

**Society for Birth Defects Research and Prevention  
2020 Virtual Annual Meeting  
Honoring Teratology's Roots, Growing a Healthier Future**

**As of June 24, 2020**

*All times listed in the agenda are Eastern Daylight Time (US).*

*Unless otherwise noted, all sessions will be recorded and available on demand to meeting registrants for one year following the meeting.*

**Thursday, June 11, 2020**

**12:30 PM–2:00 PM**      **COVID-19 and Pregnancy: What Do We Know and How Will We Learn More**

*Cohosted by the Organization of Teratology Information Specialists*

*Chairpersons: Christina D. Chambers, University of California–San Diego and  
Sonja A. Rasmussen, University of Florida*

12:30 PM–12:35 PM

Introduction

*Elise M. Lewis, Charles River*

12:35 PM–1:05 PM

COVID-19 and Pregnancy: What Do We Know

*Sonja A. Rasmussen, University of Florida*

1:05 PM–1:35 PM

COVID-19 and Pregnancy: How Will We Learn  
More

*Christina D. Chambers, University of California–  
San Diego*

1:35 PM–2:00 PM

Discussion

**Thursday, June 25, 2020**

**11:00 AM–11:05 AM**

**President's Welcome**

*BDRP President, Christine Perdan Curran, Northern Kentucky University*

**11:05 AM–11:45 AM**

**Josef Warkany Lecture**

**POPs: A Plethora of Developmental Effects (L1)**

*Chairperson: Christine Perdan Curran, Northern Kentucky University*

*Lecturer: Linda S. Birnbaum, Scientist Emeritus and Former Director, National  
Institute of Environmental Health Sciences and National Toxicology Program*

**11:45 AM–12:30 PM**

**Robert L. Brent Lecture—Teratogen Update (L2)**

**From Dysmorphology to Next-Generation Phenotyping**

**CME**

*Chairperson: Christine Perdan Curran, Northern Kentucky University*

*Lecturer: Karen W. Gripp, A.I. duPont Hospital for Children/Nemours*

**12:30 PM–12:45 PM**

**Break**

12:45 PM–3:15 PM

**Graduate Student and Postdoctoral Fellow Platform Session 1**

*Organized by the Student Affairs Committee*

*Chairperson: Ida M. Washington, West Virginia University*

**Presenting author is underlined.**

- 12:45 PM–12:51 PM Introduction
- 12:51 PM–1:09 PM 1 Gestational Exposure to Perfluorooctanoic Acid (PFOA) or Its Replacement GenX Induces Adverse Pregnancy Outcomes and Disrupts the Placenta  
*Blake BE<sup>1</sup>, Cope H<sup>1</sup>, Hall S<sup>2</sup>, Keys R<sup>1</sup>, Mahler B<sup>1</sup>, McCord J<sup>3</sup>, Scott B<sup>1</sup>, Stapleton H<sup>2</sup>, Strynar M<sup>3</sup>, Elmore S<sup>1</sup>, Fenton S<sup>1</sup>. <sup>1</sup>NTPL/NIEHS, Research Triangle Park, NC, United States, <sup>2</sup>Duke University, Durham, NC, United States, <sup>3</sup>US EPA, Research Triangle Park, NC, United States*
- 1:09 PM–1:27 PM 2 A Secondary Mechanism by Which Ethanol Enhances Macromolecular Damage and Behavioural Deficits in *Brca1* Knockout Mice  
*Drake DM<sup>1</sup>, Wells PG<sup>1,2</sup>. <sup>1</sup>Department of Pharmaceutical Sciences and the Centre for Pharmaceutical Oncology (CPO), University of Toronto, Toronto, ON, Canada, <sup>2</sup>Department of Pharmacology and Toxicology, University of Toronto, Toronto, ON, Canada*
- 1:27 PM–1:45 PM 3 Ozone Exposure during Early Pregnancy Alters Energy Balance and Adipose Morphology in Female Long-Evans Rat Offspring by Six Months of Age  
*Nguyen HH<sup>1</sup>, Miller CN<sup>1</sup>, Stewart EJ<sup>1</sup>, Philips PM<sup>2</sup>, O'Shaughnessy KS<sup>2</sup>, Dye JA<sup>2</sup>. <sup>1</sup>Oak Ridge Institute for Science and Education, Research Triangle Park, NC, United States, <sup>2</sup>Public Health and Integrated Toxicology Division, Center for Public Health and Environmental Assessment, US EPA, Research Triangle Park, NC, United States*
- 1:45 PM–2:03 PM 4 Zika-Associated Birth Defects Among Infants with Possible Congenital Zika Virus Infection, Florida Zika Pregnancy and Infant Registry, January 2016–March 2018  
*Elmore AL<sup>1</sup>, Dixon A<sup>2</sup>, Prieto J<sup>3</sup>, McDermott C<sup>4</sup>, Morrison A<sup>4</sup>, Lowry J<sup>1</sup>, Lake-Burger H<sup>1</sup>, Stanek D<sup>4</sup>. <sup>1</sup>Florida Department of Health, Florida Birth Defects Registry, Tallahassee, FL, United States, <sup>2</sup>University of South Florida, Birth Defects Surveillance Program, Tampa, FL, United States, <sup>3</sup>Fulton County Board of Health, Atlanta, GA, United States, <sup>4</sup>Florida Department of Health, Bureau of Epidemiology, Tallahassee, FL, United States*

- 2:03 PM–2:21 PM 5 A Phenome-Wide Association Study of the Associations between Maternal Diabetes and Structural Birth Defects in Offspring in 6.5 Million Live Births  
*Schraw JM<sup>1</sup>, Langlois PH<sup>2</sup>, Lupo PJ<sup>1</sup>. <sup>1</sup>Baylor College of Medicine, Houston, TX, United States, <sup>2</sup>Texas Department of State Health Services, Austin, TX, United States*
- 2:21 PM–2:39 PM 6 Reproductive Toxicity Studies to Evaluate Potential Neural Tube and Other Abnormalities Associated with Dolutegravir Exposure in Pregnancy  
*Mohan H<sup>1</sup>, Guzman-Lenis M<sup>1</sup>, Yukino Laurette E<sup>1</sup>, Sanghvi T<sup>1</sup>, Tejada O<sup>1</sup>, Greene N<sup>2</sup>, Copp A<sup>2</sup>, Serghides L<sup>1</sup>. <sup>1</sup>Toronto General Hospital Research Institute, University Health Network, Toronto, ON, Canada, <sup>2</sup>Developmental Biology and Cancer Department, UCL Great Ormond Street Institute of Child Health, University College London, London, United Kingdom*
- 2:39 PM–2:57 PM 7 Utilizing Toxicogeomics to Enhance Adverse Outcome Pathways and Testing Strategies  
*Chen H, Chidboy M, Robinson JF. Center for Reproductive Sciences and Department of Obstetrics, Gynecology & Reproductive Sciences, University of California, San Francisco, San Francisco, CA, United States*
- 2:57 PM–3:15 PM 8 Differences in Cell Proliferation and Inflammation Pathways Regulate Prenatal Alcohol Sensitivity in Mice  
*Boschen KE<sup>1</sup>, Mendoza-Romero HN<sup>1</sup>, Fish EW<sup>1</sup>, Peterson RL<sup>1</sup>, Eberhart JK<sup>2</sup>, Parnell SE<sup>1,3</sup>. <sup>1</sup>Bowles Center for Alcohol Studies, University of North Carolina, Chapel Hill, NC, United States, <sup>2</sup>Molecular Biosciences and Waggoner Center for Alcohol and Addiction Research, University of Texas, Austin, TX, United States, <sup>3</sup>Department of Cell Biology and Physiology, University of North Carolina, Chapel Hill, NC, United States.*

**3:15 PM–4:30 PM**

**Presidents' Welcome Reception**

**Monday, June 29, 2020**

**11:00 AM–11:30 AM**

**F. Clarke Fraser New Investigator Award  
Establishing a Research Program in Developmental Toxicology Utilizing *In Vitro* Models and Big Data Approaches**

*Chairperson: Suzanne E. Fenton, National Institute of Environmental Health Sciences*

*Lecturer: Joshua F. Robinson, University of California, San Francisco*

11:30 PM–12:15 PM

**James G. Wilson Publication Award**  
**The effects of alcohol and cannabinoid exposure during the brain growth spurt on behavioral development in rats**

*Chairperson: Brian Enright, AbbVie Inc.*

*Lecturer: Kristen R. Breit, San Diego State University*

12:15 PM–12:30 PM

**Break**

12:30 PM–2:30 PM

**CME**

**Investigation of a Potential Outbreak of Birth Defects Symposium**

*Chairpersons: Sonja A. Rasmussen, University of Florida and Cheryl S. Broussard, Centers for Disease Control and Prevention*

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|-------------------|----|---|
| 12:30 PM–12:55 PM | S1 | Ten Steps to a Field Investigation of an Increased Rate of Birth Defects<br><i>Sonja A. Rasmussen, University of Florida</i>                                  |
| 12:55 PM–1:20 PM  | S2 | Using Birth Defects Surveillance to Address a Possible Increased Rate of Birth Defects<br><i>Peter H. Langlois, Texas Department of State Health Services</i> |
| 1:20 PM–1:45 PM   | S3 | Developing Interventions in Response to an Increase in Birth Defects<br><i>Cheryl S. Broussard, Centers for Disease Control and Prevention</i>                |
| 1:45 PM–2:10 PM   | S4 | Communicating with the Public during a Public Health Emergency Response<br><i>Glen J. Nowak, University of Georgia</i>  |
| 2:10 PM–2:30 PM   |    | Discussion  |

12:30 PM–2:30 PM

**CME**

**Gene Therapy: CRISPR/Cas9 Technology, Breakthroughs, and Ethical Challenges Symposium**

*Organized by the Public Affairs Committee*

*Chairpersons: Gloria D. Jahnke, National Institute of Environmental Health Sciences and Evi Struble, US Food and Drug Administration*

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|------------------|----|--|
| 12:30 PM–1:00 PM | S5 | Introduction to CRISPR-Cas9 Gene Editing<br><i>Jennifer Mason, Clemson University</i>  |
| 1:00 PM–1:30 PM  | S6 | The Use of CRISPR/Cas9 Technology to Study Congenital Malformations Caused by NAD Deficiency<br><i>Paul R. Mark, Spectrum Health Medical Group</i> |
| 1:30 PM–2:00 PM  | S7 | Gene Therapy Products Using CRISPR/CAS9: Applications and Regulatory Considerations<br><i>Shana D. Hardy, US Food and Drug Administration</i>      |

2:00 PM–2:30 PM S8 Ethical and Governance Considerations of Germline Gene Editing  
*Eric T. Juengst, University of North Carolina, Chapel Hill*

**2:30 PM–3:20 PM**

**Platform Session 2**

*Chairpersons: Linda G. Roberts, NapaTox Consulting LLC and Deirdre K. Tucker, Charles River Laboratories*

2:30 PM–2:40 PM 9 Pathogenic Copy Number Variants Associated with Neurodevelopmental Impairment Detected in Chromosomal Microarray Analysis in Neonates with Congenital Heart Defects  
*Findley TO<sup>1</sup>, Crain AK<sup>2</sup>, Mahajan S<sup>2</sup>, Solis Zavala A<sup>2</sup>, Davis J<sup>3</sup>, Rodriguez-Buritica DF<sup>3</sup>. <sup>1</sup>Division of Neonatal-Perinatal Medicine, Department of Pediatrics, McGovern Medical School, University of Texas Health Science Center at Houston, Houston, TX, United States, <sup>2</sup>McGovern Medical School, University of Texas Health Science Center at Houston, Houston, TX, United States, <sup>3</sup>Division of Medical Genetics, Department of Pediatrics, McGovern Medical School, University of Texas Health Science Center at Houston, Houston, TX, United States*

2:40 PM–2:50 PM 10 Altered Mechanisms of Genital Development Identified Through Integration of DNA Methylation and Genomic Measures in Hypospadias  
*Richard MA<sup>1</sup>, Sok P<sup>1</sup>, Canon S<sup>2,3</sup>, Nembhard WN<sup>4</sup>, Brown AL<sup>1</sup>, Peckham-Gregory EC<sup>1</sup>, Ehli EA<sup>5</sup>, Kallsen NA<sup>5</sup>, Davies GE<sup>5</sup>, Patel A<sup>2,3</sup>, Zamilpa I<sup>2,3</sup>, Hobbs CA<sup>6</sup>, Scheurer ME<sup>1</sup>, Lupo PJ<sup>1</sup>. <sup>1</sup>Department of Pediatrics, Baylor College of Medicine, Houston, TX, United States, <sup>2</sup>Arkansas Children's Hospital, Little Rock, AR, United States, <sup>3</sup>Department of Urology, University of Arkansas for Medical Sciences, Little Rock, AR, United States, <sup>4</sup>Department of Epidemiology and Arkansas Center for Birth Defects Research and Prevention, Fay W. Boozman College of Public Health, University of Arkansas for Medical Sciences, Little Rock, AR, United States, <sup>5</sup>Avera Institute for Human Genetics, Sioux Falls, SD, United States, <sup>6</sup>Department of Pediatrics, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, AR, United States*

2:50 PM–3:00 PM 12 Increased Body Mass Index and Birth Defects Prevalence Across South Carolina, 2016–2018  
*Humphries B, Leedom VO. South Carolina Department of Health and Environmental Control, Columbia, SC, United States*

3:00 PM–3:10 PM

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Patterns of Congenital Malformations Co-occurring with Nonsyndromic Gastroschisis and Omphalocele

*Oluwafemi OO<sup>1</sup>, Benjamin RH<sup>1</sup>, Navarro Sanchez ML<sup>1</sup>, Scheuerle AE<sup>2</sup>, Schaaf CP<sup>3,4,5</sup>, Mitchell LE<sup>1</sup>, Langlois PH<sup>6</sup>, Canfield MA<sup>6</sup>, Swartz MD<sup>7</sup>, Scott DA<sup>5</sup>, Northrup H<sup>8</sup>, Ray JW<sup>9</sup>, McLean SD<sup>10</sup>, Ludorf KL<sup>1</sup>, Chen H<sup>1,11</sup>, Lupo PJ<sup>12</sup>, Agopian A<sup>1</sup>.*

<sup>1</sup>Department of Epidemiology, Human Genetics and Environmental Sciences, UTHealth School of Public Health, Houston, TX, United States,

<sup>2</sup>Department of Pediatrics, Division of Genetics and Metabolism, University of Texas

Southwestern Medical Center, Dallas, TX, United States, <sup>3</sup>Jan and Dan Duncan Neurological

Research Institute, TX Children's Hospital, Houston, TX, United States, <sup>4</sup>Heidelberg

University, Institute of Human Genetics,

Heidelberg, Heidelberg, Germany, <sup>5</sup>Department of Molecular and Human Genetics, Baylor

College of Medicine, Houston, TX, United States, <sup>6</sup>Birth Defects Epidemiology and Surveillance

Branch, TX Department of State Health Services, Austin, TX, United States, <sup>7</sup>Department of

Biostatistics and Data Science, UTHealth School of Public Health, Houston, TX, United States,

<sup>8</sup>Department of Pediatrics, Division of Medical Genetics, McGovern Medical School, University

of Texas Health Science Center at Houston, Houston, TX, United States, <sup>9</sup>Department of

Pediatrics, Division of Medical Genetics and Metabolism, University of Texas Medical Branch,

Galveston, TX, United States, <sup>10</sup>Clinical Genetics Section, Children's Hospital of San Antonio, San

Antonio, TX, United States, <sup>11</sup>Center for Precision Health, UTHealth School of Public Health and

UTHealth School of Biomedical Informatics, Houston, TX, United States, <sup>12</sup>Department of

Pediatrics, Section of Hematology-Oncology, Baylor College of Medicine, Houston, TX, United

States

3:10 PM–3:20 PM

14

Maternal Periconceptional Alcohol Consumption and Gastroschisis in the National Birth Defects Prevention Study, 1997–2011

*Fisher S<sup>1</sup>, Howley MM<sup>1</sup>, Romitti PA<sup>2</sup>, Desrosiers TA<sup>3</sup>, Anderson KN<sup>4</sup>, Jabs EW<sup>5</sup>, Browne ML<sup>1,6</sup>.*

<sup>1</sup>New York State Congenital Malformations Registry, New York State Department of Health, Albany, NY, United States, <sup>2</sup>Department of

Epidemiology, University of Iowa, Iowa City, IA, United States, <sup>3</sup>Department of Epidemiology,

Gillings School of Global Public Health, University of North Carolina, Chapel Hill, NC, United States,

<sup>4</sup>National Center on Birth Defects and Developmental Disabilities, Centers for Disease

Control and Prevention, Atlanta, GA, United States

Control and Prevention, Atlanta, GA, United States, <sup>5</sup>Department of Genetics and Genomic Sciences, Icahn School of Medicine at Mount Sinai, New York, NY, United States, <sup>6</sup>Department of Epidemiology and Biostatistics, School of Public Health, University at Albany, Rensselaer, NY, United States

3:30 PM–4:30 PM

**Poster Session 1**

Posters P1-P13 Attended for Questions & Answers

**Tuesday, June 30, 2020**

11:00 AM–11:45 AM

**CME**

**Keynote Lecture**

**Prenatal Genomic Medicine: Transforming Obstetric Practice and Delivering New Biological Insights (L3)**

*Chairperson: Elise M. Lewis, Charles River*

*Speaker: Diana W. Bianchi, Eunice Kennedy Shriver National Institute of Child Health and Human Development*

11:45 AM–12:15 PM

**Agnish Fellowship Lecture**

**Educating Future Birth Defects Researchers: Opportunities in the Era of Personalized Medicine, Systems Biology, and CRISPER Technologies**

*Chairperson, Caren Villano, Bristol-Myers Squibb*

*Speaker: Elaine M. Faustman, University of Washington*

12:15 PM–12:30 PM

**Break**

12:30 PM–2:30 PM

**CME**

**Opioid Use in Pregnancy: Translational Perspectives Symposium**

*Chairpersons: Christina D. Chambers, University of California–San Diego; Rina D. Eiden, Pennsylvania State University; and Jennifer Willford, Slippery Rock University*

12:30 PM–1:00 PM

S9

Outcomes among Children of Opiate Using Mothers

*Elisabeth Conradt, University of Utah*

1:00 PM–1:30 PM

S10

A Translational Model of Gestational Buprenorphine Exposure: Effects on the Dam and the Offspring

*Susanne Brummelte, Wayne State University*

1:30 PM–2:00 PM

S11

Prenatal Exposure to Opioids and Other Substances: What Do We Know about Later Development Outcomes?

*Hendrée Jones, UNC Department of Obstetrics & Gynecology*

2:00 PM–2:30 PM

S12

Modifying an Evidence-Based Home Visiting Intervention for Mothers with Opioid Dependence

*Mary Dozier, University of Delaware*

12:30 PM–2:30 PM

CME

## Assessing and Modeling Perinatal and Postnatal Exposures to Environmental Chemicals in Support of Human Health Risk Assessment Symposium

*Chairpersons: Laura Carlson, US Environmental Protection Agency and Geniece Lehmann, US Environmental Protection Agency*

- |                   |     |  |
|-------------------|-----|--|
| 12:30 PM–12:50 PM | S13 | Environmental Chemicals in Breast Milk and Formula: Exposure and Risk Assessment Implications<br><i>Judy S. LaKind, LaKind Associates</i>  |
| 12:50 PM–1:10 PM  | S14 | Level of Detail for Pharmacokinetic Modeling During Development: Time or Tissues, But Not Both<br><i>Paul M. Schlosser, US Environmental Protection Agency</i>   |
| 1:10 PM–1:30 PM   | S15 | Pharmacokinetic Modeling As a Tool to Bridge <i>In Vitro</i> , <i>In Vivo</i> , and Epidemiological Data in Risk Assessment of Developmental Exposures<br><i>Marc-Andre Verner, University of Montréal</i> |
| 1:30 PM–2:00 PM   | S16 | Children's Nondietary Exposures to Environmental Chemicals<br><i>Paloma I. Beamer, University of Arizona</i>   |
| 2:00 PM–2:20 PM   | S17 | A Review of Factors Influencing Children's Exposure Assessment<br><i>Geniece Lehmann, US Environmental Protection Agency</i>   |
| 2:20 PM–2:30 PM   |     | Discussion   |

2:30 PM–3:20 PM

### Platform Session 3

*Chairpersons: Kimberly C. Brannen, Merck and Mark Herberth, Charles River*

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|-----------------|----|--|
| 2:30 PM–2:40 PM | 15 | Risk Factors and Time Trends for Diagnosis of Nonsyndromic Craniosynostosis<br><i>Schraw JM<sup>1</sup>, Woodhouse J<sup>1</sup>, Langlois PH<sup>2</sup>, Canfield MA<sup>2</sup>, Scheuerle AE<sup>3</sup>, Agopian A<sup>4</sup>, Benjamin RH<sup>4</sup>, Lupo PJ<sup>1</sup>. <sup>1</sup>Department of Pediatrics, Baylor College of Medicine, Houston, TX, United States, <sup>2</sup>Texas Department of State Health Services, Austin, TX, United States, <sup>3</sup>University of Texas Southwestern Medical Center, Dallas, TX, United States, <sup>4</sup>University of Texas School of Public Health, Houston, TX, United States</i> |
| 2:40 PM–2:50 PM | 16 | Use of Cluster Analysis to Better Define a Distinct Clinical Phenotype Associated with Possible Congenital Zika Virus Infection<br><i>Zambrano LD<sup>1</sup>, Delaney A<sup>1</sup>, Gilboa SM<sup>1</sup>, Tong V<sup>1</sup>, Cragan JD<sup>1</sup>, Valencia M<sup>2</sup>, Roth NM<sup>1</sup>, Moore J<sup>1</sup>, Staples JE<sup>3</sup>, Honein MA<sup>1</sup>, Moore CA<sup>1</sup>. <sup>1</sup>National</i>  |



*Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, GA, United States, <sup>2</sup>Departamento de Salud de Puerto Rico, San Juan, PR, United States, <sup>3</sup>National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA, United States*

- 2:50 PM–3:00 PM 17 Prenatal Acetaminophen Use and Adverse Pregnancy Outcomes in Women with Autoimmune Conditions  
*Killon J<sup>1</sup>, Chambers CD<sup>1,2</sup>, Bandoli G<sup>1,2</sup>.  
<sup>1</sup>Department of Family Medicine and Public Health, University of California San Diego, San Diego, CA, United States, <sup>2</sup>Department of Pediatrics, University of California San Diego, La Jolla, CA, United States*
- 3:00 PM–3:10 PM 18 The Role of *In Utero* Exposure to Drugs Beyond Opioids in the Development and Severity of Neonatal Opioid Withdrawal Syndrome (NOWS)  
*Bailey BA<sup>1</sup>, Wood DL<sup>2</sup>, Shah DS<sup>2</sup>. <sup>1</sup>Central Michigan University, Mt Pleasant, Michigan, United States, <sup>2</sup>East Tennessee State University, Johnson City, TN, United States*
- 3:10 PM–3:20 PM 19 Multi-Modal Assessment of Stress-Reactivity and Self-regulation in the Newborn Period in a Prospective Cohort Study of Moderate Alcohol Exposure  
*Bakhireva LN<sup>1</sup>, Ruyak S<sup>1</sup>, Roberts M<sup>1</sup>, Rodriguez DE<sup>1</sup>, Leeman L<sup>1</sup>, Stephen J<sup>2</sup>, Maxwell JR<sup>1</sup>.  
<sup>1</sup>University of New Mexico Health Sciences Center, Albuquerque, NM, United States, <sup>2</sup>The Mind Research Network, Albuquerque, NM, United States*

**3:30 PM–4:30 PM**

**Poster Session 2**

Posters P14-P26 Attended for Questions & Answers

**Wednesday, July 1, 2020**

**11:00 AM–12:00 Noon**

**Innovator Award Finalists Platform Session 4**

*Chairperson: Suzanne E. Fenton, National Institute of Environmental Health Sciences*

- 11:00 AM–11:20 AM 21 Studying Gene-Environmental Interactions in Autism with iPSC-derived BrainSpheres: microRNA and Metabolic Biomarkers of the Synergy  
*Smirnova L, Zhong X, Modafferi S, Fagiani F, Kleensang A, Murata Y, Hartung T. Johns Hopkins University, Baltimore, MD, United States*

11:20 AM–11:40 AM	22	ReproTracker: A Human Stem Cell-Based Biomarker Assay for <i>In Vitro</i> assessment of Developmental Toxicity <i>Dimopoulou M, Hartvelt S, Zwetsloot T, Racz P, Brandsma I, Hendriks G. Toxys B.V., Leiden, Leiden, The Netherlands</i>
11:40 AM–12:00 Noon	23	A Tale of Two Livers: The Impact of Sex on Hepatic Gene Expression in the Adolescent Rat Exposed to Ozone During Implantation <i>Miller CN<sup>1</sup>, Stewart EJ<sup>2</sup>, Schladweiler MC<sup>3</sup>, Ren H<sup>3</sup>, Valdez MC<sup>1</sup>, Fisher A<sup>3</sup>, Kodavanti UP<sup>3</sup>, Dye JA<sup>3</sup>. <sup>1</sup>Oak Ridge Institute for Science and Education, Research Triangle Park, NC, United States, <sup>2</sup>Oak Ridge Institute for Science and Education, Research Triangle Park, NC, United States, <sup>3</sup>Public Health and Integrated Toxicology Division, Center for Public Health and Environmental Assessment, US Environmental Protection Agency, Research Triangle Park, NC, United States</i>

**12:00 Noon–12:30 PM**

**Warkany Tea**

**12:30 PM–2:30 PM**

**CME**

**Wiley Symposium  
Pregnancy, Environment, and Child Health: A Focus on  
Obesity and Metabolic Disorders**

*Chairpersons: Suzanne E. Fenton, National Institute of Environmental Health Sciences and Jerrold J. Heindel, Commonwealth*

12:30 PM–12:54 PM	S18	Endocrinological and Environmental Control of Obesity <i>Jerrold J. Heindel, Commonwealth</i>
12:54 PM–1:18 PM	S19	Environmental Influences on the Childhood Obesity Epidemic <i>Leonardo Trasande, NYU School of Medicine</i>
1:18 PM–1:42 PM	S20	Effects of Developmental Exposure to Genx on Mouse Offspring: Pubertal and Metabolic Targets <i>Suzanne E. Fenton, National Institute of Environmental Health Sciences</i>
1:42 PM–2:06 PM	S21	How Does Prenatal Obesogen Exposure Lead to a Transgenerational Predisposition to Obesity? <i>Bruce Blumberg, University of California, Irvine</i>
2:06 PM–2:30 PM	S22	The Role of Maternal Obesity and Pregnancy Weight Gain Patterns in Pregnancy and Birth, and Longer-Term Health Outcomes <i>Elizabeth Widen, University of Texas at Austin</i>

12:30 PM–2:30 PM

**HESI Symposium**  
**Assessing Pregnancy Risk of Immunomodulators**

*Chairpersons: Caren Villano, Bristol-Myers Squibb and  
Dinesh J. Stanislaus, GlaxoSmithKline*

- 12:30 PM–12:55 PM S23 Immune Mechanisms and Immunoregulation:  
Role in Fertility, Gestation, and Parturition  
*Joanne Kwak-Kim, Rosalind Franklin University  
of Medicine and Science*
- 12:55 PM–1:20 PM S24 Current Methods to Assess Pregnancy Risk for  
Immunomodulators  
*Caren Villano, Bristol-Myers Squibb*
- 1:20 PM–1:45 PM S25 Case Studies: Gestational Exposures to  
Immunomodulators in Nonclinical Species  
*Aimee Hillegas, GlaxoSmithKline*
- 1:45 PM–2:10 PM S26 Gaps in Evaluation of Immune Function during  
Pregnancy: Workshop Summary  
*Christopher J. Bowman, Pfizer Inc.*
- 2:10 PM–2:30 PM Panel Discussion

2:30 PM–3:30 PM

**Platform Session 5**

*Chairpersons: Philip Lupo, Baylor College of Medicine and Kristina York, Charles  
River Laboratories*

- 2:30 PM–2:40 PM 24 Adverse Outcome Pathways for Developmental  
Toxicity Gleaned from the Embryological  
Literature: A Rich and Rugged Road  
*Rogers JM. US Environmental Protection  
Agency, Research Triangle Park, NC, United  
States*
- 2:40 PM–2:50 PM 25 Automated Applications of Ontologies to  
Standardize Developmental Toxicology Study  
Extraction  
*Foster C<sup>1</sup>, Wignall J<sup>1</sup>, Kovach S<sup>1</sup>, Trgovcich J<sup>1</sup>,  
Varghese A<sup>1</sup>, Rochester J<sup>1</sup>, Stout M<sup>2</sup>, Kleinstreuer  
NC<sup>2</sup>. <sup>1</sup>ICF International Inc, Durham, NC, United  
States, <sup>2</sup>NIEHS/NTP, Durham, NC, United States*
- 2:50 PM–3:00 PM 26 Mouse Model of Dolutegravir-Induced Neural  
Tube Defects  
*Bredhoeft MR, Feser-Stessman HA, Hulen J,  
Hallgren J, Gelineau-van Waes J. Creighton  
University, Omaha, NE, United States*
- 3:00 PM–3:10 PM 27 Alterations in the Mouse Placenta After  
Preconception and Prenatal Arsenic Exposure  
*Rychlik KA, Kashiwagi C, Liao J, Sillé FC. Johns  
Hopkins University Bloomberg School of Public  
Health, Baltimore, MD, United States*

- |                 |    |   |
|-----------------|----|---|
| 3:10 PM–3:20 PM | 28 | Quantitative Proteomic Analyses of Perfluorooctanoic Acid with Primary Human Villous Trophoblasts<br><i>Chen H, Williams K, San A, Kapidzic M, Hall S, Fisher SJ, Robinson JF. University of California, San Francisco, San Francisco, CA, United States</i>                              |
| 3:20 PM–3:30 PM | 29 | Quantification of the Uncertainties in Extrapolating from <i>In Vitro</i> Androgen Receptor (AR) Antagonism to <i>In Vivo</i> Hershberger Assay Endpoints and Adverse Reproductive Development in Male Rats<br><i>Gray EE. US EPA, ORD, CPHEA, PHITD, RDTB, Durham, NC, United States</i> |

**3:30 PM–4:30 PM**

**Poster Session 3**

Posters P27-P40 Attended for Questions & Answers

**Thursday, July 2, 2020**

**11:00 AM–12:00 Noon**

**BDRP and European Teratology Society Exchange Lecture  
Early Principles of Teratology: Does Karnofsky's Law Still Apply**

*Chairpersons: Susan L. Makris, US Environmental Protection Agency and Nicola Suzanne Powles-Glover, AstraZeneca*

**Dr. David Karnofsky: The First 50 Years  
European Teratology Society**

*Derek Newall, Derek R Newall, European Teratology Society Past-President*

**Dr. David Karnofsky: Can He Rest in Peace or Do We Have a Way to Go?  
BDRP**

*Alan M. Hoberman, Charles River*

12:00 Noon–12:15 PM

Break

**12:15 PM–2:30 PM**

**Single-Cell Revolution: Embryogenesis at High-Resolution Symposium**

*Organized by the BDRP Science Committee*

*Chairpersons: Thomas B. Knudsen, National Center for Computational Toxicology, US EPA and Elaine M. Faustman, University of Washington*



12:15 PM–12:45 PM

S27

Teratogenesis at the Single-Cell Level: Opportunities and Challenges  
*Thomas B. Knudsen, National Center for Computational Toxicology, US EPA*

12:45 PM–1:15 PM

S28

Development and Disease at Single Cell Resolution  
*Malte Spielmann, Max Planck Institute for Molecular Genetics*

1:15 PM–1:45 PM

S29

What scRNAseq Is Now Telling Us about Embryology  
*Sean Megason, Harvard Medical School*

1:45 PM–2:15 PM S30 How Single-Cell Profiling Data Can Be Applied to Improve Children’s Health  
*Elaine M. Faustman, University of Washington*

2:15 PM–2:30 PM Panel Discussion

**2:30 PM–3:20 PM**

**Platform Session 6**

*Chairpersons: Bruce K. Beyer, Sanofi U.S. Inc. and Alan M. Hoberman, Charles River*

2:30 PM–2:40 PM 30 Evaluation of Bisphenol Analogue Exposure on Mouse Adipose Gene Expression *In Vivo* and *In Vitro* Using 3T3-L1 Cells  
*Chappell VA, Tucker DK, Fenton S. NTPL/NIEHS, Research Triangle Park, NC, United States*

2:40 PM–2:50 PM 31 Maternal Diabetes and Risk for Birth Defects, by Race and Ethnicity, National Birth Defects Prevention Study, 1997–2011  
*Tinker SC<sup>1</sup>, Gilboa SM<sup>1</sup>, Moore CA<sup>1</sup>, Waller DK<sup>2</sup>, Simeone RM<sup>1</sup>, Kim SY<sup>1</sup>, Jamieson DJ<sup>3</sup>, Botto LD<sup>4</sup>, Fisher S<sup>5</sup>, Reefhuis J<sup>1</sup>. <sup>1</sup>Centers for Disease Control and Prevention, Atlanta, GA, United States, <sup>2</sup>University of Texas Health Science Center at Houston, Houston, TX, United States, <sup>3</sup>Emory University School of Medicine, Atlanta, GA, United States, <sup>4</sup>University of Utah School of Medicine, Salt Lake City, UT, United States, <sup>5</sup>New York State Department of Health, Albany, NY, United States*

2:50 PM–3:00 PM 32 Modeling Shows High Potential for Preventing Major Neural Tube Defects with Folic Acid Fortification of Iodized Salt  
*Kancherla V<sup>1</sup>, Tsang B<sup>2</sup>, Dixon MA<sup>1</sup>, Wagh K<sup>1</sup>, Oakley G Jr<sup>1</sup>. <sup>1</sup>Emory University Rollins School of Public Health, Atlanta, GA, United States, <sup>2</sup>Food Fortification Initiative, Atlanta, GA, United States*

3:00 PM–3:10 PM 33 Spina Bifida Lesion Level Changes Before and After Mandatory Folic Acid Fortification in the United States  
*Mai C<sup>1</sup>, Adisa O<sup>1,2</sup>, Evans J<sup>3</sup>, Arnold K<sup>1</sup>, Flood T<sup>4</sup>, Frohnert B<sup>5</sup>, Alverson C<sup>1</sup>, Denson L<sup>6</sup>, Nestoridi E<sup>7</sup>, Nance A<sup>8</sup>, Leedom V<sup>9</sup>, Shan X<sup>10</sup>, Ethen M<sup>11</sup>, Eckert V<sup>12</sup>, Kirby R<sup>13</sup>. <sup>1</sup>National Center on Birth Defects and Developmental Disabilities, CDC, Atlanta, GA, United States, <sup>2</sup>P3S Corporation, Atlanta, GA, United States, <sup>3</sup>University of Manitoba, Winnipeg, MB, Canada, <sup>4</sup>Arizona Department of Health Services, Phoenix, AZ, United States, <sup>5</sup>Minnesota Department of Health, St. Paul, MN, United States, <sup>6</sup>Oklahoma State Department of Health, Oklahoma City, OK, United States, <sup>7</sup>Massachusetts Department of Public*

Health, Boston, MA, United States, <sup>8</sup>Utah Department of Health, Salt Lake City, UT, United States, <sup>9</sup>South Carolina Dept. of Health & Environmental Control, Columbia, SC, United States, <sup>10</sup>Arkansas Children's Hospital, Little Rock, AR, United States, <sup>11</sup>Texas Department of State Health Services, Austin, TX, United States, <sup>12</sup>California Department of Public Health, Richmond, CA, United States, <sup>13</sup>University of South Florida, Tampa, FL, United States

3:10 PM–3:20 PM

34

Prevalence of Select Brain and Eye Defects Potentially Related to Zika Virus in Pregnancy *Delaney AM*<sup>1</sup>, *Olson SE*<sup>2</sup>, *Roth NM*<sup>1</sup>, *Cragan J*<sup>3</sup>, *Godfred-Cato S*<sup>3</sup>, *Fornoff J*<sup>4</sup>, *Nestoridi E*<sup>5</sup>, *Forkner A*<sup>6</sup>, *Stolz A*<sup>7</sup>, *Cho SJ*<sup>8</sup>, *Knapp M*<sup>9</sup>, *Crawford K*<sup>10</sup>, *Breidenbach R*<sup>11</sup>, *Nance A*<sup>12</sup>, *Elmore AL*<sup>13</sup>, *Denson L*<sup>14</sup>, *Forestieri N*<sup>15</sup>, *Leedom V*<sup>16</sup>, *Tran T*<sup>17</sup>, *Romitti PA*<sup>18</sup>, *Valencia M*<sup>19</sup>, *Barton J*<sup>20</sup>, *St. John K*<sup>21</sup>, *Kimura J*<sup>22</sup>, *Orantes L*<sup>23</sup>, *Ellis EM*<sup>24</sup>, *Tong VT*<sup>3</sup>, *Gilboa SM*<sup>3</sup>, *Moore CA*<sup>3</sup>, *Honein MA*<sup>3</sup>. <sup>1</sup>Eagle Global Scientific, LLC, Atlanta, GA, United States, <sup>2</sup>G2S Corporation, San Antonio, TX, United States, <sup>3</sup>National Center on Birth Defects and Developmental Disabilities, CDC, Atlanta, GA, United States, <sup>4</sup>Illinois Department of Public Health, Springfield, IL, United States, <sup>5</sup>Massachusetts Department of Public Health, Boston, MA, United States, <sup>6</sup>Indiana State Health Department, Indianapolis, IN, United States, <sup>7</sup>New York State Department of Health, Bureau of Environmental & Occupational Epidemiology, Albany, NY, United States, <sup>8</sup>Minnesota Department of Health, St. Paul, MN, United States, <sup>9</sup>New Jersey Department of Health, Trenton, NJ, United States, <sup>10</sup>Virginia Department of Health, Richmond, VA, United States, <sup>11</sup>Birth Defects Epidemiology and Surveillance Branch, TX Department of State Health Services, Austin, TX, United States, <sup>12</sup>Utah Department of Health, Salt Lake City, UT, United States, <sup>13</sup>Florida Department of Health, Tallahassee, FL, United States, <sup>14</sup>Oklahoma State Department of Health, Oklahoma City, OK, United States, <sup>15</sup>North Carolina Department of Health and Human Services, Raleigh, NC, United States, <sup>16</sup>South Carolina Dept. of Health & Environmental Control, Columbia, SC, United States, <sup>17</sup>Louisiana Department of Health, New Orleans, LA, United States, <sup>18</sup>University of Iowa, Iowa, IA, United States, <sup>19</sup>Puerto Rico Department of Health, San Juan, PR, United States, <sup>20</sup>Georgia Department of Public Health, Atlanta, GA, United States, <sup>21</sup>Rhode Island Department of Health, Providence, RI, United States, <sup>22</sup>Hawaii Department of Health, Honolulu, HI, United

States, <sup>23</sup>Vermont Department of Health,  
Burlington, VT, United States, <sup>24</sup>US Virgin Islands  
Department of Health, Christiansted, US Virgin  
Islands, United States

3:30 PM–4:30 PM

**Closing Session: Awards Announcements and Annual Business Meeting**

**EDUCATION COURSES**

**Thursday, July 16, 2020**

11:00 AM–12:30 PM

**Course 1: Embryology and Toxicity of the Developing Immune System**  
(Separate Registration Required)

*Organized by the Education Committee*

*Chairperson: Caren Villano, Bristol-Myers Squibb*

11:00 AM–11:05 AM

Course Overview

*Education Committee, Chairperson, Caren Villano, Bristol-Myers Squibb*

11:05 AM–11:20 AM

Immunotoxicology Overview

*Jeanine L. Bussiere, Amgen, Inc.*

11:20 AM–11:45 AM

Comparative Development of the Immune System

*John Krayner, Janssen*

11:45 AM–12:15 PM

Developmental Immunotoxicology

*Jamie C. DeWitt, East Carolina University*

12:15 PM–12:30 PM

Questions and Answers

**Thursday, July 23, 2020**

11:00 AM–2:30 PM

**Education Course 2: Juvenile Toxicology**  
(Separate Registration Required)

*Organized by the Education Committee*

*Chairperson: Caren Villano, Bristol-Myers Squibb*

11:00 AM–11:05 AM

Course Overview

*Education Committee, Chairperson, Caren Villano, Bristol-Myers Squibb*

11:05 AM–11:45 AM

Overview of Juvenile Toxicology

*Jia Yao, US Food and Drug Administration*

11:45 AM–12:25 PM

Approaches to Juvenile Animal Testing

*Susan Bielmeier Laffan, GlaxoSmithKline*

12:25 PM–12:40 PM

Questions and Answers

12:40 PM–12:55 PM

Break

12:55 PM–1:35 PM	Organ System Development in Juvenile Nonclinical Species <i>Wendy Halpern, Genentech</i>
1:35 PM–2:15 PM	Clinical Relevance for Pediatric Populations <i>Susan McCune, US Food and Drug Administration</i>
2:15 PM–2:30 PM	Questions and Answers

**Thursday, July 30, 2020**

**11:00 AM–12:30 PM**

**Education Course 3: Assessment of Ovarian Toxicity**

(Separate Registration Required)

*Organized by the Education Committee*

*Chairperson: Caren Villano, Bristol-Myers Squibb*

11:00 AM–11:05 AM	Course Overview <i>Education Committee, Chairperson, Caren Villano, Bristol-Myers Squibb</i>
11:05 AM–11:35 AM	Detecting Ovarian Follicles by Deep Learning and Not <i>In Vivo</i> Ovarian Models <i>Heike Antje Marxfeld, BASF</i>
11:35 AM–12:05 PM	<i>In Vitro</i> Ovarian Models <i>Shuo Xiao, University of South Carolina</i>
12:05 PM–12:30 PM	Questions and Answers