye Institute, Bethesda, MD, United States, ⁶University of Texas School of

Public Health, Houston, TX, United States, ⁷Department of Pediatrics, Section of Hematology-Oncology, Baylor College of Medicine, Houston, TX, United States

- P12 Identifying Congener-Specific Half-Lives of Polychlorinated Biphenyls: A Mapping Review of the Literature
Chiang C¹, Zurlinden T², Kapraun D², Carlson LM², Trgovcich J³, Silva R³, Christensen K², Schlosser P², Lehmann O². ¹US EPA, Morrisville, NC, United States, ²US EPA, Durham, NC, United States, ³ICF International, Durham, NC, United States
- P13 Racial and Ethnic Disparities in Infant Mortality among Infants with Birth Defects in North Carolina, 2003–2017
Forestieri NE¹, Lee RC², Avery M². ¹NC Birth Defects Monitoring Program, Raleigh, NC, United States, ²NC State Center for Health Statistics, Raleigh, NC, United States
- P14 Infant Exposure to Chemicals via Human Milk: Next 22 High Priority Chemicals Under Review at US EPA
Cooper C. ORISE Fellow, Alexandria, VA, United States
- P15 Assessing Adult Motor Function in Three Genotypes of Mice Exposed to Benzo[a]Pyrene During Early Brain Development
Perry C, Foster E, Niang D, Clough K, Forrest T, Curran CP. Northern Kentucky University, Highland Heights, KY, United States
- P16 Extent and Effects of Quaternary Ammonium Disinfectant Exposure in People
Hrubec TC¹, Seguin RP², Xu L³, Cortopassi GA⁴, Datta S⁴, Hanlon AL⁵, Lozano AJ⁵, McDonald VA⁶, Healy OO⁶, Anderson TC⁶, Musse NM⁶, Williams RT⁶. ¹E. Via College of Osteopathic Medicine, Blacksburg, VA, United States, ²Department of Medicinal Chemistry, School of Pharmacy, Seattle, WA, United States, ³Department of Medicinal Chemistry, School of Pharmacy, Albuquerque, NM, United States, ⁴Department of Molecular Biosciences, School of Veterinary Medicine, Davis, CA, United States, ⁵Center for Biostatistics and Health Data Science, Roanoke, VA, United States, ⁶E. Via College of Osteopathic Medicine–Virginia, Blacksburg, VA, United States
- P17 Exposure to Camel Snus *In Utero* Causes Skeletal Defects
Vera-Colon MKM, Soh R, Sparks NRL, Walker LM, zur Nieden NI. University of California, Riverside, Riverside, CA, United States
- LB1 Current Breast Milk PFAS Levels in the US and Canada: After All This Time Why Don't We Know More?
Fenton SE¹, Verner M-A², Goeden H³, Naiman DQ⁴, Marchitti SA⁵, Hines EP⁶, Lehmann GM⁷, LaKind JS⁸. ¹DNTP/NIEHS/NIH, Research Triangle Park, NC, United States; ²Université de Montréal, Montréal, QB, Canada; ³Minnesota Department of Health, Environmental Health Division, St. Paul, MN, United States; ⁴The Johns Hopkins University, Baltimore, MD, United States; ⁵LaKind Associates, LLC, Commerce City, CO, United States; ⁶US Environmental Protection Agency, Research Triangle Park, NC, United States; ⁷Center for Public Health and Environmental Assessment, Office of Research & Development, Research Triangle Park, NC, United States; ⁸LaKind Associates, LLC; Department of

Epidemiology and Public Health, University of Maryland School of Medicine, Catonsville, MD, United States

- LB2 Incidence of Neurologic Findings in Esophageal Atresia Cohort at a Single Institution: A Retrospective Analysis
Evanovich DM¹, Wang JT², Jennings RW³, Bajic D⁴. ¹Department of Anesthesiology, Critical Care and Pain Medicine, Boston Children's Hospital and Tufts University School of Medicine, Boston, MA, United States, ²Department of Anesthesiology, Critical Care and Pain Medicine, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States, ³Department of Surgery, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States, ⁴Department of Anesthesiology, Critical Care and Pain Medicine, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States
- LB3 Brain Organoids to Study SARS-Cov-2 Infection of Developing CNS
Smirnova L, Bullen CK, Hogberg HT, Pekosz A, Bishai W, Hartung T. Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, United States

7:00 PM–9:00 PM

BDRP Trivia Night Social

*Organized by the Student Affairs Committee
(Space is limited for this event)*

Tuesday, June 29, 2021

10:00 AM–10:45 AM

New and Prospective Member Meet and Greet

Organized by the Membership Committee

11:00 AM–12:30 PM

Platform Session 2

*Chairpersons: Maia M. Green, ExxonMobil Biomedical Sciences, Inc. and
Kristal A. Rychlick, Johns Hopkins University Bloomberg School of Public Health*

Presenting author is underlined.

- 11:00 AM–11:15 AM 9 Tracking Development in the First Two Years of Life Among Children with Possible Congenital Zika Virus Exposure: 50 US States and the District of Columbia
Neelam V¹, Woodworth K¹, Chang DJ¹, Roth NM¹, Reynolds MR¹, Tong VT¹, Anderson K¹, Mulkey SB², DeBiasi OO², Biddle C², Lee EH³, Lash MK³, Godred-Cato S¹, Gilboa SM¹, Honein MA¹, Moore CA¹. ¹Centers for Disease Control, Atlanta, GA, United States, ²Children's National Hospital, Washington, DC, United States, ³New York City Department of Health and Mental Hygiene, Long Island City, NY, United States
- 11:15 AM–11:30 AM 10 Risk of Birth Defects by Pregestational Type 1 or Type 2 Diabetes: National Birth Defects Prevention Study, 1997–2011
Marchincin SL¹, Howley MM², Van Zutphen AR², Fisher SC², Nestoridi E³, Tinker S⁴, Browne ML². ¹New York State Department of Health, Buffalo, NY, United States, ²New York State Department of Health, Albany, NY, United States,

³Massachusetts Center for Birth Defects Research and Prevent, Department of Public Health, Boston, MA, United States, ⁴National Center on Birth Defects and Developmental Disabilities; CDC, Atlanta, GA, United States

11:30 AM–11:45 AM

11

Co-Occurring Birth Defects in Children with Nonsyndromic Microtia

Schraw JM¹, Benjamin RH², Scott DA³, McLean SD⁴, Northrup H⁵, Langlois PH⁶, Canfield MA⁶, Scheuerle AE⁷, Schaaf OO¹, Ray, JW⁸, Chen H⁹, Swartz MD¹⁰, Agopian AJ¹¹, Lupo PJ¹². ¹Baylor College of Medicine, Houston, TX, United States, ²Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX, United States, ³Department of Molecular and Human Genetics, Baylor College of Medicine, Houston, Texas, Houston, TX, United States, ⁴Baylor College of Medicine, San Antonio, TX, United States, ⁵University of Texas Health Science Center at Houston, Houston, TX, United States, ⁶Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States, ⁷Department of Pediatrics, Division of Genetics and Metabolism, University of Texas Southwestern Medical Center, Dallas, TX, United States, ⁸University of Texas Medical Branch, Galveston, TX, United States, ⁹Center for Precision Health, UTHealth School of Public Health and UTHealth School of Biomedical Informatic, Houston, TX, United States, ¹⁰Department of Biostatistics and Data Science, UTHealth School of Public Health, Houston, TX, United States, ¹¹Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX United States, ¹²Department of Pediatrics, Section of Hematology-Oncology, Baylor College of Medicine, Houston, TX, United States

11:45 AM–12:00 Noon

12

The Association between the Occurrence of Gastroschisis and Maternal Chlamydia Infection among Cases in the Texas Birth Defects Registry, 2013–2017

Shumate CJ¹, Russell K², Navarro Sanchez ML³, Le M¹, Canfield MA⁴. ¹Texas Department of State Health Services, Austin, TX, United States, ²Maternal and Child Health Epidemiology, Texas Department of State Health Services, Austin, TX, United States, ³Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX, United States, ⁴Birth Defects Epidemiology and

Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States

- 12:00 Noon–12:15 PM 13 Maternal Vitamin D Status and Risk of Select Birth Defects in the National Birth Defects Prevention Study (1997–2011)
Adrien N¹, Yazdy M², Nestoridi E², Carmichael SL³, Orta OR⁴. ¹Department of Epidemiology, Boston University School of Public Health, Boston, MA, United States, ²Massachusetts Center for Birth Defects Research and Prevent, Department of Public Health, Boston, MA, United States, ³Department of Pediatrics and Obstetrics and Gynecology, Stanford University School of Medicine, Stanford, CA, United States, ⁴Boston University School of Public Health, Department of Epidemiology, Boston, MA, United States
- 12:15 PM–12:30 PM 14 Unique Clusters of Sudden Unexpected Infant Death (SUID) Decedents Revealed Through Machine Learning Epidemiological Analyses
Blackburn J¹, Chapur VF², Stephens JA³, Zhao J³, Shepler A⁴, Pierson CR⁵, Otero JJ⁶. ¹The Ohio State University, Columbus, OH, United States, ²Instituto de Ecoregiones Andinas (INECOA)/Consejo Nacional de investigaciones científicas y técnicas, San Salvador de Jujuy, Argentina, ³The Ohio State University, Center for Biostatistics, Columbus, OH, United States, ⁴Franklin County Forensic Science Center, Columbus, OH, United States, Nationwide Children's Hospital, Department of Pathology and Laboratory Medicine, Columbus, OH, United States, ⁶The Ohio State University, Department of Pathology, Division of Neuropathology, Columbus, OH, United States

11:00 AM–12:30 PM

Platform Session 3

Chairpersons: William Slikker Jr., National Center for Toxicological Research, US FDA and Bevin Blake, National Institute of Environmental Health Sciences

Presenting author is underlined.

- 11:00 AM–11:15 AM 15 *In Vitro* to *In Vivo* Extrapolation for Developmental Toxicity Potency of Valproic Acid Analogues
Chang X¹, Kleinstreuer NC², Casey WM³, Allen DG⁴, Ceger P⁴, Bell S⁴, Mansouri K², Palmer J⁵, Donley OO⁵, Lumen A⁶, Lee UJD⁷. ¹Integrated Laboratory Systems, LLC, Morrisville, NC, United States, ²NIH/NIEHS/DNTP/NICEATM, Research Triangle Park, NC, United States, ³NIH/NIEHS/DNTP, Research Triangle Park, NC, United States, ⁴Integrated Laboratory Systems, LLC, Morrisville, NC, United States, ⁵Stemina Biomarker Discovery Inc., Madison, WI, United States

States, ⁶US FDA/NCTR, Jefferson, AR, United States, ⁷Albert Einstein College of Medicine, Bronx, NY, United States

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| 11:15 AM–11:30 AM | 16 | Does Nrf2 Play a Role in the Developmental Toxicity of the Sulfate Metabolite of 3,3'-dichlorobiphenyl (PCB-11)?
<i>Roy MA, Gridley CK, Li S, Park Y, Timme-Laragy AR. University of Massachusetts Amherst, Amherst, MA, United States.</i> |
| 11:30 AM–11:45 AM | 17 | A Data-Driven Model Analysis of Retinoid Signaling in Skeletal Dysmorphogenesis and Potential Adverse Outcome Pathways
<i>Pierro JD¹, Baker NC², Richard AM¹, Kleinstreuer NC³, Knudsen TB¹. ¹US EPA, Research Triangle Park, NC, United States, ²Leidos, Research Triangle Park, NC, United States, ³NIH/NIEHS/DNTP/NICEATM, Research Triangle Park, NC, United States</i> |
| 11:45 AM–12:00 Noon | 18 | The Effects of Low Dose Cadmium on Mouse Embryo Vascular Development <i>In Vitro</i>
<i>Erwin NJ¹, Liu J², Kapron CM³. ¹Environmental & Life Sciences, Peterborough, ON, Canada, ²Shandong University / School of Medicine, Jinan, China, ³Trent University, Peterborough, ON, Canada</i> |
| 12:00 Noon–12:15 AM | 19 | Transcriptome Analysis Reveals Toxicant-Induced miRNA Signatures Associated with Aberrant Human Embryonic Stem Cell Osteoblast Differentiation
<i>Sparks NRL¹, Williams D², zur Nieden NI¹. ¹University of California, Riverside, Riverside, CA, United States, ²Department of Molecular, Cell, and Systems Biology, College of Natural and Agricultural Sciences, Riverside, CA, United States</i> |
| 12:15 PM–12:30 PM | 20 | ReproTracker: A Human Stem Cell-Based Biomarker Assay for <i>In Vitro</i> Assessment of Developmental Toxicity
<i>Jamalpoor A, Hartvelt S, Zwetsloot T, Ghoussain N, Osterlund T, Hendriks G. Toxys B.V., Leiden, Netherlands</i> |

11:00 AM–12:30 PM

Platform Session 4

*Chairpersons: Barbara F. Hales, McGill University and
Madhumita Basu, Nationwide Children's Hospital*

Presenting author is underlined.

- 11:00 AM–11:15 AM 21 Effects of Bisphenol A and Bisphenol AF on the Murine Limb Bud Transcriptome
McHattie TJ¹, Iskandarani L¹, Robaire B^{1,2}, Hales BF¹. ¹Department of Pharmacology and Therapeutics, McGill University, Montreal, QC, Canada; ²Department of Obstetrics and Gynecology, McGill University, Montreal, Quebec, Canada
- 11:15 AM–11:30 AM 22 A New Entity: Vascular-Induced Skeletal Dystrophisms of the Lower Limb
Hootnick D¹, DeSesso JM². ¹SUNY Upstate Medical University, Syracuse, NY, United States, ²Exponent and Georgetown University School of Medicine, Alexandria, VA, United States
- 11:30 AM–11:45 AM 23 Alteration of the Expression of Proteins Associated with Radical Glial Scaffold Development in Ethanol-Exposed Forebrain Organoids Derived from Human Embryonic Stem Cells
Chen S¹, Lu L¹, Yuan F¹, Liu J¹, Wilkey DW², Merchant ML². ¹Department of Pharmacology and Toxicology, University of Louisville Health Science Center, Louisville, KY, United States, ⁶Department of Medicine, University of Louisville Health Science Center, Louisville, KY, United States
- 11:45 AM–12:00 Noon 24 Using Live Imaging and FUCCI ESC to Provide QC for a DevTox HTS and to Define Stressful Doses of PFOA and DEP
Rappolee DA¹, Abdulhasan M¹, Ruden X¹, You Y¹, Harris S², Ruden D¹, Awonuga A¹, Alvero A¹, Puscheck O¹. ¹Wayne State University, Detroit, MI, United States, ²University of Michigan, Ann Arbor, MI, United States
- 12:00 Noon–12:15 PM 25 Aryl Hydrocarbon Receptor Mediated Disruption of Dopaminergic and Serotonergic Signaling in the Hippocampus and Prefrontal Cortex of Mice Exposed to Benzo[a]pyrene during Development
Foster E, Clough K, Curran CP. Northern Kentucky University, Highland Heights, KY, United States

12:15 PM–12:30 PM 26 Exposure to Flame Retardants and Surfactants *In Utero* and Biomarkers of Human Placental Development and Disease
Varshavsky J¹, Robinson JF¹, Zhou Y¹, Puckett K¹, Buarpong S¹, Aburajab R¹, Gaw S¹, Sen O², Crispo Smith S³, Frankenfield J³, Park J-S³, Fisher S¹, Woodruff T¹. ¹University of California, San Francisco, San Francisco, CA, United States, ²The University of Tennessee Health Science Center, Memphis, TN, United States, ³Department of Toxic Substances Control, Berkeley, CA, United States

12:30 PM–1:00 PM

Break

1:00 PM–3:00 PM

Cannabis in Pregnancy and Through Generations Symposium

Organized by the Public Affairs Committee

Chairpersons: Poorni R. Iyer, California EPA and Marlissa Campbell, California EPA



1:00 PM–1:05 PM

Introduction
Poorni R. Iyer, California EPA and Marlissa Campbell, California EPA

1:05 PM–1:30 PM

S14 A Review of Epidemiological Evidence in Humans of the Effects of Prenatal Exposure to Cannabis (Smoke and Δ9-THC).
Farla Kaufman, California EPA

1:30 PM–1:55 PM

S15 A Clinical Perspective on Cannabis Use During Pregnancy
Torri Metz, University of Utah Health

1:55 PM–2:20 PM

S16 Perinatal Exposure to Δ9-tetrahydrocannabinol Alters Immune Functions in Fetal and Postnatal Stages of Life: Role of Epigenetic Pathways
Prakash Nagarkatti, University of South Carolina School of Medicine

2:20 PM–2:45 PM

S17 Epigenetic Effects of Cannabis on the Developing Brain
Anissa Bara, Icahn School of Medicine at Mount Sinai

2:45 PM–3:00 PM

Discussion

1:00 PM–3:00 PM

HESI Symposium

Nonclinical Considerations for Inclusion of Pregnant and Lactating Women in Clinical Trials

Chairpersons: Kary Ellen Thompson, Janssen Pharmaceuticals and Dinesh J. Stanislaus, GlaxoSmithKline

1:00 PM–1:05 PM

Introduction
Kary Ellen Thompson, Janssen Pharmaceuticals

1:05 PM–1:30 PM	S18	The Time Is Now: Why We Must Include Pregnant and Lactating Women in Drug Development <i>Belen Tornesi, Medicine for Malaria Medicine</i>
1:30 PM–1:55 PM	S19	Nonclinical Evaluation of Medicines Used in Pregnancy/Lactation: Looking Back to Move Forward <i>Dinesh J. Stanislaus, GlaxoSmithKline</i>
1:55 PM–2:20 PM	S20	Considerations for Evolution of the Nonclinical Toxicology Paradigm to Enable Clinical Trials in Pregnant/Lactating Patients <i>Kary Ellen Thompson, Janssen Pharmaceuticals</i>
2:20 PM–2:45 PM	S21	Making Nonclinical Data Meaningful: Communicating Data and Risk Assessment with HCP and Women <i>Wendy Halpern, Genentech</i>
2:45 PM–3:00 PM		Discussion

1:00 PM–3:00 PM

Current Topics and Updates for Pregnancy Registries Workshop (Joint with OTIS)

Chairpersons: Lewis B. Holmes, MassGeneral Hospital for Children and Keele Elise Wurst, GlaxoSmithKline

1:00 PM–1:05 PM		Introduction
1:05 PM–1:25 PM	W1	Criteria Used for Classifying Abnormalities Identified in the Antiretroviral Pregnancy Registry <i>Angela Scheuerle, UT Southwestern Medical Center</i>
1:25 PM–1:45 PM	W2	The Inclusion/Exclusion Criteria Used by the North American Antiepileptic Drug (AED) Pregnancy Registry <i>Lewis B. Holmes, MassGeneral Hospital for Children</i>
1:45 PM–2:05 PM	W3	An Update on the Use of Social Media to Recruit Pregnant People into Pregnancy Registries <i>Nicole Chavez, Nicole Chavez Public Relations</i>
2:05 PM–2:25 PM	W4	Trends in Antiepileptic Drug Use and individual Treatment Pattern during the First Trimester of Pregnancy: An Evaluation of the German Embryotox Cohort <i>Hoeltzenbein M, Slimi S, Fietz AK, Onken M, Dathe K, Schaefer C. Charité-Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt Universität zu Berlin, and Berlin Institute of Health, Institut für Klinische Pharmakologie und Toxikologie, Pharmakovigilanz- und Beratungszentrum für Embryonaltoxikologie, Berlin, Germany</i>

2:25 PM–2:45 PM W5 The Development of a Belgian Prospective Data Registration System on Perinatal Medication Use and Mother-Infant Outcomes: An Introduction to the BELpREG Initiative
Sillis L¹, Ceulemans M¹, Van Calsteren K^{2,3}, Smits A^{3,4}, Hompes T^{5,6}, Bogaerts A^{3,7,8}, Allegaert K^{1,3,9}, De Vos M^{3,10}, Verbakel JY^{11,12}, Foulon V¹.
¹Department of Pharmaceutical and Pharmacological Sciences, KU Leuven, Belgium, ²Department of Obstetrics and Gynecology, University Hospitals Leuven Gasthuisberg, Belgium, ³Department of Development and Regeneration, KU Leuven, Belgium, ⁴Department of Pediatrics and Neonatology, University Hospitals Leuven Gasthuisberg, Belgium, ⁵Adult Psychiatry UPC, KU Leuven, Belgium, ⁶Department of Neurosciences, KU Leuven, Belgium, ⁷Faculty of Medicine and Health Sciences, University of Antwerp, Belgium, ⁸Faculty of Health, University of Plymouth, Devon, United Kingdom, ⁹Department of Clinical Pharmacy, Erasmus MC Sophia's Children Hospital, the Netherlands, ¹⁰Department of Electrical Engineering (ESAT), KU Leuven, Belgium, ¹¹Department of Public Health and Primary Care, KU Leuven, Belgium, ¹²Nuffield Department of Primary Care Health Sciences, University of Oxford, United Kingdom

2:45 PM–3:00 PM Discussion

3:00 PM–3:30 PM

Break

3:30 PM–4:30 PM

Poster Session 2

Attended for Questions & Answers
Posters P18–P34 and LB4–LB7

P18 Abstract Withdrawn

P19 The Impact of Timing of *In Utero* Marijuana Exposure on Fetal Growth
Dodge PA¹, Nadolski K¹, Kopkau H¹, Forrestal K², Bailey B¹, Zablocki V¹.
¹Central Michigan University College of Medicine, Mount Pleasant, MI, United States, ²Central Michigan University, Mount Pleasant, MI, United States

P20 Abstract Withdrawn

P21 Abstract Withdrawn

P22 A Comparison of Computational Toxicology Test Results with *In Vivo* and *In Vitro* Endpoints Related to Mode of Action and the Endocannabinoid System: A Case Study with Chlorpyrifos, Chlorpyrifos-oxon and $\Delta 9$ Tetrahydrocannabinol

Silva MH, Retired from a Career in Toxicology and Risk Assessment, Davis, CA, United States

- P23** Periconceptional Folic Acid Use Prevents Both Rare and Common Neural Tube Defects
Zhou Y, Crider K, Yeung L, Rose CE, Berry RJ, Moore CA. CDC, Atlanta, GA, United States
- P24** Maternal Smoking During Pregnancy and Newborn Neurobehavior and Abstinence: A Review of the Literature
Stanfield J¹, Corey A², McCallum M², Jao NC¹, Stroud LR¹. ¹Brown University, Providence, RI, United States, ²The Miriam Hospital, Providence, RI, United States
- P25** Ethanol-Induced Reduction in the Activity of the Putative Enhancers of TFAP2A Contributes to the Repression of TFAP2A and Apoptosis in Ethanol-Exposed Human Neural Crest Cells
Chen S-y¹, Yuan F¹, Lu L², Liu J¹. ¹Department of Pharmacology and Toxicology, University of Louisville Health Science Center, Louisville, KY, United States, ²Department of Pharmacology and Toxicology, University of Louisville Health Science Center, Tampere, Finland
- P26** The Impact of *In Utero* Opioid Exposure on Newborn Outcomes: Results from a Matched Cohort Study
Bailey BA¹, Justice N², Shah D², Wood DL². ¹Central Michigan University College of Medicine, Mt. Pleasant, MI, United States, ²East Tennessee State University, Quillen College of Medicine, Johnson City, TN, United States
- P27** Fluoride Exposure and Hypothyroidism in a Canadian Pregnancy Cohort
Hall MK¹, Green R¹, Goodman CV¹, Farmus L¹, Lanphear B², Martinez-Mier EA³, Hornung R⁴, Ayotte P⁵, Till O⁶. ¹Faculty of Health, York University, Toronto, ON, Canada, ²Faculty of Health Sciences, Simon Fraser University, Burnaby, BC, Canada, ³Indiana University School of Dentistry, Indianapolis, IN, United States, ⁴Retired, Loveland, OH, United States, ⁵Québec National Institute of Public Health, Québec City, QC, Canada, ⁶York University, Toronto, Toronto, ON, Canada
- P28** Predictors of Medicaid Case Management among Infants in the Texas Birth Defects Registry, 2010–2015
Navarro Sanchez ML¹, Shumate CJ², Betancourt D², Canfield MA³. ¹Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX, United States, ²Texas Department of State Health Services, Austin, TX, United States, ³Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States
- P29** Skeletal Ossification Terminology and Criteria Harmonization
Posobiec L¹, KOPP C², Murzyn S¹, Olitan T³, Rendemonti J¹, French J⁴, Tamborini E⁵, Campey J⁶, Longo O⁵, Danberry T¹, Vaillencourt M⁷, Sprigden D⁶, Nowland W⁸, Daoud M⁹, Qualls C¹⁰, Harris SB¹¹. ¹GSK, Collegeville, PA, United States, ²CRL Ashland, Ashland, OH, United States, ³BMS, New Brunswick, NJ, United States, ⁴Syngenta, Berkshire, United Kingdom, ⁵Accelera, Nerviano, Italy, ⁶Covance, Harrogate, United Kingdom, ⁷CRL, Laval, QC, Canada, ⁸Pfizer, New Haven, CT, United States, ⁹CRL, Hertogenbosch, Netherlands, ¹⁰Covance, Greenfield, IN, United States, ¹¹Stephen B. Harris Group, San Diego, CA, United States

- P30** Factors Associated with Distance to Hospital for First Surgical Repair among Infants with Myelomeningocele in California
Kancherla V¹, Ma C², Purkey N³, Hintz SR³, Lee HC³, Grant G³, Carmichael SL⁴. ¹Emory University, Atlanta, GA, United States, ²Stanford University, Stanford, CA, United States, ³Stanford University School of Medicine, Stanford, CA, United States, ⁴Department of Pediatrics and Obstetrics and Gynecology, Stanford University School of Medicine, Stanford, CA, United States
- P31** Implementation of Cardiorespiratory Monitoring in the Juvenile Minipig Using a Noninvasive Jacketed Telemetry System
Penard L¹, Flenet T², Eynard C², Bouillon C², Bory C³, Baudet S³, Marsden E³. ¹Charles River, Saint Germain Nuelles, France, ²Etisense, Lyon, France, ³Charles River, Saint Germain-Nuelles, France
- P32** Abstract withdrawn.
- P33** Adult Learning and Memory in Three Genotypes of Mice Exposed to Benzo[a]Pyrene During Early Brain Development
Clough K, Foster E, Perry C, Mullaguru J, Honaker A, Towell A, Curran CP. Northern Kentucky University, Highland Heights, KY, United States
- P34** Preconception and Prenatal Arsenic Exposure and Gene Expression Alterations in Liver, Placenta, Heart, and Lung
Rychlik KA¹, Kashiwagi C², Liao J², Tran V², Mathur A², Illingworth E², Sanchez S², Kleensang A², Maertens O², Sillé, FCM². ¹The Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD, United States, ²Johns Hopkins University, Baltimore, MD, United States
- LB4** The Applicability of Female and Male Human Neural Progenitor Cells for Sex-Specific Developmental Neurotoxicity Testing: A Case Study
Faustman EM¹, Leme DM², Suh YP¹, Park JJ¹, Lee JH¹, Workman T¹, Smith M¹, Griffith WC¹. ¹Institute for Risk Analysis and Risk Communication, University of Washington, Seattle, WA, United States. ²Department of Genetics, Federal University of Paraná, Curitiba, PR, Brazil
- LB5** Modeling Neural Tube Defects with Self-Organizing Single Rosette Cortical Spheroids (SOSRS): A Structurally Reproducible Brain Organoid Technology
Tidball AM¹, Niu W¹, Takla T¹, Ma Q², Varela MC³. ¹Department of Neurology, University of Michigan, Ann Arbor, MI, United States, ²Department of Human Genetics, University of Michigan, Ann Arbor, MI, United States, ³Neuroscience Graduate Program, University of Michigan, Ann Arbor, MI, United States
- LB6** Mitigation of Dolutegravir Developmental Toxicity in Mice by Folic Acid
Tukeman GL, Wei H, Włodarczyk B, Lin Y, Finnell RH, Cabrera RM. Baylor College of Medicine, Houston, TX, United States
- LB7** Paternal Alcohol Exposures Induce Craniofacial Malformations: Male Inherited Teratogenesis and the Epigenetic Programming of Congenital Defects
Thomas KN, Lunde R, Bedi YS, Roach AN, Thomas K, Mehta NA, Srikanth N, Golding MC. Department of Physiology, Golding Lab, Texas A&M University, College Station, TX, United States

Wednesday, June 30, 2021

11:00 AM–12:00 Noon Innovator Award Finalists Platform Session 5

Chairperson: Kembra L. Howdeshell, National Institute of Environmental Health Sciences

Presenting author is underlined.

- 11:00 AM–11:20 AM 27 Transcriptomic and Proteomic Profiling of Alternative Flame Retardant Exposures in Human Embryonic Stem Cell Neural Derivatives
Chen H¹, Jigmeddagva U¹, Williams KE¹, Hunter CL², Yan CD¹, Iyer NS¹, Robinson JF¹.
¹University of California, San Francisco, San Francisco, CA, United States, ²SCIEX, Redwood City, CA, United States
- 11:20 AM–11:40 AM 28 Exome Sequencing Findings in 115 Children with Annular Pancreas
Pitsava G¹, Pankratz N², Lane J², Yang W³, Rigler S⁴, Shaw GM⁵, Mills JL¹. ¹NICHD, NIH, Bethesda, MD, United States, ²Department of Laboratory Medicine and Pathology, University of Minnesota Medical School, Minneapolis, MN, United States, ³Department of Pediatrics, Stanford University School of Medicine, Stanford, CA, United States, ⁴Department of Neonatology, Naval Medical Center Portsmouth, Portsmouth, VA, United States, ⁵Stanford University School of Medicine, Stanford, CA, United States
- 11:40 AM–12:00 Noon 29 Newborn Screening Analytes and Structural Birth Defects: Evaluating Novel Associations using a Phenotypic Spectrum Analysis
Lupo PJ¹, Archer NP², Marengo LK², Hoyt AT², Drummond-Borg M², Freedenberg D², Langlois PH³, Canfield MA³. ¹Department of Pediatrics, Section of Hematology-Oncology, Baylor College of Medicine, Houston, TX, United States, ²Texas Department of State Health Services, Austin, TX, United States, ³Birth Defects Epidemiology and Surveillance, Texas Department of State Health Services, Austin, TX, United States

12:00 Noon–12:30 PM Warkany Tea

12:30 PM–1:00 PM Break

1:00 PM–3:00 PM

CME

Molecular Mechanisms of Fetal Alcohol Spectrum Disorders (FASD) in Humans and Animal Models Symposium

(Joint with DNTS)

Chairpersons: Peter G. Wells, University of Toronto and Rajesh C. Miranda, Texas A&M Health Science Center

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|-----------------|-----|--|
| 1:00 PM–1:05 PM | | Introduction
<i>Peter G. Wells, University of Toronto</i> |
| 1:05 PM–1:30 PM | S22 | Oxidative DNA Damage and Repair and Epigenetic Mechanisms in Fetal Alcohol Spectrum Disorders (FASD)
<i>Peter G. Wells, University of Toronto</i> |
| 1:30 PM–1:55 PM | S23 | Epigenetic Mechanisms: Endocrine miRNAs in Pregnant Women, Predictive of FASD Infant Outcomes, Inhibit Placental Maturation, and Result in Fetal Growth Restriction
<i>Rajesh C. Miranda, Texas A&M Health Science Center</i> |
| 1:55 PM–2:20 PM | S24 | Neural Stem Cell Modeling of FASD: Mouse Strain- and Sex-dependent Effects of Alcohol on DNA Methylation
<i>Mojgan Rastegar, University of Manitoba</i> |
| 2:20 PM–2:45 PM | S25 | Transcriptomic Analyses Identify Genetic Modifiers of Adult Cardiometabolic Disease Risk in Zebrafish Following Embryonic Alcohol Exposure
<i>Wolfram Goessling, Brigham and Women's Hospital, Harvard Medical School</i> |
| 2:45 PM–3:00 PM | | Discussion |

1:00 PM–3:00 PM

Refining Toxicology Testing to Detect Endocrine Disrupting Chemicals Symposium

Chairpersons: Kembra L. Howdeshell, National Institute of Environmental Health Sciences and Heather B. Patisaul, North Carolina State University

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|-----------------|-----|--|
| 1:00 PM–1:05 PM | | Introduction
<i>Kembra L. Howdeshell, National Institute of Environmental Health Sciences</i> |
| 1:05 PM–1:30 PM | S26 | Consortium Linking Academic and Regulatory Insights on BPA Toxicity (CLARITY-BPA): Findings and Considerations for Future Guideline Toxicity Testing of Endocrine Disrupting Chemicals
<i>Kembra L. Howdeshell, National Institute of Environmental Health Sciences</i> |
| 1:30 PM–1:55 PM | S27 | Detecting Endocrine Disruption of Brain and Behavior
<i>Heather B. Patisaul, North Carolina State University</i> |

- 1:55 PM–2:20 PM S28 Validation of *In Vitro* Thyroid Mechanistic Methods Based on the Organization of Economic Co-operation and Development Scoping Document
Sandra Coecke, European Commission
- 2:20 PM–2:45 PM S29 Case-Study Applications Using Evidence-Based Approaches to Assess Endocrine Activity for Risk Assessment
Daniele Wikoff, ToxStrategies, Inc.
- 2:45 PM–3:00 PM Discussion

3:00 PM–3:30 PM

Break

3:30 PM–4:30 PM

Poster Session 3

Attended for Questions & Answers
Posters P35–P51 and LB8–LB10

- P35 Abstract Withdrawn
- P36 Developmental Toxicity Study in the Dog
Elsom T, Clubb SK. Charles River Laboratories, Edinburgh, United Kingdom
- P37 Systematic Evidence Mapping to Support an Evaluation of ~430 PFAS Chemicals
Carlson LM¹, Hubbard H², Shirke A³, Angrish MM⁴, Lin C², Vetter N², Thayer K⁴. ¹US EPA, Durham, NC, United States, ²ICF International, Durham, NC, United States, ³US EPA Office of Research and Development, Center for Public Health and Environmental Assessment, Washington, DC, United States, ⁴US EPA Office of Research and Development, Center for Public Health and Environmental Assessment, Research Triangle Park, NC, United States, ⁷US EPA Office of Research and Development, Center for Public Health and Environmental Assessment, Research Triangle Park, NC, United States
- P38 Systematic Assessment of QUATs for the Potential to Elicit Developmental and Reproductive Effects
DeSesso JM¹, Harris SB², Scialli AR³, Williams AL⁴. ¹Exponent and Georgetown University School of Medicine, Alexandria, VA, United States, ²Stephen B. Harris Group, San Diego, CA, United States, ³Scialli Consulting LLC, Washington, DC, United States, ⁴Exponent, Alexandria, VA, United States
- P39 Antifungal Medication Use in Pregnancy and the Risk of Major Birth Defects in the National Birth Defects Prevention Study, 1997–2011
Papadopoulos EA¹, Howley MM¹, Fisher SC¹, Van Zutphen AR¹, Werler MM², Romitti PA³, Browne ML¹. ¹New York State Department of Health, Albany, NY, United States, ²Boston Univeristy, Boston, MA, United States, ³University of Iowa, Iowa City, IA, United States

- P40 DNA Double-Strand Breaks in Fetal Brains from Oxoguanine Glycosylase 1 (Ogg1) Knockout Mice Exposed *In Utero* to Physiological or Ethanol-enhanced Levels of Reactive Oxygen Species (ROS)
Cheng A¹, Yan W², Wells PG^{1,2}. ¹Dept. of Pharmaceutical Sciences and Centre for Pharmaceutical Oncology (CPO), University of Toronto, Toronto, ON, Canada, ²Dept. of Pharmacology and Toxicology, University of Toronto, Toronto, ON, Canada
- P41 A Systematic Review of Antiepileptic Drug Exposure during Pregnancy and Neonatal Birthweight Outcomes and Interim Meta-Analysis
Lavu A¹, Vaccaro C², Shouman W², Alessi-Severini S², Eltonsy S². ¹College of Pharmacy, University of Manitoba, Winnipeg, MB, Canada, ²College of Pharmacy, Rady Faculty of Health Sciences, Winnipeg, MB, Canada
- P42 Lateral Epiphyseal Reductions due to Vascular Dysgenesis are Hypothesized to Cause Congenital Valgus Deformities at the Knee and Ankle in Fibular Deficient Limbs
Krisch M, Hootnick D, Horton J. SUNY Upstate Medical University, Syracuse, NY, United States
- P43 Using Live Imaging and FUCCI ESC to Distinguish G1 Cell Cycle Delays for General Stressors like PFAS and Phthalates or G2 Cell Cycle Delay for Mutagenic Stressors like Benzo(a) pyrene
Rappolee DA¹, Ruden X¹, Abdulhasan M¹, Harris S², Ruden D¹, Puscheck E
- P44 Use of Fulvestrant as an Anti-Estrogenic Positive Control Substance in Uterotrophic Bioassays
Davis SM, Coder PS, Huang J. Charles River Laboratories, Ashland, OH, United States
- P45 New Variants for Transverse Limb Deficiency Defects from Whole Exome Sequencing: The National Birth Defects Prevention Study
Gomez-Acevedo H¹, Nembhard WN¹, Moore CA², Jenkins MM², Almlı LM², Lou X-Y³, Reefhuis J², Shaw GM⁴, Romitti OO⁵, Werler MM⁶, Yazdy MM⁷, Olshan AF⁸, Kay DM⁹, Finnell RH¹⁰, Feldkamp ML¹¹, Bamshad M¹², Brody L¹³, Mullikin J¹³, Pangilinan F¹³, Nickerson D¹⁴, McGoldrick DJ¹⁴. ¹University of Arkansas for Medical Sciences, Little Rock, AR, United States, ²CDC, Atlanta, GA, United States, ³University of Florida, Gainesville, FL, United States, ⁴Stanford University School of Medicine, Stanford, CA, United States, ⁵University of Iowa, Iowa City, IA, United States, ⁶Boston Univeristy, Boston, MA, United States, ⁷Massachusetts Center for Birth Defects Research and Prevention, Boston, MA, United States, ⁸University of North Carolina, Chapel Hill, NC, Unites States, ⁹New Your State Department of Health, Albany, NY, United States, ¹⁰Baylor College of Medicine, Houston, TX, United States, ¹¹University of Utah School of Medicine, Salt Lake City, UT, United States, ¹²University of Washington SOM, Seattle, WA, United States, ¹³NHGRI NIH, Bethesda, MD, United States, ¹⁴University of Washington Genome Sciences, Seattle, WA, United States
- P46 Psychosocial Stress During Pregnancy Affects Placental Programming of Hypothalamic Pituitary Adrenal Axis
Ruyak SL¹, Milligan E², Solomon E³, Allen A², Ma X⁴, Weinburg J⁵, Roberts M⁴, Rodriguez D⁴, Enriquez Marquez O⁴, Rai R⁴, Stacy L⁴,

Jacobson S⁶, Bakhireva L⁴. ¹University of New Mexico, College of Nursing, Albuquerque, NM, United States, ²University of New Mexico, Department of Neuroscience, Albuquerque, NM, United States, ³University of New Mexico, Department of Neuroscience, Louisville, KY, United States, ⁴University of New Mexico, College of Pharmacy, Albuquerque, NM, United States, ⁵The University of British Columbia, Department of Cellular and Physiological Sciences, Vancouver, BC, Canada, ⁶Wayne State University, Department of Psychiatry and Behavioral Neurosciences, Detroit, MI, United States

- P47 Developmental Toxicity in CF-1 Mice after Gestational Opioid Exposure
Kaldhøne PR¹, Han T¹, Krishnavenisivakumar K¹, Phanavanh B¹, Moland C¹, Felton R¹, Lee G², Mellon D², Fisher O², Hanig, J², Beger RD¹, Inselman AR¹. ¹US FDA/NCTR, Jefferson, AR, United States, ²US FDA/CDER, Silver Spring, MD, United States
- P48 Evaluating the Utility of Clinical Exome Sequencing for the Molecular Diagnosis of Nonisolated Microphthalmia, Anophthalmia, and Coloboma (MAC)
Martin-Giacalone BA¹, Scott DA², Mitchell LE³, Hufnagel RB⁴, Brooks BP⁴, Lewis RA¹, Agopian AJ⁵, Lupo PJ⁶. ¹Baylor College of Medicine, Houston, TX, United States, ²Department of Molecular and Human Genetics, Baylor College of Medicine, Houston, TX, United States, ³University of Texas School of Public Health, Houston, TX, United States, ⁴National Eye Institute, Bethesda, MD, United States, ⁵Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX, United States, ⁶Department of Pediatrics, Section of Hematology-Oncology, Baylor College of Medicine, Houston, TX, United States
- P49 Patterns of Co-occurring Birth Defects among International Surveillance Systems
Navarro Sanchez ML¹, Benjamin RH¹, Agopian AJ¹, Ludorf KL¹, Chen H², Canfield MA³, Swartz MD⁴, Scheuerle AE⁵, Scott OO⁶, Stangenes M⁷, Stallings EB⁸, Scarano G⁹, Bermejo-Sanchez E¹⁰, Rissmann A¹¹, Mutchinick OM¹², Landau D¹³, Kurasawa K¹⁴, Kiuru-Kuhlefelt S¹⁵, Khoshnood B¹⁶, Källén K¹⁷, Cocchi G¹⁸, Lopez Camelo J¹⁹, De Walle HEK²⁰, Csáky-Szunyogh M²¹, Botto LD²², Amar E²³, Lupo PJ²⁴. ¹Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX, United States, ²Center for Precision Health, UTHealth School of Public Health and UTHealth School of Biomedical Info, Houston, TX, United States, ³Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services, Austin, TX, United States, ⁴Department of Biostatistics and Data Science, UTHealth School of Public Health, Houston, TX, United States, ⁵Department of Pediatrics, Division of Genetics and Metabolism, University of Texas Southwestern Medical, Dallas, TX, United States, ⁶Department of Molecular and Human Genetics, Baylor College of Medicine, Houston, TX, United States, ⁷Department of Health Registry Research and Development, Norwegian Institute of Public Health, Bergen, Norway, ⁸National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, GA, United States, ⁹U.O. di Genetica Medica, A.O.R.N., Bologna, Italy, ¹⁰ECEMC, Research Unit on Congenital Anomalies (UIAC) Instituto de Investigación de Enfermedades Raras, Madrid, Spain, ¹¹Malformation Monitoring Centre Saxony-Anhalt, Medical

Faculty Otto-von-Guericke-University Magdeburg, Magdeburg, Germany, ¹²Registro y Vigilancia Epidemiológica de Malformaciones Congénitas (RYVEMCE) Department of Genetics, Mexico, ¹³Department of Obstetrics and Gynecology, Soroka University Medical Center, Be'er Sheva, Israel, ¹⁴Department of Obstetrics and Gynecology, Yokohama City University, Yokohama, Japan, ¹⁵Information Services Department, Health and Social Services Data and Information Management, Finni, Helsinki, Finland, ¹⁶Université de Paris, CRESS, INSERM, INRA, Paris, France, ¹⁷National Board of Health and Social Welfare, Stockholm, Sweden, ¹⁸Neonatology Unit, Department of Pediatrics, University of Bologna, Bologna, Italy, ¹⁹ECLAMC, Center for Medical Education and Clinical Research (CEMIC-CONICET), Buenos Aires, Argentina, ²⁰University of Groningen, University Medical Center Groningen, Department of Genetics, Groningen, Groningen, Netherlands, ²¹Hungarian Congenital Abnormalities Registry and Rare Disease Centre, National Public Health Center Budapest, Hungary, ²²International Center on Birth Defects (ICBD) of the International Clearinghouse for Birth Defects Su, Rome, Italy, ²³REMER, Rhône-Alps registry of birth defects, Hospices Civils de Lyon, France, Lyon, France, ²⁴Department of Pediatrics, Section of Hematology-Oncology, Baylor College of Medicine, Houston, TX, United States

- P50 Measures of Anxiety in Mice Vary by Genotype, But Not Treatment Following Developmental Exposure to Benzo[a]pyrene
Honaker A, Perry C, Curran CP. Northern Kentucky University, Highland Heights, KY, United States
- P51 Noonan Syndrome with Multiple Lentigines and Pigmented Villonodular Synovitis in Multiple Generations: Insight into the Pathogenesis of a Benign Tumor
Kramer EF¹, Jonasson AR², Gripp KW³, Rasmussen SA¹. ¹Dept. of Pediatrics, University of Florida College of Medicine, Gainesville, FL, United States, ²Dept. of Pediatrics, Div. of Genetics and Metabolism, University of Florida, Gainesville, FL, United States, ³Div. of Medical Genetics, Nemours/A.I. DuPont Hospital for Children, Wilmington, DE United States
- LB8 Harnessing New Approach Methodologies for Predictive DART and Endocrine Disruption in Plant Protection Product Development
Bianchi E, LaRocca J. Corteva Agriscience, Indianapolis, IN, United States
- LB9 Evaluating Neonatal Reflexes in cyp1a1(-/-) Knockout and Wild Type Mice Exposed to Benzo[a]Pyrene during Early Brain Development
Kyntchev A, CloughnK, Foster E, Curran CP. Northern Kentucky University, Highland Heights, KY, United States
- LB10 Metal Mixtures Elicit Differential Effects in a Human Brain Organoid Model
Kincaid BJ, Smirnova L, Modafferi S, Hogberg H, Kleensang A, Hartung T. Johns Hopkins School of Public Health, Baltimore, MD, United States

4:30 PM–5:30 PM

BDRP 40th Annual Volleyball Game, A Virtual NETworking Event

Thursday, July 1, 2021

11:00 AM–12:30 PM

Transforming Women's Health Through Better Information on the Safety of Medications During Pregnancy and Lactation Symposium
(Joint with OTIS)

Chairpersons: Janet R. Hardy, Biohaven Pharmaceuticals and Elizabeth A. Conover, University of Nebraska Medical Center

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|-------------------|-----|---|
| 11:00 AM–11:05 AM | | Introduction
<i>Elizabeth A. Conover, University of Nebraska Medical Center</i> |
| 11:05 AM–11:25 AM | S30 | Overview of PRGLAC
<i>Leyla Sahin, US Food and Drug Administration</i> |
| 11:25 AM–11:45 AM | S31 | Introduction to the ConcePTION Initiative
<i>Marie Teil, UCB Biopharma</i> |
| 11:45 AM–12:05 PM | S32 | PRGLAC: Data Gaps and Strategies
<i>Janet R. Hardy, Biohaven Pharmaceuticals</i> |
| 12:05 PM–12:30 PM | | Discussion
<i>Melissa S. Tassinari, Consultant</i> |

11:00 AM–12:30 PM

Hot Topic Symposium
Assessing Reproductive Risks from Fracking and Mountaintop Mining

Chairpersons: Christine Perdan Curran, Northern Kentucky University and Philip Lupo, Baylor College of Medicine

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|-------------------|-----|---|
| 11:00 AM–11:05 AM | | Introduction
<i>Philip Lupo, Baylor College of Medicine</i> |
| 11:05 AM–11:20 AM | S33 | Intensity of Oil and Gas Well Site Activities in Early Pregnancy and the Risk of Structural Birth Defects
<i>Lisa McKenzie, Colorado School of Public Health</i> |
| 11:20 AM–11:35 AM | S34 | Drinking Water Vulnerability and Neonatal Health Outcomes in Relation to Oil and Gas Production in the Appalachian Basin
<i>Nicole Deziel, Yale University School of Public Health</i> |
| 11:35 AM–11:50 AM | S35 | Using Animal Studies to Understand Reproductive Risks Associated with Inhalation Exposures to Particles
<i>Timothy Nurkiewicz, West Virginia University</i> |
| 11:50 AM–12:05 PM | S36 | Fuel for Thought: Summing Up the Risks from Unconventional Energy Extraction
<i>Christine Perdan Curran, Northern Kentucky University</i> |
| 12:05 PM–12:30 PM | | Discussion |

12:30 PM–1:00 PM

Break

1:00 PM–3:00 PM

New Frontiers in Developmental Toxicity Testing for Environmental Chemicals Workshop

Organized by the Science Committee

Chairpersons: Thomas B. Knudsen, US Environmental Protection Agency and Susan Y. Euling, US Environmental Protection Agency

1:00 PM–1:05 PM

Introduction
Susan Y. Euling, US Environmental Protection Agency

1:05 PM–1:30 PM

W6 Challenges and Opportunities: Building NAMs to Reflect Developmental Stage Complexity
Elaine M. Faustman, University of Washington

1:30 PM–1:55 PM

W7 Scaling Up: Zebrafish Social Interaction as Scalable Phenotype for Identifying Neurodevelopmental Toxicants and Their Mechanisms
Randall T. Peterson, University of Utah

1:55 PM–2:20 PM

W8 Single-Cell RNA-Sequencing Analysis of Early Cardiogenesis Reveals Cell-Type-Specific Perturbations that Drive Organ-Level Developmental Defects upon Hand2 Loss
Yvanka De Soysa, Boston Children's Hospital

2:20 PM–2:45 PM

W9 Predictive Developmental Toxicity with Pluripotent Stem Cell Models and ToxCast/Tox21 Assay Batteries
Thomas B. Knudsen, US Environmental Protection Agency

2:45 PM–3:00 PM

Discussion

3:00 PM–3:30 PM

Break

3:30 PM–4:30 PM

Annual Meeting Awards Presentation and Business Meeting

Wilson Presentation Awards

Marie Taubeneck Award

James C. Bradford Memorial Student Poster Awards

BDRP 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

Education Courses

Thursday, July 15, 2021

11:00 AM–2:30 PM

**Education Course Session 1
Development and Disorders of the Gastrointestinal (GI) Tract**
(Separate Registration Required)

Organized by the Education Committee

Chairperson: Christina M. Carruthers, Janssen Pharmaceuticals

11:00 AM–11:05 AM	Course Overview <i>Education Committee, Chairperson, Christina M. Carruthers, Janssen Pharmaceuticals</i>
11:05 AM–11:45 AM	Early Development of the GI Tract <i>Wendy Halpern, Genentech</i>
11:45 AM–12:25 PM	Mechanisms of Gut Stem Cell Niches in Early Postnatal Gut Development and Necrotizing Enterocolitis <i>Tae-Hee Kim, The Hospital for Sick Children, University of Toronto</i>
12:25 PM–12:40 PM	Discussion
12:40 PM–12:55 PM	Break
12:55 PM–1:35 PM	Embryology and Pathogenesis of Gastroschisis <i>Marcia Lynn Feldkamp, University of Utah</i>
1:35 PM–2:15 PM	Clinical Management <i>Suna Seo, US Food and Drug Administration</i>
2:15 PM–2:30 PM	Discussion

Thursday, July 22, 2021

11:00 AM–2:30 PM

**Education Course Session 2
Craniofacial Morphogenesis and Teratogenesis**
(Separate Registration Required)

Organized by the Education Committee

Chairperson: Christina M. Carruthers, Janssen Pharmaceuticals

11:00 AM–11:05 AM	Course Overview <i>Education Committee, Chairperson, Christina M. Carruthers, Janssen Pharmaceuticals</i>
11:05 AM–11:45 AM	Embryological/Morphological Development of the Craniofacial Region <i>John DeSesso, Exponent</i>
11:45 AM–12:25 PM	Mouse Models of Craniofacial Morphogenesis and Malformations <i>Robert Lipinski, University of Wisconsin</i>

12:25 PM–12:40 PM	Discussion
12:40 PM–12:55 PM	Break
12:55 PM–1:35 PM	Craniofacial Morphogenesis and Teratogenesis <i>Brian Johnson, Michigan State University</i>
1:35 PM–2:15 PM	Management of Craniofacial Anomalies <i>Marilyn Jones, Rady Children's Hospital</i>
2:15 PM–2:30 PM	Discussion

Thursday, July 29, 2021

11:00 AM–1:00 PM

**Mini Course
Single-Cell RNA Sequencing in Understanding Normal and Abnormal
Development**

(Separate Registration Required)

Sponsored by Alan M. Hoberman, in memory of Robert L. Brent

Organized by the Education Committee

Chairperson: Christina M. Carruthers, Janssen Pharmaceuticals

11:00 AM–11:05 AM	Course Overview <i>Education Committee, Chairperson, Christina M. Carruthers, Janssen Pharmaceuticals</i>
11:05 AM–11:30 AM	Single-Cell Profiling for Advancing Birth Defects Research and Prevention <i>Thomas B Knudsen, US EPA</i>
11:30 AM–11:55 AM	Technical Considerations for Single-Cell RNAseq Workflows <i>David Gallegos, US EPA</i>
11:55 AM–12:20 PM	Analytical Approaches to Dissect Dysregulated Gene Expression and Developmental Trajectories <i>Yvanka de Soysa, Boston Children's Hospital</i>
12:20 PM–12:45 PM	Prospects for Profiling Developmental Toxicity with Single-Cell Resolution <i>Joshua F. Robinson, University of California, San Francisco</i>
12:45 PM–1:00 PM	Discussion