Dear Colleagues:

SOT is pleased to host its 58th Annual Meeting and ToxExpo in Baltimore, Maryland.

The Scientific Program Committee has developed a slate of more than 100 Featured and Scientific Sessions that will explore cutting-edge science, basic mechanisms, regulatory considerations, and more. The topics for these sessions cover the breadth of research interests in toxicology and represent the diversity of our Society and the individuals working in toxicology.

Based on attendee feedback from previous meetings, we are excited to showcase a new Scientific Session format at this year’s meeting: 90-minute Symposium and Workshop Sessions. Being presented during the afternoon of Tuesday, March 12, these 15 sessions feature three speakers each and provide attendees with more flexibility and variety in planning their meeting experience. Please take a few moments to let us know your thoughts on this format in the Annual Meeting survey available after the meeting’s conclusion. Your ideas and opinions help us continue to provide the best meeting experience possible.

Beyond the Scientific Sessions, we hope you enjoy the hundreds of additional activities affiliated with the SOT Annual Meeting, such as the receptions, luncheons, and mentoring events hosted by the SOT Regional Chapters, Special Interest Groups, and Specialty Sections. And make sure to reserve time to visit the ToxExpo where 315+ companies and organizations are ready to offer their expertise regarding toxicological products and services, as well as discuss career and other opportunities in toxicology.

Thank you to all the speakers, exhibitors, and attendees who are participating in this year’s meeting. Your contributions help SOT present the best in toxicology each year, and the 58th Annual Meeting and ToxExpo continue that fine tradition.

Sincerely,

Leigh Ann Burns Naas, PhD, DABT, ATS, ERT
2018–2019 SOT President

Leigh Ann Burns Naas, PhD, DABT, ATS, ERT
2018–2019 SOT President
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# Scientific Program Overview

## General Scientific Sessions

*Continued by type, then date and time*

<table>
<thead>
<tr>
<th>Type</th>
<th>Session</th>
<th>Title</th>
<th>Abstract</th>
<th>Level</th>
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<tbody>
<tr>
<td>Continuing Education</td>
<td>SR01</td>
<td>Handling Uncertainties in Evaluating Mixtures: What's the Difference between a “Similar” and a “Sufficiently Similar” Mixture?</td>
<td>#1001</td>
<td>300</td>
<td>See SOT Event App or see Signage On-Site for Room Location</td>
</tr>
<tr>
<td></td>
<td>SR02</td>
<td>Publicly Available Exposure Tools to Inform the Toxic Substances Control Act</td>
<td>#1002</td>
<td>400</td>
<td>Room Location</td>
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<tr>
<td>Education-Career</td>
<td>AM03</td>
<td>Assay Development Principles and Good Research Practices for Rigor and Reproducibility in In Vitro Toxicology</td>
<td>#1003</td>
<td>300 &amp; 400</td>
<td>See SOT Event App or see Signage On-Site for Room Location</td>
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<tr>
<td>Development Sessions</td>
<td>AM04</td>
<td>Complex Mixtures and UVCBs: Analysis, Testing, and Risk Assessment</td>
<td>#1004</td>
<td></td>
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<tr>
<td></td>
<td>AM05</td>
<td>Developmental Toxicity of the Skeletal System: Interpretation of Findings in DART Studies and Implications for Risk Assessment</td>
<td>#1005</td>
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<tr>
<td></td>
<td>AM06</td>
<td>Industrial Application of Computational Toxicology in the 21st Century</td>
<td>#1006</td>
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<td></td>
<td>AM07</td>
<td>Role of Toxicokinetics in Human Health Safety Assessments</td>
<td>#1007</td>
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<tr>
<td></td>
<td>AM08</td>
<td>Mechanistic Understanding and Quantitative Risk Assessment in Immunotoxicology</td>
<td>#1008</td>
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<tr>
<td>Education-Career</td>
<td>PM09</td>
<td>Applications and Review of Physiologically Based Pharmacokinetic Modeling for Regulatory Risk Assessment</td>
<td>#1009</td>
<td>300 &amp; 400</td>
<td>See SOT Event App or see Signage On-Site for Room Location</td>
</tr>
<tr>
<td>Development Sessions</td>
<td>PM10</td>
<td>Beauty of the Skin Is in the Eye of the Beholder: A Basic Course on Dermal and Ocular Toxicology</td>
<td>#1010</td>
<td></td>
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<tr>
<td></td>
<td>PM11</td>
<td>Conducting Systematic Review in Toxicology—Why, When, How?</td>
<td>#1011</td>
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<td></td>
<td>PM12</td>
<td>Current Dose-Response Modeling Strategies and Applications in Chemical Risk Assessment</td>
<td>#1012</td>
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<td></td>
<td>PM13</td>
<td>Microbiome and Environmental Toxicants: From Study Design and Analysis to Regulatory Guidance</td>
<td>#1013</td>
<td></td>
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<tr>
<td></td>
<td>PM14</td>
<td>Structural and Functional Alterations of Mitochondria in Chemically Induced Cytotoxicity</td>
<td>#1014</td>
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</tbody>
</table>

All events in this overview take place in the Baltimore Convention Center (denoted as CC) unless otherwise noted.

Abstract numbers are four digits. Poster boards are indicated with a “P” followed by 3 digits.
Monday, March 11

8:00 AM to 9:00 AM

OPENING PLENARY SESSION

Robust Assembly of Human Tissues for Disease Modeling and Discovery

**Lecturer: William L. Murphy, University of Wisconsin-Madison, Madison, WI.**

**Hall A**

“Dr. Murphy will enlighten us on his interdisciplinary approaches to develop innovative biomaterials, or as he describes, ‘bioinspired materials,’ because they mimic the fascinating ways that nature builds materials—including human organs. Such materials are quickly being adopted by toxicologists to bridge the gap between alternative methods that rely on molecular- and cellular-based platforms and whole organs or organisms. His lecture promises to be of particular interest to anyone interested in the development of new alternative methods and how these methods can be used to fulfill the vision of toxicity testing in the 21st century.”

~ Ron Hines, PhD, Chair, Scientific Program Committee

9:15 AM to 12:00 Noon

SYMPOSIUM SESSIONS

- Advances in *In Vitro to In Vivo* Extrapolation: Approaches and Applications
  Abstract #: 1015–1020  Room 316
- Alpha-Synuclein: A Good Protein Turned Bad in Chronic Brain Diseases with Toxicological Implications
  Abstract #: 1021–1025  Ballroom II
- Assessing Acute Health Risk: Potential Application of Next-Generation Toxicological Tools
  Abstract #: 1026–1031  Ballroom I
- Novel Genetic-Based Tools for Evaluating Toxicity Potential, Mechanism of Action, and Population Dynamics
  Abstract #: 1032–1037  Ballroom III

WORKSHOP SESSIONS

- Application of Computational Modeling to Risk Assessment of Endocrine Disruptors
  Abstract #: 1038–1043  Room 309
- MALDI Tissue Imaging: A New Tool for Making TK/TD Connections to Histopathology
  Abstract #: 1044–1049  Room 314
- Mechanisms and Effects of Diabetogenic Environmental Metals: Type II Diabetes Mellitus and Diabetic Kidney Disease
  Abstract #: 1050–1055  Room 308
- Pharmaceutical Investigative Toxicology: Case Studies in Optimizing Drug Discovery and Guiding Human Risk Assessment
  Abstract #: 1056–1061  Ballroom IV

PLATFORM SESSIONS

- Investigating Mode of Action in Chemical Carcinogenesis
  Abstract #: 1062–1069  Room 310
- SPC Highlights Emerging Scientists: Mechanistic Toxicology to Decode Injury and Repair
  Abstract #: 1070–1080  Room 321

9:15 AM to 4:30 PM

POSTER SESSIONS

Authors are in attendance only during one of four designated time blocks: A, B, C, or D. Poster boards are located in color-coded sections in the ToxExpo Exhibit Hall, as denoted by the colored shapes in the list below.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Section</th>
<th>Poster Board</th>
<th>Abstract #</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Air Pollution Toxicology</td>
<td>P101–P122</td>
<td>1081–1102</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>A</td>
<td>Air Pollution: Biomass</td>
<td>P124–P133</td>
<td>1103–1114</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>A</td>
<td>Air Pollution: Ozone</td>
<td>P136–P148</td>
<td>1115–1127</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>A</td>
<td>Air Pollution: PM</td>
<td>P149–P172</td>
<td>1128–1151</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>B</td>
<td>Animal Models</td>
<td>P719–P743</td>
<td>1578–1602</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>B</td>
<td>Biomarkers of Disease and Exposure</td>
<td>P539–P567</td>
<td>1457–1484a</td>
<td>Exhibit Hall</td>
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Find up-to-date information at [www.toxicology.org/2019](http://www.toxicology.org/2019) | #2019SOT  #toxexpo

Overview—Monday | 3
### Clinical and Translational Toxicology
- Poster Board #: P231–P243
- Abstract #: 1204–1216
- Exhibit Hall

### Ecotoxicology
- Poster Board #: P176–P197
- Abstract #: 1152–1173
- Exhibit Hall

### Genetic Toxicity
- Poster Board #: P683–P714
- Abstract #: 1546–1577
- Exhibit Hall

### Liver I
- Poster Board #: P246–P282
- Abstract #: 1217–1253
- Exhibit Hall

### Liver II
- Poster Board #: P283–P318
- Abstract #: 1254–1289
- Exhibit Hall

### Neurodegenerative Disease
- Poster Board #: P341–P352
- Abstract #: 1290–1301
- Exhibit Hall

### Neurodegenerative Disease: Parkinson’s Disease
- Poster Board #: P355–P368
- Abstract #: 1302–1315
- Exhibit Hall

### Neurotoxicity: Developmental
- Poster Board #: P409–P444
- Abstract #: 1352–1387
- Exhibit Hall

### Neurotoxicity: General
- Poster Board #: P371–P407
- Abstract #: 1316–1351a
- Exhibit Hall

### Neurotoxicity: Metals
- Poster Board #: P446–P472
- Abstract #: 1388–1414
- Exhibit Hall

### Neurotoxicity: Pesticides
- Poster Board #: P475–P490
- Abstract #: 1415–1430
- Exhibit Hall

### Perfluorinated Alkyl Substances
- Poster Board #: P199–P219
- Abstract #: 1174–1194
- Exhibit Hall

### Persistent Organic Pollutants
- Poster Board #: P221–P229
- Abstract #: 1195–1203
- Exhibit Hall

### Reproductive Toxicology I
- Poster Board #: P600–P629
- Abstract #: 1485–1514
- Exhibit Hall

### Reproductive Toxicology II
- Poster Board #: P630–P660
- Abstract #: 1515–1545
- Exhibit Hall

### Safety Assessment Pharmaceutical: Drug Discovery
- Poster Board #: P497–P507
- Abstract #: 1431–1441
- Exhibit Hall

### Stem Cell Biology and Toxicology
- Poster Board #: P511–P525
- Abstract #: 1442–1456
- Exhibit Hall

### Research Funding Insights
- Network with Program Officers. Room 336

### Roundtable Session
- Data for Chemical Evaluations: Secret or Otherwise Abstract #: 1603 Room 310

### Informational Sessions
- Electronic Waste: An Evolving Global Health Concern and Risk Assessment Challenge Abstract #: 1604 Room 309
- Federal Efforts in Rapidly Assessing Hazard and Risk to Emerging Threats and Emergency Response Abstract #: 1605 Room 308

### Distinguished Toxicology Scholar Award Lecture
**Epigenome-Environment Interactions**

**Lecturer:** Cheryl Lyn Walker, Baylor College of Medicine, Center for Precision Environmental Health, Houston, TX.

**Ballroom III**

"Because of her impact on toxicology and the more than 30 years she has spent in dedication to advancing the science, Dr. Walker is receiving the 2019 SOT Distinguished Toxicology Scholar Award."

~ Helen G. Haggerty, PhD, Chair, Awards Committee
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>1:45 PM to 4:30 PM</td>
<td><strong>SYMPOSIUM SESSIONS</strong>  ⚫</td>
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<tr>
<td></td>
<td>• Immune-Epithelial Cell Crosstalk in Lung Toxicology and Disease</td>
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<td>• Patterns of Co-exposure and Its Implications for Understanding the Health Effects of Mixtures</td>
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<td>• Scaling Barriers: Cellular Dynamics and Models of Blood-Brain Barrier Developmental Toxicity</td>
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<td>• Strategic Development of Read-Across within the EU-ToxRisk Project and Beyond</td>
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<td><strong>WORKSHOP SESSIONS</strong>  ⚫</td>
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<td>• A Herculean Switch? Rethinking Chemical Carcinogenicity Assessment</td>
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<td>• A Tale of an In Vitro Method: From Inception to International and Regulatory Acceptance</td>
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<td>• Applying Systems Biology Approaches to Understand the Joint Action of Chemical and Nonchemical Stressors</td>
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<td>• NextGen Renal Proximal Tubule Toxicity Screening: Novel Cellular Model and Complex Culture Platforms</td>
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<td><strong>PLATFORM SESSIONS</strong>  ⚫</td>
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<td>• Oxidant-Mediated Injury in Toxicology</td>
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<td>• Safety Assessment: Pharmaceutical—Drug Discovery I</td>
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<td>4:30 PM to 5:50 PM</td>
<td><strong>EDUCATION-CAREER DEVELOPMENT SESSION</strong>  ⚫</td>
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<td>• Models and Strategies for Building Diversity and Inclusion in Toxicology</td>
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<tr>
<td>4:45 PM to 6:00 PM</td>
<td><strong>SOT/EUROTOX DEBATE</strong>  ⚫</td>
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<tr>
<td></td>
<td>Classification of Substances as Endocrine Disruptors Has a Public Health Benefit</td>
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<td></td>
<td>Debaters: Paul Foster, NIEHS (Retired), Research Triangle Park, NC; and Martin van den Berg, Utrecht University, Utrecht, Netherlands.</td>
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<td>Ballroom I</td>
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**Tuesday, March 12**

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<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00 AM to 10:45 AM</td>
<td><strong>SOCIETY OF TOXICOLOGY AND JAPANESE SOCIETY OF TOXICOLOGY SYMPOSIUM</strong>  ⚫</td>
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<tr>
<td></td>
<td>Epigenetic Modification of Chronic Pathology and Toxicology</td>
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<td></td>
<td>Lecturers: Masatoshi Hagiwara, Kyoto University, Kyoto, Japan; Jun Kanno, Japan Bioassay Research Center, Kanagawa, Japan; Dana C. Dolinoy, University of Michigan School of Public Health, Ann Arbor, MI; and Cheryl Lyn Walker, Baylor College of Medicine, Center for Precision Environmental Health, Houston, TX.</td>
</tr>
<tr>
<td></td>
<td>Ballroom I</td>
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</tbody>
</table>
8:00 AM to 10:45 AM

**SYMPOSIUM SESSIONS**

- "Not Your Father's ED": Expanding the Definition and Understanding of Endothelial Dysfunction (ED) Due to Inhaled Toxicants  
  Abstract #: 1671–1675  
  Room 314
- Stem Cells and Metals Toxicity: From Tissue Regeneration and Repair to Carcinogenesis  
  Abstract #: 1676–1681  
  Room 316
- Systems Toxicology Approaches to the Science of Safety Evaluation  
  Abstract #: 1682–1686  
  Ballroom IV
- Using Zebrafish as a Model to Understand and Ultimately Prevent Neurotoxicity  
  Abstract #: 1687–1692  
  Room 308

**WORKSHOP SESSIONS**

- Emergent Mechanisms of Cytochrome P450 Gene Regulation: Defining an Improved Roadmap toward 21st-Century Pharmacogenomics  
  Abstract #: 1693–1698  
  Room 321
- Predicting Metabolic Clearance Rates for Drug Leads and Environmental Chemical Risk Assessment  
  Abstract #: 1699–1704  
  Room 309
- Shifting Currents in Predictive Toxicology and Safety Evaluation with In Vitro and Alternative Approaches  
  Abstract #: 1705–1710  
  Hall A
- Strategies to Mitigate the Health Impacts of Air Pollutants in Susceptible Populations  
  Abstract #: 1711–1716  
  Ballroom II

**PLATFORM SESSION**

- SPC Highlights Emerging Scientists: Adverse Effects of Perfluorinated Alkyl Substances  
  Abstract #: 1717–1724  
  Room 310

9:15 AM to 4:30 PM

**POSTER SESSIONS**

Authors are in attendance only during one of four designated time blocks: A, B, C, or D. Poster boards are located in color-coded sections in the ToxExpo Exhibit Hall, as denoted by the colored shapes in the list below.

- **B** Alternatives to Mammalian Models I  
  Poster Board #: P839–P871  
  Abstract #: 2424–2456  
  Exhibit Hall
- **C** Alternatives to Mammalian Models II  
  Poster Board #: P872–P909  
  Abstract #: 2457–2494  
  Exhibit Hall
- **C** Autoimmunity and Hypersensitivity  
  Poster Board #: P671–P678  
  Abstract #: 2264–2271  
  Exhibit Hall
- **B** Biological Modeling  
  Poster Board #: P196–P220  
  Abstract #: 1815–1839  
  Exhibit Hall
- **A** Carcinogenesis I  
  Poster Board #: P341–P360  
  Abstract #: 1954–1973  
  Exhibit Hall
- **A** Carcinogenesis II  
  Poster Board #: P361–P375  
  Abstract #: 1974–1988  
  Exhibit Hall
- **D** Cardiovascular Toxicology/Hemodynamics  
  Poster Board #: P440–P463  
  Abstract #: 2049–2072  
  Exhibit Hall
- **D** Cell Death and Apoptosis  
  Poster Board #: P465–P481  
  Abstract #: 2073–2089  
  Exhibit Hall
- **A** Chemical Threats and Bioterrorism I  
  Poster Board #: P539–P555  
  Abstract #: 2138–2154  
  Exhibit Hall
- **A** Chemical Threats and Bioterrorism II  
  Poster Board #: P556–P579  
  Abstract #: 2155–2178  
  Exhibit Hall
- **B** Computational Toxicology I  
  Poster Board #: P101–P139  
  Abstract #: 1725–1763  
  Exhibit Hall
- **B** Computational Toxicology II  
  Poster Board #: P140–P170  
  Abstract #: 1764–1794  
  Exhibit Hall
- **A** Developmental and Juvenile Toxicology  
  Poster Board #: P800–P820  
  Abstract #: 2386–2406  
  Exhibit Hall
- **A** Developmental Basis of Adult Disease  
  Poster Board #: P821–P838  
  Abstract #: 2407–2423a  
  Exhibit Hall
### Overview—Tuesday

#### RESEARCH FUNDING INSIGHTS
- Network with Program Officers.  
  Room 336

#### 11:00 AM to 12:00 Noon

#### MEET THE DIRECTORS

**A Conversation with Linda S. Birnbaum, Jennifer Orme-Zavaleta, and Mark S. Johnson**


Ballroom III

#### TRANSLATIONAL IMPACT AWARD LECTURE

**Acetaminophen Hepatotoxicity: Translating Animal Studies to the Human Pathophysiology and the Emergence of New Drug Candidates**

*Lecturer: Hartmut Jaeschke, University of Kansas Medical Center, Kansas City, KS.*

Room 308

“Dr. Jaeschke is receiving the 2019 SOT Translational Impact Award to honor the translational significance of his work in acetaminophen toxicity.”  
- Helen G. Haggerty, PhD, Chair, Awards Committee
11:00 AM to 12:20 PM

**ROUNDTABLE SESSION**

- The Delaney Clause, from 1958 to 2019: Making the Model Relevant
  
- INFORMATIONAL SESSIONS
  
- Challenges and Opportunities Encountered with TSCA Reform: Working toward a Shared Vision for Product Safety
  
- Science at the Nexus of Wildfire Smoke and Public Health

12:30 PM to 1:30 PM

**MERIT AWARD LECTURE**

Receptor Schizophrenia: Molecules That Regulate Cellular Homeostasis and Disease and Are Important Drug Targets

*Lecturer: Stephen H. Safe, Texas A&M University, College Station, TX.*

*Ballroom II*

"Dr. Safe is being honored with the 2019 SOT Merit Award for his breakthrough research developments and his devotion to advancing toxicology through mentorship and instruction."

~ Helen G. Haggerty, PhD, Chair, Awards Committee

1:00 PM to 2:30 PM

**TOXICOLOGICAL SCIENCES FEATURED SESSION**

From the Pages of ToxSci: Mouse vs. Machine … Are Animal Studies Being Supplanted by Computers?

*Panelists: Gary W. Miller, Columbia University, New York, NY; Alison Harrill, NIEHS/NTP, Research Triangle Park, NC; Thomas Hartung, Johns Hopkins University Center for Alternatives to Animal Testing (CAAT), Baltimore, MD; Nicole C. Kleinstreuer, NIEHS, Research Triangle Park, NC; and Ivan Rusyn, Texas A&M University, College Station, TX.*

*Room 310*

1:00 PM to 2:30 PM

**SYMPOSIUM SESSIONS**

- Explicating the Pathogenic Environmental Factors in Nonalcoholic Fatty Liver Disease
  
- Integrated ‘Omics Approaches to Toxicity Assessments
  
- Scientific and Regulatory Update in the Application of the 3Rs Principle in Chemical and Drug Development
### Overview—Wednesday

**1:00 PM to 2:30 PM**

**WORKSHOP SESSIONS**

- **Adverse or Not Adverse? Thinking Process behind Adversity Determination during Nonclinical Drug Development**
  - Abstract #: 2510–2513  
  - Room 321
- **Assessing the Bisphenol Class of Chemicals**
  - Abstract #: 2514–2517  
  - Ballroom I
- **In Vitro Static and Dynamic Skin Metabolism Methods and Strategies to Address the Safety Assessment of Topically Applied Chemicals**
  - Abstract #: 2518–2521  
  - Room 309
- **Innovation in Biomarker Qualification**
  - Abstract #: 2522–2525  
  - Ballroom IV

**2:30 PM to 3:00 PM**

**NETWORKING TIME**

- Visit the ToxExpo Exhibit Hall to meet with colleagues and consult with the 315+ exhibitors.

**3:00 PM to 4:30 PM**

**SYMPOSIUM SESSIONS**

- **Microbiota and Contributions to Neurodevelopment: Implications in Neurological Function, Behavior, and Toxicity**
  - Abstract #: 2526–2529  
  - Ballroom II
- **Novel Safety Biomarker Qualification: Updates and Progress**
  - Abstract #: 2530–2533  
  - Ballroom IV
- **Perfluoroalkyl Substances (PFAS): Global and Persistent Environmental Contaminants**
  - Abstract #: 2534–2537  
  - Ballroom I
- **Species Relevance: Approaches to Determine the Most Relevant Species for Safety Assessment of Pharmaceutical Products**
  - Abstract #: 2538–2542  
  - Room 308
- **The Current Application, Limitations, and Recent Advances in Humanized Mouse Models for Evaluations of Immune Function and Preclinical Immunotoxicology Studies**
  - Abstract #: 2543–2546  
  - Ballroom III
- **When “Natural” Is Not Synonymous with “Safe”: Toxicity of Natural Products Alone and in Combination with Pharmaceutical Agents**
  - Abstract #: 2547–2550  
  - Room 321

**WORKSHOP SESSIONS**

- **New Approaches Using Mode of Action to Predict Acute and Systemic Toxicity**
  - Abstract #: 2551–2554  
  - Room 316
- **The Utility of Echocardiography in Cardiac Safety Assessment**
  - Abstract #: 2555–2558  
  - Room 309

**4:45 PM to 6:05 PM**

**EDUCATION-CAREER DEVELOPMENT SESSION**

- **Tips for Improving Scientific Communication with a General Audience**
  - Abstract #: 2559  
  - Room 308

**4:45 PM to 6:15 PM**

**SOT ANNUAL BUSINESS MEETING**

- SOT members are encouraged to attend. The agenda includes a financial summary, a review of the 2018–2019 accomplishments, and highlights of the new strategic plan.

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**Wednesday, March 13**

**8:00 AM to 10:45 AM**

**SYMPOSIUM SESSIONS**

- **Establishing Effective Alternatives for Acute Oral and Inhalation Systemic Toxicity Testing**
  - Abstract #: 2560–2565  
  - Ballroom IV
- **Progress toward Charting the Course for Improving Carcinogenicity Assessments of Human Pharmaceuticals and Pesticides**
  - Abstract #: 2566–2571  
  - Ballroom I
- **The Role of Dynamic RNA Modifications in Environmental Response and Disease**
  - Abstract #: 2572–2577  
  - Ballroom II
### 8:00 AM to 10:45 AM

**WORKSHOP SESSIONS**

- **A Sharp Stick in the Eye: Understanding and Managing Ocular Findings in General Toxicology Studies**
  - Abstract #: 2578–2583
  - Room 310
- **Can We Panelize Seizure?**
  - Abstract #: 2584–2589
  - Ballroom III
- **Nerve Agent Poisoning: Mechanisms of Toxicity, Recent Releases, Verification, and Innovative Treatment Approaches**
  - Abstract #: 2590–2595
  - Room 309
- **Pregnant and Vaping: Knowns and Unknowns of Reproductive and Developmental Toxicity Related to Electronic Cigarettes**
  - Abstract #: 2596–2601
  - Hall A
- **Understanding the Impact on the Immune System of Occupationally Relevant Exposures to Multiwalled Carbon Nanotubes**
  - Abstract #: 2602–2606
  - Room 308

### 9:15 AM to 4:30 PM

**PLATFORM SESSIONS**

- **Safety Assessment: Pharmaceutical—Drug Development I**
  - Abstract #: 2607–2617
  - Room 321
- **SPC Highlights Emerging Scientists: Biopharmaceutical Safety Assessment**
  - Abstract #: 2618–2627
  - Room 316
- **Xenobiotic Disposition in Disease and Toxicities**
  - Abstract #: 2628–2635
  - Room 314

### 9:15 AM to 4:30 PM

**POSTER SESSIONS**

Authors are in attendance only during one of four designated time blocks: A, B, C, or D. Poster boards are located in color-coded sections in the ToxExpo Exhibit Hall, as denoted by the colored shapes in the list below.

<table>
<thead>
<tr>
<th>Block</th>
<th>Category</th>
<th>Poster Board</th>
<th>Abstract Range</th>
<th>Exhibit Hall</th>
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<tbody>
<tr>
<td><strong>A</strong></td>
<td>Alternatives to Mammalian Models III</td>
<td>▲ Poster Board #: P755–P771</td>
<td>Abstract #: 3170–3186</td>
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<td><strong>D</strong></td>
<td>Biotransformation and Cytochrome P450 Metabolism</td>
<td>○ Poster Board #: P647–P659</td>
<td>Abstract #: 3095–3108</td>
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<tr>
<td><strong>D</strong></td>
<td>Disposition and Pharmacokinetics</td>
<td>▲ Poster Board #: P683–P713</td>
<td>Abstract #: 3109–3139</td>
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<tr>
<td><strong>A</strong></td>
<td>Emerging Technologies</td>
<td>○ Poster Board #: P600–P612</td>
<td>Abstract #: 3063–3075</td>
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<td><strong>B</strong></td>
<td>Endocrine Toxicology</td>
<td>▲ Poster Board #: P719–P748</td>
<td>Abstract #: 3140–3169</td>
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<tr>
<td><strong>B</strong></td>
<td>Epidemiology and Human Population Studies</td>
<td>○ Poster Board #: P617–P635</td>
<td>Abstract #: 3076–3094</td>
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<tr>
<td><strong>B</strong></td>
<td>Epigenetics</td>
<td>◆ Poster Board #: P413–P439</td>
<td>Abstract #: 2970–2996</td>
<td>Exhibit Hall</td>
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<tr>
<td><strong>B</strong></td>
<td>Food Safety and Nutrition</td>
<td>■ Poster Board #: P101–P141</td>
<td>Abstract #: 2636–2676</td>
<td>Exhibit Hall</td>
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<tr>
<td><strong>C</strong></td>
<td>Gene Regulation</td>
<td>◆ Poster Board #: P441–P455</td>
<td>Abstract #: 2997–3011</td>
<td>Exhibit Hall</td>
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<td><strong>A</strong></td>
<td>Inflammation</td>
<td>◆ Poster Board #: P497–P514</td>
<td>Abstract #: 3030–3047</td>
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<td><strong>A</strong></td>
<td>Mechanisms of Kidney Toxicity</td>
<td>◆ Poster Board #: P341–P366</td>
<td>Abstract #: 2811–2836</td>
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<td><strong>C</strong></td>
<td>Medical Devices</td>
<td>◆ Poster Board #: P371–P392</td>
<td>Abstract #: 2837–2958</td>
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<td><strong>D</strong></td>
<td>Mixtures</td>
<td>◆ Poster Board #: P517–P531</td>
<td>Abstract #: 3048–3062</td>
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<tr>
<td><strong>D</strong></td>
<td>Natural Products</td>
<td>■ Poster Board #: P144–P158</td>
<td>Abstract #: 2677–2691</td>
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<td><strong>C</strong></td>
<td>Ocular Toxicity</td>
<td>◆ Poster Board #: P401–P411</td>
<td>Abstract #: 2959–2969</td>
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</table>

Find up-to-date information at [www.toxicology.org/2019](http://www.toxicology.org/2019) | #2019SOT | toxexpo
9:30 AM to 4:30 PM
RESEARCH FUNDING INSIGHTS
• Network with Program Officers.

11:00 AM to 12:00 Noon
EUROTOX BO HOLMSTEDT MEMORIAL AWARD LECTURE

Metabolism, Inflammation, and Cancer
Lecturer: Nigel J. Gooderham, Imperial College London, London, United Kingdom.

Ballroom II
“Professor Gooderham was selected as the Bo Holmstedt Memorial Lecturer from a strong field of European toxicologists. With interests in mechanisms of chemical carcinogenesis and molecular and cellular responses to toxicity, his presentation describes the role of microRNAs in colon carcinogenesis.”
~ Heather Wallace, PhD, EUROTOX President 2018–2020

11:00 AM to 12:20 PM
ROUNDTABLE SESSION
• The Necessity of Uncertainty: Quantifying Uncertainty for Regulatory Application of New Approach Methodologies

INFORMATIONAL SESSION
• Toxicology Education and Risk Assessment Training in Africa: Status, Challenges, and Role of SOT Special Interest Groups in Moving Forward

EDUCATION-CAREER DEVELOPMENT SESSION
• Stepping Out of the Lab: Maximizing Access and Experience for Internships in Toxicology

12:30 PM to 1:30 PM
PLENARY KEYNOTE MEDICAL RESEARCH COUNCIL (MRC) LECTURE

Ageing and Multimorbidity: Time for a New Approach
Lecturer: Janet M. Lord, University of Birmingham Institute of Inflammation and Ageing, Birmingham, United Kingdom.

Ballroom III
“Professor Janet Lord will tell us about the many factors that make aging unpleasant, and a few that are important in lessening the impact of age. This talk will be especially important to those of us who are interested in the interplay of factors that contribute to chronic diseases with environmental etiologies.”
~ George P. Daston, PhD, Co-Chair, Scientific Program Committee
### 1:30 PM to 4:15 PM

#### SYMPOSIUM SESSIONS

- Consideration for Safety Assessment of Chemically Synthesized Therapeutic Peptides: A Drug Development Paradigm between the Large and Small  
  Abstract #: 3190–3195  
  Room 314

- Role of Oxidative Stress in Health and Disease: Mechanisms, Methods of Detection, and Biomarkers  
  Abstract #: 3196–3201  
  Ballroom II

- Understanding the Utility of In Vitro Developmental Toxicity Assays and Building Integrated Testing Strategies  
  Abstract #: 3202–3207  
  Room 316

#### WORKSHOP SESSIONS

- Air Pollution-Induced Cardiovascular Toxicity: Endothelial Progenitor Cells as Critical Mediators  
  Abstract #: 3208–3212  
  Room 310

- Microphysiological Systems: A New Era in Neurotoxicology?  
  Abstract #: 3213–3218  
  Ballroom I

- Order from Chaos: Pattern Recognition in Challenging Human Health Datasets  
  Abstract #: 3219–3224  
  Room 308

- Risk Assessment of Consumer Products and Articles: Critical Considerations and Case Studies for Characterizing and Quantifying Consumer-Relevant Exposures to Chemicals and Nanomaterials  
  Abstract #: 3225–3230  
  Room 309

- This Is Your Teen Brain on Drugs: In Search of Biomarkers Unique to Dependence Toxicity in Adolescents  
  Abstract #: 3231–3236  
  Ballroom IV

### 1:30 PM to 4:15 PM

#### PLATFORM SESSION

- Immunotoxicity  
  Abstract #: 3237–3247  
  Room 321

### 4:30 PM to 5:30 PM

#### LEADING EDGE IN BASIC SCIENCE AWARD LECTURE

Sensing the Chemical Environment: Receptors, Mechanisms, and Implications for Toxicology  
Lecturer: Sven-Eric Jordt, Duke University School of Medicine, Durham, NC.

Room 309

“Dr. Jordt is being awarded the 2019 SOT Leading Edge in Basic Science Award to recognize his contributions to basic science and their importance to pharmacology and toxicology.” ~ Helen G. Haggerty, PhD, Chair, Awards Committee

### 4:30 PM to 5:50 PM

#### ROUNDTABLE SESSION

- A Multi-Stakeholder Dialogue on Using Proprietary Modeling Platforms to Support Risk Assessment and Regulatory Decisions  
  Abstract #: 3248  
  Room 314

### EDUCATION–CAREER DEVELOPMENT SESSION

- Navigating Turbulent Waters: How to Address Conflict throughout Your Career  
  Abstract #: 3249  
  Room 308
**Thursday, March 14**

### 8:30 AM to 11:15 AM

#### SYMPOSIUM SESSIONS

- Nerve Agent and Pesticide Poisoning: Best Practice Methodologies for Assessing Long-Term Health Effects  
  Abstract #: 3250–3254  
  Room 309
- New Mechanistic Insights into Causes and Outcomes of Epigenetic Dysregulation by Carcinogenic Metals  
  Abstract #: 3255–3260  
  Ballroom III
- Preconception Exposure to Toxicants: Assessing Gamete Quality and Reproductive Outcomes  
  Abstract #: 3261–3266  
  Ballroom IV

#### WORKSHOP SESSIONS

- Potential Alternatives to Systematic Review: Evidence Maps and Scoping Reviews  
  Abstract #: 3267–3272  
  Room 310
- Use of Adverse Outcome Pathways to Design Nonanimal Testing Strategies for Assessing Inhalation Toxicity  
  Abstract #: 3273–3278  
  Room 316

#### PLATFORM SESSIONS

- Cardiovascular Toxicology/Hemodynamics  
  Abstract #: 3279–3287  
  Ballroom I
- Nanotoxicology: In Vitro Test Platform  
  Abstract #: 3288–3294  
  Room 308
- Safety Assessment: Pharmaceutical—Drug Development II  
  Abstract #: 3295–3305  
  Room 321
- Safety Assessment: Pharmaceutical—Drug Discovery II  
  Abstract #: 3306–3313  
  Room 314

### 8:30 AM to 11:30 AM

#### LATE-BREAKING POSTER SESSION

- To be announced  
  Hall A

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**SOT | Society of Toxicology**

**Hundreds of Networking Opportunities for Attendees**

**FEATURED EVENTS • SESSIONS • POSTERS • RECEPTIONS • TOXEXPO**

**Special Interest Groups**

Explore scientific issues related to specific communities

**Regional Chapters**

Foster scientific exchange on a local level

**Specialty Sections**

Discuss science around particular research areas

Make your connections in Baltimore and keep them going year-round by joining an SOT Component Group.

---

Find up-to-date information at [www.toxicology.org/2019](http://www.toxicology.org/2019) | #2019SOT #toxexpo
Venue Maps

Baltimore Convention Center Maps—Level 100
All Scientific Sessions are taking place in the Baltimore Convention Center. Other select events are taking place at the Hilton Baltimore and Hyatt Regency Baltimore Inner Harbor, as well as venues across the city.

Plenary Lectures, Thursday Poster Sessions, and ToxExpo
Level 300

@SOT Center, CE Course Rooms, Exhibitor-Hosted Sessions, Registration, and Scientific Sessions

Find up-to-date information at www.toxicology.org/2019 | #2019SOT #toxexpo
Level 400

Awards Ceremony, CE Course Rooms, and Scientific Sessions
First Floor

Ancillary, Special Interest Group, and Specialty Section Events
Second Floor

Ancillary, Special Interest Group, Specialty Section, and Student/Postdoc Events

West Camden Street

Skybridge to Convention Center

In Vitro Toxicology Lecture and Luncheon
Student/Postdoc Mixer

Holiday Ballroom

North Foyer

Elevators

Escalators

Pratt Street

South Foyer

Key Ballroom

Elevators

Poe B
Poe A
Calloway B
Calloway A
Blake
Mencken

Pickersgill
Armstead
The UPS Store

Find up-to-date information at www.toxicology.org/2019 | #2019SOT #toxexpo
Third Floor

Ancillary and Special Interest Group Events
Second Floor

Ancillary and Special Interest Group Events and Undergraduate Education Program
Third Floor

Ancillary Events and Undergraduate Education Program
Baltimore Hotel Locations

1. **Baltimore Marriott Inner Harbor at Camden Yards**
   - Address: 110 S. Eutaw Street
   - Tel: 410.962.0202
   - Website

2. **Baltimore Marriott Waterfront**
   - Address: 700 Aliceanna Street
   - Tel: 410.385.3000
   - Website

3. **Days Inn Inner Harbor**
   - Address: 100 Hopkins Place
   - Tel: 410.576.1000
   - Website

4. **Embassy Suites by Hilton Baltimore Inner Harbor**
   - Address: 222 St. Paul Place
   - Tel: 410.727.2222
   - Website

5. **Hampton Inn Baltimore-Downtown/Convention Center**
   - Address: 550 Washington Boulevard
   - Tel: 410.685.5000
   - Website

6. **Hilton Baltimore (SOT Headquarters Hotel)**
   - Address: 401 W. Pratt Street
   - Tel: 443.573.8700
   - Website

7. **Holiday Inn Inner Harbor-Downtown Baltimore**
   - Address: 301 W. Lombard Street
   - Tel: 410.685.3500
   - Website

8. **Hotel Monaco Baltimore, A Kimpton Hotel**
   - Address: 2 N. Charles Street
   - Tel: 443.692.6170
   - Website

9. **Hyatt Regency Baltimore Inner Harbor**
   - Address: 300 Light Street
   - Tel: 410.528.1234
   - Website

10. **Lord Baltimore Hotel**
    - Address: 20 W. Baltimore Street
    - Tel: 410.539.8400
    - Website

11. **Renaissance Baltimore Harborplace Hotel**
    - Address: 202 E. Pratt Street
    - Tel: 410.547.1200
    - Website

12. **Royal Sonesta Harbor Court Hotel**
    - Address: 550 Light Street
    - Tel: 410.234.0550
    - Website

13. **Sheraton Inner Harbor**
    - Address: 300 S. Charles Street
    - Tel: 410.962.8300
    - Website

**Baltimore Convention Center**
Poster Sessions

Monday, March 11 to Wednesday, March 13
ToxExpo Exhibit Hall—100 Level
9:15 AM–4:30 PM

Poster Setup: 7:30 AM–9:15 AM
The presenting author of each poster abstract is responsible for the proper assembly, mounting, and presentation of his/her poster. Presenters should display posters ONLY on the assigned date. Posters must be removed immediately at the end of each day so that the boards may be prepared for the next day’s Poster Sessions.

The numbers preceded by a “P” (e.g., P101) refer to the poster location, which does not change throughout the week. Presenters should display posters ONLY on the date and time communicated in their acceptance notice.

Author-Attended Times:
A: 9:15 AM–10:45 AM  B: 10:45 AM–12:15 PM
C: 1:30 PM–3:00 PM  D: 3:00 PM–4:30 PM
Poster Sessions are all day, with authors in attendance during one of four designated author-attended times (labeled A, B, C, and D). See the Program Overview (pages 2–13) or the SOT Event App for the assigned time blocks.

Poster Retrieval: 4:30 PM–5:00 PM
On Monday and Tuesday, posters that are left on the boards after 5:00 pm will be placed in a poster retrieval area near that Poster Session’s presentation area and can be picked up by the author the following morning.

On Wednesday, posters left on the boards after 5:00 pm will be removed and placed on tables outside the ToxExpo entrance. Any posters unclaimed by 10:00 am on Thursday will be recycled.

Late-Breaking Poster Sessions
Thursday, March 14
Hall A—100 Level
8:30 AM–11:30 AM
Poster Setup:
8:00 AM–8:30 AM
Abstracts and poster board information for the Late-Breaking Poster Sessions are available in the SOT Event App.

Photography Policy
Photography in the ToxExpo and all Poster Sessions is prohibited without the consent of exhibitors or poster presenter(s)/author(s). Please respect your colleagues’ right to privacy.

SOT staff and security staff will be enforcing the “no photography” policy on-site to curtail concerns about the all-day display format. Attendees who violate the no photography policy risk ejection from the Annual Meeting.
Poster Board Sections/Numbering

Green: P101–P340

Purple: P341–P538

Orange: P539–P682

Blue: P683–P910

Consult the poster board map in the SOT Event App or on-site signage in the ToxExpo Exhibit Hall (and Hall A for the Late-Breaking Poster Session) for the location of individual poster boards within these groupings.
Annual Meeting Registration Includes:
- Awards Ceremony, Sunday, March 10, 5:15 pm–6:30 pm.
- Welcome Reception, Sunday, March 10, 6:30 pm–7:30 pm.
- Plenary Lecture, Monday, March 11, 8:00 am–9:00 am.
- All Scientific Sessions, Monday, March 11, through Thursday, March 14 (see the Scientific Program Overview at the beginning of this PDF for additional details).
- ToxExpo Exhibit Hall, Monday, March 11, through Wednesday, March 13, 9:15 am–4:30 pm.

Participants also are encouraged to register for the Continuing Education courses. These are available during three time intervals on Sunday, March 10: the sunrise mini-courses are 7:00 am–7:45 am, morning courses are 8:15 am–12:00 noon, and afternoon courses are 1:15 pm–5:00 pm.

Annual Meeting Registration Fees

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<tr>
<th>Registration Type</th>
<th>On-Site</th>
<th>Off-Site</th>
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<tr>
<td>SOT Member</td>
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*Copy of Student ID Required

Continuing Education Sunrise Mini-Course Fees
(includes continental breakfast)
(Only Annual Meeting registrants may enroll in CE courses.)

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Continuing Education Course Fees
(per morning or afternoon course)
(Only Annual Meeting registrants may enroll in CE courses.)

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<th>Registration Type</th>
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<td>Press</td>
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On-Site Registration Hours
Registration is located in the Pratt Street Lobby of the Baltimore Convention Center.

**Registration Hours:**
- Saturday: 4:00 PM–6:00 PM
- Sunday: 7:00 AM–7:00 PM
- Monday: 7:00 AM–5:00 PM
- Tuesday: 8:00 AM–4:00 PM
- Wednesday: 8:00 AM–4:00 PM
- Thursday: 8:00 AM–11:30 AM

Find up-to-date information at [www.toxicology.org/2019](http://www.toxicology.org/2019) | #2019SOT #toxexpo
2019 SOT Annual Meeting Policies

By registering for the 2019 SOT Annual Meeting, you are agreeing to the following terms and conditions:

For individuals who are not members of SOT, participation in SOT’s Annual Meeting and ToxExpo is available only to bona fide individuals who are engaged in or promote the field of toxicology or biotechnology research and support the growth and development of the toxicology field. For organizations, participation in SOT’s Annual Meeting and ToxExpo is available only to bona fide organizations with public policy positions and business practices that are generally consistent with SOT’s mission, goals, reputation, and its policies and principles as determined by SOT. SOT reserves the right to review applications for participation at SOT’s Annual Meeting and ToxExpo to confirm that the applicant meets these criteria and may, at SOT’s sole discretion, reject a registration by any individual or organization or withdraw registration privileges at any time if any individual or organization is found to be inconsistent with SOT’s principles and interests.

Unless written notification by the registrant stating otherwise is submitted to SOT Headquarters prior to the Annual Meeting or while registering on-site, SOT Annual Meeting registrants grant SOT permission:

To reproduce, copy, and publish image, voice, and any or all media taken at the Annual Meeting.

To share registrant contact information with organizations that SOT believes might have a product or service of interest to you. Limited data provided to third parties include name, affiliation, and business address. Your telephone, fax numbers, and email will not be disclosed to third parties.

To share registrant name and affiliation with SOT exhibiting companies.

To be included in the attendee listing accessible to meeting registrants using the SOT Event App—registrant name and affiliation shared.

SOT Annual Meeting registrants are prohibited from:

Inviting children under the age of 15 and guest/spouse registrants into the ToxExpo Exhibit Hall. (Session chairs must provide consent for the guest/spouse or child to attend sessions.)

Soliciting in the ToxExpo Exhibit Hall unless they are a current exhibitor. SOT retains the right to have removed from the exposition any company that has not duly contracted for exhibit space.

Taking photographs or other electronic capture of Scientific Sessions in meeting rooms or the ToxExpo without the consent of the session chair and the presenter(s)/author(s).

Photographing colleagues against the backdrop of scientific posters on display without the express consent of the presenting author(s).

Photographing exhibit booths.

Speaking on a cell phone while attending Scientific Sessions.

The policies adopted above will be enforced by the Society. Those individuals who do not comply will be asked to leave the session or ToxExpo floor. The SOT Annual Meeting and ToxExpo adheres to the Society’s general privacy policy and disclaimer found on the website at www.toxicology.org/privacy.asp. If you have any questions regarding these policies, please contact the SOT Headquarters Office.

Session Etiquette, Including Recording, Photography, and Electronic Device Policies

Attendees are encouraged to ask questions after the presentations by speakers or at the direction of the moderator. Given the importance of the scientific program to attendees and out of respect for the presenters, please adhere to the following rules:

All cell phones and electronic devices must be put on mute while attending Scientific Sessions.

SOT policy is to not allow photography or the electronic capture of posters unless permission is expressed by the author. SOT staff and security staff will be enforcing the “no photography” policy on-site to curtail concerns about the all-day display format. No Photography signs will be displayed on all poster boards. Attendees who violate the no photography policy risk ejection from the Annual Meeting.

Inviting children under the age of 15 and guest/spouse registrants into the Exhibit Hall is prohibited. The session chair must provide consent for the guest/spouse or child to attend the session.
The SOT 58th Annual Meeting and ToxExpo is taking place at the Baltimore Convention Center, located at 1 West Pratt Street in Baltimore’s famed Inner Harbor. The five-day meeting consists of 6,000+ attendees from 50+ countries attending more than 80 Featured and Scientific Sessions, participating in hundreds of hosted events, and interacting with 315+ exhibitors in the three-day ToxExpo.

A wide variety of information related to the event is available on the SOT Annual Meeting website and in the SOT Event App, including:

- Details on services such as accessibility for persons with a disability, the business center, coat/luggage check, first-aid and emergency services, the guest/spouse hospitality room, lost and found, and the speaker ready room;
- Travel discounts and contact information; and
- Recommendations from Visit Baltimore on things to do and where to eat.

### Safety and Security

The possibility of demonstrators is very real given the nature of the conference. Activities might range from verbal confrontations, protests, and strikes to riots. SOT recommends the following procedures:

- Have your name badge available upon entering the convention center. Wear your name badge in the convention center. When leaving the facility, remove it to blend with other people. Conceal bags and other items that might identify you as an SOT meeting attendee.
- If you see a demonstration or protest beginning, please contact any member of the SOT Annual Meeting staff and they will initiate an SOT response. If you see actions that appear threatening, notify the nearest security officer.
- Do not engage, defend either side, or subdue person(s) in any type of disturbance. Demonstrators are trying to attract media attention. Don’t help them!
- SOT representatives will respond to media inquiries. Do not participate in interviews or other media responses.
- In the unlikely event that outsiders disrupt a Scientific Session or other event, SOT security officials have developed a contingency plan. Please follow directions from the chairperson and avoid becoming involved in the situation.

### Safety Tips

Walk “smart” when you leave the convention center:

- Know your destination and the best way to reach it.
- Travel along sidewalks in lighted areas at night and don’t walk alone. Establish a “buddy” system with another attendee to walk to and from the convention center. Share schedules and check up on each other periodically.
- Build your awareness of unknown surroundings by reviewing local information.
- Laptop computers, smartphones, and electronic tablets are attractive, easy targets for thieves. Be sure they are stored in a secure place. Jackets with pockets provide a convenient alternative to reduce the chance for lost or stolen handbags.

The Society’s first priority is safety. The best way to stay safe is to be aware of your surroundings and to avoid situations where you feel uncomfortable.
ToxExpo Exhibits

About ToxExpo
Occurring every year as part of the SOT Annual Meeting, the ToxExpo features 315+ companies and organizations that support toxicologists and the toxicology community. The ToxExpo exhibitors assist attendees with finding service and equipment providers, identifying subject-matter experts, and securing new career opportunities.

The Exhibitors
Exhibiting organizations are experts in a variety of toxicology services and products, including:
» Contract Research
» Preclinical Research and Testing
» Pharmaceutical Product Safety and Toxicology
» Safety Assessment
» In Vitro Research and Testing

The full list of 2019 exhibiting companies is available on the SOT Event App and on ToxExpo.com.

SOT Pavilion
Visit the SOT Pavilion (Booth #3864) to hold scheduled and impromptu meetings, learn about SOT programs and activities, and meet with the Toxicological Sciences Editor-in-Chief, incoming Editor-in-Chief, and Managing Editor (more details on page 172).

Networking Space
ToxExpo also serves as a space for spontaneous conversations, scheduled appointments, and impromptu exchanges. The ToxExpo Exhibit Hall offers countless opportunities to connect with colleagues and exhibitors.

Exhibitor-Hosted Sessions
For the most up-to-date list of Exhibitor-Hosted Sessions, use the SOT Event App or visit the Program Details page of the SOT Annual Meeting website.

ToxExpo Details
Monday, March 11–Wednesday, March 13 | 9:15 AM–4:30 PM
Features:
» 315+ Exhibitors
» 2,100+ Poster Presentations
» Charging Cubes
» Complimentary Refreshment Breaks
» Concession Stands
» Networking Space

www.toxexpo.com

The ToxExpo exhibitor list and information is continually updated. For the latest details, floor plan, and more, visit

www.toxexpo.com
Annual Meeting Support Opportunities

Annual Meeting Supporters enable the Society to facilitate the meeting attendance of more scientists at various career levels—while helping to keep attendee registration fees low.

Annual Meeting Supporters are acknowledged on the SOT Annual Meeting and ToxExpo websites, in the SOT Event App, and on slides displayed in each Scientific Session room. Supporters also are acknowledged through prominent on-site signage during the Annual Meeting. Silver Level Supporters and above are invited to attend the SOT President’s Reception, an invitation-only event, as an expression of appreciation for support provided through leadership and contributions.

If you are interested in supporting the Annual Meeting, contact Laura Helm by emailing l曙ura@toxicology.org, calling 703.438.3115, or visiting www.toxicology.org/support.

Marketing and Advertising Opportunities

Make the most of your presence by connecting with attendees through SOT marketing and advertising opportunities. Place an advertisement in the SOT Event App or add your company logo to the stairs at the main entrance (Pratt Street) of the convention center. SOT offers opportunities to fit all budgets. Visit www.toxexpo.com for complete details.

Become a Supporter

There are five categories of support available, with the higher levels providing greater visibility for your organization:

- Diamond ($10,000 or more)
- Platinum ($5,000–$9,999)
- Gold ($2,500–$4,999)
- Silver ($2,000–$2,499)
- Contributor ($1,000–$1,999)

Visit www.toxicology.org/support

Thank you to the SOT 58th Annual Meeting and ToxExpo Supporters. View the current Supporter list at www.toxicology.org/support
**Program Schedule Reference**

The Program Schedule layout is ordered by date and start time. Each Scientific Session listing includes a session abstract and list of speakers/featured presenters.

- **Session Type and Title**: Session type and title display in dark blue type.
- **Primary Endorser**: This notation identifies the SOT Committee, Regional Chapter, Special Interest Group, or Specialty Section that developed and/or recommended the session.
- **Other Endorser(s)**: This notation identifies other SOT groups that endorsed the session.
- **Abstract Number or Presentation Time**: The first number listed is the abstract number. For Scientific Sessions (but not Continuing Education courses or poster presentations), the second number is the presentation time. Individual abstracts can be found using the SOT Event App or Online Planner or in the PDF of *The Toxicologist* via the SOT Annual Meeting website (free to all attendees). If a number is missing in the numerical sequence, the abstract assigned to the missing number was withdrawn by the author(s).
- **Poster Sessions**: The poster board number is listed above the title of each individual poster presentation for easy reference.

More details and the most up-to-date information related to the 2019 Annual Meeting Program Schedule are available on the SOT Annual Meeting website and in the SOT Event App.

**SOT Membership and Abstract Sponsors**

Author names in italic font indicate that those individuals hold SOT memberships. SOT members may sponsor abstracts that do not include an author with SOT membership. New in 2019, authors who are members of designated organizations could serve as the sponsor of the abstract if an SOT member was not a co-author; these types of sponsorships are displayed with an organization name following the sponsor name (e.g., Sponsor: A. Smith, EUROTOX).

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### General Scientific Sessions (Listed by type, then date and time)

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Abstract numbers are four digits. Poster boards are indicated with a “P” followed by 3 digits.
Saturday, March 9, 5:15 PM to 7:30 PM, Hyatt Regency Baltimore Constellation A
(By Invitation Only; Open to CDI Travel Awardees and Invited Guests)

Undergraduate Diversity Program Opening Event

Chairperson(s): Irene Abraham, JT International, Geneva, Switzerland; and James Luyendyk, Michigan State University, East Lansing, MI.

Hosted by: Committee on Diversity Initiatives (CDI)

This is the kick-off event for a three-day program during which recipients of the Undergraduate Diversity Program Student and Advisor Travel Awards learn about toxicology and careers in biomedical research. This year marks the 30th anniversary of the Undergraduate Diversity Program! The program begins with this Saturday evening event comprised of networking in mentoring groups, an introduction to toxicology, and the CDI Reunion, a celebration including current and past participants, program organizers, and all who support SOT effort’s to increase diversity in toxicology.

Saturday, March 9, 7:30 PM to 9:00 PM, Hyatt Regency Baltimore Constellation A

Committee on Diversity Initiatives Reunion

Hosted by: Committee on Diversity Initiatives (CDI)

Join the celebration of the 30th anniversary of the Undergraduate Diversity Program and the people who make it successful. The CDI Reunion is a great opportunity for former students, organizers of the program, and volunteers to gather and celebrate 30 years of success in encouraging the next generation of scientists. Please welcome and network with this year’s undergraduate student participants and mentors. The program will include the presentation of the 2019 Perry J. Gehring Diversity Student Travel Award and a presentation by Dr. Sharon Milgram, director, NIH Office of Intramural Training and Education. Dessert, coffee, and tea will be served. Please mark your calendars and begin the 58th Annual Meeting with this important and exciting recognition of this milestone.

Join the SOT Undergraduate Student Affiliate Community

For free, undergraduates can:

• Participate in an exclusive undergraduate online community for toxicology

• Take free Continuing Education courses

• Receive SOT publications

• Explore toxicology training and career options

Sign up at www.toxicology.org/undergraduate
Sunday

Find up-to-date information at www.toxicology.org/2019 | #2019SOT #toxexpo

Continuing Education (CE) Courses

Sunday, March 10, 6:30 AM to 5:30 PM, CC Level 300

CE Counter

Stop by the CE Counter or check the SOT Event App and on-site signage for room assignments. Course materials are available inside each room immediately prior to the course start; they are not available at the CE Counter or Registration. If you have your course ticket, go directly to your CE room. To pick up a lost or misplaced ticket, please visit the CE Counter. To register for a course, visit Registration in the Pratt Street Lobby.

Sunday, March 10, 7:00 AM to 7:45 AM, CC Level 300

SR01 | SUNRISE MINI-COURSE

(Ticket Required; See SOT Event App or Signage for Room Location)

CE Continuing Education Course: Handling Uncertainties in Evaluating Mixtures: What’s the Difference between a “Similar” and a “Sufficiently Similar” Mixture?

Chairperson(s): Suzanne Fitzpatrick, US FDA, College Park, MD; and Mansi Krishan, Danone North America, Louisville, CO.

Primary Endorser: In Vitro and Alternative Methods Specialty Section

Other Endorser(s): Risk Assessment Specialty Section; Women in Toxicology Special Interest Group

Evaluating the safety and potential health risks from exposure to multiple chemicals, such as environmental chemicals, pharmaceuticals, consumer and personal care products, and pesticides and food contaminants, poses one of the major challenges for toxicological research and risk assessment. Significant advances have been made in recent years in better understanding and evaluating chemical mixtures. A key factor in risk assessments of chemical mixtures is the availability of reliable data on the identity, levels of exposure, toxicokinetics, toxicodynamics, and toxicological interactions for the whole mixture or its individual components. Limited data or lack of data has a direct impact on uncertainty of the risk assessment of mixtures. As a result, risk assessment of chemical mixtures requires a lot of assumptions and uncertainty assessment. The commonly used risk assessment methods for chemical mixtures are whole mixture approaches and component-based approaches. The whole mixture approach is used when toxicological data are available for the mixture itself or toxicity data are available for a similar mixture or a sufficiently similar mixture that can be used as surrogate for the mixture of concern. This CE course will (1) provide an overview of challenges related to whole mixtures risk assessment and highlight approaches for evaluating sufficient similarity among related mixtures, and (2) present recent advances in safety assessment of complex mixtures using an alternative tiered approach, which utilizes in silico and in vitro approaches to identify safety data gaps and inform the need for additional studies. Attendees will be equipped to use similarity and sufficient similarity for whole mixtures, understand the assumptions, and understand how to address the uncertainties. This course would be of interest to scientists who conduct mixtures risk assessment in different sectors, such as occupational health and safety, product safety, public health protection, or regulatory decision-making. This sunrise CE course complements the previous CE courses and sessions at SOT on mixtures and focuses specifically on the uncertainty assessment aspect of similar and sufficiently similar mixtures, which has not been discussed before.

Abstract #

#1001 Assesing Human Health Risks from Whole Chemical Mixtures: An Overview. Glenn Rice, US EPA, Cincinnati, OH.

Novel Uncertainty Assessment Approaches for Evaluating Mixture of Concern, Sufficiently Similar Mixtures, or Similar Mixtures, Using Case Studies. Amy Roe, Procter & Gamble Company, Cincinnati, OH.
Continuing Education Course: Publicly Available Exposure Tools to Inform the Toxic Substances Control Act

Chairperson(s): John Wambaugh, US EPA/NCCT, Research Triangle Park, NC; and Kristin Isaacs, US EPA/NERL, Research Triangle Park, NC.

Primary Endorser: Exposure Specialty Section

Other Endorser(s): Risk Assessment Specialty Section; Specialty Section Collaboration and Communication Group

Exposure is a key component of chemical risk assessments, as highlighted by the recent amendment to the Toxic Substances Control Act mandating the US EPA to consider conditions of chemical use, as well as human and ecological exposures across the chemical life cycle. The US EPA Office of Research and Development has many ongoing exposure modeling efforts that may be informative for chemical safety decisions. This sunrise CE course covers how 21st-century exposure science tools could be used to inform chemical risk assessments. The first instructor will present a series of databases and models that are both peer reviewed and free to use. The second instructor will cover new, consensus exposure predictions for instances where minimal exposure data are available. Each lecture will provide examples that can be easily modified by course attendees for specific chemical risk assessment applications.

Abstract #

High-Throughput Exposure Forecasting. John Wambaugh, US EPA/NCCT, Research Triangle Park, NC.

Sunday, March 10, 7:00 AM to 7:45 AM, CC Level 300

SR02 | SUNRISE MINI-COURSE

(Ticket Required; See SOT Event App or Signage for Room Location)

Sunday Undergraduate Education Program

Chairperson(s): Irene Abraham, JT International, Geneva, Switzerland; and James Luyendyk, Michigan State University, East Lansing, MI.

Hosted by: Committee on Diversity Initiatives (CDI)

Endorser(s): Education Committee; Undergraduate Education Subcommittee

Designed for undergraduates, including the Undergraduate Diversity Program participants, this special introduction to topics in various toxicology disciplines includes an opportunity to explore and interpret data. Students discuss with graduate students and academic program directors how to submit strong graduate school applications and succeed in graduate school, as well as the merits of specific graduate programs. They also network with SOT mentors and toxicologists in various employment sectors to become more familiar with what life is like in different career paths in toxicology. For schedule details, go to the Program Details page of the SOT Annual Meeting website. A detailed schedule of the undergraduate activities will be available by late February on the Annual Meeting website.
Toxicological research and testing heavily depends on the application of cell and molecular assays to provide mechanistic insight into the effects of chemical exposures as well as model systems to overcome the constraints of in vivo human and animal exposure studies. Despite being powerful tools, these assays are not immune from the “reproducibility crisis” that has cast a considerable shadow over all fields of biomedical research. Improving the rigor, reproducibility, and physiological relevance of both traditional and high-throughput cellular and molecular methods is critical to protect human health, increase the efficiency of drug and consumer product development, and ensure the reliability of data used in chemical regulation. Recent reports in both the scientific and public literature have revealed a need for increased rigor in preclinical research and highlighted experimental design, reagents (including antibodies and cell lines), and data analysis as key challenges to study reproducibility. The goal of this course is to provide participants with “good research practices” for the rigorous development, optimization, implementation, and interpretation of robust in vitro toxicological assays for reproducible results using physiologically relevant models. Presentations will follow a broadly applicable workflow, starting with the establishment of a verified cell culture model with increased physiological relevance. Participants will learn how understanding the nature of cells in vitro and treating cells as reagents can ensure the design of more reproducible assays. Strategies will also be shared for the successful implementation of high-throughput assays that enable the rapid and high-throughput assessment of both toxicity and efficacy using in vitro models with increased physiological relevance. This will be followed by global gene expression analysis using RNA sequencing, validation, and exploration of target gene expression with quantitative PCR, assessment of protein abundance, and post-translational modification using immunoassays, and evaluation of cumulative effects of exposures on cell physiology and viability. The final presentation will empower participants with the knowledge and tools to utilize innovative statistical measures that were developed specifically to enable reliable assessments about compound properties based on data from in vitro assays. This course will provide attendees with core principles and practices for widely used methods, which will facilitate the design and execution of a broad range of rigorous and reproducible experiments, increased throughput, and improved in-depth interpretation of data from both study findings and published literature. The content of this course will benefit researchers from industry, government, and academic labs who evaluate the safety of experimental compounds and wish to learn more about the latest models, methodologies, and analysis strategies.

Abstract #

#1003

Introduction to the Course. Nathan P. Coussens, NIH/NCATS, Bethesda, MD.

Simple Approaches to Improving Relevance and Reproducibility in Cell Culture. Shaun D. McCullough, US EPA, Chapel Hill, NC.

Treating Cells as Reagents to Design Reproducible In Vitro Toxicology Assays. Terry Riss, Promega Corporation, Madison, WI.

In Vitro Toxicological Testing in qHTS Format. Menghang Xia, NIH/NCATS, Bethesda, MD.

Seq-ing the Truth: Principles and Practices for Quantifying Gene Expression Using RNA Sequencing and Quantitative PCR. Elizabeth Martin, NIEHS, Research Triangle Park, NC.

Maximizing Sensitivity, Reproducibility, and Interpretability of Immunoblots and Immunoassays. Kevin Janes, University of Virginia, Charlottesville, VA.

Characterizing Reproducibility and Optimizing Value of In Vitro Screening Methods. Viswanath Devanarayan, University of Illinois at Chicago, Chicago, IL.
A complex mixture, as defined in a 2018 update to the Agency for Toxic Substances and Disease Registry Framework for Assessing Health Impacts of Multiple Chemicals and Other stressors, has many chemicals (often of different chemical classes), has a composition which may not be fully characterized, and can arise from a single source or multiple sources. The related, but more specifically defined, term, UVCB substances (Chemical Substances of Unknown or Variable Composition, Complex Reaction Products and Biological Materials), has been applied by both the US EPA in the Toxic Substances Control Act (TSCA) Chemical Substance Inventory and the European Chemicals Agency (ECHA) under the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulations. Complex mixtures and UVCBs can include foods and beverages, personal care or consumer products, reaction by-products, emissions, and leachates. They can exhibit a wide array of physicochemical properties and fall under different regulatory jurisdictions. However, there are common principles that can be applied to these substances to gain an understanding of their complex chemistry and evaluate their toxicity and/or safety. Historically, the prevailing dichotomy was to either treat these substances as single entities, thereby ignoring their complex and often dynamic nature, or apply a reductionist approach that only considered a small subset of known constituents (i.e., identified chemical constituents with available toxicity data). Progress in analytical chemistry techniques, untargeted analyses, and in vitro screening tools has allowed for a more comprehensive and holistic approach to complex mixtures. In this course, state-of-the-science approaches for evaluating complex mixtures and UVCB analyses will be presented. It will begin with a presentation of the regulatory challenges and views of complex mixtures from the perspective of the US FDA Center for Food Safety and Applied Nutrition (CFSAN). Next, recommended methods for chemically analyzing complex mixtures and identifying biologically active constituents will be presented. Untargeted approaches for assessing complex mixtures, such as metabolomics and chemometrics, will be addressed. The use of in vitro assays and alternative animal models in screening complex mixtures will be discussed, with attention on successful applications and pitfalls to avoid. Additionally, available methods and software for combining chemical and biological assay data will be presented. Finally, existing methods for comparing across complex mixtures and determining sufficient similarity of related mixtures will be presented. Presentations will address chemistry, biological activity, and the intersection of the two, with an intentional focus on how these data can be used in safety evaluations of complex mixtures. Throughout the course, speakers will provide terminology and definitions and highlight tools using a diverse array of examples, representing distinct categories of complex mixtures and UVCBs. This course will be useful to those interested in understanding complex mixtures from a product development, research, or regulatory perspective. Course participants will be provided with both big picture context on complex mixtures and specific recommendations learned from application of the presented methods.

Abstract #

#1004

A Regulatory Perspective on Complex Mixtures. Brenna Flannery, US FDA, College Park, MD.
Characterization of Complex Mixtures to Enable Safety Assessments. Timothy Baker, Procter & Gamble Company, Cincinnati, OH.
Techniques to Identify Bioactive Constituents from Complex Mixtures: A Biochemometrics Approach. Joshua Kellogg, University of North Carolina at Greensboro, Greensboro, NC.

Sunday, March 10, 8:15 AM to 12:00 Noon, CC Levels 300 and 400

AM05 | MORNING COURSE

(Ticket Required; See SOT Event App or Signage for Room Location)

Continuing Education Course: Developmental Toxicity of the Skeletal System: Interpretation of Findings in DART Studies and Implications for Risk Assessment

Chairperson(s): Michael Garry, Exponent, Inc., Seattle, WA; and AtLee Watson, NIEHS/NTP, Research Triangle Park, NC.

Primary Endorser: Reproductive and Developmental Toxicology Specialty Section

Other Endorser(s): Regulatory and Safety Evaluation Specialty Section

Skeletal development represents a period of rapid patterning and specification of tissues that form the basis for subsequent growth in the developing organism. As a result, formation of the skeletal elements (e.g., bone and cartilage) is included as a standard endpoint in prenatal developmental toxicity studies. Abnormal findings are classified as variations or malformations; however, the interpretation of these findings and whether they result in functional deficits in postnatal life can have significant consequences within a regulatory framework for new compounds coming to market. The goal of this course is to provide participants with
an introduction to skeletal anatomy and physiology that can facilitate the interpretation of abnormal findings from a toxicological perspective. Speakers from academia, industry, and government with expertise in the fields of skeletal biology and developmental toxicology will provide (1) a fundamental review of skeletal development in animal models currently used in developmental toxicity studies, with an emphasis on differences in developmental course and extrapolation between species; (2) a discussion of current and emerging methods to identify skeletal anomalies in prenatal and postnatal/juvenile developmental toxicity studies, and their relation to overall developmental toxicity, both in the animal models and their potential human relevance; (3) case studies to illustrate the concepts introduced by the first two speakers and specific challenges faced in the interpretation of study results; and (4) context from a regulatory perspective on the interpretation of abnormal skeletal findings and the evolving requirements needed to address skeletal toxicity concerns.

Abstract #
#1005

Introduction. Michael Garry, Exponent, Inc., Seattle, WA.
Skeletal Development in Laboratory Mammals and Humans. John DeSesso, Exponent, Inc., Alexandria, VA.
Interpretation of Skeletal Anomalies in Laboratory Animals. Anthony Scialli, Scialli Consulting, LLC, Washington, DC.
Case Studies of Common Skeletal Findings in Developmental Toxicity Studies. Donald Stump, Charles River Laboratories, Ashland, OH.

Sunday, March 10, 8:15 AM to 12:00 Noon, CC Levels 300 and 400

AM06 | MORNING COURSE

Continuing Education Course: Industrial Applications of Computational Toxicology in the 21st Century

Chairperson(s): Catrin Hasselgren, Genentech, Inc., South San Francisco, CA; and Alessandro Brigo, F. Hoffmann-La Roche Ltd, Basel, Switzerland.

Primary Endorser: Computational Toxicology Specialty Section

Other Endorser(s): In Vitro and Alternative Methods; Risk Assessment Specialty Section

Computational toxicology encompasses the development of computational models and tools applied to datasets of toxicological concern and the use of such methods for various applications. This is a wide field spanning hazard identification, prioritization for experimental testing, optimization of chemical space, and chemical risk assessment. These methods are used in many different industry sectors, such as consumer products, pharmaceuticals, and agrochemicals, as well as being widely used in the environmental sector and in governmental or regulatory organizations. The methods employed vary from simple to complex depending on availability and quality of data, and range from the application of structural alerts to machine-learning models of large-scale biological data and complex systems toxicology modeling. With increased pressure to reduce the number of animal experiments, accelerate the product development cycles, and lower costs, computational toxicology is a continuously developing area with yet-untapped potential. This course will give a short background and introduction to the field, followed by a methods section where different scenarios will be presented that guide the participants in how data are analyzed and models and tools are built, depending on the use case at hand, as well as data limitations. This will be followed by two presentations on practical applications of computational toxicology, the first one focused on consumer products (e.g., food, cosmetics) and the second on examples from the pharmaceutical industry. Both of these presentations will highlight the diversity of use cases within each industry. The course will end with a presentation discussing the regulatory landscape and examples of how such tools are used to support regulatory safety assessment of various products. The aim of this course is to introduce the discipline of computational toxicology to the nonexpert and provide the participants with a broad understanding of the many benefits of computational toxicology methods, as well as an understanding of the limitations and appropriate use of such methods for successful outcomes in an industrial setting. The learnings from this course are relevant for attendees from all industry sectors as well as from other research-dedicated organizations.

Abstract #
#1006

Computational Toxicology—Past, Present, and Future. Catrin Hasselgren, Genentech, Inc., South San Francisco, CA.
Methods and Principles of Computational Toxicology—The Basics. Nigel Greene, AstraZeneca, Waltham, MA.
Continuing Education Course: Role of Toxicokinetics in Human Health Safety Assessments

Chairperson(s): Sabitha Papineni, Corteva Agriscience, Indianapolis, IN; and Anna Lowit, US EPA, Washington, DC.

Primary Endorser: Risk Assessment Specialty Section

Other Endorser(s): Biological Modeling Specialty Section; Comparative and Veterinary Specialty Section

Regulatory toxicity testing and risk assessment paradigms historically have been based on external doses, despite acknowledged scientific advantages in using systemic exposures. Integrating toxicokinetics (TK) into regulatory toxicity testing provides an opportunity to develop more relevant data by utilizing systemic dose in animals and predicted (modeled) or measured blood levels of chemicals in humans. This provides a foundation for improved evaluation of human relevance, life-stage susceptibility, mode-of-action or adverse outcome pathway, route-to-route extrapolation, and dose selection. In addition, there is increased emphasis on improving toxicity testing and safety assessment in alignment with the 3Rs principle of animal welfare (replace, reduce, refine), and expanded use and collection of TK information reduces the overall use of animals by eliminating unnecessary or redundant tests and provides more humane dose selections, which are less physiologically stressful on the animals. As with any effort, the challenge lies in harmonization of these approaches across the globe. Increased awareness and communication of the benefits of these approaches is key for global harmonization. This course aims to increase knowledge on the principles of TK and will enable students to explore the opportunities that TK offers to risk assessment (all steps: hazard identification, dose-response assessment, exposure assessment, risk characterization) and provide a forum for students to hear from scientists of varying backgrounds and sectors—regulatory, academic, and industry. There have been many advancements in technology and increased emphasis by regulatory agencies to collect TK data. However, the implementation and applicability of these data in regulatory toxicity testing have lagged considerably. The first talk will introduce the topic and present the basic principles of TK, and also will provide an understanding of why and when TK is useful for investigating issues in toxicology. The second presentation will review the experience of integrating and utilizing knowledge of TK in preclinical safety testing of pharmaceuticals. The third presentation will describe the standard testing protocols, technical details, and considerations to integrate TK in standardized guideline studies without use of additional animals and making the guidelines relevant to assessing risks to human health. The fourth presentation will describe the view of the European Food Safety Authority (EFSA) on integration of TK in safety assessments and also will discuss all the available tools, using relevant case studies. The final presentation will provide a regulatory overview of integration of TK into various steps in the risk assessment process, using case studies to demonstrate how TK data have been used in pesticide risk assessment to improve the science underlying regulatory decision-making. Overall, this course will provide the needed background and approaches to implement TK, using practical examples that will enable the attendees to have a better appreciation of its utility in risk assessment of and decision-making regarding chemicals for human health. This course also will highlight the shift toward utilization of high-throughput toxicity screening and nonanimal methods that both are in alignment with 3Rs principle and offer cost- and resource-effective means to prioritize chemicals. Thus, this course will be of a broad interest to testing laboratories, general toxicologists, and risk assessors across different sectors, including academia, regulatory agencies, and industry.

Abstract #

#1007 An Introduction to Toxicokinetics. Curtis Klaassen, University of Kansas College of Medicine, Kansas City, KS.

Pharmaceutical Industry View of Toxicokinetics. Emile Chen, GlaxoSmithKline, plc, Chester Springs, PA.

Integration of Toxicokinetics in Toxicity Studies. Sabitha Papineni, Corteva Agriscience, Indianapolis, IN.


### AM08 | MORNING COURSE

**Continuing Education Course: Mechanistic Understanding and Quantitative Risk Assessment in Immunotoxicology**

**Chairperson(s):** Emanuela Corsini, Università degli Studi di Milano, Milan, Italy; and Jamie DeWitt, East Carolina University, Greenville, NC.

**Primary Endorser:** Immunotoxicology Specialty Section

Considering the important health consequences associated with exposure to immunotoxic compounds, quantitative risk assessment in immunotoxicology is an area of growing interest. The discipline of immunotoxicology has refined several powerful tools to assess the safety of new drugs and other products. Novel approaches for assessment of hypersensitivity and cytokine-based assays to examine chemical-specific effects are moving the field away from the use of animals and providing a path forward for hazard identification and risk assessment. Although the majority of immunotoxicity studies are designed for hazard identification, there is a considerable amount of data demonstrating that a threshold for both immunosuppression and contact sensitization exists, making quantitative risk assessment possible. The purpose of this advanced course is to provide guidance on how to perform risk assessment using immunotoxicology data. Following a brief introduction (first presentation), examples will be given for both immunosuppression (second presentation) and contact hypersensitivity (third presentation). In addition, to support animal-to-human extrapolation, mechanistic understanding is crucial and will be provided in this course (last two presentations).

**Abstract #1008**

**Introduction to the Course.** Jamie DeWitt, East Carolina University, Greenville, NC.

**Integrated Strategies in Immunotoxicity Risk Assessment.** Dori Germolec, NIEHS/NTP, Morrisville, NC.

**Quantitative Risk Assessment in Chemical-Induced Skin Sensitization.** Frank Gerberick, GF3 Consultancy, LLC, West Chester, OH.

**Drug-Induced Systemic Hypersensitivity: Mechanistic Understanding and Early Detection.** Jack Uetrecht, University of Toronto, Toronto, ON, Canada.

**Cytokine Production from Mechanistic Understanding to Use in Safety Assessment.** Wimolnut Manheng, US FDA/CDER, Silver Spring, MD.

### PM09 | AFTERNOON COURSE

**Continuing Education Course: Applications and Review of Physiologically Based Pharmacokinetic Modeling for Regulatory Risk Assessment**

**Chairperson(s):** Jeffrey Fisher, US FDA/NCTR, Jefferson, AR; and Cecilia Tan, US EPA, Research Triangle Park, NC.

**Primary Endorser:** Risk Assessment Specialty Section

**Other Endorser(s):** Biological Modeling Specialty Section; Exposure Specialty Section

Physiologically based pharmacokinetic (PBPK) modeling is widely recognized as a scientifically sound approach to characterize uncertainty in the quantitative relationship between external and internal exposures. The number of regulatory reviews of PBPK models has risen significantly in recent years to support decision-making regarding safety of environmental chemicals and pharmaceutical compounds. For environmental chemicals, PBPK modeling allows for extrapolations across species, life stages, and exposure routes/frequencies, and interpretation of human biomarker measurements. For pharmaceutical compounds, PBPK modeling can be used to identify the need for dose adjustments in subpopulations, the potential for drug-drug interaction, and undesired pharmacokinetics properties such as low bioavailability or rapid clearance. The application of PBPK models to support regulatory risk assessment requires thorough vetting in the context of whether the model’s performance is appropriate for its intended purpose. However, the growing list of applications and different acceptance criteria among agencies and across countries have increased the need for a more standardized approach to both model submission and review processes. To achieve such a goal, this course is designed to provide an overview of how PBPK models might be applied to investigate health outcomes resulting from exposures to environmental or pharmaceutical compounds, as well as to discuss what the key elements being reviewed by different regulatory agencies. This overview will help to promote dialogue among developers, users, and evaluators of PBPK models across government, industry, and academia who seek to establish consistent model submission and review practices. In addition, this course provides training to both modelers and nonmodelers, with the purpose of increasing the pool of
potential peer reviewers for regulatory agencies so that they can conduct proper review of models in a timely fashion. To accomplish these training goals, topics to be covered in this course include the principles of pharmacokinetics, fundamental concepts underlying PBPK modeling, data needs, and quality assurance during model development and implementation. The overarching objectives of this course are to highlight opportunities for harmonizing model submission and review processes and to increase the likelihood of model adoption at regulatory agencies. (Disclaimer: the views expressed in this abstract are those of the authors and do not represent Agency policy or endorsement.)

Abstract #
#1009

**Introduction.** Jeffrey Fisher, US FDA/NCTR, Jefferson, AR.

**Physiologically Based Pharmacokinetic Modeling and Simulation 101.** Andrea Edginton, University of Waterloo, Waterloo, ON, Canada.

**Applications of Physiologically Based Pharmacokinetic Models in Clinical Pharmacology.** Yuching Yang, US FDA/CDER, Silver Spring, MD.

**Physiologically Based Pharmacokinetic Model Construction and Data Needs for Environmental Chemicals.** Paul Hinderliter, Syngenta, Greensboro, NC.

**Quality Assurance Review of Physiologically Based Pharmacokinetic Models for Regulatory Use.** Jordan Smith, Pacific Northwest National Laboratory, Richland, WA.

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**Sunday, March 10, 1:15 PM to 5:00 PM, CC Levels 300 and 400**

**PM10 | AFTERNOON COURSE**

(Ticket Required; See SOT Event App or Signage for Room Location)

**CE**

**Continuing Education Course: Beauty of the Skin Is in the Eye of the Beholder: A Basic Course on Dermal and Ocular Toxicology**

**Chairperson(s):** Michael Hughes, US EPA, Research Triangle Park, NC; and Neera Tewari-Singh, University of Colorado Denver, Aurora, CO.

**Primary Endorser: Dermal Toxicology Specialty Section**

**Other Endorser(s): Association of Scientists of Indian Origin**

Every day we use our eyes to see what is going on in the world, while our skin provides key information to our brains by sensing the world around us through touch. Skin also protects our body by regulating our temperature. While the eyes and skin are two distinct organs, they have some commonalities. First, they both provide our bodies with a barrier to the external environment. Although the barrier properties of the skin and cornea are not impermeable or equivalent in their ability to provide protection, they provide a degree of impedance to physical assaults such as sunlight and xenobiotic penetration. Secondly, the outer anatomy of the skin and the eye are epithelial in nature, derived from the ectoderm. These two organs have differences in their physiology, functional purpose, toxicological response, and pathological outcome. Both organs are important to toxicology because they are exposed to the external environment but react differently to toxic insults than internal organs. The purpose of this course is to provide the audience with the fundamentals of dermal and ocular toxicology and methods to assess absorption and toxicity. The first presentation will focus on dermal anatomy and methods to assess dermal absorption. Factors that can affect dermal absorption will be discussed, as well as those learned from *in vitro* studies (e.g., static, flow-through methods) and *in vivo* methods to quantitate absorption. The strengths and weaknesses of these methods will be presented. The second presentation will emphasize dermal toxicity. An overview of the manifestations of dermal toxicity, its assessment biomarkers, and useful animal models of chemical-threat agents exposure will be presented. The third presentation will discuss ocular toxicity. The anatomy of the eye and manifestations of ocular injury and toxicity from a variety of drug and chemical classes will be presented. The fourth presentation will highlight toxicology of the cornea. The anatomy of the cornea, absorption of chemicals and drugs through this tissue, and implications of toxicity on the function of the cornea will be presented. The fifth presentation will cover advances in the field of nonanimal alternatives to toxicity testing for skin sensitization and ocular/dermal irritation. Work to develop and validate integrated testing strategies and progress toward regulatory implementation will be discussed. Overall, by attending this session, the audience will gain basic information to understand the potential toxicological outcome of xenobiotic exposure to the dermal and ocular systems.

Abstract #
#1010

**Dermal Absorption of Xenobiotics: Skin Anatomy, Factors That Affect Absorption, and Methods to Assess Absorption.** Michael Hughes, US EPA, Research Triangle Park, NC.

**Dermal Toxicity: Hazardous Chemical Exposure Assessment and Animal Models.** Neera Tewari-Singh, Michigan State University, East Lansing, MI.

**Ocular Anatomy and Manifestations of Ocular Toxicity.** Marion Gordon, Rutgers, The State University of New Jersey, Piscataway, NJ.

**Tissue-Specific Aspects of Corneal Injury: The Cornea Is Not Merely a Window to the Soul.** Patrick McNutt, US Army Medical Research Institute of Chemical Defense, Fallstom, MD.

**Advances in Nonanimal Alternatives to Dermal and Ocular Toxicity Testing.** Nicole Kleinstreuer, NIEHS/NICEATM, Research Triangle Park, NC.
Continuing Education Course: Conducting Systematic Review in Toxicology—Why, When, How?

**Chairperson(s):** Martin Wilks, University of Basel, Basel, Switzerland; and Vickie Walker, NIEHS/NTP, Research Triangle Park, NC.

**Primary Endorser: Risk Assessment Specialty Section**

**Other Endorser(s):** Regulatory and Safety Evaluation Specialty Section

Systematic review is gaining interest in the field of toxicology, highlighted by regulatory requirements being globally instituted to conduct systematic review in support of safety assessments of chemicals and foods (e.g., via US EPA Toxic Substance Control Act (TSCA), US EPA Integrated Risk Information System (IRIS), and European Food Safety Authority (EFSA)). Systematic review refers to the objective and transparent process of collecting and synthesizing scientific evidence for reaching conclusions on specific research questions. While systematic review has been successfully used for decision-making in areas such as clinical medicine for many years, the implementation of systematic review within a toxicological context using established frameworks presents unique challenges. As such, several groups that conduct toxicological research have developed systematic review frameworks that take into consideration the breadth of data relevant to the environmental health and food safety sciences by extending and adapting the approaches developed for clinical medicine. This course will survey available approaches and tools for conducting systematic reviews in toxicology, provide information on the components and conduct of systematic review, and provide instructions on reporting and appraising systematic reviews. Particular emphasis will be placed on determining when a systematic review would be useful and how to determine the specific research question(s), critical appraisal of study quality for human and animal evidence, and structured integration of the evidence across evidence streams. Presenters will highlight and demonstrate tools and other software that can be used for study selection and screening, study quality appraisal, documentation, visualization, and decision-making. The course will provide the opportunity for participants to gain an understanding of why to choose to conduct a systematic review, when it is appropriate to do so, and how to conduct the critical elements of a systematic review, as well as gain an appreciation for the rigor and transparency that a systematic review requires (thus setting it apart from traditional narrative reviews). This course has strong relevance to toxicologists from diverse sectors, including researchers, regulators, risk assessors, consultants, and industry, who may need to use systematic review processes or even consider the results of systematic reviews in their practice.

Abstract #

#1011

**Systematic Review: An Overview.** Daniele Wikoff, ToxStrategies, Inc., Asheville, NC.

**Problem Formulation and Protocol Development.** Martin Wilks, University of Basel, Basel, Switzerland.

**Assessment of Study Quality.** Emily Sena, University of Edinburgh, Edinburgh, United Kingdom.

**Integrating the Evidence to Develop Hazard Conclusions.** Brandiese Beverly, NIEHS/NTP, Research Triangle Park, NC.

**Reporting and Critically Appraising Systematic Reviews.** Paul Whaley, Lancaster University, Lancaster, United Kingdom.

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Continuing Education Course: Current Dose-Response Modeling Strategies and Applications in Chemical Risk Assessment

**Chairperson(s):** Kan Shao, Indiana University, Bloomington, IN; and Allen Davis, US EPA, Cincinnati, OH.

**Primary Endorser: Risk Assessment Specialty Section**

**Other Endorser(s):** Biological Modeling Specialty Section; Regulatory and Safety Evaluation Specialty Section

Quantifying dose-response relationships to evaluate the toxicity of environmental chemicals is a key step in human health risk assessment and has substantially evolved in recent years. The purpose of this course, to be delivered by a mixed group of experts from government, academia, and industry, is to provide participants an overview of the currently prevailing dose-response modeling methodologies and tools with case studies and applications in chemical risk assessment. The first presentation will introduce basic concepts and terminologies of the benchmark dose (BMD) method, including discussions on the use of US EPA benchmark dose software (BMDs), how to model commonly available toxicological data, and how to interpret the results. The second presentation will discuss the categorical regression modeling approach, together with the US EPA Categorical Regression Analysis (CatReg) software and its application to chemical risk assessment. The third speaker will present how to apply the BMD methodology in a Bayesian framework to produce probabilistic estimates of interest (e.g., model parameter...
estimates, single model BMD estimates, and model averaged BMD estimates) to support probabilistic dose-response assessment. While the first three presentations complement each other regarding modeling methodologies, the last speaker will provide an overview to summarize the utilities of the strategies and tools through three case studies in the agrochemical industry to help participants reinforce the knowledge by using real-world relevance and experience.

Abstract #
#1012
Categorical Dose-Response Modeling. Allen Davis, US EPA, Cincinnati, OH.
Bayesian BMD Analysis—Methodologies and Applications. Kan Shao, Indiana University, Bloomington, IN.
Utilization of Dose-Response Modeling Tools for Product Safety Assessment. Zhongyu (June) Yan, Corteva Agriscience, Indianapolis, IN.

Sunday, March 10, 1:15 PM to 5:00 PM, CC Levels 300 and 400

PM13 | AFTERNOON COURSE

(Ticket Required; See SOT Event App or Signage for Room Location)

Continuing Education Course: Microbiome and Environmental Toxicants: From Study Design and Analysis to Regulatory Guidance

Chairperson(s): Sarah Blossom, University of Arkansas for Medical Sciences, Little Rock, AR; and Sangeeta Khare, US FDA/NCTR, Jefferson, AR.

Primary Endorser: Immunotoxicology Specialty Section

The microbiome consists of indigenous microbial communities and the host environment that they inhabit. Current paradigm-shifting research indicates that the interaction between the host and the microbiome is an important regulator of many diseases and is changing the way that scientists think about the role microbes play in human health. The microbiome includes microbes that are both helpful and potentially harmful, and in a healthy individual, these microbial communities coexist without problems. However, when this balance is disturbed, dysbiosis can occur. One such factor that is emerging as a regulator of this balance is exposure to environmental pollutants that may perturb host-microbiome interactions to promote disease. The microbiome is a rapidly emerging field, and toxicologists from industry, academia, and federal agencies understand the importance of studying the impact of toxicants and pharmaceuticals on gut microbiome dysbiosis and host responses. However, approaching this vast area of study can seem daunting. This course is designed to provide practical information from experts in the field with the latest state-of-the-art tools so that toxicologists can incorporate the study of microbiome and host-associated responses into mechanistic research, risk assessment, and/or therapeutics. Following this course, participants will be familiar with current advances in microbiome research as it pertains to toxicology. An overview of experimental models and case study examples of microbiome toxicity and immunotoxicity will be presented. Further discussion on how xenobiotics change the microbial population and immune status of animals during developmental exposures will be provided. Concepts will be reinforced in a multigenerational toxicology case study that will take the participants through steps of experimental design, data collection, and reporting. The course will provide participants with practical knowledge and tools to conduct microbiome analysis using the metagenomics analysis server (MG-RAST). The latest information related to regulatory aspects for microbiome-based therapeutics approaches will be presented to participants. Overall, this course will provide a comprehensive overview of study design, data analysis, and challenges in biotherapeutics using examples of toxicant-induced intestinal microbiome dysbiosis.

Abstract #
#1013
The Microbiome in Immunotoxicology: Current State-of-the-Science. Sarah Blossom, University of Arkansas for Medical Sciences, Little Rock, AR.


Microbiome Experimental Design for More Effective Planning and Execution of Multigenerational Toxicology Studies. Kenneth Drake, Seralogix, Inc., Austin, TX.

An Overview of Current Microbiome Analysis Tools. Folker Meyer, Argonne National Laboratory and University of Chicago, Argonne, IL.

Regulatory Considerations for Microbiome-Based Therapeutics. Paul Carlson, US FDA/CBER, Silver Spring, MD.
Program Schedule—Sunday

PM14 | AFTERNOON COURSE

Continuing Education Course: Structural and Functional Alterations of Mitochondria in Chemically Induced Cytotoxicity

Chairperson(s): Hilmi Orhan, Ege University, Izmir, Turkey; and Hartmut Jaeschke, University of Kansas Medical Center, Kansas City, KS.

Primary Endorser: Mechanisms Specialty Section

Mitochondria are critical subcellular organelles, as they provide more than 95% of the energy for biochemical and physiological functions, in addition to playing a critical role in lipid metabolism, steroidogenesis, and programmed cell death. In the context of this course, both structural and functional features of the mitochondria will be addressed. Involvement of mitochondria in health and in drug-induced cellular and subcellular toxicities will be discussed, and the practical applications will be described. In the first lecture of this course, the prominent role of mitochondrial toxicity in adverse outcome pathways (AOPs) mechanistically describing a wide spectrum of organ-specific toxicities will be demonstrated. In the second lecture, the central role of mitochondria in drug-induced programmed necrosis and the impact of adaptive mechanisms such as autophagy and mitochondrial biogenesis on cell survival and regeneration will be highlighted. The third lecture will focus on evaluation of mitochondrial function by confocal and multiphoton microscopy, and measurement of respiration and glycolysis. In the last lecture, the metabolic capacity of mitochondria in terms of local reactive metabolite generation, as well as toxicological outcomes, will be discussed.

Abstract #

#1014 Mitochondrial Toxicity: A Frequent Key Event in Adverse Outcome Pathways. Mathieu Vinken, Vrije Universiteit, Brussels, Belgium.

Mitochondria as Critical Regulators of Drug-Induced Organ Toxicity and Recovery. Hartmut Jaeschke, University of Kansas Medical Center, Kansas City, KS.

Assessment of Mitochondrial Dysfunction in Drug- and Oxidant-Induced Cytotoxicity. John Lemasters, Medical University of South Carolina, Charleston, SC.

Local Bioactivation of Drugs and Other Chemicals in Mitochondria: Toxicological Outcomes. Hilmi Orhan, Ege University, Izmir, Turkey.

Sunday, March 10, 3:00 PM to 5:00 PM, Hyatt Regency Baltimore Constellation F

Undergraduate Education Program: Open Time with Academic Program Directors and Internship Sponsors

Chairperson(s): Irene Abraham, JT International, Geneva, Switzerland; and James Luyendyk, Michigan State University, East Lansing, MI.

Hosted by: Committee on Diversity Initiatives (CDI)

Endorser(s): Education Committee; Undergraduate Education Subcommittee

This event is open to undergraduate students who register for this event using the Annual Meeting Registration Form, the undergraduate students and advisors receiving CDI travel funding, Pfizer SOT Undergraduate Travel Award recipients, and SOT program volunteers. During this time, academic program directors, internship hosts, undergraduate students, and faculty advisors meet informally to discuss research and graduate study opportunities. Undergraduate Diversity Program Travel Award and Pfizer SOT Undergraduate Travel Award recipients have an opportunity to display their research posters. For schedule details, go to the Program Details page of the SOT Annual Meeting website. A detailed schedule of the undergraduate activities will be available by late February on the Annual Meeting website.
**Sunday, March 10, 4:45 PM to 6:30 PM, CC Ballroom III**

(All Attendees Welcome)

**Awards Ceremony**

**Pre-ceremony Musical Performance**

4:45 PM to 5:15 PM

Karen Devitt is a well-versed pianist and vocalist based in Silver Spring, Maryland. Known for jazz, she specializes in small ensembles.

**Awards Ceremony**

5:15 PM to 6:30 PM

The [2019 SOT award recipients](#) are recognized following the pre-ceremony musical performance. Please join SOT in honoring this year’s awardees. Plaques are presented to:

SOT Award Recipients:
- Achievement Award
- Arnold J. Lehman Award
- Distinguished Toxicology Scholar Award
- Education Award
- Enhancement of Animal Welfare Award
- Founders Award (for Outstanding Leadership in Toxicology)*
- Leading Edge in Basic Science Award
- Merit Award
- Public Communications Award
- Toxicological Sciences Paper of the Year Award
- Translational Impact Award
- Daniel and Patricia Acosta Undergraduate Educator Award*

*Supported by the SOT Endowment Fund

Global Senior Scholar Exchange Program Scholars and Hosts

Supported Award Recipients:
- Colgate-Palmolive Award for Student Research Training in Alternative Methods
- Colgate-Palmolive Grants for Alternative Research
- Colgate-Palmolive Postdoctoral Fellowship Award in *In Vitro* Toxicology
- Syngenta Fellowship Award in Human Health Applications of New Technologies

In addition, recipients of the Pfizer SOT Undergraduate Student Travel Awards and SOT/SOT Endowment Fund/IUTOX Travel Awards are recognized.

**Sunday, March 10, 6:30 PM to 7:30 PM, CC Hall A**

**Welcome Reception**

The Welcome Reception is a great opportunity to renew friendships and to make new acquaintances. Please join the Society in this kickoff of the Annual Meeting.

**Sunday, March 10, 7:00 PM to 8:00 PM, CC Ballroom Foyer**

**25-Year (Or More) Member Reception**

If you have been a member of the Society of Toxicology for 25 years or more, please join your colleagues in recognition and celebration of your contributions to the Society. Be sure to wear your membership anniversary pin.

**Sunday, March 10, 7:30 PM to 9:00 PM, Hilton Baltimore Holiday 4**

(Ticket Required)

**Student/Postdoctoral Scholar Mixer**

*Hosted by: Graduate Student Leadership Committee (GSLC)*

This is an opportunity for all students and postdoctoral scholars to gather, meet new colleagues, and reestablish relationships in an informal atmosphere at the beginning of the meeting. Learn about being involved in SOT by speaking with student leaders at the SOT Component Group posters. The GSLC Outstanding Leadership Award is presented during this event. Tickets are obtained at no cost by registering for the mixer on the Annual Meeting Registration Form. A ticket and meeting badge are required. Complimentary refreshments and a cash bar are available.
Monday, March 11, 6:15 AM to 7:45 AM, CC Room 325
(Ticket Required)

**SOT Mentoring Breakfast**

**Endorser(s):** Career Resource and Development Committee; Postdoctoral Assembly; Graduate Student Leadership Committee

SOT recognizes the importance of mentoring in the scientific and professional development of its members. Therefore, the Society is pleased to announce the eighth annual Mentoring Breakfast.

The Mentoring Breakfast is for SOT members at any career stage—from students and scholars to senior scientists—who are seeking a mentor. Trained facilitators lead small-group discussions to determine each individual's wants and needs in a mentor and then use this information to connect the participant with an appropriate mentor. Please note that mentor information is provided after the Annual Meeting and that mentors do not attend the breakfast.

Registration is limited and is accepted on a first-come, first-served basis. Attendance cost is $10 per person and includes a continental breakfast.

Monday, March 11, 6:30 AM to 8:00 AM, CC Room 341

**Specialty Section Officers Meetings: Biotechnology; Exposure; Immunotoxicology; In Vitro and Alternative Methods; Mechanisms; Nanotoxicology; Neurotoxicology; Regulatory and Safety Evaluation; Risk Assessment**

Monday, March 11, 6:45 AM to 7:45 AM, Hilton Baltimore Tubman A

**Women in Toxicology Special Interest Group Executive Committee Meeting**

Monday, March 11, 7:00 AM to 8:00 AM, Miss Shirley’s Cafe

**Mixtures Specialty Section Officers Meeting**

Monday, March 11, 7:00 AM to 8:00 AM, CC Room 334

**Reproductive and Developmental Toxicology Specialty Section Officers Meeting**

Monday, March 11, 7:50 AM to 6:30 PM, CC Various Locations
(By Invitation Only; Open to CDI Travel Award Recipients, Mentors, and Organizers)

**Undergraduate Diversity Program**

**Chairperson(s):** Irene Abraham, JT International, Geneva, Switzerland; and James Luyendyk, Michigan State University, East Lansing, MI.

**Hosted by:** Committee on Diversity Initiatives (CDI)

The Undergraduate Diversity Program awardees attend Annual Meeting sessions, participate in the In Vitro Lecture, visit posters, and engage in special sessions before the conclusion of the program. Mentors meet their groups before the start of the SOT Plenary Session in the section reserved for CDI Travel Award recipients. For schedule details, go to the [Program Details page](#) of the SOT Annual Meeting website. A detailed schedule of the undergraduate activities will be available by late February on the [Annual Meeting website](#).
Monday, March 11, 8:00 AM to 9:00 AM, CC Hall A

**Opening Plenary Lecture: Robust Assembly of Human Tissues for Disease Modeling and Discovery**

*Lecturer: William L. Murphy, University of Wisconsin-Madison, Madison, WI.*

The need for human, organotypic culture models coupled with the requirements of contemporary drug discovery and toxin screening (i.e., reproducibility, high throughput, transferability of data, clear mechanisms of action) frame an opportunity for a paradigm shift. The next generation of high-throughput cell-based assay formats will require a broadly applicable set of tools for human tissue assembly and analysis. Toward that end, we have recently focused on (1) generating iPS-derived cells that properly represent the diverse phenotypic characteristics of developing or mature human somatic cells, (2) assembling organotypic cell culture systems that are robust and reproducible, (3) translating organotypic cell culture models to microscale systems for high-throughput screening, and (4) combining genomic analyses with bioinformatics to gain insights into organotypic model assembly and the pathways influenced by drugs and toxins. This lecture will emphasize recent studies in which we have explored assembly of organotypic vascular, liver, and brain tissues. These tissues mimic critical aspects of human organ structure and can be used for reproducible identification of drug candidates and toxic compounds. Our work particularly emphasizes reproducibility and data transferability, which we view as vital to the widespread use of organotypic human models in toxicity testing. The lecture will also introduce the use of our assembled human tissues to develop models of rare developmental disorders and degenerative diseases of the brain.

Monday, March 11, 9:00 AM to 10:00 AM, CC Room 339

**Exhibitor-Hosted Session: Building Consensus in the Liver 3D Cell Culture Field through Open-Source Models**

*Presented by: Visikol*

In this session, Visikol will discuss how it has developed open-source liver 3D cell culture models for use in routine toxicity studies that are tailored for specific research questions such that the ideal cost, throughput, and validation requirements are met.

Monday, March 11, 9:00 AM to 10:00 AM, CC Room 340

**Exhibitor-Hosted Session: hiPSC-CMs in Safety and Toxicity Testing—Diversity, Disease Modeling, and Resolving the Reversed Rate Effect of Calcium Channel Blockers**

*Presented by: FUJIFILM Cellular Dynamics, Inc.*

Experts in the field will discuss a comparative analysis of the effects of cardio-oncology compounds on hiPSC-CMs from multiple donors and show characterization data from several disease models. A mechanistic basis will also be provided to elucidate the increased beat rate phenomenon observed with calcium channel blockers.

Monday, March 11, 9:00 AM to 10:00 AM, CC Room 337

**Exhibitor-Hosted Session: In Vitro Platforms for Derisking Nephrotoxicity**

*Presented by: SOLVO Biotechnology*

The aProximate™ proximal tubule cell model was utilized to assess 30 mechanistically distinct pharmaceuticals for nephrotoxicity with measurement of clinically relevant biomarkers (KIM-1, NGAL, Clusterin) employed alongside nonspecific cytotoxicity endpoints (ATP depletion, LDH leakage, TEER). The results show that aProximate™ cells are a promising in vitro tool for nephrotoxicity safety assessment.
**Monday, March 11, 9:00 AM to 10:00 AM, CC Room 338**

**Exhibitor-Hosted Session: Measurement of Cytokine and Complement as Valuable Biomarkers in Immunotoxicity Assessment**

*Presented by: Altasciences Preclinical Services*

This session will provide an overview of the value of measuring cytokines and complement in nonclinical and clinical study designs to assess the potential for test article-induced immunotoxicity.

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**Monday, March 11, 9:15 AM to 12:00 Noon, CC Room 316**

**Symposium Session: Advances in In Vitro to In Vivo Extrapolation: Approaches and Applications**

*Chairperson(s): Ben van Ravenzwaay, BASF SE, Ludwigshafen, and Wageningen University Netherlands, Ludwigshafen, Germany; and Barbara Wetmore, US EPA, Research Triangle Park, NC.*

*Primary Endorser: Biological Modeling Specialty Section*

*Other Endorser(s): Computational Toxicology Specialty Section; In Vitro and Alternative Methods Specialty Section*

The development of nonanimal-based testing strategies of chemicals is important in current human safety testing. Many efforts focus on the development and standardization of *in vitro* new approach methodologies (NAMs) that provide concentration-response data. However, concentration-response data obtained from *in vitro* models are inadequate for human risk and safety assessment. In order to use these data for risk assessment purposes, the *in vitro* concentration-response data should be translated to *in vivo* dose-response data to obtain points of departure to set safe human exposure levels. It has been proven that *in vivo* dose-response data can be predicted by *in vitro* concentration-response data using physiologically based kinetic (PBK) modeling-based reverse dosimetry, thus enabling the use of *in vitro* toxicity data for risk assessment and prioritization. In the PBK modeling-based reverse dosimetry approach, the *in vitro* effect concentrations are set as equal to the blood or tissue effect concentrations, following which the PBK model can calculate the corresponding *in vivo* dose levels that are required to reach the same level of blood or tissue concentrations. Current research focuses on the development of *in vitro* assays and QSAR models for obtaining parameter values needed for the PBK models, as well as the use of PBK modeling-based reverse dosimetry to predict toxic dose levels based on *in vitro* toxicity data. The first talk will provide an overview of PBK modeling-based *in vitro* to *in vivo* extrapolation (IVIVE), including the concept of the approach and the application of the developed approach for the prediction of toxic dose levels based on *in vitro* data. The second talk will discuss the *in vitro* models and QSAR models developed to obtain the input parameter values for the development of the PBK model. The third talk will focus on the evaluation and application of IVIVE for risk assessment purposes using high-quality data and open-source, user-friendly tools. The fourth presentation will describe the development and evaluation of a generic PBK model for a series of compounds tested in assays for estrogenic activity. The fifth talk will provide a case study for antiandrogens and give an outlook of industry use of the PBK modeling-based IVIVE for toxicological assessment of chemicals. This session will bring together academic, government, and industry scientists to give an overview of the IVIVE approach. Relevant to the field of toxicology, the application of *in vitro* NAMs and QSAR models developed for PBK models, the evaluation of the extrapolation approach, and how to apply this concept in risk assessment and chemical prioritization will be discussed in this symposium and in a concluding Q&A session with the audience.

**Abstract #**

| #1015 | 9:15 | Advances in In Vitro to In Vivo Extrapolation: Approaches and Applications. | N. Kleinstreuer. NIEHS, Raleigh, NC. |
|       | 9:15 | Introduction. | N. Kleinstreuer. NIEHS/NICEATM, Research Triangle Park, NC. |
| #1017 | 9:50 | Quantitative In Vitro-In Vivo Extrapolation (QIVIVE), Models, and Input Parameters. | N. Kramer. Utrecht University, Utrecht, Netherlands. |
| #1019 | 10:50 | PBK Modeling-Based IVIVE for the Toxicological Assessment of Potential Endocrine Disruptors. | E. Fabian. BASF SE, Ludwigshafen, Germany. |
| #1020 | 11:20 | Development of a Generic Physiologically Based Kinetic Model to Predict In Vivo Endocrine Activity in Rats Based on In Vitro Bioassays. | M. Zhang. Wageningen University, Wageningen, Netherlands. Sponsor: B. van Ravenzwaay |
|       | 11:50 | Panel Discussion/Q&A. |
**Symposium Session: Alpha-Synuclein: A Good Protein Turned Bad in Chronic Brain Diseases with Toxicological Implications**

Chairperson(s): Wei Zheng, Purdue University, West Lafayette, IN; and Anumantha Kanthasamy, Iowa State University, Ames, IA.

Primary Endorser: Neurotoxicology Specialty Section

Other Endorser(s): Mechanisms Specialty Section; Metals Specialty Section

Alpha-Synuclein (αSyn) is a low molecular weight (14.5 kDa), natively unfolded protein expressed in a wide range of cell types and is particularly abundant in presynaptic terminals. The exact function of αSyn remains uncertain; however, recent evidence suggests that αSyn functions in the brain to maintain synaptic plasticity, regulate dopamine synthesis, and facilitate vesicular dynamics, (e.g., stabilization and exocytic fusion at presynapses). Dysfunction and aggregation of αSyn has been associated with the pathobiology of Parkinson’s disease (PD), Alzheimer’s disease (AD), and Diffused Lewy Body disease (DLB). The monomeric form of αSyn in the brain mainly originates from neuronal cells, yet αSyn present in the circulatory system can pass across the blood-brain barrier (BBB) to enter the brain parenchyma. Recent studies have explored the possibility of using total plasma levels of αSyn as a surrogate marker for the progression of PD and other neurodegenerative diseases such as AD. Thus, it is imperative to understand the mechanism by which the BBB regulates the fluxes of αSyn in and out of the brain to maintain αSyn homeostasis in the central milieu. Excessive αSyn proteins in brain tend to misfold, leading to massive aggregation in Lewy bodies. This aggregation is believed to be promoted by the binding of the protein to phospholipid membranes and by post-translational modifications resulting from mitochondrial dysfunction/oxidative stress. αSyn has divalent metal binding sites that are known to affect the protein stability. Toxicological findings support a role for αSyn in chemically induced Parkinsonian disorders; for example, exposure to beta carboline derivatives in food and manganese in the environment greatly increases αSyn aggregation. Also, certain pesticides are known to upregulate αSyn expression. These discoveries have established causal relationships between the environmental exposure to toxic substances and altered αSyn gene expression, increased influx to brain, decreased clearance from brain parenchyma, and ultimately accelerated αSyn aggregation.

This session brings together in one place the worldwide experts who are actively investigating αSyn biology, chemistry, neurotoxicity, its underlying cellular and molecular mechanisms, and clinical consequences, to address an interesting question: How does a “good” αSyn protein change to be a culprit in environmentally linked neurodegenerative diseases? After a brief introduction of αSyn in health and human diseases, the first presenter will highlight the current understanding of mechanisms of αSyn self-assembly and how exposure to environmental toxicants promotes the protein’s aggregation. The second presenter will discuss the potential of using total and phosphorylated αSyn in the cerebrospinal fluid (CSF) and plasma to diagnose AD and PD, based on human longitudinal studies, and how this approach may be applied to neurotoxicological investigations. The third presenter will extend the subject to illustrate the processes that regulate αSyn transport by the BBB and how the altered αSyn transport at brain barriers may lead to Parkinsonian disorders. The last presenter will report the latest findings showing that Mn exposure enhances the release of misfolded αSyn via exosomes by impairing endosomal trafficking machinery. A sensitive high-throughput method to quantify αSyn in welder’s serum will also be introduced. This session will present the latest discoveries on the structural, genetic, cellular, and molecular mechanisms of αSyn in neurodegenerative diseases. The session will capture a broad interest from those engaged in toxicological research of neurodevelopment and neurodegenerative diseases, neuroscience, neurotoxicology, metal toxicology, and nanoscience.

**Abstract #**

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<th>Time</th>
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<tr>
<td>#1021</td>
<td>9:15</td>
<td>Alpha-Synuclein: A Good Protein Turned Bad in Chronic Brain Diseases with Toxicological Implications</td>
<td>W. Zheng, Purdue University, West Lafayette, IN.</td>
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<td>#1022</td>
<td>9:22</td>
<td>How αSyn Converts from Good to Bad: A Role for Environmental Toxicants</td>
<td>J. Rochet, Purdue University, West Lafayette, IN. Sponsor: W. Zheng</td>
</tr>
<tr>
<td>#1023</td>
<td>9:59</td>
<td>Potential Roles of Peripheral αSyn in Alzheimer’s and Parkinson’s Diseases: Implication in Toxicological Studies</td>
<td>J. Zhang, University of Washington, Seattle, WA. Sponsor: W. Zheng</td>
</tr>
<tr>
<td>#1024</td>
<td>10:36</td>
<td>Transport of αSyn by Brain Barrier Systems and Relevance to αSyn Toxicity</td>
<td>A. Mahringer, University of Heidelberg, Heidelberg, Germany. Sponsor: W. Zheng</td>
</tr>
<tr>
<td>#1025</td>
<td>11:13</td>
<td>Translational Relevance of Misfolded αSyn Release via Exosomes in Manganese-Induced Parkinsonian Disorder</td>
<td>A. Kanthasamy, Iowa State University, Ames, IA.</td>
</tr>
</tbody>
</table>

11:50 Panel Discussion/Q&A.
Symposium Session: Assessing Acute Health Risk: Potential Application of Next-Generation Toxicological Tools

Chairperson(s): Michael Stewart, US EPA, Research Triangle Park, NC; and Brian Chorley, US EPA, Research Triangle Park, NC.

Primary Endorser: Risk Assessment Specialty Section

Other Endorser(s): Exposure Specialty Section; Molecular and Systems Biology Specialty Section


#1027 9:20 Exposure Assessment and Risk Management Using Acute Toxicity Factors to Evaluate Ambient Air Monitoring Data in Texas. T. Bredfeldt, Texas Commission on Environmental Quality, Austin, TX.

#1028 9:50 A Conceptual Model for Predicting How Acutely Toxic Exposure Levels Should Relate to Those Associated with Toxicity from Longer-Term Exposures, Suggesting Approaches to Using In Vitro Data in Exposure-Duration Extrapolation. L. Rhomberg, Gradient, Cambridge, MA.

#1029 10:20 Application of Modern Toxicology Approaches for Predicting Acute Toxicity. D. Dorman, North Carolina State University, Raleigh, NC.

#1030 10:50 Predicting Chemical Affinity and Extrapolating to Safe Acute Exposure Levels (SAELs). L. Burgoon, US Army Engineer Research and Development Center, Vicksburg, MS.


11:50 Panel Discussion/Q&A.

Symposium Session: Novel Genetic-Based Tools for Evaluating Toxicity Potential, Mechanism of Action, and Population Dynamics

Chairperson(s): Brian Cummings, University of Georgia, Athens, GA; and Joshua Harrill, US EPA, Research Triangle Park, NC.

Primary Endorser: Biotechnology Specialty Section

Other Endorser(s): Mechanisms Specialty Section; Molecular and Systems Biology Specialty Section

The genetic information encoded in DNA and perturbations in the flow of genetic information from DNA to downstream biomolecules (i.e., RNA then protein) following chemical exposure are critical determinants of toxicological responses in terms of both functional outcomes and variations in response across a population (i.e., inter-individual susceptibility). In general, toxicologists have been cautious regarding when and how to incorporate information about genetically controlled responses or genetic susceptibility into safety and risk assessment pipelines. However, there are a number of recently developed molecular biology tools that can be used to evaluate the role of genetic structure, gene regulation, and gene expression in response to drug and chemical exposures that provide informative data for use in various steps across risk evaluation pipelines. The aim of this session is to discuss emerging systems genetics tools that may help advance toxicological evaluation and to present case studies demonstrating their utility. Tools and approaches that will be discussed in this session include (1) the use of genetically diverse population models for investigating the contribution of genetic sequence variation to toxicant susceptibility and applications toward replacement of default toxicodynamic uncertainty factors, (2) the use of gene-editing technologies in a screening context toward discovery of key genetic drivers underlying susceptibility and resistance to toxicant exposures, (3) the use of methylome-based next-generation sequencing (NGS) for rapid assessment of toxicant-induced changes in DNA methylation patterns and applications for adverse outcome pathway (AOP) integration, (4) the use of targeted RNA-seq in a high-throughput transcriptomics (HTTr)
screening context and methods for in vitro point-of-departure estimation and in vitro to in vivo extrapolation (IVIVE), and (5) the use of weighted gene co-expression networks (WGCNA) for toxicant mode-of-action analysis. Participants in the session will gain a broader understanding of emerging genetic and transcriptomic analysis tools, their strengths and limitations, and their applications in testing prioritization, mechanistic analysis, and human health risk assessment.

Abstract #


#1033 9:20  Quantifying Inter-Individual Toxicodynamic Variability Using Genetic Reference Populations to Inform Risk Assessment.  A. Harrill.  NIEHS/NTP, Research Triangle Park, NC.


#1035 10:16  Novel Methods for Rapid Assessment of Toxicant-Induced Changes in DNA Methylation.  B. Cummings. University of Georgia, Athens, GA.

#1036 10:44  High-Throughput Transcriptomics (HTTr) Screening with Targeted RNA-Seq: Applications for In Vitro Point-of-Departure Estimation and In Vitro to In Vivo Extrapolation.  J. Harrill. US EPA, Research Triangle Park, NC.

#1037 11:12  TXG-Map: Systems Biology Approaches to Understanding Adverse Outcomes.  Y. Webster. Eli Lilly and Company, Indianapolis, IN.

Monday, March 11, 9:15 AM to 12:00 Noon, CC Room 309

Workshop Session: Application of Computational Modeling to Risk Assessment of Endocrine Disruptors

Chairperson(s): Qiang Zhang, Emory University, Atlanta, GA; and Hisham El-Masri, US EPA, Research Triangle Park, NC.

Primary Endorser: Biological Modeling Specialty Section

Other Endorser(s): Computational Toxicology Specialty Section

Endocrine disruption is a major health concern for many persistent environmental chemicals, with adverse outcomes in metabolism, development, reproduction, and cancer. The endocrine systems are robust nonlinear dynamical systems by nature, which can resist perturbations to maintain hormone homeostasis through feedback regulations between multiple organs. Simple, linear extrapolation from high-dose data to environmental low-dose effects is thus not applicable to predicting the health risk of endocrine-disrupting chemicals (EDCs). Moreover, as toxicity testing is increasingly shifting to cell- or organoid-based in vitro assays, the demand for in vivo extrapolation that can predict systems-level hormonal outcomes and apical endpoint consequences in human populations is also rising. Bridging these data gaps calls for a computational systems biology approach to mechanistically model the endocrine systems and their responses to perturbations by endocrine disruptors acting via diverse molecular initiating events (MIEs). This session is organized to present the state-of-the-science in mathematical modeling of endocrine systems in the context of chemical risk assessment through presentations of a series of computational works on thyroid, reproductive, and adrenal systems. The first presenter lays out the general design principles for the homeostatic regulation of the endocrine systems involving feedback interactions between the hypothalamus, pituitary, and endocrine organs. Using the thyroid system as an example, the presentation illustrates how mechanistic computational models constructed according to these principles and incorporating individual variability can aid in the interpretation and quantitative prediction of the health outcomes of EDCs. The second talk presents a more detailed model of the thyroid system to understand the effect of iodine nutritional status on thyroid hormone levels during pregnancy and lactation. While the model is unable to explain why repletion of iodine intake cannot ameliorate the effect of iodine deficiency, it provides mechanistic insights into the dynamic functioning of the hypothalamic-pituitary-thyroid (HPT) axis during the reproductive stage of women. The third talk presents the modeling work on in vitro to in vivo extrapolation (IVIVE) for the risk effects of EDCs in both the thyroid and male reproduction systems. By using in vitro data from thyroperoxidase and sodium-iodide symporter inhibition assays and a purified rat Leydig cells assay that detects alterations in testosterone production, the speaker illustrates quantitative adverse outcome pathway (qAOP) models that can extrapolate these in vitro data to predict mammalian neurodevelopmental deficits. The fourth talk presents the modeling work on the hypothalamic-pituitary-adrenal axis and how its interaction with the circadian rhythm can affect between-sex and within-sex variability. The model provides a computational tool that can be tapped to understand the heterogeneous responses in human populations to stress and to aid risk assessment of EDCs interfering with the physiological stress response. The final presentation includes a comprehensive modeling framework that links exposure, toxokinetinc, and ovarian cycle models. The work illustrates how modeling the exposure-to-outcome continuum through linking these models and incorporating ToxCast assay data can predict the mixture effects of aromatase inhibitors on menstrual cycle length and ovulation. In summary, the session will demonstrate that through integrating chemical and biological data from in vitro, in vivo, epidemiology, and exposure studies, computational systems biology models of endocrine systems can play a key, bridging role in quantitatively understanding and predicting the health risks of EDCs.

Abstract #

#1038 9:15  Application of Computational Modeling to Risk Assessment of Endocrine Disruptors.  Q. Zhang. Emory University, Atlanta, GA.

#1039 9:20  Design Principles of Endocrine Systems and Their Applications to Understanding Endocrine Disruptions: A Case Study with the Hypothalamic-Pituitary-Thyroid Axis.  Q. Zhang, and Z. Shi. Emory University, Atlanta, GA.

Program Schedule—Monday | 51
Using Computational Approaches to Understand the Hypothalamic-Pituitary-Thyroid (HPT) Axis for Iodine Sufficient and Insufficient Conditions during Lactation. J. Fisher, and M. E. Gilbert. 1US FDA/NCTR, Jefferson, AR; and 2US EPA, Research Triangle Park, NC.

Biologically Based Computational Models for Endocrine Disruption Incorporating Adverse Outcome Pathways and High-Throughput Toxicity In Vitro Testing. H. El-Masri. US EPA, Research Triangle Park, NC.


Panel Discussion/Q&A.

Monday, March 11, 9:15 AM to 12:00 Noon, CC Room 314

Workshop Session: MALDI Tissue Imaging: A New Tool for Making TK/TD Connections to Histopathology

Chairperson(s): Laura K. Schnackenberg, US FDA/NCTR, Jefferson, AR; and Lisa H. Cazares, US Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD.

Primary Endorser: Toxicologic and Exploratory Pathology Specialty Section

Matrix-assisted laser desorption/ionization imaging mass spectrometry, or MALDI IMS, is an emerging label-free technology, which can provide the spatial distribution of drugs, drug metabolites, lipids, and other endogenous analytes in tissue samples. The analyte tissue distributions, when correlated with histopathology, provide detail that may allow a better understanding of a drug’s mechanism of action or the effects of a toxicological insult. MALDI IMS provides high spatial resolution (10 µm), is highly sensitive, and can be quantitative, qualities that have propelled the use of MALDI IMS across a variety of disciplines, including toxicological applications. This session will explore the recent incorporation of MALDI IMS to inform TK/TD drug decisions, a tool for identifying biomarkers related to histopathology and toxicity, and a method for identifying n-linked glycans across a variety of diseases and therapeutic models. Presenters representing government, academia, and pharmaceutical sectors will share recent MALDI IMS data from toxicology studies. The first presentation will provide a brief overview of MALDI IMS, including its strengths and limitations as a new tool for toxicology. The second presenter will discuss the role of MALDI-FTICR imaging to assist the United States Department of Defense at Fort Detrick to evaluate changes in metabolites in relation to infection from viral or bacterial pathogens. The third presenter will discuss the recent incorporation of MALDI IMS to assess drug, metabolites, and histopathological changes in a zebrafish model of drug-induced kidney toxicity. The fourth presentation will present case studies in drug development whereby MALDI IMS was utilized to better understand PK/PD relationships within a drug development pipeline. Finally, a cutting-edge and recent application of MALDI IMS will be presented, whereby n-linked glycan distributions can be identified in formalin-fixed paraffin-embedded (FFPE) tissues and microarrays from cancer biopsies. Use of this approach to further understand how glycan profiles and glycoproteins respond to therapeutics or xenobiotic exposures also will be discussed.

Abstract #


#1045 9:15  MALDI IMS: An Emerging Technology in the Field of Toxicology. L. K. Schnackenberg. US FDA/NCTR, Jefferson, AR.

#1046 9:35  MALDI-FTICR Mass Spectrometry Imaging Reveals Dysregulated Lipid and Small Molecule Metabolites in Tissues Harvested from Mice Infected with a Bacterial or Viral Pathogen. L. H. Cazares. US Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD. Sponsor: L. Schnackenberg


11:45  Panel Discussion/Q&A.
Monday, March 11, 9:15 AM to 12:00 Noon, CC Room 308

**Workshop Session: Mechanisms and Effects of Diabetogenic Environmental Metals: Type II Diabetes Mellitus and Diabetic Kidney Disease**

*Chairperson(s):* Joshua Edwards, Midwestern University, Downers Grove, IL; and Malek El Muayed, Northwestern University, Chicago, IL.

*Primary Endorser: Metals Specialty Section*

*Other Endorser(s):* Mechanisms Specialty Section; Occupational and Public Health Specialty Section

Complications arising from diabetes mellitus (DM) is the seventh leading cause of death in the US. Approximately 30.3 and 84.1 million Americans had type II DM or prediabetes, respectively, in 2015. The number of Americans with type II DM is projected to increase by nearly 20 million from 2015 to 2030. Lifestyle choices such as diet and exercise, in addition to genetics, are major factors in determining if someone will become type II DM. In addition to these factors, exposure to environmental metal and nonmetal substances (e.g., cadmium, arsenic, zinc, manganese, and selenium) may also play a significant role. Many epidemiological studies show a significant and positive association between exposure to toxic environmental metals and type II DM, prediabetes, or impaired fasting glucose. Experimental studies using animal models of metal toxicity show significant increases in fasting blood glucose levels or disruption of major mediators of metabolism. This session will examine the cellular and molecular mechanisms responsible for the diabetogenic effects of various metals. In addition, factors that may mitigate arsenic-induced dysglycemia, such as selenoproteins, will be discussed. Lastly, the session will review the synergistic or additive effects of cadmium-induced nephrotoxicity in an in vitro model of diabetic nephropathy. This session will highlight the most recent experimental findings from presenters who are experts at the forefront of this field of study.

**Abstract #**

- **#1050** 9:15  *Mechanisms and Effects of Diabetogenic Environmental Metals: Type II Diabetes Mellitus and Diabetic Kidney Disease.* J. Edwards. Midwestern University, Downers Grove, IL.
- **#1051** 9:15  *Cadmium Accumulates within Pancreatic Islets at Levels Similar to the Renal Cortex in an Experimental Model of Long-Term Exposure.* J. Edwards. Midwestern University, Downers Grove, IL.
- **#1052** 9:42  *Methods of Investigating the Toxic Potential of Environmental Factors in Insulin-Producing Islets of Langerhans Illustrated Using the Example of Cadmium.* M. El Muayed. Northwestern University, Chicago, IL.
- **#1053** 10:09  *Dissecting Mechanisms of Metal-Induced Beta Cell Dysfunction: Arsenic, Cadmium, Manganese, and Zinc.* M. Styblo. University of North Carolina at Chapel Hill, Chapel Hill, NC.
- 11:30  *Panel Discussion/Q&A.*

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Monday, March 11, 9:15 AM to 12:00 Noon, CC Ballroom IV

**Workshop Session: Pharmaceutical Investigative Toxicology: Case Studies in Optimizing Drug Discovery and Guiding Human Risk Assessment**

*Chairperson(s):* Clay W. Scott, AstraZeneca, Waltham, MA; and Howard Mellor, Vertex Pharmaceuticals, Oxford, United Kingdom.

*Primary Endorser: Drug Discovery Toxicology Specialty Section*

*Other Endorser(s):* Mechanisms Specialty Section

Toxicity and clinical safety have a major impact on drug development success. Moving toxicological studies into earlier phases of the research and development chain prevents drug candidates with a safety risk from entering clinical development. However, to identify candidates without such risk, safety has to be addressed proactively. Therefore, toxicology should ideally be integrated into the discovery process. Successful discovery phase drug safety assessment requires in-depth hazard identification and integrated experimental approaches to address target and lead compound risks to support target assessment, candidate prioritization, candidate selection, and derisking of safety flags from in vitro, animal, and clinical testing. Consequently, the application of innovative models and techniques that allow the identification of early hazards, prioritize chemical series, and steer chemical design and safety assessment should ideally be integrated into the early phases of the discovery process. Similarly, mechanistic insight into animal and clinical drug toxicities can be critical in developing informed human risk assessment. In this session, we will present case studies of innovative investigative discovery phase toxicology that have enabled mechanistic understanding and improved quantitative human risk assessment. Examples will include the use of recombinant proteins and antibodies to probe the effects of small molecule candidate drugs on in vivo safety biomarkers, use of 3D microphysiological models of human and animal organs, transcriptomics, drug metabolism, and modeling and simulation techniques to quantify translational risk assessment to humans.
Abstract #


#1058 9:49  Reduced Kupffer Cell Clearance Is Causing Elevation of Serum Toxicity Biomarkers in Rat and Monkey in Absence of Organ Injury. F. Pognan. Novartis, Basel, Switzerland.

#1059 10:18  Use of Early Phenotypic In Vivo Markers to Assess Human Relevance of an Unusual Rodent Non-Genotoxic Carcinogen In Vitro. A. Roth. F. Hoffman-La Roche Ltd, Basel, Switzerland.

#1060 10:47  Characterization and Mechanistic Investigation of Hemolytic Anemia in Rats Induced by an Early Small Molecule Oncology Candidate. H. Mellor. Vertex Pharmaceuticals, Oxford, United Kingdom.


11:45  Panel Discussion/Q&A.

Monday, March 11, 9:15 AM to 12:00 Noon, CC Room 310

**PL** Platform Session: Investigating Mode of Action in Chemical Carcinogenesis

**Chairperson(s):** B. Bhaskar. Gollapudi, Exponent, Inc., Alexandria, VA; and Matthew James. LeBaron, Dow Chemical Company, Midland, MI.

Abstract #


#1065 10:00  Spectrum of DMBA-Induced Pig-a Mutations in Rat Bone Marrow Erythroid Cells. V. Dobrovoljsky, J. Revollo, A. Dad, and M. Pearce. US FDA/NCTR, Jefferson, AR.

#1066 10:15  Similarities in the Transcriptomic Signatures in the Duodenum of Mice Exposed to Hexavalent Chromium, Captan, or Folpet Inform Mechanisms of Chemical-Induced Mouse Small Intestine Cancer. G. A. Chappell,1 J. E. Rager,1 J. C. Wolf,1 M. Babic1, K. J. LeBlanc1, C. L. Ring1, M. A. Harris1, and C. T. Thompson1. ToxStrategies, Inc., Austin, TX; 1Experimental Pathology Laboratories, Inc, Sterling, VA; and 1BioSpyder Technologies, Inc., Carlsbad, CA; and 1ToxStrategies, Inc, Katy, TX.

#1067 10:30  Mammary Tumor Prevention Effects of Broccoli-Derived Sulforaphane in Rats Exposed to 17β-Estradiol Is Mediated by Multiple Cytoprotective Mechanisms. D. L. Palliyaguru,1 and T. W. Kensler1,2.1University of Pittsburgh, Pittsburgh, PA; and 2Fred Hutchinson Cancer Center, Seattle, WA.

#1068 10:45  Aflatoxin B1 Induces Fibrosis and Cirrhosis in Nrf2 Knockout Rats. K. Taguchi1, N. Osanai2, E. Naganuma1, T. W. Kensler1, and M. Yamamoto1. 1Tohoku University, Sendai, Japan; and 2Fred Hutchinson Cancer Research Center, Seattle, WA.

#1069 11:00  Adverse Outcome Pathway of Ionizing Radiation Leading to Increased Risk of Breast Cancer. J. Helm, and R. Rudel. Silent Spring Institute, Newton, MA.

11:15  Q&A.

Monday, March 11, 9:15 AM to 12:00 Noon, CC Room 321

**PL** Platform Session: SPC Highlights Emerging Scientists: Mechanistic Toxicology to Decode Injury and Repair

**Chairperson(s):** Jennifer Freeman, Purdue University, West Lafayette, IN; and Vishal Vaidya, Pfizer, Inc., Cambridge, MA.

Abstract #

#1070 9:15  Phosphatidic Acid Enhances Liver Regeneration after Acetaminophen Hepatotoxicity by Promoting Phosphorylation and Inhibition of GSK3β. M. Clemens1, S. Kennon-McGill2, U. Apte2, B. Finck2, and M. McGill2. 1University of Arkansas for Medical Sciences, Little Rock, AR; 2University of Kansas Medical Center, Kansas City, KS; and 2Washington University School of Medicine, St. Louis, MO.

#1071 9:30  De Novo Fibrinogen Synthesis Promotes Liver Repair after APAP Overdose in Mice. A. Pant1, A. K. Kopec1, K. S. Baker1, H. Cline-Fedewa1, A. Revenko2, and J. P. Luyendyk1. 1Michigan State University, East Lansing, MI; and 2Ions Pharmaceuticals, Carlsbad, CA.


#1072 9:45  A Non-canonical Role of Epidermal Growth Factor Receptor (EGFR) in Regulating Lipid Metabolism in a Fast Food Diet Model for Non-alcoholic Fatty Liver Disease (NAFLD) in Mice.  B. Bhushan, S. Banerjee, S. Paranjpe, and G. K. Michalopoulos. University of Pittsburgh, Pittsburgh, PA.

#1073 10:00  Characterization of 3D Spheroid Co-cultures of Primary Human Hepatocytes and Non-parenchymal Cells from Different Donors.  T. Hurrell1, D. Hendriks1, A. Fardellaz, V. Kastrinou-Lampou1, A. Baze1, C. Parmentier1, L. Richert1, and M. Ingelman-Sundberg1. 1 Karolinska Institutet, Stockholm, Sweden; and 2 Kaly-Cell, Plobsheim, France. Sponsor: M. Mosedale


#1077 11:00  mRNA-sequencing Identifies Liver as a Potential Target Organ for Triphenyl Phosphate in Embryonic Zebrafish.  A. Reddam, C. Mitchell, S. Dasgupta, and D. Volz. University of California Riverside, Riverside, CA.

#1078 11:15  The Cross-Laboratory Testing and Comparison of a Liver Microphysiological System.  C. Sakolish1, Y. Liu1, C. Reese2, R. DeBiasio2, L. Vernet1, and L. Taylor1. Texas A&M University, College Station, TX; and 2 University of Pittsburgh, Pittsburgh, PA.

#1079 11:30  Acute In Vitro Nephrotoxicity of Three Brominated Flame Retardants.  L. Barnett, N. Siddiquee, and B. S. Cummings. University of Georgia, Athens, GA.


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**Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Air Pollution Toxicology**

*Chairperson(s): Aimen K. Farraj, US EPA, Research Triangle Park, NC; and Jonathan Shannahan, Purdue University, West Lafayette, IN.*

**Displayed: 9:15 AM – 4:30 PM  |  Author Attended: 9:15 AM – 10:45 AM**

**Abstract #**

#1081  Poster Board Number


#1082  Poster Board Number

**In Vivo and In Vitro Toxicity of PM2.5 from a Marcellus Shale Drilling Operation.**  T. L. Knuckles, A. B. Tolbert, and A. E. Peroni. West Virginia University, Morgantown, WV.

#1083  Poster Board Number

**Neural Effects of Fracking Sand Dust Aerosols.**  K. Sriram, G. X. Lin, A. M. Jefferson, W. McKinney, and J. S. Fedan. CDC-NIOSH, Morgantown, WV.

#1084  Poster Board Number


#1085  Poster Board Number

**The Effects of Inhalation Exposure to Traffic-Generated Air Pollutants on Angiotensin II Receptor Expression and Signaling of Monocytes/Macrophages in the Vasculature and Kidney of Wildtype Mice on a High-Fat vs. Low-Fat Diet.**  B. Phipps1, J. Lucero1, J. D. McDonald1, and A. K. Lund1. 1 University of North Texas, Denton, TX; and 2 Lovelace Biomedical Research Institute, Albuquerque, NM.

#1086  Poster Board Number

**Traffic-Generated Air Pollution-Mediated Alterations in Cerebral AhR and CYP Enzyme Expression Dependent upon Age and Diet in C57Bl/6 Wild Type Mice.**  C. Kennedy1, J. Lucero1, J. D. McDonald1, and A. K. Lund1. 1 University of North Texas, Denton, TX; and 2 Lovelace Biomedical Research Institute, Albuquerque, NM.

#1087  Poster Board Number

**Angiotensin II Receptor Type 1 (AT-1) Mediates Alterations in Blood Brain Barrier Integrity and Inflammation in Wildtype Mice, on Either a High- or Low-Fat Diet, Exposed by Inhalation to Vehicle Emissions.**  U. Suwannasual1, J. Lucero1, J. D. McDonald1, and A. K. Lund1. 1 University of North Texas, Denton, TX; and 2 Lovelace Biomedical Research Institute, Albuquerque, NM.

#1088  Poster Board Number

**One Year Urban Nanoparticle Concentration Monitoring in Queens, New York.**  R. Luo1, and R. J. Jaeger2. 1 Columbia University, New York, NY; and 2 CH Technologies (USA) Inc., Westwood, NJ.

#1089  Poster Board Number

**Developmental Traffic-Related Air Pollution Exposure and Autism-Related Neurotoxicity in Mice.**  Y. Chang1, T. Cole2, and L. G. Costa3. 1 University of Washington, Seattle, WA; 2 Graduate, Seattle, WA; and 3 University of Parma, Parma, Italy.
#1090 Poster Board Number.................................................................................................................. P110
**Mouse Pulmonary Response Induced by Exposure to Dust from Sawing Corian, a Solid-Surface Composite Material.** W. Mandler, J. Siddler, C. Qi, L. Battelli, M. Orandle, K. Sarkisian, R. Mercer, A. Stefaniak, A. Knepp, L. Bowers, and Y. Qian. ‘NIOSH, Morgantown, WV; and ‘NIOH, Cincinnati, OH.

#1091 Poster Board Number.................................................................................................................. P111
**Effect of Vinyl Chloride on HNF4α Expression in a Model of Nonalcoholic Steatohepatitis (NASH).** N. T. Peterson, M. L. Kreider, S. Sendesi, A. Whelton, and J. Shannahahan. Purdue University, West Lafayette, IN.

#1092 Poster Board Number.................................................................................................................. P112
**The Effect of Farm Dust Collection Method on the Toxicological Responses in Lung Co-culture Model.** M. Martikainen, T. Tossavainen, K. Wolczekiewicz, and M. Rononen. University of Eastern Finland, Kuopio, Finland. Sponsor: M. Viluksela

#1093 Poster Board Number.................................................................................................................. P113
**Nanjing Youth Olympic Games 2014 Air Quality Intervention: Changes in the Chemical Composition and Toxicological Characteristics of Segregated Urban Air Particulate Matter.** T. J. Rönkköi, P. J. Jalava, M. S. Happo, O. Sippula, A. Leskinen, M. Komppula, J. Jokiniemi, and M. Hirvonen. University of Eastern Finland, Kuopio, Finland; and ‘Finnish Meteorological Institute, Kuopio, Finland. Sponsor: M. Viluksela

#1094 Poster Board Number.................................................................................................................. P114
**Assessment of Cured-in-Place Pipe Worksite Emissions and Toxicity.** L. Kobos, S. Sendesi, A. Whelton, and J. Shannahahan. Purdue University, West Lafayette, IN.

#1095 Poster Board Number.................................................................................................................. P115
**Co-exposure of Air Pollutants in Human Lung In Vitro Models.** A. Steneholm, S. Upadhya, A. Chakraborty, H. Keteliesjers, and L. Palmberg. ’Nynas AB, Stockholm, Sweden; ’Karolinska Institutet, Stockholm, Sweden; and ’Concave, Brussels, Belgium. Sponsor: A. Steneholm, EUROTOX

#1096 Poster Board Number.................................................................................................................. P116
**Evaluation of Tire and Road Wear Particles in Air in Delhi, India.** M. L. Kreider, E. S. Hynds, and J. M. Panko. Cardno ChemRisk, Pittsburgh, PA.

#1097 Poster Board Number.................................................................................................................. P117
**In Vivo Toxicity Assessment of Metal Contaminated Wind Blown Particulate Matter from an Abandoned Uranium Mine on the Navajo Reservation.** J. Begay, Y. Ordonez, L. Lucas, A. Wheeler, F. Baldwin Jr., G. Herbert, C. Shuey, J. Harkema, I. Wagner, M. Morishita, B. Bleseke, and M. Campan. University of New Mexico, Albuquerque, NM; Dine College, Tsaile, AZ; and Michigan State University, East Lansing, MI.

#1098 Poster Board Number.................................................................................................................. P118
**Evaluating Toxicity of Inhalation Exposure to Unconventional Natural Gas Drilling-Related Chemicals.** B. Rivera, L. Tidwell, C. Donald, Y. Chang, B. Siddens, K. Mullen, D. Ainsworth, K. Anderson, and S. Tilton. Oregon State University, Corvallis, OR; and ‘Cornell University, Ithaca, NY.

#1099 Poster Board Number.................................................................................................................. P119
**Genetic Injury Caused by LINE-1 Retrotransposition following Intratracheal Instillation of Benzo(a)pyrene in ORFeus® Transgenic Mice.** A. A. Hassanin, M. Tavera-Garcia, P. Bojang, and K. S. Ramos. University of Arizona, College of Medicine, Tucson, AZ; and ’Suez Canal University, Ismailia, Egypt.

#1100 Poster Board Number.................................................................................................................. P120
**Investigating the Role of TRPV3 in Lung Epithelial Cell Repair.** K. L. Burrell, and C. Reilly. University of Utah, Salt Lake City, UT.

#1101 Poster Board Number.................................................................................................................. P121
**Apoptosis Resistance of Fibroblasts Precedes Progressive Scarring in Pulmonary Fibrosis and Is Partially Mediated by Toll-Like Receptor 4 Activation.** K. Hanson, and J. Finkelstein. University of Rochester Medical Center, Rochester, NY.

#1102 Poster Board Number.................................................................................................................. P122
**The Effect of Enriched vs. Inadequate Housing Conditions on Biomass Smoke-Induced Cardiovascular Dysfunction in Mice.** M. E. Harmon, Y. Kim, C. King, B. Martin, N. H. Coates, M. I. Gilmour, A. K. Farraj, and M. S. Hazari. University of North Carolina at Chapel Hill, Chapel Hill, NC; US EPA, Research Triangle Park, NC; and ‘Oak Ridge Institute for Science and Education, Oak Ridge, TN.

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**Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Air Pollution: Biomass**

**Chairperson(s):** Ian Gilmour, US EPA, Research Triangle Park, NC; and Travis Knuckles, West Virginia University, Morgantown, WV.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM**

**Abstract #**

#1103 Poster Board Number.................................................................................................................. P124
#1104  Poster Board Number .................................................................................................................P125
Direct Activation of Chemoreceptors by Chemicals Emitted from Wood and Wood Products: An In Vitro Approach to Test Effects of Mixtures. C. van Thrift1, M. Ohlmeier2, K. Butter1, and J. Krosz1. 1Leibniz Research Centre for Working Environment and Human Factors, Dortmund, Germany; and 2Thünen Institute of Wood Research, Hamburg, Germany.

#1105  Poster Board Number .................................................................................................................P126
Baroreflex Sensitivity and Cardiovascular Responses to Acute Peat Smoke Inhalation in Rats. A. K. Farraj1, B. L. Martin2, L. C. Thompson2, Y. Kim1, C. King1, S. J. Snow1, M. Schladeweiler1, N. Haykal-Coates1, I. George1, M. I. Gilmour2, U. P. Kodavanti2, and M. S. Hazari2. 1US EPA, Research Triangle Park, NC; and 2ORISE, Research Triangle Park, NC.

#1106  Poster Board Number .................................................................................................................P127
Multiple Comparison of Combustion Emission Toxicity of Wood, Diesel and Aged Equivalents on Novel Thermophoretic Air-Liquid Interface Exposure System. T. Ihantola1, M. Ihaiainen1, H. Hakkarainen1, T. Rönkkö1, K. Kuuspalto1, A. Leskinen1, O. Sippula1, R. Zimmermann1, J. Tissari1, J. Jokiniemi1, M. Hirvonen1, and P. Jalava1. 1University of Eastern Finland, Kuopio, Finland; 2Savonia University of Applied Sciences, Kuopio, Finland; 3Finnish Meteorological Institute, Kuopio, Finland; and 4Helmholtz Virtual Institute of Complex Molecular Systems in Environmental Health (HICE), München, Germany. Sponsor: M. Viluksela

#1107  Poster Board Number .................................................................................................................P128
Inflammatory Responses in Mouse BALF after Exposure to Fresh or Aged Spruce or Lignite Combustion Aerosol. P. A. Vartiainen1, S. Bauer2, M. S. Happon1, M. Martikainen1, T. J. Rönkkö1, H. Hakkarainen1, C. Hollauer2, M. Ihaiainen1, P. Yli-Pirilä1, J. Tissari1, O. Sippula1, R. Zimmermann1, J. Jokiniemi1, M. Hirvonen1, and P. I. Jalava1. 1University of Eastern Finland, Kuopio, Finland; and 2Helmholtz Zentrum München, München, Germany. Sponsor: M. Viluksela

#1108  Poster Board Number .................................................................................................................P129
Zebrafish Locomotor Responses Reveal That Irritant Effects of Biomass Smoke Are Influenced by Fuel Type, Burn Conditions, and Byproduct Chemistry. W. K. Martin1, S. Padilla1, Y. Kim1, M. D. Hays1, D. L. Hunter1, M. S. Hazari2, D. M. DeMarini3, M. I. Gilmour4, and A. K. Farraj5. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2US EPA, Research Triangle Park, NC.

#1109  Poster Board Number .................................................................................................................P130

#1110  Poster Board Number ................................................................................................................P131

#1111  Poster Board Number ................................................................................................................P132
High-Carbohydrate Oral Load Increases Arrhythmia and Alters Cardiovascular Function One Day after a Single Eucalyptus Smoke Exposure in Sprague-Dawley Rats. M. Hazari1, B. Martin2, M. Harmon1, Y. Kim1, C. King1, L. Thompson3, K. Martin1, M. Gilmour2, and A. Farraj4. 1US EPA, Research Triangle Park, NC; 2ORISE, Research Triangle Park, NC; and 3University of North Carolina at Chapel Hill, Chapel Hill, NC.

#1112  Poster Board Number ................................................................................................................P133
Acute Eucalyptus Smoke Inhalation Sensitizes Rats to the Postprandial Effects of a High Carbohydrate Oral Load. B. L. Martin1, L. C. Thompson1, Y. H. Kim1, S. Snow1, M. C. Schladeweiler2, P. Phillips1, C. King1, J. Richards2, W. K. Martin1, N. Haykal-Coates1, M. I. Gilmour2, U. P. Kodavanti2, M. S. Hazari2, and A. K. Farraj3. 1Oak Ridge Institute for Science and Education, Oak Ridge, TN; 2US EPA, Research Triangle Park, NC; and 3University of North Carolina at Chapel Hill, Chapel Hill, NC.

#1113  Poster Board Number ................................................................................................................P134
Greater Respiratory Effects of Acute Biomass Smoke Inhalation in Mice Compared with Episodic Exposures. M. McGee Hargrove1, Y. Kim1, C. King1, J. Gilmour4, and S. Gavett1. 1ORISE, Research Triangle Park, NC; and 2US EPA, Research Triangle Park, NC.

#1114  Poster Board Number ................................................................................................................P135
Molecular Mechanisms of Wood Smoke Exposure in an Organotypic Model. N. Mallek1, and S. McCullough3. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2US EPA, Chapel Hill, NC.

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**Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**PS Poster Session: Air Pollution: Ozone**

**Chairperson(s):** Urmila Kodavanti, US EPA, Research Triangle Park, NC; and Patricia Silveyra, University of North Carolina at Chapel Hill, Chapel Hill, NC.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM**

**Abstract #**

#1115  Poster Board Number .................................................................................................................P136

#1116  Poster Board Number .................................................................................................................P137
Elevated CCR2 and CD11b Expression Identifies Activated Proinflammatory Macrophages Accumulating in Induced Sputum after Human Ozone Exposure. D. L. Laskin1,2, R. C. Rancourt1, K. Black1, J. Cervelli1, C. Cepeda1, T. Black1, H. Chang1, J. D. Laskin1, and H. M. Kipen3. 1Rutgers, The State University of New Jersey, Piscataway, NJ; and 2Environmental and Occupational Health Sciences Institute, Piscataway, NJ, United States, Piscataway, NJ.
#1117
**Poster Board Number**

**Differential Gene Expression in Alveolar versus Interstitial Macrophages during Ozone-Induced Pulmonary Inflammation.** M. Hodge, S. Reece, R. Tigges, B. Luo, J. House, E. Browder, B. Kilburg, and K. Gowdy. 1East Carolina University, Greenville, NC; 2Duke University, Durham, NC; and 3North Carolina State University, Raleigh, NC.

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#1121
**Poster Board Number**


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#1127
**Poster Board Number**

**Ozone Exposure Predisposes Mice to Sepsis-Induced Lung Injury.** J. Radbel, K. Vayas, O. Le-Hoang, V. Sunil, A. Gow, and D. L. Laskin. 1Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ; and 2Rutgers Ernest Mario School of Pharmacy, Piscataway, NJ.

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#1130
**Poster Board Number**

**Estrogen Regulation of Ozone-Induced Lung Inflammation.** N. Fuentes, L. Rivera, M. Nicoleau, S. DiAngelo, and P. Silveyra. 1Penn State College of Medicine, Hershey, PA; and 2University of North Carolina at Chapel Hill, Chapel Hill, NC.

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#1137
**Poster Board Number**

**Neuroendocrine Stress Axis and Adaptation after Repeated Daily Ozone Exposure.** U. P. Kodavanti, A. R. Henriquez, M. C. Schladweiler, C. N. Miller, C. Fisher, R. Grindstaff, and S. J. Snow. 1US EPA, Research Triangle Park, NC; and 2University of North Carolina at Chapel Hill, Chapel Hill, NC.

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#1138
**Poster Board Number**

**Differential Gene Expression in Alveolar versus Interstitial Macrophages during Ozone-Induced Pulmonary Inflammation.** M. Hodge, S. Reece, R. Tigges, B. Luo, J. House, E. Browder, B. Kilburg, and K. Gowdy. 1East Carolina University, Greenville, NC; 2Duke University, Durham, NC; and 3North Carolina State University, Raleigh, NC.

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#1145
**Poster Board Number**

**The Impact of Ozone Exposure and Sedentary Lifestyle on Microglia and Mitochondrial Bioenergetics of Female Long-Evans Rats.** M. C. Valdez, D. L. Freeborn, A. F. Johnston, A. Tennant, and P. R. Kodavanti. 1Oak Ridge Institute for Science and Education (ORISE), Oak Ridge, TN; and 2US EPA/NHEERL, Research Triangle Park, NC.

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#1146
**Poster Board Number**


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#1147
**Poster Board Number**

**Airway Transcriptomic Responses to Ozone: Altered Extracellular Vesicle MicroRNA and Alveolar Macrophage mRNA Expression Profiles.** C. J. Smith, A. Pelov, M. Kanke, P. Sethupathy, and S. Kelada. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2Cornell University College of Veterinary Medicine, Ithaca, NY.

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#1148
**Poster Board Number**

**Ozone-Associated ROS Induces Microvesicle-Containing miRNAs Which Regulate Epithelial Cell Death.** J. Camino, H. Lee, D. Zhang, V. Sunil, K. Vayas, J. D. Laskin, D. L. Laskin, and Y. Jin. 1Boston University, Boston, MA; and 2Rutgers, The State University of New Jersey, Piscataway, NJ.

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Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**PS**

**Poster Session: Air Pollution: PM**

**Chairperson(s):** Marisa L. Kreider, Cardno ChemRisk, Pittsburgh, PA; and James Wagner, Michigan State University, East Lansing, MI.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 9:15 AM–10:45 AM

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#1128
**Poster Board Number**

**Air Pollution and Insulin Resistance: Comprehensive Transcriptome Map of Mice Exposed to Particulate Matter Air Pollution, PM2.5.** B. Park. Johns Hopkins University, Baltimore, MD.

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#1129
**Poster Board Number**


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#1130
**Poster Board Number**

P152 Traffic-Generated Air Pollution Exposure Mediates Adipocyte Hypertrophy Associated with Increased Angiotensin II Signaling in C57Bl/6 Wildtype Mice. J. Lucero1, J. D. McDonald2, and A. K. Lund3. ‘University of North Texas, Denton, TX; and 4Lovelace Biomedical Research Institute, Albuquerque, NM.


P154 Effects of Diesel Exhaust on Airway Epithelial Ion Transport and Lung Function in the Rat. J. A. Thompson, W. G. McKinney, M. C. Jackson, and J. S. Fedan. NIOSH, Morgantown, WV.

P155 Characterizing PM_{2.5} Samples with Different Source Contributions. A. Perez, C. Roper, S. L. Massey Simonich, and R. L. Tanguay. Oregon State University, Corvallis, OR.

P156 Marco Regulates In Vivo Response to Low Molecular Weight Hyaluronan Fragments. A. Birukova, T. Espenschied, and R. M. Tighe. Duke University, Durham, NC.

P157 Comparison of Precision Cut Lung Slices and Whole Lungs in Particle-Induced Inflammation. Y. Kim, and M. Gilmour. US EPA, Durham, NC.

P158 Fine Particulate Matter (PM_{2.5}) Exposure Impairs Vascularization. A. M. Gumpert, D. J. Conklin, T. E. O'Toole, and P. Haberzettl. University of Louisville, Louisville, KY.

P159 Piecing Together the Puzzle: Identifying the Role Oxidative Stress and the Alveolar Epithelium Play in Air Pollution-Induced Cardiovascular Disease. E. C. Vitucci1, and S. D. McCullough2. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2US EPA/NHEERL, Research Triangle Park, NC.


P161 Differences in Rodent and Human TRPA1, M8, V1, and V3 Responses to Prototypical and Environmental Particulate Material Agonists. J. G. Lamb, C. E. Deering-Rice, and C. A. Reilly. University of Utah, Salt Lake City, UT.

P162 Pulmonary Fibroblasts Influence Epithelial Cells Response to Air Pollution. N. M. Aponte-Hernández1, E. Vitucci2, N. Mallek2, and S. McCullough1. 1University of Puerto Rico at Cayey, Barranquitas, Puerto Rico; 2University of North Carolina at Chapel Hill, Chapel Hill, NC; and 3US EPA/NHEERL, Research Triangle Park, NC.


P166 OH Formation from Fulvic Acid-Fe(II) Complexes in Human Lung Fluids. D. A. Diaz1, D. H. Gonzalez2, and S. Paulson1. 1California State University, Granada Hills, CA; and 2University of California Los Angeles, Los Angeles, CA.

P167 Exacerbation of Allergic Airway Responses by Livestock Farm-Derived PM_{2.5}, is Associated with the Source of the Particulate Matter. J. G. Wagner1, D. Liu1, R. Vanderbrie1, J. Boere1, M. Gerlofs-Nijland2, J. Hemming1, M. Shafer1, and J. Schauer1. 1University of North Texas, Denton, TX; and 2Lovelace Biomedical Research Institute, Albuquerque, NM.

P168 Oxidative and Inflammatory Potential of PM_{2.5} from the San Joaquin Valley: Seasonal Trends and Molecular Marker Associations. D. S. Antkiewicz1, A. Al Hanai1, A. Lai1, M. Olson1, M. Bae1, J. Hemming2, M. Shafer1, and J. Schauer1. 1University of Wisconsin-Madison, Madison, WI; and 2Mokpo National University, Muan, Korea, Republic of.

P169 Pulmonary Responses to Fine Particulate Matter (PM_{2.5}) from California and China: Effects of PM Source, Exposure Frequency, and Recovery Time. W. Yuan1, C. C. Fulgar1, S. C. Velasquez2, Z. Sun2, W. Li3, A. R. Castañeda1, C. F. Vogel1, H. Wei1, and K. E. Pinkerton1. 1University of California Davis, Davis, CA; 2Shanxi University, Taiyuan, China; and 3Shandong University, Jinan, China.

Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Ecotoxicology**

**Chairperson(s):** Thaddaeus H. Johnson, Texas Southern University, Houston, TX; and Leslie E. Patton, TSG Consulting, Washington, DC.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM**

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<th>Poster Board Number</th>
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<tr>
<td>P171</td>
<td>Organosulfates Identified in Traffic-Related Air Pollution Are Neurotoxic in Primary Rat Hippocampal and Cortical Neuron-Glia Co-Cultures. R. K. Morgan1, D. R. Carty1, H. Lehmlev3, A. E. Stone1, and P. J. Lein1. 1University of California Davis, Davis, CA; and 2University of Iowa, Iowa City, IA.</td>
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<td>P172</td>
<td>Effects from Airborne Metal-Enriched Particulate Matter from an Abandoned Uranium Mine. J. Tworek1, B. Sanchez1, F. Baldwin1, A. Wheeler1, G. Herbert1, S. Lucas1, M. Morishita1, B. Bleske1, M. Campen1, M. Paffett1, and K. Zychowski1. 1Augustana College, Mount Prospect, IL; and 2University of New Mexico, Albuquerque, NM.</td>
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<td>P162</td>
<td>Wastewater Reuse, Exposure Risk, and Fish Endocrine Disruption in the Shenandoah River Watershed. A. M. Vajda1, L. Barber1, J. L. Rapp1, C. Kandel1, S. Keefe1, J. Rice1, P. Westerhoff1, and D. Bertalatus1. 1US Geological Survey, Boulder, CO; 2US Geological Survey, Richmond, VA; 3University of North Carolina at Charlotte, Charlotte, NC; and 4Arizona State University, Tempe, AZ. Sponsor: A. Vajda, Society of Environmental Toxicology and Chemistry</td>
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<tr>
<td>P163</td>
<td>Daphnia magna Chronic Toxicity Testing towards Using Widely Found Pharmaceuticals in the Aquatic Environment. M. Tarapoulouzi1, M. I. Vasquez2, and D. Fatta-Kassinos2. 1University of Cyprus, Nicosia, Cyprus; and 2Nereus-International Water Research Center, University of Cyprus, Nicosia, Cyprus. Sponsor: M. Ines Vasquez, Society of Environmental Toxicology and Chemistry</td>
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<td>P165</td>
<td>Evaluation of Skin Mucus Vitellogenin (VTG) in a Japanese Medaka Fish Sexual Development Test (OECD TG 234) with 17α-estradiol (EE2) as Contribution to 3Rs Animal Welfare Concept. V. Strauss, E. Salinas, M. Braun, S. Gröters, S. Pawlowski, and B. van Ravenzwaay. BASF SE, Ludwigshafen am Rhein, Germany.</td>
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<tr>
<td>P166</td>
<td>Effects of Low, Subchronic, Exposure of Commercial 2,4-D Formulation on Early Life Stages of Native Wisconsin Game Fish Species. G. K. Dehnert1, M. Freitas2, T. Barry1, and W. Karasov1. 1University of Wisconsin-Madison, Madison, WI; and 2University of Viçosa, Viçosa, Brazil. Sponsor: G. Dehnert, Society of Environmental Toxicology and Chemistry</td>
</tr>
<tr>
<td>P170</td>
<td>Toxicity Study of Perfluorohexanoic Acid (PFHxA) and Its Salts in Aquatic Animals. Z. Guo, and H. Iwai. Daikin Industries, Ltd., Osaka, Japan.</td>
</tr>
<tr>
<td>P171</td>
<td>Silicic—Do They All Behave the Same Way in the Environment Regarding Biodegradability/Degradability? T. Creusot1, J. G. Louvet1, A. Bellemain1, B. Combourieu1, B. Page1, S. Soum1, S. Catoire1, and H. Ficheux1. 1THOR Personal Care, Compiègne, France; and 2Rovaltain Research Company, Alixan, France.</td>
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Abstract #

#1165

Poster Board Number


#1166

Poster Board Number

Developmental Exposure to Fluoxetine Induces Higher Mortality but Not Gross Anomalies in an In Ovo Chicken Model. J. R. Meadows, Q. Hu, and J. C. DeWitt. East Carolina University, Greenville, NC.

#1167

Poster Board Number


#1168

Poster Board Number

Tebuthiuron and Trifluralin Affect Locomotor Activity of Zebrafish (Danio rerio) Embryos and Larvae Body Length. A. A. de Oliveira, and D. P. de Oliveira. Universidade de São Paulo, Ribeirão Preto, Brazil.

#1169

Poster Board Number

Yeast Atlas, Diversity of Wild Yeast Collected from North and South American Regions. J. Barney, and J. Gallagher. West Virginia University, Morgantown, WV.

#1170

Poster Board Number

An Overview of the Properties MCHM Exhibits on Multiple Yeast Strains. Z. N. Sherman, M. C. Ayers, A. Pupo, and J. E. Gallagher. West Virginia University, Morgantown, WV.

#1171

Poster Board Number

Analysis of Emerging Contaminants in Maryland Coastal Bays Using In Vitro Bioassays as Biological Screening Tools. R. A. Elfadul1, R. Jesien1, A. Ematabawi, P. Chigbu1, and A. Isahque1. 1University of Maryland Eastern Shore, Princess Anne, MD; and 2Maryland Coastal Bays Program, Berlin, MD.

#1172

Poster Board Number

Mapping Nutrient and Heavy Metal Concentrations in Greens Bayou. T. H. Johnson, J. Johnson, T. Bukanumi-Omidran, and M. S. Bhaskar. Texas Southern University, Houston, TX.

#1173

Poster Board Number

Culture System Differences in Growth and Hematological Profiles of Juveniles and Adults Clarias gariepinus. N. Achilike1, and A. D. Wusu2. 1Nigerian Institute for Oceanography and Marine Research, Lagos, Nigeria; and 2Lagos State University, Lagos, Nigeria.

Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session:** Perfluorinated Alkyl Substances

**Chairperson(s):** Saif A. Alharthy, St. John’s University, Queens, NY; and Janet K. Anderson, Integral Consulting Inc, Mico, TX.

Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM

Abstract #

#1174

Poster Board Number


#1175

Poster Board Number

Comparative Analysis of International and Domestic Points of Departure and Uncertainty Factors Contributing to Disparate Oral Reference Doses for PFDA. J. V. Miller1, D. G. Kougias2, M. M. Abramson3, M. A. Maddaloni1, and M. L. Kreider1. 1Cardno ChemRisk, Pittsburgh, PA; and 2Cardno ChemRisk, Brooklyn, NY.

#1176

Poster Board Number

Approaches for Assessing Perfluoralkyl Acid Mixture Toxicity: A Case Study with PFOA and PFHxS. A. Luz1, J. Anderson1, and P. Goodrum1. 1Integral Consulting, Inc, Annapolis, MD; 2Integral Consulting, Inc, San Antonio, TX; and 3Integral Consulting, Inc, Syracuse, NY.

#1177

Poster Board Number

PFOA and PFOS Interfere with Hepatocyte Differentiation in a Human iPSC to Hepatocyte Model. I. Huck, J. Draper, J. L. Vivian, and U. Apte. University of Kansas Medical Center, Kansas City, KS.

#1178

Poster Board Number

Concentration of 19 Perfluorinated Compounds in Processed Seafood Analyzed by Liquid Chromatography-Tandem Mass Spectrometry. Y. Jeong1, J. Kim1, Y. Joo2, and K. Lee3. 1Korea University, Seoul, Korea, Republic of; and 2Dongguk University, Seoul, Korea, Republic of. Sponsor: J. Lee

#1179

Poster Board Number

PFAS Tissue Distribution in Cattle. R. Drew1, T. G. Hagen1, D. Chompness2, and A. Sellier3. 1ToxConsult Pty Ltd, Darling South, Australia; 2Agriculture Victoria, Melbourne, Australia; and 3AsureQuality Limited, Wellington, New Zealand.

#1180

Poster Board Number

The Interaction with and Transport of Three Perfluoralkyl Sulfonates by Renal Organic Anion Transporters. P. J. Sandoval1, J. D. Zitzow2, S. Chang3, and B. Hagenbuch3. 1Kansas University Medical Center, Kansas City, KS; and 23M Company, St. Paul, MN.

Program Schedule—Monday | 61
#1196  
**Poster Board Number**.................................................................P222  
**Metatranscriptomics and Metabolomics to Investigate the Impact of Dietary 2,3,7,8-Tetrachlorodibenzo-p-dioxin Exposure on the Mouse Intestinal Microbiome.** R. G. Nichols, J. Zhang, P. B. Smith, G. H. Perdue, and A. D. Patterson. Pennsylvania State University, State College, PA.

#1197  
**Poster Board Number**.................................................................P223  
**Physiologic and Metabolic Impact of Persistent Organic Pollutants on Gut Microbiota.** Y. Tian1, J. Cai2, W. Gui1, and A. D. Patterson3.  
1Pennsylvania State University, University Park, PA; and 2Wuhan University of Physics and Mathematics, University of Chinese Academy of Sciences, Wuhan, China.

#1198  
**Poster Board Number**.................................................................P224  
**Chronic Exposure to Tetrabromobisphenol A Potentially Alters Circadian Rhythm in Rats.** S. J. Coulter1, G. A. Knudsen1, and L. S. Birmbaum2.  
1National Cancer Institute, Research Triangle Park, NC; and 2NIEHS/NTP, Research Triangle Park, NC.

#1199  
**Poster Board Number**.................................................................P225  
**Mitigating the Health Consequences of Environmental Exposure to Arctic Pollutants with Folic Acid.** P. L. Charest1, M. Lessard1, P. M. Herst1, P. Navarro2, A. MacFarlane3, S. Kimmins3, J. Trasler3, M. Dalval3, M. Benoît-Biancamano3, and J. L. Bailey4.  
1Université Laval, Quebec City, QC, Canada; 2Health Canada, Ottawa, ON, Canada; 3McGill University, Montreal, QC, Canada; and 4Université de Montréal, St-Hyacinthe, QC, Canada.

#1200  
**Poster Board Number**.................................................................P226  
**Telomeres as a Potential Target for the Chronic Toxicity of Polychlorinated Biphenyls (PCBs).** S. VanEtten1, M. Bonner1, X. Ren1, L. Birmbaum2, P. Kostyniak3, and J. Olson1.  
1University at Buffalo, Buffalo, NY; and 2NIEHS/NTP, Research Triangle Park, NC.

#1201  
**Poster Board Number**.................................................................P227  
Woods Hole Oceanographic Institution, Woods Hole, MA.

#1202  
**Poster Board Number**.................................................................P228  
**Skeletal Toxicity of Co-planar Polychlorinated Biphenyl Congener 126 in the Rat Is Aryl Hydrocarbon Receptor-Dependent.** A. Williams1, J. Watt2, L. Robertson4, M. Osborn1, M. Soares1, and M. Ronis1.  
1Louisiana State University Health Sciences Center, New Orleans, LA; 2University of Iowa, Iowa City, IA; 3Louisiana State University, Baton Rouge, LA; and 4University of Kansas Medical Center, Kansas City, MO.

#1203  
**Poster Board Number**.................................................................P229  
**Toxicity of PCB126 in Adult Male and Female Rats, Including Timed Pregnant Rats.** N. Eti1, V. E. Klenov1, S. Flor1, K. Iqbal1, J. Watt1, W. H. Watson1, A. F. Keating1, K. N. Gibson-Corley1, M. J. Ronis2, M. J. Soares2, G. Ludewig2, and L. W. Robertson1.  
1University of Iowa, Iowa City, IA; 2University of Kansas Medical Center, Kansas City, KS; 3Louisiana State University Health Sciences Center, New Orleans, LA; and 4University of Louisville, Louisville, KY; and 5Iowa State University, Ames, IA.

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### Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

#### Poster Session: Clinical and Translational Toxicology

**Chairperson(s):** Emma Bowers, University of Arizona, Tucson, AZ; and Haixia Lin, University of Arkansas for Medical Sciences, Little Rock, AR.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 10:45 AM–12:15 PM

### Abstract #

#### #1204

**Poster Board Number**.................................................................P231  
**Beneficial Effect of Resveratrol in Combined Treatment with Cisplatin on Growth Inhibition and Apoptosis Induction in Gastric Cancer SGC-7901 Cells.** Y. Xu1, X. Wu1, Q. Liu1, W. Zheng1, and G. Zhao1.  
1Hubei University of Chinese Medicine, Wuhan, China; and 2Purdue University, West Lafayette, IN.

#### #1205

**Poster Board Number**.................................................................P232  
Wayne State University, Detroit, MI.

#### #1206

**Poster Board Number**.................................................................P233  
**A Novel Metformin-Methyglyoxal Imidazolone Metabolite Sensitizes Cells to Insulin: A Potential Role in Alleviating T2DM Complications.** T. Hargraves1, N. Mastrandrea1, S. Lau2, and T. Monks2.  
1University of Arizona, Tucson, AZ; and 2Wayne State University, Detroit, MI.

#### #1207

**Poster Board Number**.................................................................P234  
**In Vivo and In Silico Evaluation of Anti-diabetic Effect of White Butterfly (Clerodendrum volubile) Leaves.** O. Molehin1, O. Elekofehinti1, and O. Oloboye1.  
1Ekiti State University, Ado-Ekiti, Nigeria; and 2Federal University of Technology, Akure, Nigeria.

#### #1208

**Poster Board Number**.................................................................P235  
1Rutgers, The State University of New Jersey, New Brunswick, NJ; and 2Rutgers Institute for Translational Medicine and Science, New Brunswick, NJ.

#### #1209

**Poster Board Number**.................................................................P236  
**Effect of Systemic Post-Operative Cannabinoid Receptor Agonist on Spine Fusion in Rat Model.** J. Yun, S. Jeong, C. Yun, S. Stock, W. Hsu, and E. Hsu.  
Northwestern University, Chicago, IL.
Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Liver I**

**Chairperson(s):** Bharat Bhushan, University of Pittsburgh, Pittsburgh, PA; and Anna K. Kopec, Michigan State University, East Lansing, MI.

**Displayed: 9:15 AM – 4:30 PM | Author Attended: 1:30 PM – 3:00 PM**

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<td>#1217</td>
<td>P246</td>
<td><strong>Delayed Treatment with 4-Methylpyrazole Protects against Apap Hepatotoxicity by Inhibition of C-Jun N-Terminal Kinase.</strong> J. Akakpo1, A. Ramachandran1, W. Ding2, B. Rumack2, and H. Jaeschke1. 1University of Kansas Medical Center, Kansas City, KS; and 2University of Colorado School of Medicine, Aurora, CO.</td>
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<td>#1218</td>
<td>P247</td>
<td><strong>2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) Dysregulation of Hepatic One Carbon Metabolism during the Progression of Steatosis to Steatohepatitis with Fibrosis in Mice.</strong> R. R. Fling, C. M. Doskey, K. A. Fader, R. Nault, and T. Zacharewski. Michigan State University, East Lansing, MI.</td>
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<td>#1219</td>
<td>P248</td>
<td><strong>Masitinib Induces Apoptosis in Human Hepatic and Cardiac Cells.</strong> Q. Shi1, L. Ren1, L. Pang1, J. J. Greenhaw1, X. Yang2, and W. B. Mattes3. 1US FDA/NCTR, Jefferson, AR; 2US FDA/NCTR, Silver Spring, MD.</td>
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<td>#1220</td>
<td>P249</td>
<td><strong>CYP2A5 Absence in PPARα+ Mice Develop Less Obesity but More Severe NAFLD in Response to High Fat Diet.</strong> X. Chen1, P. Gao2, and Y. Lu1. 1East Tennessee State University, Johnson City, TN; and 2University of Dali, Dali, China.</td>
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<td>#1221</td>
<td>P250</td>
<td><strong>Crosstalk between Wnt/β-Catenin Pathway and Osteopontin in Liver Regeneration following Partial Hepatectomy in Mice.</strong> M. Schreiner1, S. Singh1, S. Monga2, and A. Uffle1. 1Slippery Rock University of Pennsylvania, Slippery Rock, PA; and 2University of Pittsburgh, Pittsburgh, PA.</td>
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<td>#1222</td>
<td>P251</td>
<td><strong>Biochemical and Histological Studies on the Effect of African Iba, a Herbal Purgative, in Albino Rats.</strong> K. Ushe0, M. Adegbola, and C. Otueche1. 1Redeemer's University, Ede Town, Nigeria; and 2Federal Polytechnic, Ede Town, Nigeria.</td>
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<td>#1223</td>
<td>P252</td>
<td><strong>Comparison of Primary Human Hepatocyte Spheroid Generation and Performance in Different Culture Systems.</strong> S. Buesch1, M. Burgner1, J. Schroeder1, and M. Stosik1. 1Lonza, Cologne, Germany; and 2Lonza, Morrisville, NC.</td>
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<td>#1224</td>
<td>P253</td>
<td><strong>Functional Comparison of HepaRG Cells and Primary Human Hepatocytes in Monolayer and Spheroid Culture as Repeated Exposure Models for Hepatotoxicity.</strong> J. Li, R. Settivani, M. LeBaron, and M. Marty. Dow Chemical Company, Midland, MI.</td>
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Stable and Robust PSC-Derived Hepatic Model for Drug Biotransformation and Toxicity Prediction. M. Kumar1, R. Boon1, T. Tricot1, J. De Smedt1, W. Hu2, J. Castel3, and C. Verfaillie.1 Stem Cell Institute, KU Leuven, Leuven, Belgium; 2University of Minnesota, Minneapolis, MN; and 3Instituto de Investigaciòn Sanitaria, Hospital Universitario La Fe, Valencia, Spain. Sponsor: M. Leist

Sex Differences in Environmental Liver Disease Vary by Pollutant Type: Volatile Organic Compounds vs. Persistent Organic Pollutants. K. Falkner1, B. Wahlang2, C. M. Klinge3, A. Bhatnagar4, J. I. Beier5, and M. C. Cave6. 1University of Louisville, Louisville, KY; and 2University of Pittsburgh, Pittsburgh, PA.


Mice Deficient in Pyruvate Dehydrogenase Kinase 4 Are Protected against Acetaminophen-Induced Liver Injury. L. Duan, A. Ramachandran, J. Akakpo, B. Woolbright, and H. J aeschke. University of Kansas Medical Center, Kansas City, KS.

Hepatic Fibrosis Is Induced by Ochratoxin A through Smad Pathway in LX2 Cells and Mice. S. Chae1, M. Pyo1, H. Lee2, J. Bae5, and K. Lee3. 1Korea University, Seoul, Korea, Republic of; and 2Korean National Food Cluster FOODPOLIS, Iksan, Korea, Republic of. Sponsor: J. Lee

Distribution of Acetaminophen Protein Adducts following Repeat Administration of Subtoxic Doses in Fed Mice. N. Nguyen, J. Weemhoff, J. Akakpo, A. Ramachandran, and H. Jaeschke. University of Kansas Medical Center, Kansas City, KS.


Acute Liver Injury Drives Fibrinogen Cross-Linking Independent of Thrombin-Catalyzed Fibrin Polymerization. A. K. Kopiec1, H. Cline-Fedewa2, L. G. Poole3, A. Pant4, M. J. Flick5, and J. P. Luyendyk1. 1Michigan State University, East Lansing, MI; and 2Cincinnati Children's Hospital, Cincinnati, OH.


Exposures to Polychlorinated Biphenyls Altered the Hepatic Proteome. J. Jin1, H. Shi2, J. E. Hardesty3, K. C. Falkner1, M. Merchant1, R. A. Prough1, and M. C. Cave6. 1University of Louisville, Louisville, KY; and 4Northwestern University, Chicago, IL.

Restoration of Cellular Circadian Rhythm by FGF15/19 in Prevention of Non-Alcoholic Fatty Liver Disease. Z. Yang1,2, K. Bendinelli3, B. Kong1, G. Guo1, H. Zarbl1, and M. Fang1. 1Rutgers, The State University of New Jersey, Piscataway, NJ; 2Norman Bethune Medical College, Piscataway, NJ; and 3University of Kansas Medical Center, Kansas City, KS.

The Role of LCN2 in Acetaminophen-Induced Acute Liver Failure. C. J. Okaro, E. D. Reed, C. J. Moses, R. Shashidharamurthy, and V. S. Bhave. Philadelphia College of Osteopathic Medicine School of Pharmacy, Suwanee, GA.

Insulin Action and Steatosis Can Be Evaluated with Bioluminescent Metabolite Detection Assays. M. Bach1, M. Valley2, N. Karassina3, D. Leippe4, J. Vidugiriene5, and J. Calli6. 1Promega Corporation, Madison, WI; and 2Promega, Fitchburg, WI. Sponsor: A. Landreman

Hepatic Coenzyme A Insufficiency Promotes Non-Alcoholic Fatty Liver Disease. K. Flannagan1, D. Matye2, U. Apte3, and T. Li4. 1University of Kansas, Kansas City, KS; and 2University of Kansas Medical Center, Kansas City, KS.

Multiparametric Assay Using HepaRG Cells for Predicting the Degree of Drug-Induced Liver Injury Risk. T. Tomida1, H. Okamura2, T. Yokoi3, and M. Satsukawa2. 1Kaken Pharmaceutical Co., Ltd., Kyoto, Japan; 2Kaken Pharmaceutical Co., Ltd., Fujieda, Japan; and 3Nagoya University Graduate School of Medicine, Nagoya, Japan.

#1243  
**Poster Board Number**

**Sitagliptin Exacerbates Hepatic Inflammation and Necrosis in Rats Fed High Cholesterol Diet.**  
1Southern University and A&M College, Baton Rouge, LA; and 2Pennington Biomedical Research Center, Baton Rouge, LA.

#1244  
**Poster Board Number**

**Methionine Protects against Sitagliptin-Induced Oxidative and Fibrotic Responses in Male Sprague Dawley Rats Fed a High Cholesterol Diet.**  
1Southern University and A&M College, Baton Rouge, LA; and 2Pennington Biomedical Research Center, Baton Rouge, LA.

#1245  
**Poster Board Number**

**Direct Activation of Tissue Factor:Factor Vila Procoagulant Activity by Bile Acids.**  
D. Ivkovich, K. S. Baker, A. K. Kopec, and J. P. Luyendyk.  
Michigan State University, East Lansing, MI.

#1246  
**Poster Board Number**

**Investigating Liver Toxicity with 3D Cultures of Induced Pluripotent Stem Cells and Hepatic Non-Parenchymal Cells.**  
L. T. Wills, and P. Rajagopalan.  
Virginia Tech, Blacksburg, VA. Sponsor: M. Ehrich.

#1247  
**Poster Board Number**

**Persistent Aryl Hydrocarbon Receptor Activation Abolishes Circadian Regulation of Hepatic Metabolic Activity in Mice.**  
Michigan State University, East Lansing, MI.

#1248  
**Poster Board Number**

**Environmental Perfluoroalkyl Substance Exposures Are Associated with Apoptotic Liver Disease and Decreased Serum Cytokines: Implications for Nonalcoholic Fatty Liver Disease.**  
M. C. Cave1, B. Wahlang1, J. Barnett2, S. Wen2, J. R. Bassler2, M. Elliot2, and A. Ducatman2.  
1University of Louisville, Louisville, KY; and 2West Virginia University, Morgantown, WV.

#1249  
**Poster Board Number**

**Apoptosis Contributes to the Cytotoxicity Induced by Amodiaquine and Its Major Metabolite N-Desethylamodiaquine in Hepatic Cells.**  

#1250  
**Poster Board Number**

**Characterization of Human Hepatocytes Isolated from Chimeric Mice with Humanized Livers (PXB-Cells) and Optimization of In Vitro Cytochrome P450 Induction Test Conditions.**  
C. Yamasaki1, A. Yanagi1, Y. Yoshizane1, Y. Ogawa1, Y. Ishida2, S. Ishida2, and C. Tateno3.  
1PhoenixBio Co., Ltd., Higashiihiroshima, Japan; 2Research Center for Hepatology and Gastroenterology, Hiroshima University, Hiroshima, Japan; and 3Division of Pharmacology, National Institute of Health Sciences, Kawasaki, Japan. Sponsor: J. Weaver.

#1251  
**Poster Board Number**

**Diet-Induced Steatohepatitis Alters Liver and Gut Microbiota Catalyzed Green Tea Metabolism in Mice.**  
University of Kentucky, Lexington, KY.

#1252  
**Poster Board Number**

**Hepatocyte-Derived Exosomes May Promote Liver Immune Tolerance.**  
R. Church, N. Holman, M. Mosedale, M. Nautiyal, and P. Watkins.  
University of North Carolina Institute for Drug Safety Sciences, Research Triangle Park, NC.

#1253  
**Poster Board Number**

**Hepatoprotective Effects of Methanolic Extract of Moringa oleifera Leaf against Gasoline-Induced Oxidative Stress in Rats.**  
University of Ilorin, Ilorin, Nigeria.

Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Liver II**

*Chairperson(s):* Udayan Apte, University of Kansas Medical Center, Kansas City, KS; and Asmita Pant, Michigan State University, East Lansing, MI.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 1:30 PM–3:00 PM

**Abstract #**

#1254  
**Poster Board Number**

**Hepatotoxicity Assessment in Hepatic Humanized Mice.**  
Y. Cai1, M. Connerney1, A. D. Knapton1, S. Stewart2, A. Gandhi3, V. Patel4, and K. E. Howard1.  
1US FDA, Silver Spring, MD; and 2Taconic Biosciences, Rensselaer, NY. Sponsor: J. Weaver.

#1255  
**Poster Board Number**

**Metabolomic and Genomic Profiling of Altered Hepatic Function in Transport-Deficient (TR) Rats.**  
Bristol-Myers Squibb, Lawrenceville, NJ.

#1256  
**Poster Board Number**

**Primary Human Hepatocyte 3D Spheroids: An In Vitro Tool for Studying Hepatic Function and Drug Toxicity.**  
S. Lahiri1, J. C. Hoover1, M. P. Connolly1, D. L. Johnson1, M. Kennedy1, D. K. Tieberg1, M. J. Powers1, and R. P. Witek1.  
1Thermo Fisher Scientific, Frederick, MD; and 2Thermo Fisher Scientific, Maddison, WI.

#1257  
**Poster Board Number**

**Mitochondrial Biogenesis Plays a Critical Role in Recovery after an Acetaminophen Overdose.**  
Kansas University Medical Center, Kansas City, KS.
#1258 Poster Board Number.........................................................................................................................P287
Identification of Candidate Risk Factor Genes for Human Idealallosis Toxicity Using a Collaborative Cross Approach. M. Mosedale1, Y. Cai2, J. S. Eaddy3, R. W. Carty4, M. Nautiyal1, J. Therrien1, W. Valdar5, and P. B. Watkins6. 1University of North Carolina Eshelman School of Pharmacy, Research Triangle Park, NC; 2University of North Carolina School of Medicine, Chapel Hill, NC; and 3Gilead Sciences, Inc., Foster City, CA.

#1259 Poster Board Number.........................................................................................................................P288

#1260 Poster Board Number.........................................................................................................................P289
Assessing Drug-Drug Interactions Using the HEPATOPAC Model, a Long-Term In Vitro Liver Platform. O. Irrechukwu1, J. Gaffney1, H. Engi2, A. Doran3, C. Black4, and R. Obachi1. 1BioVIT, Medford, MA; and 2Pfizer, Groton, CT.

#1261 Poster Board Number.........................................................................................................................P290

#1262 Poster Board Number.........................................................................................................................P291
Spheroid-Qualified Primary Human Hepatocytes for In Vitro 3D Liver Modeling. F. Li, S. Parikh, L. Cao, K. Cooper, and R. Zuo. Corning Life Sciences, Bedford, MA.

#1263 Poster Board Number.........................................................................................................................P292

#1264 Poster Board Number.........................................................................................................................P293
A HepaRG-Based In Vitro System for Non-Alcoholic Fatty Liver Disease Modeling. I. Mannae1, S. Verhulst2, A. Smout1, R. Boon1, C. Verfaille1, C. Chesne1, A. Jamin1, L. Grunenve1, and D. Steen1. Vrije Universiteit Brussel, Brussels, Belgium; 2Integrale Stem Cell Institute, Leuven, Belgium; 3Biopredic International, Saint Grégoire, France; and 4Biopredic International, Saint-Grégoire, France.

#1265 Poster Board Number.........................................................................................................................P294
Ahx Signaling in Hepatocytes Is Required for Myofibroblast Activation during TCDD-Induced Liver Fibrosis. S. Rayavara Veerabhadraiah, J. Van Trease, J. Klar, K. Cornell, W. Harvey, and K. Mitchell. Boise State University, Boise, ID.

#1266 Poster Board Number.........................................................................................................................P295

#1267 Poster Board Number.........................................................................................................................P296
Effects of FGF15 on Expression of Genes Involved in Circadian Rhythm and Lipid Metabolism in Mouse Liver. K. Bendinelli1,2, Z. Yang1, B. Kong1, G. L. Guo1, H. Zerbi1, and M. Fang1. 1Dickinson College, Carlisle, PA; 2Rutgers, The State University of New Jersey, Piscataway, NJ; and 3Ernesto Mario School of Pharmacy, Piscataway, NJ.

#1268 Poster Board Number.........................................................................................................................P297
Development of a High-Throughput IPSC-Derived Liver-on-a-Chip for Hepatotoxicity Detection. K. Bircsak1, R. Reddinger1, R. DeBiasio2, M. Miedel3, K. Wilschut1, K. Czyz4, L. Vernetti5, D. L. Taylor6, P. Vuito7, A. Gough8, and A. D. Saleh9. 1Mimetas, Gaithersburg, MD; 2University of Pittsburgh Drug Discovery Institute, Pittsburgh, PA; 3Mimetas, Leiden, Netherlands; and 4Fujifilm Cellular Dynamics Inc., Madison, WI.

#1269 Poster Board Number.........................................................................................................................P298
Ahx Signaling in Hepatocytes Is Required for Maximum Myofibroblast Activation by TCDD. G. N. Cholico1, P. C. Stegelmeier1, J. M. Nelson1, J. VanTrease1, K. Cornell1, and K. A. Mitchell1. Boise State University, Boise, ID; and 2Brigham Young University-Idaho, Rexburg, ID.

#1270 Poster Board Number.........................................................................................................................P299
Does Triclosan Affect High-Fat Diet-Induced Non-Alcoholic Fatty Liver Disease (NAFLD) in Mice? J. P. Fyolek, X. Li, Z. Wang, K. Ilmant, and J. E. Klaunig. Indiana University. Bloomington, IN.

#1271 Poster Board Number.........................................................................................................................P300
The Effect of Kupffer Cells on Hepatobiliary Transporters in Human and Rat Hepatocyte/Kupffer Co-culture Model. J. K. Zolnerciks1, K. Jemnitz2, Z. Veres3, E. Kis4, B. Töth2, and P. Krajecsi2. 1SOLVO Biotechnology, Boston, MA; and 2SOLVO Biotechnology, Budapest, Hungary.

#1272 Poster Board Number.........................................................................................................................P301
Biochemical Mechanisms of Orally Administered Phenobarbital in Minipig Liver. P. Singh1, J. Nielsen2, J. Decorde3, C. Erratico1, C. Parmentier1, M. Untrau1, C. Bansard1, P. Ancian1, M. Fonsi1, L. Richert1, and R. Forster1. 1CiToxLAB, Evreux Cedex, France; 2CiToxLAB, Lille Skensved, Denmark; and 3Ka-ly Cell, Plobsheim, France.

#1273 Poster Board Number.........................................................................................................................P302

#1274 Poster Board Number.........................................................................................................................P303

#1275 Poster Board Number.........................................................................................................................P304
Multidrug Resistance-Associated Protein 4 (MRP4) Plays a Crucial Role in the Pathogenesis of Fatty Liver Disease. M. De La Rosa1, A. C. Donepudi2, J. E. Manautou3, and S. J. Toro3. 1San Joaquin Delta College, Stockton, CA; and 2University of Connecticut, Storrs, CT.
#1276  
**Demonstration of Hepatocyte-Targeted siRNA Transfection and Gene Silencing in the Micro-Patterned Hepatocyte Co-culture System (HEPATOPAC).**  
M. Yang, O. Irechukwu, and J. Gaffney. BioIVT, Medford, MA.

#1277  
**Human Liver-Chip Model for Drug Metabolism and Liver Safety Assessment.**  

#1278  
**Effects of Phenobarbital on Minipig Liver Gene Expression.**  
1CToxLAB, Evreux Cedex, France; 2CToxLAB, Lille Skensved, Denmark; and 3KalLy-Cell, Plobsheim, France.

#1279  
**Lack of Multidrug Resistance–Associated Protein 4 (Mrp4) Does Not Alter Susceptibility towards Acetaminophen Toxicity.**  
A. C. Donepudi, M. J. Goedken, and J. E. Manautou.  
1University of Connecticut, Storrs, CT; and 2Rutgers, The State University of New Jersey, Piscataway, NJ.

#1280  
**3D Spheroids from Nonhuman Primary Hepatocytes as an In Vitro Cell Culture Model.**  
Thermo Fisher Scientiﬁc, Frederick, MD; and Thermo Fisher Scientiﬁc, Madison, WI.

#1281  
**CryoHepatoPearl: Ready-to-Use Cryopreserved 3D Human Liver Model.**  
1ESPCI Paris, PSL Research University, Paris, France; and 2Cyprio, Paris, France. Sponsor: D. Zalko.

#1282  
**Transient Vinyl Chloride Exposure Exacerbates High Fat Diet-Induced Hepatic Injury and Tumor Formation in Mice.**  
University of Pittsburgh, Pittsburgh, PA; and University of Louisville, Louisville, KY.

#1283  
**Using 3D Human Liver Microtissues to Model NASH Progression In Vitro for Drug Discovery and Safety Testing.**  

#1284  
**Role of Mitoferrin2 (Mfrn2) and Mitochondrial Ca2+ Uniporter (MCU) in Hepatotoxicity by Acetaminophen (APAP).**  
Medical University of South Carolina, Charleston, SC; and University of Utah, Salt Lake City, UT.

#1285  
**Lactobacillus rhamnosus GG Prevents Liver Fibrosis through Intestinal FXR-Mediated Inhibition of Bile Acid Synthesis and Increase of Bile Acid Excretion in Mice.**  
W. Feng, Y. Liu, and C. McClain. University of Louisville School of Medicine, Louisville, KY.

#1286  
**Effect of HepG2 and MDCK Cells on the Breakdown of DCPT: A Comparative Study.**  

#1287  
**Transcriptomic Profiling of the Inter-Individual Variability of Chemical-Induced Cellular Stress Response Activation Using a Large Panel of Primary Human Hepatocyte Donors.**  
M. Nienmeijer, S. Huppelschoten, A. Baze, C. Parmentier, R. S. Paules, L. Richert, and B. van de Water.  
Leiden University, Leiden, Netherlands; KalLy-Cell, Plobsheim, France; and NIEHS/NTP, Research Triangle Park, NC.

#1288  
**Improved Phenotypic Relevance of Primary Mouse Hepatocyte Spheroids Supports Development of an In Vitro Collaborative Cross Platform for the Evaluation of Genetic Susceptibility Factors Associated with DILI.**  
M. Nautiyal, S. U. Vorrink, M. Ingelman-Sundberg, and M. Mosedale.  
University of North Carolina Eshelman School of Pharmacy, Research Triangle Park, NC; and Karolinska Institutet, Stockholm, Sweden.

#1289  
**Immunological Effects of Deficiency of Hepatocyte-Speciﬁc Farnesoid X Receptor and Lipopolysaccharide in the Spleen.**  
**Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Neurodegenerative Disease**

**Chairperson(s):** Hendrik J. Greve, Indiana University School of Medicine, Indianapolis, IN; and Jessica H. Hartman, Duke University, Durham, NC.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM**

**Abstract #**

#1290  
**Poster Board Number**

Pharmacological Estrogens and Reduced Risk of Cognitive Deficits in the US Elderly Population.  
M. V. Preciados, A. Deoraj, Q. Felty, V. Narayanan, C. Yoo, and D. Roy. Florida International University, Miami, FL.

#1291  
**Poster Board Number**

S. Sarkar, A. Olsen, and M. Feany. Brigham and Women's Hospital, Harvard Medical School, Boston, MA.

#1292  
**Poster Board Number**

Long-Term Swimming Exercise in Caenorhabditis elegans Improves Mitochondrial Health and Protects Animals from Age- and Toxicant-Induced Degeneration.  
1Duke University, Durham, NC; and 2Rutgers, The State University of New Jersey, Piscataway, NJ.

#1293  
**Poster Board Number**

Indole-3-Carbinol and 3, 3'-Diindolylmethane Attenuate aluminium Chloride-Induced Alzheimer’s Disease in Male Wistar Rat.  

#1294  
**Poster Board Number**

Induction of Autophagy in Mouse Neuroblastoma Cells by Rabies Lyssavirus Infection.  
1Azabu University, Sagamihara, Japan; and 2Institute of National Infectious Diseases, Tokyo, Japan.

#1295  
**Poster Board Number**

Evaluation of Role of Pericytes in Cerebral Amyloid Angiopathy (CAA) Model of Alzheimer’s Disease (AD).  

#1296  
**Poster Board Number**

Decreased NRF1 Activity Contributes to Neurogenesis Deficits in Alzheimer’s Disease (AD).  
K. Bhave, Q. Felty, C. Yoo, A. Deoraj, and D. Roy. Florida International University, Miami, FL.

#1297  
**Poster Board Number**

Astrocyte-Specific Ablation of IKK2 Prevents Neuroinflammatory Injury in a “Two-Hit” Model Using Manganese and MPTP.  
K. Wright, S. Hammond, C. Bantle, and R. Tjalkens. Colorado State University, Fort Collins, CO.

#1298  
**Poster Board Number**

Treatment with the Metabotropic Receptor Agonist, CHPG, Reverses Clinical Signs in Mice with Experimental Allergic Encephalomyelitis (EAE).  

#1299  
**Poster Board Number**

Prevalence and Differential Neuroantibody (NAb) Class Detection in Pesticide-Exposed Horticulturists.  
H. A. El-Fawal. American University in Cairo, New Cairo, Egypt.

#1300  
**Poster Board Number**

Diesel Exhaust Dysregulates Markers of Disease-Associated Microglia.  
1Indiana University School of Medicine, Indianapolis, IN; and 2US EPA, Research Triangle Park, NC.

#1301  
**Poster Board Number**

The Selective Group I Metabotropic Glutamate Receptor Agonist 2-Chloro-5-Hydroxyphenylglycine (CHPG) Enhances BDNF and Reverses Demyelination.  

**Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Neurodegenerative Disease: Parkinson’s Disease**

**Chairperson(s):** Rachel M. Foguth, Purdue University, West Lafayette, IN; and Jie Luo, Iowa State University, Ames, IA.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM**

**Abstract #**

#1302  
**Poster Board Number**

Using the Transgenic Zebrafish Model to Compare Mechanisms of Action of Two Environmental Toxicants with Opposite Correlations to Parkinson’s Disease Development, DEPe and CSE.  
#1303 Poster Board Number: P356
Pharmacological Activation of Prokineticin-2 Signaling Protects against Dopaminergic Neurodegeneration in MPTP and MitoPark Rodent Models of Parkinson's Disease. J. Luo1, S. Sarkar1, M. Neal1, M. Huang1, L. Burns1, D. Borts1, H. Jin1, V. Anantharam1, A. Kanthasamy2, and A. Kanthasamy3. 1Iowa State University, Ames, IA; 2Harvard University, Boston, MA; and 3Florida International University, Miami, FL.

#1304 Poster Board Number: P357
Manganese Exposure Induces the Release of Exosomes Containing Misfolded α-Synuclein by Impairing Endosomal Trafficking and Protein Degradation Machinery. D. Rokad, D. Harischandra, D. Luo, V. Anantharam, A. Kanthasamy, and A. G. Kanthasamy. Iowa State University, Ames, IA.

#1305 Poster Board Number: P358
Development of an Electrochemiluminescence-Based Assay to Characterize Pyroptosis-Related Proteins in Plasma Obtained from Parkinson's Disease Patients. F. L. Anderson1, A. S. Andrew1, K. M. von Herrmann1, F. P. Bispo1, A. L. Young1, S. L. Lee1, and M. C. Havrda1. 1Dartmouth College, Lebanon, NH; and 2Saint Anselm College, Manchester, NH.

#1306 Poster Board Number: P359

#1307 Poster Board Number: P360
Effects of Low-Dose Developmental Dieldrin Exposure on Neuroinflammation and α-Synuclein Aggregation in the Mouse Nigrostriatal Pathway. A. O. Gezer, S. E. VanDeveren, J. Kochmanski, and A. Bernstein. Michigan State University, Grand Rapids, MI.

#1308 Poster Board Number: P361

#1309 Poster Board Number: P362
Function of LncRNA NR_030777 in Affecting Cell Proliferation and Apoptosis by Regulating Zfp326/Cnp5 in Nerve Cell Damage Induced by Parquat. H. Yang1, Q. Lin1, N. Chen1, Z. Luo1, J. Li1, F. Zheng1, Q. Zhang1, S. Wu1, and H. Li1. 1Fujian Medical University, Fuzhou, China; and 2University of Louisville, Louisville, KY.

#1310 Poster Board Number: P363
Neurobehavioral and Neurochemical Effects of Acute to Subchronic PhIP Exposure. R. M. Foguth, and J. R. Cannon. Purdue University, West Lafayette, IN.

#1311 Poster Board Number: P364
Parquat Directly Induces the Microglial Nlrp3 Inflammasome via the Voltage-Gated Proton Channel Hv1. M. Neal1, A. Boyle1, L. Wu1, and J. R. Richardson1. Florida International University, Miami, FL; 2Northeast Ohio Medical University, Rootstown, OH; and 3Mayo Clinic, Rochester, MN.

#1312 Poster Board Number: P365
Establishment of a Medium-Throughput, Adverse Outcome Pathway (AOP)-Informed, In Vitro Test Battery for the Identification of Pesticides Causing Parkinsonian Motor Symptoms. M. Elgamal1, S. Maijasthusmann1, I. Lauria1, M. Leist1, and E. Fritsche1. 1IUF – Leibniz Research Institute for Environmental Medicine, Dusseldorf, Germany; and 2University of Konstanz, Konstanz, Germany.

#1313 Poster Board Number: P366

#1314 Poster Board Number: P367
A Novel Model of Alphavirus-Induced Neurotoxicity for Studying the Interaction between Microbes and Environmental Neurotoxins in Neurodegenerative Diseases. C. M. Bantle1, R. Smyrne1, and R. Tjalkens1. 1Colorado State University, Fort Collins, CO; and 2Thomas Jefferson University, Philadelphia, PA.

#1315 Poster Board Number: P368
The NLRP3 Inflammasome in Parkinson’s Disease. M. Havrda, F. Anderson, E. Martinez, and K. von Herrmann. Geisel School of Medicine at Dartmouth, Lebanon, NH.

Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Neurotoxicity: General**

*Chairperson(s):* Monica R. Langley, Mayo Clinic, Rochester, MN; Kpobari W. Nkpa, University of Port Harcourt, Choba, Port Harcourt, Nigeria; AtLee T. Watson, North Carolina State University, Morrisville, NC; and Sanjeeva Wijeyesakere, Dow Chemical Company, Midland, MI.

*Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM*

**Abstract #**

#1316 Poster Board Number: P371
Assessing Chemotherapeutics Neurotoxicity Using Human Cells Based High-Throughput Neuronal-Schwann Cells Culture System. L. McCoy1, A. D. Sharma1, E. Jacobs1, J. Curley1, and M. J. Moore1. 1AxoSim Inc., New Orleans, LA; and 2Tulane University, New Orleans, LA.
Poster Board Number

Patch Clamp Electrophysiology to Determine the Mechanism of Toxicity of 1,1’-Methylenebis{4-[(hydroxyimino)methyl]pyridinium} (MMB4) in Alpha-1 and Alpha-7 Nicotinic Acetylcholine Receptors. S. Wolfe, P. Bodner, M. Cerasoli, M. Krichton, J. Machamer, and P. McNutt. US Army Medical Research Institute of Chemical Defense, Gunpowder, MD.

Poster Board Number


Poster Board Number

Changes of CaMKII/CREB Signaling in NAc during the Acquisition, Extinction, and Reinstatement Phase of the Nicotine-Induced Conditioned Place Preference in Rats. H. Chen. China National Tobacco Quality Supervision and Test Center, Zhengzhou, China. Sponsor: S. Jia

Poster Board Number


Poster Board Number

Ethanol Increases Manganese-Induced Spatial Learning and Memory Deficits via Oxidative/Nitrosative Stress Induced p53

Dependent/Independent Hippocampal Apoptosis. K. Nkpaa1,2, B. Amadi1, M. Wegu1, and E. Farombo1,2. Federal Ministry of Environment, Port Harcourt, Nigeria; 1University of Port Harcourt, Port Harcourt, Nigeria; and 2University of Ibadan, Ibadan, Nigeria.

Poster Board Number


Poster Board Number


Poster Board Number

Role of Microglial Activation and Neuroinflammation in Neurotoxicity of Acrylamide, an Environmental Soft Electrophile. C. Zong1, R. Hasegawa1, M. Urushitani1, T. Sakurai1, S. Ohsako1, and G. Ichihara2. 1Tokyo University of Science, Noda, Japan; 2Shiga University of Medical Science, Otsu, Japan; and 3University of Tokyo, Tokyo, Japan.

Poster Board Number


Poster Board Number

TSPO Gene Dosage Decreases Nox2 Subunit Gene Expression in Microglia: Implications for Regulation of ROS in the CNS. V. Nunes de Paiva, D. J. Azzam, and T. R. Guilarte. Florida International University, Miami, FL.

Poster Board Number

Effects of New Psychoactive Substances on Neuronal Activity In Vitro Measured Using Microelectrode Arrays (MEAs) in Rat Primary Cortical Cultures following Acute and Prolonged Exposure and Washout. A. Zwarten1,2, L. Hondebrink1, and R. Westerink1. Institute for Risk Assessment Sciences (IRAS), Utrecht, Netherlands; and Independent Hippocampal Apoptosis. 1NIOSH, Morgantown, WV; and 2Boston University School of Public Health, Boston, MA.

Poster Board Number

2,4,6-Tribromophenol Differentially Regulates ABC Transporters In Vivo and Ex Vivo in Rat Brain Microvessels. A. W. Trexler, G. A. Knudsen, R. E. Cannon, and L. S. Birmbaum. NIEHS, Research Triangle Park, NC.

Poster Board Number


Poster Board Number


Poster Board Number

Oral Administration of Citronella for Eight Weeks Does Not Produce Large Changes in Peripheral Nerve Function or Somatosensory Evoked Potentials. G. L. Jung1, K. L. McDaniel1, A. R. Smith1, and D. W. Herr1. 1US EPA, Durham, NC; and 2ORISE, Durham, NC.

Poster Board Number

Propranolol as a Novel Treatment for Gulf War Illness in a Preclinical Mouse Model. L. T. Michalovicz1, K. A. Kelly1, D. B. Miller1, K. Sullivan1, and J. P. O’Callaghan1. 1NIOSH, Morgantown, WV; and 2Boston University School of Public Health, Boston, MA.

Poster Board Number


Poster Board Number

Nanomolar Tetrabromopyrrole Alters Ca2+ Dynamics in Cortical Neuronal Networks by Selective Modification of Ryanodine Receptors and Micromolar Is Neurotoxic Due to SERCA Pump Inhibition. I. N. Pessah1, J. Zheng1, W. Feng1, S. Antmbus1, S. McKinnie1, and B. Moore1. University of California Davis, Davis, CA; and University of California San Diego, San Diego, CA.
#1335   Poster Board Number........................................................................................................................................P390
NIEHS, Research Triangle Park, NC.

#1336   Poster Board Number........................................................................................................................................P391

#1337   Poster Board Number........................................................................................................................................P392

#1338   Poster Board Number........................................................................................................................................P393

#1339   Poster Board Number........................................................................................................................................P394
Proteomic Analysis Links Proteasome Inhibitors Induced Peripheral Neuropathy to Mitochondrial Toxicity in a Human Neuronal Cell Model. A. Jannuzzi, G. Sari, A. Yilmaz, M. Federova, B. Karademir, and B. Alpertunga. 1Istanbul University, Istanbul, Turkey; and 2Universitat Leipzig, Leipzig, Germany.

#1340   Poster Board Number........................................................................................................................................P395
3D Nerve-on-a-Chip Model Effectively Screens Neurotoxic Compounds. H. Nguyen, L. Kramer, K. Pollard, J. Curley, and M. J. Moore. 1AxxoSim Inc., New Orleans, LA; and 2Tulane University, New Orleans, LA.

#1341   Poster Board Number........................................................................................................................................P396
The Metabolomic Profile of Monoaminergic Neuronal Perturbation in Caenorhabditis elegans. V. Kalia, J. Bradner, M. Chen, D. Walker, D. Jones, and G. Miller. 1Columbia University, New York, NY; Emory University, Atlanta, GA; and 2Icahn School of Medicine at Mount Sinai, New York, NY.

#1342   Poster Board Number........................................................................................................................................P397
14-Day Dermal Toxicity Study in B6C3F1/N Mice and HSD:Sprague-Dawley Rats Exposed to Dimethyldimethoxyborane (DMAB). A. Watson, S. Thakur, M. Behl, M. Vantall, K. Eelsaas, B. Sparrow, and D. Germolec. 1NIEHS/NTP, Research Triangle Park, NC; and 2Battelle, Columbus, OH.

#1343   Poster Board Number........................................................................................................................................P398

#1344   Poster Board Number........................................................................................................................................P399
PCB 52 and Metabolites: Toxicity to the Dopaminergic System. B. Cagle, L. Lehmiller, and J. Doorn. University of Iowa, Iowa City, IA.

#1345   Poster Board Number........................................................................................................................................P400
Dietary Strategies Affect Marine Algal Toxin Levels in Subsistence Harvested Alaskan Pinnipeds. A. Hendrix, K. A. Lefebvre, L. Quakenbush, R. Stimmelmayr, A. Bryan, G. Sheffield, P. Kendrick, E. Frame, D. J. Marcinek, and T. Burbacher. 1University of Washington, Seattle, WA; 2NOAA Northwest Fisheries Science Center, Seattle, WA; 3Alaska Department of Fish and Game Arctic Marine Mammal Program, Fairbanks, AK; 4North Slope Borough Department of Wildlife Management, Barrow, AK; 5University of Alaska Fairbanks Alaska Sea Grant Marine Advisory Program, Nome, AK; 6University of Washington Medical School, Seattle, WA; and 7King County Department of Natural Resources and Parks, Seattle, WA.

#1346   Poster Board Number........................................................................................................................................P401
Behavioral and Histological Evidence of a Neuroimmune Basis for Gulf War Illness. K. Kelly, J. Michalolvic, C. Fornal, D. Miller, J. O’Callagham, and S. Lesley. 1CDC-NIOSH, Morgantown, WV; and 2University of Illinois, Peoria, IL.

#1347   Poster Board Number........................................................................................................................................P402
Comparison of Acute Effects of Neurotoxic Compounds on Network Activity in Human and Rodent Neural Cultures. L. Saavedra, K. Wallace, T. Freudenreich, M. Mall, W. R. Mundy, J. Davila, T. C. Sudhof, T. J. Shafer, M. Wernig, and D. Haag. 1Stanford University School of Medicine, Stanford, CA; and 2Los Alamos National Laboratory, Los Alamos, NM.

#1348   Poster Board Number........................................................................................................................................P403

#1349   Poster Board Number........................................................................................................................................P404

#1350   Poster Board Number........................................................................................................................................P405
An Engineered 3D Peripheral Human "Nerve-on-a-Chip": A Novel Assessment for Neurotoxicity In Vitro. A. D. Sharma, L. McCoy, E. Jacobs, H. Nguyen, J. Curley, and M. J. Moore. 1AxxoSim Inc., New Orleans, LA; and 2Tulane University, New Orleans, LA.

#1351   Poster Board Number........................................................................................................................................P406

#1351a  Poster Board Number.........................................................................................................................................P407
Different Human-Induced Pluripotent Stem Cell Models for In Vitro Neurotoxicity Assessment. A. Tikker, F. Wijnolts, R. van Kleef, and R. Westenink. Utrecht University, Utrecht, Netherlands.
Poster Session: Neurotoxicity: Developmental

Chairperson(s): Mamta Behl, NIEHS/NTP, Research Triangle Park, NC; Katharine A. M. Horzmann, Auburn University, Auburn, AL; and Kimberly P. Keil, University of California Davis, Davis, CA.

Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM

Abstract #

#1352
Poster Board Number

iPSC Derived Human 3D Brain Model to Study Developmental Neurotoxicity Adverse Outcome Pathways (DNT AOP).
D. Pamies, C. Nunes, D. Tavel, and M. Zurich Fontanellaz. University of Lausanne, Lausanne, Switzerland.

#1353
Poster Board Number

2,3,7,8 Tetrachlorodibenzo-[p] Dioxin Exposure and Genetic Manipulation of the Aryl Hydrocarbon Receptor Disrupts Forebrain Development and Axonal Targeting.
N. R. Martin1, C. L. Dunham2, R. L. Tanguay2, and J. S. Plavicki1. Brown University, Providence, RI; and 1Oregon State University, Corvallis, OR.

#1354
Poster Board Number

Can Environmentally Relevant Neuroactive Chemicals Specifically Be Detected with the Locomotor Response Test in Zebrafish Embryos?
D. Leuthold, N. Klüver, R. Altenburger, and W. Busch. Helmholtz Centre for Environmental Research-UFZ, Leipzig, Germany.

#1355
Poster Board Number

Evaluating the Developmental Toxicity of Halogenated Pyrroles in Zebrafish.
B. Yaghoobi, I. N. Pessah, and P. J. Lein. University of California Davis, Davis, CA.

#1356
Poster Board Number

Identifying Neurophysiological Signatures of Neurotoxicant Action Using Classification Models.
S. Davila-Monterol1, T. Shaffer1, K. Wallace1, B. Lynch1, and A. Mason1. Michigan State University, East Lansing, MI; and 1US EPA/ORD, Research Triangle Park, NC.

#1357
Poster Board Number

Thyroid Toxicants and Neurodevelopment: Molecular Initiating Event May Be an Important Consideration.

#1358
Poster Board Number

Zebrafish Larvae Require Specific Strains of Bacteria to Allow for Control-Like Neurobehavioral Development.

#1359
Poster Board Number

Cytotoxicity of Quantum Dots on Human Neural Progenitor Cells Are Influenced by Their Surface Chemistry and the Sex Origin of Cells.
D. M. Leme1,2,3, Y. J. Suh, S. Hong, T. Workman, M. Smith, W. C. Griffith, and E. M. Faustman1. 1Federal University of Paraná (UFPR), Curitiba, Brazil; and 2University of Washington, Seattle, WA.

#1360
Poster Board Number

Neurodevelopmental Effects of a Non-Dioxin-Like Polychlorinated Biphenyl (PCB153).

#1361
Poster Board Number

Comparison of Chemical Effects on Acute Neural Network Function in Mature Cultures and Effects on Neural Network Development.
J. Fink, and T. Shaffer. US EPA, Research Triangle Park, NC.

#1362
Poster Board Number

Y. Sene, R. Conaway, I. Rivera, A. Parton, L. Massie, P. J. Schultheis, and C. P. Curran. Northern Kentucky University, Highland Heights, KY.

#1363
Poster Board Number

A Lack of Changes in the Transcriptomic Response in the Hippocampus or Amygdala after Developmental Exposure to Mild Variable Stress.

#1364
Poster Board Number

Early-Life Lead Exposure Increases μ-Opioid Receptor Levels in the Juvenile Rat Brain: Implications for Opioid Addiction.

#1365
Poster Board Number

Altered Sterol Homeostasis during Neurodevelopment, In Vivo and In Vitro, Is a Common Target for Benzalkonium Chloride Disinfectants.

#1366
Poster Board Number

The Role of ATP13A1 in the Developing Brain: Effects on Sensorimotor Gating and Learning and Memory.
I. Rivera, R. Conaway, Y. Sene, A. Parton, P. J. Schultheis, and C. P. Curran. Northern Kentucky University, Highland Heights, KY.

#1367
Poster Board Number

Screening for Developmental Neurotoxicity at the National Toxicology Program: The Future Is Here.
M. Behl, K. Ryan, J. Hsieh, F. Parham, A. J. Shapiro, B. J. Collins, M. S. Sipes, L. S. Birnbaum, J. R. Bucher, P. M. Foster, N. J. Walker, and R. S. Paules. NIEHS, Morrisville, NC; 1Kelly Government Solutions, Research Triangle Park, NC; 2InfiniaML, Durham, NC; and 3Retired, NIEHS, Morrisville, NC.
The Placenta as a Potential Target of Neuroendocrine Disruption: A Comparison of Brominated and Organophosphate Flame Retardants. K. D. Rock1, B. Hormann1, A. L. Phillips2, M. Ruis2, H. M. Stapleton3, and H. B. Patisaul. North Carolina State University, Raleigh, NC; and Duke University, Durham, NC.

Equilin Does Not Affect Thyroid Hormone Signalling in the Developing Xenopus laevis Tadpole Brain. R. Bass, Z. Husain, and C. Thompson. Virginia Tech, Blacksburg, VA.

Perfluorooctane Sulfonate (PFOS) Exacerbes Microglial Responses to Brain Injury in Exposed Zebrafish Embryos. S. E. Martin, and J. Plavicki. Brown University, Providence, RI.

Neuroactive Compounds Alter Neural Network Formation Measured in Microelectrode Arrays with Potencies Lower Than Median Toxcast Potencies. T. Shafer1, J. Brown1, B. Lynch1, S. Davilla-Montero2, K. Paul-Friedman1, and K. Wallace1. US EPA/NHEERL, Research Triangle Park, NC; and Michigan State University, East Lansing, MI.


Integration of Genomic and Metabolomic Data Streams in an In Vitro Neuronal Development Model. C. A. Marable1, S. Hester1, W. M. Henderson1, B. N. Chorley1, K. A. Wallace1, T. M. Freudenrich1, and T. J. Shafer1. US EPA/NHEERL, Research Triangle Park, NC; and US EPA, Athens, GA.

Adolescent Methylmercury: Effects on Sustained Attention and Retention and Interactions with d-Amphetamine. D. Kendricks, and M. C. Newland. Auburn University, Auburn, AL.

Autism Spectrum Disorders (ASD) and Cerebral Palsy (CP) as Neurodevelopmental Disorders in Children in Ibadan, Nigeria: Pb and Se in Focus. A. O. Akinade1, I. O. Omotosho1, I. A. Lagunju1, and M. A. Yakubu1. University of Ibadan, Ibadan, Nigeria; and Texas Southern University, Houston, TX.

Assessment of Neurotoxic Potential of 90 Blinded Compounds Using Zebrafish Embryos. C. Quevedo1, M. Behi1, K. Ryan1, R. S. Paules1, A. Alday1, A. Muriana1, and A. Alzuade1. Biobide, San Sebastian, Spain; and NIHES, Research Triangle Park, NC.

Social Behavioral Effects in Prairie Voles Perinatally Exposed to Firemaster 550. S. A. Gillera1, B. Hormann1, W. Marinello1, R. Grinceviciute1, and H. Patisaul1. North Carolina State University, Raleigh, NC; and University of Texas at El Paso, El Paso, TX.


Behavioral Consequences of Retinoid Disruption during Embryonic Development in the Zebrafish. Z. R. Holloway1, A. B. Hawkey1, C. L. Dean1, A. Akhiesh1, T. Shoval1, S. Kullman1, and E. D. Levin1. Duke University Medical Center, Durham, NC; and North Carolina School of Math and Science, Durham, NC.


Behavioral Impairments of Infant and Adult Mice Exposed to 2,3,7,8-Tetrabromodibenzofuran In Utero and via Lactation. E. Kimura1, N. Uramaru1, G. Suzuki1, and F. Maekawa1. National Institute for Environmental Studies, Ibaraki, Japan; Japan Society for the Promotion of Science, Tokyo, Japan; and Nihon Pharmaceutical University, Saitama, Japan.


Combined Administration of Cypermethrin and Prenatal Stress Alter Maternal and Placental Physiology with Cumulative Impacts on Fetal Growth and Brain Development. B. A. Else1, B. O’Hare1, H. Lehmler1, and H. Stevens1. University of Iowa, Iowa City, IA; and Saint Mary’s University, Winona, MN.
Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall
Poster Session: Neurotoxicity: Metals

Abstract #

#1388
Mechanisms Involved in the Induction of TNF-α Expression by Methylmercury in Mouse Brain. T. Toyama, T. Hoshi, A. Naganuma, and G. Hwang. Tohoku University, Sendai, Japan.

#1389
Activity of SLC30A10 in the Digestive and Nervous Systems Regulates Brain Manganese under Basal and Neurotoxic Conditions Respectively. C. Taylor1, S. Hutchens1, C. Liu1, T. Jursa1, W. Shawl1, M. Aschner2, C. Smith1, and S. Mukhopadhyay1. 1University of Texas at Austin, Austin, TX; 2University of California Santa Cruz, Santa Cruz, CA; and 1Albert Einstein College of Medicine, Bronx, NY.

#1390
SLC30A10 Mutation Involved in Parkinsonism Results in Manganese Accumulation within N ano-Vesicles of the Golgi Apparatus Revealed by Synchrotron X-Ray Fluorescence Imaging. A. Cammona1,2, C. Zogzas3, S. Roudau3,4, F. Porcaro3,5, J. Garrevoet3, K. Spiers5, M. Salomé5, P. Cloetens5, S. Mukhopadhyay1, and R. Ortega5,5. 1CRNS, Gradignan, France; 2University of Bordeaux, Gradignan, France; 3University of Texas, Austin, TX; 4Deutsches Elektronen Synchrotron, Hamburg, Germany; and 5European Synchrotron Radiation Facility, Grenoble, France.

#1391
LRRK2 Kinase Activity Is Involved in Manganese-Induced Oxidative Stress, Inflammation, and Apoptosis in Microglia. E. Pajarillo, J. Kim, A. Rizor, J. Johnson, M. Aschner, and E. Lee. Florida A&M University, Tallahassee, FL.

#1392
Urinary Cadmium and Cognitive Function. F. Scinisciariello. ATSDDR, Atlanta, GA. Sponsor: M. Muntaz

#1393

#1394

#1395
Refining In Vitro Models in Neurotoxicology: Comparing Biological Responses in a Neuronal Cell-Type after Manganese Nanoparticle Exposure. S. H. Pradhan, H. Lujan, and C. M. Saszewski. Baylor University, Waco, TX.

#1396

#1397
Cadmium Alters Heat Shock Protein Pathways in SNS6 Cholinergic Neurons, Leading to Aβ and Phosphorylated Tau Protein Generation and Cell Death. P. Moyano Cires1, J. Garcia1, M. Lobo1, M. Anadon1, E. Sola1, A. Pelayo1, J. Garcia1, M. Frego1, and J. Del Pino1. 1University Complutense De Madrid, Paracuellos De Jarama, Spain; and 4University Alfonso X, Madrid, Spain.

#1398
Identification of Accessible Cysteine Residues in Neuronal-Derived Sepiapterin Reductase as Targets of Methyl Mercury. S. Yang1, Y. Jan1, V. Mishra1, D. Heck1, J. Richardson1, and J. Laskin1. Rutgers University School of Public Health, Piscataway, NJ. 2Ernest Mario School of Pharmacy, Piscataway, NJ; 3New York Medical College, Valhalla, NY; and 4Florida International University, Miami, FL.

#1399

#1400
Methylmercury In Vivo Preferentially Stimulates Spontaneous GABAergic Synaptic Transmission in Brainstem Hypoglossal Motorneurons (MNs) of Mouse. Y. Yuan, J. M. Bailey, J. B. Spitsbergen, and W. D. Atchison. Michigan State University, East Lansing, MI.
Role of Internal Calcium Pools during Acute Methylmercury-Mediated Increase in Internal Calcium Concentration in C57BL6J Mouse Spinal Cord Slices. N. Rivera, M. Rios-Cabanillas, and W. Atchison. Michigan State University, East Lansing, MI.

Early Postnatal Manganese Exposure Causes Lasting Changes in Prefrontal Cortex Catecholaminergic Systems Accompanied by Aroused Dysregulation and Heightened Behavioral Reactivity. T. Conley1, S. Beaudrin1, S. Lasley2, C. Fornal2, B. Strupp1, W. Uribe3, T. Kahn1, and D. Smith1. 1University of California Santa Cruz, Santa Cruz, CA; 2University of Illinois College of Medicine, Peoria, IL; and 3Cornell University, Ithaca, NY.

Autophagy: An Early Pathogenic Target of Manganese but a Therapeutic Target of Drp1 Inhibition. C. Sportelli1, R. Z. Fan2, M. P. Helley3, T. R. Guillarte1, and K. Tier1. Florida International University and Plymouth University (UK), Miami, FL; and 3Florida International University, Miami, FL.

Pb-Induced Neurotoxicity of the Brain Barrier System: New Implications. H. Gu1, P. Territo1, S. Persohn1, A. Bedwell1, Z. Chen1, W. Zheng1, and Y. Du1. 1Indiana University School of Medicine, Indianapolis, IN; and 2Purdue University, West Lafayette, IN.

Lead(Pb) Exposure Stimulates RAGE Relocation and Expression in Chroid Plexus: Implication in Amyloid Aggregation in Brain. X. Shen1, L. Xia1, W. Jiang1, Y. Du1, and W. Zheng1. 1Purdue University, West Lafayette, IN; and 2Indiana University, Indianapolis, IN.

Whole-Brain Approaches for Investigating Iron Accumulation R2* Show No Excess from Occupational Exposure to Welding Fumes. J. L. Davis, D. A. Edmondson, and U. Dydak. Purdue University, West Lafayette, IN.

LRP-1 Expressions and Distribution across BBB and BCB Following Subchronic Lead Exposure. L. Xia, X. Shen, and W. Zheng. Purdue University, West Lafayette, IN.

Transcription Factor REST/NR5F Is a Positive Regulator of Tyrosine Hydroxylase and Protects Dopaminergic Neurons against Manganese-Induced Neurotoxicity. E. Pajarillo1, J. Kim1, A. Rizor1, J. Johnson1, M. Aschner1, and E. Lee1. 1Florida A&M University, Tallahassee, FL; and 2Albert Einstein School of Medicine, New York, NY.

Manganese Exposure Induces Misregulation of Tyrosine Hydroxylase and Dopamine Receptor D2 Protein Expression in Differentiated SH-SY5Y Cells: Implications for an Epigenetic Mechanism of Mn Neurotoxicity. N. Santiago, A. Rios, S. Howard, D. McDonald, and D. Smith. University of California Santa Cruz, Santa Cruz, CA.

Role of Akt/AMPKa-Regulated Autophagy Pathway in Arsenic-Induced Neurotoxic Injuries. J. Lin1, Y. Chiu1, K. Lee2, C. Su1, C. Lin1, C. Wu1, S. Liu1, C. Huang1, and Y. Chen1. 1China Medical University, Taichung, Taiwan; 2Buddhist Tzu Chi Medical Foundation, Taichung, Taiwan; 3Changhua Christian Hospital, Changhua, Taiwan; 4Department of Public Health, Taipei, Taiwan; and 5National Taiwan University, Taipei, Taiwan.

Lead (Pb) Exposure Induces Dopaminergic Neurotoxicity in Caenorhabditis elegans. A. Akinyemi1, and M. Aschner. Albert Einstein College of Medicine, Bronx, NY.

Role of Internal Calcium Pools during Acute Methylmercury-Induced Cell Death in the C57BL6J Mouse. A. Aldaz2, and W. Atchison2. 1St. Mary’s University, San Antonio, TX; and 2Michigan State University, East Lansing, MI.

Poster Session: Neurotoxicity: Pesticides

Chairpersons: Aseel Eid, Florida International University, Miami, FL; Harm J. Heusinkveld, Institute for Risk Assessment Sciences, Utrecht, Netherlands; Shuaizhang Li, NIH/NCATS, Rockville, MD; and Matthew L. Neal, Florida International University, Miami, FL.

Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM

Abstract #

#1415
Poster Board Number


#1416
Poster Board Number

Taurine Improved Motor Coordination in Wistar Rats Co-administered with Chlordiazepoxide and Lead Acetate. M. Akande1, S. Ambali2, J. Ayo3, C. Orijo4, and R. Edhe5. 1University of Abuja, Abuja, Nigeria; 2University of Ilorin, Ilorin, Nigeria; and 3Ahmadu Bello University, Zaria, Nigeria.

#1417
Poster Board Number

Toxicologic Evaluation of SABA-10 (X-7590-15). M. Bauter1, O. Mendes1, W. Droege2, and T. Osimintz2. Eurofins Product Safety Labs, Dayton, NY; and 2Science Strategies, LLC, Charlottesville, VA.

#1418
Poster Board Number

Differential Effects of Organophosphate Insecticides and Their Metabolites on Neuronal Network Development and Function Assessed in Primary Rat Cortical Cultures Using Microelectrode Array (MEA) Recordings. H. Heusinkveld1, and R. Westerink1. Institute for Risk Assessment Sciences, Utrecht, Netherlands; and 2National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands.

#1419
Poster Board Number

Molecular Mechanisms for the Antidepressant Effects of Ketamine in a Rat Model of Gulf War Illness. J. Zhu1, M. Kronfol2, M. Abuhelil3, N. Rashid3, J. Harris3, E. Hawkins4, R. Blair4, J. McClay5, K. Phillips5; and L. S. Desthende1. Virginia Commonwealth University, Richmond, VA; and Virginia Tech, Blacksburg, VA.

#1420
Poster Board Number


#1421
Poster Board Number

Butyrylcholinesterase Inhibition and Its Effects on Ghrelin-Induced Food Intake. K. Hester1, K. Maclay1, J. Liu1, and C. Pope1. Oklahoma State University, Stillwater, OK; and 2Charles River Laboratories, Reno, NV.

#1422
Poster Board Number

Chronic Low-Dose Diazinon Exposure of Rats during Gestation Causes Long-Term Neurobehavioral Effects Lasting into Adulthood. E. D. Levin, E. Pippen, H. White, J. Kim, B. Kenou, A. Hawkey, and Z. Holloway. Duke University Medical Center, Durham, NC.

#1423
Poster Board Number


#1424
Poster Board Number

Adult Exposure to the Pesticide Chlorpyrifos Causes Short-Term Behavioral Effects in the Zebrafish. A. B. Hawkey, C. Dean, B. Bajaj, J. Zhang, and E. D. Levin. Duke University, Durham, NC.

#1425
Poster Board Number

Inhibition of ER Stress Attenuates Deltamethrin-Induced Hippocampal Neuroinflammation in Mice. M. Hom1, M. Nair1, P. Khooblall1, P. Alamir1, A. Belkadi2, J. R. Richardson3, and M. M. Hossein1,2,1. 1Northeast Ohio Medical University, Rootstown, OH; and 2Florida International University, Miami, FL.

#1426
Poster Board Number

DDT Increases Neuroinflammation and Microglial Activation: Role of Microglial Sodium Channels. A. Eid, I. Mhatre, and J. R. Richardson. Florida International University, Miami, FL.

#1427
Poster Board Number

Characterization of Organophosphorous Pesticides on Acetylcholinesterase Inhibition Using In Vitro Assays with Xenobiotic Metabolic Capability. S. Li1, J. Zhao2, R. Huang2, M. F. Santillo2, K. A. Houch1, and M. Xia2. 1NIH/NCATS, Bethesda, MD; 2NIH, Bethesda, MD; 1US FDA, Laurel, MD; and 2US EPA/NCCT, Research Triangle Park, NC.

#1428
Poster Board Number

Parkinson’s Disease-Relevant Gene Mutations Render C. elegans More Vulnerable to Mancozeb Fungicide Exposure and Mitochondrial Hyperpolarization. A. Ignacz1, N. Eisell1, K. Rivenbark2, and V. A. Fetsanakis3. King University, Bristol, TN; and 3Northeast Ohio Medical University, Rootstown, OH.

#1429
Poster Board Number

Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Safety Assessment Pharmaceutical: Drug Discovery**

**Chairperson(s):** Abdel-Illah El Amrani, Citoxlab, Evreux, France; Norman Kim, Immunovant, Inc., Cambridge, MA; and April O’Connell, Gilead Sciences, Inc., Foster City, CA.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM**

### Abstract #

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<tr>
<td><strong>Poster Board Number</strong></td>
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<tr>
<td><strong>Dithiocarbamate Fungicide Mancozeb Disrupts the Pituitary-Thyroid Axis and Cell Proliferation in Rat Hippocampus.</strong> A. Akhtar, and L. Trombetta. St. John’s University, Bellerose, NY.</td>
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<tr>
<td><strong>A Novel 68-Gene Biomarker Signature to Identify Respiratory Irritation/Toxicity Induced by Inhaled Compounds Using Machine-Learning Assisted Classifications Based on Transcriptomic Data from Calu-3 Cells.</strong> A. Aro, J. Van Den Bulcke, C. Ethien, B. Clijsters, M. Akhtar, and A. O’Connell. Suven Life Sciences, Inc., Foster City, CA.</td>
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<tr>
<td><strong>Simultaneous Measurement of Contraction, Voltage and Calcium in hiPSC-CMs for the Detection of Inotropic Effects Under Blinded Conditions.</strong> T. de Korte1, B. van Meer1, A. Kröning1, L. Tertoolen1, P. J. Clements1, A. Bahinski1, E. Rossmann1, X. Xu2, S. Turner1, C. Denning2, A. Reijerkerk3, S. Braam1, and C. Mummery1. 1Ncardia, Leiden, Netherlands; 2Leiden University Medical Center, Leiden, Netherlands; 3Pivot Park Screening Centre, Esslingen, Germany.</td>
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<td><strong>Poster Board Number</strong></td>
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<tr>
<td><strong>High-Throughput Assessment of Cardiotoxicity Using Bioreactor Produced hiPSC-Derived Cardiomyocytes.</strong> F. Famili1, A. Reijerkerk2, G. Luerman3, T. Lam1, P. van Loenen1, M. Brax1, S. Honarejad2, Y. Jiang, J. Rutjes1, S. Braam1, and A. Reijerkerk1. 1Ncardia, Leiden, Netherlands; 2Leiden University Medical Center, Leiden, Netherlands; 3Pivot Park Screening Centre, Esslingen, Germany.</td>
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<tr>
<td><strong>Controlled Conditions Reduce Critical Edge Effect in 96-Well Plates.</strong> A. M. Frank1, S. Henn1, A. Henn1, K. Alm1, S. Darou1, and R. Yerdin1. 1BioSpherix, Parish, NY; and 2Phase Holographic Imaging, Inc., Lund, Sweden.</td>
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<td><strong>Poster Board Number</strong></td>
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<tr>
<td><strong>Histopathological Changes in Canine Liver and Gall Bladder Induced by Liposomal Formulations.</strong> K. Makita-Suzuki1, C. Kakinuma2, Y. Sakata1, T. Yamakawa1, A. Inomata1, and T. Harai. 1FUJIFILM Corporation, Kanagawa, Japan; and 2FUJIFILM Corporation, Kanagawa, Japan.</td>
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<td><strong>Poster Board Number</strong></td>
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<tr>
<td><strong>Small Molecule Inhibitor of BRG1/SMARC4-BRM/SMARC2 ATPase (SWI/SNF Chromatin-Remodeling Complex)-Induced Gastrointestinal Toxicity with Possible Progenitor Cell Modulations in Athymic Mice.</strong> F. Huet1, R. Kikkawa2, C. Bhang3, A. Li1, D. Lapardula1, V. Dubost1, T. Terranova1, J. Papillon1, and Z. Jagani1. 1Novartis, Cambridge, MA; 2Novartis, East Hanover, NJ; and 3Novartis, Basel, Switzerland.</td>
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</tbody>
</table>
Program Schedule—Monday | 79

**Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Stem Cell Biology and Toxicology**

*Chairperson(s):* Gaurav Kaushik, University of Wisconsin-Madison, Madison, WI; and Qing Liu, Stanford University, Sunnyvale, CA.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 10:45 AM–12:15 PM

**Abstract #**

**Poster Board Number**

**1442** Cardiotoxicity Assessment of Tridocan in Human Stem Cell-Derived Cardiomyocytes. G. Du, W. Hu, C. Lu, Y. Xia, and X. Wang. Nanjing Medical University, Nanjing, China.

**Poster Board Number**

**1443** Possible Window of Susceptibility-Dependent Effects of Tretinoin on Human Cardiomyocyte Differentiation. E. J. Tokar, and X. Wu. NEHIS/NTP, Durham, NC.

**Poster Board Number**

**1444** Comparative Analysis of Human iPSC-Derived Cardiomyocytes in Diversity and Disease Modeling. D. Majewski, J. Liu, S. Lor, T. Feaster, S. Hilcove, and E. Jones. FUJIFILM Cellular Dynamics, Madison, WI. Sponsor: K. Kolar

**Poster Board Number**

**1445** Mechanisms of Cadmium and Arsenic-Induced Aberrant Differentiation of Human Embryonic Stem Cells to Cardiomyocytes during Heart Development. X. Wu, A. Lu, G. Hu, and E. Tokar. NEHIS/NTP, Durham, NC.

**Poster Board Number**

**1446** Gene-Environment Interaction of DDT/DDE and APOE on the Amyloid Pathway in Induced Human Neurons. A. D. Morris¹, A. Eid¹, J. R. Richardson¹, and R. P. Hart¹. Rutgers, The State University of New Jersey, Piscataway, NJ; and “Florida International University, Miami, FL.

**Poster Board Number**

**1447** High-Throughput Toxicity Screening of iPSC-Derived Neurons on Synthetic Hydrogels. J. Evans, G. Kaushik, E. Torr, V. Harms, W. T. Daly, and W. L. Murphy. University of Wisconsin-Madison, Madison, WI.

**Poster Board Number**


**Poster Board Number**


**Poster Board Number**


**Poster Board Number**

**1451** Comprehensive Analysis for the Mechanism of Busulfan-Induced Hematotoxicity in Mice. K. Goto¹, Y. Nakajima-Takagi², M. Oshima², K. Mori¹, and A. Iwama¹. Daichi Sankyo Co., Ltd, Tokyo, Japan; and “University of Tokyo, Tokyo, Japan.

**Poster Board Number**

**1452** In Vitro Human Perineural Vascular Plexus Model for Predicting Developmental Toxicity in a Microfluidics Plate. G. Kaushik¹, E. Torr¹, V. Harms¹, J. Evans¹, H. J. Johnson¹, C. Sore³, J. Antosiewicz-Bourget³, D. Mamott³, B. Johnson³, D. J. Beebe³, J. A. Thomson³, W. T. Daly³, and W. L. Murphy³. University of Wisconsin-Madison, Madison, WI; and “Morgridge Institute of Research, Madison, WI.

**Poster Board Number**

**1453** A Stem Cell-Derived Endothelial Model Used to Identify Cytokine Responses to Tobacco Smoke. D. Gerhold¹, D. Kuo², P. Chu², G. Chen², J. Braisted¹, R. Huang¹, Y. Wang¹, A. Simeonov¹, and M. Boehm². "NIH/NCATS, Rockville, MD; and “NIH/NHLBI, Bethesda, MD.

**Poster Board Number**

**1454** The Plasticity of the Human Gastric Cell Line SNU-1 and Response to Treatment with Benzo[a]pyrene. M. Hawai, and N. J. Gooderham. Imperial College London, London, United Kingdom.

**Poster Board Number**


**Poster Board Number**

**1456** Development of an Automated Platform for Predicting the Teratogenic Potential of Drugs Using Human-Induced Pluripotent Stem Cells. C. Terrenoire¹, B. McCarthy¹, D. Paull¹, L. Bauer¹, R. Otto¹, J. Goldberg¹, M. Jaklin¹, N. Schaefer¹, S. Kustermann¹, S. Noggle¹, and C. McGinnis¹. "The New York Stem Cell Foundation Research Institute, New York, NY; and “Roche Innovation Center Basel, F. Hoffmann-La Roche Ltd, Basel, Switzerland.
Poster Session: Biomarkers of Disease and Exposure

**Chairperson(s):** Suzanne N. Martos, NIEHS, Research Triangle Park, NC; and Mitchell McGill, University of Arkansas for Medical Sciences, Little Rock, AR.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 10:45 AM–12:15 PM

**Abstract #**

#1457

**Poster Board Number**


#1458

**Poster Board Number**

Circulating miRNAs as Potential Biomarkers of Arsenic Exposure. R. Beck1, P. Bommarito1, C. Douillet1, M. Kanke1, L. Del Razo1, G. Garcia-Vargas1, R. Fry1, P. Sethupathy2, and M. Styblo1. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; 2Cornell University, Ithaca, NY; 3Center of Investigation and of Advanced Studies of the National Polytechnic Institute, Mexico City, Mexico; and 4Juarez University of Durango State, Durango, Mexico.

#1459

**Poster Board Number**

Development of Circulating Exosome-Based Biomarkers for Manganese Neurotoxicity in Human Serum and Plasma Using RT-QuIC Assay and Exosomal RNA-sequencing Analysis. S. Manne1, N. Kondru1, H. Jin1, E. Lee1, M. Lewis1, V. Anantharam1, X. Huang1, A. Kanthasamy1, and A. Kanthasamy1. 1Iowa State University, Ames, IA; and 2Pennsylvania State University-Milton S. Hershey Medical Center, Hershey, PA.

#1460

**Poster Board Number**

Linkage between Elevation of Biomarkers of Harm and Metals in the Urine of Electronic Cigarette Users. S. Sakamaki-Ching. University of California Riverside, Riverside, CA.

#1461

**Poster Board Number**

A Whole Blood Gene Expression-Based Diagnostic Test Prototype for Determining Smoking Status. C. Poussin1, F. Martin1, J. Binder1, M. C. Peitsch1, J. Hoeng1, M. Abedi1, F. Flores1, B. Terbrueggen1, and N. V. Ivanov1. 1Philip Morris International, Neuchâtel, Switzerland; and 2OxTerity Diagnostics Inc, Rancho Dominguez, CA.

#1462

**Poster Board Number**


#1463

**Poster Board Number**

Proteomic and Metabolomic Profiling Identify Plasma Biomarkers for Exposure to Ultra-Low Levels of Carfentanil. E. Dhunmukapt1, G. Rizzo1, M. Fease1, P. Mach1, B. Tran1, D. Carmany1, P. Demond1, E. McBride1, M. Maughran1, J. Sekowski1, and T. Glaros1. 1RDECOM—Chemical and Biological Center, Aberdeen Proving Grounds, MD; and 2Excet Inc., Springfield, VA.

#1464

**Poster Board Number**

Glycosylated High Mobility Group Box 1 (HMGB1) as a Potential Plasma Mesothelioma Biomarker. R. Sanku1, L. Weng1, A. Vachani1, C. Mesaros1, and I. Blair1. 1University of Pennsylvania, Philadelphia, PA; and 2Perelman School of Medicine, Philadelphia, PA.

#1465

**Poster Board Number**


#1466

**Poster Board Number**


#1467

**Poster Board Number**

Nephrotoxic Biomarkers in Gentamicin-Induced Acute Kidney Injury for Hazard Identification. S. Lee1, S. Hwang1, N. Tham1, J. Bang1, H. Yi1, B. Jeon1, H. Lee1, G. Woo1, H. Kang1, Y. Kim1, and H. Ku1. 1Toxicological Evaluation Laboratory, Animal and Plant Quarantine Agency, Gimcheon, Korea, Republic of; 2Semyung University, Jecheon, Korea, Republic of; and 3Animal Pathodiagnostic Laboratory, Animal and Plant Quarantine Agency, Gimcheon, Korea, Republic of. Sponsor: Y. Chung

#1468

**Poster Board Number**


#1469

**Poster Board Number**

miRNA Profile Assessment of Urine Exosomes from Boric Acid Treated Rats as Potential Biomarkers for Testicular Toxicity. R. W. Ball1, B. R. Gould1, and J. Wise1. 1REACH Borates Consortium, Brussels, Belgium; and 1QIAGEN Inc, Germantown, MD.

#1470

**Poster Board Number**

Transient Alanine Aminotransferase Increases following Acetaminophen Treatment in Rats. W. B. Mattes1, A. Regev1, R. J. Church1, P. B. Watkins1, M. Avigan1, D. L. Mendrick1, J. J. Greenhaw1, and Q. Shi1. 1US FDA/NCTR, Jefferson, AR; 2Eli Lilly and Company, Indianapolis, IN; 3Institute for Drug Safety Sciences, Research Triangle Park, NC; and 4US FDA/CDER, Silver Spring, MD.
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<th>Title</th>
<th>Presenters</th>
<th>Institution/Location</th>
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<tr>
<td>#1471</td>
<td>Application of Magnetic Carbon Nanotubes Facilitated Dispersive Micro Solid Phase Extraction of the Cyanide Metabolite (2-Aminothiazoline-4-Carboxylic Acid) in Biological Samples.</td>
<td>S. Li, I. Petrikovics, and J. Yu. Sam Houston State University, Huntsville, TX.</td>
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<tr>
<td>#1472</td>
<td>Temporal microRNA Analysis in Multiple Brain Regions following Soman Exposure in Rats.</td>
<td>A. Gautam, R. Kumar, L. Naider, D. Getn, G. Dimitrov, B. Sowe, X. Feng, F. Rossetti, J. Meyerhoff, M. Pham, R. Hammami, L. Lumley, and M. Jett.</td>
<td>US Army Center for Environmental Health Research, Frederick, MD; Frederick National Lab for Cancer Research, Frederick, MD; ORISE, Frederick, MD; Geneva Foundation, Frederick, MD; Clinical Research Management, Silver Spring, MD; and US Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD. Sponsor: M. Madejczyk</td>
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<tr>
<td>#1473</td>
<td>Organophosphate Exposure of Aircraft Maintainers.</td>
<td>M. V. Brahmajothi, T. Sterner, O. Sponsor: I.</td>
<td>Do</td>
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<td>#1475</td>
<td>Increased Autoantibodies to Gial Fibrillary Acidic Protein (GFAP) in Plasma of Veterans with Gulf War Illness (GWI).</td>
<td>M. B. Abou-Donia, M. V. Brahmojath, and K. Sullivan.</td>
<td>Duke University Medical Center, Durham, NC; and Boston University School of Public Health, Boston, MA.</td>
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<tr>
<td>#1476</td>
<td>PAH Exposure among Slaughterhouse and Slaughter Slab Workers Who Utilize Scrap Automobile Tires to Singe Meat in Ghana.</td>
<td>A. Brown, N. M. Johnson, A. V. Cleve, L. Uwak, and E. Afriyie-Gyawu.</td>
<td>Georgia Southern University, Statesboro, GA; and Texas A&amp;M University, College Station, TX.</td>
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<td>#1478</td>
<td>Use of Neopterin as a Biomarker of Immune Activation in Preclinical Species.</td>
<td>A. Zurita, and J. D. Smith. Boehringer Ingelheim, Ridgefield, CT.</td>
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<td>#1480</td>
<td>The Impact of Different Assay Platforms on the Performance of Three Inflammation Biomarker Assays for Rat Serum.</td>
<td>D. Hamlin, and A. Schultz. Eli Lilly and Company, Indianapolis, IN.</td>
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<td>#1481</td>
<td>Development of a Novel CD133-Targeted Antibody for More Selective Monitoring and Treatment of Aggressive Variant Prostate Cancer.</td>
<td>P. Glumac, and A. LeBeau. University of Minnesota, Minneapolis, MN.</td>
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<td>#1483</td>
<td>Optical Densities as Measures to Assess In Vitro Therapeutic Equivalences, Antimicrobial Susceptibilities, Resistances, Toxicities against Escherichia coli CFT073.</td>
<td>N. Garimella. US FDA, Silver Spring, MD.</td>
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<td>#1484</td>
<td>Comparison of Lactate Concentration with Different Anticoagulants.</td>
<td>H. Pei, L. Fan, and M. Chen. WuXi AppTec (Suzhou) Co., Ltd., Suzhou, China.</td>
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Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Reproductive Toxicology I

Chairperson(s): Catheryne Chiang, University of Illinois at Urbana-Champaign, Urbana, IL; Kembra L. Howdeshell, NIEHS, Research Triangle Park, NC; and Ulrike Luderer, University of California Irvine, Irvine, CA.

Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM

Abstract #

#1485
Poster Board Number

The Effect of Phthalates on the Population of Primordial Germ Cells of Xenopus laevis before and after Gastrulation. N. Monplaisir,1 A. Turgeon,1 J. Flaws, and J. Yang1. Tuskegee University, Tuskegee Inst, AL; and 2University of Illinois at Urbana-Champaign, Urbana-Champaign, IL.

#1486
Poster Board Number

Iodoacetic Acid Inhibits Follicle Growth and Alters Expression of Genes That Regulate Apoptosis and the Cell Cycle in Mouse Ovarian Follicles. A. V. Gonsioroski, D. D. Meling, L. Gao, M. Plewa, and J. A. Flaws1. University of Illinois at Urbana-Champaign, Urbana, IL; and 2Safe Global Water Institute, Urbana, IL.

#1487
Poster Board Number


#1488
Poster Board Number

An Environmentally Relevant Phthalate Mixture Inhibits Cyclic AMP/Protein Kinase A Signaling to Disrupt Ovulatory Progesterone Action in Primary Human Granulosa Cells. P. R. Hannon,1 J. W. Akin2, and T. E. Curry3. University of Kentucky, Lexington, KY; and 4Bluegrass Fertility Center, Lexington, KY. Sponsor: J. Flaws

#1489
Poster Board Number


#1490
Poster Board Number

The Effects of Environmentally Relevant Phthalates on Early Embryo Development. K. A. Richardson, and R. Nowak. University of Illinois at Urbana-Champaign, Urbana, IL. Sponsor: J. Flaws

#1491
Poster Board Number

Acute Exposure to Di(2-Ethylhexyl) Phthalate and Dibutyl Phthalate during Adulthood Disrupts Hormone Levels and Has Long-Lasting Impacts on Female Fertility in Mice. C. Chiang, L. Lewis, S. Rattan, E. Brehm, L. Gao, D. Meling, and J. Flaws. University of Illinois at Urbana-Champaign, Urbana, IL.

#1492
Poster Board Number

Differential Transmission of EDC-Induced Male Reproductive Traits via Maternal vs. Paternal Lineages. R. Barakat,1 2 P. P. Lin,1 J. A. Flaws,1 and C. J. Ko1. University of Illinois at Urbana-Champaign, Urbana, IL; and 3Benha University, Benha, Egypt.

#1493
Poster Board Number

The Effect of Prenatal Exposure to an Environmentally Relevant Phthalate Mixture on Testosterone Levels in Adult Male Mice. T. Seymore1, R. Barakat2, and C. Ko1. Pennsylvania State University, University Park, PA; and 2University of Illinois, Urbana-Champaign, IL.

#1494
Poster Board Number

Prenatal Exposure to a Phthalate Mixture Alters Sex Steroid, Peptide, and Gonadotropin Hormones in the F1, F2, and F3 Generations of Female Mice. E. Brehm, C. Zhou, L. Gao, and J. Flaws. University of Illinois at Urbana-Champaign, Urbana, IL.

#1495
Poster Board Number


#1496
Poster Board Number

Prenatal Exposure to a Phthalate Mixture Changes Uterine Morphology and Differentiation in Mice in Multiple Generations. K. Li, M. Liszka, C. Zhou, J. A. Flaws, and R. A. Nowak. University of Illinois at Urbana-Champaign, Urbana, IL.

#1497
Poster Board Number

Effects of In Vitro Exposure to Di-n-butyl Phthalate and Mono-n-butyl Phthalate on Early Embryo Viability and Development. L. Rasmussen, E. J. Jauregui, and Z. R. Craig. University of Arizona, Tucson, AZ.

#1498
Poster Board Number

Measurements of Mono-n-butyl Phthalate in the Tissues of Cycling Adult CD-1 Female Mice after the Oral Administration of Di-n-butyl Phthalate. E. J. Jauregui, L. Rasmussen, and Z. R. Craig. University of Arizona, Tucson, AZ.

#1499
Poster Board Number

Examining the Impact of DEHP Exposure via Food on Reproductive Function in Adult Men. S. E. Brown1, M. R. Monroe2, and D. A. Drechsler. 1CardnoChemrisk, Boulder, CO; and 2University of Colorado Denver, Colorado School of Public Health, Aurora, CO.

Experimental Rat Cryptorchidism and Susceptibility to Dibutyl Phthalate or Acrylamide. N. Souza1, A. Cardoso2, L. Gomide1, G. Briañezzi1, T. Lima1, H. Miot1, A. Martino-Andrade1, L. Arnold1, K. Pennington1, S. Cohen1, J. de Camargo1, and M. Nascimento e Pontes1. 1São Paulo State University - UNESP, Botucatu, Brazil; 2University of Louisville, Louisville, KY; 3Faculty Southwest Paulista - FSP, Avaré, Brazil; 4Federal University of Paraná - UFPR, Curitiba, Brazil; and 5University of Nebraska Medical Center, Omaha, NE.

Interaction between Mono-(2-Ethylhexyl) Phthalate and All-Trans Retinoic Acid Alters Development of Ex Vivo Cultured Fetal Mouse Testis. D. J. Spade, and S. J. Hall. Brown University, Providence, RI.


Reproductive Toxicity and Oxidative Damage Induced by Titanium Dioxide, Zinc Oxide Nanoparticles, and Their Mixture in Mice. O. Fadoju1, O. Ogunseyi2, O. Akanni1, O. Adaramoye1, S. Cambier1, S. Esware2, A. Gutleb1, and A. Bakare1. 1University of Ibadan, Ibadan, Nigeria; and 2Luxembourg Institute of Science and Technology, Belvaux, Luxembourg.


Dual Hit–Uteroplacental Hypoxia after Engineered Nanomaterial Exposure. J. D’Errico, and P. Stapleton. Rutgers, The State University of New Jersey, Piscataway, NJ.

Differential Gene Expression Analysis in Mouse Placenta Reveals Association between Preterm Birthed Genes and PM2.5 Exposure. A. Schanzer1, J. L. Blum1, L. C. Chen2, M. A. Deyssenroth2, J. Chen2, and J. T. Zeilikoff1. 1New York University, New York, NY; and 2Icahn School of Medicine at Mount Sinai, New York, NY.

Stainless Steel Welding Fumes Adversely Affect Migratory Ability of First Trimester Human Placental Cells. N. Olgun, A. Morris, L. Bowers, A. Stefaniak, S. Friend, and S. Leonard. CDC, Morgantown, WV.

Exposure to Concentrated Ambient Fine Particulate Matter (PM2.5) Depletes the Ovarian Follicle Reserve in Mice Genetically Predisposed to Atherosclerosis. U. Luderer, L. Ortiz, B. Allen, D. Herman, and M. Kleinman. University of California Irvine, Irvine, CA.

The Trichloroethylene S-(1,2-Dichlorovinyl)-L-Cysteine Causes an Early Metabolic Shift Followed by Mitochondrial Dysfunction in a First Trimester Extravillous Trophoblast Cell Line. E. Elkin, D. Bridges, and R. Loch-Caruso. University of Michigan, Ann Arbor, MI.

Trichloroethylene Stimulates Metabolomic Changes in the Amniotic Fluid of a Timed-Pregnant Wistar Rat Model of Fetal Growth Restriction. A. L. Su, S. M. Harris, E. R. Elkin, and R. Loch-Caruso. University of Michigan, Ann Arbor, MI.

Etiological, Clinical and Data Base Analyses of Human Infertility in USA, Suggest the Role of Environmental Pollutants in Increasing Infertility for Industrial and Urban Populations. T. Odedere, B. Taaja, K. Williams, M. Sales, and T. V. Damodaran. North Carolina Central University, Durham, NC.

NTP Monograph on the Systematic Review of Occupational Exposure to Cancer Chemotherapy Agents and Adverse Health Outcomes. K. Howdeshell1, M. D. Shelby1, R. B. Blain2, P. Ross2, K. W. Taylor1, K. L. Witt1, and A. A. Rooney1. 1NIH/NTP, Research Triangle Park, NC; and 2ICF, Fairfax, VA.

A Retrospective Study on EU Harmonized Classifications for Reproductive Toxicity. K. Mikles1, R. Richards-Doran2, S. Udatha1, and C. Terry1. 1Corteva AgriScience, Agricultural Division of DowDuPont, Newark, DE; 2Corteva AgriScience, Agricultural Division of DowDuPont, Milton Park, United Kingdom; 3Corteva AgriScience, Agricultural Division of DowDuPont, Hyderabad, India; and 4Corteva AgriScience, Agricultural Division of DowDuPont, Indianapolis, IN.
Poster Session: Reproductive Toxicology II

Chairperson(s): Joanna Klapacz, Dow Chemical Company, Midland, MI; and Angela R. Stermer, Brown University, Providence, RI.

Abstract #

#1515

Poster Board Number

Development of a Liquid Chromatography-Mass Spectrometry Method to Quantitate Deoxynivalenol in Harlan Sprague-Dawley (HSD) Rat Plasma, Amniotic Fluid and Fetal Homogenerate. V. G. Robinson¹, J. A. Gilliam², A. M. Silinski³, R. Fernando¼, D. R. Germolec¹, and S. Waidyanatha¹. ¹NIAMS, Research Triangle Park, NC; and ²RTI International, Research Triangle Park, NC.

#1516

Poster Board Number

Propanil Acutely Changes Prolactin, Estrogen and Splenic Cell Populations in Female Mice. M. Berg, J. Franko, I. Holáková, R. Schafer, and R. Dailey. West Virginia University, Morgantown, WV.

#1517

Poster Board Number

Disruption of Cholesterol Homeostasis through the Retinoid X Receptor in Human Ovarian Granulosa and Theca Cells after a Low-Dose Tributylin Exposure. Y. Pu¹, S. Pearl², D. Martin³, and A. Veiga-Lopez¹. ¹Michigan State University, East Lansing, MI; and ²Sparrow Hospital, Lansing, MI.

#1518

Poster Board Number

Sirtuin-1 Inhibitor EX-527 Hyperacetylates p53 and Attenuates CrVI-Induced Germ Cell Apoptosis. J. A. Stanley, K. K. Sivakumar, J. C. Behlen, J. A. Arosh, and S. K. Banu. Texas A&M University, College Station, TX.

#1519

Poster Board Number

Ataxia Telangiectasia Mutated Coordinates the Response to Phosphoramidite Mustard-Induced Ovarian DNA Damage. K. L. Clark, S. Ganesan, and A. F. Keating. Iowa State University, Ames, IA.

#1520

Poster Board Number


#1521

Poster Board Number

Chromium VI Exposure during Pregnancy Disorganizes Uterine Artery Remodeling. J. C. Behlen, and S. Banu. Texas A&M University, College Station, TX.

#1522

Poster Board Number

Adverse Effects of Naphthenic Acids on Reproductive Health: A Focus on Placental Trophoblast Cells. S. Raza-Villanueva¹, G. Ratnayake¹, L. Jamshed¹, P. J. Thomas¹, and A. C. Holloway¹. ¹McMaster University, Hamilton, ON, Canada; and ²Environment and Climate Change Canada, Ottawa, ON, Canada.

#1523

Poster Board Number

Inhibition of Cyclic Nucleotide Efflux by Placental MRPs Enhances Trophoblast Syncytialization. L. Gorczyca, and L. Aleksunes. Rutgers, The State University of New Jersey, Piscataway, NJ.

#1524

Poster Board Number

Proteomic Profiling of Primary Human Villous Cytotrophoblasts Exposed to BDE-47. H. Chen¹, K. E. Williams¹, M. Kapidic², E. Kwan³, R. Aburajab¹, C. L. Hunter¹, S. J. Fisher¹, and J. F. Robinson¹. ¹University of California San Francisco, San Francisco, CA; and ²AB SCIEX, Redwood City, CA.

#1525

Poster Board Number

Mycotoxin Zearalenone (ZEA) Induces Toxicity and Alters microRNA Expression in C57bl/6 Mouse Placenta. C. Andersen¹, R. Li¹, L. Hu¹, A. El Zowalaty¹, Z. Wang¹, and X. Ye¹. ¹University of Georgia, Athens, GA; ²NIAMS, Research Triangle Park, NC; ³South China Agriculture University, Guangzhou, China; and ⁴University of Massachusetts Medical School, Worcester, MA.

#1526

Poster Board Number

Per- and Polyfluoroalkyl Substances (PFAS) Effects on Mouse Mammary Epithelial Cells. T. Russ¹, H. Capo¹, V. Chappell¹, and S. E. Fenton¹. ¹NIAMS, Durham, NC; and ²NIAMS Summer Connect Scholar, Durham, NC.

#1527

Poster Board Number


#1528

Poster Board Number


#1529

Poster Board Number

Testicular Toxicity of Sub-chronic Low-Dose Methotrexate Exposure in Rat. H. Li¹, T. Nolan, S. Hall, E. Bianchi, C. Hopkins, S. Madnick, A. Stermer, and K. Boekelheide. Brown University, Providence, RI.

#1530

Poster Board Number

Effect of Serum Organochlorine Pollutants (DDTs, HCB and PCBs) Levels on Human Sperm Parameters. S. Amir¹, M. Tatranzakis², S. A. Shah¹, S. Eqani¹, H. Ali², A. Suvorov², F. Tahir³, S. Sultan³, and A. M. Tsatsakis¹. ¹COMSATS University Islamabad, Islamabad, Pakistan; ²University of Crete, Heraklion, Greece; ³Aga Khan University, Karachi, Pakistan; ⁴University of Massachusetts, Amherst, MA; and ⁵National Institute of Health, Islamabad, Pakistan.
Monday, March 11, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Genetic Toxicity**

**Chairperson(s):** Nan Mei, US FDA/NCTR, Jefferson, AR; Raul Salazar-Gonzalez, University of Louisville, Louisville, KY; and Raja Settivari, Dow Chemical Company, Midland, MI.

Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM

**Abstract #**

#1546  
**Poster Board Number**  
**Poster Board Number #1547**

**Benchmark Dose Modeling of In Vitro Genotoxicity Data from the Mouse Lymphoma Assay.**

N. Mei, and X. Guo. US FDA/NCTR, Jefferson, AR.

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**Poster Board Number #1548**

**Is It Appropriate to Set 5% CD71+ Reticulocytes of Control as the Toxicity Limit in the Flow Cytometry-Based Rat Blood Micronucleus Assay?**


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**Poster Board Number #1549**

**Low Equimolar 90-Day Exposure of Fungicides Carbendazim and/or Thiram in Drinking Water Caused Persistent Genotoxicity.**

B. Rai, and S. Mercurio. Minnesota State University, Mankato, MN.

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**Poster Board Number #1550**

**Quantitative Analysis of Genotoxicity and Cytotoxicity of the Nitrooxide Radical 2,2,6,6-Tetramethylpiperidin-1-oxyl (TEMPO) and TEMPO Derivatives.**

J. Seo1, S. Bryce1, Q. Wu1, S. Dial1, M. Moore1, N. Mei1, and X. Guo1. US FDA/NCTR, Jefferson, AR; and Liton Laboratories, Rochester, NY.

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**Poster Board Number #1551**

**Assessment of the Mutagenic Potential of Para-Chloroaniline and Aniline in the Liver, Spleen and Bone Marrow of Big Blue Rats with Micronuclei Analysis in Peripheral Blood.**

L. Reynolds, G. T. K. Ramos, B. Rai, and D. Rijkers1, W. Jansen Holleboom1, M. Delagrange1, E. Molthof1, M. Audebert2, and G. Stoopen1. 1RIKILT Wageningen University, Wageningen, Netherlands; and 2Liton Laboratories, Rochester, NY.

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**Poster Board Number #1552**

**Presence of a Genotoxic Impurity, 2-Chloro N,N-Dimethylhydroxylamine in Aroclor 1254-Induced S9 Fraction and Possible Relevance to Differential Frequencies of Spontaneous Revertants in the Presence vs. Absence of S9 Activation System.**


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**Poster Board Number #1553**

**The Effect of Ingredients on the In Vitro Mutagenicity of the Gas Phase from a Heated Tobacco Product.**


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**Poster Board Number #1554**

**Genotoxicity Evaluation of α,8 Unsaturated Aldehyde Class of Fragrance Materials in the Alternative Chicken Egg Genotoxicity Assay (CEGA) Compared to the Results with Other Regulatory Approved In Vitro and In Vivo Genotoxicity Assays.**

Y. Thakkar1,2, and A. Api1. 1Research Institute for Fragrance Materials (RIFM) Inc., Woodcliff Lake, NJ; and 2New York Medical College, Valhalla, NY.

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**Poster Board Number #1555**

**3D Skin Micronucleus and Comet Assay as an Animal Alternative Model for Genotoxicity Positive Materials in Traditional In Vitro Studies: A Case Study on p-Methoxybenzylaldehyde.**

K. Joshi, Y. Thakkar, and A. Api. RIFM, Woodcliff Lake, NJ.

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**Poster Board Number #1556**

**Re-evaluation of Genotoxicity Data for 4,4'-Methylenedianiline to Improve Data Quality for Hazard Assessment.**

I. Krueger1, and A. Chappelle1. 1Covestro LLC, Pittsburgh, PA; and 2International Isocyanate Institute, Chadds Ford, PA.

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**Poster Board Number #1557**

**Role of the Human N-acetyltransferase Genetic Polymorphism in Metabolism and Toxicity of 4,4'-Methyleneedianiline.**


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**Poster Board Number #1558**

**Genotoxic Effects of Aromatic Amines Related to the Occurrence of Bladder Cancer among the Exposed Workers.**

R. Wang1, T. Toyooka1, Y. Qi1, Y. Yangab1a, M. Suda1, and H. Ohta2. 1Japan National Institute of Occupational Safety and Health, Kawasaki, Japan; and 2Kitasato University, Sagamihara, Japan.

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**Poster Board Number #1559**

**E. coli O4-Alkylguanine-DNA-Alkyltransferase-Deficient Mutants Exhibit Greater Mutation Levels in Response to the DNA-Alkylating Agents EMS and ENU without Changes in Their Mutation Spectra.**

L. McDaniel, and J. Revollo. US FDA/NCTR, Jefferson, AR.

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**Poster Board Number #1560**

**An Extended Evaluation of Commercially Purchased Blood and Cryopreserved Isolated Human Peripheral Blood Lymphocytes for Use in the In Vitro Chromosomal Aberration Assay.**

S. N. Kellum, A. Myhre, and R. Settivari. Corteva, Newark, DE.

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**Poster Board Number #1561**

**Flow Cytometric Analysis of the HPBL In Vitro Micronucleus Assay—Proof of Concept.**

A. Myhre1, and R. Settivari1. 1Corteva, Newark, DE; and 2Dow Chemical Company, Midland, MI.

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**Poster Board Number #1562**

**Integrated In Vitro Genotoxicity Testing to Follow-Up the Positive Ames Test of a Meptylidinocap Metabolite.**

R. S. Settivari1, M. Aggarwal1, L. Murphy1, and C. Terry1. 1Corteva Agriscience, Agriculture Division of DowDuPont, Newark, DE; and 2Corteva Agriscience, Agriculture Division of DowDuPont, Indianapolis, IN.

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**Poster Board Number #1563**

**1,3-Dichloropropene In Vivo Mutation Study in Male Big Blue Transgenic F344 Rats via Dietary Treatment.**

C. Terry1, B. Gollapudi1, R. Settivari1, and Z. Yan1. 1Corteva Agriscience, Agriculture Division of DowDuPont, Indianapolis, IN; 2Exponent, Alexandria, VA; and 3Corteva Agriscience, Agriculture Division of DowDuPont, Newark, DE.

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**Poster Board Number #1564**

**Analysis of the Genotoxic Potency of Pyrrolizidine Alkaloids Using HepaRG Cells in Conjunction with the GammaH2AX Assay.**

A. Peijnenburg1, J. Louisse2, D. Rijkers1, W. Jansen Holleboom1, M. Delagrange1, E. Moithof1, M. Audebert1, and G. Stooppen1. RIKILT Wageningen University and Research, Wageningen, Netherlands; and 2INRA, Toulouse, France.
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<td>Potential Endocrine-Disrupting Effects of Graphene Oxide Nanomaterial on Japanese Medaka Fish</td>
<td>A. Dasmahapatra, D. Powe, T. Dasari Shareena, and P. Tchounwou. Jackson State University, Jackson, MS.</td>
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<td>#1581</td>
<td>Attenuation of Lung Inflammation and Emphysema-Like Changes following Cigarette Smoking Cessation or Switching to Aerosol Inhalation from an NTV</td>
<td>H. Suzuki, S. Onami, T. Hirata, and H. Ozaki. Japan Tobacco Inc., Yokohama, Japan. Sponsor: S. Ito</td>
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<td>#1582</td>
<td>Positive Control Study of Urethane and MNU in TgRasH2 Mice</td>
<td>L. Hopper, and B. Saladino. BASI, Mount Vernon, IN; and Seventh Wave Laboratories, LLC, Maryland Heights, MO.</td>
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<td>#1583</td>
<td>Biochemical Studies on Toxicity of Yoyo Bitters (a Polyherbal Preparation) on Kidney and Liver Functions of Wister Rats</td>
<td>I. Omotosho, and T. Olusanya. University of Ibadan, Ibadan, Nigeria.</td>
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<td>#1585</td>
<td>Increased Non-biliary Cholesterol Excretion during Alpha-Naphthylisothiocyanate (ANIT)-Induced Cholestasis in Mice</td>
<td>Y. Tanaka, T. Ikeda, H. Ogawa, and T. Kamisako. Kindai University Faculty of Medicine, Osaka, Japan; and Tezukayama Gakuin University, Sakai, Japan. Sponsor: C. Klaassen</td>
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<td>#1586</td>
<td>Evaluation of Repurposed Antiepileptic Drugs to Treat Spontaneous Recurrent Seizures in Instrumented Male C57BL/6 Mice following a Sublethal Soman Exposure</td>
<td>D. L. Nguyen, M. R. Eisen, C. A. Angrisani, E. N. Dunn, K. M. Haines, A. N. Santoro, P. M. Bodner, C. A. Ondeck, P. B. Dubee, H. S. McCarron, P. H. Beske, and P. M. McNutt. USAMRICD, Aberdeen Proving Ground, MD; and Battelle, Columbus, OH.</td>
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<td>#1590</td>
<td>Optimized Methods for Irradiation and Chemical Myeloablation in NSG Mice Prior to Human Hematopoietic Stem Cell (Gene) Therapy</td>
<td>L. Kelamangalath, J. Pellman, R. Yoder, B. McIntosh, and T. Oppeneer. Covance Inc., Greenfield, IN; Covance Inc., Madison, WI; and Biomarin Pharmaceutical Inc., Novato, CA. Sponsor: M. Sievert</td>
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<td>#1592</td>
<td>Electrolyte Quantification in Aqueous and Vitreous Humor of Common Preclinical Species</td>
<td>C. Li, L. Negro Silva, P. Seidi Pereira, R. Forster, S. Autier, W. Tan, M. Dubuc-Mageau, and A. Sanfacon. Citoxlab North America, Laval, QC, Canada; Citoxlab France, Evreux, France; and University of Montreal, St. Hyacinthe, QC, Canada.</td>
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<td>#1593</td>
<td>A Simple In Vivo Model for Monitoring CYP3A Induction and Inhibition</td>
<td>J. J. Cali, D. Ma, and A. Niles. Promega Corporation, Madison, WI.</td>
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<td>#1594</td>
<td>Assessments of Sexual Maturity in Three Lineages of Miniature Swine</td>
<td>S. E. Boley, D. F. Brocksmith, and G. F. Bouchard. Sinclair Research Center, LLC, Auxvasse, MO; and Sinclair Bio Resources, LLC, Auxvasse, MO.</td>
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<td>#1595</td>
<td>Genetic Selection of Phenotype for Body Weight in the Sinclair Miniature Swine</td>
<td>D. F. Brocksmith, A. Stricker-Krongrad, and G. F. Bouchard. Sinclair Bio Resources, LLC, Auxvasse, MO; and Sinclair Research Center, LLC, Auxvasse, MO.</td>
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<td>#1596</td>
<td>Cardiac Ultrastructure Damage and Pathological Remodeling after Halogen Inhalation in Rats</td>
<td>S. Ahmad, J. Masjoan Junco, W. Bradley, W. Chih-Chang, I. Zafar, P. Powell, N. Manioppan, L. Dell’Italia, and A. Ahmad. Anesthesiology and preoperative Medicine, University of Alabama at Birmingham, Birmingham, AL; and University of Alabama at Birmingham, Birmingham, AL.</td>
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<td>#1597</td>
<td>Maternal and Embryo-Fetal Historical Background Control Data in the Hsd: Sprague Dawley Rat</td>
<td>M. Horn, D. Williams, and R. Parker. Envigo, Indianapolis, IN; and Envigo, East Millstone, NJ. Sponsor: L. Coney</td>
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Monday, March 11, 9:30 AM to 11:30 AM, CC Room 301

Global Collaboration Coffee

Organized by: International Union of Toxicology (IUTOX)

IUTOX invites all Global Gallery participants from toxicology societies and others from around the world to join in for this event, hosted by SOT. Panelists from academia, the federal government, and private industry will address the topic, “Open Data in a Big Data World: A Toxicology Perspective.” After the coffee, attendees will adjourn to the Global Gallery of Toxicology, where presenters will share their posters from 11:45 am to 12:15 pm. Please see page 90 for additional information about the poster display.

Monday, March 11, 9:30 AM to 3:00 PM, CC Room 336

Research Funding Insights

Hosted by: Career Resource and Development Committee

Representatives from federal agencies will be available in the Research Funding Insights Room for individual conversations. Make an appointment with your Program Officer in advance or check the posted schedule to meet with a staff member who can discuss aspects of scientific review or specific grant opportunities. New investigators are especially encouraged to meet with program staff.

Monday, March 11, 9:45 AM to 10:45 AM, CC Room 311

(Ticket Required; Limited Seating)

Trainee Discussion with Plenary Session Presenter: Dr. Murphy

Presenter: William L. Murphy, University of Wisconsin-Madison, Madison, WI.

Dr. Murphy will meet informally for discussion with graduate students and postdoctoral scholars after the Plenary Session Lecture. Registration is limited to SOT Student and Postdoctoral members.

Monday, March 11, 10:30 AM to 11:30 AM, CC Room 338

Exhibitor-Hosted Session: Hematology and Biochemistry Background Data in Juvenile Sprague Dawley Rats at 4, 7, and 21 Days of Age

Presented by: ITR Laboratories Canada Inc.

Our laboratory published background hematology and biochemistry data from naive pups at 4, 7, and 21 days of age. A number of pups were used to generate the data. We will discuss the difference in some of these parameters from 4 days of age until shortly before weaning.
Monday, March 11, 10:30 AM to 11:30 AM, CC Room 337

Exhibitor-Hosted Session: ICH M7 Perception: Unifying Knowledge from Predictions to Purging

Presented by: Lhasa Limited

Multiple approaches exist for addressing potentially mutagenic impurities (PMIs) under ICH M7. This session will demonstrate how purge argumentation, (Q)SAR predictions, and data can all be used to qualify PMIs and importantly how knowledge gained can be retained and easily applied to future projects.

Monday, March 11, 10:30 AM to 11:30 AM, CC Room 339

Exhibitor-Hosted Session: The Application of hTERT-Immortalized Primary Cells in Toxicological Assays

Presented by: ATCC

hTERT-immortalized primary cells exhibit the growth characteristics of continuous cell lines while providing the physiological attributes of primary cells. Our experts will discuss the characteristics of respiratory, ocular, cardiovascular, skin, reproductive, and kidney hTERT-immortalized primary cells, as well as the utility of these versatile cells in various toxicological assays.

Monday, March 11, 10:30 AM to 11:30 AM, CC Room 340

Exhibitor-Hosted Session: The Expanded Role of Flow Cytometry in PK/PD Studies in Nonhuman Primates—What Can We Learn Early within Biotherapeutic Drug Development Programs?

Presented by: Charles River

Flow cytometry quantitation of biotherapeutics and receptor binding assessments has become an integral tool in supporting investigative toxicology, preclinical and clinical programs. Comprehensive PK/PD studies in nonhuman primates provide valuable information used to design nonclinical and clinical programs. We will present an overview of pharmacology and pharmacodynamic capabilities in nonhuman primates, strategies for implementing these endpoints on studies, and options for expediting reporting of key data.

Monday, March 11, 11:45 AM to 12:15 PM, CC Exhibit Hall (Near SOT Pavilion)

Global Gallery of Toxicology—Representative Attended

Representatives from toxicology-related scientific societies from around the world present a poster showcasing their history, key accomplishments, strategic initiatives, activities, and more. The goal of SOT and of all these societies is to increase the reliance of international decision-makers on toxicology to advance human health and disease prevention. Posters will be available for viewing during the ToxExpo hours.

Monday, March 11, 11:45 AM to 12:15 PM, CC Exhibit Hall (Near SOT Pavilion)

Regional Chapter, Special Interest Group, and Specialty Section Posters Session—Representative Attended

Dedicated poster space is available for the SOT Regional Chapters, Special Interest Groups, and Specialty Sections during the 2019 SOT Annual Meeting. The poster area will be located adjacent to the SOT Pavilion in the ToxExpo Exhibit Hall. Come meet representatives on Monday, March 11, from 11:45 am to 12:15 pm. Posters will be available for viewing during the ToxExpo hours.
Monday, March 11, 12:00 Noon to 1:00 PM, CC Room 337

Exhibitor-Hosted Session: Game Changing—The Latest Developments in the Machine Learning/PBPK/QST Modeling Space

Presented by: Simulations Plus, Inc.

With the evolving partnership between Simulations Plus and DILisym Services, and several recent grant awards, we’re excited to share the latest developments in our top-ranked, streamlined software—GastroPlus™, ADMET Predictor™, and DILisym™—for simplifying the complex processes required to predict risk assessment and develop safe therapies. Join us for lunch!

Monday, March 11, 12:00 Noon to 1:00 PM, CC Room 340

Exhibitor-Hosted Session: Nonclinical Development Considerations for Cell and Gene Therapies

Presented by: Covance

Regenerative therapies have recently undergone some spectacular clinical successes and offer great potential to significantly redefine medical treatments. In this session, we will highlight some of the nonclinical development studies and analytical tools supporting a cell or gene product for an IND/IMPD submission and beyond.

Monday, March 11, 12:00 Noon to 1:00 PM, CC Room 339

Exhibitor-Hosted Session: Scalable, 3D In Vitro Technology for Predictive DILI Screening and Mechanistic Hepatotoxicity Testing

Presented by: InSphero Inc.

A comprehensive evaluation of clinical compounds in 3D liver cocultures consisting of primary hepatocytes and Kupffer cells for improved DILI prediction compared to standard 2D hepatocyte culture will be presented. Data on functional characterization of 3D liver cocultures in 384-well plates suitable for high-throughput screening also will be shared.

Monday, March 11, 12:00 Noon to 1:00 PM, CC Room 338

Exhibitor-Hosted Session: The Utility of Electrical Field Stimulation for Functional Maturation of hiPSC-CM and Assessment of Inotropic Compounds

Presented by: ACEA Biosciences, Inc.

One of the biggest gaps to full utilization of hiPSC-CM is their inherent maturation status. We discuss the launch of a high-throughput instrument that uses electrical conditioning to achieve fully functional, mature cardiomyocytes, used to assess excitation-contraction coupling and more. We discuss how the system can provide incisive multiparametric and predictive information for safety assessment, drug discovery, and disease modeling.
Monday, March 11, 12:00 Noon to 1:30 PM, Hilton Baltimore Holiday 4

(Ticket Required)

**In Vitro Toxicology Lecture and Luncheon for Students: Patient-Based Cellular Model Systems to Assess Individual Risk to Neurotoxicants**

*Chairperson(s):* Deb Haivik, Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT; and Agnes Karmaus, ILS, Research Triangle Park, NC.

*Lecturer:* Aaron B. Bowman, Purdue University, West Lafayette, IN.

*Supported by:* An Educational Grant from the Colgate-Palmolive Company

*Hosted by:* Education Committee

The goal of the *In Vitro Toxicology Lecture series* is to feature important research using *in vitro* and alternative techniques to study basic mechanisms and to develop test methods aimed at replacing animal use whenever feasible. Undergraduate students, graduate students, postdoctoral scholars, and recipients of Colgate-Palmolive awards are among the guests at this event. Students and postdoctoral scholars register for $10 (nonrefundable) with their Annual Meeting registration. Luncheon service is available for guests with tickets who arrive before 12:15 pm.

After lunch, the speaker makes a short presentation, which is the basis for a case study discussion at each table. Dr. Bowman will examine the benefits of using induced pluripotent stem cells (iPSC) technology to personalize human risk assessment for suspected and known neurotoxicants. iPSCs can be generated from individual human subjects or representative vulnerable populations. These cells can be used to differentiate cells along all three embryonic germ lines, including the brain and neurovascular unit. Examples from the recent literature will be used to illustrate opportunities and challenges in the field. The audience will be asked to discuss these opportunities and challenges and apply their ideas to a real-world situation.

Monday, March 11, 12:00 Noon to 1:30 PM, CC Room 334

**Carcinogenesis Specialty Section Officers Meeting**

Monday, March 11, 12:00 Noon to 1:30 PM, CC Charles Street VIP Suite

**Special Interest Group Collaboration Group Meeting**

Monday, March 11, 12:00 Noon to 1:30 PM, CC Room 330

**Specialty Section Collaboration and Communication Group Meeting**

Monday, March 11, 12:00 Noon to 1:30 PM, CC *See room listing below.*

**Specialty Section Meetings/Luncheons: Ethical, Legal, Forensics, and Societal Issues** *(Room 345)*; **Exposure** *(Room 343)*

Monday, March 11, 12:15 PM to 1:45 PM, Hilton Baltimore Key 5

**Biotechnology Specialty Section Mentoring Event**

Monday, March 11, 12:15 PM to 2:00 PM, Pratt Street Ale House

**Mid-Atlantic Regional Chapter Business Meeting and Networking Luncheon**
In April 2018, the US EPA requested comment on its proposed Strengthening Transparency in Regulatory Science Rule (Strengthening Transparency Rule). The proposal goes to the heart of information used for significant regulations: specifically, “the dose response data and models that underlie what we are calling ‘pivotal regulatory science.’” Pivotal regulatory science is the studies, models, and analyses that drive the magnitude of the benefit-cost calculation, the level of a standard, or point-of-departure from which a reference value is calculated. US EPA intends the rule to provide this transparency “in a manner consistent with statutory requirements for protection of privacy and confidentiality of research participants, protection of proprietary data and confidential business information, and other compelling interests.” US EPA “will use peer-reviewed information, standardized test methods, consistent data evaluation procedures, and good laboratory practices to ensure transparent, understandable, and reproducible scientific assessments.” Many have expressed support for the Strengthening Transparency Rule, stating that the requirement for transparency is long overdue. Others have expressed concern, including concerns about a potential for US EPA to handpick certain “public” studies and to discount other valid studies only because the submitters did not divulge all of the confidential data. Similarly, concerns have been expressed regarding the inability to protect important confidential information such as patient identity. The proposed rule is controversial and will be the subject of debate (which is likely to be ongoing in March 2019) and significant comment. What this raises is a fear that addressing some concerns about how air regulations are justified might have unintended consequences in other US EPA media programs. US EPA review of epidemiology data underlying its conclusions may be subject to more stringent requirements than it previously was. This session will consider legal, scientific, ethical, and policy issues pertinent to the proposal, and consider broader issues pertinent to the use of data for chemical evaluations. Similarly, the proposed rule is expected to significantly impact rulemakings under the Toxic Substances Control Act (TSCA), the Clean Air Act (CAA), and the Safe Drinking Water Act (SDWA), each of which requires US EPA to rely on the best available science. Data that are protected by medical privacy restrictions, and on which US EPA has historically relied in many rulemaking contexts, could be disallowed under a broad reading of the proposal. Several nongovernmental organizations have already expressed concern over this interpretation and believe that US EPA could be acting in an arbitrary and capricious manner if it relied on some confidential data for Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) purposes while disallowing medical data for CAA purposes. These, and many other issues, are expected to be raised during the comment period.

Abstract #

#1603 12:10  Data for Chemical Evaluations: Secret or Otherwise. L. Bergeson. Bergeson & Campbell, PC, Washington, DC.
1:05  Panel Discussion/Q&A.

Monday, March 11, 12:10 PM to 1:30 PM, CC Room 309

Informational Session: Electronic Waste: An Evolving Global Health Concern and Risk Assessment Challenge

Chairperson(s): Babasaheb (Bob) R. Sonawane, TRACS, LLC, North Potomac, MD; and Michelle Heacock, NIEHS, Research Triangle Park, NC.

Primary Endorser: Mixtures Specialty Section

Other Endorser(s): Metals Specialty Section; Risk Assessment Specialty Section

As the demand for electronics increases, the amount of electronic waste (e-waste) steadily accumulates at a rapid pace. An estimated 65 million tons of e-waste were created globally in 2017, with further increases projected in the years ahead. E-waste is composed of an alarming combination of several hazardous substances. A systematic review looking at health outcomes related to e-waste exposure showed that increases in spontaneous abortions, stillbirths, and premature births, and reduced birth weights and birth lengths, are associated with exposure to e-waste. Direct and indirect exposures are a threat to human health and vulnerable groups such as fetuses, children, pregnant women, the disabled, and workers in the informal sector. Because of this threat, they need specific protection. The majority of e-waste recycling is conducted in low-to-middle-income countries informally, by workers using primitive techniques such as burning, with little or no safeguards in place for human and environmental health. This session will provide an overview of the e-waste problem and present research findings from studies conducted in India and Vietnam. The session will end with a presentation that will discuss the multi-factorial problem of e-waste due to limited studies and the multiple routes of exposure to multiple classes of hazardous substances in the context of vulnerable populations. These presentations will inform a panel that will discuss risk assessment challenges (exposures to a mixture of chemicals from multiple sources) and provide a forum to discuss strategies to reduce exposures to e-waste.
Early in life, the epigenome is quite plastic and modifiable by the environment. Maternal-fetal interactions in utero, nutritional status, and exposure to environmental chemicals are all known to affect the developing epigenome. These epigenome-environment interactions can provide an adaptive advantage but also can disrupt the epigenome to alter physiology and increase susceptibility to cancer and other diseases in adulthood. Mechanistically, environmental exposures can disrupt the process of epigenomic programming that normally occurs during development by altering the activity of the “readers, writers, and erasers” that add, remove, and act as effectors of epigenetic marks. Recently, we performed longitudinal epigenomic, transcriptomic, and metabolomic profiling across the life course normally occurs during development by altering the activity of the “readers, writers, and erasers” that add, remove, and act as effectors of epigenetic marks. Recently, we performed longitudinal epigenomic, transcriptomic, and metabolomic profiling across the life course using exposure to an endocrine-disrupting chemical as a tool to understand how an early-life exposure could reprogram the liver epigenome and drive metabolic dysfunction in adulthood. We found that this early-life exposure targeted the plasticity of the developing epigenome to accelerate epigenomic aging. Remarkably, although epigenetic reprogramming of chromatin states and target genes persisted into adulthood, the impact of reprogramming was metabolically silent until a later-life challenge with a Western-style diet high in fat, fructose, and cholesterol. In response to this dietary challenge, metabolic reprogramming manifested as an increase in serum cholesterol and dyslipidemia, and in the liver, metabolic dysfunction driven by reprogramming of gene expression, signaling, and production of metabolites in pathways linked to cholesterol, lipid, and one-carbon metabolism. These findings reveal that age-related plasticity of the developing epigenome creates a vulnerability to reprogramming by environmental exposures, which can accelerate epigenomic aging and drive a conditional metabolic dysfunction dependent on later-life diet.
Monday, March 11, 1:30 PM to 2:30 PM, CC Room 337

**Exhibitor-Hosted Session: Derisk Your Drug Pipeline—Screen Out Drug-Induced Mitochondrial Toxicity in the Early Stages of Drug Development**

*Presented by: Agilent Technologies*

Dr. Karen Tilmant will share how real-time cell-based bioenergetics for mitochondrial toxicity can be part of the battery of safety screening assays. This talk assesses the Seahorse XF platform as a tool for screening mitochondrial dysfunction and presents a workflow with reference to a panel of mitotoxic drugs. The work was performed by UCB Pharma (Belgium) and was supported by the MIP-DILI consortium (Innovative Medicines Initiative).

Monday, March 11, 1:30 PM to 2:30 PM, CC Room 338

**Exhibitor-Hosted Session: Developing High Content and MEA Assays for Toxicology Prediction Using Organ-Specific Cellular Subtypes**

*Presented by: Cyprotex*

The session will provide an overview of the latest cell-based technologies available for predicting human safety. Strategies for assessing organ-specific toxicity using iPSC-derived cells, electrophysiology, 2D and 3D models, and high content imaging will be presented with case studies on how these techniques have been used to understand clinical liabilities.

Monday, March 11, 1:30 PM to 2:30 PM, CC Room 340

**Exhibitor-Hosted Session: Discover Hidden Relationships in Your Toxicological Studies with IPA and 50,000 Curated Datasets**

*Presented by: QIAGEN*

Learn how to discover the hidden upstream drivers and downstream outcomes in your toxicogenomics datasets, based on up- or downregulation of genes, proteins, or metabolites. Understand how those results compare to ~50,000 preanalyzed ‘omics datasets from human, mouse, and rat. These approaches can help you explain the causes and effects in your studies so you can generate hypotheses to develop better drugs, biomarkers, and more.

Monday, March 11, 1:30 PM to 2:30 PM, CC Room 339

**Exhibitor-Hosted Session: Strategies and Innovations for Addressing the Requirements of Proposition 65 and Other Consumer Product Regulations**

*Presented by: Gradient*

The session provides guidance and case studies related to both proactive (e.g., company initiated) and reactive (e.g., responding to regulatory requirements) chemical product safety programs. Speakers will address changes under California’s Proposition 65, as well as the growing number of product disclosure regulations in the US. Discussion includes some of the challenges that have been observed in applying risk and exposure assessment strategies in this context.

Monday, March 11, 1:30 PM to 2:30 PM, Hilton Baltimore Johnson

**Undergraduate Consortium Meeting**

*Hosted by: Undergraduate Consortium Task Force*

*Chairperson(s): Marquea D. King, USDA, Beltsville, MD.*

Students and faculty from the nine institutions participating in the SOT Undergraduate Consortium, the SOT Champions connected to each of these institutions, and members of the Undergraduate Consortium Task Force will exchange ideas and best practices for encouraging students to pursue careers in toxicology.
Symposium Session: Immune-Epithelial Cell Crosstalk in Lung Toxicology and Disease

Chairperson(s): Alessandro Venosa, University of Pennsylvania, Philadelphia, PA; and Andrew Gow, Rutgers, The State University of New Jersey, Piscataway, NJ.

Primary Endorser: Immunotoxicology Specialty Section

Other Endorser(s): Inhalation and Respiratory Specialty Section

Understanding the mechanisms involved in mediating the pollutant-based deficits in pulmonary health remains an area of continued interest within SOT and in the field of public health. The lung represents a unique toxicological target due to its continuous exposure to the gaseous components of the environment and its function as a major first pass organ. The environment of the lung surface is a unique system consisting of both barrier and immunological defenses. A key aspect of the system is the interaction between resident cells of the lung (both parenchymal epithelial cells and resident immune subsets) and recruited inflammatory cells. It is the goal of this session to address the molecular mechanisms involved in the resident/recruited response to toxicants. Therefore, the session will highlight current developments in the fields of lung biology, immunotoxicology, and pharmacology. The pulmonary response to toxicant exposure consists of a number of complex processes, including direct cellular injury, inflammation, and resolution. Much of this response is regulated by the resident cells of the lung surface, including both type I and type II epithelial cells and the alveolar macrophages. Proper recruitment and activation of circulating inflammatory cells is essential to mount the appropriate inflammatory and resolution responses. Therefore, epithelial-immune crosstalk is critical in the regulation of the pulmonary response to toxicants.

To this end, high-throughput phenotyping of resident and infiltrating cells has highlighted novel pathways involved in cell-cell communication during progression and resolution of lung injury. These data, paired with characterization of temporal and spatial responses of immune cells, are pivotal to understand the mechanisms of chemical/environmental aggression. Although often neglected in several immunology studies, it is clear that lung epithelial cells intimately interact with resident immune subsets to activate (and dampen, when necessary) the appropriate inflammatory response following a diverse range of deleterious cues, including toxic exposure. In addition to discussing the most recent progress made in this area of research, speakers will address existing hurdles in our understanding of the subsets. By describing these different aspects of cellular crosstalk, these presentations will offer a more insightful understanding of the lung dynamics following mechanisms and effects of toxicant (ozone) exposure on production of specialized proresolving lipid mediators by resident and recruited monocyte/macrophage subsets, chromatin remodeling to specific responses to air pollutants (ozone) associated with exacerbation of inflammatory conditions; (4) evaluate the role age, sex, history of prior exposure, and antioxidant status play in lung epithelial cell response to nanoparticles, ozone, naphthalene, and particulate matter; and (5) characterize the system is the interaction between resident cells of the lung (both parenchymal epithelial cells and resident immune subsets) and recruited inflammatory cells. It is the goal of this session to address the molecular mechanisms involved in the resident/recruited response to toxicants. Therefore, the session will highlight current developments in the fields of lung biology, immunotoxicology, and pharmacology. The pulmonary response to toxicant exposure consists of a number of complex processes, including direct cellular injury, inflammation, and resolution. Much of this response is regulated by the resident cells of the lung surface, including both type I and type II epithelial cells and the alveolar macrophages. Proper recruitment and activation of circulating inflammatory cells is essential to mount the appropriate inflammatory and resolution responses. Therefore, epithelial-immune crosstalk is critical in the regulation of the pulmonary response to toxicants.

Abstract #


#1608 2:25 Extracellular Vesicle: An Emerging Mediator of Intracellular Crosstalk in Lung Inflammation and Injury. J. Yang. Boston University School of Medicine, Boston, MA. Sponsor: A. Venosa

#1609 2:55 To Each Their Own: Molecular Mechanisms of Inter-Individual Variability in the Effects of Inhaled Toxicant Exposures. S. McCullough. US EPA, Chapel Hill, NC.


#1611 3:55 Inflammatory Responses of Resident and Recruited Immune Cells to Inhaled Toxicants. K. Gowdy. East Carolina University, Greensboro, NC.

Symposium Session: Patterns of Co-exposure and Its Implications for Understanding the Health Effects of Mixtures

Chairperson(s): Thomas Webster, Boston University School of Public Health, Boston, MA; and Rogelio Tornero-Velez, US EPA, Research Triangle Park, NC.

Primary Endorser: Mixtures Specialty Section
Other Endorser(s): Exposure Specialty Section

While current chemical testing tends to focus on individual chemicals, the exposures that people actually experience involve mixtures of chemicals. The number of mixtures that can be formed from the thousands of environmental chemicals is enormous, and testing all of them would not be realistic. In recent years, the ongoing revolution in exposure science and analytic chemistry (e.g., non-targeted analysis) is permitting better assessment of exposures to more and more chemicals at lower cost. It appears likely that we will be facing the biggest data challenge in exposure science in the not very distant future, and novel statistical methods are needed for analyzing these data. Collaboration between mixtures toxicologists and exposure scientists has great promise. Exposure science has a very important role to play by (1) determining the combinations of chemicals to which people are actually exposed, reducing the combinatoric problem facing toxicologists; (2) identifying highly correlated exposures that might be better studied using whole mixtures methods than component-based methods; and (3) providing information needed by epidemiologists studying exposure to mixtures. A critical problem is understanding the patterns of exposure; for example, which exposures tend to occur together and how does this tendency depend on demographics and other factors? This session will bring together exposure scientists and mixtures toxicologists to examine methods for analyzing patterns of co-exposures; apply them to large datasets, such as National Health and Nutrition Examination Survey (NHANES) biomonitoring data and personal care product purchasing database; and discuss their implications for research on the health effects of exposure to mixtures in toxicology and epidemiology.

Abstract #

#1612 1:45 Patterns of Co-exposure and Its Implications for Understanding the Health Effects of Mixtures. T. Webster. Boston University School of Public Health, Boston, MA.

#1613 1:45 Introduction. T. Webster. Department of Environmental Health, Boston University School of Public Health, Boston, MA.

#1614 1:48 Hierarchical Structure of Patterns of Correlations between Biomarkers of Exposure and Their Implications for Studying the Health Effects of Mixtures. T. Webster. Boston University School of Public Health, Boston, MA.


#1617 2:54 Understanding and Predicting Patterns of Co-exposure. R. Zaleski. ExxonMobil Biomedical Sciences, Inc., Annandale, NJ. Sponsor: T. Webster

#1618 3:16 Using Pregnancy Cohort Data to Identify Human-Relevant Mixtures for Experimental Evaluation in a Whole Mixture Risk Assessment Strategy. C. Gennings. Icahn School of Medicine at Mount Sinai, New York, NY.

#1618a 3:38 An Evaluation of HTS and Mixtures: From Component-Based to Whole Mixtures Studies. M. DeVito. NIEHS/NTP, Research Triangle Park, NC.

4:00 Panel Discussion/Q&A.

Symposium Session: Scaling Barriers: Cellular Dynamics and Models of Blood-Brain Barrier Developmental Toxicity


Primary Endorser: Reproductive and Developmental Toxicology Specialty Section
Other Endorser(s): Neurotoxicology Specialty Section; Scientific Liaison Coalition

This session will focus on a critical vascular interface, the blood-brain barrier (BBB), with regard to embryology and toxicology. The BBB is a core of the neurovascular unit (NVU) comprising microvascular endothelial cells, pericytes, astrocytes, microglia, and neurons. These cell types function in various capacities throughout development to regulate the distribution of substances from the circulatory system to the developing brain (i.e., toxicokinetics). Although historically described as “leaky,” the leading perspective in the field has recently shifted toward an understanding that the BBB is functional soon after it forms. BBB research tends to focus on toxicokinetics, but less is known about the toxicodynamic impact that drugs and chemicals may have on the developing BBB. Moreover, it is unclear whether such impacts would lead to developmental neurotoxicity (DNT). Evidence from mouse models and human genetics suggests that altered BBB development and
function have a role in the etiology of neurobehavioral disorders such as autism spectrum disorder, supporting the hypothesis that chemical disruption of the developing BBB may also lead to DNT. While current models representing the state-of-the-science in this field have not demonstrated a direct link between BBB perturbation by chemical exposures and subsequent DNT, this hypothesis remains to be adequately tested. Alternative models may provide tools toward understanding this “black box” in BBB toxicology. This session will address the integrative biology and systems toxicology underlying BBB toxicodynamics and highlight the cutting-edge in vivo, in vitro, and in silico models currently utilized for early life-stage considerations. The presenter lineup will begin with an overview that frames the importance, yet paucity, of developmental BBB research, followed by talks progressing from in vivo to in vitro and in silico BBB models. The first Co-Chair will provide an introduction to the session theme by describing key cell types and timing of embryonic BBB development across species. This introduction will also briefly cover other areas of the brain (e.g., circumventricular organs) and their barriers; provide an overview of the state of the art in BBB models that will be described in more detail by the session presenters; and briefly survey traditional, toxicokinetic models and BBB transporters. The first presentation will introduce the cortical BBB and describe a mammalian in vivo model used to investigate the role of microglia in establishing BBB integrity during embryonic development. The next presenter will discuss an embryonic, transgenic zebrafish model being used to investigate the role of pericytes in mediating developmental BBB toxicity. The next presenter will introduce a 3D in vitro model designed to test BBB permeability to therapeutic antibodies. The final presentation will discuss novel multiscale in silico models for unraveling complex cellular dynamics of BBB development in a computational neurovascular unit (cNVU) system, whereby toxicity pathways interact with fundamental morphoregulatory signaling (e.g., Wnt, Shh, Delta/Notch) during windows of vulnerability to developmental neurotoxicants. To wrap up the session, the second Co-Chair will emphasize the importance of establishing alternative BBB models that reduce animal testing, in addition to providing translational context for developmental BBB research by discussing the importance of these studies in relation to children’s environmental health protection.

Abstract #

#1620 1:55 Applying a Mouse Model of Embryonic Macrophage Depletion to Elucidate the Role of Microglia in Blood-Brain Barrier Development. K. Saili. US EPA/NCCT, Research Triangle Park, NC.
#1621 2:25 Environmental Contaminant Exposure Reduces Pericyte Coverage of the Developing Cerebral Vasculature. J. Plavicki1, and M. Yue2. 1Brown University, Providence, RI; and 2University of Wisconsin - Madison, Madison, WI.
#1623 3:25 Microglia Are Required for Anastomosis in a Computational Neurovascular Unit (cNVU). T. Zurlinden1, K. Saili1, N. Baker2, R. Spencer3, and T. Knudsen1. 1US EPA/NCCT, Research Triangle Park, NC; 2Leidos, Research Triangle Park, NC; and 3ARA, Research Triangle Park, NC.

Monday, March 11, 1:45 PM to 4:30 PM, CC Room 316

Symposium Session: Strategic Development of Read-Across within the EU-ToxRisk Project and Beyond

Chairperson(s): Marcel Leist, University of Konstanz, Konstanz, Germany; and Russell Thomas, US EPA/ORD, Research Triangle Park, NC.

Primary Endorser: In Vitro and Alternative Methods Specialty Section

Other Endorser(s): Computational Toxicology Specialty Section; Regulatory and Safety Evaluation Specialty Section

EU-ToxRisk is an integrated European “flagship” program driving mechanism-based toxicity testing and risk assessment for the 21st century. To support the paradigm shift in human risk assessment away from the traditional in vivo animal studies and toward new approach methodologies (NAMs), EU-ToxRisk, with its almost 40 partners and $40 million funding, focuses on two areas: repeat-dose systemic toxicity, using the lung, kidney, liver, and nervous system as examples of potential target organs; and developmental and reproductive toxicity. NAMs include different approaches such as in vitro, ex vivo, or omics technologies and in silico toxicokinetic modeling. The integration of NAM data into a risk assessment strategy is challenging, in particular for complex endpoints, such as repeat-dose or reproductive toxicity. This session, we will provide a view across the Atlantic; we will provide an in-depth overview and then demonstrate opportunities of the use of read-across, starting with an EU regulatory perspective and then broadening the scope to the most up-to-date developments from the EU-ToxRisk program. A focus is set on read-across case studies, by which the use of NAMs and mechanistic data is demonstrated. While the majority of techniques used within EU-ToxRisk is already well established, the project also invested into the development of new in silico prediction models. In addition, the session will address automated read-across (RASAR: read-across-based structure activity relationships) and Good Read-Across Practices. Session organizers believe that the learnings from the reported proof of concept read-across approaches will help to develop new mechanism-based chemical safety testing strategies. An early discussion on the limitations and advances of such approaches with the scientific community is needed to substantially and support a paradigm shift in regulatory risk assessment practice.

Abstract #

#1625 1:45 Strategic Development of Read-Across within the EU-ToxRisk Project and Beyond. M. Leist. University of Konstanz, Konstanz, Germany.
#1626 1:55 Status of the EU-ToxRisk Project. B. van de Water. Leiden University, Leiden, Netherlands.
#1627 2:20 Integration of NAMs in Risk Assessment: The Read-Across Approach of the EU-ToxRisk Project. S. E. Escher. Fraunhofer Institute for Toxicology and Experimental Medicine, Hannover, Germany. Sponsor: M. Leist
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<tr>
<th>Time</th>
<th>Session Description</th>
<th>Presenter(s)</th>
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<tr>
<td>2:45</td>
<td>International Acceptance of Read-Across Based on NAMs</td>
<td>H. Kamp. BASF SE, Ludwigshafen, Germany.</td>
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<td>3:10</td>
<td>Automated Read-Across and Good Practices</td>
<td>T. Hartung. Johns Hopkins University Center for Alternatives to Animal Testing (CAAT), Baltimore, MD.</td>
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<td>3:35</td>
<td>A View across the Atlantic: Synopsis and Opportunities</td>
<td>S. Fitzpatrick. US FDA, College Park, MD.</td>
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<td>4:00</td>
<td>Panel Discussion/Q&amp;A</td>
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Monday, March 11, 1:45 PM to 4:30 PM, CC Room 314

**Workshop Session: A Herculean Switch? Rethinking Chemical Carcinogenicity Assessment**

**Chairperson(s):** Sabitha Papineni, Corteva Agriscience, Indianapolis, IN; and Amy Clippinger, PETA International Science Consortium Ltd., Norfolk, VA.

**Primary Endorser: Risk Assessment Specialty Section**

**Other Endorser(s):** Carcinogenesis Specialty Section

The two-year rodent cancer bioassay has been the standard regulatory requirement to predict carcinogenicity following human exposure to chemicals, including industrial chemicals and agrochemicals, food additives, pharmaceuticals, and environmental pollutants. Decades of experience conducting the bioassay and a better understanding of biology and cancer pathogenesis have led to questions about the scientific limitations and usefulness of the bioassay, especially in light of the resources, time, and animal use associated with the test. Moreover, further questions on the relevance of these data to assess human health risk arise due to the use of very high dose levels in these studies, which are several orders of magnitude higher than real-world human exposures. To address concerns over the human relevance of the assay, a shift in thought process has paved a path to many cross-sector efforts to rethink carcinogenicity assessment. The first presentation will provide a historical perspective on development and adoption of the rodent cancer bioassay and more recent efforts to modernize testing in this area. The second presentation will focus on alternative testing methods to carcinogenicity assessment to improve the efficiency of chemical risk assessment and produce data that are more relevant to protecting human health. The third presenter will share a global perspective on development and adoption of the rodent cancer bioassay and more recent efforts to modernize testing in this area. The second presentation will focus on alternative testing methods to carcinogenicity assessment to improve the efficiency of chemical risk assessment and produce data that are more relevant to protecting human health. The fourth presentation will describe a decision tree and criteria developed within the agrochemical sector and share the results of how they have been used to retrospectively analyze the need for the cancer bioassay in regulatory decision-making. The final presentation will share the US EPA Office of Pesticide Programs’ perspective on alternative methods of testing, including a weight of evidence approach incorporating all the relevant data available including exposure, and will share their vision going forward on waiver criteria for rodent cancer bioassays. Overall, the session will include presentations from scientists across different sectors and enable a panel discussion between the speakers and audience on the value of the cancer bioassay, which has been used as the gold standard for decades by global regulatory bodies despite being resource, time, and animal intensive. Finally, the session will discuss alternative approaches that could be used to assess carcinogenicity, identifying remaining gaps and shedding light on ongoing global efforts on this subject.

**Abstract #**

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<tr>
<td>1631</td>
<td>1:45</td>
<td>A Herculean Switch? Rethinking Chemical Carcinogenicity Assessment</td>
<td>S. Papineni. Corteva Agriscience, Indianapolis, IN.</td>
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<td></td>
<td>1:45</td>
<td>Introduction.</td>
<td>S. Papineni. Corteva Agriscience, Indianapolis, IN.</td>
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<td>1634</td>
<td>2:45</td>
<td>Moving Forward in Carcinogenicity Assessment: An International Perspective</td>
<td>R. Corvi. EURL ECVAM, Ispra, Italy. Sponsor: S. Papineni</td>
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<td>1635</td>
<td>3:10</td>
<td>A Weight of Evidence Approach to Assess Carcinogenicity Potential and Retrospective Analysis of Agrochemicals</td>
<td>S. Papineni. Corteva Agriscience, Indianapolis, IN.</td>
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<td></td>
<td>4:00</td>
<td>Panel Discussion/Q&amp;A</td>
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In vitro alternative test methods sound promising but can often be difficult to implement on a global scale in a way that will be truly impactful. This is a tale of success for one such method. Medical devices are evaluated for biological safety in accordance with the ISO 10993 biocompatibility standards. Every medical device, irrespective of its nature or body contact, must be assessed for its potential to cause cytotoxicity, irritation, and sensitization. Historically, cytotoxicity was the only approved in vitro method. However, over the past decade an in vitro irritation method using reconstructed human epidermis (RhE) was validated for pure chemicals as described in OECD 439. It seemed logical that this method, with a few adjustments, could also be used to assess medical device extracts. Introducing this test as the preferred method to address the irritation potential of medical devices will greatly reduce the number of animals used for the biological safety assessment of medical devices and combination products prior to market release. This session will present the monumental collaboration that took place to bring the in vitro irritation method for medical devices to the industry, including manufacturing an extractable positive control, designing and performing an international interlaboratory round-robin study, and presenting of tools to fast-track the method into regulatory acceptance.

Abstract #

#1637  1:45  A Tale of an In Vitro Method: From Inception to International and Regulatory Acceptance. A. Turley. Nelson Laboratories LLC, Salt Lake City, UT.
1:45  Introduction to Session. A. Turley, Nelson Laboratories LLC, Salt Lake City, UT.
1:50  Introduction to Presenters. K. Coleman. Medtronic plc, Minneapolis, MN.

#1638  2:00  Time for a Change: The ISO 10993 Standards and Irritation Testing of Medical Devices. K. Coleman. Medtronic plc, Minneapolis, MN.
#1640  2:50  Creating Irritant-Infused Polymers for Extraction and Irritation Analysis. B. Rollins. ConvaTec, Greensboro, NC.
4:05  Panel Discussion/Q&A.

Workshop Session: Applying Systems Biology Approaches to Understand the Joint Action of Chemical and Nonchemical Stressors

Chairperson(s): Cynthia V. Rider, NIEHS/NTP, Research Triangle Park, NC; and Julia E. Rager, University of North Carolina at Chapel Hill, Chapel Hill, NC.

Primary Endorser: Mixtures Specialty Section

Other Endorser(s): Molecular and Systems Biology Specialty Section; Women in Toxicology Special Interest Group

Toxicology has evolved from a strictly observational science to a more predictive one that relies on knowledge of stressors (chemical or nonchemical) and the biological systems with which those stressors interact to identify health hazards. Furthermore, the introduction of the exposome concept brought into sharp focus the fact that humans are routinely exposed to a great number of chemical and nonchemical stressors over the course of a lifetime. Chemical stressors can arise from everyday use of personal care products and consumer products, occupational exposures, and exposure to pollutants through contaminated air, water, and/or food. Nonchemical stressors include physical stressors (e.g., heat and cold, radiofrequency radiation, biological agents such as allergens and viruses), and psychosocial stressors (e.g., noise, exposure to violence), which involve both exposure and perception. The traditional reductionist view reflected in toxicology by the study of one chemical at a time falls short of the promise of high-throughput technologies, a focus on biological pathway disruption, and acknowledgement that real-world exposures are complex. In response to the evolution of our thinking in toxicology and exposure science, a rational approach to address the challenges of mixtures has emerged. This conceptual framework incorporates systems biology and mixtures toxicology. Mixtures toxicology refers here to predictive models of how stressors can act when they are present concurrently, exemplified by concepts of dose addition and response addition. The starting place of this conceptual framework is the disease or endpoint of interest. Next, the adverse outcome pathways that converge at that disease are described as a network of intersecting pathways that lead from multiple molecular initiating events or key events to a single apical target. Chemicals or nonchemical stressors that are known to disrupt those pathways are identified. Finally, we can develop and test hypotheses of how those stressors might contribute to development of the disease or adverse outcome of

Program Schedule—Monday | 100
interest. Recently, several independent groups have developed projects or case studies to work through this conceptual framework. Examples of endpoints include disruption of male reproductive tract development, atherosclerosis, steatosis, and cancer. Although these efforts are in various stages of development, a detailed review of the available programs will provide opportunities to identify challenges and knowledge gaps, share information, and foster collaboration and cooperation to move the field forward. Case studies, such as the ones presented here, will inform cumulative risk assessment by providing a path forward for determining which stressors to include and how we might move away from a chemical-centric perspective to one focused on the diseases that are of greatest concern to public health.

Abstract #
#1643 1:45 Applying Systems Biology Approaches to Understand the Joint Action of Chemical and Nonchemical Stressors. C. Rider. NIEHS, Research Triangle Park, NC.
#1644 1:45 Understanding Biological Pathways across Toxicological Tools. J. E. Rager. University of North Carolina at Chapel Hill, Chapel Hill, NC.
#1646 2:45 A Model Disease to Determine the Interaction of Chemical and Nonchemical Stressors. D. J. Carlin. NIEHS, Research Triangle Park, NC.
#1648 3:45 Converging on Cancer with Systems Toxicology. C. V. Rider. NIEHS/NTP, Research Triangle Park, NC.
4:15 Panel Discussion/Q&A.

Monday, March 11, 1:45 PM to 4:30 PM, CC Ballroom III

Workshop Session: NextGen Renal Proximal Tubule Toxicity Screening: Novel Cellular Model and Complex Culture Platforms

Chairperson(s): Shuyan Lu, Pfizer, Inc., San Diego, CA; and Martijn Wilmer, Radboudumc, Nijmegen, Netherlands.

Primary Endorser: In Vitro and Alternative Methods Specialty Section

Other Endorser(s): Drug Discovery Toxicology Specialty Section; Mechanisms Specialty Section

Active renal secretion in the proximal tubules is a major drug elimination route, making the kidney susceptible to drug-induced injury. High blood flow to the kidneys significantly contributes to exposure to potential nephrotoxins that enter the cells mostly basolaterally via organic anion and organic cation transporters or apically via reabsorption processes. Many drugs associated with proximal tubule damage are polar, such as acyclovir (cLogP -2.2) and cidofovir (cLogP -2.0), exhibiting poor passive permeability, and hence require active transporters or receptors. To investigate the nephrotoxic potential of lead compounds, in vitro systems should emulate the renal physiologic environment, including functional transport machinery. Cell lines or primary cells traditionally used in 2D kidney toxicity screening lack the appropriate transporter expression, in vivo structure, and function and are unable to predict preclinical/clinical kidney toxicity. Recent biotechnological developments provide more sophisticated and promising models, including 3D culture platforms and reprogrammed proximal tubule cells, which could be utilized to create a more physiologically relevant platform with the potential to improve the prediction value for proximal tubule toxicity screening. The session will provide a general overview of these state-of-the-art biotechnological advances to facilitate the discussion about the path forward for in vitro kidney toxicity screening with high reliability and mechanistic insight.

Abstract #
#1651 2:15 Directly Reprogrammed Induced Renal Tubular Cells (iREC) for Renal Toxicity Testing. S. Lienkamp. University Medical Center Freiburg, Freiburg, Germany. Sponsor: S. Lu
#1652 2:45 Challenge Accepted: Update on NC3R NephroTube Challenge. M. Wilmer. Radboudumc, Nijmegen, Netherlands. Sponsor: S. Lu
#1654 3:45 3D Vascularized Kidney-on-Chip Models for In Vitro Drug Toxicity Studies. N. Lin. Harvard University, Cambridge, MA. Sponsor: S. Lu
4:15 Panel Discussion/Q&A.
**Platform Session: Oxidant-Mediated Injury in Toxicology**

*Chairperson(s):* Krishna P. Maremsta, University of Rochester, Rochester, NY; and Laurie Roszell, US Army Public Health Center, Aberdeen, MD.

**Abstract #**


#1656 2:00  *Macrophages Metabolic Reprogramming after Silica Exposure.* A. Marocco, K. Frawley, L. Pearce, J. Peterson, A. Detwiler, and L. Ortiz. Department of Environmental and Occupational Health University of Pittsburgh, Pittsburgh, PA.

#1657 2:15  *LncRNA MALAT1 Interacts with Nrf2 to Regulate Septic Shock in Mouse: Molecular Mechanism and Potential Therapeutic Application.* J. Chen, S. Ke, and Y. Tian. Texas A&M University, College Station, TX.

#1658 2:30  *Thiol-Containing Compound 2,3-Dimercaptopropanol (DMP) Attenuates Neuronal Hyperexcitability in Vitro and In Vivo.* A. Sri Hari1, L. Liang1, B. J. Day2, and M. Patel1. 1University of Colorado, Anschutz Medical Campus, Aurora, CO; and 2National Jewish Health, Aurora, CO.

#1659 2:45  *Decreased Survival and Increased Oxygen-Mediated Lung Injury in Mice Lacking Nrf2: Protection by Beta-Naphthoflavone.* D. A. Callaway, W. Jiang, K. Lingappan, and B. Moorothy. Baylor College of Medicine, Houston, TX.

#1660 3:00  *Oxidative Stress and Pro-inflammatory beyond the Barrier: Inhaled Chemical Exposures Alter Stromal and Epithelial Cellular Dynamics within the Airway Microenvironment.* S. C. Faber1, N. McNabb2, and S. D. McCullough1. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2US EPA/NHEERL, Research Triangle Park, NC.


3:45  Q&A.

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**Platform Session: Safety Assessment: Pharmaceutical—Drug Discovery I**

*Chairperson(s):* Tomomi Kiyota, Genentech, South San Francisco, CA; and Marie Lemper, UCB, Braine l’Alleud, Belgium.

**Abstract #**

#1663 1:45  *Target Safety Assessments: Evaluation of the Toxicological Risk of Targeting FRS (Phenylalanyl-tRNA Synthetase) in the Treatment of Malaria.* J. Barber1, C. Sadler1, D. Baud1, P. Willis2, and R. Roberts1. 1ApconIX, Alderley Edge, United Kingdom; 2Medites for Malaria Venture, Geneva, Switzerland; and 3University of Birmingham, Birmingham, United Kingdom.

#1664 2:00  *Efficacy and Preclinical Pharmacokinetics and Toxicology of L-Proparpygligynocine, a Prototype Inhibitor of Sleep Disordered Breathing (Sleep Apnea).* D. McCormick1, M. Muzzio1, G. Murillo1, and N. Prabhakar2. 1IIT Research Institute, Chicago, IL; and 2University of Chicago, Chicago, IL.


#1666 2:30  *In Vitro P-Glycoprotein (MDR-1) Activity Assay, Coupled with Cyp Induction and Hepatotoxicity Assessments, Is an Early Predictor of Drug-Drug Interaction Liabilities.* E. Maddox1, S. Maalouf1, J. P. Vanden Heuvel1,2, and B. Sherf1. 1INDIGO Biosciences, Inc., State College, PA; and 2Penn State University, University Park, PA.

#1667 2:45  *Investigation of the Mechanism of a Small Molecule-Associated Coagulopathy.* S. Kakiuchi-Kiyota1, H. Booier1, M. B. Brooks2, A. P. Stablein1, C. Chou1, Z. Zhong1, and P. Katavolos1. 1Genentech Inc., South San Francisco, CA; and 2Cornell University College of Veterinary Medicine, Ithaca, NY.

#1668 3:00  *High-Throughput Analysis of Contractile Function in Adult Canine Cardiomyocytes via Kinetic Image Cytometry.* P. M. McDonough1, R. C. Basa1, R. S. Ingemanson1, B. Azimi1, N. Abi-Gerges1, P. E. Miller1, and J. H. Price1. 1Vala Sciences Inc, San Diego, CA; 2AnaBios, San Diego, CA; and 3Scintillon Institute, San Diego, CA.


3:30  Q&A.
Exhibitor-Hosted Session: Embracing Translation at the National Toxicology Program: A Strategic Realignment

**Presented by:** National Institute of Environmental Health Sciences (NIEHS)

The National Toxicology Program (NTP) continuously builds on its history of relevance, excellence, and impact. In 2018, the NIEHS NTP Division initiated an effort to refine its portfolio and approaches to evolve the way toxicology is applied to public health issues. This session will provide information about the NTP realignment toward translational toxicology.

Exhibitor-Hosted Session: In Vitro Hepatic and Enteric Systems for Drug Metabolism, Toxicology, and Pharmacology

**Presented by:** In Vitro ADMET Laboratories Inc.

Novel in vitro experimental systems for the evaluation of hepatic and enteric drug metabolism, toxicity, and pharmacology to aid drug development will be discussed. The novel systems include human and animal 999Elite™ plateable cryopreserved hepatocytes, MetMax™ permeabilized hepatocytes and enterocytes, and cryopreserved intestinal mucosa.

Exhibitor-Hosted Session: Strategies for Large Molecule Programs: What Is Needed for Your IND Submission?

**Presented by:** WuXi AppTec

This session will provide the details that you need to know for your IND submission for your large molecule programs. WuXi AppTec will discuss the average timeline for a large molecule and how you can be better prepared to plan for your large molecule development needs.

Exhibitor-Hosted Session: Working with Weird and Wonderful Viral Vectors—How to Combine Animal Husbandry and Study Design to Ensure Success

**Presented by:** Envigo

Specific considerations are required when assessing safety of viral products. However, with an increasing move to utilization of species that are natural pathogens of toxicology species, standard approaches to handling and containment are insufficient. Creative and adaptable approaches are required to enable assessment of such products without jeopardizing unrelated studies.

Research Funding Insights Session: Funding 101: Multiple Perspectives on the NIH Grant Process

This unique session provides participants with a robust overview of the NIH grant funding process, insights from a successful early-stage investigator, and numerous opportunities to network and discuss your questions with NIH staff.
Diversity and inclusion in science are more than a strategic goal for universities, government labs, and industry. Recent findings demonstrate that diverse scientific teams produce more innovative science and more highly cited publications. However, many institutions struggle with implementing effective programs to increase representation by women, underrepresented minorities, and those from countries with fewer educational and scientific resources. This session will bring together leading experts from the Society of Toxicology, the National Institutes of Health, and the University of Maryland, Baltimore County’s Meyerhoff Scholars Program to share successful models and strategies for recruitment and retention of STEM trainees and career development toward independent research careers. The topics to be discussed include (1) an overview of the SOT Undergraduate Diversity Program’s 30 years of experience in recruiting new toxicology trainees and the Committee on Diversity Initiatives’ efforts to expand global opportunities in toxicology training, (2) the NIH perspective on supporting career success in biomedical research where the number of underrepresented minority trainees is increasing while success at the early career stage is lagging, (3) the successful implementation of the Meyerhoff Scholars Program, which encourages positive peer pressure among highly capable underrepresented minorities and structured mentoring toward advanced degrees in STEM fields, and (4) guidance on successfully navigating a career transition from academe to industry. The session will conclude with questions from the audience and a general discussion of inclusion and diversity in toxicology training and mentoring.

Abstract #

#1670 4:30 Models and Strategies for Building Diversity and Inclusion in Toxicology. C. Curran. Northern Kentucky University, Highland Heights, KY.
4:30 SOT’s Diverse Efforts to Promote Diversity and Inclusion in Toxicology Education and Training. J. Manautou. University of Connecticut School of Pharmacy, Storrs, CT.
5:10 The Meyerhoff Scholars Program: Successful Approaches for Promoting Inclusive Excellence in STEM. M. Summers. University of Maryland, Baltimore County, Baltimore, MD. Sponsor: C. Curran
5:30 Reach Back as You Climb: A Personal Journey from Academia to a Career in Drug Development. E. Lewis. Charles River Laboratories, Horsham, PA.

Monday, March 11, 4:30 PM to 5:30 PM, CC Room 340

Exhibitor-Hosted Session: Immunogenicity Testing in Preclinical Studies for Elucidating Downstream Safety Events

Presented by: Intertek Pharmaceutical Services

Preclinical animal studies may not be predictive of the heterogeneous clinical immune response but can often contribute to the understanding of a toxicity profile that can help elucidate downstream safety events caused by the pharmacological activity of therapeutic proteins.

Monday, March 11, 4:30 PM to 5:30 PM, CC Room 339

Exhibitor-Hosted Session: Impurity Identification and Analysis for ICH M7 Guidelines

Presented by: MilliporeSigma

The session will discuss an integrated testing solution for genotoxic impurities with unknown molecular structures. Molecular structures can be determined from nanograms of chemical using a novel X-ray crystallography technology, Crystal-Do. (Q)SAR in silico analysis can be performed, and if there are alerts, chemical synthesized permitting genetox testing under ICH M7.
Monday, March 11, 4:30 PM to 5:30 PM, CC Room 338

Exhibitor-Hosted Session: Refining the Use of Microelectrode Array Technology: Lessons Learned from the NeuTox Pilot Study for Neurotoxicology and Safety Pharmacology Assessment

**Presented by:** Lonza

The detection of seizurogenic activity is critical for assessments in neurotoxicology and safety pharmacology, highlighted by the efforts of the international HESI NeuTox consortium. This session will demonstrate how rodent cortical neurons and microelectrode technology can evaluate neuro-active and seizurogenic effects with example data from the HESI NeuTox pilot study.

Monday, March 11, 4:30 PM to 5:30 PM, CC Room 337

Exhibitor-Hosted Session: The Value of SEND Data—Industry Perspectives

**Presented by:** Instem

Although a standard, there can be differences in the way SEND data can be presented. Some are only concerned about doing what is needed for the US FDA to accept their submission, while others are looking beyond to gain maximum value out of their SEND data. Come and join the discussion.

Monday, March 11, 4:45 PM to 6:00 PM, CC Ballroom I

**SOT/EUROTOX Debate: Classification of Substances as Endocrine Disruptors Has a Public Health Benefit**

**Chairperson(s):** George Daston, Procter & Gamble Company, Cincinnati, OH; and Félix Carvalho, University of Porto, Porto, Portugal.

**SOT Debater:** Paul Foster, NIEHS (Retired), Research Triangle Park, NC.

**EUROTOX Debater:** Martin van den Berg, Utrecht University, Utrecht, Netherlands.

Each year, the SOT Annual Meeting includes a debate in which leading toxicologists advocate opposing sides of an issue of significant toxicological importance. The debate continues a tradition that originated in the early 1990s. This year, the debaters will address the proposition “Classification of Substances as Endocrine Disruptors Has a Public Health Benefit.”

Endocrine disruptors are compounds that produce adverse responses in various organ systems, but particularly the reproductive system, by interfering with normal hormonal signaling. There has been considerable public concern about endocrine disruptors, particularly in how much of a role they may play in causing certain cancers, infertility, and birth defects, as well as population declines in wildlife. This public concern has led to the passage of various laws in the United States and Europe to identify and regulate compounds that have endocrine-active properties. This includes action by the European Commission to develop a classification system for endocrine disruptors. It is unclear, however, whether classification as an endocrine disruptor conveys any public health benefit; endocrine disruption is a collection of modes of action, not an adverse response, and if the adverse responses are already the subject of regulation, does classification provide any additional protection? The debaters will discuss whether there is value in an additional classification scheme.

In addition to the inclusion as a Featured Session at this meeting, this debate will again take place (with the debaters taking the reverse positions) in Helsinki, Finland, during the 55th Congress of the European Societies of Toxicology (2019 EUROTOX Annual Congress), September 8–11, 2019.

Monday, March 11, 4:45 PM to 5:45 PM, Hilton Baltimore Peale

Association of Scientists of Indian Origin Special Interest Group Career Talk with Toxperts

Monday, March 11, 5:00 PM to 7:00 PM, Luna Del Sea Steak and Seafood Bistro

Allegheny-Erie, Lake Ontario, and Michigan Regional Chapters Joint Reception

Monday, March 11, 5:00 PM to 6:00 PM, CC Room 343

Food Safety Specialty Section Mentoring Event
Monday, March 11, 5:00 PM to 6:30 PM, James Joyce Irish Pub and Restaurant
Lone Star and South Central Regional Chapter Mixer

Monday, March 11, 5:30 PM to 7:30 PM, Pratt Street Ale House
Pacific Northwest Regional Chapter Reception

Monday, March 11, 5:30 PM to 8:00 PM, Cazbar
Toxicologists of African Origin Special Interest Group Reception

Monday, March 11, 6:00 PM to 10:00 PM, Luna Del Sea Restaurant
Southeastern Regional Chapter and University of Georgia Joint Reception

Monday, March 11, 6:00 PM to 7:30 PM, Hilton Baltimore See room listing below.
Specialty Section Meetings/Receptions: Biotechnology (Key 5); Dermal Toxicology (Key 8); Mechanisms (Key 6); Nanotoxicology (Key 9); Regulatory and Safety Evaluation (Holiday 3); Stem Cells (Key 11)

Monday, March 11, 7:00 PM to 9:30 PM, Hilton Baltimore Peale
Association of Scientists of Indian Origin Special Interest Group Reception

Monday, March 11, 7:00 PM to 9:00 PM, Tir Na Nog Irish Bar and Grill
Computational Toxicology, In Vitro and Alternative Methods, Mechanisms, Molecular and Systems Biology, and Regulatory and Safety Evaluation Specialty Sections Joint Mentoring Event
Tuesday, March 12, 7:00 AM to 8:00 AM, CC Starbucks

Comparative and Veterinary Specialty Section Officers Meeting

Tuesday, March 12, 7:00 AM, Camden Yards Sports Complex West Camden Street Entrance

Past Presidents’ 5K Fun Run/Walk

Supported by: IDEXX BioAnalytics

When you pack for the meeting, don’t forget your running shoes so you can participate in the ninth annual Past Presidents’ 5K Fun Run/Walk! Open to anyone interested, this event is a great opportunity to meet friends and make new acquaintances in a casual environment, joining SOT Past Presidents in showing support for the Society. Whether you’re in it for some friendly competition or would rather take a leisurely stroll, this event’s emphasis is on camaraderie and will bring together runners and walkers of all levels and paces.

Visit the Fun Run page of the SOT Annual Meeting website to register. Registration is only $25, and all proceeds support the SOT Endowment Fund.

Tuesday, March 12, 8:00 AM to 10:45 AM, CC Ballroom I

Society of Toxicology and Japanese Society of Toxicology Symposium: Epigenetic Modification in Chronic Pathology and Toxicology

Chairperson(s): Ron Hines, US EPA, Research Triangle Park, NC; and Akihiko Hirose, National Institute of Health Sciences Japan, Kawasaki, Japan.

SOT and the Japanese Society of Toxicology are delighted to jointly sponsor a symposium on a topic of mutual interest: epigenetic modifications in chronic pathology and toxicology. Each society has selected from among its membership true leaders in the field to provide their perspectives on recent advances in this area. The epigenome functions to regulate gene expression through chemical modifications to DNA and its histone protein scaffolding, as well as through the differential expression of non-coding RNAs. In contrast to DNA, where preservation of DNA fidelity is of utmost importance, the epigenome exhibits tremendous plasticity, and can respond to a range of environmental factors, including chemical exposures, diet, and stress. Consequently, epigenetic mechanisms are now well recognized as having an important role in determining toxicant-dependent adverse health outcomes. Within an adverse outcome pathway framework, toxicant-induced changes in the epigenome can alter the dose-response relationship at one or more key elements and thus impact susceptibility. More direct impacts on key elements can occur through toxicant-induced changes in the epigenome that manifest in acute gene expression changes or can persist but remain silent until activated by a second signal and then drive inappropriate gene expression at a critical window of time. This symposium will explore different avenues of research that are improving our understanding of toxicant-induced changes in the epigenome and our ability to predict adverse outcomes, but also how we are taking advantage of chemical-dependent epigenome changes to open up a new chemical space for therapeutics.

Genetic Diseases Caused by Aberrant Splicing and Their Therapeutics. Masatoshi Hagiwara, Kyoto University, Kyoto, Japan.

Patients of congenital diseases have abnormalities in their chromosomes and/or genes. Therefore, it has been considered that drug treatments can do little for these patients than to patch over each symptom temporarily when it arises. Although we cannot normalize their chromosomes and genes with chemical drugs, we may be able to manipulate the amounts and patterns of mRNAs transcribed from patients’ DNAs with small chemicals. Based on this simple idea, we have looked for chemical compounds that can be applicable for human diseases targeting kinase families of CDKs, CLKs, and DYRKs, which are involved in the regulation of gene expression, and eventually succeeded by finding FIT039, TG003, and ALGERNON as potential therapeutic drugs to cure diseases such as viral infections, Duchenne muscular dystrophy, and Down syndrome, respectively. In addition, we established splicing reporter assay with dual color (SPREADD) using a segment of pathogenic genes and found a splicing modulator, RECTAS, which can rectify the aberrant IKBKAP splicing in Familial Dysautonomia patient fibroblasts with SPREADD screening. Our chemical therapeutics are applicable for other congenital diseases, such as Fabry disease and cystic fibrosis.

Epigenetic Mechanism of Modification of Gene Expression Network by a Repeated Exposure to a Chemical. Jun Kanno, Japan Bioassay Research Center, Kanagawa, Japan.

The Percellome Project aims at reinforcing and replacing the “safety factor” by comprehensively identifying the transcriptomic networks induced by xenobiotics. “Percellome” method was developed to generate absolute copy numbers of mRNAs in a “per one cell” basis from the Affymetrix MOE430 2.0 GeneChip. Data were acquired from mouse liver after a single oral gavage (4 time points (2, 4, 8, and 24 hours after dosing) x 4 dose levels (control, low, middle, and high), triplicate, 48 GeneChip data per chemical/organ from 48 mice) on 160 chemicals are compiled. Here, we report the newly designed repeated-dosing study; 48 wild-type mice were repeatedly given a same dose of a chemical orally for 4 to 14 days to create a “chemically induced transgenic state.” Then, the next day, a single gavage of a chemical in four dose levels was given, and the liver was sampled at 2, 4, 8, and 24 hours thereafter. Up to now, GeneChip data on CCl4, tributyltin, deet, clofibrate, valproic acid, acetaminophen, phenobarbital, thalidomide, 5-fluorouracil, acephate, imidacloprid, and diethylthioctosamine are obtained. Repeated dosing of CCl4 suppressed the baseline expression of many genes related to ER stress. Valproic acid did not show such an effect. Tributyltin and deet were similar to CCl4, whereas acetaminophen and phenobarbital enhanced the response. Thalidomide showed complex response—suppression of 2 hr response and enhancement of 4 to 8 hr response. 5-FU tended to show an elevation of baseline with increased transient response. Acephate was similar to valproic acid (i.e., no effect of repeated dosing). To clarify the molecular basis, whole genome bisulfite analysis (WGBA) and ChiP-seq using antibodies against H3K4me3, H3K27me3, H3K27Ac, and H3K9me3 were applied to the CCl4, sample pair. WGBA was validated by a F1 of C57BL/6 and Japanese domestic syngenic JF1 mice that have 10 million SNPs so that maternal and paternal strands of imprinting genes can be clearly identified. In short, 14 days of CCl4 treatment did not alter DNA methylation. On the other hand, ChiP-seq revealed that transcriptomic activation by the treatment in some characteristic genes was in good correlation with histone modification. More details on the relation between GeneChip data and valproic acid will be presented. Co-Authors: Ken-ichi Aisaki, Ryuchi Ono, and Satoshi Kitajima with the Biological Safety Research Center, National Institute of Health Sciences, Kawasaki, Kanagawa, Japan. Funding Source: This project is supported by the Health and Labour Sciences Research Grant, MHLW, Japan. Disclosure Statement: None of the authors have any conflicts of financial interest to declare.

Epigenetics and the Use of piRNA for Epigeneome Editing in Environmental Health Research. Dana C. Dolinoy, University of Michigan School of Public Health, Ann Arbor, MI.

Toxicant exposures early in life adversely affect health outcomes in both animals and humans, in part due to epigenetic mechanisms (e.g., DNA methylation). Studies also indicate that exposure impact on the epigenome can be tissue and cell specific. Yet, epigenetic epidemiology analysis of toxicants is often limited to biologically available or “surrogate” (e.g., blood, saliva) samples. Using lead (Pb) and bisphenol A (BPA) as representative toxicants, we evaluate tissue-specific epigenetic alterations associated with perinatal exposures and disease outcomes. These analyses include a multi-omics integration of DNA methylation and hydroxymethylation, chromatin accessibility, and gene expression data in an effort to inform epigenetic epidemiology studies with an environmental focus. Our approach evaluates sex differences and conducts analyses immediately following perinatal exposure in target tissues (e.g., liver and brain) and in surrogate tissues of human relevance (e.g., blood leukocytes), as well as longitudinally into adulthood, to identify persistent exposure-dependent epigenetic changes. Once regions of altered methylation are identified, precision modification of the epigeneome holds great promise for our ability to modify environmentally induced changes in gene expression yet is currently out of reach using common techniques (drugs, transgenics, etc). Until recently, it was widely believed that Piwi Like RNA-Mediated Gene Silencing (PiWIL) gene expression was confined to the germ line of animals, and neither PiWILs nor piRNAs were present or active in somatic tissues. Our research overturns this accepted knowledge by finding widespread PiWIL expression in multiple somatic tissues of the mouse. Thus, we are now using this class of RNA to develop in vivo technology to target specific genes and loci for stable, mitotically heritable silencing at predetermined genomic locations. This research is providing sorely needed evidence clarifying the roles and activity of piRNA in somatic tissues of mammals and will be used to develop piRNA targeted methylation for the wider toxicological research and therapeutic communities.

Epigenic Reprogramming by Early-Life Environmental Exposures. Cheryl Lyn Walker, Baylor College of Medicine, Center for Precision Environmental Health, Houston, TX.

Early in life, the epigeneome is quite plastic and modifiable by the environment—for example, by maternal-fetal interactions in utero, diet, and exposure to environmental chemicals. These epigenome-environment interactions can provide an adaptive advantage but in other cases can disrupt the epigeneome to alter physiology and increase disease susceptibility in adulthood. After a developmental exposure to the prototypical endocrine-disrupting chemical (EDC) bisphenol A, we conducted longitudinal epigenomic, transcriptomic, and metabolomic profiling across the life course to understand how an early-life exposure could reprogram the epigeneome and drive metabolic dysfunction in adulthood. This early-life EDC exposure targeted the plasticity of the developing epigeneome, increasing specific histone modifications (H3K4me1, H3K27Ac, and H3K27me) to accelerate epigenomic plasticity and accelerating epigenetic aging, resulting in persistent epigenetic reprogramming that can drive metabolic dysfunction in adulthood. Co-Authors: Lindsey S. Trevino with City of Hope, Duarte, CA; Tiffany A. Katz, Jianrong Dong, Akhilesh Kaushal, Rahul Jangid, and Cristian Coarfa with the Center for Precision Environmental Health, Baylor College of Medicine, Houston, TX; and Matthew J. Robertson with Advanced Technology Cores, Baylor College of Medicine, Houston, TX.
Thelights the various ways that metals can target and alter SCs during biological processes such as differentiation, tissue repair and regeneration, and carcinogenesis.

Endothelial Dysfunction (ED) has referred traditionally to any decrement in endothelium-dependent vascular function. This typically involves nitric oxide (NO) production/signaling, as NO is one of the most ubiquitous messengers. This selective definition remains important today, as loss of NO production/bioavailability can contribute to any number of pathological sequelae, including hypertension, erectile dysfunction, and thrombogenesis/stroke. Our understanding of endothelium biology and ED now incorporates other dysfunctional changes, including angiogenesis, vascular permeability, release of matrix metalloproteinases (MMPs), expression of adhesion proteins, and loss of endothelial repair, to name a few, into an ever more inclusive definition of ED. New technologies and tools applied in the assessment of said functions have spurred innovative measures of myriad ED-related outcomes and a better appreciation of the functional capacity of endothelium. The session will span a continuum of complementary methodological approaches, from flow-mediated dilation in humans to angiogenesis assays in vitro and in vivo. As an overall theme for exploring emergent measures of ED, the symposium will focus on ED induced by inhaled toxins, which provides a real-world, contemporary problem and an unresolved mystery by which inhaled air toxics (air pollution, nanoparticles, e-cigarette aerosols) exert extrapulmonary influence over the systemic endothelium.

Abstract #

#1671 8:00  "Not Your Father’s ED”: Expanding the Definition and Understanding of Endothelial Dysfunction (ED) Due to Inhaled Toxicants. D. Conklin. University of Louisville, Louisville, KY.

#1672 8:10  Diverse Methodological Approaches to Investigate the Endothelial Impacts of Toxicants and Systemic Inflammation. M. J. Campen. University of New Mexico, Albuquerque, NM.

#1673 8:40  Flavoring Additives in Tobacco Products Induce Endothelial Cell Dysfunction. J. Fetterman, and N. Hamburg. Boston University, Boston, MA. Sponsor: D. Conklin


#1675 9:40  Endothelial Heterogeneity: Diverse Anatomic and Physiologic Determinants of Toxicological Assessments after Inhalation Exposures. T. R. Nurkiewicz. West Virginia University, Morgantown, WV.

10:10  Moderated Panel Discussion. C. J. Wingard. Bellarmine University, Louisville, KY.

Tuesday, March 12, 8:00 AM to 10:45 AM, CC Room 314

Symposium Session: “Not Your Father’s ED”: Expanding the Definition and Understanding of Endothelial Dysfunction (ED) Due to Inhaled Toxicants

Chairperson(s): Daniel J. Conklin, University of Louisville, Louisville, KY; and Matthew J. Campen, University of New Mexico, Albuquerque, NM.

Primary Endorser: Cardiovascular Toxicology Specialty Section

Other Endorser(s): Inhalation and Respiratory Specialty Section; Stem Cells Specialty Section

Humans are exposed to metals on a daily occurrence. These exposures can occur during all stages of life, and could result in toxic effects in all organ systems, leading to aberrations in development and other biological processes. Stem cells (SCs) are highly specialized cells that are found in nearly all tissues and organs. Alterations in normal SC functions can adversely affect development and health, and can play key roles in disease etiology. The objective of this session is to highlight the various ways that metals can target and alter SCs during biological processes such as differentiation, tissue repair and regeneration, and carcinogenesis. The first presentation will focus on how chronic arsenic exposure alters muscle SC function to diminished regeneration, and how the effects of this metalloid on the microenvironment appear to play a key role in these alterations. The second presentation will discuss the effects of early-life methyl mercury exposure on muscle development and resultant motor function deficits, including the key roles of several candidate genes that act at the level of muscle SCs and/or regulate myocyte differentiation, mitochondrial biogenesis, and mtDNA transcription. The third talk will describe how subchronic manganese exposure affects adult neurogenesis by reducing the number of neural SCs in the hippocampal dentate gyrus and inhibiting the differentiation of neural stem/progenitor cells to mature neurons. The implications of these effects in Parkinson’s disease will be presented. The fourth presentation discusses how arsenic targets SCs and alters SC signaling pathways during carcinogenesis and the emerging evidence of how the metalloid can “recruit” SCs via altering exosome cargo and the tumor microenvironment. The final presentation focuses on how the stage of life during cadmium exposure can lead to differences in the number of breast SCs and their differentiation. Mechanisms underlying these differences and in breast cancer formation induced by this heavy metal will be presented. This session will be of interest to scientists involved in SCs, metals, development, or cancer research, and will be ideal for those who desire mechanistic understanding of the pathogenic and toxic effects of metals on SCs.
Brain health is essential for human well-being across all life stages. Brain development and function are impacted by both genetic and environmental factors. Environmental factors, including exposure to environmental contaminants, are implicated in the etiology of a number of developmental, psychiatric, and neurodegenerative disorders. The zebrafish is a powerful model for assessing the impact of toxicants on brain development and function. Zebrafish embryos are externally fertilized, which enables direct exposure of the developing embryo, obviating the requirement for maternal exposures. In addition, developing embryos are transparent, which allows for in vivo imaging of the developing brain. Overall, development occurs rapidly, including formation of the nascent nervous system by three days of life. Furthermore, a suite of behavioral assays have been developed as functional readouts of toxicant effects on nervous system development and function.
and these have been routinely adapted to medium-to-high-throughput screens for hazard identification and chemical prioritization. In this session, researchers will describe how they have leveraged the zebrafish model to investigate different mechanisms of action by which toxicant exposure alters brain development and function. The first presentation will reveal the essentiality of the aryl hydrocarbon receptor (AHR) in blood-brain barrier (BBB) formation and how AHR agonists perturb BBB development. The second talk will introduce the microbiota-gut-brain axis and how developmental exposure to exogenous estradiol compromises neurobehavioral development in a microbiota-dependent manner. The third talk will illuminate the role of GABAergic perturbations by environmental chemicals using a gene editing approach. The fourth presentation will show a mechanistic link between domoic acid exposure, myelination defects, and impaired startle response. The fifth talk will highlight new analytical chemistry approaches that can be used to elucidate mechanisms by which xenobiotics disrupt cholineric, serotonergic, dopaminergic/adrenergic, histaminergic, and glutaminergic/GABAergic neurotransmitter systems. An excellent 2018 zebrafish session surveyed the multiple uses for larval and adult zebrafish including screening environmental chemicals for developmental toxicity, identifying epilepsy drugs, examining chemical uptake, and the assessing of the effects of early-life chemical exposures on adult behavior or transgenerational epigenetic changes. This 2019 session, however, will focus solely on the developing nervous system and all presentations will be mechanistically focused. Attendees will be exposed to the basic biology underlying unique neurodevelopmental systems like the blood-brain barrier, microbiota-gut-brain axis, GABAergic neuronal activity, and axonal myelination. In addition, perturbation of these systems by toxicant exposures will reveal linkages between these core neurodevelopmental processes and phenotypic outcomes like hyperactivity, seizures, abnormal startle responses, and blood-brain barrier maintenance and function.

Abstract #

#1687 8:00  Using Zebrafish as a Model to Understand and Ultimately Prevent Neurotoxicity. J. Plavicki. Brown University, Providence, RI.

#1688 8:05  Zebrafish as a Model for Studying Toxicant-Induced Neurovascular Malformations and Blood-Brain Barrier Dysfunction. J. Plavicki. Brown University, Providence, RI.


#1690 9:09  Using Larval Zebrafish as a Model Organism to Study Chemical-Induced Seizures. D. Carty, and P. Lein. University of California Davis, Davis, CA.


Tuesday, March 12, 8:00 AM to 10:45 AM, CC Room 321

Workshop Session: Emergent Mechanisms of Cytochrome P450 Gene Regulation: Defining an Improved Roadmap toward 21st-Century Pharmacogenomics

Chairperson(s): Andrew J. Annalora, Oregon State University, Corvallis, OR; and Patrick L. Iversen, LS Pharma, LLC, Lebanon, OR.

Primary Endorser: Molecular and Systems Biology Specialty Section

Other Endorser(s): Mechanisms Specialty Section

To understand the interplay between nuclear receptor (NR) signaling and the expression of phase I, II, and III drug metabolizing systems, one must appreciate the role that endo-xenobiotic exposures play in organizing both gene expression and alternative gene splicing events. The human transcriptome is shaped by an array of different factors, including genetics, chemical exposures, diet, and metabolic diseases; this complex process is mediated primarily by differential recognition of gene promoters and canonical splice-sites by either the DNA Polymerase II transcriptional complex or the spliceosome; the structural organization of these multi-subunit, gene-processing complexes are subject to modulation by ligand-activated NR proteins that allow highly specific cellular responses to chemical or microbial invasion. Systems approaches are quickly expanding our ability to assess the impact of endo-xenobiotic exposures on gene expression and metabolism. The goal of the session is to integrate cutting-edge research focused on various systems approaches to toxicology that are providing novel insights into the global determinants of Cytochrome P450 (CYP) gene regulation as needed to synthesize a more coherent model of NR-mediated regulation of both transcription and gene splicing. The workshop will highlight research aimed at deconvoluting the overlapping contributions that endogenous substrate, xenobiotic, and microbiome-mediated metabolism play in crafting cellular responses to the environment, in pursuit of an improved pharmacogemomic framework for advancing both predictive toxicology and precision-based approaches to medicine. The presentations will also explore how alternative model systems, such as the organ-on-a-chip technology, are providing new opportunities to manipulate CYP gene expression and splicing in a highly personalized manner that promises to usher in a new era of safe and effective gene-directed therapeutics.

Abstract #

#1693 8:00  Emergent Mechanisms of Cytochrome P450 Gene Regulation: Defining an Improved Roadmap toward 21st-Century Pharmacogenomics. A. Annalora. Oregon State University, Corvallis, OR.


**Program Schedule—Tuesday**

**112**

**9:05**  
*Intestinal Epithelial Cell Receptors as Modulators of Host-Microbiota Communication.*  
A. Patterson. Pennsylvania State University, University Park, PA.

**9:35**  
*Demystifying Alternate Transcripts in Toxicology: How the Environment Shapes Our Cellular Response to Stress and Shapes Human Health Resilience.*  
P. L. Iversen. LS Pharma, LLC, Lebanon, OR. Sponsor: A. Annalora

**10:05**  
*Developing the Human “Kidney-on-a-Chip”: An Enhanced Model System for Assessing Personalized Drug and Xenobiotic Toxicity.*  
E. Kelly. University of Washington, Seattle, WA.

10:35  
Panel Discussion/Q&A.

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**Tuesday, March 12, 8:00 AM to 10:45 AM, CC Room 309**

**Workshop Session: Predicting Metabolic Clearance Rates for Drug Leads and Environmental Chemical Risk Assessment**

**Chairperson(s):** Nisha Sipes, NIEHS/NTP, Research Triangle Park, NC; and Jon Arnot, ARC Arnot Research and Consulting Inc., Toronto, ON, Canada.

**Primary Endorser: Biological Modeling Specialty Section**

**Other Endorser(s):** Computational Toxicology Specialty Section; Risk Assessment Specialty Section

As the National Research Council (NRC) established in 1983, chemical risk assessment requires analysis of hazard, exposure, and the dose-response relationship, all three of which require toxicokinetic (TK) data that are often unavailable. To address this gap, *in vitro* high-throughput TK approaches have been developed to assess metabolic clearance rate, and fraction unbound, in plasma. However, while high(er) throughput, these *in vitro* approaches are still too slow to address all novel compounds and chemicals occurring in commerce and the environment. Several computational methods have been published for predicting plasma binding for pharmaceuticals and environmental spaces, but the prediction of metabolic rate has been more difficult. Libraries of TK data, largely obtained from *in vitro* assays, have been painstakingly obtained for many hundreds of chemicals. TK libraries are now being used as gold standards for developing methods to estimate TK for untested compounds. These methods draw inferences from chemical structure and physicochemical properties. If the uncertainty and domain of applicability can be characterized and quantified, then these methods would allow for a timely, risk-based prioritization strategy characterizing dose relationships between *in vitro* bioactivities and predicted human exposure. Presenters will consider the state-of-the-science between traditional and higher-throughput methods, and the associations between them, such as extrapolation techniques, model confidence, acceptable uncertainty, and context applicability. Understanding the state-of-the-science in *in silico* toxicokinetics for government and industry applications will aid the inclusion of such techniques when limited data are available.

**Abstract #**

**1699**  
8:00  
*Predicting Metabolic Clearance Rates for Drug Leads and Environmental Chemical Risk Assessment.*  
N. Sipes. NIEHS, Research Triangle Park, NC.

8:00  
*Introduction: The Necessity of In Silico Methods for Prioritizing Chemical Risk.*  
N. Sipes. NIEHS/NTP, Research Triangle Park, NC.

**1700**  
8:10  
*Implementation and Evaluation of State-of-the Art In Silico Models for In Vitro and In Vivo Endpoint Predictions.*  
D. Mucs. RISE (Research Institutes of Sweden), Södertälje, Sweden. Sponsor: J. Wambaugh

**1701**  
8:39  
*Applying In Silico-In Vitro-In Vivo Extrapolation (IS-IVIVE) Techniques to Predict Exposure and Guide Risk Assessment.*  
M. Lawless. Simulations Plus, Lancaster, CA.

**1702**  
9:08  
*Quantitative Property-Property Relationship for Screening-Level Prediction of Intrinsic Metabolic Clearance.*  
C. Kirman. Summit Toxicology, Bozeman, MT.

**1703**  
9:37  
*Designing QSARs for Metabolic Clearance and Plasma Protein Binding in Diverse Chemical Space Using Pharmaceutical Data.*  
B. Ingle. ICF International, Research Triangle Park, NC.

**1704**  
10:06  
*Using Chemical Structure Information to Develop Predictive Models for In Vitro Toxicokinetic Parameters to Inform High-Throughput Risk Assessment.*  
P. Pradeep. US EPA/ORISE, Research Triangle Park, NC.

10:35  
Panel Discussion/Q&A.
Workshop Session: Shifting Currents in Predictive Toxicology and Safety Evaluation with In Vitro and Alternative Approaches

Chairperson(s): Marie C. Fortin, Jazz Pharmaceuticals, Ewing, NJ; and Jessica L. LaRocca, Corteva Agriscience, Indianapolis, IN.

Primary Endorser: Regulatory and Safety Evaluation Specialty Section

Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Molecular and Systems Biology Specialty Section

Transformative approaches, such as organotypic in vitro models and high content screening, are redefining the science of toxicology. However, the path to their integration in toxicity testing programs remains somewhat elusive. Toxicity testing, a necessary element of product development and the foundation of human health risk assessment, has traditionally relied heavily on in vivo apical endpoints. The advent of in vitro and computational technologies holds promise to drastically change and improve the testing paradigms of the future. Beyond the obvious benefit of reducing animal testing, embracing high-throughput predictive models can both provide valuable information to aid in molecule design and provide guidance for targeted toxicological testing strategies. This session will focus on innovative methods, such as toxicogenomics, 3D microtissues, and in vitro high content analysis, that are being used to characterize the safety profile of molecules and products, and their application to predictive and mechanistic toxicity testing approaches. Emphasis will be given to methods that are currently being employed to characterize the safety profile of molecules and products and inform decision-making. The targeted audience would be those interested in understanding how these tools are being leveraged in real-world applications, such as integrated approaches to testing and assessment (IATA) strategies to help prioritize and streamline chemical testing programs. To this end, experts from industry, government, academia, and non-for-profit were gathered to discuss the current state-of-the-science. The talks will present how cutting-edge research tools and next-generation alternative models are being integrated in the safety evaluation of environmental chemicals, pharmaceuticals, and plant protection products. Topics covered will include the value of in vitro transcriptomics to predict in vivo apical findings and identify points of departure; the use of a systems approach to predict and mechanistically classify kidney toxicity in vitro; the use of in silico and in vitro models in discovery toxicology; and the utility of 3D tissue models for screening endocrine disruptors. Following the presentations, a Q&A will be held to engage the audience. Attendees will leave with a deeper understanding of the realm of potential applications of next-generation toxicology models. They will also gain insight into the strengths, limitations, and future development opportunities of in vitro and alternative models for predictive toxicology.

Abstract #

#1705 8:00 Shifting Currents in Predictive Toxicology and Safety Evaluation with In Vitro and Alternative Approaches. M. Fortin. Jazz Pharmaceuticals, Ewing, NJ.

8:00 Introduction. M. C. Fortin. Jazz Pharmaceuticals, Ewing, NJ.

#1706 8:10 Evaluation of In Vivo and In Vitro High-Throughput Transcriptomics for Safety Assessment. W. Gwinn. NIEHS/NTP, Research Triangle Park, NC.

#1707 8:35 Using a Systems Approach to Predict and Mechanistically Classify Kidney Toxicity In Vitro. S. Ramm. AstraZeneca, Boston, MA.

#1708 9:00 Integration of In Vitro and In Silico Models for Predictive Toxicology in Discovery Molecule Development. J. L. LaRocca. Corteva Agriscience, Indianapolis, IN.

#1709 9:25 Screening Estrogenic Endocrine-Disrupting Chemicals with Human MCF-7 3D Microtissues by In Vitro Pathology. K. Boekelheide. Brown University, Providence, RI.

#1710 9:50 In Vitro Hepatic Model Systems for Investigative and Predictive Toxicology Applications. E. LeCluyse. LifeNet Health Institute of Regenerative Medicine, Research Triangle Park, NC.

10:15 Panel Discussion. M. C. Fortin. Jazz Pharmaceuticals, Ewing, NJ.

Workshop Session: Strategies to Mitigate the Health Impacts of Air Pollutants in Susceptible Populations

Chairperson(s): Haiyan Tong, US EPA/NHEERL, Research Triangle Park, NC; and Howard M. Kipen, Rutgers, The State University of New Jersey, Piscataway, NJ.

Primary Endorser: Inhalation and Respiratory Specialty Section

Other Endorser(s): Cardiovascular Toxicology Specialty Section

The World Health Organization (WHO) has estimated that indoor and outdoor air pollution causes approximately 7 million premature deaths worldwide each year, and 40,000–60,000 premature deaths in the United States alone. Implementation of the regulations of the Clean Air Act has brought forth substantial improvements in air quality and attendant benefits to public health. Yet tens of millions of Americans still live in areas where levels of air pollutants exceed US EPA’s National Ambient Air Quality Standards (NAAQS). Furthermore, some studies have shown that there is no threshold for exposure to particulate air pollution below which exposure is safe, implying that susceptible individuals may be at risk of adverse health effects not only in nonattainment areas but also in communities that are in compliance with NAAQS. Two main intervention strategies to further reducing adverse health impacts of air pollution are reducing personal exposure to air...
Abstract #

Strategies to Mitigate the Health Impacts of Air Pollutants in Susceptible Populations. 
H. Tong. US EPA, Research Triangle Park, NC.

Better Stoves or Cleaner Fuels: What Is the Evidence Base That Is Needed to Decrease the Burden of Household Air Pollution? 

Vitamin E (Gamma-Tocopherol)-Based Intervention for Environmental Airway Disease. 
N. Alexis. University of North Carolina at Chapel Hill, Chapel Hill, NC. Sponsor: H. Tong

Dietary Intervenational Approach to Ameliorate the Health Effects of Air Pollution. 
J. M. Samet. US EPA, Research Triangle Park, NC.

Personal Solutions to Air Pollution: What Does the Evidence Recommend? 
H. M. Kipen. Rutgers, The State University of New Jersey, Piscataway, NJ.

Urban Green Spaces Reduce Stress-Related Allostatic Load and Enhance Resilience to Environmental Insults. 
A. Egorov. US EPA, Chapel Hill, NC. Sponsor: H. Tong

Panel Discussion/Q&A.

Tuesday, March 12, 8:00 AM to 10:45 AM, CC Room 310

Platform Session: SPC Highlights Emerging Scientists: Adverse Effects of Perfluorinated Alkyl Substances

Chairperson(s): Udayan Apte, University of Kansas Medical Center, Kansas City, KS; and Suzanne E. Fenton, NIEHS/NTP, Research Triangle Park, NC.

Abstract #

Bayesian Evaluation of Physiologically Based Pharmacokinetic (PBPK) Modeling for Perfluorooctanesulfonate (PFOS) to Characterize the Interspecies Uncertainty between Mice, Rats, Monkeys, and Humans: Development and Performance Verification. 
W. Chou, and Z. Lin. Kansas State University, Manhattan, KS.

Class Comparison Study of Perfluorinated Substances in Sprague-Dawley Rats: Liver Toxicity and Thyroid Hormone Dysregulation. 
A. Dziriengla1, K. Janardhan1, R. Herbert1, M. Cora1, M. Vaillant1, D. Gerken1, M. Hejtmancik1, S. Waidyanatha1, K. Snowley1, and C. Blystone1. 
1NIEHS/DNTP, Morrisville, NC; 2Integrated Laboratory Systems, Morrisville, NC; and 3Battelle, Columbus, OH.

An In Vitro Screen of a Panel of Perfluoroalkyl Substances and an In Vivo Assessment of Effects on Placental and Fetal Growth. 
B. Blake, H. Cope, and S. Fenton. NIEHS, Research Triangle Park, NC.

Effect of Lifestyle-Based Lipid-Lowering Interventions on the Relationship between Circulating Levels of Per- and Poly-Fluorinated Chemicals and Serum Cholesterol. 
M. Petriello, A. Mottaleb, M. Kraemer, G. Mudd-Martin, D. Moser, and A. Morris. University of Kentucky, Lexington, KY.

Targeted Gene Expression Assays Reveal Markedly Different Gene Expression and Lipid Accumulation Profiles for Perfluoralkyl (PFAA) Mixtures Compared to Single PFAA Treatment in Cryopreserved Human Hepatocytes. 
E. Marques1, M. Pfohl1, W. Wei1, O. Amaze2, and A. Stlirit3. 
1University of Rhode Island, Kingston, RI; and 2University of Lagos, Lagos, Nigeria.

Perfluorooctanesulfonic Acid (PFOS) Is Selectively Neurotoxic to Dopaminergic Neurons in C. elegans. 
S. R. Sammi, and J. R. Cannon. Purdue University, West Lafayette, IN.

D. R. Hall, J. Han, S. Joudan, and H. Peng. University of Toronto, Toronto, ON, Canada. Sponsor: D. Hall, Society of Environmental Toxicology and Chemistry

Adverse Effects of Oral Gestational Exposure to Hexafluoropropylene Oxide Dimer Acid (GenX) in the Sprague-Dawley Rat. 
J. Conley1, C. Lambright1, N. Evans1, M. Strynan1, J. McCord1, B. McIntyre2, G. Travlos1, M. Cardon1, E. Medlock-Kakeyia1, P. Hartig1, V. Wilson1, and L. Gray Jr1. 
1US EPA/ORP/NHEERL/TAD, Research Triangle Park, NC; 2US EPA/ORD/NERL/EMMD, Research Triangle Park, NC; and 3NIEHS/NTP, Research Triangle Park, NC.

Q&A.
Tuesday, March 12, 8:30 AM to 9:30 AM, CC Room 302

**Undergraduate Educator Network Meeting**

**Chairperson(s):** Christine Perdan Curran, Northern Kentucky University, Highland Heights, KY.

**Endorser(s):** Education Committee; Undergraduate Education Subcommittee

The Undergraduate Educator Network Meeting is for all faculty involved in teaching toxicology to undergraduates, trainees thinking about teaching, and those interested in including toxicology at the undergraduate level. Learn about initiatives for undergraduate faculty, provide your input, network with your colleagues, and discuss shared interests.

Tuesday, March 12, 9:00 AM to 10:00 AM, CC Room 340

**Exhibitor-Hosted Session: Animal-Free Testing Strategies for Risk Assessment of Inhalable Compounds**

**Presented by:** Fraunhofer ITEM

Testing strategies to predict toxicity after repeated-dose inhalation exposure will be introduced. Chemically similar compounds sharing a specific adverse outcome pathway (AOP) in vivo are tested in vitro. Gene expression analyses are combined with QSAR and PBPK models to establish an integrated approach for testing and assessment (IATA).

Tuesday, March 12, 9:00 AM to 10:00 AM, CC Room 338

**Exhibitor-Hosted Session: Endocrine Disrupter (ED) Testing in the European Union (EU)—From ‘Conceptual Framework’ to Reality**

**Presented by:** Envigo

The European Union (EU) is finally emerging from the shadow of proactive US EPA testing-based approaches embodied in the EDSP Tier 1 battery and development of the EDSP21 Dashboard. The OECD ‘Conceptual Framework’ has now come of age with ED assessment for agrochemical AIs coming into force from November 10, 2018.

Tuesday, March 12, 9:00 AM to 10:00 AM, CC Room 337

**Exhibitor-Hosted Session: ICCVAM Update on Implementing New Approaches to Evaluate the Safety of Chemicals and Medical Products in the United States**

**Presented by:** National Institute of Environmental Health Sciences (NIEHS)

In 2018, ICCVAM published a strategic roadmap to guide US federal agencies and stakeholders seeking to adopt new approaches to safety and risk assessment that improve human relevance and replace or reduce the use of animals. This session will provide an update on implementation activities within federal agencies.

Tuesday, March 12, 9:00 AM to 10:00 AM, CC Room 339

**Exhibitor-Hosted Session: SEND (Standard for Exchange of Nonclinical Data) Past, Present, and Future, and What It Means for Toxicologists**

**Presented by:** PDS Life Sciences Inc

Provide a SEND update on what has happened to date, including latest information provided by the FDA to the SEND community. The most pressing issue is the implementation of SENDIG v3.1 in March 2019. Further discussion on new requirements compared to the SENDIG v3.0.
Abstract #

#1725  

#1726  
**Post. Board Number #1726**  

#1727  
**Poster Board Number #1727**  

#1728  
**Poster Board Number #1728**  
**The Development of a Database for Herbal and Dietary Supplement Induced Liver Toxicity.** J. Zhu1, J. Seo1, S. Wang2, K. Ashby1, R. Ballard1, D. Yu1, B. Ning1, R. Agarwal1, J. Borlak1, W. Tong2, and M. Chen1. 1. US FDA/NCCT, Jefferson, AR; 2. China's State Food and Drug Administration, Beijing, China; 3. US FDA/CDER, Jefferson, AR; and 4. Hannover Medical School, Hannover, Germany.

#1729  
**Poster Board Number #1729**  

#1730  
**Poster Board Number #1730**  
**Ensemble QSAR Modeling to Predict Multispecies Fish Toxicity Points of Departure.** T. Sheffield, and R. Judson. US EPA, Research Triangle Park, NC.

#1731  
**Poster Board Number #1731**  
**Computational Association of Permethrin Exposure and Asthma in California Agricultural Counties.** R. Farkhar, D. Ruvalcaba, C. Thatcher, and D. Johnson. University of California Berkeley, Berkeley, CA.

#1732  
**Poster Board Number #1732**  
**Analyzing ToxCast Data Using Nebula (Neighbor-Edges Based and Unbiased Leverage Algorithm).** H. Hong, and W. Tong. US FDA, Jefferson, AR.

#1733  
**Poster Board Number #1733**  
**Applications of Toxicokinetics in Animal-Free Risk Assessments: What We Know and What We Need to Know.** E. Fabian, R. Landsiedel, and B. van Ravenzwaay. BASF SE, Ludwigshafen am Rhein, Germany.

#1734  
**Poster Board Number #1734**  
**In Vitro to In Vivo Extrapolation of High-Throughput Screening Assay for Thyroperoxidase Inhibition.** H. Hassan1, H. E. Masri2, J. Ford1, A. Brennan3, S. Handa4, and M. E. Gilbert1. 1. US EPA, Research Triangle Park, NC; and 2. Oak Ridge Institute for Science and Education (ORISE), Oak Ridge, TN.

#1735  
**Poster Board Number #1735**  

#1736  
**Poster Board Number #1736**  
**Utilization of the Ascentos LIMS and TransSEND to Streamline the Collection and Compilation of Data for Send Dataset Creation.** C. Drennan1, L. Eickhoff2, M. Schuster1, and P. Dugan1. 1. BASI, Mount Vernon, IN; and 2. PDS Life Sciences, Mount Arlington, NJ. Sponsor: L. Hopper

#1737  
**Poster Board Number #1737**  
**Retrospective and Prospective Case Studies to Accelerate the Pace of Chemical Risk Assessment.** K. Paul Friedman, M. Gagne1, T. Barton-Maclaren1, J. Bucher1, R. Thomas1, M. Rasenberg1, and T. Sobanski1. 1. US EPA/NCCT, Research Triangle Park, NC; 2. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, ON, Canada; 3. NIEHS/NTP, Research Triangle Park, NC; and 4. Computational Assessment Unit, European Chemicals Agency, Helsinki, Finland.

#1738  
**Poster Board Number #1738**  

#1739  
**Poster Board Number #1739**  
**Characterizing Developmental Toxicity through Pluripotent Stem Cell Assays and the ToxCast Library.** T. Zurlinden1, K. Salit2, N. Baker1, E. Hunter1, and T. Knudsen1. 1. US EPA/NCCT, Research Triangle Park, NC; 2. Leidos, Research Triangle Park, NC; and 3. US EPA/NHEERL, Research Triangle Park, NC.
#1740 Poster Board Number

#1741 Poster Board Number

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#1746 Poster Board Number

#1747 Poster Board Number

#1748 Poster Board Number

#1749 Poster Board Number

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#1754 Poster Board Number

#1755 Poster Board Number

#1756 Poster Board Number

#1757 Poster Board Number
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Post Session: Computational Toxicology II**

**Chairperson(s): Matthew Martin, Pfizer, Inc., Groton, CT; and Daniel Wilson, Dow Chemical Company, Midland, MI.**

**Displayed: 9:15 AM—4:30 PM | Author Attended: 10:45 AM—12:15 PM**

<table>
<thead>
<tr>
<th>Abstract #</th>
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<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>#1758</td>
<td>Comparative Case Studies to Establish a Standardized Process for Read-Across within a Daily Safety Assessment Workflow.</td>
<td>T. Kawamoto, A. Grantzny, J. Rathman, A. Mostrag, and C. Yang. Kao Corporation, Ichikai-machi, Japan; Kao Germany GmbH, Darmstadt, Germany; Ohio State University, Columbus, OH; and BM-AM, Columbus, OH.</td>
</tr>
<tr>
<td>#1759</td>
<td>Biocerlate Sendharmonization Initiative: A Proposal to Better Harvest the Value from Send Data.</td>
<td>M. A. Cartagna, T. G. Bjerregaard, T. Fukushima, W. Houser, K. Mera, and T. J. Page. Eli Lilly and Company, Indianapolis, IN; Novo Nordisk, Copenhagen, Denmark; Shionogi &amp; Co., Ltd., Osaka, Japan; and Bristol-Myers Squibb, New Brunswick, NJ.</td>
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<tr>
<td>#1760</td>
<td>Development of an Adverse Outcome Pathway (AOP) Network for Carcinogenicity Using Expert-Derived (Q)SAR Knowledge.</td>
<td>S. Stafford, A. Cayley, R. Foster, S. Kane, and R. Williams. Lhasa Limited, Leeds, United Kingdom. Sponsor: C. Barber</td>
</tr>
<tr>
<td>#1761</td>
<td>Machine Learning Approaches to Categorize Carbonaceous Nanomaterials Based on Patterns of Inflammatory Markers and Pathological Outcomes in Lungs.</td>
<td>I. Desai, W. Miller, V. Kodali, G. Syamlal, J. Roberts, A. Erdely, and N. Yamamula. NIOSH, Morgantown, WV; and Ohio State University, Cleveland, OH.</td>
</tr>
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Program Schedule—Tuesday | 118
Poster Board Number..................................................................................................................P148

**Determination of Plasma Protein Binding via Ultracentrifugation and In Silico Modeling: Can We Trust the Results?**  
D. Dimitrijevic1, E. Fabian1, C. Haase1, M. Mathes1, J. Keller1, B. van Ravenzwaay1, and R. Landsiedel1.  
1BASF SE, Ludwigshafen am Rhein, Germany; and 2BASF Services Europe GmbH, Berlin, Germany.

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**Poster Board Number..................................................................................................................P149

**In Silico Modelization of Compounds Interaction with Bile Salt Export Pump (BSEP): An Alternative Approach to Predict Hepatotoxicity.**  
A. Sharma1, D. Thomas1, F. Bree1, S. Martin1, and D. Steen1.  
1Eurosafe, Saint Grégoire, France; and 2Biopredic International, Saint Grégoire, France.

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**Poster Board Number..................................................................................................................P150

**Optimum Concentration-Response-Curve Metrics for Toxicity Prediction Based on High-Content Cellular Imaging.**  
J. A. Miller, and L. Loo.  
Agency for Science, Technology, and Research (A*STAR), Singapore, Singapore. Sponsor: B. Smith

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**Poster Board Number..................................................................................................................P151

**A Unified Approach for the Analysis of Zebrafish Developmental and Neurotoxicity Data: A Multi-Lab Case Study.**  
J. Hsieh1, K. Ryan1, N. Sipes1, A. Shapiro1, F. Parham1, S. Auerbach1, and M. Behl2.  
1Kelly Government Solutions, Morrisville, NC; 2NIEMS, Morrisville, NC; and 3InfiniaML, Durham, NC.

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**Poster Board Number..................................................................................................................P152

**Development of an RNA-Seq Tissue Expression Atlas of Preclinical Species (Cynomolgus Monkeys and Beagle Dogs) for In Silico Assessment of Target Expression and Distribution.**  
Pfizer Inc, Groton, CT.

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**Poster Board Number..................................................................................................................P153

**A Large Two Stage Multi-Task Network for Chemical Properties.**  
T. Luechtefeld1, S. Abraham1, and C. Rowlands2.  
1Underwriters Laboratories, Baltimore, MD; and 2UL Supply Chain & Sustainability, Midland, MI.

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**Poster Board Number..................................................................................................................P154

**Identifying Contributors to the Response to Endocrine Drug Therapy in Breast Cancer: An In Silico Study.**  
S. Parvin-Nejad, S. Cheema, and G. Acquaah-Mensah.  
Massachusetts College of Pharmacy and Health Sciences, Worcester, MA.

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**Poster Board Number..................................................................................................................P155

**Validated and Predictive Models of Skin Sensitization and Acute Inhalation Toxicity.**  
J. V. Borba1,2, V. M. Alves1, A. C. Silva1, K. Overdahl1, S. Capuzzi1, E. Overdahl1, D. R. Korn1, R. N. Silva1, S. U. Half1, R. Braga1, N. Kleinreuther1, C. H. Andrade1, E. Muratov1, and A. Tropsha1.  
University of North Carolina Eshelman School of Pharmacy, Chapel Hill, NC; 1Federal University of Goias, Goiania, Brazil; and 2NIEMS/NICEATM, Research Triangle Park, NC.

---

**Poster Board Number..................................................................................................................P156

**Drug-Induced Liver Injury Severity and Toxicity (DILList): Binary Classification of 1379 Drugs by Human Hepatotoxicity.**  
S. Thakkar1, T. Li1, L. Wu1, Z. Liu1, R. Roberts1, and W. Tong1.  
1US FDA/NCTR, Jefferson, AR; and 2AppcoN Ltd, Alderley Park, Alderley Edge, United Kingdom.

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**Poster Board Number..................................................................................................................P157

**Computational Studies of a Select Group of Amino Alkylindoles.**  
T. Riggins, and T. Holmes.  
Fort Valley State University, Fort Valley, GA. Sponsor: R. Bright

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**Poster Board Number..................................................................................................................P158

**Evaluating Potential Refinements to Existing Thresholds of Toxicological Concern Values for Environmentally Relevant Compounds.**  
M. D. Neims1,2, P. Pradeep1,3, and G. Patlewicz1.  
1ORISE, Oak Ridge, TN; and 2US EPA/NCCT, Durham, NC.

---

**Poster Board Number..................................................................................................................P159

**Predicting Neurological Targets of Toxicity Employing the Read-Across Approach of Toxcast In Vitro Data.**  
J. M. Gearhart1, Y. G. Chushak1, and H. A. Pangburn1.  
1Henry M. Jackson Foundation for the Advancement of Military Medicine, Wright Patterson AFB, OH; and 2United States Air Force, Wright Patterson AFB, OH.

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**Poster Board Number..................................................................................................................P160

**Looking Under the Hood–Expert Review of In Silico Carcinogenicity Predictions.**  
B. Hansen, and J. Cohen.  
Gradient, Cambridge, MA.

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**Poster Board Number..................................................................................................................P161

**Application of the SOHN Methodology to Build Accurate hERG Models Using a Combination of Public and Proprietary Data.**  
L. Johnston1, J. Plante1, T. Hansen1, F. Steinmetz1, M. Krier2, and F. Rippmann2.  
1Lhasa Limited, Leeds, United Kingdom; and 2Merck, Darmstadt, Germany. Sponsor: C. Barber

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**Poster Board Number..................................................................................................................P162

**Computational Analysis of Pre-Clinically Efficacious Drug Molecules without Defined Target Pharmacology.**  
AbbVie, North Chicago, IL.

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**Poster Board Number..................................................................................................................P163

**Quantitative Hazard Assessment and Product Scoring Methods for High-Throughput Chemical Alternative Assessments.**  
C. E. McLoughlin, P. J. Beattie, H. C. Ruhter, and J. P. Rinkevich.  
Scivera, Charlottesville, VA.

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**Poster Board Number..................................................................................................................P164

**Establishing Mechanistic Key Event Information of Repeated Dose Toxicity to Support Category-Based Read-Across Assessment.**  
National Institute of Health Sciences, Kawasaki, Japan.

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**Poster Board Number..................................................................................................................P165

**Development of an Automated Workflow for Adverse Outcome Pathway Hypothesis Generation: Case Study in Non-genotoxic-Induced Hepatocellular Carcinoma.**  
N. O. Oki1, T. Enzer1, F. Hollinger1, B. Hardy1, and T. Y. Doktorova1.  
1Edelweiss Connect GmbH, Durham, NC; and 2Edelweiss Connect GmbH, Basel, Switzerland.
**Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Bioinformatics**

*Chairperson(s): Hong Fang, US FDA/NCTR, Jefferson, AR; and Holly Mortensen, US EPA, Research Triangle Park, NC.*

**Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM**

<table>
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<th>Poster Board Number</th>
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<tr>
<td>#1790</td>
<td><strong>P166</strong> Toxicogenomic-Based Gene Co-regulated Network Analysis for Quantitative Mode-of-Action Assessment of Chemical-Induced Organ Toxicity. S. J. Kunnen, G. Callegaro, W. den Hollander, Y. W. Webster, J. J. Sutherland, J. Mollon, P. Trairatphisan, E. Guney, J. Pihro, J. L. Stevens, and B. van de Water. Leiden University, Leiden, Netherlands; Eli Lilly and Company, Indianapolis, IN; Indiana Biosciences Research Institute, Indianapolis, IN; AbbVie Deutschland GmbH &amp; Co KG, Ludwigshafen, Germany; Heidelberg University, Heidelberg, Germany; and Hospital del Mar Research Institute (IMIM), Barcelona, Spain.</td>
</tr>
<tr>
<td>#1792</td>
<td><strong>P168</strong> Delivering Rapid Computational Profiling of Chemicals by High-Throughput Toxicokinetics. C. N. Davidson1, E. Pitts1, J. M. Gearhart2, Y. G. Chushak3, and H. A. Pangburn1. UES, Inc., Wright-Patterson AFB, OH; Henry M. Jackson Foundation for the Advancement of Military Medicine, Wright-Patterson AFB, OH; and US Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH.</td>
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<tr>
<td>#1794</td>
<td><strong>P170</strong> Development of DILI Prediction Tools for Humans and Mammals from the Vantage of Translational Safety Assessment. W. Muste1, D. Naga1, J. Rathman2, A. Mostrag3, M. Pavan4, and C. Yang5. F. Hoffmann-La Roche Ltd., Basel, Switzerland; MN-AM, Columbus, OH; and Ohio State University, Columbus, OH.</td>
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Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**PS**  
Poster Session: Biological Modeling

**Chairperson(s):** Sean Gehen, Dow AgroSciences, Indianapolis, IN; Thomas Hill III, US EPA, Durham, NC; and Elaina M. Kenyon, US EPA, Research Triangle Park, NC.

**Displayed:** 9:15 AM—4:30 PM  |  **Author Attended:** 10:45 AM—12:15 PM

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<th>Abstract #</th>
<th>#1803</th>
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<td><strong>Poster Board Number</strong></td>
<td>Triangle Park, NC.</td>
<td>Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall</td>
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<td><strong>Machine Learning Approach to Analyze the Impact of TP53 Deleterious Single Nucleotide Polymorphisms on Estrogen Receptor Alpha-p53 Interaction.</strong></td>
<td>K. Chitra, M. Nagarkatti, P. Nagarkatti, and S. Yeguvali. University of South Carolina, School of Medicine, Columbia, SC; and &quot;Sri Venkateswara University, Tirupati, India.</td>
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<td><strong>AOP-DB v.1: A Database Resource for the Exploration of Adverse Outcome Pathways.</strong></td>
<td>H. Mortensen, P. Langley, and T. Levey. US EPA, Research Triangle Park, NC.</td>
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<td><strong>Modeling Aryl Hydrocarbon Receptor-Mediated Gene Regulatory Networks in the Human Liver.</strong></td>
<td>W. Qi, S. Bhattacharya, C. Jose, V. Tanwar, and S. Cuddapah. Michigan State University, East Lansing, MI; and &quot;New York University School of Medicine, New York, NY.</td>
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<td><strong>Functional Consequences of miRNA Regulation by Polycyclic Aromatic Hydrocarbons in 3D Human Lung Epithelial Cells.</strong></td>
<td>M. Mans, L. K. Siddens, D. Sampson, Y. Chang, and S. C. Tilton. Oregon State University, Corvallis, OR.</td>
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<td><strong>Dysregulation of ID3-Regulated Transcriptomic Signatures by Polychlorinated Biphenyls.</strong></td>
<td>M. Doke, and Q. Feityl. Florida International University, Miami, FL.</td>
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Program Schedule—Tuesday | 121
#1818 Poster Board Number

**Improved Prediction of Tissue and Urine Concentrations of 2-Phenoxyethanol and Its Metabolite 2-Phenoxyacetic Acid in Rat and Human after Oral and Dermal Exposures via GastroPlus Physiologically Based Pharmacokinetic Modeling.** F. Zhang, and S. Marty.

Dow Chemical Company, Midland, MI.

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#1819 Poster Board Number

**Carcinogenic Alterations of Mouse Tissue-Derived Organoids by Chemical Treatment.** T. Imai1, M. Ochiai1, M. Naruse1, and Y. Hippo1.

1National Cancer Center Research Institute, Tokyo, Japan; and 1Chiba Cancer Center Research Institute, Chiba, Japan. Sponsor: K. Ogawa

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#1820 Poster Board Number


Michigan State University, East Lansing, MI.

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#1821 Poster Board Number

**Computational Modeling of an In Vitro Neural Network: Microelectrode Assay for Neurotoxicity Screening.** R. B. Conolly, and T. J. Shafer.

US EPA, Research Triangle Park, NC.

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#1822 Poster Board Number

**Exploring Applications of Human Primary Cells for Drug Screening in Various Cell Culture Systems.** J. A. Wells, N. Mahashetty, and D. Yin.

ATCC, Gaithersburg, MD.

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#1823 Poster Board Number

**Using PBPK Modelling to Understand the Low-Dose Kinetics of Paraquat in Rodents and Dogs.** J. L. Campbell Jr.1, H. J. Clewell II1, K. Z. Travis1, P. M. Hindertler2, and A. J. Stevens2.

1Ramboll, Research Triangle Park, NC; 2Syngenta, Ltd, Bracknell, United Kingdom; and 1Syngenta Crop Protection, LLC, Greensboro, NC.

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#1824 Poster Board Number

**Use of a PBPK-Quantitative Adverse Outcome Pathway Model to Resolve the Species Specificity of Lung Carcinogens.** T. Hill III, M. Matikar, and R. Conolly.

US EPA, Research Triangle Park, NC.

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#1825 Poster Board Number


Gradient, Cambridge, MA.

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#1826 Poster Board Number

**Development of a Multi-route Physiologically Based Pharmacokinetic Model of Carbon Tetrachloride Uptake in Rats.** D. Williams1, M. Evans2, J. Bruckner3, and J. Simmons3.

1ORISE, Oak Ridge, TN; 2US EPA, Research Triangle Park, NC; and 3University of Georgia, Athens, GA.

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#1827 Poster Board Number


1Agency for Toxic Substances and Disease Registry (ATSDR), Atlanta, GA; and 2BioSimulation Consulting Inc, Newark, DE.

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#1828 Poster Board Number

**Neonatal Murine-Engineered Cardiac Tissue Toxicology Model: Impact of Metallothionein Overexpression, Cadmium Exposure, and Zinc Countermeasures.** H. Yu1,2, F. Ye1, F. Yuan1, Y. Kang1, L. Cai1, H. Ji1, and B. Keller1,2,4.

1Pediatric Research Institute, Department of Pediatrics, Louisville, KY; 2Kosair Charities Pediatric Heart Research Program, Cardiovascular Innovation Institute, Louisville, KY; 3The Center of Cardiovascular Disorders, First Hospital of Jilin University, Changchun, China; and 4University of Louisville, Louisville, KY.

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#1829 Poster Board Number


1Université de Montréal IRSPUM, Montreal, QC, Canada; 2Université de Montréal, Montreal, QC, Canada.

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#1830 Poster Board Number

**Physiologically Based Pharmacokinetic Modeling to Estimate Narrow Dose Bands of Hydroquinone from Smoking.** A. E. Locioscano1, and B. D. Kerger1.

1Exponent, Alexandria, VA; and 2Exponent, Irvine, CA.

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#1831 Poster Board Number


1ToxStrategies, Inc., Research Triangle Park, NC; 2ToxStrategies, Inc., Austin, TX; 3Ramboll, Monroe, LA; 4NIFERA, Research Triangle Park, NC; 5Atfont Chemical Co., Richmond, VA; and 6Ramboll, Research Triangle Park, NC.

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#1832 Poster Board Number


1Corteva Agriscience, Indianapolis, IN; and 2Corteva Agriscience, Newark, DE.

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#1833 Poster Board Number

**PkSens: An R Package to Apply Sensitivity Analysis in Pharmacokinetic Modeling.** N. Hsieh1, W. Chiu1, and B. Reifeld2.

1Texas A&M University, College Station, TX; and 2Colorado State University, Fort Collins, CO.

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#1834 Poster Board Number

**POPKat: A Framework for Bayesian Population PBPK Analysis.** B. Reifeld1, W. Chiu1, N. Hsieh2, S. Ghosh1, C. Osłonowskyski1, and F. Bois1.

1Colorado State University, Fort Collins, CO; 2Texas A&M University, College Station, TX; 3Boise State University, Boise, ID; and 4Institut National de l’Environnement Industriel et des Risques, Verneuil-en-Halatte, France.

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#1835 Poster Board Number

**Thermal Stress Effects on Physiologically Based Pharmacokinetic Model for Department of Defense Personnel.** E. Pitts1, J. M. Gearhart1, T. R. Covington1, C. M. Duran1, D. P. Yamamoto1, D. McKenzie-Smith1, R. K. Ott1, and H. A. Pangburn1.

1UES, Aeromedical Research Department, Wright-Patterson AFB, OH; 2HUF, Aeromedical Research Department, Wright-Patterson AFB, OH; and 3Aeromedical Research Department, US Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Risk Assessment I**

**Chairperson(s):** William Mendez, ICF International, Charlottesville, VA; Esther Omaiye, University of California Riverside, Riverside, CA; Patricia Ruiz, CDC/ATSDR, Atlanta, GA; and Bingxuan Wang, ToxServices LLC, Washington, DC.

**Displayed:** 9:15 AM—4:30 PM | **Author Attended:** 3:00 PM—4:30 PM

### Abstract #

**#1836**

**Poster Board Number**

**Contribution of Individual Trihalomethanes (THMs) to Internal Dose during Multi-route Exposures.** E. M. Kenyon, C. R. Eklund, J. E. Simmons, and R. A. Pegram. US EPA, Durham, NC.

**#1837**

**Poster Board Number**

**Data-Driven Modeling of Chemical-Induced Mitochondrial Toxicity Using Dynamic High-Content Imaging Data.** H. Yang, W. van der Stel, R. Lee, B. van de Water, E. H. Danen, and J. B. Beltman. Leiden University, Leiden, Netherlands.

**#1838**

**Poster Board Number**

**Extending the PLETHEM Platform for PBPK Modeling: Batch Mode Processing, Dermal Route of Exposure, and Integration with Mode-of-Action Tools.** S. N. Pendse¹, A. Y. Efremenko¹, C. I. Nicolas¹, H. J. Clewell², and P. D. McMullen. ¹Scitovision LLC., Durham, NC; and ²Ramboll Environ, Durham, NC.

**#1839**

**Poster Board Number**

**Evaluations of the Utility of HTTK-PBTK Models for In Vitro to In Vivo Extrapolation.** Y. Aleman¹, U. Lee², and A. Lumen³. ¹Universidad Metropolitana Recinto de Cupey, San Juan, PR; and ²US FDA/NCTR, Jefferson, AR.

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**#1840**

**Poster Board Number**

**Use of Risk Assessment for InnovativeReuse of Dredged Sediment.** C. Cheatwood, EA Engineering, Science, and Technology, Hunt Valley, MD. Sponsor: M. Carlo, Society of Environmental Toxicology and Chemistry

**#1841**

**Poster Board Number**

**Improving Read-Across Assessment of Cosmetic Ingredients Utilizing COSMOS DB In Vivo Data and In Silico Evidence to Reduce Uncertainties.** A. Mostrag¹, A. Bassan¹, B. Bienfait¹, E. Fioravanzo¹, T. Kleinoeder¹, J. Madden¹, T. Magdiziar¹, J. Maruszczyk¹, M. Pavan¹, O. Sacher¹, J. Rathman¹, A. Richarz¹, C. Schwab¹, A. Tarkhov¹, A. Worth¹, C. Yang¹, and M. Kronin¹. ¹MN-AM, Columbus, OH; ²ToxNavigation, East Molesey, Surrey, United Kingdom; ³Liverpool John Moores University, Liverpool, United Kingdom; ⁴Ohio State University, Columbus, OH; and ⁵European Commission Joint Research Centre, Ispra, Italy.

**#1842**

**Poster Board Number**

**Arsenic Levels in Drinking Water Sources and Risk of Prostate Cancer for US Counties.** Z. Kramer¹, I. Boroje¹, H. Ferdosi¹, J. Ahn¹, and S. Lamm¹,². ¹Center for Epidemiology and Environmental Health (CEOH, LLC), Washington, DC; ²Georgetown University School of Medicine, Washington, DC; and ³Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD.

**#1843**

**Poster Board Number**

**Toxicological Risk Assessment of Benzene Exposure in a Keratin Wound Dressing.** H. Xie, R. Sloboda, and L. Desai. Toxikon Corporation, Bedford, MA.

**#1844**

**Poster Board Number**


**#1845**

**Poster Board Number**

**Fractional Polynomial Meta-regression Analysis of Arsenic-Associated Health Effects.** W. Mendez¹, K. Magnusson¹, J. Davis¹, B. Allen¹, K. Shao¹, J. Lee², D. Shams³, and J. Gift¹. ¹ICF International, Charlottesville, VA; ²ICF International, Fairfax, VA; ³US EPA, Cincinnati, OH; ⁴Independent Consultant, Chapel Hill, NC; ⁵Indiana University, Bloomington, IN; ⁶US EPA, Washington, DC; and ⁷US EPA, Research Triangle Park, NC.

**#1846**

**Poster Board Number**

**Derivation of Oral and Inhalation No Significant Risk Levels for 2-Nitropropane (2-NP).** B. Gadagbud¹, J. Moore¹, D. McCready¹, A. Parker¹, A. Monnat⁴, L. Garnick³, P. Spencer¹, and A. Maier⁴. ¹Toxicology Excellence for Risk Assessment, Cincinnati, OH; ²Angus Chemical Company, Buffalo Grove, IL; ³EnviroCalc Consulting, South Charleston, WV; ⁴University of Cincinnati College of Medicine, Risk Science Center, Cincinnati, OH; ⁵Cardno ChemRisk, San Francisco, CA; and ⁶Cardno ChemRisk, Cincinnati, OH.

**#1847**

**Poster Board Number**

**Risk Characterization of Bisphenol-A in the Slovenian Population Starting from Human Biomonitoring Data.** D. Sanigianis¹, J. Snoj Tratnik¹, D. Majez¹, T. Kosijek¹, E. Heath¹, M. Horvat¹, and S. Karakitsios¹. ¹Aristotle University of Thessaloniki, Thessaloniki, Greece; and ²Josef Stefan Institute, Ljubljana, Slovenia.

**#1848**

**Poster Board Number**

**High-Fat Diet Promotes the Obesity Induced by Perinatal Exposure to 4-Nonylphenol in Rats.** H. Zhang¹, and Z. Wang². ¹Wuhan Polytechnic University, Wuhan, China; and ²Johns Hopkins University, Baltimore, MD.

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Program Schedule—Tuesday | 123
Chemical Reactivity, Not Molecular Weight or Lipophilicity, Determines Skin Sensitization Potential and Potency: An Analysis Based on the Latest Public Data Set of Chemical Substances Tested for Skin Sensitization. H. Chintagunta1, S. Kim2, and A. Schatz3. 1Ashland LLC, Hyderabad, India; 2Ashland LLC, Lincoln, CA; and 3Ashland LLC, Bridgewater, NJ.

Analysis of Environmental Chemical Exposure of the Canadian Population from the Canadian Health Measures Survey in a Risk Based Context. S. Faure1, N. Noisel1, K. Subramanian1, L. Aylward1, and A. St-Amand1. 1Health Canada, Ottawa, ON, Canada; 2University of Montreal, Montreal, QC, Canada; and 3Summit Toxicology, LLP, Falls Church, VA.

Development of Inhalation Reference Concentrations for Chlorotrifluoroethylene (CTFE) and 1,2-Dichloro-1,2,2-trifluoroethane (HCFC-123a). B. Magee1, and N. Forsberg2. 1Arcadis US, Inc., Chelmsford, MA; and 2Arcadis US, Inc., Clifton Park, NY.

Derivation of a No-Significant-Risk-Level (NSRL) for Pyridine. Z. Guerette1, B. Wang1, J. Fleischer2, and M. H. Whittaker1. 1ToxServices LLC, Ann Arbor, MI; and 2ToxServices LLC, Washington, DC.

Derivation of a Screening-Level No Significant Risk Level (NSRL) for Tris(2-Chloroethyl) Phosphate (TRCP). G. Kuan1, J. G. Fleischer2, and M. H. Whittaker1. 1ToxServices LLC, Ann Arbor, MI; and 2ToxServices LLC, Washington, DC.


Updated Modeling Indicates Historical Sterilization Worker Ethylene Oxide Exposures Were Higher Than Assumed in the US EPA IRIS Assessment. A. Li1, P. Sheehan2, C. Valdez-Flores3, and K. Bogen4. 1Exponent Health Science, San Francisco, CA; 2Exponent Health Science, Oakland, CA; and 3Texas A&M University, College Station, TX.

Hazard Characterisation of Acrylates by In Vitro and Ex Vivo Models—An Update of the ExTox Project. S. Schramm1, M. Wehr1, O. Danov1, H. Obernolte1, J. Knebel1, J. Kschenmann1, C. Meckbach1, M. Niehof1, P. Braubach1, D. Jonigk1, T. Hansen1, A. Braun1, K. Sewald1, and S. Escher1. 1Fraunhofer Institute for Toxicology and Experimental Medicine, Hannover, Germany; 2geneXplain GmbH, Wolfenbüttel, Germany; 3Institut für Bioinformatik, Universitätspippenheim Göttingen, Göttingen, Germany; and 4Medizinische Hochschule Hannover, Hannover, Germany. Sponsor: C. Dasenbrock.

Estimating the Risk of Long-Term Health Effects following Acute Exposure to Cholinergic Agents. K. R. Wegman1, L. Roszell2, J. Cox2, D. Bradley3, S. A. Ralston1, P. Wax1, and C. McKay4. 1Battelle Memorial Institute, Columbus, OH; 2Army Public Health Center, Aberdeen Proving Ground, MD; 3Department of Homeland Security, Aberdeen Proving Ground, MD; 4Department of Homeland Security. Security Analysis Center, Aberdeen Proving Ground, MD; and 5American College of Medical Toxicology, Phoenix, AZ.
#1866
**Poster Board Number**


#1867
**Poster Board Number**


#1868
**Poster Board Number**


**Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Exposure Assessment and Biomonitoring**

**Chairperson(s):** Krisa Camargo, Texas A&M University, College Station, TX; Melissa Chan, Corteva Agriscience, Newark, DE; and June Yan, Corteva Agriscience, Indianapolis, IN.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 3:00 PM–4:30 PM

**Abstract #**

#1874
**Poster Board Number**


#1875
**Poster Board Number**

**Acute Dermal Toxicity Studies of Aircraft Engine Oils.** I. Sibomana, N. Good, and D. Mattie. 1. Air Force Research Laboratory, Dayton, OH; and 2. Charles River Laboratories, Inc, Spencerville, OH.

#1876
**Poster Board Number**


#1877
**Poster Board Number**


#1878
**Poster Board Number**

**Development of Promising Biomarkers for Prevention against Colorectal Cancer.** E. Kim, and M. Yang. Sookmyung Women's University, Seoul, Korea, Republic of.

#1879
**Poster Board Number**

**Estimating the Evaporation Rate and Time-Varying Generation Rate of Acetic Acid from an All-Purpose Floor Cleaner.** S. F. Arnold, H. Kaup, and J. Servadio. University of Minnesota, Minneapolis, MN. Sponsor: L. Peterson
#1880 Poster Board Number..................................................................................................................P264
Reassessing Drinking Water Exposures: Relevance of Reactive Electrophiles Formed in Drinking Water Disinfection. C. Prasse1,2, and D. Sedlak1. 1Johns Hopkins University, Baltimore, MD; and 2University of California, Berkeley, CA.

#1881 Poster Board Number..................................................................................................................P265
The Missing Link: Using the TTC to Provide a Risk-Based Approach for Focusing Non-targeted Analysis Efforts. R. A. Becker1, and J. A. Arnot2. 1American Chemistry Council, Washington, DC; and 2ARC Arnot Research and Consulting, Toronto, ON, Canada.

#1882 Poster Board Number..................................................................................................................P266
Testing Strategy Development Based on Effects of Low-Level Mixtures of Chemicals in Drinking Water (Sources) in Reporter Gene Assays. M. Dingemans1, H. Bessellink1, and T. Ter Laak1,1. 1KWR Waterycle Research Institute, Nieuwegein, Netherlands; 2BioDetection Systems bv, Amsterdam, Netherlands; and 3University of Amsterdam, Amsterdam, Netherlands.

#1883 Poster Board Number..................................................................................................................P267
Exposure of Third Trimester Human Fetuses to Persistent Environmental Chemicals. R. Björvarg1,2, L. Salto Mamsen1,4, D. Mucs1, M. Vinnars1, N. Papadogiannakis1, H. Kiviranta2, P. Rantakokko3, P. Ruokojärvi3, C. Lindh4, C. Yding Andersen3,4, and P. Damdimopoulou1,5,6,7,8,9,10,11,12. 1Karolinska Institutet, Stockholm, Sweden; 2Swedish Toxicology Sciences Research Center, Stockholm, Sweden; 3University of Copenhagen, Copenhagen, Denmark; 4University Hospital of Copenhagen, Copenhagen, Denmark; 5National Institute for Health and Welfare, Kuopio, Finland; and 6Lund University, Lund, Sweden. Sponsor: J. Flaws

#1884 Poster Board Number..................................................................................................................P268
Association between Maternal Exposure to PCBs and Head Circumference of Male Newborns at Birth in Chiba Birth Cohort (C-MACH). K. Yanase1,2, A. Eguchi1, M. Yamamoto1, K. Sakurai1, M. Watanabe1, E. Todaka1,2, and C. Mori1,2. 1Graduate School of Medicine, Chiba University, Chuo-ku, Chiba, Japan; 2Chiba Foundation for Health Promotion and Disease Prevention, Mihama-ku, Chiba, Japan; and 3Center for Preventive Medical Sciences, Chiba University, Inage-ku, Chiba, Japan.

#1885 Poster Board Number..................................................................................................................P269

#1886 Poster Board Number..................................................................................................................P270
Airborne and Surface Lead Concentrations Measured during Manual Soldering of Microelectronics. B. D. Kerger1, A. E. Locrisano2, and M. J. Glassman3. 1Exponent, Irvine, CA; 2Exponent, Alexandria, VA; and 3Exponent, Menlo Park, CA.

#1887 Poster Board Number..................................................................................................................P271
Estimated Intakes of Hydroxyanthracene Derivatives (HADs) from Consumption of Drinkable Aloe vera Products on the EU Market and Foods Consumed in the Background Diet. D. Martyn1, M. Darch2, J. Hu3, T. Smillie4, K. Ngo5, N. Dai6, Q. Gao7, and P. Purohit8. 1Intertek Scientific & Regulatory Consultancy, Farnborough, United Kingdom; 2Intertek Scientific & Regulatory Consultancy, Mississauga, ON, Canada; and 3Herbalife Nutrition, Torrance, CA.

#1888 Poster Board Number..................................................................................................................P272
The Norwegian Biomonitoring Study in EuroMix: Real-Life Exposure to Bisphenols, Parabens and Triclosan in Humans as Measured in 24-Hour Urine Samples and Associations with Food Consumption and Cosmetics Use. H. Dirven1, M. Andreassen1, H. Hjertøhm1, M. Hauger Carlsen1, A. Kaur Sahi1, A. Sabarezadovic1, and T. Hussy1. 1Norwegian Institute of Public Health, Oslo, Norway; and 2University of Oslo, Oslo, Norway.

#1889 Poster Board Number..................................................................................................................P273
Derivation of Dermal Absorption Values Using Operator Exposure Biomonitoring Studies: A Case Study with MCPA. M. Aggarwal1, J. Y. Domoradzki2, A. W. Morriss3, and C. Perry4. 1Corteva Agriscience, Newark, DE; and 2Corteva Agriscience, Indianapolis, IN.

#1890 Poster Board Number..................................................................................................................P274
Risk Assessment of the Flame Retardant Chemical Tris (1, 3-Dichloro-2-Propyl) Phosphate (TDCPP). M. A. Babich1, and K. Chen. CPSC, Rockville, MD.

#1891 Poster Board Number..................................................................................................................P275
Biomarker Based Occupational Exposure. V. K. Nguyen, J. Colacino, and O. Jolliet. University of Michigan, Ann Arbor, MI.

#1892 Poster Board Number..................................................................................................................P276

#1893 Poster Board Number..................................................................................................................P277
In Vitro to In Vivo Translation of Salivary Concentrations for Non-invasive Biomonitoring of 2,4-Dichlorophenoxyacetic Acid (2,4-D). A. A. Han1, Z. A. Carver2, C. Timchalk3, T. J. Weber4, and J. N. Smith1. 1Pacific Northwest National Laboratory, Richland, WA; and 2Columbia Basin College, Pasco, WA.

#1894 Poster Board Number..................................................................................................................P278
Exposure Assessment of Milk Protein in Non-dairy or Vegan Ice Cream Substitutes: Are Non-dairy or Vegan Products Safe to Populations with Milk Allergy? L. G. Yang, R. Brewster, M. Hoang, and R. M. Novick. Cardno ChemRisk, San Francisco, CA.

#1895 Poster Board Number..................................................................................................................P279

#1896 Poster Board Number..................................................................................................................P280
#1897
Poster Board Number  
Biomonitoring of Polycyclic Aromatic Hydrocarbons in Human Exposure to the Deepwater Horizon Oil Spill.  
1University of Texas Medical Branch, Galveston, TX; and 2Prairie View A&M, Prairie View, TX.

#1898
Poster Board Number  
Polycyclic Aromatic Hydrocarbons in Breast Milk of Texas Women.  
N. Achariya1, B. Gautam1, S. Subbiah1, M. M. Rogge1, T. A. Anderson2, and W. Gao1.  
1Institute of Environmental and Human Health, Lubbock, TX; 2Texas Tech University Health Sciences Center, Lubbock, TX; and 3West Virginia University, Morgantown, WV.

#1899
Poster Board Number  
Mechanism-Based Biomonitoring with Enhanced Throughput for Examination of Human Impacted Surface and Drinking Water.  
J. P. Vandenhove1, M. Granda1, S. M. MacAninch2, and B. Sherf1.  
1INDIGO Biosciences, Inc., State College, PA; and 2Pennsylvania State University, University Park, PA.

#1900
Poster Board Number  
Assessing External Exposure to Chemical Mixtures Starting from Human Biomonitoring Data with the INTEGRA Computational Platform.  
D. Sarigiannis, S. Karakitsios, and A. Gotti.  
Aristotle University of Thessaloniki, Thessaloniki, Greece.

#1901
Poster Board Number  
Evaluation of Inhaled Low-Dose Formaldehyde Induced DNA Adducts and DNA-Protein Cross-Links by Liquid Chromatography-Tandem Mass Spectrometry.  
C. Liu1, J. Leng1, H. J. Hartwell1, R. Yu1, Y. Lai1, W. M. Bodnar1, K. Lu1, and J. A. Swenberg1.  
1University of North Carolina at Chapel Hill, Chapel Hill, NC; 2North University of China, Taiyuan, China; and 3Lovelace Respiratory Research Institute, Albuquerque, NM.

#1902
Poster Board Number  
Ribosomal Operon Profiling of the Human Respiratory Tract by MinION.  
Rutgers, The State University of New Jersey, Piscataway, NJ.

#1903
Poster Board Number  
P. Geurs1, Y. Li2, Z. Yan1, and C. Terry2.  
1Michigan State University, East Lansing, MI; and 2Corteva Agriscience, Indianapolis, IN.

#1904
Poster Board Number  
Post-Hurricane Harvey Sediments: PAH Distributions and Relative Sources.  
1Texas A&M University Department of Veterinary Integrative Biosciences, College Station, TX; 2Texas A&M University Geochronological Environmental Research Group (GERG), College Station, TX; 3Texas A&M University Galveston, Galveston, TX; and 4Texas A&M University Department of Environmental Science, Galveston, TX.

#1905
Poster Board Number  
Perfluoroalkyl Acid Mixtures—Data Analysis Steps to Uncover Clues Hidden in Biomonitoring Data.  
P. Goodrum1, J. Anderson1, and A. Luz1.  
1Integral Consulting Inc., Fayetteville, NY; 2Integral Consulting Inc., San Antonio, TX; and 3Integral Consulting Inc., Annapolis, MD.

#1906
Poster Board Number  
Indirect Dietary Exposure Assessment of Surface Cleaner Residues (ADBAC) and Refinement Using a Novel Analytical Residue Method.  
J. Vaughan, Q. Wei, M. Miller, D. Boesenberg, J. Rubino, J. Rowland, and B. Lew.  
RB, Montvale, NJ.

#1907
Poster Board Number  
Indoor Air Quality in a Makerspace 3D Printing Facility.  
A. Raja1, C. Simpson1, and T. Gordon1.  
1New York University School of Medicine, New York, NY; and 2University of Washington, Seattle, WA.

#1908
Poster Board Number  
Health Assessment of Bacterial and Fungal Contamination inside Single Serve Coffee Makers.  
Veritox Inc, Redmond, WA.

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Pesticides**

**Chairperson(s):** Laura E. Armstrong, Rutgers, The State University of New Jersey, Piscataway, NJ; Chanese Forte, University of Michigan, Ann Arbor, MI; and Sabitha Papineni, Dow AgroSciences, Indianapolis, IN.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 3:00 PM–4:30 PM

**Abstract #**

#1909
Poster Board Number  
Comparative Efficacy and Safety of Ectoparasitcides (Activyl, Certifect, Parastar Plus, Vetguard Plus, and Vectra 3D) in Dogs.  
R. Gupta1, R. Doss1, N. Barreto2, C. Case1, K. Clark3, H. Litchfield1, H. Nichols1, M. Lasher1, and T. Canerdy1.  
1Murray State University, Hopkinsville, KY; and 2Murray State University, Murray, KY.

#1910
Poster Board Number  
Dissipation and Residues of Flumetralin in Tobacco after Field Application.  
Zhengzhou Tobacco Research Institute of CNTC, Zhengzhou, China. Sponsor: R. Meng
Program Schedule—Tuesday | 128

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Tobacco and Electronic Nicotine Delivery Systems

Chairperson(s): Ilona Jaspers, University of North Carolina at Chapel Hill, Chapel Hill, NC; and Alexandra Noël, Louisiana State University, Baton Rouge, LA.

Displayed: 9:15 AM–4:30 PM  |  Author Attended: 3:00 PM–4:30 PM

Abstract #  

#1926

Poster Board Number...........................................................................................................................................P312

#1927  
**Poster Board Number**  
**Regulation of NRF2, AP-1, and NF-xB by Cigarette Smoke Exposure in a Three-Dimensional Model of Human Bronchial Epithelial Cells.**  
T. Sekine\textsuperscript{1}, T. Hirata\textsuperscript{a}, S. Ishikawa\textsuperscript{b}, K. Ishimori\textsuperscript{c}, K. Matsumura\textsuperscript{d}, and S. Ito\textsuperscript{1}.  
\textsuperscript{1}JFT International SA, Geneva, Switzerland; and \textsuperscript{a}Japan Tobacco Inc., Yokohama, Japan.  

#1928  
**Poster Board Number**  
**Developing a Versatile Exposure System for the Analysis of the Effects of Electronic Cigarettes.**  
University of North Carolina at Chapel Hill, Chapel Hill, NC.  

#1929  
**Poster Board Number**  
**Analyzing the Cellular Stress Response in Airway Epithelial Cells to Vaporized Propylene Glycol and Glycerol.**  
University of North Carolina at Chapel Hill, Chapel Hill, NC.  

#1930  
**Poster Board Number**  
**Effects of E-cigarette Flavoring Chemicals on Human Macrophages and Bronchial Epithelial Cells.**  
A. Morris\textsuperscript{1,2}, N. Olgun\textsuperscript{1}, K. Attfield\textsuperscript{1}, J. Fowles\textsuperscript{1}, and S. Leonard\textsuperscript{1}.  
\textsuperscript{1}NIOSH, Morgantown, WV; \textsuperscript{2}West Virginia University Health Sciences Center, Morgantown, WV; and \textsuperscript{3}California Department of Public Health, Richmond, CA.  

#1931  
**Poster Board Number**  
**Systems Toxicology Assessment of a Representative E-liquid Formulation Using Human Primary Bronchial Epithelial Cells.**  
PMI R&D, Philip Morris Products S.A., Neuchâtel, Switzerland.  

#1932  
**Poster Board Number**  
**Differential Regulation of Ion Channel Function from Exposures to Cigarette Smoke and ENDS Preparations.**  
R. E. Rayner\textsuperscript{1}, P. Makea\textsuperscript{2}, G. L. Prosad\textsuperscript{1}, and E. Cornet-Boyaka\textsuperscript{1}.  
\textsuperscript{1}Ohio State University, Columbus, OH; and \textsuperscript{2}RAI Services Company, Winston Salem, NC.  

#1933  
**Poster Board Number**  
**In Vitro Toxicity Induced by JUUL and E-cigarette Aerosol Extracts in Human Bronchial Epithelial Cells.**  
R. Pinkston\textsuperscript{1,2}, H. M. Zaman\textsuperscript{1}, Z. Pevereri\textsuperscript{1}, E. Hossain\textsuperscript{1}, A. L. Penn\textsuperscript{1}, and A. Noel\textsuperscript{1}.  
Southern University and A&M College, Baton Rouge, LA; and \textsuperscript{2}Louisiana State University, Baton Rouge, LA.  

#1934  
**Poster Board Number**  
**The Importance of Controlling Exposure Generation Parameters for In Vitro Electronic Cigarette Toxicity Testing.**  
J. Adrogna\textsuperscript{1}, A. Ruiz\textsuperscript{1}, K. Corbett\textsuperscript{1}, R. Jaeger\textsuperscript{1}, and T. Gordon\textsuperscript{1}.  
\textsuperscript{1}NYU Langone Medical Center, New York, NY; \textsuperscript{2}eAerosols, LLC, Central Valley, NY; and \textsuperscript{3}CH Technologies, Westwood, NJ.  

#1935  
**Poster Board Number**  
**A 7-Month Inhalation Study in C57bl/6 Mice to Investigate Potential Toxicity of E-vapor Aerosols Compared to Cigarette Smoke Using Cessation and Switching Study Design.**  
A. Kumar\textsuperscript{1}, S. Harbo\textsuperscript{1}, E. Benson\textsuperscript{1}, M. Oldham\textsuperscript{1}, B. Gardner\textsuperscript{1}, J. Hoeng\textsuperscript{1}, W. McKinney\textsuperscript{1}, and K. M. Lee\textsuperscript{1}.  
\textsuperscript{1}Altria Client Services LLC, Richmond, VA; \textsuperscript{2}Battelle; West Jefferson, OH; and \textsuperscript{3}Philip Morris International R&D, Neuchâtel, Switzerland.  

#1936  
**Poster Board Number**  
**Toxic Effects of Waterpipe Tobacco Smoking: Revealing the Mechanism Using Bioinformatics Approach.**  
D. Mitic Potkrajac\textsuperscript{1}, T. Krsmmanovic\textsuperscript{1}, J. Kankovic\textsuperscript{2}, and R. B. Russell\textsuperscript{2}.  
\textsuperscript{1}Metisox Ltd, Cambridge, United Kingdom; and \textsuperscript{2}Cell Networks, University of Heidelberg, Heidelberg, Germany.  

#1937  
**Poster Board Number**  
**Prenatal Waterpipe Tobacco Smoke Exposure Alters Lung Immune Responses to House Dust Mite Allergen in Adult Offspring Mice.**  
Louisiana State University School of Veterinary Medicine, Baton Rouge, LA.  

#1938  
**Poster Board Number**  
**Exposure of Cells of the Airways to Cigarette Smoke Extract or Acrolein Disrupts the Molecular Regulation of Mitochondrial Metabolism.**  
C. B. Tuli\textsuperscript{1}, C. H. Schiffer\textsuperscript{1}, N. L. Reynaert\textsuperscript{1}, M. A. Dentener\textsuperscript{1}, S. J. Snow\textsuperscript{1}, U. P. Kodavanti\textsuperscript{1,2}, X. Liu\textsuperscript{1}, P. M. Sivasankaran\textsuperscript{1}, F. J. van Schooten\textsuperscript{1}, A. A. Oppenhuizen\textsuperscript{1,2}, and A. H. Remels.  
\textsuperscript{1}University of Maastricht, Maastricht, Netherlands; \textsuperscript{2}US EPA, Durham, NC; \textsuperscript{3}University of North Carolina at Chapel Hill, Chapel Hill, NC; \textsuperscript{4}Purdue University, West Lafayette, IN; and \textsuperscript{5}Netherlands Food and Consumer Product Safety Authority, Utrecht, Netherlands.  

#1939  
**Poster Board Number**  
**Acute Exposure to Thirdhand Smoke Produces Rapid Changes in the Human Nasal Epithelial Transcriptome.**  
G. L. Pozuelos\textsuperscript{1}, M. Kagda\textsuperscript{1}, S. Schick\textsuperscript{1}, T. Girke\textsuperscript{1}, D. C. Volz\textsuperscript{1}, and P. Talbot\textsuperscript{1}.  
\textsuperscript{1}University of California Riverside, Riverside, CA; and \textsuperscript{2}University of California San Francisco, San Francisco, CA.  

#1940  
**Poster Board Number**  
**Cigarette Smoke Induced Pathophysiological Changes in the Extracellular Matrix but Not Inflammation as Early Events in Fresh Human Lung Tissue.**  
H. Obernoelte\textsuperscript{1,2}, D. Ritter\textsuperscript{1,2}, J. Knebel\textsuperscript{1,2}, M. Niehoff\textsuperscript{1,2}, P. Braubach\textsuperscript{1,2}, D. Jonigk\textsuperscript{1,2}, G. Warnecke\textsuperscript{1,2}, P. Zardo\textsuperscript{1,2}, H. Fieguth\textsuperscript{1,2}, O. Pfennig\textsuperscript{1,2}, A. Braun\textsuperscript{1,2}, and K. Siewald.  
\textsuperscript{1}Fraunhofer Institute for Toxicology and Experimental Medicine ITEM, Hannover, Germany; \textsuperscript{2}German Center for Lung Research (DZL), Biomedical Research in Endstage and Obstructive Lung Disease (BREATHE) Research Network, Member of the Cluster of Excellence Regenerative Biology and Biotechnological Therapy (REBIRTH), Hannover, Germany; \textsuperscript{3}Medical School Hannover, Hannover, Germany; and \textsuperscript{4}KRH Clinics, Hannover, Germany. Sponsor: C. Dasenbrock.  

#1941  
**Poster Board Number**  
**Mitochondrial Stress and Dysfunction by Tobacco Smoke, Leading to Cellular Senescence in Lung Epithelial Cells.**  
University of Rochester, Rochester, NY.  

#1942  
**Poster Board Number**  
**Vaping during Pregnancy Impairs Cerebrovascular Function in Offspring.**  
West Virginia University School of Medicine, Morgantown, WV.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Carcinogenesis I

Chairperson(s): Sharavan Ramachandran, Texas Tech University Health Sciences Center, Amarillo, TX; Robert Schiestl, University of California Los Angeles, Los Angeles, CA; and Leah Wehmas, US EPA, Research Triangle Park, NC.

Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM

Abstract #

#1943

Poster Board Number


#1944

Poster Board Number


#1945

Poster Board Number


#1946

Poster Board Number


#1947

Poster Board Number


#1948

Poster Board Number

Characteristics of Electronic Cigarette Device Particle Emissions. J. Moore, E. Aboaziza, W. Goldsmith, and J. O’Reilly. West Virginia University School of Medicine, Morgantown, WV.

#1949

Poster Board Number

The Effects of E-cigarette Flavoring Compounds on Neutrophil Phagocytosis and Oxidative Burst. E. Hickman, C. Herrera, and J. Jaspers. The University of North Carolina at Chapel Hill, Chapel Hill, NC.

#1950

Poster Board Number

Next Generation Products Induce Lower Biological Activity Than Com busted Cigarettes: A Comparison of Aerosol Bubbled Extract Chemistry and In Vitro Toxicity. L. Simms1, R. Wieczorek1, E. Trelles-Sticken1, J. Pani1, L. Bode1, G. Cava1, and M. Stevenson1. Imperial Brands PLC, Bristol, United Kingdom; and ‘Imperial Brands PLC, Hamburg, Germany.

#1951

Poster Board Number

E-cigarettes Induce Lower Biological Responses Than Conventional Cigarettes: A Comparison of In Vitro Toxicity following Repeated Whole Aerosol Exposure to Human Bronchial Tissue. L. Czekala1, R. Wieczorek1, E. Trelles Sticken1, L. Simms1, and M. Stevenson1. Imperial Brands PLC, Bristol, United Kingdom; and ‘Imperial Brands PLC, Hamburg, Germany. Sponsor: F. Ayala-Fiero

#1952

Poster Board Number

The Role of PI3K Pathway and MAPK Pathway in Cigarette Smoke-Induced Autophagy and Inflammation in BEAS-2B Cells. L. Xu, X. Li, H. Wang, K. Liu, F. Xie, H. Liu, and J. Xie. Zhengzhou Tobacco Research Institute of CNCTC, Zhengzhou, China. Sponsor: R. Meng

#1953

Poster Board Number

Chronic Toxicity and Lung Cancer Tumorigenesis in A/J Mice in Response to Aerosol from a Candidate-Modified Risk Tobacco Product and Mainstream Cigarette Smoke. E. Wong1, K. Luetich1, K. Trivedi1, E. Guedj1, Y. Xiang1, T. Schneider1, C. Nury1, B. Titz1, P. Leroy1, G. Vuillaume2, B. Phillips1, P. Vanscheeuwijk2, N. Nikolai Ivanov2, M. Peitsch2, and J. Hoeng2. ‘Philip Morris International Research Laboratories, Singapore, Singapore; and ‘Philip Morris Products S.A., Neuchatel, Switzerland.
The Extent to Which Sunscreen SPF Correlates with Ability to Protect against UV-Induced Mutations In Vitro. A. Lemay, and J. Field. University of Pennsylvania, Philadelphia, PA. Sponsor: J. Field, American Association for Cancer Research

Pimavanserin Tartrate, a Novel Anti-Parkinson Drug Suppresses Pancreatic Tumor Growth by Inhibiting Akt/Gli-1 Signaling Axis. S. Ramachandran, and S. K. Srivastava. Texas Tech University Health Sciences Center, Amarillo, TX.


RON Receptor-Targeted Antibody-Drug Conjugate Therapy Eliminates Cancer Stem-Like Cells and Induces Long-Term Tumor Regressions in Preclinical Models of Triple-Negative Breast Cancer (TNBC). S. Suthe1, H. Yao2, and M. Wang1. 1Texas Tech University Health Sciences Center, Amarillo, TX; and 2Zhejiang University School of Medicine, Hangzhou, China.

Evaluation of the Potential Carcinogenicity of the Pyrethroid Imiprothrin in Mice. T. Yamada1, L. Rhomberg1, J. Haseman1, P. Greaves1, H. Greim1, C. Berry1, and S. Cohen1. 1Sumitomo Chemical Co., Ltd., Osaka, Japan; 2Gradient, Cambridge, MA; 3J.K. Haseman Consulting, Raleigh, NC; 4University of Leicester, Leicester, United Kingdom; 5Technical University Munich, Weihenstephan, Germany; 6Queen Mary University of London, London, United Kingdom; and 7University of Nebraska Medical Center, Omaha, NE.

Overcoming the Acquired Drug Resistance of Gefitinib in A549 via Downregulations of Twist1. Z. Liu, and W. Gao. West Virginia University, Morgantown, WV.

Arsenic Malignantly Transformed Prostate Cancer Stem Cells Show Increased FTO/ALKBH5, Which is Associated with Increased SOX2 and CD44 Transcripts Levels. C. Escudero1, E. Lares-Villaseñor1, Y. Rivas-Martínez1, J. Alvarado-Morales1, E. Reynaga-Hernández1, and E. Tokar1. 1Universidad Autonoma de San Luis Potosi, San Luis Potosi, Mexico; and 2NIEHS, Research Triangle Park, NC.

A Case Study Using a Systematic Review Approach for Cancer Hazard Identification That Incorporates the 10 Key Characteristics of Carcinogens. A. Wang1, J. Trgovcich1, K. L. Witt1, A. Ewens1, J. Geter1, S. Garner1, G. Jahnke1, S. L. Smith-Roe1, and R. Lunn1. 1NIEHS, Research Triangle Park, NC; 2ICF, Durham, NC; 3ILS, Durham, NC; and 4Formerly ILS, Durham, NC.

Improving Formalin-Fixed Paraffin-Embedded (FFPE) Samples for DNA-Sequencing Analysis. L. Wehms1, C. Wood2, P. Guan3, H. Moore1, C. Youk4, L. Peel5, M. Gosink6, and S. Hester6. 1US EPA, Research Triangle Park, NC; 2US EPA (Formerly), Research Triangle Park, NC; 3National Cancer Institute, Bethesda, MD; 4Health Canada, Ottawa, ON, Canada; 5HESI, Washington, DC; and 6Pfizer, Inc., Groton, CT.


Nuclear Receptor 4A1 (NRA4A1) as a Drug Target for Endometriosis. S. Safe1, S. Han1, and K. Mohankumar1. 1Texas A&M University, College Station, TX; and 2Baylor College of Medicine, Houston, TX.


Nuclear Receptor 4A2 (NRA4A2) as a Drug Target for Glioblastoma. K. B. Karki1, U. Jin1, S. Safe1, S. Michelaugh2, and S. Mittal2. 1Texas A&M University, College Station, TX; and 2Karmanos Cancer Institute, Detroit, MI.

Using the Key Characteristics of Carcinogens in Carcinogen Hazard Identification. K. Z. Guyton1, and M. T. Smith1. 1IARC-WHO, Lyon, France; and 2University of California Berkeley, Berkeley, CA.
Abstract #

**#1974**

**Proteomic Analysis of Liver Proteins of Mice Exposed to 1,2-Dichloropropane.** X. Zhang1, K. Morikawa1, Y. Morii1, C. Zong1, L. Zhang1, E. Garner1, C. Huang1, W. Wu1, J. Chang1, D. Nagashima1, T. Sakurai1, S. Ichihara2, S. Oikawa1, and G. Ichihara1. 1Tokyo University of Science, Noda, Japan; and 2Mie University, Tsu, Japan. 3Lovelace Respiratory Research Institute, Albuquerque, NM; 4Nagoya University, Nagoya, Japan; and 5Jichi Medical University, Shimotsuke, Japan.

**#1975**

**Pimozone Suppresses the Growth of Brain Tumor by Targeting STAT3 Signaling.** I. Kaushik, A. Ranjan, B. Schwettmann, and S. Srivastava. Institutional. Texas Tech University Health Sciences Center, Amarillo, TX. Sponsor: I. Kaushik, American Association for Cancer Research.

**#1976**

**Uterine Adenocarcinomas in Isopropylamine-Treated Rats Occur via a Human Non-relevant Mode of Action.** P. P. Parsons1, R. C. Peffer2, R. Richards-Doran3, D. E. Cowie1, R. A. Currie1, K. Lichti-Kaiser1, E. McInnes1, D. C. Wolf1, P. Sawhney-Coder2, R. J. Handsa1, D. R. Grattana, and K. Yf3. 1Exponent International, Harrogate, United Kingdom; 2Syngenta Crop Protection, Greensboro, NC; 3Syngenta Crop Protection, Bracknell, United Kingdom; 4Syngenta Crop Protection, Research Triangle Park, NC; 5Charles River Laboratories, Ashland, OH; and 6Colorado State University, Fort Collins, CO; and 7University of Otago, Dunedin, New Zealand.

**#1977**

**Dietary Polyunsaturated Fatty Acids Modulates Adipose Secretome and Is Associated with Changes in Mammary Epithelial Stem Cell Self-Renewal.** E. M. Hill1, R. E. Esper1, N. Polakowski1, B. R. Simon1, N. N. Aslam1, Y. Jiang1, M. K. Dame1, Z. Djuric1, M. S. Wicha1, W. L. Smith1, J. A. Colacino1, and D. E. Brenner. 1University of Michigan, Ann Arbor, MI; and 2MD Anderson Cancer Center, Houston, TX.

**#1978**

**Efficient Carcinogenesis via Mutated Inflammation-Activated Stem Cells: A New Theory Explains Why Nrf2 Activation Blocks Aflatoxin-Induced Liver Cancer in Rats.** K. T. Bogen. Exponent, Inc., Silver Spring, MD.

**#1979**

**Mechanistic Role of Cytochrome P450 1 Enzymes in Polycyclic Aromatic Hydrocarbon Mediated Carcinogenesis.** G. Gastelum1, A. Veith1, W. Jiang2, L. Wang2, G. Zhou2, and M. M. B. Moorthy1. 1Baylor College of Medicine, Houston, TX; and 2University of Texas Health Science Center, Houston, TX.

**#1980**

**Synthetic Progestins Elicit Similar Proliferative and Gene Expression Responses as Endogenous Progesterone at Much Lower Concentrations.** E. M. Martin and P. A. Wade. NIEHS, Research Triangle Park, NC.

**#1981**

**Glycolipid Transfer Protein (GLTP) Regulates Non-apoptotic Cell Death in Colon Cancer Cells: Implications in Cancer Therapy and Cytotoxicity.** S. K. Mishra and R. E. Brown. Hormel Institute, University of Minnesota, Austin, MN.

**#1982**

**Comprehensive Molecular Characterization of Mitochondrial Genomes in Spontaneous and Chemical-Induced Hepatocellular Carcinomas in B6C3F1/N Mice.** M. Xu1, A. Burkholder1, D. Fargo2, J. Marzec3, S. Kleeberger2, G. Solomon4, R. Sills1, and A. Pandiri5. 1NIH/NTP, Research Triangle Park, NC; and 2NIH, Research Triangle Park, NC. Sponsor: A. Pandiri, Society of Toxicologic Pathology.

**#1983**

**Inflammation Potentiates the DNA Damaging Effects of Environmental Chemicals in Colorectal Cancer Cells: The Role of miR27b.** A. A. Alsaleh, A. P. Goodenham, Imperial College London, London, United Kingdom.

**#1984**

**Mechanistic Data Can Play a Pivotal Role in IARC Monographs Evaluations When Human Data Are Less Than Sufficient.** L. Benbrahim-Talaa. International Agency for Research on Cancer, Lyon Cedex 08, France.

**#1985**

**Zonal-Specific Transcriptional Programs Associated with PPAR Activation in the Rat Liver and Their Role in Liver Cancer in Rodents.** M. E. Anderson1, M. B. Black1, S. N. Pendse1, R. A. Clewell2, E. L. ElCluyse2, and P. D. McMullen3. 1ScitoVation, LLC, Research Triangle Park, NC; 2ToxStrategies, Cary, NC; and 3LifeNet Health, Research Triangle Park, NC.

**#1986**

**Application of ToxCast, ToxPi and Read-Across for Analyzing the Potential Carcinogenicity and Mutagenicity of Some Di- and Triphenylymethanes.** J. Hsieh1, M. Sun1, J. Chang1, and M. Sandy2. CalEPA, Sacramento, CA.

**#1987**

**Estrogen Provides Protection against B(a)P-Induced Colon Carcinogenesis.** K. D. Harris1, A. E. Archibong1, J. M. Amos-Landgraf2, S. E. Adunyah1, and A. Ramesh1. 1Meharry Medical College, Nashville, TN; and 2University of Missouri, Columbia, Columbia, MO.

**#1988**

**Bis-Indole Derived NR4A1 Antagonist Inhibits TGF-ß Induced Rhabdomyosarcoma Cell Invasion.** R. Shrestha, and S. Safe. Texas A&M University, College Station, TX.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Oxidative Injury and Redox Biology

Chairperson(s): Xanthi I. Couroucli, Baylor College of Medicine, Houston, TX; Phillip Wages, Vanderbilt University, Nashville, TN; and Rui Xiong, US FDA/NCTR, Jefferson, AR.

Displayed: 9:15 AM–4:30 PM  |  Author Attended: 3:00 PM–4:30 PM

Abstract #

#1989  
**Poster Board Number**

**Nrf2 Induction of Antioxidant Response Increases Bioactivation of the Mutagenic Air Pollutant 3-Nitrobenzanthrone.**  
J. Murray1, L. de la Vega1, J. Hayes2, and T. Penning3.  
1University of Pennsylvania, Philadelphia, PA; and 2University of Dundee, Dundee, United Kingdom.

#1990  
**Poster Board Number**

**Combined Use of Sulfonaphene and Zinc Provides a Better Protection against Diabetic Cardiomyopathy Than Either One Alone in Type 1-Diabetic OVE26 Mice.**  
J. Wang1,2, S. Wang1,2, W. Wang1,2, J. Chen1,2, Z. Zhang1, Q. Liu1, and L. Cai1.  
1University of Louisville, Louisville, KY; 2First Hospital of Jilin University, Changchun, China; and 3Stanford University, Palo Alto, CA.

#1991  
**Poster Board Number**

**Application of Imaging-Based Nrf2 Pathway Activation to Support a Read across of Phenolic Compounds.**  
J. P. Schimming1, L. Bischoff1, M. J. Moné1, B. ter Braak1, D. Noort2, J. P. Langenberg2, and Y. Kumagai2,3,7,8.  
1Leiden University, Leiden, Netherlands; and 2TNO Defence, Safety and Security, Rijswijk, Netherlands.

#1992  
**Poster Board Number**

**Caffeic Acid Derivatives Are Effective Bacteriostatic Compounds against Paenibacillus larvae by Increasing Oxidative Stress.**  
Fort Lewis College, Durango, CO.

#1993  
**Poster Board Number**

**The General Transcription Factor II-I Increase PAR-Association during ROS-Mediated Cell Death.**  
A. Islas-Robles1, S. Lau1, and T. Monks2.  
1University of Arizona, Tucson, AZ; and 2Wayne State University, Detroit, MI.

#1994  
**Poster Board Number**

**Identification and Characterization of Metallothionein-3 as a Peussulfide-Binding Protein.**  
Y. Ding, Y. Shinkai, and Y. Kumagai.  
University of Tsukuba, Tsukuba, Japan.

#1995  
**Poster Board Number**

**Cholesterol Biosynthesis Disruptors Alter the Redox Biology of Developing In Vitro Cultures of Primary Rat Cortical Neurons.**  
J. Kim1, A. M. Palubisky1, P. A. Wages1, N. A. Porter1, and B. McLaughlin2.  
1Vanderbilt University, Nashville, TN; and 2Vanderbilt University Medical Center, Nashville, TN.

#1996  
**Poster Board Number**

**Synergistic Cytotoxic Responses of Co-exposure to Mixtures of Acrolein and Formaldehyde through Oxidative Stress on Human Bronchial Epithelial BEAS-2B Cells.**  
H. Hou.  
China National Tobacco Quality Supervision & Test Center, Zhengzhou, China.  
Sponsor: S. Jia

#1997  
**Poster Board Number**

**Inhibiting 7-Dehydrocholesterol Reductase Elevates Protein Adduction and Depletes Intracellular Glutathione.**  
P. A. Wages1, H. H. Kim1, and N. A. Porter.  
Vanderbilt University, Nashville, TN.

#1998  
**Poster Board Number**

**9,10-Phenanthraquinone, an Atmospheric Quinone, Activated EGFR Signaling through S-Oxidation of PTP1B in A431 Cells.**  
N. Cong Luong, Y. Abiko, and Y. Kumagai.  
University of Tsukuba, Tsukuba, Japan.

#1999  
**Poster Board Number**

**2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)-Elicited Metabolic Reprogramming in Primary Mouse Hepatocytes Supports Antioxidant Defense Mechanisms.**  
C. M. Doskey1, R. Nault1, K. A. Fader1, and T. R. Zacharewski2.  
1Michigan State University, East Lansing, MI.

#2000  
**Poster Board Number**

**Exposure to Dimethyl Selenide (DMSe) Derived Secondary Organic Aerosol Alters Oxidative Stress and Inflammatory Gene Expression in Human Airway Epithelial Cells (BEAS-2B).**  
C. Ahmed1, A. L. Frie1, A. Burr1, R. Kamath1, T. Nordgren1, Y. Lin1, and R. Bahreini1.  
1University of California Riverside, Riverside, CA.  
Sponsor: Y. Lin, Society of Environmental Toxicology and Chemistry

#2001  
**Poster Board Number**

**Mapping Glutathione Utilization in the Developing Zebrafish (Danio rerio) Embryo.**  
A. Rastogi1, C. W. Clark1, and A. R. Timme-Laragy2.  
1University of Massachusetts Amherst, Amherst, MA.

#2002  
**Poster Board Number**

**Manganese Superoxide Dismutase (MnSOD) Attenuates Hypoxia-Induced Cell Death and Alters ERK Activation.**  
J. Woo1, L. L. Mantell2, and A. Gautier1.  
1St. John's University, Jamaica, NY.

#2003  
**Poster Board Number**

**Redox Proteomics Analysis Reveals Slc7a11 Restores Age-Dependent Change of Redox State of Proteins in Pathways of Protein Turnover and Cell Death.**  
Y. Zheng1, J. Cai1, M. Merchant1, T. Burke1, J. Ritzenthaler1, J. Roman2, and W. Watson1.  
1University of Louisville, Louisville, KY; and 2Thomas Jefferson University, Philadelphia, PA.
<table>
<thead>
<tr>
<th>#</th>
<th>Abstract #</th>
<th>Title</th>
<th>Authors and Affiliations</th>
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<tr>
<td>#204</td>
<td>Poster Board Number</td>
<td>The Activation of NF-κB in Airway Epithelia Protects against Hypoxia-Induced Proinflammatory Lung Injury.</td>
<td>L. Daley1, M. Wang1, M. Zuri1, M. Entezari1, M. Jaydan1, and L. L. Mantell2. 1St. Johns University, Queens, NY; and 2Feinstein Institute for Medical Research, Manhasset, NY.</td>
</tr>
<tr>
<td>#206</td>
<td>Poster Board Number</td>
<td>Macrophages Hypoxia-Compromised Phagocytic Function Improved by Nrf-2 Inducer.</td>
<td>J. Wu, K. Dial, W. Wu, and L. Mantell. St. John’s University, Queens, NY.</td>
</tr>
<tr>
<td>#208</td>
<td>Poster Board Number</td>
<td>Supplementation with Omega-3 Fatty Acids Potentiates Oxidative Stress in Human Airway Epithelial Cells Exposed to Ozone.</td>
<td>E. Corteselli1, and J. Samet2. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2US EPA/NHEEERL, Chapel Hill, NC.</td>
</tr>
<tr>
<td>#210</td>
<td>Poster Board Number</td>
<td>Ambient Air PMx Reactive Oxygen Species Generation Capacity.</td>
<td>D. Sanigiannis, M. Kermendou, and S. Karakitsios. Aristotle University of Thessaloniki, Thessaloniki, Greece.</td>
</tr>
<tr>
<td>#211</td>
<td>Poster Board Number</td>
<td>Possible Prooxidant Actions of Tetramethobiphenol A.</td>
<td>K. E. Nixson1, M. O. Claville1, R. M. Uppu1, and S. Babu1. 1Hampton University, Hampton, VA; and 2Southern University and A &amp; M College, Baton Rouge, LA.</td>
</tr>
<tr>
<td>#211</td>
<td>Poster Board Number</td>
<td>Production of Reactive Oxygen Species by BP-1,6-Q and Its Effects on the Endothelial Dysfunction: Involvement of the Mitochondria.</td>
<td>Z. Jia1, H. Shah1, G. Gaje1, A. Koucheki1, H. Lee1, M. A. Trush1, H. Zhu1, and R. Li1. 1University of North Carolina at Greensboro, Greensboro, NC; 2Johns Hopkins Bloomberg School of Public Health, Baltimore, MD; and 3Campbell University School of Osteopathic Medicine, Buies Creek, NC.</td>
</tr>
<tr>
<td>#211</td>
<td>Poster Board Number</td>
<td>Effect of Diet and Occupational Exposure in Different Rat Strains on Serum Biomarkers and Peripheral Blood Mononuclear Cell Function.</td>
<td>J. Antonini1, and L. Falcone2. 1NIOSH, Morgantown, WV; 2NIOSH, Cincinnati, OH; and 3West Virginia University, Morgantown, WV.</td>
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<tr>
<td>#211</td>
<td>Poster Board Number</td>
<td>Single Cell Transcriptomics Identifies Key Cellular Players in an Animal Model of Asbestos-Induced Pulmonary Fibrosis.</td>
<td>N. Joshi, A. Misharin, and S. Budinger. Northwestern University, Chicago, IL.</td>
</tr>
<tr>
<td>#211</td>
<td>Poster Board Number</td>
<td>Lack of Lung Tumor Promotion after Inhalation of a Copper-Nickel Welding Fume in A/J Mice.</td>
<td>P. Zeidler-Erdely1, A. Erdely2, R. Salmen3, L. Battelli2, T. Dodd1, M. Keane1, W. McKinney1, S. Stone1, M. Donlin1, H. Leonard1, J. Cumpston1, J. Cumpston1, R. Mercier1, B. Chen1, R. Andrews3, M. Kashon3, J. Antonini1, and L. Falcone2. 1NIOSH, Morgantown, WV; 2NIOSH, Cincinnati, OH; and 3West Virginia University, Morgantown, WV.</td>
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<tr>
<td>#211</td>
<td>Poster Board Number</td>
<td>Functional Significance of the SLC26A4 Gene in Silica-Induced Pulmonary Toxicity.</td>
<td>T. Sager. NIOSH, Morgantown, WV.</td>
</tr>
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#2019 Posters

**Reducing the Respiration Rate and Improving Animal Welfare in Inhalation Large Animal Studies by Using a 3D Printer and Designing Specific Masks.** S. Moore, and E. Moore. Envigo, Huntington, United Kingdom.


**HIF-1α and IL-1β Are Two Key Events of the Lung Inflammation and Fibrosis Induced by Particles Used in Li-on Batteries.** V. Sironval, M. Palmi-Pallag, T. Yakoub, D. Lison, and S. van den Brule. Université Catholique de Louvain, Brussels, Belgium.

**Timing of Rat Gestational High-Fat Diet and Sex Determine Increased Susceptibility to Allergic Responses to Offspring.** S. Gavetti1, M. Hargrove2, S. Snow3, P. Phillips3, C. Gordon1, and U. Kodavanti4. 1US EPA, Research Triangle Park, NC; and 2ORISE, Research Triangle Park, NC.


**Docosahexaenoic Acid Supplementation Effectively Treats Toxicant-Triggered Autoimmunity in Lupus-Prone Mice.** J. Harkema1, P. Akbari1, M. Bates1, A. Freeland1, E. Eldridge1, K. Gilley1, J. Wagner1, and J. Pestka1. Michigan State University, East Lansing, MI.

**Natural History of Inhaled Sulfur Mustard Poisoning in Rats.** R. Malaviya1, R. Bancourt2, E. Abramova1, A. Bellomo1, Z. Henny1, C. Crowtcher1, J. Rosenort1, E. Peters1, R. P. Casillas3, C. Amuzie4, V. Sunil5, J. D. Laskin5, and D. L. Laskin5. 1Rutgers, The State University of New Jersey, Piscataway, NJ; 2Winston-Salem State University, Winston-Salem, NC; 3MRIGlobal, Kansas City, MO; and 4Janssen Research & Development, Spring House, PA.

**Molecular Signature of Asthma-Enhanced Sensitivity to Aerosols of pristine and Carboxylated CuO Nanoparticles, Identified in 3D Cell Models.** L. D. Rajasinghe1, K. Gilley1, J. Wee1, P. Phillips1, I. M. Kooter1, M. Ilves2, M. Grollers-Mulderij3, P. Tromp1, E. Duistermaat4, D. Greco2, J. Ndika2, and H. Alenius2. 1TNO, Utrecht, Netherlands; 2University of Helsinki, Helsinki, Finland; 3University of Helsinki, Helsinki, Finland; 4TNO, Zeist, Netherlands; and 5Triskelion, Zeist, Netherlands. Sponsor: R. Woutersen.

**Comparative Toxicities of 1,1'-Methylenebis(4-(hydroxymethyl)pyridinium) (MMB4) at Rat and Rabbit Diaphragm Neuromuscular Junctions.** K. T. Pagarigan1, C. H. Phung1, J. B. Machamer1, B. M. Winner1, C. A. Ondeck1, and P. M. McNutt1. US Army Medical Research Institute of Chemical Defense, Gunpowder, MD.

**Development of a Computational Model for the Transient Receptor Potential Vanilloid Subfamily Type 1 Protein (TRPV1).** S. M. Krieger1, S. J. Wijesekere1, T. R. Auerhammer1, A. K. Parks1, J. A. Hotchkiss1, D. Wilson1, and M. S. Morty1. Toxicology and Environmental Research and Consulting, Dow, Midland, MI.

**A Read-Across Study on Diketones.** B. Kühne1, D. Ritter1, J. Knebel1, J. Boei1, H. Vrieling1, F. Hieistra1, S. Escher1, and T. Hansen1. Fraunhofer ITEM, Hannover, Germany; and 2Leiden University Medical Center, Leiden, Netherlands. Sponsor: C. Dasembrock.

**Effects of Low Level Hydrogen Sulfide Exposure on the Pathogenicity of Influenza A Virus Pathogenicity in a Swine Model.** C. M. Santana1, and W. Rumbelha1. Iowa State University, Ames, IA.


**Xenobiotic Metabolism Response to 3RF or THS 2.2 Exposure: From Prerelational to Clinical.** S. Pouly, M. Tallikka, A. van der Plas, B. Titz, G. de La Bourdonnaye, N. Blanc, F. Martin, C. Haziza, N. V. Ivanov, F. Lüdicke, J. Hoeng, and M. C. Peitsch. PMI R&D, Philip Morris Products S.A., Neuchatel, Switzerland.

**Mechanisms of Silica-Induced Alveolar Macrophage Cell Death and Protection by the Omega-3 Fatty Acid DHA.** P. S. Chauhan1, K. A. Wierenga1, L. D. Rajasinghe1, K. Gilley1, J. Wei1, P. Akbari1, M. A. Gavrilin1, J. R. Harkema1, A. Holian1, and J. J. Pestka1. 1Michigan State University, East Lansing, MI; 2Ohio State University, Columbus, OH; and 3University of Montana, Missoula, MT.

**Vitamin A Attenuates Hyperoxic Lung Injury in Newborn Rats Exposed Prenatally to Benzo[a]pyrene (BP).** X. I. Courouci1, P. Maturu2, Y. Wei, and B. Moorthy. Baylor College of Medicine and Texas Children’s Hospital, Houston, TX.


### Poster Board Number

#### Human Multi-organ-Chip Co-culture Approach of Bronchial Airway and Liver Models for Substance Exposure Studies.


#### A Multi-tiered In Vitro Approach for Sensitive and Predictive Respiratory Safety Assessment.


#### An In Vitro Model for Studying the Mechanism of Flavoring-Induced Airway Injury.


#### Toxicological Characterization and Efficacy of an Inhaled Therapeutic Platform for Optimization of Protein Therapies.

A. Aslam, K. McInally, and O. Blaschuk. ITR Laboratories Canada Inc, Baie-D’Urfé, QC, Canada; and McGill University, Montreal, QC, Canada. Sponsor: W. Ruddock

#### Carbon Black and Ozone Co-exposure Present Novel Prospects of Disease Susceptibility.


#### Effects of Subacute Inhalation Exposure to Multiwalled Carbon Nanotubes in Mice and Rats.


#### Critical Analysis of Diacetyl and Bronchiolitis Obliterans.


#### Moderate Aspergillus versicolor Inhalation Exposure Triggers Neuroinflammation.

T. B. Ladd, M. A. Barnes, C. L. Mummaw, B. J. Green, D. H. Beezhold, and M. L. Block. Indiana University School of Medicine, Indianapolis, IN; and NIOSH, Morgantown, WV.

#### Role of FFAR1/FFAR4 in Excitation Contraction Coupling in Human Airway Smooth Muscle (HASM) Cells.

S. Xu, A. Schwab, N. Karmacharya, J. Jude, and R. Panettieri. Rutgers, The State University of New Jersey, Piscataway, NJ.

#### Preservation of Xenobiotic Metabolizing Capacity in Airway Cells In Vitro: A Species Comparative Approach Using Cells from Mice, Monkeys and Humans.

J. Kelty, N. Kovalchuk, X. Ding, and L. Van Winkle. University of California Davis, Davis, CA; and University of Arizona, Tucson, AZ; and University of Arizona, Tucson, AZ.

#### Comparative Study of Multiwalled Carbon Nanotubes and Pro-inflammatory IL-1 Beta Production: The Role of Purification and Surface Functionalization.

H. Lee, A. Taylor-Just, D. You, D. Lison, S. Brüler, C. Ziemann, O. Creutzenberg, S. Simon, A. Vulpoli, F. Turcu, and J. C. Bonner. North Carolina State University, Raleigh, NC; Université catholique de Louvain, Louvain, Belgium; Fraunhofer Institute for Toxicology and Experimental Medicine, Hannover, Germany; and Babes-Bolyai University, Cluj-Napoca, Romania.

#### Toxicity Screening of Volatile Chemicals Using a Novel Air-Liquid Interface In Vitro Exposure System.


#### Amiodarone-Induced Lung Injury is Associated with Alterations in Alveolar Macrophages and Mesenchymal Stem Cell Populations in Mice.

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Cardiovascular Toxicology/Hemodynamics

Chairperson(s): Yi-Fan Chen, Louisiana State University School of Veterinary Medicine, Baton Rouge, LA; and Jun Nakamura, Osaka Prefecture University, Izumisano, Japan.

Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM

Abstract #

#2049

Poster Board Number

The Multi-kinase Inhibitor, C374, Perturbs Excitation-Contraction Coupling in Human iPSC-Derived Cardiomyocytes. M. Holbrook1, C. McMahon2, G. Smith3, K. McGlynn3, and L. Burns-Naas4. 1VAST Pharma Solutions, Harrogate, United Kingdom; 2Gilead Sciences, Foster City, CA; and 4Clyde Biosciences, Glasgow, United Kingdom.

#2050

Poster Board Number


#2051

Poster Board Number


#2052

Poster Board Number

Comparative Gene Expression Profiles of Human Ventricles and the Next Generation In Vitro Human Cardiac Model, BioWire II. M. Hong1, I. Pallotta2, M. Colombo3, R. Robbi3, K. Mavrommatis4, M. Graziano5, and K. Koloja6. 3Celgene, Summit, NJ; 4Tara Biosystems, New York, NY; 5Celgene, Seville, Spain; and 6Celgene, San Diego, CA.

#2053

Poster Board Number


#2054

Poster Board Number


#2055

Poster Board Number


#2056

Poster Board Number

Arsenic Increases Atherosclerotic Plaque Formation in PCSK9-AAV Transgenic Mice. K. Makhani1, C. Guilbert2, D. Plouder3, T. Ebrahimian4, F. Dierick5, S. Lehoux5, and K. Mann6. 1McGill University, Montreal, QC, Canada; and 2Jewish General Hospital, Montreal, QC, Canada.

#2057

Poster Board Number

The Effect of Inhaled Multiwalled Carbon Nanotubes on Blood Pressure in Spontaneously Hypertensive Rats. H. Kan1, W. Zheng2, W. McKinney3, M. Kashon1, and V. Castranova4. 1NIOSH, Morgantown, WV; and 2West Virginia University, Morgantown, WV.

#2058

Poster Board Number

Inhibition of TGFβ Signaling in Rat Valvular Interventricular Cells Redirects the Activated Phenotype. F. Wang, J. Kwagh, C. Zhang, J. Zhu, L. Li, R. Westhouse, J. Fargnoli, R. Borzilleri, and K. Augustine-Rauch. Bristol-Myers Squibb, Pennington, NJ.

#2059

Poster Board Number


#2060

Poster Board Number


#2061

Poster Board Number

Functional and Safety Evaluation of Biodegradable Scaffold in Swine Coronary Arteries. L. Guy1, M. Laflamme1, F. Soza1, and G. Leclair1,2. 1AcCelAB Inc. (a Citoxlab Company), Biodbriand, QC, Canada; and 2University of Montreal, Montreal, QC, Canada. Sponsor: P. Singh

#2062

Poster Board Number

Cardiovascular Characterization of the Multi-kinase Inhibitor C374 in Telemeterized Cynomolgus Monkeys. B. Singh1, C. McMahon2, M. Coffee3, B. Roche4, L. Burns-Naas4. 1Gilead Sciences, Inc., Foster City, CA; 2Charles River, Ashland, OH; and 3VAST Pharma Solutions, Harrogate, United Kingdom.
**Poster Board Number**

**Abstract**

**Chronic Antiretroviral Treatment Disrupts Mitochondrial Homeostasis and Promotes Premature Endothelial Senescence.** Y. Chen¹, J. Stampley², B. Irving³, and T. Dugas⁴. ¹Louisiana State University School of Veterinary Medicine, Baton Rouge, LA; and ²Louisiana State University, Baton Rouge, LA.

**Mitochondrial Alterations May Play a Role in Cardiotoxicity of the Tyrosine Kinase Inhibitor Regorafenib.** T. Boran, A. Gunaydin, A. Jannuzzi, and B. Alpertunga. Istanbul University, Istanbul, Turkey.

**Effect of a Cardiotoxic Pollutant-Phenanthrene on the Cardiac Function of Brown Trout (Salmo trutta).** M. Ainerua¹, J. Tinwell¹, E. Sarhus², K. White³, B. VanDongen⁴, and H. Shiel⁵. ¹University of Manchester, Manchester, United Kingdom; and ²Institute of Marine Research, Bergen, Norway.

**In Vitro Investigation of the Antineoplastic Agent Lenvatinib Induced Cardiotoxicity in Terms of Mitochondrial Toxicity.** A. Gunaydin, T. Boran, A. Jannuzzi, and B. Alpertunga. Istanbul University, Istanbul, Turkey.

**The Cardiovascular Effects of Crotonaldehyde In Vivo and In Vitro.** L. Jin, G. Jagatheesan, and D. J. Conklin. University of Louisville, Louisville, KY.

**Effects of Tobacco Product-Derived Unsaturated Aldehydes on Circulating Angiogenic Cells.** J. Finch, and D. J. Conklin. University of Louisville, Louisville, KY.


**Influence of Maternal Engineered Nanomaterial Inhalation on Uterine Adrenergic and Myogenic Microvascular Responses.** K. L. Garner¹, A. B. Abukabda², E. C. Bowdrige³, T. P. Batchelor⁴, S. Hussain⁵, W. T. Goldsmith⁶, and T. R. Nurkiewicz⁷. ¹Department of Physiology and Pharmacology, West Virginia University, Morgantown, WV; and ²Toxicology Working Group, Morgantown, WV.


**Incorporating the CIPA Paradigm into an Integrated Cardiac Risk Assessment.** M. Morton¹, R. Printemps², M. Le Grand³, M. Davies⁴, and R. Roberts⁵. ¹Apconix Ltd, Alderley Park, United Kingdom; ²PhysioStim, Toulouse, France; and ³QT Informatics Ltd., Alderley Park, United Kingdom.

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**Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**PS Poster Session: Cell Death and Apoptosis**

**Chairperson(s):** Gaku Ichihara, Tokyo University of Science, Noda, Japan; and Mohammad Shoeb, CDC/NIOSH, Morgantown, WV.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM**

**Abstract #**


**Investigating the Role of MyD88 Signaling in CD4+ T Cells and Its Implications in Non-ischemic Heart Failure.** D. Padilla Rolon¹, N. Ngwenyama², H. Muenland³, A. Poltorak⁴, and P. Alcaide⁵. ¹University of Puerto Rico at Cayey, Cayey, PR; and ²Tufts University, Boston, MA.


**Cytotoxic Mechanism of a Mitomycin C-Lexitropsin Hybrid Anticancer Drug.** M. Zheng¹, C. Clement², E. Champeil³, and S. Cheng¹. ¹John Jay College of Criminal Justice, New York, NY; and ²‘Albert Einstein College of Medicine, Bronx, NY.
Abstract #

#2078

Methylglyoxal-Induced Advanced Glycation End Products Promote Proliferation via MAPK/PI3K/Akt Signaling Pathways in Renal Cell Carcinoma Cell. H. Nam, H. Kim, and K. Lee. Korea University, Seoul, Korea, Republic of. Sponsor: J. Lee

#2079

Sensitive Luminescent LDH-Release Assay That Enables “Real-Time” Sampling from Individual 3D Microtissues. N. Karassina1, M. Kijanska2, C. Pichon3, and J. Vidugiriene4. 1Promega Corp, Madison, WI; and 3InSphero AG, Schlieren, Switzerland. Sponsor: A. Niles

#2080

Cytotoxicity of Acrylamide in Neuron and Microglia, and Involvement of Autophagy with Caspase Activity. S. Iwama1, C. Zong1, T. Sakurai2, M. Urashtani3, S. Ohmako3, and G. Ichihara4. 1Tokyo University of Science, Noda, Japan; 2Shiga Medical University, Otsu, Japan; and 3University of Tokyo, Tokyo, Japan.

#2081


#2082

Trovaflloxacin-Induced Protective Autophagy is Inhibited by TNFalpha-Mediated Upregulation of mTOR Pathway in HepG2. J. Ahn, J. Oh, and S. Yoon. Korea Institute of Toxicology, Daejeon, Korea, Republic of. Sponsor: S. Yoon, Japanese Society of Toxicology

#2083

Characterization and Application of a 3D Human Oral Buccal Model for Whole Cigarette Smoke and Smokeless Tobacco Exposure. B. Keyser1, W. Morgan2, A. Maione3, and W. Fields4. 1RAI Services Company, Winston-Salem, NC; and 2MatTek Inc., Ashland, MA.

#2084


#2085


#2086


#2087

The Molecular Mechanism of Cigarette Smoke Induced Necroptosis on Human Vascular Endothelial Cell. L. Qiao, C. Hua, J. Zhao, P. Shang, X. Li, F. Xie, and H. Liu. Zhengzhou Tobacco Research Institute, Zhengzhou, China. Sponsor: R. Meng

#2088

Cadmium Exposure Induces Pancreatic β-cell Dysfunction and Death via a Ca2+-Triggered JNK/CHOP-Related Apoptotic Signaling Pathway. J. Lin1, Y. Chiu2, C. Yang3, K. Lee3, C. Su1, C. Lin1, C. Wu3, S. Liu1, Y. Chen1, and C. Huang3. 1China Medical University, Taichung, Taiwan; 2National Taiwan University Hospital, Taipei, Taiwan; 3Taichung Tzu Chi Hospital, Taichung, Taiwan; 4Changhua Christian Hospital, Changhua, Taiwan; 5Department of Public Health, Taipei, Taiwan; and 6National Taiwan University, Taipei, Taiwan.

#2089


Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Safety Assessment Pharmaceutical: Drug Development

Chairperson(s): Derek Leishman, Eli Lilly and Company, Indianapolis, IN; Prathap Mahalingaiah, Abbvie, North Chicago, IL; and Sidhartha D. Ray, Touro College of Pharmacy and School of Osteopathic Medicine, New York, NY.

Displayed: 9:15 AM – 4:30 PM  |  Author Attended: 9:15 AM – 10:45 AM

Abstract #

#2090


#2091

Two Cases of Lumbar Spinal Cord Infarction in Cynomolgus Monkeys Associated with Intrathecal Budesonide Administration. F. Ludwig1, F. Runge1, T. Voß1, A. von Keutz1, S. Friderichs-Gromoll1, C. Leonard2, M. Wozniak3, S. Korte1, A. Romeike1, and L. Mecklenburg1. 1Covance Preclinical Services GmbH, Münster, Germany; 2Covance Laboratories Ltd., Harrogate, United Kingdom; and 3Medical University of Lublin, Lublin, Poland.
#2092 Poster Board Number


#2093 Poster Board Number

Safety Assessment of Ionis-MAPTter, a Microtubule-Associated Protein-Tau (MAPT) Lowering Antisense Oligonucleotide (ASO), by Intrathecal (IT) Lumbar Puncture (LP) for 13 and 39 Weeks in Cynomolgus Monkeys. R. Narayanan1, S. Korte2, J. A. Engelhardt3, H. Kordasiewicz4, D. A. Norris5, J. F. Schroeder6, B. Fitzsimmons7, E. Swayze8, L. Mignon9, R. Lane10, C. Bennett1, and S. P. Henry1;1 Ionis Pharmaceuticals, Carlsbad, CA; and 2Covance Preclinical Services GmbH, Muenster, Germany.

#2094 Poster Board Number


#2095 Poster Board Number


#2096 Poster Board Number


#2097 Poster Board Number

A Bioinformatics Tool for Prediction of Drug Target Safety Assessment. K. Jankovic1, T. Krsmanovic1, D. Mitic Potkrajac1, G. Apic1, and R. B. Russell2;1 Metisox Ltd, Cambridge, United Kingdom; and 2Cell Networks, University of Heidelberg, Heidelberg, Germany.

#2098 Poster Board Number


#2099 Poster Board Number

Characterization of a Modified CNS Tetram Safety Test in Sprague Dawley Rats. A. Mason1, A. Tomkinson1, M. Coffee1, and L. Burns-Taas1;1 Gilead Sciences, Inc, Foster City, CA; and 2Charles River, Ashland, OH.

#2100 Poster Board Number


#2101 Poster Board Number

Preclinical Safety Assessment of JM4, a Novel 19-Amino Acid Peptide, for Traumatic Brain Injury and Multiple Sclerosis. P. Joshi1, V. Kale2, K. Elsas3, P. Dowling4, S. Cook5, and P. Tese6;1 NIH/NCATS, Bethesda, MD; 2Battelle Memorial Institute, Columbus, OH; 3Rutgers, The State University of New Jersey Medical School, Newark, NJ; and 4Rutgers, The State University of New Jersey Medical School, Newark, NJ.

#2102 Poster Board Number

Drug Permeation Assessment through Reconstructed Vaginal Epithelium: The Case of Econazole. L. Ceriotti1, A. Granata2, C. Pellevisoin3, and M. Meloni4;1 VitroScreen, Milan, Italy; 2LabAnalysis, Pavia, Italy; and 3EpiSkin Academy, Paris, France. Sponsor: E. Dufour.

#2103 Poster Board Number

Human Reconstructed Mucosal Models to Assess Drug Permeation. M. Meloni1, A. Granata2, C. Pellevisoin3, and L. Ceriotti1;1 VitroScreen, Milan, Italy; 2LabAnalysis, Pavia, Italy; and 3EpiSkin Academy, Paris, France. Sponsor: E. Dufour.

#2104 Poster Board Number

Antifertility Effect of Antituberculosis Drugs Combinations Containing Ethambutol or Streptomycin in Male Rats. T. Karatsuba, and G. Shayakhmetova. Institute of Pharmacology and Toxicology NAMS of Ukraine, Kyiv, Ukraine. Sponsor: T. Karatsuba, EUROTX.

#2105 Poster Board Number

Preclinical Development of a Novel Intramuscular Male Contraceptive: Dimethandrolone-17 β-Undecanoate (DMAU, CDB-4521). K. Kim1, J. Gahegan1, T. A. Birkebak1, D. Fairchild1, L. Iyer1, C. Wang1, T. Burch1, M. Zelinski1, D. Blithe5, M. Lee5, and T. Parman1;1 SRI International, Biociences Division, Menlo Park, CA; 2Experimental Pathology Laboratories, Sterling, VA; 3Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, Torrance, CA; 4Oregon National Primate Research Center, Beaverton, OR; and 5National Institute of Child Health and Human Development, Contraceptive Development Program, Bethesda, MD.

#2106 Poster Board Number


#2107 Poster Board Number

High Content In Vitro Cell Monitoring of Adjuvant Chemotherapy Effects in Breast Cancer and Treatment-Related Cardiomyopathy. K. Juhahs1,2, O. Reinhardt2, R. Knox2, G. Okoye3, E. Dragicevic2, S. Stoelzel-Feix2, F. Alves3, and N. Fertig4;1 Nanion Technologies, Munich, Germany; 2Institute for Nano-electronics, TUM, Munich, Germany; 3Translational Molecular Imaging Group, MPI of Experimental Medicine, Göttingen, Germany; 4Nanion Technologies Inc., Livingston, NJ; and 5Uni Medical Center, Göttingen, Germany. Sponsor: S. Stoelzel-Feix, Safety Pharmacology Society.

#2108 Poster Board Number

Concomitant Effects of Clonidine on QT Interval Duration, hERG Current, Heart Rate and Body Temperature in Cynomolgus Monkeys: QT Correction Formula for Changes in Core Body Temperature. A. El Amrani1, H. Huang2, S. Loriot3, F. El Amrani-Callens3, P. Singh4, S. Authier5, and R. Forster5;1 Citoxlab, Eurex, France; and 2Citoxlab North America, Laval, QC, Canada.

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#2109 Poster Board Number.................................................................P502
An Improved Model for Thorough QT (TQT) Clinical Trials That Explicitly Includes RR and Does Not “Correct” QT. W. D. McGuinn Jr.
Drug Development Services, Indianapolis, IN.

#2110 Poster Board Number.................................................................P503

#2111 Poster Board Number.................................................................P504
Safety Studies and Preclinical Development of Novel EPAC Inhibitors as Promising Therapeutics for Drug-Resistant Rickettsiosis. L. L. Rausch1, K. Kim1, E. Riccio1, R. Doppalapudi1, K. O'Loughlin1, T. Birkebak1, N. Ye1, Y. Zhu1, F. C. Mei1, P. Wang1, J. Zhou1, X. Cheng1, and T. Parman1. 1SR1 International, Menlo Park, CA; and 1University of Texas Medical Branch, Galveston, TX.

#2112 Poster Board Number.................................................................P505
A 9-Month Oral Toxicology, Efficacy, and Pharmacokinetic Study of Dimethandro1ne-17 β-Undecanoate (DMAU, CDB-4521). J. Gahagen1, D. Fairchild1, C. Green1, C. McFarlane1, R. Swezey1, C. Wang1, D. Blithe1, M. Lee1, and T. Parman1. 1SR1 International, Menlo Park, CA; 2Los Angeles Biomedical Research Institute at Harbor, Torrance, CA; and 3National Institute of Child Health and Human Development, Bethesda, MD.

#2113 Poster Board Number.................................................................P506

#2114 Poster Board Number.................................................................P507
Characterization of a Novel Oxygenating Therapeutic. A. Dabi, G. V. Aquino, F. Zhang, and E. D. Bruce. Baylor University, Waco, TX.

#2115 Poster Board Number.................................................................P508
Preclinical Evaluation of Pharmacokinetics and Toxicity of AT1965, a Novel Immunotherapeutic Agent. A. Sengupta1,2, M. Samarla1,2, M. Pandey1, A. Sarkar1,2, M. Roy1, and S. Sengupta1,2. 1Invictus Oncology Pvt. Ltd., Delhi, India; 2Akamara Therapeutics Inc., Philadelphia, PA; and 3Brigham and Women’s Hospital, Cambridge, MA. Sponsor: A. Sengupta, American Association for Cancer Research.

#2116 Poster Board Number.................................................................P509
Loss of BET Signaling Inhibits Bone Marrow Progenitor Differentiation Leading to Multi-Lineage Cell Depletion in the Rat. C. Zhang1, J. Panza-Kelly1, J. Price1, H. Wang1, D. Bounous1, F. Lee1, A. Gava1, R. Westhouse1, and K. Augustine1. 1Bristol-Myers Squibb, Pennington, NJ; and 2Bristol-Myers Squibb, Lawrenceville, NJ.

#2117 Poster Board Number.................................................................P510
Are We Fully Exploiting the Use of a Single Species for Post-“First-in-Human” (FHI) Studies Allowed within ICHS6? H. Prior, and F. Sewell. NC3Rs, London, United Kingdom.

#2118 Poster Board Number.................................................................P511
Magnetic Resonance Imaging (MRI) and Histopathology Characterization of Osteoarthritis (OA)-Associated Lesions in a Mongrel Dog Surgical Model. M. Guillot1, A. Bédard1, A. Landry1, F. Émond1, C. Foucault1, L. Tremblay1, and A. Varela1. 1Charles River Laboratories, Senneville, QC, Canada; 2Charles River Laboratories, Senneville, QC, Canada; and 3University of Sherbrooke, Sherbrooke, Qc, Canada.

#2119 Poster Board Number.................................................................P512
Micro-CT and Histopathology Characterization of Atherosclerotic Plaque in Aorta from High Fat Diet-Fed Ovariectomized Apolipoprotein E Knockout Mice. M. Guillot1, G. Boyd1, J. Bienvenu1, M. Felix1, C. Glaus1, J. Turk1, V. Stadelmann1, and A. Varela1. 1Charles River Laboratories, Senneville, QC, Canada; and 2Amgen, Thousand Oaks, CA; and 3Scanco Medical AG, Bruttisellen, Switzerland.

#2120 Poster Board Number.................................................................P513
Detection of Organometallic Compounds and Their Toxicity in Zebrafish Using ICPSM Metal Equivalents. B. Kanas1, L. Corte-Real1, L. White1, A. Valente1, K. Cooper1, and B. Buckley1. 1Rutgers, The State University of New Jersey, Piscataway, NJ; and 2Universidade de Lisboa, Lisboa, Portugal.

#2121 Poster Board Number.................................................................P514

#2122 Poster Board Number.................................................................P515

#2123 Poster Board Number.................................................................P516
Establishing a Toxicologically-Based Level for ßeta- Glucans. C. Schubert1, and C. Moudgal1. 1Hoffmann-La Roche Basel, Basel, Switzerland; and 2Genentech, Inc., South San Francisco, CA.

#2123a Poster Board Number.................................................................P517
A Risk Assessment Pathway (RAP) Map for Setting Impurity Limits for Pharmaceuticals. R. Sandhu1, M. A. Maier2, R. A. Jolly3, D. D. Dolan4, E. Levison Bartle5, and J. Bercu3. 1Safedose Ltd., Oakville, ON, Canada; 2Cardno ChemRisk, Cincinnati, OH; 3Eli Lilly, Indianapolis, OH; 4Amgen, Thousand Oaks, CA; 5Lonza, Basel, Switzerland; and 6Gilead, Foster City, CA.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Education, Ethical, Legal, and Social Issues

Chairpersons: Joshua P. Gray, US Coast Guard Academy, New London, CT; and Kristine L. Willett, University of Mississippi, University, MS.

Abstracts:

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<td>#2127</td>
<td>Using Low-Cost Air Pollution Sensors as an Educational Tool in an Undergraduate Science Course.</td>
<td>J. Mirowsky. SUNY College of Environmental Science and Forestry, Syracuse, NY.</td>
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<td>#2128</td>
<td>Improvisation as a Teaching Tool to Be Incorporated into Summer Undergraduate Research Programs.</td>
<td>M. Phelps, L. Xiang, and H. Swanson. University of Kentucky, Lexington, KY.</td>
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<td>ToxMSDT: An Innovative Toxicology Research Education Pipeline Program Targeting Underrepresented Undergraduate Students to the Field of Toxicology.</td>
<td>W. K. Rumbeha, E. Gilbreath, D. Alexander, A. Correia, S. Bradford, J. Danielson, P. Leigh, and J. Wolt. Iowa State University, Ames, IA; Tuskegee University, Tuskegee, AL; and Ohio State University, Columbus, OH.</td>
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<td>#2130</td>
<td>Undergraduate Education Programs at the Northeast and Ohio Valley Regional Society of Toxicology Chapters: Large Impact for a Low Cost.</td>
<td>J. P. Gray, C. P. Curran, and L. Williams. U.S. Coast Guard Academy, New London, CT; Northern Kentucky University, Highland Heights, KY; and Bates College, Lewiston, ME.</td>
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<td>#2131</td>
<td>Use of Case Studies to Introduce Undergraduate STEM Students to Environmental Regulations.</td>
<td>J. M. Shimek. Indiana University School of Public Health, Bloomington, IN.</td>
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<td>#2132</td>
<td>Strategies for Effectively Incorporating Team-Based Learning in an Undergraduate Toxicology Course.</td>
<td>C. P. Curran. Northern Kentucky University, Highland Heights, KY.</td>
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<td>#2133</td>
<td>Establishing Foundational Toxicology Education in Sierra Leone Using Active Learning Modules.</td>
<td>R. H. Wilson, M. T. Walcheck, F. Arowolo, L. Gonzalez Vazquez, M. M. Morgan, B. Sanchez-Sedillo, S. Thomas, J. S. Yee, M. Avilla, C. A. Bradfield, and A. U. Njai. University of Wisconsin-Madison, Madison, WI; University of Sierra Leone, Freetown, Sierra Leone; and Project 1808, Inc., Madison, WI.</td>
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<td>#2134</td>
<td>Publishing Trends of Graduate Students in an Interdepartmental Toxicology Program over a 6-Year Period.</td>
<td>L. M. Aleksunes. Rutgers, The State University of New Jersey, Piscataway, NJ.</td>
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<td>#2135</td>
<td>International ToxScholar: Promoting Toxicology Careers Globally.</td>
<td>R. J. Dearman, B. L. Baisha, and B. J. Eidemiller. University of Manchester, Manchester, United Kingdom; Henkel Corporation, Trumbull, CT; and Society of Toxicology, Reston, VA.</td>
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<td>#2137</td>
<td>Reducing Exposure to Lead-Based Ammunition to Improve Child Health.</td>
<td>S. Gilbert, and R. Shaffer. INND, Seattle, WA; and University of Washington, Seattle, WA.</td>
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#2138 Poster Board Number

**Genomic Responses to Phosphine Intoxication.** M. Hartog, R. Lewandowski, J. Tressler, L. Gooch, B. McCranor, B. Wong, and H. Hoard-Fruehey. United States Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD.

#2139 Poster Board Number


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#2142 Poster Board Number


#2143 Poster Board Number

**Circulating Cell-Free Nucleic Acids in the Pathogenesis of Sulfur Mustard Analog-Induced Acute Respiratory Distress Syndrome.** N. Mariappan, M. Husain, I. Zafar, K. G. Smithson, S. Ahmad, and A. Ahmad. University of Alabama at Birmingham, Birmingham, AL.

#2144 Poster Board Number


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#2149 Poster Board Number

**BiP5, a Type-IV Collagenase Inhibitor, Modulates Epidermal Keratin Expression in Mouse Skin Treated with Sulfur Mustard.** Y. Chang, T. Peng, R. A. Hahn, M. K. Gordon, J. D. Laskin, and D. R. Gerecke. Rutgers, The State University of New Jersey, Piscataway, NJ.

#2150 Poster Board Number


#2151 Poster Board Number

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Chemical Threats and Bioterorism II**

**Chairperson(s):** Dennis Carty, University of California Davis, Davis, CA; and Aarti Gautam, US Army Center for Environmental Health Research, Frederick, MD.

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**Abstract #**

- **Poster Board Number:**
- **Poster Board Number:**
- **Toxicity and Mechanisms to Identify Therapeutic Targets of Phosgene Oxime Skin Exposure.** D. G. Goswami, J. Roseman, P. Anantharami, C. R. Crouch, D. J. Orlicky, R. Agarwal, and N. Tewari-Singh. 1University of Colorado Denver, Aurora, CO; and 2MRI Global, Kansas City, MO.
- **Poster Board Number:**
- **Amelioration of Nerve Agent Injury.** C. Dalton, S. Graham, and J. Jenner. Dstl, Salisbury, United Kingdom.

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**Displayed: 9:15 AM—4:30 PM | Author Attended: 9:15 AM—10:45 AM**

- **Poster Board Number:** Genetic-Based, Differential Susceptibility to Exposure to Combined Organophosphate and Increased Glucocorticoid in a Mouse Model of Gulf War Illness. B. C. Jones, J. P. O’Callaghan, D. B. Miller, L. Lu, W. Zhao, and D. Ashbrook. 1University of Tennessee Health Sciences Center, Memphis, TN; and 2NIOHS, Morgantown, WV.

- **Poster Board Number:** Neuroinflammation Detected by Longitudinal Tspo Positron Emission Tomography (PET) Is Associated With Deficits in Learning and Memory in a Rat Model of Acute Organophosphate (OP) Intoxication [H1]. B. A. Hobson, Y. Dou, S. Bandara, D. Rowland, Z. Harleyman, D. Bruun, D. Harvey, A. Chudhari, and P. J. Lein. 1University of California Davis, Sacramento, CA; and 2University of California Davis, Davis, CA.


- **Poster Board Number:** An Ex Vivo and In Vivo Comparative Study with MMB4 and 2-PAM to Determine Liabilities Associated with Toxic Levels of the Oximes. S. R. Roof, R. L. Hamlin, and C. L. del Rio. QTest Labs, Columbus, OH.

- **Poster Board Number:** Organophosphate-Induced Neuropathology in the Rat Hippocampus Is Mitigated by Novel Brain-Penetrating Oxime Acetylcholinesterase Reactivators. M. Dail, C. Leach, R. Pringle, E. Meek, C. Green, and J. Chambers. 1Mississippi State University, Mississippi State, MS; and 2SRI International Biosciences Division, Menlo Park, CA.

- **Poster Board Number:** Novel Pyridinium Oximes in Combination with 2-PAM Potentiate Survival and Neuroprotection Following Organophosphate (OP) Exposure. E. Meek, and J. Chambers. Mississippi State University, Mississippi State, MS.

- **Poster Board Number:** Identifying New Serine Hydrolase Targets of a Sarin Analogue and Reactivation with Novel Phenoxyalkyl Pyridinium Oximes. C. Price, M. Dail, and J. Chambers. Mississippi State University, Mississippi State, MS.

- **Poster Board Number:** Effect of a Novel Brain-Penetrating Oxime Acetylcholinesterase Reactivator on Sarin Surrogate-Induced Changes on Gene Expression in the Rat Brain. D. Stanford, M. Dail, E. Meek, and J. Chambers. Mississippi State University, Mississippi State, MS.

- **Poster Board Number:** Inhibition and Reactivation Potential of Novel Phenoxyalkyl Pyridinium Oximes on Rat Serum Butyrylcholinesterase and Acetylcholinesterase. R. Nichols, and J. Chambers. Mississippi State University, Mississippi State, MS.

- **Poster Board Number:** Novel Pyridinium Oximes Enhance 24-Hour Survivability against Lethal Organophosphate Dosages in Adult Female Rats. J. Garcia, and J. Chambers. Mississippi State University, Mississippi State, MS.

- **Poster Board Number:** Evaluation of Allopregnanolone as Treatment for Nerve Agent-Induced Status Epilepticus in Pediatric and Adult Rats. E. Dunn, K. Taylor, K. Whitten, L. Matson, K. Haines, K. Berger, H. McCaren, S. Miller-Smith, and J. McDonough. USAMRICD, Aberdeen Proving Ground, MD.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Nanotoxicology In Vitro: Alternative Testing Strategies**

**Chairperson(s):** Marion MacFarlane, Medical Research Council (MRC) Toxicology Unit, Leicester, United Kingdom; Monita Sharma, PETA International Science Consortium, London, United Kingdom; and Liying Wang Rojanasakul, NIOSH, Morgantown, WV.

**Displayed:** 9:15 AM—4:30 PM | **Author Attended:** 10:45 AM—12:15 PM

### Abstract #2166

**Poster Board Number**

**Comparing the Anticonvulsant Efficacy of the Neurosteroids Ganaxalone and Allopregnanolone in a Rat Model of Delayed Treatment of Nerve Agent Intoxication.**

S. Mills, B. Barker, C. Jackson-Piercy, J. McDonough, and H. McCarren. USAMRICD, Gunpowder, MD.

### Abstract #2167

**Poster Board Number**

**Lethality and Acetylcholinesterase Inhibition in the Larval Zebrafish Can Be Used as Screening Endpoints for Assessing Organophosphate Acute Toxicity in Humans.**


### Abstract #2168

**Poster Board Number**

**Intramuscularly Administered A1 Adenosine (ADO) Receptor Agonist (±)-5’-Chloro-5’-Deoxy-ENBA (cdENBA) Induces Isoelectric Brain State in Rats.**

T. N. Loughery1, K. Meads1, A. Collazo1, T. Thomas1, and T. Shih1. 1USAMRICD, Aberdeen Proving Ground, MD; and 2Army Research Laboratory, Aberdeen Proving Ground, MD. Sponsor: J. Dillman

### Abstract #2169

**Poster Board Number**

**Delayed Treatment with Midazolam Increases Survival but Is Not Fully Protective against Soman-Induced Epileptogenesis and Neuropathology in Male and Female Carboxylesterase Knockout Mice.**

E. Kündig1, B. Marrero-Rosado1, M. de Araujo Furtado1, M. Stone1, C. Schultz1, K. Walker1, S. O’Brien1, R. Lee1, and L. Lumley1. 1USAMRICD, Aberdeen Proving Ground, MD; and 2BioSEaD, Rockville, MD. Sponsor: L. Wright

### Abstract #2170

**Poster Board Number**

**Characterization of a Mouse Model of Tetramethylenedisulfotetramine (TETS)-Induced Status Epilepticus.**


### Abstract #2171

**Acute Intoxication of Juvenile Rats with Diisopropylfluorophosphate (DFP) Causes Sex-Specific Seizure Behavior and Neuropathology.**

E. A. González, S. Supasai, and P. J. Lein. University of California Davis, Davis, CA.

### Abstract #2172

**Poster Board Number**

**Delayed Adenosine A1 Receptor Agonist (±)-5’-Chloro-5’-Deoxy-ENBA (cdENBA) Treatment Terminates Soman-Induced Status Epilepticus.**

K. Meads1, A. Wegener1, T. Thomas1, and T. Shih1. 1USAMRICD, Aberdeen Proving Ground, MD; and 2Army Research Laboratory, Aberdeen Proving Ground, MD. Sponsor: J. Dillman

### Abstract #2173

**Poster Board Number**

**A Targeted Approach for Terminating Tetramethylenedisulfotetramine (TETS)-Induced Status Epilepticus and Attenuating Neurotoxicity in Zebrafish.**


### Abstract #2174

**Poster Board Number**

**RNA Seq Transcriptome Analyses Reveals Genes and Pathways Involved in Acute Exposure to Hydrogen Sulfide.**

D. Kim1, P. Anantharam1, P. Padhi1, D. R. Thedens1, G. Li1, and W. K. Rumbeiha1. 1Iowa State University, Ames, IA; and 2University of Iowa, Iowa City, IA.

### Abstract #2175

**Poster Board Number**

**Antidotal Protection Enhancement of the Cyanide Antidote DMTS by Formulations and Combinations with Cobinamide Derivatives.**

I. Petrikovics1, K. Kiss1, K. Kovacs1, M. Kiss1, M. Buda1, C. Chiu1, A. Ebrahimpour1, A. Chan1, G. R. Boss1, and G. Rockwood1. 1Sam Houston State University, Huntsville, TX; 2University of California San Diego, San Diego, CA; and 3USAMRICD, Aberdeen Proving Ground, MD.

### Abstract #2176

**Partitioning and Elimination Kinetics of the Cyanide Antidote Candidate Dimethyl Trisulfide in Sheep Blood.**

C. T. Rios, A. Ebrahimpour, E. Kefer, M. Carpenter, L. Kiss, A. C. Whiteman, D. Thompson, and I. Petrikovics. Sam Houston State University, Huntsville, TX.

### Abstract #2177

**Postie in Vitro and Ex Vivo Models in Medical Chemical Defense Research.**

T. Wilie, J. Herbert, K. Marquart, N. Amend, F. Worek, and H. Thiemann. Bundeswehr Institute of Pharmacology and Toxicology, Munich, Germany.

### Abstract #2178

**Poster Board Number**

**Development of a Sulfur Mustard Model of Hematological Toxicity in Male and Female Rats.**

P. Beske1, C. Wilhelm1, R. Moyer1, J. Harvilchuck1, G. Platoff Jr1, and D. Yeung1. 1Batelle, Columbus, OH; and 2NIH, Bethesda, MD.
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Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

PS Poster Session: Nanotoxicology In Vitro: Mechanism, Uptake, and Cell Response

Chairperson(s): Richard Agans, Henry M. Jackson Foundation, Wright-Patterson AFB, OH; Yue-Wern Huang, Missouri University of Science and Technology, Rolla, MO; Pius Joseph, NIOSH, Morgantown, WV; and Teresa Palacios-Hernandez, US FDA/CDRH, Bethesda, MD.

Displayed: 9:15 AM–4:30 PM | Author Attended: 10:45 AM–12:15 PM

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#2181 Poster Board Number........................................................................................................P583 Gut Microbiota and Food Grade Nanoparticles Affect Function in an In Vitro Model of the Small Intestine. F. Moreno-Olivas, A. Garcia-Rodriguez, and G. J. Mahler. Binghamton University, Binghamton, NY.

#2182 Poster Board Number........................................................................................................P584 Physiochemical Properties of NIO and Nii(OH), Nanoparticles Correlate with Cytotoxicity in A549 Cells. Y. Huang1, M. H. Cambre1, H. Lee1, C. C. Chusuei1, R. R. Pandey1, and F. S. Hou1. Missouri University of Science and Technology, Rolla, MO; 2National Dong Hwa University, Hualien, Taiwan; 3Middle Tennessee State University, Murfreesboro, TN; and 4University of Wisconsin-Milwaukee, Milwaukee, WI.

#2183 Poster Board Number........................................................................................................P585 Synthesis and Characterization of Biotinylated Hyroxyethylstarch-Polyethyleneimine Conjugates Having Low Toxicity with Potential for Targeted Delivery of Oligonucleotides. E. Chowdhury1, F. Hack2, B. Noorani2, D. Fischer2, and U. Bickel1. Texas Tech University Health Sciences Center, Amarillo, TX; and 2University of Jena, Jena, Germany.

#2184 Poster Board Number........................................................................................................P586 Cytotoxicity of Nanomaterials Applicable as Additives for Stone Consolidation. T. Brzicova1,2, M. Remzova1, R. Zouzelka1, J. Rathousky1, P. Rossner1, and J. Topinka1. Institute of Experimental Medicine CAS, Prague, Czech Republic; 2VS - Technical University of Ostrava, Ostrava, Czech Republic; and 3J. Heyrovsky Institute of Physical Chemistry CAS, Prague, Czech Republic.

#2185 Poster Board Number........................................................................................................P587 Determination of Carbon Nanodot Cytotoxicity in Macrophages and Their Effects on TNF-alpha-Induced Inflammation. L. Smith1, J. Chavez1, S. Khan1, J. Fowler1, H. Ahmed1, R. Shi1, H. Zhu2, R. Li2, and Z. Jia1. 1University of North Carolina at Greensboro, Greensboro, NC; and 2Campbell University School of Osteopathic Medicine, Buies Creek, NC.


#2187 Poster Board Number........................................................................................................P589 In Vitro Intestinal Toxicity of Multiwalled Carbon Nanotubes. T. Kodavanti1, and M. Hughes1. ‘ORISE, Research Triangle Park, NC; and 2US EPA/ORD, Research Triangle Park, NC.

#2188 Poster Board Number........................................................................................................P590 Differential Mitochondrial Perturbations among Primary, Cancerous, and Asthmatic Lung Cell-Types after Exposure to Engineered Nanomaterials. H. Lujan, and C. M. Soyes. Baylor University, Waco, TX.

#2189 Poster Board Number........................................................................................................P591 Assessing Organomodified Nanoclay Pulmonary Toxicity across Its Life Cycle Using Integrated Exposure and In Vitro/In Vivo Approaches. T. Stueckle1, A. Wagner1, J. Jensen1, A. Afshari1, E. G. Lee1, J. Kwon1, J. Coyle2, R. Derk3, S. Friend1, S. Agarwal4, R. Gupta1, and C. Z. Dinu1. 1NIOSH, Morgantown, WV; 2West Virginia University, Morgantown, WV; and 4OSHA, Ulsan, Korea, Republic of.

#2190 Poster Board Number........................................................................................................P592 Biomimetic In Vitro/In Vivo Models for Assessment of Hazardous Pulmonary Effects of Nanoparticles. L. Wang Rojanasakul1, J. Coyle1, X. He1, C. Kiratipalboon1, T. Stueckle1, R. Derk1, P. Demokritou1, and Y. Rojanasakul1. 1NIOSH, Morgantown, WV; and 2West Virginia University, Morgantown, WV.

#2191 Poster Board Number........................................................................................................P593 Biointeractions of Aerospace Relevant Nanomaterials with Human Gut Microbiota in a Human Gut Simulator. R. Agans1, A. Gordon1, S. Hussain1, and O. Pally1. 1Henry M. Jackson Foundation, Wright-Patterson AFB, OH; 2Wright State University, Fairborn, OH; and 3Air Force Research Laboratory, Wright-Patterson AFB, OH.


#2193 Poster Board Number........................................................................................................P596 Incinerated Carbon Nanotube-Enabled Thermoplastics Enhance Cytotoxicity in Human Airway In Vitro Models. J. Coyle1, R. Derk1, T. Kornberg1, T. Singh1, T. Stueckle1, P. Demokritou1, Y. Rojanasakul1, and L. Rojanasakul1. 1NIOSH, Morgantown, WV; 2West Virginia University, Morgantown, WV; and 3Harvard University, Boston, MA.

**P598**

Label-Free 3D Raman Imaging of Carbon Nanotubes in Mammalian Cells. M. Huynh, C. Mikoryak, P. Pantano, and R. Draper. University of Texas at Dallas, Richardson, TX.

**P599**

Titanium Dioxide Nanoparticle Induced AP-1 Activation via ERKs and p38 Kinase. M. Ding, T. Barber, S. Leonard, and J. Aldinger. NIOSH, Morgantown, WV. Sponsor: Y. Yuan

**P600**

Particle Size and Surface Charge Dependent Toxicity of PAMAM Dendrimers in Cultured Endothelial Cells. M. Patel, S. De Paoli, O. Elhelu, S. Farooq, and J. Simak. US FDA, Silver Spring, MD.

**P601**

Developing a Protocol for Observing the Effects of Sex Differences on Macrophage Polarization. M. Lyons, J. Ray, and A. Holian. Troy University, Troy, AL; and University of Montana, Missoula, MT.

**P602**


**P603**

Amorphous Silica Coating Protects against Iron Oxide Nanoparticle-Induced Cell Transformation and Genotoxicity. T. Kornberg, T. Stueckle, J. Coyle, R. Derk, P. Demokritou, Y. Rojanasakul, and L. Rojanasakul. West Virginia University, Morgantown, WV; NIOSH, Morgantown, WV; and Harvard University, Boston, MA.

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**P605**

In Vitro Dermal Toxicity of Redox-Active Metal Nanocatalysts. E. Kisin, S. Guppi, N. Yanamala, and A. Shvedova. NIOSH, Morgantown, WV; and West Virginia University, Morgantown, WV.

**P606**

Comparative In Vitro Study of Adverse Pro-neoplastic Potential of Tremolite Asbestos and Its Cleavage Fragments in Human Epithelial (BEAS-2B) and Mesoepithelial (MET-5A) Cells. A. Shvedova, S. Guppi, T. Khaliullin, N. Yanamala, and E. Kisin. NIOSH, Morgantown, WV; and West Virginia University, Morgantown, WV.

**P607**

Effects of Multiwalled Carbon Nanotube Accumulation on Macrophage Cell Viability and Proliferation In Vitro. E. Chow, R. Wang, and R. Draper. University of Texas at Dallas, Richardson, TX.

**P608**


**P609**

Bioactivity of Multiwalled Carbon Nanotube Mixtures with Multiple Aspect Ratios. J. Hubczak, A. Erdely, T. Stueckle, K. Smith, T. Eye, M. Shoeb, A. Stefanik, J. Roberts, and V. Kodali. West Virginia University, Morgantown, WV; and NIOSH, Morgantown, WV.

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**P611**

Evaluation of the Behavior of Lanthanum Titanium Oxide Nanoparticles in Macrophages. T. C. Kohs, M. J. Sydori, J. Ross, A. Hollan, and D. S. Anderson. Whitworth University, Spokane, WA; and University of Montana, Missoula, MT.

**P612**

NanoCeria Corona Transformation in Simulated Biological Fluids: Characterization and Effects. R. Yokel, M. Hancock, A. Brooks, B. Cherian, M. Ensor, and E. Grulke. University of Kentucky, Lexington, KY; and Virginia Commonwealth University, Richmond, VA.

**P613**


**P615**

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Nanotoxicology: In Vivo**

**Chairperson(s):** Hao Chen, University of Florida, Gainesville, FL; Robert Landsiedel, BASF SE, Ludwigshafen am Rhein, Germany; and Swetha Rudraiah, University of South Joseph, Hartford, CT.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 10:45 AM–12:15 PM

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**Poster Board Number**

| #2215 | Evaluation of the Skin Sensitizing Potential of Gold Nanomaterials and the Impact of Established Dermal Sensitivity to Gold on the Pulmonary Immune Response with Respect to Dose Mass and Surface Area.  
K. A. Roach, S. E. Anderson, A. B. Stefaniak, H. L. Shane, and J. R. Roberts. NIOSH, Morgantown, WV. |
|---|---|
| #2216 | Gender-Specific Biological Responses in Juvenile Rats Orally Exposed to Three Engineered Nanomaterials.  
N. F. Mortensen1, M. C. Moreno1, P. R. Patel1, R. W. Snyder1, S. L. Watson1, S. R. Black1, S. J. Sumner1, and R. F. Fennell1. RTI International, Research Triangle Park, NC; and 1University of North Carolina at Chapel Hill, Chapel Hill, NC. |
| #2217 | Long-Term Effects of Inhaled Nanoparticles in Rats: Ceriumdioxide and Bariumsulphate.  
R. Landsiedel1, L. Ma-Hock1, K. Wienczi1, S. Grotter1, B. van Ravenzwaay1, H. Ernst1, and D. Schauden1. BASF SE, Ludwigshafen am Rhein, Germany; and 1Fraunhofer Institute for Toxicology and Experimental Medicine, Hannover, Germany. |
| #2218 | Comparative In Vivo Assessment of Alveolar Fibrosis, Histopathology, and Systemic Translocation Induced by Carbon Nanotubes and Nanofibers from US Facilities.  
K. Fraser1, V. K. Kodali1, L. Bishop1, T. Eye1, J. Hubcza1, S. Foster1, N. Yamamola1, D. Schwegler-Berry1, S. Friend1, A. Stefaniak1, M. M. Dahm1, M. K. Schubauer-Berigan1, E. M. Birch1, D. E. Evans1, N. Q. Wu1, G. Casuccio1, K. Bunker1, M. S. Orandle1, A. F. Hubbs1, R. R. Mercer1, and A. Erdely1. NIOSH, Morgantown, WV; 1NIOSH, Cincinnati, OH; 1West Virginia University, Morgantown, WV; and 1RJ Lee Group, Monroeville, PA. |
| #2219 | Multiwalled Carbon Nanotubes Modulate Immune Responses and Pulmonary Injury without Increasing Influenza A Virus Titers in Infected Mice.  
H. Chen1, S. T. Humes1, M. Rose1, S. E. Robinson1, J. C. Loeb1, L. C. Smith1, I. Y. Sabaraya1, N. B. Saleh1, W. L. Castlemain1, J. A. Lednicky1, and T. Sobo-Aitwood1. University of Florida, Gainesville, FL; and 1University of Texas at Austin, Austin, TX. |
| #2220 | Effects of N-Acetyl-L-Cysteine on Acute Toxicity of Silver Nanoparticles Intraperitoneally Administered in BALB/c Mice.  
| #2221 | Cytogenotoxic and Mitodepressive Effects Induced by Silver and Copper Oxide Nanoparticles, and Their Mixture in Allium cepa L. O. Ogunsuyi1, O. Fadiju1, O. Alabi1, C. Alimba1, S. Cambier1, S. Esuard1, A. Guitle1, and A. Bakare1. University of Ibadan, Ibadan, Nigeria; 1Federal University of Technology Akure, Akure, Nigeria; and 2Luxembourg Institute of Science and Technology, Belvaux, Luxembourg. |
| #2222 | Changes in Lung and Blood Transcriptomes following Exposure to Multiwalled Carbon Nanotubes in Mice.  
T. O. Khallullin1,2, M. S. Newman1, E. R. Risin1, K. A. Suleimanova1, L. M. Fatkhutdinova1, N. Yamamola1, and A. A. Shvedova1,1. West Virginia University, Morgantown, WV; 1NIOSH, Morgantown, WV; and 2Kazan State Medical University, Kazan, Russian Federation. |
| #2223 | Development of Whole Body Inhalation System for Well-Dispersed Nanomaterials Toxicity Testing (Taquan Direct-Injection Whole Body Inhalation System).  
Y. Taquahashi1, S. Yokota1, K. Morita1, M. Tsuji1, Y. Hirabayashi1, A. Hirose1, and J. Kanno1,2. National Institute of Health Sciences, Kawasaki, Japan; and 1Japan Bioassay Research Center, Japan Organization of Occupational Health and Safety, Hadano, Japan. |
| #2224 | Pulmonary Toxicity Associated with Different Zinc Nanoparticles after Intratracheal Instillation in Rats.  
X. Xin1, M. Barger1, K. Roach1, G. Boyce1, M. Dulung1, A. Stefaniak1,2, S. Leonard1,2, and J. Roberts1,2. NIOSH, Morgantown, WV; and 1West Virginia University, Morgantown, WV. |
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P646 A High-Throughput Screen Identifies Dyrk1a Inhibitor ID-8 That Stimulates Human Kidney Tubular Epithelial Cell Proliferation. M. Monteiro, S. Ramn, V. Chandrasekaran, S. A. Boswell, E. J. Weber, K. A. Lidberg, E. J. Kelly, and V. S. Vaidya. 1Harvard Medical School, Boston, MA; 2Universidade de São Paulo, São Paulo, Brazil; 3Harvard Program in Therapeutic Science, Harvard Medical School Laboratory of Systems Pharmacology, Boston, MA; University of Washington, Seattle, WA; 4Bingham and Women’s Hospital, Boston, WA; and 5Harvard T.H. Chan School of Public Health, Boston, WA.

P647 Proteome Analysis of CD4+ T Cells Leading to the Proposal of a Novel Mechanism to Interpret the Impact of Bisphenol A on Immunity. K. Zhang, M. Sowers, R. Goldblum, and T. Midoro-Horiuti. University of Texas Medical Branch, Galveston, TX.

P648 Assessment of Aryl Hydrocarbon Receptor (AhR) Transcriptional Activation in Liver and Lung for Rat over a 1-Month 2,3,4,4',5-Pentachlorobiphenyl (PCB-126) Study to Set Thresholds of Carcinogenic Risk Potential. A. Aslamkhian, C. Qin, S. Pacchione, P. Ciacco, B. Sacre-Salem, T. Pippet, P. Lane, Z. Erdos, J. Lebron, W. Glaab, and F. Sistare. Merck & Co., Inc, Kenilworth, NJ.

P649 A Systems Toxicology Approach to Identify Liver and Kidney Injuries in Rat after Thiocacetamide Exposure. P. Schyman, R. Printz, S. Estes, K. Boyd, M. Shiota, and A. Wallqvist. 1Biotechnology HPC Software Applications Institute (BHSAl), Frederick, MD; and 2Vanderbilt University School of Medicine, Nashville, TN.


P652 Systems Toxicology Assessment of E-vapor Aerosols Compared to Cigarette Smoke following 7-Month Inhalation Exposures in C57BL/6 Mice. U. Kogel, A. Kumar, M. Talikka, Y. Xiang, B. Titz, K. Trivedi, E. Guedj, S. Harboi, K. M. Gideon, N. Ivanov, K. M. Lee, and J. Hoeng. 1PMI R&D, Philip Morris Products S.A, Neuchâtel, Switzerland; 2Altia Client Services LLC, Richmond, VA; and 3Battelle, West Jefferson, OH.

P653 Metabolite Markers for Acetaminophen-Induced Liver Damage in the Laboratory Rat. V. Pannala, K. Vinnakota, K. Rawls, S. Estes, T. O’Brien, R. Printz, J. Papini, J. Reifman, M. Shiota, J. Young, and A. Wallqvist. 1US Army Medical Research and Materiel Command, Frederick, MD; 2University of Virginia, Charlottesville, VA; 3Vanderbilt University School of Medicine, Nashville, TN; and 4Vanderbilt University School of Engineering, Nashville, TN.


P656 Evaluation of Systemic and Microbiome-Derived Effects of Antibiotics on the Plasma Metabolome in Rats. V. de Bruijn, C. Behr, S. Sperber, T. Walk, E. Fabian, M. Slopianka, K. Beekmann, and B. van Ravenzwaay. 1BASF SE, Ludwigshafen am Rhein, Germany; 2Metanomics GmbH, Berlin, Germany; and 3Wageningen University, Wageningen, Netherlands.


P658 Development of a Quantitative Systems Toxicology Model of Drug-Induced Cholangiocyte Injury in DILysm. G. Taneja, S. Q. Siler, B. A. Howell, P. B. Watkins, and J. L. Woodhead. 1DILysm Services, Raleigh, NC; and 2University of North Carolina at Chapel Hill, Chapel Hill, NC.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Autoimmunity and Hypersensitivity**

**Chairperson(s):** Lichchavi Rajasinghe, Michigan State University, East Lansing, MI; and Gangduo Wang, University of Texas Medical Branch, Galveston, TX.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 1:30 PM–3:00 PM

### Abstract #

#### #2254

**Poster Board Number: #2254**

**Serum TCDD Levels Are Associated with Cholesterol Levels in Humans and HMG-CoA Reductase Modulates TCDD-Induced Liver Injury in Mice.**  

#### #2255

**Poster Board Number: #2255**

**High-Throughput Screening for Food Carcinogen Resistance Genes in Budding Yeast Identifies Mechanisms in DNA Damage Tolerance of Carcinogen-Associated DNA Adducts.**  
*M. Fasullo, N. St. John, J. Freedland, F. Doyle,* and *H. Baldino.* SUNY Polytechnic Institute, Albany, NY.

#### #2256

**Poster Board Number: #2256**

**Inter-individual Variability of Carcinogen Metabolism in the Collaborative Cross Mouse Population.**  
*G. Boysen*1, *G. P. Miller*1, *E. Siegel*1, *I. Nookaew*1, *L. M. Hallberg*2, and *B. T. Amredes.*1  
1University of Arkansas for Medical Sciences, Little Rock, AR; and 2University of Texas Medical Branch, Galveston, TX.

#### #2257

**Poster Board Number: #2257**

**A Multi-scale Stochastic Model Explains Zonated Cytochrome P450 Induction in the Liver Lobule.**  
*Y. Yang, N. Wawee,* and *S. Bhattacharya.* Michigan State University, East Lansing, MI.

#### #2258

**Poster Board Number: #2258**

**Simulation of Macrophage Activation Dynamics under Various Microenvironment Signals using an Agent-Based Modeling Approach.**  
*T. Nguyen, L. Chao, D. L. Laskin,* and *P. G. Georgopoulos.* Rutgers, The State University of New Jersey, Piscataway, NJ.

#### #2259

**Poster Board Number: #2259**

**Metabolome-Wide Association Study of Deployment to Balad, Iraq or Bagram, Afghanistan.**  
*D. P. Jones*1, *M. Ryan*1, *D. Walker*1, *K. Uppal*1, *P. Krahf*1, *P. Hopke*1, *M. Utell*1, *T. Mallon*1, and *Y. Go.*1  
1Emory University, Atlanta, GA; 2Uniformed Services University, Bethesda, MD; and 3Clarkston University, Potsdam, NY.

#### #2260

**Poster Board Number: #2260**

**Neonatal Exposure to Environmental Chemicals BPA, BDE-99, and PCB Persistently Alters the Liver Transcriptome in Adult Mice.**  
*J. L. Dempsey*1, *H. Lehmler*2, *J. McDonald*1, *T. Bammler*1, *T. J. Kavanagh*1, and *J. Y. Cui.*1  
1University of Washington, Seattle, WA; and 2University of Iowa, Iowa City, IA.

#### #2261

**Poster Board Number: #2261**

**Metabolome Wide Association Study of Occupational Exposure to Benzene.**  
1Icahn School of Medicine at Mount Sinai, New York, NY; 2National Cancer Institute, Rockville, MD; 3University of California Berkeley, Berkeley, CA; 4Utrecht University, Utrecht, Netherlands; 5Chinese Center for Disease Control and Prevention, Beijing, China; and 6Emory University School of Medicine, Atlanta, GA.

#### #2262

**Poster Board Number: #2262**

**Study of Hookah/Cigarette Constitutes Gene/Protein-Pathway-Disease Using Systems Biology Approach.**  
1National Chiao Tung University, Hsinchu, Taiwan; and 2New York University School of Medicine, Tuxedo, NY.

#### #2263

**Poster Board Number: #2263**

**Serum Metabolomics Reveals That Gut Microbiome Perturbation Mediates Arsenic Toxicity in Mice.**  
1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2University of North Carolina at Chapel Hill, Chapel Hill, NC.

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**Program Schedule—Tuesday | 151**
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Immunotoxicity**

**Chairperson(s):** Hasan Alghetaa, University of South Carolina School of Medicine, Columbia, SC; Emanuela Corsini, Università degli Studi di Milano, Milan, Italy; Rachel Frawley, NIEHS/NTP, Research Triangle Park, NC; and Colleen M. McLoughlin, Scivera LLC, Charlottesville, VA.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM**

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<td>N. B. Chakrabarty, H. Wang, G. Wang, and F. Khan. University of Texas Medical Branch Galveston, Galveston, TX.</td>
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<td>#2268</td>
<td><strong>Contribution of Cytochrome P450 2E1 in Trichloroethene-Mediated Autoimmunity: Association with Oxidative Stress and Nrf2 Pathway.</strong></td>
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<td>G. Wang, M. Wakamiya, J. Wang, S. Ansari, and F. Khan. University of Texas Medical Branch, Galveston, TX.</td>
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<td>#2269</td>
<td><strong>Modulation of Trichloroethene-Mediated Hepatic Inflammation Activation and Immune Dysregulation by Antioxidant N-Acetylcysteine.</strong></td>
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<td>H. Wang, G. Wang, Y. Liang, J. Sun, and F. Khan. University of Texas Medical Branch, Galveston, TX.</td>
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<td>#2270</td>
<td><strong>Percent n-3 in Highly Unsaturated Fatty Acids (HUFAs) is Predictive of Disease Outcomes in Environmental Toxicant-Triggered Autoimmunity.</strong></td>
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<td><strong>In Situ Mapping of the Reactivity of Chemical Sensitizers in Reconstructed Human Epidermis Using High-Resolution Magic Angle Spinning (HRMAS) NMR Technique.</strong></td>
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<td>H. Sour1, F. M. Moussali1, K. Elbayed1, E. Giménez-Arnaul, M. Klaric2, and J. P. Lepoittevin1. 1University of Strasbourg, Strasbourg, France; and 2Cosmetics Europe, Brussels, Belgium. Sponsor: A. Schepky</td>
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| Δ⁹-Tetrahydrocannabinol Suppression of Monocyte-Mediated Astrocyte Production of MCP-1 and IL-6 in a Co-culture Stimulated with TLR7 Agonist. | M. Rizzo, R. Crawford, S. Sermet, and N. Kaminski. Michigan State University, East Lansing, MI. |
| #2273 | Poster Board Number .................................................................................................................. P684 |  
| Resveratrol-Induced FoxP3-Regulatory T Cell Subset, Th3, Alleviates Acute Lung Injury Induced by Staphylococcal Enterotoxin-B (SEB). | H. Alghetaa, A. Mohammed, M. Nagarkatti, and P. Nagarkatti. University of South Carolina School of Medicine, Columbia, SC. |
| #2274 | Poster Board Number .................................................................................................................. P685 |  
| Protective Effects of Sodium Butyrate Resulted from Reconstruction of Altered Gut Microbiota Mediated by SEB-Induced Acute Lung Injury. | A. Mohammed, H. Alghetaa, P. Nagarkatti, and M. Nagarkatti. University of South Carolina School of Medicine, Columbia, SC. |
| #2275 | Poster Board Number .................................................................................................................. P686 |  
| TCDD Alters Microbiome and Induces Myeloid-Derived Suppressor Cells That Inhibit T Cell Activation by Depleting Cysteine. | W. Neamah, M. Nagarkatti, and P. Nagarkatti. South Carolina School of Medicine, Columbia, SC. |
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| Immunomodulatory Activity of N-Butylbenzenesulfonamide in Female B6C3F1/N Mice. | R. Frawley1, C. Rider1, V. Johnson1, G. Burleson1, K. Shockley1, C. Willson1, T. Steinbach1, and D. Germo1. 1NIEHS, Research Triangle Park, NC; 2Burleson Research Technologies, Morrisville, NC; 3Integrated Laboratory Systems, Inc., Research Triangle Park, NC; and 4Experimental Pathology Laboratories, Inc., Durham, NC. |
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| Alterations in the Mouse Skin and Gut Microbiome following Dermal Exposure to the Antimicrobial Chemical Triclosan. | R. Baur1, N. Marshall2, E. Lukomskas2, L. Weatherly2, H. Shane2, and S. Anderson2. 1West Virginia University, Morgantown, WV; and 2NIOSH, Morgantown, WV. |
| #2278 | Poster Board Number .................................................................................................................. P689 |  
| Investigation on the Possible Role of microRNAs in the Regulation of Chemical Allergen Potency. | V. Galbiati, M. Pisapia, M. Marinovich, C. L. Galli, and E. Corsini. Università degli Studi di Milano, Milan, Italy. |
| #2279 | Poster Board Number .................................................................................................................. P690 |  
| The Effects of Pristine and Carboxylated Multiwalled Carbon Nanotubes on Phagocytic Function of Macrophages. | R. Lohray, R. Wang, E. Chow, and R. Draper. University of Texas at Dallas, Richardson, TX. |
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| Development of an In Vitro Neutrophil Maturation Assay from Bone Marrow-Derived CD34+ Hematopoietic Stem Cells from Cynomolgus Monkey. | T. Lahoti, G. Yanochko, S. Couto, and J. Piccotti. Celgene Corporation, San Diego, CA. |
Assessing the Effects of Inorganic Arsenic on Cytokine Secretion, Gene Expression, and DNA Methylation in Murine Macrophages to Gauge Immunotoxic Effects of Heavy Metals. L. DeLong, and J. Nyland. Salisbury University, Salisbury, MD.

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Lead Exposure Modifies Differentiation and Phenotypic Expression of Monocyte/Macrophage Lineage Cells. S. M. Nicholson, and F. A. Schanne. St. John's University, Jamaica, NY.

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Genetic Polymorphisms of CIITA (MHCI Master Regulator) in the Puerto Rican Asthmatic Population. J. D. Andino-Vega1, H. Jirau1, and B. Jimenez2. 1University of Puerto Rico Rio Piedras, San Juan, PR; and 2University of Puerto Rico Medical Science Campus, San Juan, PR.

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In Vitro Assessment of Cannabinoids on Immune Responses in Canine PBMCs. J. Sears, C. Brown, T. Archer, and B. L. Kaplan. Mississippi State University, Mississippi State, MS.

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Cigarette Smoke Extract May Induce Lysosomal Storage Disease-Like Adverse Health Effects. E. Park1, Y. Park1, S. Lee1, C. Yoon1, and K. Lee1. 1Kyu-Hyung Hee University, Yongin-si, Korea, Republic of; 2Korea Institute of Toxicology, Jeongup-si, Korea, Republic of; and 3Korea Basic Science Institute, Seoul, Korea, Republic of. Sponsor: A. Shvedova

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IL-4 Administration or Zinc Supplementation Mitigates Aggravated Thymus Atrophy in Zinc-Deficient Rats. T. Kido1, M. Suka1, M. Tsunoda2, and H. Yanagisawa1. 1Jikei University School of Medicine, Tokyo, Japan; and 2National Defense Medical College, Saitama, Japan.

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Effects of the Food Additive tBHQ on OVA-Elicited Food Allergy in Mice. Y. Jin, A. Boss, J. Bursley, H. Dover, V. Gangur, and C. E. Rockwell. Michigan State University, East Lansing, MI.

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Microcystin Exposure in Non-alcoholic Fatty Liver Disease Links Ectopic Intestinal Fibrotic Lesions: Role of Liver-Gut Crosstalk. S. Sarkar1, D. Kimono1, M. Albadrani1, R. K. Seth2, G. Scott2, D. E. Porter1, P. Nagarkatti1, M. Nagarkatti1, and S. Chatterjee1. 1University of South Carolina, Columbia, SC; and 2University of South Carolina School of Medicine, Columbia, SC.

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High Dimension Biological Analysis Pipeline for Assessing the Immunotoxicity of Carbon Nanotubes. D. Sarigiannis1, S. Karakitsios1, A. Tsatsakis1, and K. Golokhovtst.1 Aristotle University of Thessaloniki, Thessaloniki, Greece; 2University of Crete, Heraclion, Greece; and 3Far Eastern Federal University, Vladivostok, Russian Federation.

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#2301
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The Role of Nrf2 in Regulation of Th17 Differentiation in Primary Murine CD4 T Cells. M. V. Poidomani, R. C. Kennedy, A. E. Turley, and C. E. Rockwell. Michigan State University, East Lansing, MI.
#2301 Poster Board Number

**The Synthetic Food Additive Tert-Butylhydroquinone Weakens Host Memory Response to Heterosubtypic Influenza Infection.**


#2302 Poster Board Number

**Nitro-Oleic Fatty Acids Regulate the Inflammatory Response to Bleomycin-Mediated Lung Injury.**


#2303 Poster Board Number

**Development of a Mauritius Cynomolgus Monkey Vaccination Model to Assess CD8-Specific Responses.**


#2304 Poster Board Number

**CRISPR/Cas9 Editing of the Polymorphic hst1.2 Enhancer Alters Antibody Production and Sensitivity to TCDD.**

C. P. Alex-Buckner, A. Snyder, S. Abdulla, and C. Sulemct. Wright State University, Dayton, OH.

#2305 Poster Board Number

**Role of L-Arginine Modulation on B Cell Responses in the Spinal Cord in EAE.**

E. Illingworth1, H. Zhang1, A. Fink2, S. Klein1, C. Heaney1, and F. Williams. 1University of Illinois at Chicago, Chicago, IL; and 2University of British Columbia, Vancouver, BC.

#2306 Poster Board Number

**Dietary Indole-3-Carbinol Promotes Insulitis in Non-obese Diabetic Mice.**

H. M. Kahalehili, N. Kerkvliet, and A. Ehrlich. Oregon State University, Corvallis, OR.

#2307 Poster Board Number

**Neuroimmunotoxicological Perspectives of Gulf War Illness.**

M. V. Brahmanothri, and M. B. Abou-Dania. Duke University Medical Center, Durham, NC.

#2308 Poster Board Number

**Breaking Tolerance: A Case of Immune-Mediated Thrombocytopenia after Administration of BMS-986156 an Anti-GITR Monoclonal Antibody to Cynomolgus Monkey.**


#2309 Poster Board Number

**Development and Validation of Assays for Detection of Anti-HPV Antibodies and Neutralization of HPV Viruses.**

M. Lindeblad1, K. Kabirov1, Y. Chen1, U. Bhat1, E. Glaze2, R. Shoemaker2, and A. Lyubimov3. 1University of Illinois at Chicago, Chicago, IL; and 2National Cancer Institute, Bethesda, MD.

#2310 Poster Board Number

**In Vitro Skin Tests for the Detection of Sensitization, Immunotoxicity, and Assessment of Relative Potency.**


#2311 Poster Board Number

**Role of Lymphocyte-Specific Protein Tyrosine Kinase (LCK) in Suppression of the Immunoglobulin M (IgM) Response in Human CDS**

J. Zhou, L. Blevins, R. Crowford, and N. Kaminski. Michigan State University, East Lansing, MI.

#2312 Poster Board Number

**Sex-Specific Effects of Chronic Arsenic Exposure on Influenza Pathology in Adult C57BL/6 Mice.**

S. Attreed1, C. Kashiwagi1, K. Ryckik1, E. Illingworth1, H. Zhang, A. Fink1, S. Klein1, C. Heaney1, and F. Sillé1. 1Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD; and 2College of Saint Benedict and Saint John's University, Collegeville, MN.

#2313 Poster Board Number

**Hunting for Goldilocks: Trying to Identify a “Just Right” Dose for an OX40-Activating Antibody in Cynomolgus Toxicology Studies.**

J. Game1, W. Freebern1, R. Haynes II1, M. Koepfinger1, M. Koeplinger1, M. Quigley2, C. Guo1, C. Milburn2, Z. Chen1, E. Sahin1, H. Haggerty1, M. Graziano1, and R. T. Bunch1. Bristol-Myers Squibb, New Brunswick, NJ; and 2Bristol-Myers Squibb, Redwood City, CA.

#2314 Poster Board Number

**Nickel Nanoparticles Enhance LPS-Induced Pro-inflammatory Cytokine Production via a NF-κB-Dependent Pathway in Human Lung Epithelial Cells In Vitro and Promote Acute Lung Inflammation in Mice In Vivo.**

D. You, A. Taylor-Just, and J. Bonner. North Carolina State University, Raleigh, NC.

#2315 Poster Board Number

**The Scaffold Protein RACK1: A Possible Target of Estrogen Active Compounds in Human Promyelocytic Cells.**

E. Corsini1, F. Pasini1, E. Buoso2, V. Galbiati1, M. Marinovich1, and M. Racchi1. 1Università degli Studi di Milano, Milan, Italy; and 2Università degli Studi di Pavia, Pavia, Italy.

#2316 Poster Board Number

**Applying the Appropriate Assay Format for Cytokine Release Assays to Deliver the Appropriate Interpretation of Safety Risks.**

J. Munday1, S. Burchief6, and C. Cooper1. Covance, Harrogate, United Kingdom; and Covance, Madison, WI.

#2317 Poster Board Number

**Epicutaneous Sensitization with Protein Allergens Differentiates Naïve T Cells into Not Only Th2 but Also Th17 Cells, Which Differs from the Sensitization with Chemical Allergens.**


#2318 Poster Board Number

**Effect of TCDD on B Cell Responses in the Spinal Cord in EAE.**

E. Kummar, and B. Kaplan. Mississippi State University, Mississippi State, MS.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Metals I

Chairperson(s): Alicia Bolt, University of New Mexico, Albuquerque, NM; James M. Harrington, Research Triangle Institute, Research Triangle Park, NC; Robyn Prueitt, Gradient, Seattle, WA; and Georgia K. Roberts, NIEHS/NTP, Research Triangle Park, NC.

Displayed: 9:15 AM–4:30 PM | Author Attended: 10:45 AM–12:15 PM

Abstract #

#2319 Poster Board Number ................................................................. P731
Low-Level Arsenic Exposure Impairs the In Vitro Differentiation of Mouse Bone Marrow Erythroid Progenitor Cells. S. Medina1, X. Zhou1, A. Bolt1, H. Xu1, F. Lauer1, K. Liu1, and S. Burchiel1. 1University of New Mexico, Albuquerque, NM; and ‘East China University of Science and Technology, Shanghai, China.

#2320 Poster Board Number ................................................................. P732

#2321 Poster Board Number ................................................................. P733

#2322 Poster Board Number ................................................................. P734
Oncogenic KRAS Occurs after Prolonged In Vitro Arsenite Exposure of Human Prostate Epithelial Cells. A. Merrick1, D. Phadke1, R. Shah1, K. Pelch1, S. Auerbach1, R. Paules1, M. DeVito1, M. Waalkes1, and E. Tokar1. 1NIEHS, Research Triangle Park, NC; and 2Sciome, LLC, Research Triangle Park, NC.

#2323 Poster Board Number ................................................................. P735
Impacts of Gut Bacteria on Oral Bioaccessibility of Arsenic in Soils Using a Multi-compartment In Vitro Gastrointestinal Model. J. Griggs1, D. Thomas1, K. Lu1, L. Chi1, M. Kohani1, N. Hanley1, and K. Bradham1. University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2US EPA, Research Triangle Park, NC.

#2324 Poster Board Number ................................................................. P736
Chronic Exposure to Arsenic and High-Fat Diet Induces Sex-Dependent Renal Effects. Y. Zhang1, J. Young1, M. Kong1, J. Freedman1, and L. Cai1. 1University of Louisville, Louisville, KY; and ‘Jilin University, Chang Chun, China.

#2325 Poster Board Number ................................................................. P737
The Gut Microbiota Modulates As-Disrupted Lipid and Cholesterol Homeostasis. L. Chi1, P. Tu1, Y. Lai1, J. Xue1, C. Liu1, H. Ru1, and K. Lu1. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2North Carolina State University, Raleigh, NC.

#2326 Poster Board Number ................................................................. P738
Building an Adverse Outcome Pathway Network for Arsenic-Induced Diseases. I. L. Druwe1, J. Davis2, J. Gift1, I. Cote3, and J. S. Lee1. 1US EPA, Research Triangle Park, NC; 2US EPA, Cincinnati, OH; and 3US EPA, Washington, DC.

#2327 Poster Board Number ................................................................. P739

#2328 Poster Board Number ................................................................. P740
Arsenic-Induced Perturbations of the GR Pathway in Trophoblasts: Implications for Placental Disregulation. C. J. Meakin1, E. M. Martin1, J. T. Szilagy1, and R. C. Fry1. 1University of North Carolina at Chapel Hill, Chapel Hill, NC; and 2NIEHS, Research Triangle Park, NC.

#2329 Poster Board Number ................................................................. P741

#2330 Poster Board Number ................................................................. P742
Using the Zebrafish Model System to Define Developmental Arsenic Toxicity. K. G. Kiper, and J. L. Freeman. Purdue University, West Lafayette, IN.

#2331 Poster Board Number ................................................................. P743

#2332 Poster Board Number ................................................................. P744
Sexually Dimorphic Hepatic Responses to Environmental Arsenic Exposure in a Mouse Model of Non-alcoholic Fatty Liver Disease. W. H. Watson1, J. L. Young1, T. J. Burke1, T. Kalbfleisch1, L. Cai1, C. States1, G. E. Arteel1, and J. H. Freedman2. 1University of Louisville, Louisville, KY; and 2University of Pittsburgh, Pittsburgh, PA.

#2333 Poster Board Number ................................................................. P745
Alternative Splicing Events and RT-PCR Analysis of SHC1 in Arsenic Exposed Human Keratinocytes. A. P. Ferragut Cardoso1, M. Banerjee1, L. Al-Eryani1, M. A. Sayed1, J. W. Park1, and J. C. States1. 1University of Louisville, Louisville, KY; and 2National Cancer Institute, Bethesda, MD.

#2334 Poster Board Number ................................................................. P746
Investigating Cell Type Specific Immune Responses to Acute Influenza A Infection in Adult Mice Exposed to Arsenic In Utero. B. C. Goodale1, K. S. Hsu1, K. E. Ely1, B. A. Stanton1, and R. I. Enelow1. 1Geisel School of Medicine at Dartmouth, Hanover, NH; and 2Dartmouth College, Hanover, NH.


Prenatal Exposure to Cadmium (Cd) and Postnatal Exposure to Cd and High-Fat Diet (HFD) Impairs Spermatogenesis and Increases Testicular Apoptosis. B. Zhou1,2, A. Gentry1, K. Pagidas1, J. Young1, M. Kong1, L. Cai1, and J. H. Freedman1. University of Louisville, Louisville, KY; 'Children's Hospital of JiangXi Province, Nanchang, China, China; and Obstetrics/Gynecology and Women's Health, Louisville, KY.


Exposure to Lead and Cadmium Contaminating Metals: A Biochemical, Oxidative Stress and Lipid Profile Study in a Rat Model. O. O. Ogurinrinola1, B. B. Sogunw12, O. A. Ogurinrinola2, and O. Ademuyiwil2. Lagos State University, Lagos, Nigeria; 'Babcock University, Lagosililshan-Remo, Nigeria; and 'Federal University of Agriculture, Abeokuta, Nigeria.


A Rare Case of Severe Life-Threatening Lead Poisoning Due to Accidental Exposure: Diagnosis, Treatment, and Prognosis. X. Du1,2, W. Zheng3, and Q. Ye1. Beijing Chaoyang Hospital, Beijing, China; and 'Purdue University, West Lafayette, IN.


Use of Zea mays Cob (Corncob) as an Economic Adsorbent for the Adsorption of Lead (ii) Ions from Aqueous Solution. C. Onowotor1, C. Uche1, and L. Petrik2. University of the Western Cape, Cape Town, South Africa; and 'Lagos State University, Lagos, Nigeria.

Development and Use of a Yeast Two Hybrid System to Detect Lead. D. Bianculli, and M. E. Gillespie. St. John's University, Jamaica, NY.

Inhibition of Insulin Secretion by As, Cd, and Mn Is Associated with Metal-Specific Shifts in miRNA Profiles. R. Beck1, M. Chandi1, M. Styb1, and P. Sethupathy2. University of North Carolina at Chapel Hill, Chapel Hill, NC; and 'Cornell University, Ithaca, NY.


Understanding the Role of the Manganese Transporter Slt30a10 in Developing Mice. H. Conboy, C. Mercadante, M. Prajapati, D. Dash, and T. Bartnikas. Brown University, Providence, RI.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Metals II**

**Chairperson(s):** Alex Merrick, NIEHS, Research Triangle Park, NC; Olabisi O. Oggunrinola, Lagos State University, Lagos, Nigeria; David J. Thomas, US EPA, Research Triangle Park, NC; and Walter Watson, University of Louisville, Louisville, KY.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 1:30 PM–3:00 PM

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<td>#2353</td>
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<td>Tungsten Enhances Cancer-Associated Fibroblast Activation from Bone Marrow-Derived Mesenchymal Stromal Cells.</td>
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<td>Associations between Mercury Levels in Hair and Fish Consumption among Children in the South Area of Wakayama Prefecture, Japan.</td>
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The Effect of GMDC in Overcoming Cisplatin-Induced Systemic Toxicity. Y. Ge1, N. Zheng2, X. Tang3, and X. Ren4. 1State University of New York at Buffalo, Buffalo, NY; and 2Guangdong Zoolgen Bio-Tec Co., Ltd, Guangzhou, China.

Leaving Ligand Effects on Cytotoxicity, Solubility, and Reactivity of Monofunctional Platinum(II) Complexes. H. L. Millay, B. B. Williams, and K. M. Williams. Western Kentucky University, Bowling Green, KY.

The Effectiveness of a Monofunctional, Novel Platinum (II) Compound on Mammalian Cell Viability. J. Ko, L. B. Freeman, B. B. Williams, and K. M. Williams. Western Kentucky University, Bowling Green, KY.

Development and Validation of an Analytical Method for Total Thallium in Rodent Plasma and Tissues by ICP-MS. K. Levine1, J. Harrington1, F. Weber1, E. Poitras1, R. Fernando1, V. Robinson2, and S. Waidyanatha3. 1Research Triangle Institute, Research Triangle Park, NC; and 3NIEHS, Research Triangle Park, NC.

Dose Range Studies of Thallium (I) Sulfate Subchronic Toxicity in Perinatally-Exposed HSD: Sprague-Dawley SD Rats and Adult B6C3F1 Mice via Dosed Drinking Water. T. D. Hubbard1, K. A. Shipkowski2,3, S. Waidyanatha4, V. G. Robinson5, J. Allen6, H. Toy7, B. Sparrow1, K. Levine1, J. Harrington1, K. Ryan1, M. D. Stout1, and G. K. Roberts1. 1NIEHS/NTP Research Triangle Park, NC; 2ICF Inc., Durham, NC; 3Battelle Memorial Institute, Columbus, OH; and 4RTI International, Research Triangle Park, NC.

Antimony Exposure Induces Pancreatic ß-Cell Dysfunction and Death via a ROS-Triggered Apoptotic Signaling Pathway. Y. Chiu1, J. Lin2, K. Lee3, C. Su4, C. Wu5, C. Lin6, C. Yang7, C. Liu8, Y. Chen9, and C. Huang1. 1China Medical University, Taichung, Taiwan; 2Department of Physiology and Graduate Institute of Biomedical Science, Taichung, Taiwan; 3Taichung Tsu Chi Hospital, Taichung, Taiwan; 4Changhua Christian Hospital, Changhua County, Taiwan; 5Department of Public Health, Taichung, Taiwan; 6National Taiwan University, Taipei, Taiwan; and 7Department of Physiology and Graduate Institute of Biomedical Science, Taichung, Taiwan.

3-Month Toxicity Studies of Tetravalent and Pentavalent Vanadium Compounds in Hsd:Sprague-Dawley SD Rats and B6C3F1/N Rice via Drinking Water Exposure. G. Roberts1, K. Elsass2, F. Fallacara3, K. Levine4, J. Harrington4, S. Waidyanatha5, M. Hooth6, V. Godfrey-Robinson1, B. Sparrow1, and M. Stout1. 1NIEHS/NTP, Research Triangle Park, NC; 2Battelle Memorial, Columbus, OH; and 3RTI International, Research Triangle Park, NC.

Application and Safety Concern of Bismuth Materials and the Role of Autophagy in Bismuth Induced Nephrotoxicity Associated Mechanisms. L. Zhang, Soochow University, Suzhou, China.

Pulmonary Function in Veterans Exposed to Depleted Uranium. D. Glick1, S. Hines1, P. Gucer2, J. Gaitens1, M. Cloeren1, M. Condon2, M. Oliver1, T. Roth1, B. Weiler1, and M. McDiarmid1. 1University of Maryland School of Medicine, Baltimore, MD; and 2VA Medical Center, Baltimore, MD.

Minimal Urinary Immunotoxicity following a 60-Day Drinking Water Exposure to Uranyl Acetate in Male and Female C57BL/6J Mice. A. M. Bolt, S. Medina, F. T. Lauer, K. J. Liu, and S. W. Burchiel. University of New Mexico, Albuquerque, NM.

The Association between Whole Blood Concentrations of Heavy Metals in Pregnant Women and Premature Births: The Japan Environment and Children's Study. M. Tsuji1, R. Tanaka1, C. Koriyama2, M. Yamamoto3, Y. Ishihara4,5, and T. Kawamoto6. 1University of Occupational and Environmental Health, Kitakyushu, Japan; 2Kagoshima University Graduate School of Medical and Dental Sciences, Kagoshima, Japan; 3National Institute for Minamata Disease, Minamata, Japan; and 4Hiroshima University, Higashi-Hiroshima, Japan.


Improvement of Organotypic Slice Culture of Mouse Cerebral Cortex to Evaluate M1-Type Microglial Activation. T. Hoshi, T. Toyama, A. Naganuma, and G. Hwang. Tohoku University, Sendai, Japan.

Correlations in Metal Concentrations between a Spot and 24-Hour Urine Collection. J. Gaitens1,2, M. Condon2, H. Xu1, M. Lewin-Smith1, F. Strathmann1, M. Velez-Quinones1, C. Brown1, and M. McDiarmid1. 1University of Maryland School of Medicine, Baltimore, MD; 2Department of Veterans Affairs Medical Center, Baltimore, MD; 3Joint Pathology Center, Silver Spring, MD; and 4NMS Labs, Willow Grove, PA.

Neurodevelopmental Aspects of In Utero Exposure to Heavy Metals. D. Sarigianis1, N. Papaioannou1, M. Fafouti1, M. Horvat2, J. Snoj Tratinik3, and S. Karakitsos1. 1Aristotle University of Thessaloniki, Thessaloniki, Greece; and 2Josef Stefan Institute, Ljubljana, Slovenia.

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Developmental and Juvenile Toxicology**

*Chairperson(s): Janiel K. Ahkin Chin Tai, Purdue University, West Lafayette, IN; and Natasha Catlin, Pfizer, Inc., Groton, CT.*

**Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM**

### Abstract #

#### #2385

**Poster Board Number**


#### #2386

**Poster Board Number**

Absence of Embryofetal Malformations in Rats and Rabbits and Pre/Postnatal Developmental Toxicity in Rats following Oral Dosing with Bictegravir. C. McMahon1, T. White1, S. Moore1, V. Sharp1, J. Charlap1, and L. Burns-Naas. 1Gilead Sciences Inc., Foster City, CA; 1Aclairo Pharmaceutical Development Group, Inc., Vienna, VA; 1Charles River, Horsham, PA; and 1Charles River, Ashland, OH.

#### #2387

**Poster Board Number**


#### #2388

**Poster Board Number**


#### #2389

**Poster Board Number**

Adverse Developmental Effects in Progeny of Zebrafish That Were Exposed to Atrazine during Embryogenesis. J. Ahkin Chin Tai, K. Horzmann, and J. Freeman. Purdue University, West Lafayette, IN.

#### #2390

**Poster Board Number**

Role of the Transcription Factor Nfe2 and Pro-oxidant Exposure in Inner Ear Development in Zebrafish. A. Bowsher, M. Mait, and L. Williams. Bates College, Lewiston, ME.

#### #2391

**Poster Board Number**


#### #2392

**Poster Board Number**


#### #2393

**Poster Board Number**

Placental Transfer of [125I]iodinated Humanized Immunoglobulin G2 Δ A in the Cynomolgus Monkey. N. Cattin1, A. Mitchell2, M. Pochioha1, D. O’Hara1, M. Wang1, M. Zhang1, G. Weinbauer3, and C. Bowman. 1Pfizer, Inc., Groton, CT; 2University of Florida, Gainesville, FL; 3Covance Laboratories, Inc., Madison, WI; 4Pfizer, Inc., Andover, MA; and 5Covance Preclinical Services, Munster, Germany

#### #2394

**Poster Board Number**

Identifying the Molecular Mechanisms Responsible for Persistent Effects of Developmental Exposure to Chlorpyrifos on Behavior. N. Alugubelly, A. N. Mohammad, and R. L. Carr. Mississippi State University, Starkville, MS.

#### #2395

**Poster Board Number**


#### #2396

**Poster Board Number**

Compartmental Redox Potential and Histiotrophic Nutrition in Organogenesis-Stage Mouse Conceptuses Treated with Valproic Acid. S. R. Lapehn, and C. Harris. University of Michigan, Ann Arbor, MI.

#### #2397

**Poster Board Number**

Maternal Bococizumab (Anti-PCSK9 Monoclonal Antibody) Administration Does Not Affect Rat Pre- and Postnatal Development, S. N. Campion1, G. D. Cappon1, E. M. Lewis5, and C. J. Bowman1. 1Pfizer, Inc., Groton, CT; and 5Covance Preclinical Services, Inc., Horsham, PA.

#### #2398

**Poster Board Number**

Role of Nrf2a in Modulating MEHP-Induced Hepatosteatosis following Embryonic Exposure in Danio rerio. H. Moreau1, K. Sant1, L. M. Williams, and A. Timme-Laragy. 1Bates College, Lewiston, ME; 2University of Massachusetts Amherst, Amherst, MA; and 3San Diego State University, San Diego, CA.

#### #2399

**Poster Board Number**


#### #2400

**Poster Board Number**

Abstract #

#2401  
**Poster Board Number**.................................................................................................................................P815  
**Bisphenol A Exposure Differentially Affects Echinoderm Embryogenesis.** I. Veras1, A. Bonilla1, B. Zhong5, H. Aguilar1, T. Onorato1, H. Zaki2, G. Reyes3, N. Oulhenn1, and G. Wessel1. 1LaGuardia Community College, Long Island City, NY; and 2Brown University, Providence, RI.

#2402  
**Poster Board Number**.................................................................................................................................P816  
**Mono(2-ethylhexyl) Phthalate (MEHP) Adversely Affects Mice Embryonic Development In Vitro.** R. Braz Arcanjo, and R. A. Nowak. University of Illinois at Urbana-Champaign, Urbana, IL.

#2403  
**Poster Board Number**.................................................................................................................................P817  
**Modulation of Peroxisome Proliferator-Activated Receptors Gamma (PPARγ) Signaling Perturbs Embryonic Pancreas Development in the Zebrafish, Danio rerio.** O. L. Venezia1, K. E. Sant2, and A. R. Timme-Laragy1. 1University of Massachusetts Amherst, Amherst, MA; and 2San Diego State University, San Diego, CA.

#2404  
**Poster Board Number**.................................................................................................................................P818  
**Improving In Silico Predictions in Developmental and Reproductive Toxicology.** C. Villano1, B. Rickett2, and A. Fowkes3. 1Bristol-Myers Squibb, New Brunswick, NJ; 2University of the Sciences, Philadelphia, PA; and 3Lhasa Limited, Leedes, United Kingdom.

#2405  
**Poster Board Number**.................................................................................................................................P819  
**Toxicity Interaction of the Two Most Common Agricultural Herbicides in the United States: Glyphosate and Atrazine.** L. Brulinski, J. Tai, and J. L. Freeman. Purdue University, West Lafayette, IN.

#2406  
**Poster Board Number**.................................................................................................................................P820  
**Patterns of Hyaluronan Deposition in Normal and Diseased Pediatric Livers.** M. Czerwinski1, A. Kats2, J. Surgner3, S. E. Tague3, and M. T. Pitchard2. 1Sekisui XenoTech LLC, Kansas City, KS; 2Children's Mercy Hospital, Kansas City, MO; and 3University of Kansas Medical Center, Kansas City, KS.

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**Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Developmental Basis of Adult Disease**

*Chairperson(s):* Colette N. Miller, US EPA, Research Triangle Park, NC; and Anne E. Turco, University of Wisconsin-Madison, Madison, WI.

**Displayed: 9:15 AM—4:30 PM | Author Attended: 9:15 AM—10:45 AM**

Abstract #

#2407  
**Poster Board Number**.................................................................................................................................P821  
**Paternal Age Modulates Neurotoxicity of Rotenone In Vitro.** S. Menwin1,2, S. McLamr1, J. Halaby1, R. Stark1, and B. Pearson3. 1Columbia University, New York, NY; and 2University of California Irvine, Irvine, CA.

#2408  
**Poster Board Number**.................................................................................................................................P822  
**In Vitro and In Vivo Evaluation of Bisphenol Analogue Exposure on Mouse Adipose Gene and Protein Profiles.** V. A. Chappell, D. K. Tucker, and S. E. Fenton. NIEHS, Durham, NC.

#2409  
**Poster Board Number**.................................................................................................................................P823  
**Gestational Exposure to BPA and BPS Alters Myogenic Differentiation and Fiber-Type Formation in Fetal Skeletal Muscle.** J. Jing, Y. Pu, J. Gingrich, J. Steibel, and A. Veiga-Lopez. Michigan State University, East Lansing, MI.

#2410  
**Poster Board Number**.................................................................................................................................P824  
**Adverse Outcome Pathway of Estrogen Receptor Activation by Endocrine-Disrupting Chemicals Leading to Enhanced Breast Cancer Susceptibility.** A. Hindman, and R. Rudel. Silent Spring Institute, Newton, MA.

#2411  
**Poster Board Number**.................................................................................................................................P825  

#2412  
**Poster Board Number**.................................................................................................................................P826  

#2413  
**Poster Board Number**.................................................................................................................................P827  
**Peri-implantation Ozone Exposure Induces Sexually Dimorphic Placental-Fetal-Brain Axis Abnormalities.** C. N. Miller1, A. R. Henriquez2, E. J. Stewart1, K. S. Laviach1, D. Freeborn1, P. R. Kodavanti1, G. Carswell1, B. N. Chorley1, U. P. Kodavanti1, and J. A. Dye1. 1US EPA, Research Triangle Park, NC; 2Oak Ridge Institute for Science and Education, Oak Ridge, TN; and 3University of North Carolina at Chapel Hill, Chapel Hill, NC.

#2414  
**Poster Board Number**.................................................................................................................................P828  
**Gestational Exposure to Inhaled Nano-Sized Titanium Dioxide Impairs Fetal Nutrition.** C. A. Love1, J. T. Szlak2, J. N. D’Errico2, S. B. Fournier1, A. Brinker1, B. Buckley1, L. M. Aleksunes1, and P. A. Stapleton2. 1Grinnell College, Grinnell, IA; and 2Rutgers, The State University of New Jersey, Piscataway, NJ.

#2415  
**Poster Board Number**.................................................................................................................................P829  

#2416  
**Poster Board Number**.................................................................................................................................P830  
**Rats Exposed to Nanoparticles during Gestation Do Not Develop Metabolic Disease in Early Adulthood.** S. B. Fournier, and P. A. Stapleton. Rutgers, The State University of New Jersey, Piscataway, NJ.
Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Alternatives to Mammalian Models I**

**Chairperson(s):** Ellen Berg, BioSeek, a Division of DiscoveRx, South San Francisco, CA; Tetyana Kobets, New York Medical College, Valhala, NY; Diego Rua, US FDA, Silver Spring, MD; and Lili Tang, University of Georgia, Athens, GA.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 10:45 AM–12:15 PM

**Abstract #**

**#2417**

**Poster Board Number:**

**The Sex-Specific Influence of Gestational Air Pollution Exposure on Placental Metabolic Gene Expression within the Rhode Island Child Health Study (RICHSt).** K. Kaur1,2; C. Lesseur1, M. Deyssenroth2; J. Zelikoff1, M. Carmen1, and J. Chen1. 1New York University School of Medicine, New York, NY; 2Icahn School of Medicine at Mt. Sinai, New York, NY; and 3Emory University School of Medicine, Atlanta, GA.

**#2418**

**Poster Board Number:**

**Sex-Dependent Effects of Early-Life Cadmium Exposure and High-Fat Diet on the Liver, Heart, and Kidney.** J. Young1, Y. Liang1,2, M. Merchant1, G. Arte1, J. Freedman1, and L. Cai1. 1University of Louisville, Louisville, KY; 2First Affiliated Hospital of Wenzhou Medical University, Wenzhou, China; and 3University of Pittsburgh, Pittsburgh, PA.

**#2419**

**Poster Board Number:**

**Long-Lasting Effects of Developmental Exposure to 2,2',4,4'-Tetrabromodiphenyl Ether on Blood-Liver Balance of Lipids in Male Mice.** A. Khalil1,2, S. E. Cevik1, S. Hung1, S. Kolla1, M. Roy1, and A. Suvorov1. 1University of Massachusetts Amherst, Amherst, MA; and 3City of Scientific Research and Technological Applications, Alexandria, Egypt.

**#2420**

**Poster Board Number:**

**Early-Life TCDD Exposure Shapes Gene Expression across the Life Course of Mice.** J. P. Parker1, T. I. Konnerer1, N. E. Allard1, B. Hormann1, A. Safi1, L. Song1, H. B. Patisaaul1, G. E. Crawford1, and D. L. Aylor1. 1North Carolina State University, Raleigh, NC; and 2Duke University, Durham, NC.

**#2421**

**Poster Board Number:**

**Gestational Exposure to Ultra-Low Doses of CdCl2, Sex-Specifically Alter Metabolic Function and Hepatic Transcriptome in Adult CD-1 Mice.** S. Belcher1, T. Guillette1, T. Jackson1, G. Ryherd1, and K. Beam1. 1North Carolina State University, Raleigh, NC.

**#2422**

**Poster Board Number:**

**Developmental Exposure to Brominated Flame Retardant 2,2',4,4'-Tetrabromodiphenyl Ether (BDE-47) Permanently Reprograms Liver Lipid Metabolism in Mice via mTOR-Dependent Pathway.** J. P. McGaunn1, V. R. Saleem1, A. Poluyanoff1, and A. Suvorov1. University of Massachusetts, Amherst, MA.

**#2423**

**Poster Board Number:**

**Reprogramming of Peroxisome Proliferator-Activated Receptor Target Genes in Mice Perinatally Exposed to Phthalates.** K. Neier1, T. R. Jones1, M. A. Sartor1, and D. C. Dolino1. University of Michigan, Ann Arbor, MI.

**#2424**

**Poster Board Number:**

**Participation of Endothelial Small GTPase RhO in Embryo Development and Retinal Angiogenesis.** F. Zahra1, M. Sajib1, Y. Ichiyama1, P. Tullar1, Y. Kubota1, and C. Mikelis1. Texas Tech University, Amarillo, TX; and 3Keio University School of Medicine, Tokyo, Japan.

**#2424a**

**Poster Board Number:**

**The Kinetic Direct Peptide Reactivity Assay (k-DPRA): An In Chemico Method to Characterize the Skin Sensitization Potency of Chemicals.** B. Wareing, S. Kolle, B. Birk, and R. Landsiedel1. BASF SE, Ludwigshafen am Rhein, Germany.


#2430

Poster Board Number:  P845

A New Method for Skin Sensitization Potential for Poorly Soluble Compounds Using a 3D Keratinocyte/THP-1 Co-culture. A. Thélù1,2, M. Stricher1, A. Josseanne1, L. Beaudéquin1, L. De La Barrera1, H. Ficheux1, S. Catoire1, and S. Kerdine-Römer1. THOR Personal Care, Compiègne, France; and UMR-S 996 Université Paris Sud/Paris Saclay, Chatenay-Malabry, France.

#2431

Poster Board Number:  P846

Skin Sensitization Potential: Addressing the 3 Key Events of AOP Using a 3D Keratinocyte/THP-1 Co-Culture. A. Thélù1,2, L. De La Barrera1, H. Ficheux1, S. Catoire1, and S. Kerdine-Römer1. THOR Personal Care, Compiègne, France; and UMR-S 996 Université Paris Sud/Paris Saclay, Chatenay-Malabry, France.

#2432

Poster Board Number:  P847

Effects of Ammonia Vapor Exposure on Viability in a Full-Thickness Human Skin Tissue Model. J. Molignano1, M. Bachelor1, P. J. Hayden1, H. D. Garcia1, K. Toon1, and V. E. Ryder1. MatTek Corporation, Ashland, MA; KBRWyle, Houston, TX; and NASA Johnson Space Center, Houston, TX.

#2433

Poster Board Number:  P848

Evaluation of the EpibiSens® for Identifying Dermal Sensitization Potential of Complex Actives and Crop Protection Formulations. M. J. LeBaron1, H. Mizumachi2, R. Settivari2, M. Miyazawa1, M. S. Marty1, and H. Sakaguchi2. Dow Chemical Company, Midland, MI; Kao Corporation, Tochigi, Japan; and Corteva Agriscience, Newark, DE.

#2434

Poster Board Number:  P849


#2435

Poster Board Number:  P850

How to Assess a Phototoxicity Risk Related to Topical Exposure by Using the In Vitro SkinEthic® RHE Model. C. Videau1, C. Grégoire1, N. Alépée2, S. Dreyfuss1, and N. Seyler1. Épiskin SA, Lyon, France; and L’Oréal, Aulnay sous Bois, France. Sponsor: E. Dufour

#2436

Poster Board Number:  P851


#2437

Poster Board Number:  P852

Evaluation of Epitelint™ Model for Absorption Studies In Vitro in an Automated Flow-Through Device. S. Wölk1, E. Fabian1, H. Marxfeld1, J. Markus1, H. Kandarova1, B. van Ravenzwaay1, and R. Landsiedel1. BASF SE, Ludwigshafen am Rhein, Germany; and MatTek In Vitro Life Science Laboratories, Bratislava, Slovakia.

#2438

Poster Board Number:  P853

Inter-individual and Inter-ethnic Variation in Liver Toxicity of Lasiocarpine Predicted by Integrating Physiologically Based Kinetic (PBK) and Monte Carlo Modeling. J. Ning1, I. M.C.M. Rietjens1, and M. Strikwold2. Wageningen University, Wageningen, Netherlands; and Van Hall Larenstein University, Leeuwarden, Netherlands.

#2439

Poster Board Number:  P854


#2440

Poster Board Number:  P855

The Power of Resolution: Contextualized Understanding of Chemical-Biological Interactions. S. S. Ferguson1, S. C. Ramaihagari2, S. S. Auerbach1, T. O. Saddler1, J. R. Rice1, P. E. Dunlap1, N. S. Sipes1, M. J. De Vivo1, R. R. Shah1, P. R. Bushel1, B. Merrick1, and R. S. Paules1. NIEHS, Research Triangle Park, NC, and Sciome, LLC, Research Triangle Park, NC.

#2441

Poster Board Number:  P856

Identification of Peroxisome Proliferators by Metabolomics in HepG2 Cells. H. Kamp1, S. Sperber1, B. Birk1, V. Haake1, T. Walk1, and B. van Ravenzwaay1. BASF SE, Ludwigshafen am Rhein, Germany; and Metanomics GmbH, Berlin, Germany.

#2442

Poster Board Number:  P857

A Novel In Vitro All-Human Tri-culture Model That Maintains Structural Organization and Key Functions of Primary Hepatocytes over Several Weeks. A. C. Murchison1, K. K. Wolf1, E. K. Breathwaite1, J. R. Weaver1, M. L. Treadwell1, V. Soldatow1, J. Chen1, E. L. LeCluyse1, and J. Lee1. LifeNet Health, Virginia Beach, VA; and LifeNet Health, Research Triangle Park, NC.

#2443

Poster Board Number:  P858

Studies on Physiological Equivalence of Human Hepatocytes and Liver Cells Harvested from Humanized-Liver Chimeric Mice. H. Suemizu1, Y. Higuchi1, N. Yoneda1, H. Yamazaki2, and S. Uehara1. Central Institute for Experimental Animals, Kawasaki, Japan; and Showa Pharmaceutical University, Machida, Japan.

#2444

Poster Board Number:  P859

Mode-of-Action Prediction of Liver Toxicants Using Metabolomics In Vitro. S. Sperber1, V. Starck1, B. Birk1, V. Haake1, H. Kamp1, T. Walk1, and B. van Ravenzwaay1. BASF SE, Ludwigshafen am Rhein, Germany; and Metanomics GmbH, Berlin, Germany.

#2445

Poster Board Number:  P860

Cytotoxicity and Oxidative Stress of Nivalenol and Sterigmatocystin on Human Hepatocarcinoma Cells. M. Ruiz1, C. Fedeli1, V. Zingales1, A. Juan-García1, and M. Fernandez-Franzoni1. University of Valencia, Valencia, Spain; and Universita degli Studi di Perugia, Perugia, Italy.

#2446

Poster Board Number:  P861

Tuesday, March 12, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Alternatives to Mammalian Models II

Chairperson(s): Stephen Ferguson, NIEHS, Research Triangle Park, NC; Yulia Kaluzhny, MatTek Corporation, Ashland, MA; Stefanie L. O’Neal, Purdue University, West Lafayette, IN; and Natalia Vinas, US Army Engineer Research and Development Center, Vicksburg, MS.

Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM

Abstract #

#2447 Poster Board Number........................................................................................................................................P862
**Enabling Assessment of Cardiotoxicity Hazard for Environmental Chemicals Using an In Vitro Human Population Model.**
S. D. Burnett1, A. Blanchette1, F. Grimm1, F. Wright1, W. Chiu1, and I. Rusyn2. 1Texas A&M University, College Station, TX; and 2North Carolina State University, Raleigh, NC.

#2448 Poster Board Number........................................................................................................................................P863
**Matured Human Cardiac Microtissues Provide Increased Predictive Value for Cardiac Toxicity Testing.**
B. Charrez1, N. Huebsch1, V. Charvat1, B. A. Siemons1, S. Boggess1, N. Jeffreys1, N. Deveshwar1, J. Serrano1, M. Snuderl1, E. Miller1, and K. E. Healy1. 1University of California Berkeley, Berkeley, CA; 2Washington University in St. Louis, St. Louis, MO; and 3New York University, New York, NY. Sponsor: I. Rusyn

#2449 Poster Board Number........................................................................................................................................P864
**Evaluation of Corneal Damage Recovery Using 3-Dimensional Model.**
H. Kojima1, Y. Kato2, A. Sato3, and N. Yamamoto1. 1National Institute of Health Sciences, Kawasaki, Japan; 2Nippon Menard Cosmetic Co., Ltd, Nagoya, Japan; and 3Fujita Health University, Aichi, Japan.

#2450 Poster Board Number........................................................................................................................................P865
**Molecular Footprints of Oxidative Stress in Corneal Injuries of Different Origin: Utilization of Human Organotypic 3D Corneal Tissue Model.**
Y. Kaluzhny, M. Kinuthia, T. Truong, A. Lapointe, M. Klausner, and P. Hayden. MatTek Corporation, Ashland, MA.

#2451 Poster Board Number........................................................................................................................................P866
**The EYEIRR-LS Assay: Development of an In Vitro Method Using SkinEthic HCE Model for Liquid Chemical Eye Irritation Subcategorization.**
F. Cottrez1, V. Leblanc2, H. Groux2, and N. Alepee2. 1Immunosearch, Grace, France; and 2L’Oreal, Aulnay Sous Bois, France. Sponsor: E. DuFour

#2452 Poster Board Number........................................................................................................................................P867
**Identifying Eye Irritants (GHS Category 2) Using Validated, Nonanimal Tests.**

#2453 Poster Board Number........................................................................................................................................P868
**Prevalidation of the OptiSafe Ocular Irritation Assay for the Detection of Ocular Corrosives.**
S. J. Lebrun1, N. Choks1, A. Daniel1, D. Aller1, and W. Casey1. 1Lebrun Labs, Anaheim, CA; 2ILS, Research Triangle Park, NC; and 3NIEHS/NICEATM, Research Triangle Park, NC.

#2454 Poster Board Number........................................................................................................................................P869
**Updated Survey of CAMVA and BCOP Assays Used to Predict Ocular Irritancy of Personal Care Products—7 Years Later.**

#2455 Poster Board Number........................................................................................................................................P870
**In Vitro Metabolome Analysis Can Predict Nephrotoxicity and Its Mode-of-Action.**
B. Birk1, S. Sperber1, S. Wallisch2, H. Huener1, A. Verlerner1, T. Walk1, V. Haake1, M. Spitzer1, H. Kamp3, and B. van Ravenzwaay1. 1BASF SE, Ludwigshafen am Rhein, Germany; 2Metanomics GmbH, Berlin, Germany; and 3Metanomics, Berlin, Germany.

#2456 Poster Board Number........................................................................................................................................P871
**Development and Screening of a High-Throughput Metabolically Competent Renal Toxicity Assay.**
J. A. Jimenez-Torres1, and B. P. Johnson1. 1Onexio Biosystems LLC, Madison, WI; and 2University of Wisconsin-Madison, Madison, WI.
#2461 Poster Board Number..............................................................................................................P876

#2462 Poster Board Number..............................................................................................................P877

#2463 Poster Board Number..............................................................................................................P878

#2464 Poster Board Number..............................................................................................................P879
Authentic Lung and Gingival Fibroblasts Cell Models for In Vitro Toxicity Testing. L. Romero, and C. Zou. ATCC Cell Systems, Gaithersburg, MD.

#2465 Poster Board Number..............................................................................................................P880

#2466 Poster Board Number..............................................................................................................P881
Interference of Barcoded DNA Measurements When Determining High-Throughput CYP-Mediated Cytotoxicity. E. A. Woolard, G. Carswell, S. Simmons, and B. Cheley. ORISE, Durham, NC; and *US EPA/ORD, Research Triangle Park, NC.

#2467 Poster Board Number..............................................................................................................P882

#2468 Poster Board Number..............................................................................................................P883

#2469 Poster Board Number..............................................................................................................P884
Using the Monocyte Activation Test for Medical Devices. D. G. Allen, A. Clippinger, S. Morefield, W. Casey, C. Ghosh, J. Goode, and J. Brown. ILS, Research Triangle Park, NC; *PISC, London, United Kingdom; *NIEHS, Research Triangle Park, NC; and *US FDA/CDRH, College Park, MD.

#2470 Poster Board Number..............................................................................................................P885

#2471 Poster Board Number..............................................................................................................P886

#2472 Poster Board Number..............................................................................................................P887

#2473 Poster Board Number..............................................................................................................P888

#2474 Poster Board Number..............................................................................................................P889
Development and Characterization of an In Vitro Human iPSC-Derived Neurophsroid Model. J. L. Mohn, M. Klausner, and P. J. Hayden. MatTek Corporation, Ashland, MA.

#2475 Poster Board Number..............................................................................................................P890
3D-Bioprinting Microtissues with Human 1T1 Urothelial Cells Exposed to Diuron and Its Metabolites. T. Rios Rossi Lima, C. Adriene da Silva, J. Viana de Camargo, and L. Pereira. FMB-UNESP, Botucatu, Brazil.

#2476 Poster Board Number..............................................................................................................P891

#2477 Poster Board Number..............................................................................................................P892
Human Neurophsoids Contribute to an In Vitro Testing Battery for Developmental Neurotoxicity Assessment. S. Masjosthusmann, M. Bareyns, J. Baumann, F. Bendt, N. Förster, E. Kefel, U. Hüenthal, M. Schmuck, T. Temme, A. Mosig, and E. Fritsche. Leibniz Research Institute for Environmental Medicine, Düsseldorf, Germany; Ruhr University Bochum, Bochum, Germany; and Heinrich-Heine-University Düsseldorf, Düsseldorf, Germany.

#2478 Poster Board Number..............................................................................................................P893
Identification of Risk Factors for Breast Cancer Using Engineered In Vitro Techniques. S. Chittiboyina, R. Rahimi, C. Cosby, Y. Bai, and S. A. Lelièvre. Purdue University, West Lafayette, IN.
#2479 Poster Board Number..............................................................................................................P894
A Multiple Organ Integrated In Vitro Model for Studying Repeated Dose Toxicity. J. M. McKim Jr., J. A. Willoughby Sr., N. Hibbard, B. Ebendick-Corpus, and J. T. Dever. iONTOX, LLC, Kalamazoo, MI; and Amway Corp., Ada, MI.

#2480 Poster Board Number..............................................................................................................P895

#2481 Poster Board Number..............................................................................................................P896

#2482 Poster Board Number..............................................................................................................P897

#2483 Poster Board Number..............................................................................................................P898

#2484 Poster Board Number..............................................................................................................P899
In Vitro Evaluation of the Pharmacokinetics of Phenoxyethanol in the Human Dynamic Multi-Organ Plate (HuDMOP). J. A. Willoughby Sr., N. Hibbard, B. Ebendick-Corpus, E. L. McClymont, M. S. Martz, J. Domoradzki, and J. M. McKim Jr. iONTOX, LLC, Kalamazoo, MI; DowDuPont, Midland, MI; and Corteva Agriscience Agricultural Division of DowDuPont, Indianapolis, IN.

#2485 Poster Board Number..............................................................................................................P900

#2486 Poster Board Number..............................................................................................................P901

#2487 Poster Board Number..............................................................................................................P902

#2488 Poster Board Number..............................................................................................................P903

#2489 Poster Board Number..............................................................................................................P904

#2490 Poster Board Number..............................................................................................................P905
A Retrospective Study on 100+ Agrochemical Formulations: Comparing Classifications Based on Testing Data and GHS Additivity Formula. S. P. Ng, and K. A. Mikkles. Corteva Agriscience, Agriculture Division of DowDuPont, Newark, DE.

#2491 Poster Board Number..............................................................................................................P906

#2492 Poster Board Number..............................................................................................................P907

#2493 Poster Board Number..............................................................................................................P908

#2494 Poster Board Number..............................................................................................................P909
Research Funding Insights

Hosted by: Career Resource and Development Committee

Representatives from federal agencies will be available in the Research Funding Insights Room for individual conversations. Make an appointment with your Program Officer in advance or check the posted schedule to meet with a staff member who can discuss aspects of scientific review or specific grant opportunities. New investigators are especially encouraged to meet with program staff.

Exhibitor-Hosted Session: Auditory Safety in Toxicology: Discussions on Current Trends

Presented by: Charles River and Vet Path Services (VPS)

Evaluation of sensory systems in toxicity studies has historically been only a priority for directly administered compounds and those in classes of risk. We will discuss the necessary considerations for compounds that may be in a class of risk for ototoxicity, those directly administered to the ear, those targeting the ear, and considerations for future screening and inclusion of these specialty system evaluations in standard toxicity studies.

Exhibitor-Hosted Session: Factors to Consider for Developing In Vitro Cytotoxicity Assays to Replace Animal Testing

Presented by: Promega Corporation

There are many options for measuring cytotoxicity in vitro as an alternative to animal testing. Critical factors to consider during alternative assay development include predictivity and reproducibility of the cell model, detection sensitivity, selecting endpoint versus real-time kinetic assay methods, and the ability to multiplex more than one orthogonal endpoint.

Exhibitor-Hosted Session: Global IND Submission: What Are the Benefits and Why Should It Be Considered?

Presented by: WuXi AppTec

This session will provide the details of why a global IND submission should be considered and will also highlight the many benefits that will come from it. Also, during this session, we will highlight what is needed for a global IND submission.

Exhibitor-Hosted Session: Using In Silico Tools to Increase Confidence in Defined Approaches for Skin Sensitization

Presented by: Lhasa Limited

In silico tools are a valuable complement to defined approaches, as they can consider chemical reactivity, metabolism, and lipophilicity, often outside the domain of in chemico/in vitro assays. Lhasa Limited will illustrate, using case studies, how confidence in skin sensitization predictions increases when using all three (in silico/in chemico/in vitro).
Tuesday, March 12, 11:00 AM to 12:00 Noon, CC Ballroom III

Meet the Directors: A Conversation with Linda S. Birnbaum, Jennifer Orme-Zavaleta, and Mark S. Johnson

Chairperson(s): Ron Hines, US EPA, Research Triangle Park, NC.


This important session will provide an informal venue for meeting attendees to have a candid and open discussion with three key leaders of federal organizations with missions to protect and improve public health and the environment: Linda S. Birnbaum, PhD, director, National Institute of Environmental Health Sciences (NIEHS); Jennifer Orme-Zavaleta, PhD, principal deputy assistant administrator for science, US EPA Office of Research and Development, and agency science advisor; and Mark S. Johnson, PhD, DABT, ATS, director of toxicology, Army Public Health Center, US Department of Defense (US DoD). The entire session will be devoted to a question-and-answer format concerning scientific directions and priorities for NIEHS, US EPA, and US DoD (e.g., DTRA, DARPA, SERDP, and ESTCP), including funding priorities and outlooks and training opportunities. Dr. Birnbaum has served as the director of NIEHS and the National Toxicology Program since 2009. Dr. Orme-Zavaleta has been with the US EPA since 1981, working in the areas of human health and ecological research, risk assessment, policy and regulation development, strategic planning, and program implementation. Before assuming her current position in 2017, she served as the director of the US EPA National Exposure Research Laboratory and as the interim national program director for Safe and Sustainable Water Resources. Dr. Johnson is the director of toxicology at the Army Public Health Center and the chair of the Tri-Service Toxicology Consortium.

Tuesday, March 12, 11:00 AM to 12:00 Noon, CC Room 308

Translational Impact Award Lecture: Acetaminophen Hepatotoxicity: Translating Animal Studies to the Human Pathophysiology and the Emergence of New Drug Candidates

Lecturer: Hartmut Jaeschke, University of Kansas Medical Center, Kansas City, KS.

Acetaminophen (APAP) is a widely used analgesic and antipyretic drug. Considered safe at therapeutic levels, it was recognized very early that an overdose can induce severe liver injury and acute liver failure in patients. The first breakthrough came when a mouse model of APAP toxicity was developed, which implicated cytochrome P450-mediated metabolic activation, hepatic GSH depletion, and protein adduct formation as critical events in cell death. This early mechanistic insight led to the introduction of N-acetylcysteine as the first, and still the only, clinically approved antidote against APAP toxicity. More recent studies brought into focus the central role of mitochondria in APAP-induced liver injury. The initial protein adduct formation in mitochondria triggers a mild oxidant stress, which induces the activation of redox-sensitive mitogen activated protein kinases, ultimately leading to phosphorylation of c-jun N-terminal kinase (JNK), which translocates to the mitochondria and amplifies the oxidant stress. These events trigger the mitochondrial membrane permeability transition pore opening with collapse of the membrane potential, mitochondrial matrix swelling with rupture of the outer membrane, and release of endonucleases, which cause nuclear DNA fragmentation. This refined mechanistic understanding of APAP-induced cell death identifies new therapeutic targets including JNK activation and the mitochondrial oxidant stress. Thus, mitochondria-targeted superoxide dismutase mimetics and a combined P450/JNK inhibitor are currently being evaluated in clinical studies as potential new therapeutics for APAP overdose. These examples emphasize the value of clinically relevant animal models for the identification of novel therapeutic targets applicable to patients.
The Delaney Clause of the Federal Food, Drug, and Cosmetic Act, named after Congressman Jim Delaney, was enacted in 1958 because he was worried that potential harmful chemicals were finding their way into foods and were responsible for causing cancer. It states that “no additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or if it is found, after tests which are appropriate for the evaluation of the safety of food additives, to induce cancer in man or animal.” The US FDA and US EPA are the two federal agencies charged with implementing this clause. It has been 60 years and significant advances in cancer research have elucidated the causes and mechanisms by which chemicals induce cancer. Advancements in analytical methodologies are allowing for accurate and progressively lower detection limits, resulting in detection of trace amounts of chemicals. Based on the current scientific knowledge, there is a need to look at the Delaney Clause from a different lens and make it more relevant. As a scientific community, we are committed to improving public health by promoting the development and utilization of appropriate and relevant science in risk assessment and regulatory decision-making. The objective of this roundtable session is to provide a balanced discussion and propose a path forward. The presenters in the session will provide (1) a historical overview of the scientific advances in cancer research since the 1950s, (2) the role of the Delaney Clause in the current regulatory paradigm, (3) a case study demonstrating the impact of the Delaney Clause on scientific advances, and (4) a proposed path forward on the Delaney Clause to make it more relevant based on 21st-century science.

Abstract #

11:00 The Delaney Clause, from 1958 to 2019: Making the Model Relevant. M. Krishan. Danone North America, Louisville, CO.
11:05 Session Overview. L. Navarro. Givaudan Flavors, Cincinnati, OH.
12:05 Moderated Panel Discussion. M. Krishan. Danone North America, Louisville, CO.

The Lautenberg Chemical Safety Act (LCSA) was signed into law in June of 2016 to reform the Toxic Substances Control Act (TSCA). Its requirements provide many opportunities for improvements in how the science and information concerning the manufacture and use of chemicals are applied for ensuring safety regarding chemical exposures. While the scope covers many issues, the primary focus has been on how the US EPA will carry out its mandate to evaluate both new and existing chemicals and manage those that pose an unreasonable risk. Specifically, US EPA has been working on updating the pre-manufacture notification (PMN) process covered in Section 5, as well as developing processes to prioritize and evaluate existing chemicals in commerce under Section 6, in accordance with new science standards laid out in Section 26. Since the law became effective upon enactment, US EPA has been required to meet many statutory deadlines in a short timeframe (e.g., finalize the prioritization and risk evaluation rules, complete scoping documents on the initial 10 chemicals selected for risk evaluation). In addition, the PMN process has been undergoing “fixes” in real time as attempts are made to navigate the statutory requirements for new chemicals without undue delays hindering innovation. More recently, discussions about data transparency for information used by US EPA in its regulatory decisions have become a prominent part of the narrative. In addition, there are extensive efforts around how nonanimal approaches can be used to fill data and information needs. There are both challenges and opportunities that must be addressed. Each of the three presentations will provide the perspective of the groups they represent on how these challenges and opportunities can be addressed to achieve progress toward an improved chemicals management process in the US.

Abstract #

11:00 Challenges and Opportunities Encountered with TSCA Reform: Working toward a Shared Vision for Product Safety.
D. Boverhof. The Dow Chemical Company, Midland, MI.
11:05 Introduction. D. Boverhof. Dow Chemical Company, Midland, MI.
Tuesday, March 12, 11:00 AM to 12:20 PM, CC Room 316

**Informational Session: Science at the Nexus of Wildfire Smoke and Public Health**

*Chairperson(s): Ian Gilmour, US EPA/ORD, Research Triangle Park, NC; and Ann R. Brown, US EPA, Research Triangle Park, NC.*

*Primary Endorser: Inhalation and Respiratory Specialty Section*

*Other Endorser(s): Occupational and Public Health Specialty Section; Risk Assessment Specialty Section*

Wildfires are increasing in frequency, size, and intensity in the United States, resulting in significant impacts to air quality locally, regionally, and nationally as smoke is transported across the country. Smoke from wildland fires, which include prescribed burns, now accounts for up to 40% of the fine particulate matter (PM2.5) in the country, affecting the ability of some states to meet the National Ambient Air Quality Standards. Emissions from fires also contribute to the formation of ozone and other pollutants that impact public health. Smoke plumes can extend for hundreds of miles across state and national boundaries, making any given wildfire, and a season of wildfire events, a national community health issue. The potential health effects from exposure to wildland fires require a more thorough investigation to address this growing health threat. Toxicological, epidemiological, and clinical-based research is providing new insights into the health impacts of smoke from fires and how to protect exposed populations. Research is improving understanding of who is most vulnerable and at greater risk from smoke events, and identifying health outcomes in these populations. Health studies are informing investigations to enhance public health intervention strategies and communications before, during, and after a fire. This session provides an overview of the impact wildfires and prescribed burns are having on air quality and the state of knowledge about the health effects from smoke events. The session will describe research to improve understanding of smoke toxicity, highlight clinical-based findings and describe innovative approaches to communicating the health risks.

**Abstract #**

- **11:00** *Science at the Nexus of Wildfire Smoke and Public Health.* I. Gilmour. US EPA, Research Triangle Park, NC.
- **11:00** *Public Health Implications of Wildland Fire Smoke and Communicating Risk.* W. Cascio. US EPA/ORD, Research Triangle Park, NC.
- **11:20** *Clinical Symptoms Associated with Wildfire Smoke Exposure.* J. Domitrovich. US Forest Service, Missoula, MT. Sponsor: I. Gilmour
Tuesday, March 12, 12:00 Noon to 1:00 PM, CC Room 338

**Exhibitor-Hosted Session: Building Confidence in Neurotoxicity Testing Using an In Vitro Phenotypic Assay Platform Based on Human iPSC-Derived Neurons**

*Presented by:* NeuCyte, Inc.

A powerful assay platform for neurotoxicity testing can be built from highly functional, rapid maturation SynFire® neurons with a phenotypic approach. During this session, experts in the field will present studies on the predictive power of such an in vitro system when combined with high-sensitivity, high-throughput microelectrode array (MEA).

Tuesday, March 12, 12:00 Noon to 1:00 PM, CC Room 337

**Exhibitor-Hosted Session: Recent Advances in ECG Analysis for Proarrhythmia Risk Assessment: The Need to Read between the Lines**

*Presented by:* Emka Technologies, Inc.

In recent years, US FDA has characterized innovative ECG analysis methods for proarrhythmia assessments in clinical trials. ECG is a cornerstone of cardiac safety monitoring in toxicology and safety pharmacology. The session will compare well-established ECG analysis methods used in toxicology with novel strategies that may offer lower false positive rates. Critical success factors in the analysis of preclinical ECGs will also be discussed.

Tuesday, March 12, 12:00 Noon to 1:00 PM, CC Room 339

**Exhibitor-Hosted Session: What Is the Metformin Clinical DDI Study Design That Enables an Efficacy- and Safety-Based Dose Adjustment Decision?**

*Presented by:* BioIVT

Metformin DDI studies are conducted during drug development that inhibit renal OCTs/MATEs. These DDIs are mechanistically more complex, involving transporters in absorption and distribution. Evaluation of renal clearance, antihyperglycemic effects, and blood lactate as a safety biomarker are necessary to support rational metformin dose adjustment.

Tuesday, March 12, 12:00 Noon to 1:30 PM, CC Room 330

**Drug Discovery Toxicology Specialty Section Mentoring Event**

Tuesday, March 12, 12:00 Noon to 1:30 PM, CC Room 341

**Occupational and Public Health Specialty Section Meeting/Luncheon**

*(Ticket Required)*

**Postdoctoral Assembly Luncheon**

*Chairperson(s):* Manushree Bharadwaj, NIEHS, Research Triangle Park, NC.

*Hosted by:* Postdoctoral Assembly (PDA)

The Postdoctoral Assembly Luncheon is a casual event that encourages engagement and networking among postdoctoral scholars. Finishing up a discussion from a morning session? Leaving early to attend another meeting? That’s no problem; stop in when you can! Enjoy a buffet lunch while networking with others, including PDA officers, Postdoctoral Representatives, and SOT Council members. This is the time for postdocs to relax, celebrate achievements, and have fun. At 12:30 pm, there will be a short program, which will include recognizing the Best Postdoctoral Publication Award recipients and welcoming the 2019–2020 PDA officers. Door prizes add even more fun to this lively event. Postdocs should reserve a ticket for $10 when registering for the Annual Meeting.

Tuesday, March 12, 12:15 PM to 2:00 PM, Hilton Baltimore Key 12

**American Association of Chinese in Toxicology Special Interest Group Career Development Workshop**
The aryl hydrocarbon receptor (AhR) was initially identified as the intracellular protein that binds and mediates the toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and structurally related compounds. Subsequent studies with AhR knockout animal models have demonstrated that this receptor plays an important role in maintaining cellular homeostasis in multiple tissues and in pathophysiology. The AhR binds TCDD but also structurally diverse ligands, which include pharmaceuticals, health-promoting phytochemicals, and microbial metabolites. These compounds are selective AhR modulators (SAhRMs) and exhibit tissue/cell-specific AhR agonist and antagonist activities and can be used as drugs to target the AhR and its functions in multiple diseases, including cancer. The functions of the AhR and its ligands in both cellular homeostasis and disease are not unique and are also observed for many members of the nuclear receptor superfamily, which include steroid hormone receptors and adopted orphan and orphan receptors. In our studies on SAhRMs derived from 1,1-bis (3'-indolyl) methane (DIM), a series of synthetic analogs typified by 1,1-bis (3'-indolyl) -1- (p-hydroxyphenyl) methane (DIM-C-pPhOH) were characterized as AhR-inactive; they target the orphan nuclear receptor 4A1 (NR4A1, Nur77, TR3), and other analogs interact with NR4A2 (Nurr1). Like the AhR, endogenous ligands for NR4A1 and NR4A2 have not been identified, and ongoing studies show that both NR4A receptors are important in maintaining cellular homeostasis and in pathophysiology. Selective NR4A1 modulators such as DIM-C-pPhOH and related compounds are being investigated as potential drugs for treating metabolic diseases, arthritis, immune dysfunction, neurological and cardiovascular problems, and cancer. DIM-C-pPhOH and a series of more potent second-generation analogs exhibit cell/tissue-specific NR4A1 antagonist and agonist activities, and this presentation will highlight some of the potential clinical applications of bis-indole-derived NR4A1 ligands and focus primarily on their inhibition of NR4A1-dependent pro-oncogenic pathways and genes in solid tumors.
Tuesday, March 12, 1:00 PM to 2:30 PM, CC Room 310

Toxicological Sciences Featured Session: From the Pages of ToxSci: Mouse vs. Machine ... Are Animal Studies Being Supplanted by Computers?

Chairperson(s): Gary W. Miller, Columbia University, New York, NY; ToxSci Editor-in-Chief.

Panelists: Gary W. Miller, Columbia University, New York, NY; Alison Harrill, NIEHS/NTP, Research Triangle Park, NC; Thomas Hartung, Johns Hopkins University Center for Alternatives to Animal Testing (CAAT), Baltimore, MD; Nicole C. Kleinstreuer, NIEHS, Research Triangle Park, NC; and Ivan Rusyn, Texas A&M University, College Station, TX.

Computational approaches for predicting toxicological outcomes have dramatically improved over the past few years. Many of these advances have been reported in Toxicological Sciences. This session will feature a panel of experts to discuss, debate, and examine the current state of the art in computational toxicology. The panel will explore the possibility of a future without animal testing in toxicology. Each panelist will be given five minutes to provide context for the discussion. Attendees will be encouraged to contribute to the discussion via a moderated Q&A.
Nonalcoholic fatty liver disease (NAFLD) is a progressive disease recognized as the underlying liver pathology associated with obesity and metabolic syndrome. Poor diet and lifestyle are implicated as pathogenic factors in the development and progression of NAFLD, with emerging evidence implicating exposures to environmental contaminants in the initiation, perturbation, and/or acceleration of NAFLD progression. Accumulating molecular toxicology data suggest that environmental contaminants target mechanisms associated with NAFLD progression to induce and/or enhance steatosis, inflammation, and fibrosis, and increase risk for more complex metabolic diseases, including metabolic syndrome, diabetes, cardiovascular disease, and hepatocellular carcinoma. Moreover, NAFLD is emerging as the second leading cause of liver transplantation. The complexities related to NAFLD progression, the stage of disease when environmental exposures occur, and the specific pathways affected have confounded the delineation of risk and limited the development of effective treatment options. The goals of this session are to (1) explicate recent advances in the elucidation of NAFLD progression mechanisms, and (2) build a consensus regarding future research into the role of environmental contaminants in NAFLD development and progression. To achieve these goals, experts in this field will present recent data and address future challenges. Questions that will be addressed include: How do hepatotoxic compounds that drive NAFLD progression affect pathophysiological factors associated with each stage of NAFLD? Can NAFLD and toxicant-associated fatty liver disease (TAFLD) be distinguished when exposure is variable across a lifetime and/or in the presence of obesity and metabolic syndrome? What are the potential biomarkers that will help with delineation of TAFLD from NAFLD? How do external factors such as diet influence exposure to and the toxicity of compounds that drive NAFLD progression? Are there additional adverse outcome pathways that can be developed for each stage of NAFLD? This session will include novel data for the roles of per- and polyfluoroalkyl substances, the mechanistic role of aryl hydrocarbon receptor, and the importance of hepatocyte defenses in NAFLD development and progression. In addition, this session will include novel biomarker data designed to circumvent the limitations of standard liver toxicity biomarkers and invasive diagnostic techniques. Session attendees will gain a greater appreciation of the role of environmental factors in NAFLD progression and a more comprehensive understanding of key factors involved in the progression of NAFLD. Taken together, information from this session has implications for risk assessment in affected populations and for defining mechanisms and potential biomarkers of liver damage.

Abstract #

#2498 1:00  Explicating the Pathogenic Environmental Factors in Nonalcoholic Fatty Liver Disease. J. Clarke. Washington State University, Spokane, WA.

#2499 1:00  Differing Effects of Perfluorooctanesulfonic Acid-Induced Hepatic Steatosis: Influence of Diet Type and Timing for Hepatic Steatosis Outcomes. A. Slitt. University of Rhode Island, Kingston, RI.

#2500 1:30  The Progression of Steatosis to Steatohepatitis with Fibrosis following Aryl Hydrocarbon Receptor (AhR) Activation. T. Zacharewski. Michigan State University, East Lansing, MI.

#2501 2:00  Toxicant-Associated Steatohepatitis: Clinical and Translational Studies. M. Cave. University of Louisville, Louisville, KY.

Tuesday, March 12, 1:00 PM to 2:30 PM, CC Room 316

Symposium Session: Integrated 'Omics Approaches to Toxicity Assessments

Chairperson(s): Julia Elizabeth. Rager, University of North Carolina at Chapel Hill, Chapel Hill, NC; and Scott S. Auerbach, NIEHS/NTP, Research Triangle Park, NC.

Primary Endorser: Biological Modeling Specialty Section

Other Endorser(s): Molecular and Systems Biology Specialty Section; Risk Assessment Specialty Section

Recent advances surrounding assay and sequencing-based technologies have increased the feasibility of multi-'omic research, wherein two or more 'omic profiles (e.g., genomics, transcriptomics, epigenomics, metabolomics, and proteomics) are integrated and evaluated to further understand molecular mediators of biological function and cellular health. Multi-'omic analysis strategies rely upon the joint analysis of multiple data types, yielding toxicity responses that may not have been identified given the analysis of only one 'omic endpoint. Integrated analyses provide insights into how the features of the 'omes interact through biological networks, resulting in an integrated systems level understanding of toxicity. The utilization of multi-'omic strategies presents the opportunity to elucidate hierarchical processes in complex systems that can further substantiate mechanisms of action linking chemical exposures to disease, which ultimately aids in the accurate assessment of chemical risk and overall protection of public health. Integrated 'omics strategies are also employed to understand mechanisms of action linking pharmaceuticals to health outcomes. However, methods and associated databases that can be leveraged to integrate multi-'omic response signatures that result in findings useful for drug development and chemical assessments are still under development, with current limitations that require further research. This session will address this growing research area by discussing multi-'omic data integration tools, data reduction methods, dose-response modeling, toxicity predictions based
on machine learning algorithms, and systems level analyses to elucidate molecular pathways involved in disease etiology. Case studies also will be discussed to provide examples of how multi-omic response signatures can inform toxicity assessments relevant to environmental regulation and the chemical/pharmaceutical industries.

Abstract #

#2502 1:00 Integrated 'Omics Approaches to Toxicity Assessments. J. Rager. University of North Carolina at Chapel Hill, Chapel Hill, TX.
1:00 Introduction. J. E. Rager. University of North Carolina at Chapel Hill, Chapel Hill, NC.

#2503 1:03 Computational Tools for Multi-'Omics Integration. K. Uppal. Emory University, Atlanta, GA. Sponsor: J. Rager

#2504 1:32 An Integrated 'Omics Dose-Response Assessment from Short-Term In Vivo Studies of the Two Aromatics Phosphate Flame Retardants. S. S. Auerbach. NIEHS/NTP, Research Triangle Park, NC.

#2505 2:01 On-the-Fly Machine Learning to Predict Adverse Drug Reactions by 'Omics Integration of Drug Properties. A. Ma'ayan. Icahn School of Medicine at Mount Sinai, New York, NY. Sponsor: J. Rager

Tuesday, March 12, 1:00 PM to 2:30 PM, CC Room 308

Symposium Session: Scientific and Regulatory Update in the Application of the 3Rs Principle in Chemical and Drug Development

Chairperson(s): A. Hayes, University of South Florida, Tampa, FL; and Brinda Mahadevan, Abbott Laboratories, Mumbai, India.

Primary Endorser: Ethical, Legal, Forensics, and Societal Issues Specialty Section

Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Regulatory and Safety Evaluation Specialty Section

The 3Rs principle (3Rs), developed as a framework for humane research, has become embedded in animal use legislation. There remains ample opportunity to improve efficient usage of animals and to facilitate the 3Rs, with the availability of new in vitro/in silico technologies. Most toxicity studies are conducted to determine safe doses and a reasonable margin of safety. This facet is considered during pharmaceutical development. In case of nonproprietary pharmaceuticals wherein the toxicity of the active is known and the excipients are not novel or adhere to regulatory guidelines, the need to conduct in vivo studies is minimal. However, country regulatory requirements vary and repeat of studies may be necessary. At the global level, although there are ongoing discussions on the 3Rs, follow-up and implementation have not been rapid and many countries have a lot of catching up to do, especially in revamping their country regulation. This symposium session will address the following objectives: (1) to understand the need to conduct animal studies to address safety/efficacy and meet regulatory requirements for nonpropriety pharmaceuticals; (2) to adopt in vitro, in chemico, and in silico approaches for skin sensitization; and (3) to comprehend human-relevant, nonanimal methodologies to predict toxicity and provide a scientific underpinning for the use of read-across techniques.

Abstract #

#2506 1:00 Scientific and Regulatory Update in the Application of the 3Rs Principle in Chemical and Drug Development. A. Hayes. University of South Florida, Tampa, FL.

#2507 1:00 3Rs in the Development of Nonproprietary Pharmaceuticals. B. Mahadevan. Abbott Laboratories, Mumbai, India.


#2509 2:00 Novel Strategies for the Implementation of 3Rs: Case Studies on What Has Worked Best in Europe. M. Leist. University of Konstanz, Konstanz, Germany.

Tuesday, March 12, 1:00 PM to 2:30 PM, CC Room 321

Workshop Session: Adverse or Not Adverse? Thinking Process behind Adversity Determination during Nonclinical Drug Development

Chairperson(s): Vijaykumar P. Kale, Battelle Memorial Institute, Columbus, OH; and Lawrence Thomas, Celldex Therapeutics Inc., Needham, MA.

Primary Endorser: Drug Discovery Toxicology Specialty Section

Other Endorser(s): Association of Scientists of Indian Origin Special Interest Group; Biotechnology Specialty Section

The determination of adversity, and a No-Observed-Adverse-Effect-Level (NOAEL), is often a fundamental component of the analysis of toxicological data. A NOAEL is often the basis for the determination of the First-In-Human (FIH) dose, although alternative methodologies like Highest Non-Severely Toxic Dose (HNSTD) and Minimum Anticipated Biological Effect Level (MABEL) have emerged to address specific situations. While the definition of adversity has often been a judgment call based on experience, a number of organizations have undertaken efforts to streamline and standardize the definitions and guidance on how to determine adversity. Study directors, pathologists, safety pharmacologists, preclinical drug development leads, and regulatory reviewers are among the key players involved in safety assessment who may have different perspectives and sometimes disagreements about determining adversity. The purpose of the session is to discuss the current thinking process behind the determination of adversity in nonclinical toxicity studies from multiple points of view. Moreover, all the speakers also
will discuss their perspectives about dealing with unique situations in a toxicology study such as nonlinear vs. linear kinetics, sex differences in toxicokinetics and observed toxicity, (mis)use of historical control data, No-to-Partial Recovery of toxic effects, and on-target vs. off-target effects. Presenters will discuss these scenarios with the help of case studies wherever possible.

Abstract #

#2510 1:00 Adverse or Not Adverse? Thinking Process behind Adversity Determination during Nonclinical Drug Development. V. Kale. Battelle Memorial Institute, Columbus, OH.


#2512 1:30 A Pathologist’s Perspective on Determining Adversities in Nonclinical Toxicology Studies of Therapeutics. B. Singh. Janssen Research & Development, Spring House, PA.

#2513 1:55 A Regulatory Perspective of Determining Adversity and Translating Findings from Nonclinical Studies. J. Bebenek. US FDA, Silver Spring, MD.

2:20 Panel Discussion/Q&A.

Tuesday, March 12, 1:00 PM to 2:30 PM, CC Ballroom I

Workshop Session: Assessing the Bisphenol Class of Chemicals

Chairperson(s): John Szilagyi, Rutgers, The State University of New Jersey, Piscataway, NJ; and Vicki Sutherland, NIEHS/NTP, Research Triangle Park, NC.

Primary Endorser: Reproductive and Developmental Toxicology Specialty Section

Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Regulatory and Safety Evaluation Specialty Section

The bisphenol class of chemicals includes over 20 analogues that have different structural, chemical, and biological activities. The primary analogue of interest in this class is Bisphenol A (BPA), a chemical widely utilized in plastics, epoxy resins, and other products. Most of the other analogues are not routinely used or used at high production levels, but exposure to some has led to evaluations to determine if there is any toxicological evidence for concern. The complications associated with toxicological evaluation of BPA may be attributed to the ubiquitous nature of this chemical. Carefully assessing the effects of this compound in animal studies is extremely difficult due to the requirement to control and monitor BPA from all external sources. It has therefore become essential to characterize dosing solutions, housing materials, and internal dose measurements to ensure that the animals are exposed to the levels of the chemical that the protocol dictates. While the analogues may not generate such a high level of attention, the primary question regarding their potential risks to humans is exposure levels. BPA is currently found at levels far exceeding any other analogue and its unique nature ensures that it is not easily replaced in a majority of products; however, there is evidence that the analogues are in use and information on their potential effects and endocrine activity will be essential if their use increases. An additional concern associated with assessing classes of compounds is determining effective methods to quickly and efficiently evaluate multiple analogues. High-throughput screening data and in vitro assays are not reliably “predicting” in vivo outcomes. This may be due to the use of assays not applicable for this class, focusing assessments to just the estrogen and androgen receptors, limitations with in vitro metabolism, or not recognizing that there needs to be a compromise when evaluating chemicals that are potential endocrine activators. Therefore, how to best generate reproducible and reliable data and understand the biology and/or chemistry of conflicts as they arise, as well as collecting routine internal measurements of the compound(s), may need to be a primary focus for those assessing chemicals in this group. The session will begin with an overview of the bisphenol class of chemicals and highlight its uses and products and then discuss testing of select analogues before discussing limitations of the in vitro assessments for this class of chemicals. In summary, the session will provide an overview of the bisphenol class of chemicals and the data that we have to date on the analogues, and discuss best methods for evaluating these compounds and the next steps in the assessment process.

Disclaimer: This overview does not necessarily reflect any Agency opinions.
Workshop Session: In Vitro Static and Dynamic Skin Metabolism Methods and Strategies to Address the Safety Assessment of Topically Applied Chemicals

Chairperson(s): Andreas Schepky, Beiersdorf AG, Hamburg, Germany; and Sandra Coecke, EURL ECVAM, Ispra, Italy.

Primary Endorser: Dermal Toxicology Specialty Section

Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Molecular and Systems Biology Specialty Section

Understanding a chemical’s bioavailability, either locally or systemically, is important for predicting adverse effects and conducting a safety assessment. Metabolism was originally thought to be an inactivation or detoxification pathway for xenobiotics; however, today it is generally accepted that metabolism-mediated toxicity is important in regulatory toxicity. Therefore, all in vitro toxicity methods proposed for regulatory risk assessment should include careful consideration of metabolism-mediated toxicity. In addition to a detailed knowledge on metabolism, the biokinetics of the test chemicals in the in vitro method setup will be vital for designing the most valuable and predictive integrated test strategies. The main exposure route of cosmetic ingredients is via the skin. However, once the parent compound or metabolites formed in the skin enter the systemic circulation, they can be further metabolized systemically (e.g., by the liver). In vivo skin models can help to predict the amount of parent and metabolite(s) formed locally in the skin and escaping first pass skin metabolism. The session will present examples of metabolism of relevant chemicals in ex vivo human skin explants compared to S9 fractions from EpiSkin. Incubations with human liver S9 were also included to allow a comparison of dermal and hepatic metabolism. An additional consideration is how the frequency and route of application of a chemical and its interaction with different organs can affect the kinetics and ratio of different metabolites formed systemically. For example, first pass skin effects have been reported for aromatic hair dyes as well as for several topically applied glucocorticoids. The route of exposure (topical vs. systemic application) may differentially determine a chemical’s effect on the liver. Qualitative as well as quantitative differences may be important aspects for risk assessment in cosmetic risk assessment. The session will present how a 3D skin-liver dynamic model can help us understand the interaction between skin and liver metabolism over extended and repeated exposure of a test chemical via different routes (topical vs. systemic) and how it affects systemic concentrations of both parent chemical and its metabolites. The threshold of toxicological concern (TTC) is a safety assessment tool that involves establishing a low-level exposure value, from known chemicals with curated toxicity data, below which there is a low probability of adverse effects for chemicals lacking sufficient safety data. The TTC concept has evolved over the last 50 years and a logical next step in the continued evolution of TTC is to develop this concept further by converting the external NOAEL values to internal concentrations. This is especially relevant for chemicals with a low absorption, either via the oral or dermal routes, and thus relevant to the cosmetics, pharmaceutical, and chemistry industries. The development of iTTC thresholds would provide conservative hazard-based values that could be utilized in exposure-based safety assessments in the context of (1) refinement of de minimis exposure levels for dermal exposures, (2) metabolism-based structure-activity relationship (SAR) assessments, (3) low-level aggregate exposures from different dose routes, or (4) in vitro biological assays. The session will provide an update on the development of iTTCs and present case study examples for possible uses. In the absence of the use of animal studies in the cosmetics industry for safety assessment, in vitro alternatives and strategies to waive additional tests (e.g., the iTTC) are essential.

Abstract #

#2518 1:00  In Vitro Static and Dynamic Skin Metabolism Methods and Strategies to Address the Safety Assessment of Topically Applied Chemicals. A. Schepky. Beiersdorf AG, Hamburg, Germany.

1:00 Introduction. A. G. Schepky. Beiersdorf AG, Hamburg, Germany.

#2519 1:05  Studying In Vitro Metabolism of Cosmetics Ingredients in Skin Explants or by Using Liver- or Skin-Derived S9 Sub-Cellular Fractions. C. Jacques Jamin. Pierre Fabre Dermo-Cosmétique, Toulouse, France. Sponsor: A. Schepky

#2520 1:30  Understanding Chemical Metabolism in Skin and Liver Models over Extended and Repeated Exposure in a Multi-Organ Chip Device. J. Kuehn. Beiersdorf AG, Hamburg, Germany. Sponsor: A. Schepky

#2521 1:55  Internal Thresholds of Toxicological Concern as Tools for Assessment of Exposures via Oral and Dermal Routes.  C. Ellison. Procter & Gamble Company, Cincinnati, OH. Sponsor: A. Schepky

2:20 Panel Discussion/Q&A.

Workshop Session: Innovation in Biomarker Qualification

Chairperson(s): Shashi Ramaiah, Pfizer, Inc., Cambridge, MA; and John-Michael Sauer, Critical Path Institute, Tucson, AZ.

Primary Endorser: Clinical and Translational Toxicology Specialty Section

Biomarkers have become highly utilized tools in the drug development process. However, the unknown regulatory acceptance of biomarker data has made the routine incorporation of these tools and interpretation of their data unclear for some companies. Qualification of biomarkers removes this uncertainty for drug developers. This session will provide attendees with an overview of the US FDA Center for Drug Evaluation and Research (CDER) Biomarker Qualification Program (BQP) under the 21st-Century Cures Act. US FDA BQP works with external stakeholders to develop biomarkers as drug development tools (DDT) to provide regulatory certainty regarding the acceptance of these tools. Presenters will discuss how the Critical Path Institute (C-Path), through their Predictive Safety Testing...
Consortium (PSTC), is working to advance qualification of novel safety biomarkers. Further, the newly formed TransBioLine (Translational Biomarker Pipeline) consortium of EFPIA pharmaceutical companies and leading European academic institutions and bioanalytical companies, which has been established to build on previous consortia work to advance regulatory qualification of new and emerging safety biomarkers, will be presented.

Abstract #

#2522 1:00  **Innovation in Biomarker Qualification.**  S. Ramaiah. Pfizer, Inc., Cambridge, MA.
1:00  **Introduction.**  S. Ramaiah. Pfizer, Inc., Cambridge, MA.

#2523 1:10  **21st-Century Cures Biomarker Qualification Program.**  C. Leptak. US FDA, White Oak, MD. Sponsor: J. Sauer


1:55  **Panel Discussion/Q&A.**

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**Tuesday, March 12, 1:30 PM to 2:30 PM, CC Room 339**

**E**  **Exhibitor-Hosted Session: A Scalable, 3D In Vitro Drug Discovery Platform for NASH and Fibrosis**

*Presented by: InSphero Inc.*

Characterization and applications of 3D microtissue models for screening and efficacy testing of anti-NASH and antifibrotic drugs will be discussed. These advanced human disease models contain the relevant primary liver cell types involved in disease initiation and progression and incorporate key pathophysiological aspects, such as inflammation and scarring.

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**Tuesday, March 12, 1:30 PM to 2:30 PM, CC Room 338**

**E**  **Exhibitor-Hosted Session: Case Studies: Using Primary Cells and Media to Create Physiologically Relevant Models**

*Presented by: Lonza*

Understanding ADMET of new drugs is a key element of drug discovery. *In vitro* systems such as culturing primary human cells to mimic human *in vivo* environment are becoming increasingly important for decision-making in the drug development pipeline. Lonza offers a large selection of primary human cells and advanced cell culture systems suitable for ADMET research. Toxicity-related applications as supported by various customer studies will be discussed.

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**Tuesday, March 12, 1:30 PM to 2:30 PM, CC Room 337**

**E**  **Exhibitor-Hosted Session: Identify Functional and Structural Cardiotoxicants with the Biomarker-Based Cardio quickPredict Assay**

*Presented by: Stemina Biomarker Discovery, Inc.*

Preclinical cardiac safety evaluations are heavily focused on electrophysiological assessment and often fail to identify structural cardiotoxicants. Stemina’s Cardio quickPredict assay accurately identifies compounds that elicit both structural and/or functional cardiotoxic effects. We will discuss how the assay can be used for early cardiac safety assessment.

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**Tuesday, March 12, 1:30 PM to 2:30 PM, CC Room 340**

**E**  **Exhibitor-Hosted Session: Reviewing Statistical and Expert Rule Alerts in ICH M7 Assessments**

*Presented by: MultiCASE, Inc.*

The presentation demonstrates handling common statistical and expert rule alerts identified in drug impurities during QSAR analysis following ICH M7 guideline. Emphasizing the differences and similarities of statistical and expert rule based alerts and what is the impact on the review process. Case studies and common principles highlighted.
Program Schedule—Tuesday

Tuesday, March 12, 1:30 PM to 2:50 PM, CC Room 325
(Ticket Required)

Career Exploration through Speed Informational Interviews

Hosted by: Postdoctoral Assembly (PDA)

Do you find yourself wondering what your career options are in toxicology? Then this is the event for you! This career development special event is designed for graduate students and postdocs who want to gain insight into the different career sectors in toxicology. Groups of trainees will rotate through a series of approximately eight-minute discussions with career representatives from academia, government, and industry. Trainees can ask the career representatives questions about their background, their career path, the hiring process in their company/sector, and other aspects of identifying and pursuing career interests. This session will provide an informal opportunity to gain insight into different employment sectors in toxicology through candid discussions in a casual setting. Graduate students and postdocs are encouraged to register early, as registration will be limited to maximize the opportunity for small-group discussion with career representatives.

Tuesday, March 12, 2:30 PM to 3:00 PM, CC Exhibit Hall

Networking Time

Tuesday, March 12, 2:30 PM to 3:30 PM, CC Room 343

Women in Toxicology Special Interest Group: Improving Your Negotiation Skills to Close the Salary Gap

Tuesday, March 12, 3:00 PM to 4:30 PM, CC Ballroom II

Symposium Session: Microbiota and Contributions to Neurodevelopment: Implications in Neurological Function, Behavior, and Toxicity

Chairperson(s): Troy Hubbard, NIEHS/NTP, Research Triangle Park, NC; and Charlene McQueen, University of Arizona, Tucson, AZ.

Primary Endorser: Neurotoxicology Specialty Section

Other Endorser(s): Molecular and Systems Biology Specialty Section; Reproductive and Developmental Toxicology Specialty Section

The host and its associated microbiome evolved as a cooperative unit that influences multi-factorial host physiological and pathological outcomes. Disruption of host-microbial mutualism is associated with numerous effects upon metabolism, immune function, and organogenesis. For example, sensitive periods of brain development and formation of neural circuitry are influenced by both intrinsic and extrinsic signals, including maturation of the gastrointestinal microbiome. While a connection between gut microbiota and the brain may seem unlikely, emerging data support the concept of the microbiota-gut-brain axis. Alterations in gut microbiota are associated with decreased social behavior, increased stress response, hyperactivity, reduced anxiety, and deficits in learning and memory. These findings implicate the microbiome as an omnipresent environmental factor that influences brain development, directly impacting functions of memory, behavior, personality, and higher cognition. The session contains presentations by both academic and government scientists to introduce concepts on the role of physiologic perturbations or toxic insults to the gut microbiome and its implications in neurodevelopment using both human and animal models. The first speaker illustrates how human microbial colonization at birth and life-stage transitions of the microbiome have implications in later cognitive function. A proposed mechanism for communication between gut microbes and the developing brain is presented next. Using conventional and germ-free mice, microbial signaling molecules capable of influencing host brain development and behavior have been identified. The final presentation utilizes a zebrafish model to investigate host-associated microbiota capacity to modify developmental neurotoxicity of environmental chemicals. Overall, these presentations will provide a better understanding of the function of the microbiota-gut-brain axis in neurodevelopment and the potential consequences of chemical exposures.

Abstract #

#2526 3:00  Microbiota and Contributions to Neurodevelopment: Implications in Neurological Function, Behavior, and Toxicity. T. Hubbard. NIEHS, Research Triangle Park, NC.

#2527 3:03  Introduction. T. Hubbard. NIEHS/NTP, Research Triangle Park, NC.


#2529 4:01  Examining Microbiota as a Modifying Factor for Developmental Neurotoxicity. T. Tal. US EPA/NHEERL, Research Triangle Park, NC.
**Symposium Session: Perfluoroalkyl Substances (PFAS): Global and Persistent Environmental Contaminants**

**Chairperson(s):** Melanie Abongwa, Iowa State University, Ames, IA; and Lauren Walker, University of California Riverside, Riverside, CA.

**Primary Endorser: Postdoctoral Assembly**

**Other Endorser(s):** Graduate Student Leadership Committee; Mechanisms Specialty Section

Perfluoroalkyl substances (PFAS) are a diverse group of chemicals that have been used in the production of industrial and consumer products worldwide since the 1950s. Structurally, PFAS have a characteristic hydrophobic alkylated chain that is saturated with fluorine atoms attached to a hydrophilic head. Their hydrophobic and hydrophilic properties make PFAS suitable for manufacturing of a variety of products, including nonstick cookware, liquid repellants, fire-fighting foams, protective coatings, additives, textiles, and leather and carpet goods. The two most extensively studied PFAS are perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Although no longer manufactured in the United States, PFOA and PFOS are still used in the manufacturing of consumer products in other countries that can be imported into the country. Consequently, most people have been exposed to PFOA and PFOS unknowingly, as they tend to end up in the environment (air, water, soil, etc.). In addition, PFOA and PFOS are known to be persistent, bioaccumulative, and toxic (PBT) in animals and humans. Studies have shown that they can cause immunological, reproductive, and developmental toxicity in experimental animals, as well as liver and kidney damage. Exposure to both chemicals has also been linked to the formation of cancerous tumors in animals. There is evidence that humans exposed to PFOA and PFOS can develop increased cholesterol levels, thyroid hormone disruption, and cancer. The goal of this session is to bring together graduate students and postdoctoral scientists from different sectors to address the emerging scientific, environmental health, and regulatory issues raised by PFOA and PFOS. The first speaker will present on the use of various approaches to vascular injury safety biomarkers, use of surrogate patient populations, animal models, and novel bioimaging endpoints. The second speaker will discuss the potential mechanisms by which PFOA and PFOS cause fetal growth restriction in mice. Finally, the last speaker will talk about the modulatory effects of PFOA and PFOS on GABAA receptor function and neuronal network activity in primary rat cortical neurons.

**Abstract #**

| #2534 | 3:00 | Perfluoroalkyl Substances (PFAS): Global and Persistent Environmental Contaminants. | M. Abongwa. Iowa State University, Ames, IA. |
| #2535 | 3:05 | Exposure to PFOS, PFHpS, PFHxS, or PFHxA Elicits Developmental Neurotoxicity in Larval Zebrafish. | S. Gaballah. US EPA/ORISE, Durham, NC. |
| #2536 | 3:35 | An In Vitro Screen of a Panel of Perfluoroalkyl Substances and an In Vivo Assessment of Effects on Placental and Fetal Growth. | B. Blake. University of North Carolina at Chapel Hill, Chapel Hill, NC. |
| #2537 | 4:05 | Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoate (PFOA) Differentially Modulate GABAA Receptor Function and Spontaneous Neuronal Network Activity. | A. M. Tukker. Utrecht University, Utrecht, Netherlands. |
Most development programs for pharmaceutical products employ a rodent and nonrodent species for assessment of potential hazards. In a risk assessment, findings from the most relevant species are typically used to determine safe exposure levels. Many scientists typically conclude that the most sensitive species is the most relevant species. However, there are instances in which the most relevant species may be selected based on anatomy, physiology, target site for efficacy, pharmacokinetic profile, or other relevant factors. Identifying the most relevant species is a critical step in hazard/risk assessment given the need to determine that the hazards identified are clinically relevant and representative of effects likely to occur in humans, based on qualitative and quantitative aspects of the hazard(s) identified. This session provides attendees with an overview of factors used to determine the most relevant species for product evaluation, an examination of case studies used to illustrate the challenges encountered when determining the most relevant species, and a discussion of practical approaches employed to evaluate the clinical relevance and utility of hazards identified. The first talk will introduce the attendees to multiple factors that may impact species relevance when conducting a hazard assessment. The second talk will discuss risk assessment of small molecules and approaches used to determine the most relevant species in pharmacology and general toxicology studies. The third talk will discuss approaches used to determine the most relevant rodent species for carcinogenicity assessment of small molecules. The fourth presentation will discuss hazard assessment of biologic products and approaches used to determine the most relevant species for reproductive toxicology studies and carcinogenicity assessment. Together, the information presented in these talks will highlight the importance of and provide a framework for selecting the most relevant species when conducting a safety assessment.

Abstract #

#2538  3:00  Species Relevance: Approaches to Determine the Most Relevant Species for Safety Assessment of Pharmaceutical Products.  M. Delatte. US FDA, Silver Spring, MD.

#2539  3:00  Comparative Anatomy and Physiology in Animal Species Commonly Used for Drug Safety Testing.  J. Turk. Amgen, St. Louis, MO.  Sponsor: M. Delatte


#2541  3:42  Species Considerations for Nonclinical Carcinogenicity Evaluations.  O. McMaster. US FDA, Silver Spring, MD.

#2542  4:03  Biologic Product Species Selection: When Data Conflict.  J. Dubinion. US FDA, Silver Spring, MD.  Sponsor: M. Delatte

#2543  4:24  Panel Discussion/Q&A.

Tuesday, March 12, 3:00 PM to 4:30 PM, CC Room 308

Symposium Session: Species Relevance: Approaches to Determine the Most Relevant Species for Safety Assessment of Pharmaceutical Products

Chairperson(s): Marcus Sherode. Delatte, US FDA/CDER, Silver Spring, MD; and Simon Authier, Citoxlab North America, Laval, QC, Canada.

Primary Endorser: Comparative and Veterinary Specialty Section

Significant advances have been made in recent years in the development of humanized mice for use in preclinical pharmacology and toxicology studies to support the development of pharmaceutical biotherapeutics. Multiple models currently exist, and the selection of the appropriate model is critical to provide meaningful and clinically translatable data. This session will provide an overview of current models, including details regarding the engraftment of specific immune cell subsets, and their potential application. The limitations of each of these models also will be discussed. Examples of current applications will be discussed, including considerations for nonclinical carcinogenicity evaluations.

Abstract #

#2543  3:00  The Current Application, Limitations, and Recent Advances in Humanized Mouse Models for Evaluations of Immune Function and Preclinical Immunotoxicology Studies.  M. Collinge. Pfizer, Inc., Groton, CT.

#2544  3:00  NSG Mice Deficient in Murine MHC Class I and Class II Expression Support Engraftment of Functional Human T Cells in the Absence of Acute Xenogeneic GVHD Following Injection of PBMC.  M. Brehm. University of Massachusetts Medical School, Worcester, MA.  Sponsor: M. Collinge


#2546  4:00  Recent Advances in the Utilization of Humanized Mouse Models for Toxicology Assessment of Novel Therapeutics.  J. Keck. The Jackson Laboratory, Sacramento, CA.  Sponsor: M. Collinge

Tuesday, March 12, 3:00 PM to 4:30 PM, CC Ballroom III

Symposium Session: The Current Application, Limitations, and Recent Advances in Humanized Mouse Models for Evaluations of Immune Function and Preclinical Immunotoxicology Studies

Chairperson(s): Mark Collinge, Pfizer, Inc., Groton, CT; and Michael Brehm, University of Massachusetts Medical School, Worcester, MA.

Primary Endorser: Immunotoxicology Specialty Section

Program Schedule—Tuesday | 180
Symposium Session: When “Natural” Is Not Synonymous with “Safe”: Toxicity of Natural Products Alone and in Combination with Pharmaceutical Agents

Chairperson(s): Donna Mendrick, US FDA/NCTR, Silver Spring, MD; and Cathy Yeung, University of Washington, Seattle, WA.

Primary Endorser: Scientific Liaison Coalition

Other Endorser(s): Clinical and Translational Toxicology Specialty Section; Regulatory and Safety Evaluation Specialty Section

There is a transformation occurring in toxicology: a shift toward characterizing chemical safety based on an understanding of the biomolecular activity of the chemical coupled with a deeper understanding of how that activity can lead to adverse effects at the organ, individual, or population level. New approach methodologies (NAMs) can be used to identify a chemical’s mode of action (MoA), including the molecular initiating events (MIEs) and downstream key events possibly leading to adverse outcomes (AOs). Application of this NAM paradigm is furthest advanced for biology where the MIEs are better established, such as skin sensitization, genetic toxicity, and endocrine models. However, for systemic acute or repeat-dose toxicity, where several possible MIEs may be involved, the ability to identify specific MIEs and use in vitro data to predict complex toxicological outcomes is much less mature and urgently needed. This session provides three innovative approaches to predicting chemical safety by identification of MoA based on NAM data: one for acute mammalian systemic toxicity, and two different approaches for repeat-dose target organ toxicity. The presentations will provide a synopsis of the state-of-the-science regarding availability of databases for these endpoints, approaches to predicting chemical safety by identification of MoA based on NAM data: one for acute mammalian systemic toxicity, and two different approaches for repeat-dose target organ toxicity. The session will emphasize successes and limitations in current NAMs for these endpoints and highlight the priority needs for future dedicated research to improve modeling. Discussion will focus on what is needed to bring these approaches into broad regulatory use.

Abstract #

#2547 3:00  When “Natural” Is Not Synonymous with “Safe”: Toxicity of Natural Products Alone and in Combination with Pharmaceutical Agents. D. Mendrick. US FDA, Silver Spring, MD.

#2548 3:02  Causative Ingredients and Mechanisms Underlying Interactions between Prescription and Nonprescription Medications and Natural Products. M. F. Paine. Washington State University, Spokane, WA. Sponsor: D. Mendrick


Workshop Session: New Approaches Using Mode of Action to Predict Acute and Systemic Toxicity

Chairperson(s): Catherine Willett, Humane Society of the United States, Washington, DC; and Daniel Wilson, Dow Chemical Company, Midland, MI.

Primary Endorser: Scientific Program Committee

There is a transformation occurring in toxicology: a shift toward characterizing chemical safety based on an understanding of the biomolecular activity of the chemical coupled with a deeper understanding of how that activity can lead to adverse effects at the organ, individual, or population level. New approach methodologies (NAMs) can be used to identify a chemical’s mode of action (MoA), including the molecular initiating events (MIEs) and downstream key events possibly leading to adverse outcomes (AOs). Application of this NAM paradigm is furthest advanced for biology where the MIEs are better established, such as skin sensitization, genetic toxicity, and endocrine models. However, for systemic acute or repeat-dose toxicity, where several possible MIEs may be involved, the ability to identify specific MIEs and use in vitro data to predict complex toxicological outcomes is much less mature and urgently needed. This session provides three innovative approaches to predicting chemical safety by identification of MoA based on NAM data: one for acute mammalian systemic toxicity, and two different approaches for repeat-dose target organ toxicity. The presentations will provide a synopsis of the state-of-the-science regarding availability of databases for these endpoints, as well as application of integrating computational and in vitro models in a predictive fashion. The session will emphasize successes and limitations in current NAMs for these endpoints and highlight the priority needs for future dedicated research to improve modeling. Discussion will focus on what is needed to bring these approaches into broad regulatory use.

Abstract #

#2551 3:00  New Approaches Using Mode of Action to Predict Acute and Systemic Toxicity. C. Willett. Humane Society of the United States, Washington, DC.

3:00  Introduction. C. Willett. Humane Society of the United States, Washington, DC.

#2552 3:10  Mechanistic Approaches to Predict Acute Mammalian Systemic Toxicity. D. Wilson. Dow Chemical Company, Midland, MI.
Workshop Session: The Utility of Echocardiography in Cardiac Safety Assessment

Chairperson(s): Jacqueline Walisser, Covance Inc., Madison, WI; and Timothy Hacker, University of Wisconsin-Madison, Madison, WI.

Primary Endorser: Cardiovascular Toxicology Specialty Section

Other Endorser(s): Drug Discovery Toxicology Specialty Section; Regulatory and Safety Evaluation Specialty Section

Echocardiography provides a noninvasive means to assess cardiac structure and function and is widely used clinically to assess left ventricular function, hypertrophy, valvular disease, and myocardial infarction. Increasingly, echocardiography has become a sought-after tool in nonclinical research to make informed decisions on intended pharmacology and/or off-target actions of test articles under development. This session will aim to provide an overview of the utility of echocardiography in nonclinical research, including the latest novel technologies, species and study design considerations, and a regulatory viewpoint on the utility of nonclinical echocardiography data in the assessment of Investigational New Drug (IND) submissions and subsequent clinical trials. The session will start with an outline of the use of small (rodents) and large (dogs, monkeys) animal echocardiography, including a description of common endpoints assessed. In addition, the first presenter will address the utility of echocardiography in healthy animals and animal models of cardiac disease as part of nonclinical safety assessment. The second presentation will address data quality and effect size detection thresholds, and potential pitfalls to avoid. The third talk will discuss how nonclinical ultrasound data generated in animals are utilized and interpreted as part of an IND submission and how these data may impact early clinical trials. The target audience is toxicologists who may have limited exposure to the utility of echocardiography in nonclinical animal studies and are looking to expand their knowledge in the area. By the end of the session, attendees should better understand the technical considerations and strategies for employing echocardiography in nonclinical animal studies and how animal-based echocardiography data generated as part of a drug safety assessment program may impact IND submission and subsequent clinical trials. Based on the fact that cardiovascular liabilities continue to be a leading cause of drug attrition in late-stage clinical trials and post-market approval, it is expected that additional measures to assess cardiac function will be of great interest to the toxicology and drug development communities.

Abstract #

#2555 3:00 The Utility of Echocardiography in Cardiac Safety Assessment. J. Walisser. Covance Inc., Madison, WI.

#2556 3:05 Introduction. J. Walisser. Covance Inc., Madison, WI.


#2558 3:55 Insights into Echocardiography in Drug Development. B. Olivier. Michigan State University, Lansing, MI. Sponsor: J. Walisser


Panel Discussion/Q&A.
Tuesday, March 12, 3:00 PM to 4:00 PM, CC Room 340

**Exhibitor-Hosted Session: Pre-IND Research Opportunities to Accelerate Rare/Orphan Disease Trials**

*Presented by:* Charles River

Approval and clinical efficacy of AAV-based gene therapies, as well as the advent of CRISPR, promise many new therapies that might reverse monogenic disease, and possibly modify many other diseases including cancers, neurodegenerative, cardiovascular, and autoimmune disease. Many of these diseases are inherited or start in utero from naturally occurring mutations, so the key target population for therapy is young infants. How do we accelerate entry into these trials, before significant or irretrievable loss of abilities has occurred?

Tuesday, March 12, 3:00 PM to 4:00 PM, CC Room 338

**Exhibitor-Hosted Session: Predictive Toxicology Research at the KIT National Center for Efficacy Evaluation of Respiratory Disease Product (NCER)**

*Presented by:* Korea Institute of Toxicology (KIT)

Predictive toxicology research plays a leading role in the development of alternative toxicological technologies related to advanced predictive toxicity evaluation to develop state-of-the-art technology. NCER provides respiratory disease models and sub-femto levels of ultrasensitive protein quantitation technology for the study of inhalation toxicity and the efficacy of disease treatments.

Tuesday, March 12, 3:00 PM to 4:00 PM, CC Room 337

**Exhibitor-Hosted Session: Using the Göttingen Minipigs—Why, When, How?**

*Presented by:* Ellegaard Göttingen Minipigs A/S and Marshall BioResources

In this session the reasons for selecting Göttingen Minipigs for preclinical studies will be reviewed. The aim is to provide background knowledge for nonrodent species selection. Several illustrative examples of its use also will be given. The session celebrates the 50-year anniversary of Göttingen Minipigs.

Tuesday, March 12, 4:30 PM to 5:30 PM, CC Room 338

**Exhibitor-Hosted Session: Addressing Safety and Risk Assessment with ChemTunes-ToxGPS**

*Presented by:* Molecular Networks & Altamira

MN-AM (Molecular Networks & Altamira) presents the unique ChemTunes-ToxGPS platform, a highly curated toxicity and safety evaluation database, MoA-based prediction knowledgebase, and read-across workflow for the safety and risk assessment of chemicals.

Tuesday, March 12, 4:30 PM to 5:30 PM, CC Room 340

**Exhibitor-Hosted Session: Developmental NeuroToxicity Data Integration and Visualization Enabling Resource (DNT-DIVER)**

*Presented by:* National Toxicology Program (NTP)

The NTP and collaborators are developing rapid screening methods to identify potential environmental developmental neurotoxicants (DNTs) for prioritization and interim risk assessment. Learn about NTP’s newly launched interactive web-application, Developmental NeuroToxicity Data Integration and Visualization Enabling Resource (DNT-DIVER). This tool is designed to analyze, compare, and visualize multiple DNT screening assays.
Tuesday, March 12, 4:30 PM to 5:30 PM, CC Room 337

Exhibitor-Hosted Session: Innovation and Industry Trends in Target Safety Assessment

Presented by: Instem

Target Safety Assessment (TSA) is one of the earliest formal evaluations of drug safety performed by the pharmaceutical industry. This session describes how Instem’s KnowledgeScan TSA service harnesses innovations in technology, workflow, and data visualization to enable the expeditious production of comprehensive, consistent, and high-quality TSAs.

Tuesday, March 12, 4:30 PM to 5:30 PM, CC Room 339

Exhibitor-Hosted Session: Novel Approaches for Respiratory Measurement in Safety Pharmacology and Toxicology

Presented by: Data Sciences International

How do you measure respiratory endpoints? Join us as two researchers show how DSI solutions assist in achieving study goals for safety pharmacology and the development of medical countermeasures for chemical agent exposure. Don’t miss results of a beta study of DSI’s newest digital implant, the L11R!

Tuesday, March 12, 4:45 PM to 6:05 PM, CC Room 308

Education-Career Development Session: Tips for Improving Scientific Communication with a General Audience

Chairperson(s): Jonathan Shannahan, Purdue University, West Lafayette, IN; and Samantha J. Snow, US EPA, Durham, NC.

Primary Endorser: Postdoctoral Assembly

Other Endorser(s): Ethical, Legal, Forensics, and Societal Issues Specialty Section; Graduate Student Leadership Committee

For research to broadly and positively impact public health, it must be efficiently communicated to, and understood by, the general public. The majority of university-level scientific training focuses on performing cutting-edge research and sharing those findings with other scientists within one’s own field. In a time where information is readily accessible, ensuring effective and accurate scientific messaging through community outreach is necessary for maximizing societal impact and understanding. This is true during one-on-one conversations with nonscientists, and through interactions utilizing social and mass media. Deficiencies in the capacity to share science-related topics with nonscientists result in misinterpretation of conclusions and decreased community engagement in science. This session is designed to bring in scientific outreach experts to share tips and strategies for researchers to successfully communicate science with the general public. Speakers will focus on (1) individual interactions, (2) controlling your message, (3) the use of innovative social media platforms, and (4) effective utilization of mass media. These interactive presentations will include real-world examples of successful scientific communication as well as illustrations of common errors scientists are prone to committing. These discussions will be highly applicable to all attendees, including graduate students, postdoctoral trainees, and senior toxicologists. This session will allow both trainees and seasoned toxicologists to learn and implement this increasingly useful and necessary skill set.

Abstract #

#2559  4:45  Tips for Improving Scientific Communication with a General Audience. J. Shannahan. Purdue University, West Lafayette, IN.

4:45  Beer-Reviewed Science: How (and Why) to Talk About Your Science with People outside the Lab. K. May. North Carolina State University, Raleigh, NC. Sponsor: J. Shannahan

5:05  Science Is Not Finished Until It Is Communicated. J. Zelikoff. New York University School of Medicine, Tuxedo, NY.

5:25  Using Free Social Media Online Tools to Communicate Scientific Activities, Distribute Data, and Enhance Scientific Articles Post-Publication. A. Williams. US EPA/NCT, Durham, NC.


Tuesday, March 12, 4:45 PM to 6:15 PM, CC Room 310

SOT Annual Business Meeting

SOT members are invited and encouraged to attend the Annual Business Meeting. The agenda includes a financial summary, a review of the 2018–2019 accomplishments, and highlights of the new strategic plan.
Tuesday, March 12, 6:00 PM to 9:00 PM, Baltimore Marriott Inner Harbor University Ballroom 1
Hispanic Organization of Toxicologists Special Interest Group Reception

Tuesday, March 12, 6:00 PM to 9:00 PM, Pratt Street Ale House
Korean Toxicologists Association in America Special Interest Group Reception

Tuesday, March 12, 6:00 PM to 7:30 PM, Hilton Baltimore See room listing below.
Specialty Section Meetings/Receptions: Biological Modeling (Key 11); Carcinogenesis (Key 9); In Vitro and Alternative Methods (Holiday 4); Inhalation and Respiratory (Key 5); Mixtures (Key 7); Molecular and Systems Biology (Key 6); Ocular Toxicology (Key 8); Reproductive and Developmental Toxicology (Holiday 3)

Tuesday, March 12, 7:00 PM to 10:00 PM, Tir Na Nog Irish Bar and Grill
Northern California Regional Chapter Reception

Tuesday, March 12, 7:30 PM to 9:00 PM, Baltimore Marriott Inner Harbor East Ballroom
Tox ShowDown

Chairperson(s): Phil Wexler, Bethesda, MD.
This is the eighth year of the Tox ShowDown, the toxicological quiz game par excellence. Three teams of three contestants each—the Endocrine Disruptors, the Free Radicals, and the Toxic Metabolites—battle each other to answer questions wholly, partially, or remotely related to toxicology. Topics run the gamut, including the role of toxicology in history, current events, arts, culture, and society, not to mention science. The event features a cash bar and is a great opportunity to see how many questions you can answer correctly while enjoying a good laugh.

Join IUTOX and SOT for the
15th International Congress of Toxicology.
“Toxicology Solutions for Global Public, Environmental, and Personal Health”

Upcoming Deadlines
Late-Breaking Abstract Submissions: March 21
Early-Bird Registration: April 15
Acute systemic toxicity testing is required by regulatory agencies worldwide, provides the basis for hazard labeling and risk management of industrial chemicals, agrochemical formulations, and pharmaceuticals, and represents the highest cumulative animal use across chemical sectors. The development of test methods that reduce or replace animal use for acute systemic toxicity tests is one of the highest priority activities of the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM), which is composed of representatives from 16 US federal regulatory and research agencies that use or generate toxicological testing information. Despite the multitude of in vitro and in silico methods, a lack of regulatory acceptance of defined approaches prevents the widespread adoption of these approaches by industry. This session will demonstrate how engaging regulators and stakeholders up-front facilitates effective integration of alternatives, ensuring a path to success in reducing the use of animals in acute testing. Efforts in the United States to identify, develop, validate, and implement alternatives to the traditional acute systemic toxicity tests associated with oral and inhalation exposures will be highlighted. Overall this session will review the current status of developing alternative methods to meet agency needs, challenges in integrating new methods, and approaches to facilitate the adoption of these alternative methods in the near term and achieve the goal of significantly reducing animal use in acute toxicity testing by 2020.

Abstract #
#2560 8:00 Establishing Effective Alternatives for Acute Oral and Inhalation Systemic Toxicity Testing. A. Karmaus. ILS, Morrisville, NC.
#2561 8:05 Introduction. A. Karmaus. ILS, Research Triangle Park, NC.
#2562 8:35 Derivation of a Dataset for Modeling Acute Oral Toxicity and Variability Assessment of In Vivo LD50 Data. N. Kleinstreuer. NIEHS/NICEATM, Research Triangle Park, NC.
#2564 9:35 In Silico and In Vitro Approaches to Assess Inhalation Toxicity Testing. A. Clippinger. PETA International Science Consortium Ltd., Norfolk, VA.
#2565 10:05 Integrating Nonanimal Alternative Approaches to Assess the Risk to Human Health from Inhaled Materials. J. Hotchkiss. Dow Chemical Company, Midland, MI.
10:35 Panel Discussion/Q&A.
ses stimulated ICH to evaluate compounds in a prospective way in an ongoing exercise. US EPA and the pesticide industry are similarly stimulated to consider harmonization on such alternative approaches. This symposium is intended to provide transparency into the progress being made to establish internationally harmonized approaches to enable more flexible carcinogenicity assessment strategies focused on mechanisms while reducing reliance on the two-year rodent bioassay. Case examples for pharmaceutical and pesticide development will be provided that demonstrate how successful implementation would look. The opportunities that emerging new technologies and rich scientific information sources can play to impact the future evolution of this flexible framework will be described.

**Abstract #**

**#2566** 8:00  Progress toward Charting the Course for Improving Carcinogenicity Assessments of Human Pharmaceuticals and Pesticides.  
F. Tyson. NIEHS, Research Triangle Park, NC.

**#2567** 8:00  ICH S1 Project Status Update: The Need for Carcinogenicity Assessment.  

**#2568** 8:25  Lessons Learned from Completed Submissions: Case Studies.  
T. Bourcier. US FDA, Silver Spring, MD.

**#2569** 8:50  Leveraging New Capabilities to Optimize the Framework of Carcinogenicity Evaluation.  
F. D. Sistare. Merck & Co., Kenilworth, NJ.

**#2570** 9:15  Application of Next-Generation Sequencing Approaches to Enhance Carcinogenicity Assessment of Pharmaceuticals In Vivo.  

**#2571** 9:40  The Chronic Cancer Bioassay Is Frequently Conducted for Pesticides When It Is Not Always Needed to Protect Human Health.  
D. C. Wolf. Syngenta, Research Triangle Park, NC.

10:05  Panel Discussion/Q&A.

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**Wednesday, March 13, 8:00 AM to 10:45 AM, CC Ballroom II**

**SYMPOSIUM SESSION: THE ROLE OF DYNAMIC RNA MODIFICATIONS IN ENVIRONMENTAL RESPONSE AND DISEASE**

**Chairperson(s):** Frederick Tyson, NIEHS/GEHB, Research Triangle Park, NC; and Jaclyn Goodrich, University of Michigan, Ann Arbor, MI.

**Primary Endorser: Molecular and Systems Biology Specialty Section**

**Other Endorser(s): Mechanisms Specialty Section**

This symposium will discuss how dynamic RNA modifications can interpret environmental stimuli/challenges and respond by altering gene regulation, biological pathways, and disease outcomes. Chemical modifications of proteins, DNA, and RNA nucleoside moieties appear to have critical roles in regulating gene expression. These chemical modifications are central to the field of functional RNA modifications and emerging evidence suggests these modifications have critical roles in basic biological processes. These include: embryonic stem cell differentiation, excitotoxic cell death, development, intergenerational inheritance of acquired traits, regulation of RNA stability, temperature adaptation, meiotic progression, and regulation of RNA-RNA and RNA-protein binding interactions. A small number of coherent RNA modifications have been studied extensively, and recent evidence suggests that other newly discovered RNA modifications have interesting biological and disease functions in mammals. Moreover, recent studies have identified N6-methyladenosine (m6A) sites in thousands of human mRNAs, suggesting that this modification may play a role in regulation of alternative splicing and gene expression. The impact of the environment on chemical modifications of RNA molecules (the epitranscriptome) in the development of adverse human health outcomes is relatively unexplored. Technology advances in recent years have accelerated the detection of RNA modifications, and the RNA Modification Database currently lists approximately 100 RNA modifications identified in eukaryotic cells. This database also reveals transfer and ribosomal RNA are heavily modified, and many of these same modifications occur in messenger RNA and non-coding RNAs (including long noncoding and microRNAs). The function of most of the modifications found in messenger and non-coding RNAs remains a mystery, despite their potential to influence RNA properties and functions, including RNA stability, trafficking, localization, activity (enzymatic, sensing, or regulatory), and interactions with other molecules. This session will bring together toxicologists with investigators in the emerging area of functional RNA modifications to discuss the state-of-the-science as well as to identify research opportunities to interrogate how environmental exposures impact this layer of cellular regulation. Questions this session will address include: Have technologies for assessing RNA modifications matured enough to apply them to investigate how environment agents and exposures impact the role of functional RNA modifications and contribute to adverse health outcomes? Does the latest research suggest diverse environmental exposures can modify functional RNA modifications and/or the readers, writers, and erasers of these modifications? Was evidence presented that suggested or confirmed that stressors can have impacts on phenotypes through RNA modification mediated mechanisms? How can toxicologists leverage knowledge about epitranscriptomics to develop new biomarkers for toxicity or targets for therapeutic intervention?

**Abstract #**

**#2572** 8:00  The Role of Dynamic RNA Modifications in Environmental Response and Disease.  
F. Tyson. NIEHS, Research Triangle Park, NC.

8:00  Introduction.  
F. Tyson. NIEHS/GEHB, Research Triangle Park, NC.

**#2573** 8:05  RNA Methylation in Gene Expression Regulation.  
C. He. University of Chicago, Chicago, IL. Sponsor: J. Goodrich

**#2574** 8:37  Structure and Function of RNA Methyltransferases.  
Y. Nam. University of Texas Southwestern Medical Center, Dallas, TX. 
Sponsor: J. Goodrich

**#2575** 9:09  Epigenetic Inheritance of Acquired Traits through Sperm RNAs and Associated RNA Modifications.  
Q. Chen. University of California Riverside, Riverside, CA. Sponsor: J. Goodrich
Seizure liability remains a significant cause of attrition in drug discovery and development, leading to loss of competitiveness, delays, and increased costs. Current detection methods usually rely on observations made in the nonclinical rodent and nonrodent studies required to support clinical trials. These could be central nervous system (CNS)-related signs such as tremors or other abnormal movements, but these signs can be misdiagnosed or misinterpreted by inexperienced operators. Thus, confirmation of drug-induced seizure or seizure-like activity requires a follow-up electroencephalogram (EEG) study. Some progress has been made in in-life detection of seizure using automated video systems that record and analyze animal movements, looking for abnormalities. Nonetheless, it would be far preferable to have an earlier prediction of seizurogenic risk that could be used to eliminate liabilities early in discovery while there are still options in chemistry.

Two approaches offer exciting opportunities. Microelectrode array is now able to detect seizurogenic signals in iPSC-derived cortical neural stem cells differentiated far preferable to have an earlier prediction of seizurogenic risk that could be used to eliminate liabilities early in discovery while there are still options in chemistry. This offers great potential to screen for seizurogenic liability in an in vitro system. A second approach could be based on

**Workshop Session: Can We Panelize Seizure?**

*Chairperson(s): Jennifer Pierson, HESI, Washington, DC; and Ronald Tjalkens, Colorado State University, Fort Collins, CO.

*Primary Endorser: Drug Discovery Toxicology Specialty Section

*Other Endorser(s): Neurotoxicology Specialty Section

Seizure liability remains a significant cause of attrition in drug discovery and development, leading to loss of competitiveness, delays, and increased costs. Current detection methods usually rely on observations made in the nonclinical rodent and nonrodent studies required to support clinical trials. These could be central nervous system (CNS)-related signs such as tremors or other abnormal movements, but these signs can be misdiagnosed or misinterpreted by inexperienced operators. Thus, confirmation of drug-induced seizure or seizure-like activity requires a follow-up electroencephalogram (EEG) study. Some progress has been made in in-life detection of seizure using automated video systems that record and analyze animal movements, looking for abnormalities. Nonetheless, it would be far preferable to have an earlier prediction of seizurogenic risk that could be used to eliminate liabilities early in discovery while there are still options in chemistry. Two approaches offer exciting opportunities. Microelectrode array is now able to detect seizurogenic signals in iPSC-derived cortical neural stem cells differentiated to electrically active cortical neurons. This offers great potential to screen for seizurogenic liability in an in vitro system. A second approach could be based on
an understanding of the neuronal ion channels implicated in the seizurogenic response. There is clear evidence for the involvement of ion channels in seizure. Genetic studies have pointed to a role for voltage-gated sodium and potassium channels and the ligand-gated ion channels, GABA and nicotinic acetylcholine receptors. Pharmacologically, a number of ion channel modulators are known to be seizurogenic, such as chlorpromazine. Recently, great progress has been made in developing these in vitro seizure models and in characterizing the ion channels both at the expression and at the functional level. These data may provide the opportunity to panelize seizure by creating a panel of ion channel assays that predict seizure, linked to an in vivo assessment, with the ultimate aim of eliminating compounds predicted to be associated with the pro-seizurogenic state. The regulatory community has great expertise and experience of how to shape such work for decision-making from lessons learned from implementation of similar approaches in derisking cardiovascular liability. This session will address the issue, the basic science, and the regulatory context. It is relevant to academia, industry, CROs, and regulators who wish to learn more about these exciting, new, and high-impact developments in drug discovery and development.

Abstract #

#2584 8:00 Can We Panelize Seizure? J. Pierson. HESI, Washington, DC.
#2585 8:00 Seizure Liability in Drug Discovery and Development: Current State of Play. J. Valentin. UCB, Braine-l’Alleud, Belgium.
#2586 8:30 Identification and Confirmation of Seizure Liability In Vivo: The Importance of Behavioral Monitoring and EEG Recording. S. Authier. Citoxlab North America, Laval, QC, Canada.
10:30 Panel Discussion/Q&A.

Wednesday, March 13, 8:00 AM to 10:45 AM, CC Room 309

Workshop Session: Nerve Agent Poisoning: Mechanisms of Toxicity, Recent Releases, Verification, and Innovative Treatment Approaches

Chairperson(s): Allister Vale, University of Birmingham, Birmingham, United Kingdom; and Horst Thiermann, Bundeswehr Institute of Pharmacology and Toxicology, Munich, Germany.

Primary Endorser(s): Clinical and Translational Toxicology Specialty Section

Other Endorser(s): Neurotoxicology Specialty Section; Occupational and Public Health Specialty Section

All nerve agents act by inhibiting the enzyme acetylcholinesterase (AChE), which is responsible for catalyzing the breakdown of acetylcholine (ACh) at neuromuscular junctions and at synapses in the central and peripheral nervous systems. In addition, the process of “aging” results in a monooctylphosphonyl product that does not reactivate spontaneously and cannot be reactivated by pyridinium oximes, such as pralidoxime and obidoxime. Nerve agents were employed most recently in an attack on Khan Sheikhoun, Syria, in April 2017. VX was used as a weapon of assassination on February 13, 2017, when Kim Jong-nam, was killed at Kuala Lumpur International Airport. In Salisbury, England, on March 4, 2018, Sergei Skripal, his daughter Yulia, and a policeman investigating the incident were severely poisoned following exposure to a Novichok agent. Subsequently, on June 30, 2018, two more individuals were severely poisoned with the same Novichok agent, one of whom died. All these releases indicate that countries and their clinicians must be prepared adequately to treat casualties optimally from nerve agent exposure. This requires an understanding of the mechanisms of toxicity of these agents, the factors that influence their clinical impact, and knowledge of potential treatments. Although the signs and symptoms manifested by exposed individuals will aid diagnosis, reliable point-of-care diagnostic systems will expedite triage and the application of appropriate medical countermeasures. Most of these systems are based on measurement of acetyl- or butyrylcholinesterase activity, but more recently an easy-to-use lateral flow assay has been developed that can be used for both rapid point-of-care diagnosis, as well as for detection of submicrogram amounts of nerve agents in/on various matrices. However, unequivocal verification of an exposure requires a variety of specialized techniques, and the utility of these methods will be exemplified by the analysis of various samples from the Syrian Arab Republic conflict in April 2013. Much research is underway to improve the current treatment regimens, which include an anticholinergic drug (e.g., atropine) to antagonize the effects of excess ACh at muscarinic effector sites, the use of an oxime (e.g., pralidoxime, obidoxime, and HI-6) to reactivate nerve agent-inhibited AChE, and a benzodiazepine to prevent or stop nerve agent-induced seizures. Four innovative treatment approaches will be described during the session. First, the development of catalytic scavengers: multiple candidate enzyme variants on different structural scaffolds have been produced in an effort to develop a single enzyme capable of catalyzing the hydrolysis of a broad spectrum of organophosphorus (OP) compounds into nontoxic products. The most promising candidate enzyme platform is the bacterially produced recombinant variant of organophosphorus hydrolase from B. diminuta. In in vivo studies, two different organo-phosphorus hydrolase variants were capable of providing protection against at least 2 x LD50s of all of the OPs tested. Second, a series of novel substituted phenoxoalkyl pyridinium oximes have been produced, which reduce brain AChE inhibition in rats treated with high-dose challenges of OP compounds. These novel oximes also have shortened the time to cessation of OP-induced seizure-like behavior on the day of OP challenge and have reduced neurodegeneration observed four days after the challenge by such neural markers as NeuN. These oximes when delivered intramuscularly show a high ability to provide 24-hour survival from lethal OP dosages and they have a half-life of 2.5 hours or greater in the blood stream of the rat, and therefore have promising pharmacokinetics. Third, the use of the bispyridinium non-oxime compound MB327 increased the survival of rats poisoned with soman, without reactivation of AChE. Moreover, it has been shown in human and rodent muscle tissue that paralysis of the respiratory muscles could be restored partially by MB327. In addition, MB327 and several structurally analogous compounds were able to restore function of nicotinic receptors (Torpedo californica muscle-type and human a7 subtype) after desensitization (demonstrated with electrophysiological techniques using patch clamp and SSM-based electrophysiology). Moreover,
molecular modeling allowed identification of a new allosteric binding site close to the transmembrane domain of the nicotinic receptor. From these data, it may be concluded that by using MB327 and its analogues as a template, new structures with improved binding properties may be able to antagonize paralysis of blocked muscle function, without reactivation of inhibited AChE. Fourth, improvement of nerve agent elimination by small molecule scavengers might further contribute a beneficial effect. Indeed, modified cyclodextrins are able to bind the highly toxic (−) isomere of GF and calixarenes are able to enhance degradation of VX by a factor of 3500.

Abstract #

#2590 8:00  Nerve Agent Poisoning: Mechanisms of Toxicity, Recent Releases, Verification, and Innovative Treatment Approaches. A. Vale. University of Birmingham, United Kingdom.

#2591 8:00  Nerve Agents: Mechanisms of Toxicity, Factors That Influence Their Clinical Impact, Recent Releases, and Current Treatment. A. Vale. University of Birmingham, Birmingham, United Kingdom.


#2594 9:30  Blood-Brain Barrier Penetrating Reactivators of Organophosphate-Inhibited Acetylcholinesterase (AChE). J. Chambers. Mississippi State University, Mississippi State, MS.

#2595 10:00  Alternative Approaches for Therapy of Nerve Agents. H. Thiermann. Bundeswehr Institute of Pharmacology and Toxicology, Munich, Germany.

10:30  Panel Discussion/Q&A.

**Chairperson(s):** Nigel Walker, NIEHS/NTP, Research Triangle Park, NC; and Victor J. Johnson, Burleson Research Technologies, Inc., Morrisville, NC.

**Primary Endorser:** Immunotoxicology Specialty Section

**Other Endorser(s):** Inhalation and Respiratory Specialty Section; Nanotoxicology Specialty Section

Extensive efforts in research and development have led to extraordinary advances in nanoscience, nanotechnology, and the utility of nanomaterials. Uses of nanomaterials range from structural improvements, to building materials, to improvements in medical devices and drug delivery. As a result, there has been an increase in the potential for human exposure to nanomaterials not only inadvertently in occupational settings, but also in consumers and patients that utilize nanomaterials. Multiwalled carbon nanotubes (MWCNT) are a class of nanomaterials used for a variety of applications including structural enhancement of building materials and sports equipment, and for improvement of electrical and thermal conductivity for electronics. Animal studies have largely focused on the health effects following pulmonary exposure in rodent models. Many of these studies have demonstrated the occurrence of pulmonary inflammation associated with fibrotic changes in the airways. However, the majority of these studies investigated pulmonary exposure at dose levels that are significantly higher than occupational exposure levels. Recent studies have also demonstrated that pulmonary exposure to carbon nanotubes can result in systemic effects (cardiovascular changes and immunotoxicity), including increased expression of inflammatory cytokines genes in splenic lymphocytes in rats. These findings suggest that carbon nanotubes could target the immune system and raise the concern that low-level exposure may impact host resistance to infections or development of neoplastic diseases or increase susceptibility to allergy or autoimmune diseases. To address this issue, a consortium of academic and federal scientists initiated an integrated approach to investigate the toxicity of low-level occupationally relevant exposures to a representative high-purity “long and thin” aggregated MWCNT. Characterization of this MWCNT shows that it aggregates into micron-sized “cotton ball” structures that morphologically appear similar to MWCNTs sampled in the workplace. Key features of the approach were the well-characterized, GLP-compliant inhalation exposure system used for treatment of the rats and the partnership between the federal and academic laboratories assessing different models of impacts of the exposure on the immune system. Importantly, all of the immunotoxicity studies that will be discussed in this session were obtained from the same exposure cohorts, thereby enhancing the ability to integrate results across all studies and participating laboratories. The session will identify the occupational exposures to MWCNT, put the experimental work into a human-relevant context, and then highlight the complementary approaches undertaken by the different groups to characterize the effects of MWCNT on innate and adaptive immune responses following low-dose pulmonary inhalation exposures.

**Abstract #2602**

8:00 Understanding the Impact on the Immune System of Occupationally Relevant Exposures to Multiwalled Carbon Nanotubes. N. Walker. NIEHS, Research Triangle Park, NC.

8:00 Introduction. N. Walker. NIEHS/NTP, Research Triangle Park, NC.

**Abstract #2603**

8:05 Perspectives from the Field: Occupational Exposures to Carbon Nanotubes in the US. M. Dahm. NIOSH, Cincinnati, OH. Sponsor: V. Johnson

**Abstract #2604**

8:40 Pulmonary and Systemic Immunotoxicity following Inhalation of Multiwalled Carbon Nanotubes. V. J. Johnson. Burleson Research Technologies, Inc., Morrisville, NC.

**Abstract #2605**

9:15 Consequences of Inhalation Pre-exposure to Multiwalled Carbon Nanotubes on Airway Inflammation and Fibrosis Induced by House Dust Mite Allergen. J. Bonner. North Carolina State University, Raleigh, NC.

**Abstract #2606**


Platform Session: Safety Assessment: Pharmaceutical—Drug Development I

Chairperson(s): Monica Metea, Preclinical Electrophysiology Consulting, Mattapoisett, MA; and Rodney Rouse, US FDA, Silver Spring, MD.

Abstract #

**#2607** 8:00 Assessing Effects of BHV-0223 40 mg Zydus Sublingual Formulation and Riluzole 50 mg Oral Tablet on Liver Function Test Parameters Utilizing DILysym. D. Longo¹, L. Shoda¹, B. Howell², V. Coric², R. Berman², and I. Qureshi². DILysym Services Inc., Durham, NC; and ¹Zydus Pharmaceuticals, Inc., New Haven, CT.


**#2609** 8:30 Determination of Permissible Daily Exposures in Human Drug Products for Elemental Impurities via the Transdermal Delivery Route. J. Kancherla¹, B. Sonawane¹, and B. Fowler¹. ¹University of Maryland, College Park, College Park, MD; and ²Toxicology and Risk Assessment Consulting Services, LLC, North Potomac, MD.

**#2611** 8:45 Off-Target Activities of Triglitazone and Rosiglitazone in Tox21/ToxCast In Vitro Tests and Comparison of the Results with Systematically Reviewed In Vivo Animal Data and Human Adverse Events from Pharmacovigilance Databases Using Evidence-Based Approaches. K. Tsaioun¹, S. Bandhakavi¹, G. E. Vist¹, R. Wright¹, J. Mehta¹, A. Abdelaziz², R. Ram³, B. Hardy⁴, J. Hartung⁴, and H. Dirven⁴. Johns Hopkins University, Baltimore, MD; ¹Northeastern University, Boston, MA; ²Norwegian Institute of Public Health, Oslo, Norway; ³KEVA Health, Cambridge, MA; ⁴Amazon, Munich, Germany; ⁵Safer Medicines Trust, London, United Kingdom; ⁶DouglasConnect, Basel, Switzerland; and ⁷Center for Alternatives to Animal Testing (CAAT) at Johns Hopkins University, Silver Spring, MD.

**#2612** 9:00 Supportive Care for Animals on Toxicology Studies: An Industrial Benchmark Survey. S. Salian-Mehta¹, J. M. Wilson¹, H. N. Burr¹, A. Wolf Greenstein¹, A. Kamholz¹, K. West¹, S. Poy¹, and L. Medina¹. AbbVie, North Chicago, IL; ¹Janssen, Spring House, PA; ²Bristol-Myers Squibb Co, New Brunswick, NJ; ³Covance, Madison, WI; ⁴Charles River Laboratories, Wilmington, MA; ⁵Boehringer-Ingelheim, Ridgefield, CT; and ⁶Amgen Research, South San Francisco, CA.

**#2613** 9:15 New Opportunities for a Psychoactive Psilocybin in Neuropsychopharmacological Clinical Disorders. P. A. Duffy¹, S. Stansfield², G. Healing³, R. Knight⁴, and R. A. Roberts⁵,⁶. ¹Aponix, Alderley Edge, United Kingdom; ²COMPASS Pathways, London, United Kingdom; and ³University of Birmingham, Birmingham, United Kingdom.

**#2614** 9:30 Functional, Histologic, and Ultrastructural Assessment of Novel Optical Coherence Tomography Findings in the Cynomolgus Monkey. H. Boorer¹, A. McKenzie¹, N. Tassew¹, C. Frantz¹, M. Holden², R. Lai¹, T. Nork³, C. Rasmussen³, and V. Bantseev¹. Genentech, Inc., San Francisco, CA; ¹Ocular Services On Demand, Madison, WI; and ²University of Wisconsin-Madison, Madison, WI.

**#2615** 9:45 Intestinal Toxicity in Rats Following Administration of CDK4/6 Inhibitors is Independent of Pharmacology. W. Hu¹, S. Thibault¹, B. Hirakawa¹, S. Kalabat¹, T. Franks¹, T. Sung¹, S. Lu¹, S. Khoh-reiter¹, M. Finkelstein¹, B. Jessen¹, and A. Sacca¹. ¹Pfizer, San Diego, CA; ²Pfizer, Groton, CT; and ³Pfizer, Pearl River, NY.

**#2616** 10:00 Assessing Immunogenicity of Host Cell Proteins in BLT-Immune Humanized Mice. S. B. Hosain¹, H. Yan¹, C. L. San Emeterio¹, A. D. Knapton¹, and K. E. Howard. US FDA, Silver Spring, MD. Sponsor: J. Weaver

**#2617** 10:15 Safety Testing of Challenge Agents. J. Bussiere¹, J. Solomon², and C. Dean Jr. ¹Amgen Inc., Thousand Oaks, CA; and ²Charles River Laboratories, Reno, NV.

**#2618** 10:30 Q&A.
This session will include a demonstration of HepaRG-based hepatic spheroid system for liver fibrosis assessment. This system can metabolize hepatotoxins in vitro.

Presented by: Biopredic International

Wednesday, March 13, 9:00 AM to 10:00 AM, CC Room 339

Exhibitor-Hosted Session: A Robust Human HepaRG Hepatocyte-Based In Vitro Liver System for Liver Fibrosis Assessment

Presented by: Biopredic International

This session will include a demonstration of HepaRG-based in vitro hepatic spheroid system for liver fibrosis assessment. This system can metabolize hepatotoxins and promote hepatocyte-damage induced activation of human primary- or iPSC cell-derived hepatic stellate cells. This model could facilitate the modeling of NALFD and the discovery novel antifibrotic compounds.
Wednesday, March 13, 9:00 AM to 10:00 AM, CC Room 337

**E** Exhibitor-Hosted Session: Characterizing Indoor Air Quality and Human Exposure

*Presented by:* Fraunhofer ITEM

Today, people spend most of their time indoors—at workplaces, at home, traveling. Thus, indoor air quality is a hot topic for human health. In combination with its expertise in inhalation toxicology, Fraunhofer ITEM characterizes air quality and human exposure at special places—in aircraft and at special workplaces.

Wednesday, March 13, 9:00 AM to 10:00 AM, CC Room 340

**E** Exhibitor-Hosted Session: DABT: The Value of Certification and Overview/Rationale for Revised Exam and Recertification Procedures

*Presented by:* American Board of Toxicology, Inc.

A member of the American Board of Toxicology (ABT) will provide an overview of the ABT, the value of ABT certification, information about the revised examination and recertification procedures, an overview of exam preparation strategies/resources, and global exam locations for 2019, and will answer questions from the audience.

Wednesday, March 13, 9:00 AM to 10:00 AM, CC Room 338

**E** Exhibitor-Hosted Session: Demystifying Juvenile Toxicology Study Designs for Regulatory Success

*Presented by:* Envigo

Recognizing that children are not just miniature adults is the first step to understanding juvenile toxicity studies. During this session we will explore a range of key considerations, from age of the target pediatric population to regulatory expectations for CNS and when to include developmental neurotoxicity or reproductive performance evaluations.

Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

**PS** Poster Session: Food Safety and Nutrition

*Chairperson(s):* Serena Manganelli, Nestlé Research, Lausanne, Switzerland; Miriam Mossoba, US FDA, Laurel, MD; and Jun Zhou, University of Georgia, Athens, GA.

*Displayed: 9:15 AM–4:30 PM | Author Attended: 10:45 AM–12:15 PM*

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<td>#2636</td>
<td>Developmental Thyrotoxicosis via Dietary Iodine: Identifying Genetic Vulnerabilities Using the Zebrafish Model. B. A. Sumprer, and J. L. Freeman. Purdue University, West Lafayette, IN.</td>
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<td>#2637</td>
<td>Identification of Potential Emerging Chemical Risks in Food from REACH Registered Chemicals. A. Bitsch¹, M. Bohlen², S. Escher¹, G. Kass¹, O. Licht¹, M. MacLeod¹, C. Merten¹, H. Noteborn³, J. Oltmanns², M. Schwarz², and V. Silano².¹ Fraunhofer ITEM, Hannover, Germany; ² FoBiG, Freiburg, Germany; ³ EFSA, Parma, Italy; ⁴ Stockholm University, Stockholm, Sweden; ⁵ Netherlands Food and Consumer Product Safety Authority, Utrecht, Netherlands; and ⁶II University of Rome, Rome, Italy. Sponsor: C. Dasenbrock</td>
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<td>#2638</td>
<td>Occurrence and Co-occurrence of Aflatoxin and Fumonisin in Maize and Maize Products in Nigeria. N. Saha Turna¹, L. Liverpool-Tasie¹, O. Ademola¹, A. Obadina¹, and F. Wu¹.¹ Michigan State University, East Lansing, MI; and ² Federal University of Agriculture, Abeokuta, Nigeria.</td>
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<td>#2641</td>
<td>A Perinatal and Chronic Extended-Dose-Range Study of Bisphenol A (BPA) in Rats: CLARITY-BPA Core Study. K. B. Delclos¹, L. Camacho¹, G. Olson¹, R. P. Felton¹, S. M. Lewis¹, M. Vanlandingham¹, M. Bryant¹, D. R. Doerge¹, N. J. Walker², and G. Gamboa da Costa¹.¹ US FDA/NCTR, Jefferson, AR; and ² NIEHS, Research Triangle Park, NC.</td>
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**Evaluation of Exposure to Mycotoxins through Fruit Juices Consumption by Chromatographic Methods Coupled to Mass Spectrometry in Tandem.**  

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**Toxic Tall Fescue Grazing during Fluctuating Environmental Conditions: Impact on the Metabolome, Microbiome and Their Interaction.**  
R. S. Mote1, N. S. Hill2, G. Suen2, Z. B. Turner1, Z. P. Sanders1, D. P. Jones1, J. H. Skarupka1, V. Tran1, D. I. Walker1, and N. M. Filipov1.  
1University of Georgia, Athens, GA; 2University of Wisconsin-Madison, Madison, WI; and ‘Emory University, Atlanta, GA.

#2663  
**Poster Board Number**  
**In Vivo Genotoxicity Study of Cylindrospermopsis by the Comet Assay.**  

#2664  
**Poster Board Number**  
**Toxicologic Evaluation of Magnesium Biotinate.**  
J. Chen1, S. P. Ojalvo2, O. Mendes3, and J. Komorowski3.  
1Product Safety Labs, Dayton, NJ; 2Nutrition 21, LLC, Purchase, NY; and 3Nutrition 21, LLC, Purchase, NY.

#2665  
**Poster Board Number**  
**Comparison of the Cytotoxic Response of Non-differentiated and Differentiated SH-SY5Y Cells Exposed to Microcystin-LR and Cylindrospermopsis.**  

#2666  
**Poster Board Number**  
**Immunologic Assessment of Rats Fed E171, a Food Grade Titanium Dioxide (TiO2), Containing Diet for 7 Days.**  
R. B. Crawford1, T. Bach1, M. D. Rizzo1, J. Zhou1, J. E. Henriquez1, D. O. Khan1, L. K. Blevins1, S. Sermet1, L. L. Arnold2, S. Cohen2, and N. E. Kaminski2.  
1Michigan State University, East Lansing, MI; and 2University of Nebraska Medical Center, Omaha, NE.

#2667  
**Poster Board Number**  
**Toxicological Assessment of Exposing Human Kidney Cells to Free 3-MCPD and Select Esters In Vitro.**  
M. Mossoa1, M. S. T. Mapa1, M. de Araujo1, Y. Zhao1, B. Flannery1, T. Flynn1, P. Wiesenfeld1, and R. Sprando1.  
1US FDA, Laurel, MD; and 2US FDA, College Park, MD.

#2668  
**Poster Board Number**  
**Virulence Evaluation of Salmonella enterica Isolates Containing Incompatibility Group IT (IncIT) Plasmids from Food Animal and Human Sources.**  
P. R. Kaldhone1, A. Carlton2, B. Khajanchi1, Y. Sanad1, J. Han1, J. Deck1, S. C. Ricke1, and S. L. Foley1.  
1University of Arkansas, Pine Bluff, AR, and 2USFDA/NCTR, Jefferson, AR.

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**Evaluating the Significance of Immunomodulatory Effects Reported for Food Ingredients Undergoing Generally Recognized as Safe (GRAS) Evaluations.**  
A. Mak, N. Dai, A. R. Lobach, and A. Roberts. Intertek, Mississauga, ON, Canada.

#2670  
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**Determination of L-Lysine by Raman Spectroscopy.**  
E. Holland, and R. Bright. Fort Valley State University, Fort Valley, GA.

#2671  
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**Dried Pig Faeces: Impacts on Nutrient Utilization, Histology and Haematology of Claris gariipes.**  
A. O. Ajiboye1, F. Ajani1, B. O. Emikpe1, and A. A. Adesanya1.  
1Bowen University, Iwo, Nigeria; 2University of Ibadan, Ibadan, Nigeria; and 3Osun State University, Ejigbo Campus, Nigeria.

#2672  
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**Influence of Serum Lutein and Zeaxanthin on Select Cancer Mortality: An 18-Year Follow-Up Cohort Study.**  
E. Afrjie-Gyawu, P. Shankar, A. Brown, and J. Zhang. Georgia Southern University, Statesboro, GA.

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**Metal Oxide Nanoparticles and Bacteria Alter Brush Border Enzyme Activity in an In Vitro Small Intestinal Model.**  
A. Garcia Rodriguez. Binghamton University, Binghamton, NY. Sponsor: G. Mahler

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**Comparison of Dietary Exposures to Acrylamide from Intakes of Bread and French Fries to a Proposed New No Significant Risk Level for Acrylamide.**  
L. A. Haighton, K. Ngo, S. Pham, C. Sulaiman, and S. Floyd. Intertek Scientific & Regulatory Consultancy, Mississauga, ON, Canada.

#2675  
**Poster Board Number**  
**Detecting Genotoxicity within Non-intentionally Added Substances (NIAS): A Problem Facing the Food Contact Materials Industry.**  
P. Rawlinson, and M. Tate. Gentronix Limited, Alderley Edge, United Kingdom. Sponsor: M. Cumberbatch

#2676  
**Poster Board Number**  
**Mycotoxins and Endotoxin Content Vary between Commercially Available Grain-Based Diets.**  
S. Radhakrishnan1, M. A. Pellizzon1, P. Greiss2, and M. Ricci3.  
1Research Diets, Inc, New Brunswick, NJ; and 2Randox Food Diagnostics, Kearneysville, WV. Sponsor: J. Blum
Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Natural Products

Chairperson(s): Timothy Fennell, RTI International, Research Triangle Park, NC; and Esra Mutlu, NIEHS/NTP, Research Triangle Park, NC.

Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM

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Assessment of Efficacy of Oroxyllum indicum in Rat Model of Thioacetamide-Induced Hepatotoxicity and Its Safety Profile. A. More1, and K. Apte.1 APT Research Foundation, Pune, India; and 2APT Testing and Research Pvt. Ltd., Pune, India.

#2678 Posterior Board Number.................................................................................................................. P145
Hepatotoxicity of Cannabidiol in the Mouse Model. I. Kotorbash1, L. Ewing1, C. Skinner1, M. Eisohly2, and B. Gurley1. 1University of Arkansas for Medical Sciences, Little Rock, AR; and 2Eisohly Laboratories, Inc. (ELI), Oxford, MS.

#2679 Poster Board Number.................................................................................................................. P146

#2680 Poster Board Number.................................................................................................................. P147
Cellular Accumulation of Caffeine Following Osteoblastic Differentiation in MC3T3-E1 Cells. S. Kano, I. Otaki, H. Kato, M. Fukuta, Y. Nakamura, T. Horita, and Y. Aoki. Nagoya City University Graduate School of Medical Sciences, Nagoya, Japan.

#2681 Poster Board Number.................................................................................................................. P148
Protective Effect of Essential Oils Extract of Vitellaria paradoxa (Gaertn F) on Sodium Arsenite-Induced Toxicities in Male Wistar Rats. A. Oyibe, M. Gbadegesin, and O. Oduolu. University of Ibadan, Ibadan, Nigeria.

#2682 Poster Board Number.................................................................................................................. P149

#2683 Poster Board Number.................................................................................................................. P150
Halogenated Marine Natural Products and Human Health: Exploring the Activity of Halogenated Methyl Bipyroles as Agonists for the Aryl Hydrocarbon Receptor. E. Overton1,2, D. G. Franks1,3, B. Pedler1, N. Sha1, A. Kumar1, W. Fenical4, L. I. Aluwihare5, C. M. Reddy5, and M. E. Hahn1,2. Woods Hole Oceanographic Institution, Woods Hole, MA; 2Haverford College, Haverford, PA; 3Woods Hole Center for Oceans and Human Health, Woods Hole, MA; and 4Scripps Institution of Oceanography, La Jolla, CA.

#2684 Poster Board Number.................................................................................................................. P151

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The In Vitro Antibacterial Activity and Safety of Morinda lucida Leaf Extracts against Salmonella Serovars Relevant in Livestock Infections. O. S. Olawuovo1, A. O. Ar02, J. N. Eloff1, J. M. Famuyide1, and L. J. McGaw1. 1University of Pretoria, Pretoria, South Africa; and 2University of South Africa, Johannesburg, South Africa.

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#2688 Poster Board Number.................................................................................................................. P155
Characterization and Formulation of a Black Cohosh Root Extract (BCE) Lot to Be Used in Rodent Toxicology Studies. E. Mutlu1, T. Cristy2, J. Pierfelice3, J. Andre2, B. Stiffler2, B. Burback2, and S. Waidyanatha4. 1NIEHS/NTP, Research Triangle Park, NC; and 2Battelle, Columbus, OH.

#2689 Poster Board Number.................................................................................................................. P156

#2690 Poster Board Number.................................................................................................................. P157
Development and Validation of an Analytical Method for Quantitation of Alpha-Pinene in Rodent Blood by Headspace GC-MS. M. A. Silinski1, J. C. Blake1, L. Jicause1, R. A. Fernando1, V. G. Robinson1, and S. Waidyanatha1. 1RTI International, Research Triangle Park, NC; and 2NIEHS/NTP, Research Triangle Park, NC.

#2691 Poster Board Number.................................................................................................................. P158
Development and Validation of an Analytical Method for Quantitation of Alpha-Pinene in Rodent Mammary Tissue by Headspace GC-MS. M. A. Silinski1, J. Licause1, T. Uenoyma1, J. C. Blake1, R. A. Fernando1, V. G. Robinson1, and S. Waidyanatha1. 1RTI International, Research Triangle Park, NC; and 2NIEHS/NTP, Research Triangle Park, NC.
Poster Session: Skin

**Chairperson(s):** Laurie Joseph, Rutgers, The State University of New Jersey, Piscataway, NJ; Kathryn E. Page, The Clorox Company, Pleasanton, CA; and Andrea D. Rodrigues, Allergan, Irvine, CA.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 1:30 PM–3:00 PM

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<td>hTERT Immortalized Adult Dermal Melanocytes: An In Vitro Cell Model for the Study of Skin Pigmentation.</td>
<td>L. G. Rodriguez, and C. Zou. ATCC Cell Systems, Inc, Gaithersburg, MD.</td>
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<td>Lipid Analysis of the Phenion FT Skin Model and the OS-Rep Model—The Molecular Basis for a Functional Skin Barrier.</td>
<td>A. K. Cuevas1, L. Vierkotten1, A. Fischer1, M. Merker1, N. Basius1, G. Götz2, T. Beyer1, D. Petersohn1, and K. Mewes1. 1Henkel Corp. North America, Stamford, CT; and 2Henkel AG &amp; Co. KGaA, Düsseldorf, Germany.</td>
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<td>#2695</td>
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<td>Human Reconstructed Epidermides and Vasculared Bioprinted Skin Tissues as Tissue-in-a-Dish Models for Drug Screening.</td>
<td>X. Liu, M. Song, S. Michael, and M. Ferrer. NIH, Rockville, MD. Sponsor: M. Xia</td>
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<td>Donor Age of Primary Keratinocytes and Type of Coating Matrix Strongly Influence the Stratiﬁcation and Barrier Function of In Vitro Reconstructed Human Epidermides.</td>
<td>V. S. Costa Gagosian1, L. F. Oya Silva1, E. S. Trindade1, D. M. Leme1, and C. B. Pestaona1. 1Universidade Federal do Paraná, Curitiba, Brazil; and 2ALS TECAM, São Paulo, Brazil.</td>
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<td>T. Madsen1, J. Liu1, L. Brown1, D. F. Brocksmith1, and G. F. Bouchard1. 1Sinclair Research Center LLC, Auxvasse, MO; and 2’Sinclair Bio Resources LLC, Auxvasse, MO.</td>
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<td>L. Estigoy, X. Li, and W. Reifenrath. EAG Laboratories, Hercules, CA.</td>
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<td>Solvent Partitioning from Formulations to Build Skin LFER Models.</td>
<td>J. Hughes-Oliver1, G. Xu1, and R. Baynes1. 1North Carolina State University, Raleigh, NC; and 2Wells Fargo &amp; Company, Charlotte, NC.</td>
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<td>Large Data Sets and Quantitative Risk Assessment (QRA) for Dermal Allergens.</td>
<td>J. Laiko, J. Wong, W. Su, and C. Saliou. Esteelauder, Melville, NY.</td>
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<td>#2701</td>
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<td>Experimental Induction of Allergic Contact Dermatitis in Sinclair, Hanford, and Yucatan Minipigs.</td>
<td>A. Stricker-Krongrad. Sinclair Research Center LLC, Auxvasse, MO.</td>
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<td>C. Johnson1, D. Bower1, K. Cross1, S. Miller1, D. P. Quigley1, R. R. Tice2, C. M. Zwick2, and G. Myatt1. 1Leadscope, Inc., Columbus, OH; 2RTice Consulting, Hillsborough, NC; and 3Transendix LLC, Indianapolis, IN.</td>
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<td>Evaluation of OECD Accepted In Vitro Methods for Assessment of Skin Sensitizing Potential of Agrochemical Formulations.</td>
<td>J. Ball1, H. Scott1, E. Smith1, S. Bennett1, W. Masinja1, C. Elliott1, M. Tate1, and M. Cumberbatch1. 1Gentronix, Alderley Edge, United Kingdom; 2Alderley Analytical, Alderley Edge, United Kingdom; and 3Syngenta, Bracknell, United Kingdom.</td>
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<td>Applying In Silico Approaches to Unravel Mechanism of Toxicity of Contact-Sensitizing Hair Dye Components.</td>
<td>T. Krsmannovic1, K. Jankovic1, D. Mitic Potkrajac1, G. Apic1, and R. B. Russell1. 1Metisox Ltd, Cambridge, United Kingdom; and 2Cell Networks, University of Heidelberg, Heidelberg, Germany.</td>
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<td>A Tier-Based Skin Sensitisation Testing Strategy for Personal Care Products.</td>
<td>E. S. Fung1, D. A. Drechsel2, K. M. Towle1, D. J. Paustenbach1, and A. D. Monnot1. 1Cardno ChemRisk, Aliso Viejo, CA; 2Cardno ChemRisk, Boulder, CO; 3Cardno ChemRisk, San Francisco, CA; and 4Cardno ChemRisk, Jackson Hole, WY.</td>
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<td>An In Vitro Assay Platform to Assess Skin Sensitisation Potential of Chemicals in Subset of Tox21 10k Library.</td>
<td>Z. Wei1, L. Zhang1, X. Liu1, M. Song1, T. Xu1, R. Huang1, M. Ferrer1, and M. Xia1. 1NIH/NCATS, Bethesda, MD; and 2NIH/NEI, Bethesda, MD.</td>
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<td>In Vitro Irritation Potential of Cyanotoxins in Reconstructed Human Skin.</td>
<td>D. G. Ross, M. F. Hughes, and J. E. Simmons. US EPA, Research Triangle Park, NC.</td>
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<td>Poster Board Number</td>
<td>Acute Dermal Irritation Response in White Sinclair and Hanford Minipigs.</td>
<td>J. Klein. Sinclair Research Center LLC, Auxvasse, MO.</td>
</tr>
<tr>
<td>#2709</td>
<td>Poster Board Number</td>
<td>Validation Method to Detect Formazan Salt Using High-Performance Liquid Chromatography to Evaluate Irritation and Corrosion Assays in 3D Human Epidermal Model.</td>
<td>S. A. Drees, C. A. Mini, S. S. Maria-Engler, and D. P. Oliveira. 1University of São Paulo, Ribeirão Preto, Brazil; and 2University of São Paulo, São Paulo, Brazil.</td>
</tr>
<tr>
<td>#2710</td>
<td>Poster Board Number</td>
<td>Establishment of Skin Irritation and Corrosion Testing Proficiency Using Reconstructed Epidermis and Investigation of Key Sensitization Event Biomarkers via Meso Scale Discovery Multi-array Technology.</td>
<td>D. Buhajczuk, R. Binil, J. Bernard, R. Kanippayoor, and A. Periteau. SGS, Mississauga, ON, Canada.</td>
</tr>
<tr>
<td>#2711</td>
<td>Poster Board Number</td>
<td>Decontamination of TMAH Splashes: In Vitro Experiments.</td>
<td>L. Mathieu, K. Padois, H. Coudoul, F. Rondinelli, J. Blomet, and A. H. Hall. 1Laboratoire Prevor, Valmondois, France; 2Toxicology Consulting and Medical Translating Services, Azle, TX; and 3University of Colorado Denver, Denver, CO.</td>
</tr>
<tr>
<td>#2712</td>
<td>Poster Board Number</td>
<td>Genotoxic Effects Induced by Hair Dyes in Immortalized Keratinocytes in Monolayer and in 3D Culture.</td>
<td>C. A. Mini, S. S. Maria-Engler, and D. P. Oliveira. 1University of São Paulo, Ribeirão Preto, Brazil; and 2University of São Paulo, São Paulo, Brazil.</td>
</tr>
<tr>
<td>#2713</td>
<td>Poster Board Number</td>
<td>Development of a Method to Measure Cigarette, E-Cigarette, and Tobacco Heating Product Skin Staining.</td>
<td>A. Dalrymple, S. Corke, D. Sheehan, H. Behrings, and S. Coburn. 1British American Tobacco (Investments) Ltd, Southampton, United Kingdom; and 2Institute for In Vitro Sciences, Gaithersburg, MD.</td>
</tr>
<tr>
<td>#2714</td>
<td>Poster Board Number</td>
<td>Double-Blind, Randomized Controlled Tolerability Trial of Six Hair Cleansing Products.</td>
<td>E. Warshaw, A. Boyd, A. Zhang, R. Kimyon, Y. Liu, J. Schlirbaum, S. Hylwa, and A. Monnot. 1Park Nicollet Clinic, Minneapolis, MN; and 2Cardno ChemRisk, San Francisco, CA.</td>
</tr>
<tr>
<td>#2715</td>
<td>Poster Board Number</td>
<td>Efficient Re-epithelialization is Dependent on Sufficient Levels of the Anti-inflammatory Protein TNIP1.</td>
<td>R. Shamilov, and B. J. Anesieievich. University of Connecticut, Storrs, CT.</td>
</tr>
<tr>
<td>#2716</td>
<td>Poster Board Number</td>
<td>Effect of Polycyclic Aromatic Hydrocarbon Benzo(a)pyrene on Skin Inflammatory Disease in a Mouse Psoriatic Model.</td>
<td>N. Tewari-Singh, D. G. Goswami, D. M. Shepherd, J. M. Brown, D. J. Orlicky, and C. A. Beamer. 1University of Colorado Denver, Aurora, CO; and 2University of Montana, Missoula, MT.</td>
</tr>
<tr>
<td>#2717</td>
<td>Poster Board Number</td>
<td>Anti-melanogenic Effects by Novel(1e, 3e, 5e)-1,6-Bis(Substituted Phenyl)hexa-1,3,5-Triene Analogs in B16f10 Cells and Zebrafish Larvae.</td>
<td>J. Oh1, J. Kim1, J. Jang1, S. Lee1, C. Park1, S. Yoo1, W. Kim1, and J. Kim. 1Kyungpook National University, Daegu, Korea, Republic of; 2Korea Institute of Toxicology, Daejeon, Korea, Republic of; and 3Korea Research Institute of Chemical Technology, Daejeon, Korea, Republic of.</td>
</tr>
<tr>
<td>#2718</td>
<td>Poster Board Number</td>
<td>The UV Filter Octinoxate Modulates AHR Activity via CYP1A1 Inhibition.</td>
<td>S. Dickinson (Phelan), and L. DeLouise. University of Rochester Medical Center, Rochester, NY.</td>
</tr>
</tbody>
</table>

**Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**PS Poster Session: Safety Assessment: Nonpharmaceutical**

**Chairperson(s):** Michael K. Peterson, Gradient, Leavenworth, WA; and Janet Zang, US FDA, College Park, MD.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM**

**Abstract #**

| #2720 | Poster Board Number | Oral Ingestion of a Novel Oxygenating Compound, Ox66, is Non-toxic and Results in Increased Oxygenation. | F. Zhang, G. Aquino, A. Dahi, W. Nugent, B. Song, and E. Bruce. 1Baylor University, Waco, TX; and 2Song Biotehnologies LLC, Baltimore, MD. | P201 |
| #2721 | Poster Board Number | Application of New Approach Methodologies (NAMs) to Address Data Gaps in Human Risk Assessment: 2-Amino-2-Methylpropanol (AMP) Case Study. | F. Sura, and P. Spencer. ANGUS Chemical Company, Buffalo Grove, IL. | P202 |
Next Generation Products Induce Lower Biological Activity Than Combusted Cigarettes: A Comparison of Aerosol Chemistry and In Vitro Toxicity. K. Ruddy1, R. Wieczorek2, E. Treles-Stocken1, J. Pan1, O. Dethloff1, L. Simms1, and M. Stevenson1. Imperial Brands plc, Bristol, United Kingdom; and Reemtsma Zigarettenfabriken GmbH, Hamburg, Germany.

Use of Alternative Test Methods to Assess the Sensitization Potential of Commonly Used Botanical Extracts Found in Cosmetic Products. Z. Wang1, C. Avento2, R. Verma1, S. I. Khan1, A. G. Chittiboyina1, I. A. Khan1, and N. Sadrieh1. US FDA, College Park, MD; and University of Mississippi, University, MS.

Improving Safety Assessment Weight-of-Evidence with Poison Center Data. A. Maier1, M. Vincent1, J. Colvin1, A. Quiñones-Rivera1, and J. Arbogast1. Cardno ChemRisk, Cincinnati, OH; Cincinnati Children’s Hospital Drug and Poison Information Center, Cincinnati, OH; and GOJO Industries, Inc., Akron, OH.

Evaluating the Phototoxic Potential of a Hair Cleansing Conditioner. D. A. Drechsel1, E. S. Fung1, K. M. Towle1, D. J. Paustenbach1, and A. D. Monnot1. Cardno ChemRisk, Boulder, CO; Cardno ChemRisk, Aliso Viejo, CA; Cardno ChemRisk, San Francisco, CA; and Cardno ChemRisk, Jackson, WY.

An Inter-species Comparison of the Triclopyr In Vitro and In Vivo Toxicokinetic Properties, for Risk Assessment Purpose. M. Corvaro1, M. Bartels1, C. Brown1, G. Chung1, and M. Chan1. Corteva Agrisciences, Abingdon, United Kingdom; ToxMetrics.com, LLC, Midland, MI; NewCell BioTech, Newcastle upon Tyne, United Kingdom; NewCells Biotech, Newcastle upon Tyne, United Kingdom; and Corteva Agrisciences, Newark, DE. Sponsor: C. Terry

Safety Testing of Bacteria: Challenges and Approaches to Translocation Testing in Studies Conducted in a High-Throughput Vivarium. A. B. Pater-Faranda, J. Roper, P. Mukerji, and F. Burns. DuPont Haskell Global Center for Health Sciences, Newark, DE.

Effect of Percent S9 Fraction on Bacterial Background Lawn Assessment in Ames Assay Using 35mm Plate Spread Technique. S. K. Bharti1, B. Kallam1, and M. W. Fariss1. Enthalpy Analytical, Henrico, VA; and ToxSynergy LLC, Midlothian, VA.

Oral Toxicity Testing of the Novel GreenInsensitive Munitions Explosives, 2,4-Dinitropyrazole (DNP) and 2,4,6-Trinitro-3-bromoanisole (TNBA). T. E. Susan, A. Jackovitz, K. Koistinen, L. Crouse, M. Bazar, V. Adams, and M. Quinn. Army Public Health Center, Aberdeen Proving Ground, MD.


Chemical Alternatives Assessment of Selected Phthalate Substitute Plasticizers: Carboxylates, Adipates, Citrates, and Trimellitates. M. Zachary, and M. H. Whittaker. ToxScries LLC, Washington, DC.

Evaluation of Possible Risk in Genome Editing for Human Gene Therapy. R. Ono1, K. Tano1, S. Yasuda1, K. Aisaki1, Y. Sato1, S. Kitajima1, J. Kanno1, and Y. Hirabayashi1. National Institute of Health Sciences, Kawasaki, Japan; and Japan Organization of Occupational Health and Safety, Hadano, Japan.


The Effects of 3,3’Dichlorobiphenyl (PCB11) on Hepatic Nuclear Receptor Activity in Primary Human Hepatocytes. P. E. Dunlap1, M. DeVito1, S. Ferguson1, and S. Ramiahган1. NIEHS/NTP, Research Triangle Park, NC; and NIEHS, Research Triangle Park, NC.
**Program Schedule—Wednesday | 201**

**Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Risk Assessment II**

**Chairperson(s): Jennifer Fleischer, ToxServices LLC, Washington, DC; Dan Petersen, US EPA/ORD, Cincinnati, OH; and Kan Shao, Indiana University, Bloomington, IN.**

**Displayed: 9:15 AM—4:30 PM | Author Attended: 9:15 AM—10:45 AM**

### Abstract #

#### #2739

**Poster Board Number**

| **A Revised Approach to the Cramer Decision Tree for the Estimation of Toxic Hazard.** J. M. Davidsen¹, J. Schnabel², and S. V. Taylor³.

¹International Organization of the Flavor Industry/Flavor and Extract Manufacturers Association, Washington, DC; and ²Givaudan International SA, Kemptthal, Switzerland. |

#### #2740

**Poster Board Number**

| **RGPearl: Innovative 3D HepaRG Microtissue Model for Safety Assessment.** R. Ayata¹, J. Caron¹, P. Ibanez², E. Person², N. Cabaton³, D. Zalko², J. Bibette¹, and N. Dianati¹.

¹ESPCI Paris, PSL Research University, CBI, Paris, France; ²Toxalim, INRA, Toulouse, France; and ³Cypriot Paris, France. |

#### #2741

**Poster Board Number**

| **Data-Gap Filling Approaches for Cosmetic Ingredients Assessed under the EU Cosmetics Regulation.** T. Clipson, J. Rutkiewicz, and M. Whittaker. ToxServices LLC, Washington, DC. |

#### #2742

**Poster Board Number**

| **Chemical Analysis and Toxicity of VOC Emissions from Hair Care Products for African American Women.** D. Butler, E. Weaver, and S. Hsieh. Trinity Washington University, Washington, DC. |

#### #2743

**Poster Board Number**

| **Cosmetics Exposure Data: Particular Case of Children from Birth.** M. Le Bastard¹, F. Ben Taarit², D. Javel³, and D. Steen³.

¹Eurosafe, Saint Grégoire, France; and ²Biopredic International, Saint Grégoire, France. |

#### #2744

**Poster Board Number**

| **Safety Assessment of Cosmetic Ingredients and Chemicals for Skin Sensitization Using QSAR In Silico Tool.** S. Martin¹, D. Thomas¹, F. Bree¹, A. Sharma¹, and D. Steen³.

¹Eurosafe, Saint Grégoire, France; and ²Biopredic International, Saint Grégoire, France. |

### Abstract #

#### #2745

**Poster Board Number**

| **Hepatic Toxicity of Diethyl Phthalate (DEP): A Systematic Review of Animal Toxicology Studies.** J. Weaver¹, E. E. Yost¹, B. E. Beverly⁴, N. Keshava¹, A. Mudipalli⁴, X. Arzuaga⁵, L. Wang¹, A. Hotchkiss¹, and S. Makris¹.

¹US EPA/NCEA, Research Triangle Park, NC; ²NIEHS, Research Triangle Park, NC; and ³US EPA/NCEA, Washington, DC. |

#### #2746

**Poster Board Number**

| **Formaldehyde and Leukemia: A Case Study Using the IPCS MOA and Human Relevance Frameworks.** R. Gentry¹, T. Greene¹, A. Franzen¹, and C. M. Thompson².

¹Ramboll US Corporation, Monroe, LA; and ²ToxStrategies, Katy, TX. |

#### #2747

**Poster Board Number**

| **Use of Cross-Route Extrapolation to Develop an Oral Cancer Slope Factor for Isoprene and Its Application in a Drinking Water Risk Assessment.** J. Fleischer, and M. H. Whittaker. ToxServices LLC, Washington, DC. |

#### #2748

**Poster Board Number**


#### #2749

**Poster Board Number**

| **Application of Toxicogenomics for the Risk Assessment of the Food Contaminant Acetamide.** R. Nault¹, B. Bals¹, F. Teymourii¹, M. Black¹, M. Andersen¹, S. Krishnan¹, N. Kuravadi¹, S. Kumar¹, K. Kannan¹, K. C. Jayachandra¹, L. Alagappan¹, B. D. Patel¹, B. Gollapudi¹, J. Klaunig⁴, T. Zacharewski⁴, and V. Bringi³.

¹Michigan State University, East Lansing, MI; ²Michigan Biotechnology Institute, Lansing, MI; ³Scitovation, Research Triangle Park, NC; ⁴Syngene International, Bengaluru, India; ⁵Eurofins Adviris, Bengaluru, India; ⁶Exponent, Menlo Park, CA; and ⁷Indiana University Bloomington, Bloomington, IN. |

#### #2750

**Poster Board Number**

| **An Updated Mode-of-Action Analysis for Formaldehyde-Induced Nasal Tumors in Rodents: A Case Study Using the IPCS MOA and Human Relevance Frameworks.** C. M. Thompson¹, and R. Gentry¹.

¹ToxStrategies, Katy, TX; and ²Ramboll US Corporation, Monroe, LA. |

#### #2751

**Poster Board Number**


#### #2752

**Poster Board Number**

| **Health Risks of Chemicals in Consumer Products: A Review.** D. Li¹, and S. Suh².

¹University of Nevada Reno, Reno, NV; and ²University of California Santa Barbara, Santa Barbara, CA. |

#### #2753

**Poster Board Number**

A Health Assessment of Stable (Nonradioactive) Soluble Lanthanum. Q. Zhao. US EPA, Cincinnati, OH.


Development of Exposure Limits for Chemicals Encountered during Aircraft Operation. L. Sweeney1, J. Gearhart2, D. Ott3, and H. Pangburn4. 1UES, Inc., Beavercreek, OH; 2‘Henry M. Jackson Foundation, Wright-Patterson AFB, OH; 3‘US Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH; and 4‘711th Human Performance Wing, Wright-Patterson AFB, OH.


Identification of Points of Departure for Trimethylamine Exposure Guidance Levels. D. Petersen1, P. McGinnis2, and S. Milanez3. 1US EPA, Cincinnati, OH; 2TERA, Cincinnati, OH; and 3ORN, Oak Ridge, TN.


The Escalating Severity of Boron Trifluoride Inhalation Effects Necessitates Prompt Emergency Response Actions. J. C. Lipscomb1, C. Troxel2, G. Henning3, and M. Mcclanahan4. 1US EPA/ORD/NHWR, Cincinnati, OH; 2CM Tox, Lander, WY; 3Front Range Environmental Toxicology, Monument, CO; and 4CD (Retired), Chamblee, GA.


Derivation of a Total Allowable Concentration for Methyl Acetate. S. M. Ciotti1, K. Licko2, and M. H. Whittaker3. 1ToxServices LLC, Washington, DC; and 2‘Water Quality Association, Lisle, IL.

Comparison of Dam Toxicogenomic and Dam/Embryo-Fetal Apical Points of Departure in a Rat Ketoconazole Developmental Toxicity Study. K. Johnson1, E. Costa2, A. Venkatraman3, S. Siriram4, V. Marshall5, and J. LaRocca6. 1Corteva Agriscience, Agriculture Division of DowDuPont, Indianapolis, IN; 2Corteva Agriscience, Agriculture Division of DowDuPont, Mogi Mirim, Brazil; 3Corteva Agriscience, Agriculture Division of DowDuPont, Johnston, IA; and 4Dow Chemical Company, Midland, MI.

The Utility of Informative Prior in Benchmark Dose Modeling for Animal Reduction. K. Shao1, W. A. Chi2, and A. Shapiro3. 1Indiana University, Bloomington, IN; 2Texas A&M University, College Station, TX; and 3Independent Consultant, Durham, NC.

Assessing Somatic and Psychosocial Health Risks of Water Body Contamination on Human Communities in the Niger-Delta, Nigeria. B. C. Akpunne. Redeemer’s University, Osun State, Nigeria.


Derivation of No Significant Risk Levels (NSRLs) for Benzo[k]fluoranthene and Indeno[1,2,3-cd]pyrene Using a Relative Potency Factor (RPF) Approach. B. E. Reid1, S. M. Ciotti2, B. R. Stern3, and M. H. Whittaker4. 1ToxServices, LLC, Washington, DC; and 2BR Stare and Associates LLC, Washington, DC.
Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Regulatory Policy and Methods**

**Chairperson(s):** Paul C. DeLeo, Integral Consulting Inc, Annapolis, MD; Rama Rayavarapu, US FDA, White Oak, MD; and Jill E. Ryer-Powder, Environmental Health Decisions, Ladera Ranch, CA.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM**

**Abstract #**

#2777  
**Poster Board Number**  
**Introducing ATSDR’s SHOWER Model, V1.0.**  
D. Mellard1, K. Scruton1, A. DePasquale1, T. Ahmed2, and W. Morgan2.  
1Agency for Toxic Substances and Disease Registry, Atlanta, GA; 2New Jersey Department of Health, Trenton, NJ; and 3Eastern Research Group, Boston, MA.  
Sponsor: M. Mumtaz

#2778  
**Poster Board Number**  
**Using In Vitro ToxCast Assays to Evaluate Mechanistic Plausibility and Build Confidence in the Selection of Analogues for Quantitative Read-Across: A Case Study on p,p’-Dichlorodiphenyl dichloroethane.**  

#2779  
**Poster Board Number**  
**A Multifaceted Approach to Demonstrate Safety of Aerosolized and Pumped Spray Fragrance Products.**  
K. Magurany. NSF International, Ann Arbor, MI.

#2780  
**Poster Board Number**  
**Rapid Evidence Mapping: Feminine Care Product Case Study.**  
J. Lam1, B. Howard1, A. Tandon1, A. Maharana1, R. Elmore1, B. Merrick1, R. Shah1, and M. Wolfe1.  
Scime LLC, Research Triangle Park, NC; 2NIEHS/NTP, Research Triangle Park, NC; and 3NIEHS, Research Triangle Park, NC.

#2781  
**Poster Board Number**  
**Benchmark Dose (BMD) Modelling Analysis of In Vitro Data of Human Respiratory Epithelium (MucilAir) to Establish a Toxicological Point of Departure (POD).**  
L. Li, P. Mosquin, and D. J. Brambilla. RTI International, Research Triangle Park, NC. Sponsor: P. Hinderliter

#2782  
**Poster Board Number**  
**Comparison of Lung Cancer Risks from Environmental Exposures to Arsenic and from Those Associated with Medical Monitoring Criteria for Smokers.**  

#2783a  
**Poster Board Number**  
**Fipronil Hazard Identification for Occupational and Residential Exposure.**  

**Program Schedule—Wednesday | 203**


**Poster Board Number**

**Better Ways Than the Bioassay: Weight-of-Evidence Approach to Assess Carcinogenicity Potential of Food-Use Pesticides.**

G. M. Hilton1, A. J. Clippinger1, S. Papineni2, R. Buesen3, S. Melching-Kollmuss1, T. Kormos4, N. Ryan1, D. C. Wolf5, R. C. Peffer6, and A. W. Hayes7.

1PETA International Science Consortium Ltd, London, United Kingdom; 2Corteva Agriscience, Agricultural Division of DowDuPont, Indianapolis, IN; 3BASF Corporation, Ludwigshafen am Rhein, Germany; 4Bayer Crop Science LP, Research Triangle Park, NC; 5Syngenta Crop Protection, LLC, Research Triangle Park, NC; and 6University of South Florida College of Public Health, Tampa, FL.

**Poster Board Number**

**California Law First in North America to Require Non-animal Safety Substantiation of Cosmetic Ingredients.**


Physicians Committee for Responsible Medicine, Washington, DC.

**Poster Board Number**

**PBT Assessment Criteria—Critical Tool or Policy Anachronism? An Analysis of Regulatory Approaches for Selection of Chemicals for Expedited Action.**

P. C. DeLeo1, and S. Hartigan1.

1Integral Consulting Inc, Annapolis, MD; and 2American Chemistry Council, Washington, DC.

**Poster Board Number**

**The Nonclinical Innovation and Patient Safety Initiative (NIPSI): Supporting Human-Based Nonclinical Approaches through Advances in Regulation, Policy, Science, Education and Training.**

E. Baker. Physicians Committee for Responsible Medicine, Washington, DC.

**Poster Board Number**

**Comparing Safe Intakes of Elements Established by the Food and Nutrition Board of the Institute of Medicine versus Those Established by the US Environmental Protection Agency.**

J. Ryer-Powder1, and L. Ausman2.

1Environmental Health Decisions, Ladera Ranch, CA; and 2Tufts University, Boston, MA.

**Poster Board Number**

**A Case Study on Parabens Shows the Applicability of New Generation Risk Assessment Based on New Approach Methodologies.**

B. Desprez1, S. Grégoire1, C. Mahoney1, S. Tozer1, M. Dent1, G. Kenna1, A. Schepky1, C. Ellison1, H. Rothe1, D. Keller1, M. Klaric1, N. J. Hewitt1, J. Eilstein1, and G. Ouedraogo2.

1Cosmetics Europe, Brussels, Belgium; 2L’Oreal, Aulnay Sous Bois, France; 3Procter & Gamble Company, Egham, United Kingdom; 4Unilever, Sharnbrook, United Kingdom; 5Gerry Kenna Consulting, Macclesfield, United Kingdom; 6Beiersdorf AG, Hamburg, Germany; 7Procter & Gamble Company, Cincinnati, OH; 8Coty, Darmstadt, Germany; and 9Henkel, Düsseldorf, Germany.

**Poster Board Number**

**Characterizing In Vitro Testes Co-culture for Safety Assessment: Characterization of Testes Longitudinal Cellular Dynamics In Vitro.**

Y. P. Suh, and E. Faustman.

University of Washington, Seattle, WA.

**Poster Board Number**

**Tiered Approach to Chemical Screening Using Both Hazard- and Exposure-Based Evaluation.**

S. Dubrow1, S. Risotto1, and M. Carlo2.


**Poster Board Number**

**Active Machine Learning for Information Retrieval in Systematic Literature Reviews: Addressing Bias and Appropriate Use.**


**Poster Board Number**

**Using Interactive Media to Explore and Explain Hazard Assessment Data.**

C. Suke1, A. Williams1, P. Hartman1, G. Agyeman-Badu1, K. Osborn1, and C. Henning.

1ICF, Columbia, SC; 2ICF, Durham, SC; and 3ICF, Fairfax, SC. Sponsor: J. Wignall.

**Poster Board Number**

**Development of a Joint DOD Roadmap to Promote the Use of New Approach Methodologies in Rapid Chemical Hazard Assessment.**

E. Perkins1, L. Burgoon1, N. Garcia-Reyero1, J. M. Geathart1, M. McAttee1, D. Ott1, H. Pangburn1, E. Reinke1, and L. Stolle1.

1US Army ERDC-Vicksburg, MS; 2US Air Force School of Aerospace Medicine, Wright-Patterson Air Force Base, OH; 3US Army Public Health Center, US Army Medical Command, Aberdeen Proving Ground, MD; and 4711 Human Performance Wing, US Air Force, Wright-Patterson Air Force Base, OH.

**Poster Board Number**

**Updated Problem Formulation for the IRIS Toxicological Review of Inorganic Arsenic.**

J. S. Lee1, A. Davis2, I. L. Druwe1, J. Gift1, and K. Thayer1.

1US EPA, Research Triangle Park, NC; and 2US EPA, Cincinnati, OH.

**Poster Board Number**

**Pilot Testing of a Tiered Approach to Exposure Screening for Products and Their Ingredients.**

M. Ciarlo1, S. Dubrow2, and S. Risotto1.


**Poster Board Number**

**Evaluation of In Utero Exposures to Environmental Pollutants Using Machine Learning Methods.**

J. Wignall1, A. Hotchkiss2, J. Cowden2, A. Davis2, J. Gift1, and K. Thayer1.

1US EPA, Research Triangle Park, NC; and 2US EPA, Cincinnati, OH. Sponsor: J. Wignall.

**Poster Board Number**

**Improving Efficiency of Systematic Reviews through Machine Learning for Automated Record Deduplication and Text Analytics for Iterative Keyword Streamlining.**

K. Magnuson1, M. Cawley2, D. Reilly2, and A. Varghese1.

1ICF, Fairfax, VA; 2University of Michigan, Ann Arbor, MI; 3Pradeep Rajan, LLC, Chapel Hill, NC; and 4ICF, Durham, NC. Sponsor: J. Wignall.

**Poster Board Number**

**Determination of Public Health Risk Levels for Contaminants in Consumer Products.**

B. J. Hughes, V. S. Bhat, and K. D. Cox. NSF International, Ann Arbor, MI.
Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Mechanisms of Kidney Toxicity**

**Chairperson(s):** Julia Tobacyk, University of Arkansas for Medical Sciences, Little Rock, AR; and Monica Valentovic, Marshall University, Huntington, WV.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 9:15 AM–10:45 AM

**Abstract #**

#2801

**Poster Board Number: #2801**

**Comparison of NTP OHAT and US EPA TSCA Study Quality Criteria: Trichloroethylene (TCE) and Congenital Heart Defects (CHDs) as a Case Study.** J. Urban1, D. Wikoff1, M. Suh1, J. Britt1, S. Fitch1, G. Chappell1, and L. Haws1. 1ToxStrategies, Inc., Austin, TX; 2ToxStrategies, Inc., Asheville, NC; 3ToxStrategies, Inc., Mission Viejo, CA; 4ToxStrategies, Inc., Tallahassee, FL; and 5ToxStrategies, Inc., Katy, TX.

#2802

**Poster Board Number: #2802**

**An Acceptable Daily Exposure (ADE) Approach to Protect Home Healthcare Workers Exposed to Common Nebulized Drugs.** E. Frank1, S. Ishau1, A. Maier1, S. Reutman1, and J. Reichard1. 1University of Cincinnati, Cincinnati, OH; and 2Cardno ChemRisk, Cincinnati, OH.

#2803

**Poster Board Number: #2803**

**The Risk Assessment of Pharmaceuticals in the Environment: An Improved Approach.** M. D. Rodda, L. Brunasso Cattarello, E. Gillio Tos, and A. Conto. Chemsafe Srl, Colleretto Giacosa (To), Italy.

#2804

**Poster Board Number: #2804**

**The Extrapolation of a Safe Oral Dose from Lab Animals to Humans Differs by Agency.** J. A. Brickett. Burdock Group, Orlando, FL.

#2805

**Poster Board Number: #2805**

**Considerations on the Use of Chronic or Subchronic Reference Values to Calculate Regional Screening Levels (RSLs) When the Subchronic Value Is More Conservative.** K. L. Salinas. SRC, Inc., East Syracuse, NY.

#2806

**Poster Board Number: #2806**

**Determination of Health-Based Exposure Limits for a Residual Active Substance Based on the Method for Establishing the Permitted Daily Exposure (PDE). Three Years Chemsafe PDE Evaluations’ Analysis.** E. Gillio Tos, M. D. Rodda, A. Iavello, L. Brunasso Cattarello, I. Barbiero, and A. Conto. Chemsafe Srl, Colleretto Giacosa (To), Italy.

#2807

**Poster Board Number: #2807**

**The Eight Key Characteristics of Male Reproductive Toxicants: An Approach for Screening and Evaluating Mechanistic Evidence.** X. Arzuaga1, E. Yost1, M. Smith1, C. Gibbons1, N. Skakkebæk1, B. Beverly1, A. Hotchkiss1, R. Hauser1, R. Pagani1, S. Schrader1, L. Zeise1, and G. Prins1. 1US EPA, Washington, DC; 2US EPA, Durham, NC; 3University of California Berkeley, Berkeley, CA; 4University of Copenhagen, Copenhagen, Denmark; 5NIEHS/NTP, Durham, NC; 6Harvard University, Boston, MA; 7University of Illinois, Chicago, IL; 8CDC/ATSDR (Retired), Atlanta, GA; and 9Cal EPA, Sacramento, CA.

#2808

**Poster Board Number: #2808**

**Biological Effect Points of Departure in the TG-GATES Database Show Exposure Duration Stability and are Predictive of Apical Points of Departure.** R. Hao1, E. Costa2, S. Auerbach2, and K. Johnson2. 1Corteva Agriscience, Agriculture Division of DowDuPont, Indianapolis, IN; and 2NIEHS/NTP, Research Triangle Park, NC.

#2809

**Poster Board Number: #2809**

**How Have the “Final” AEGLS Held Up over the Last 15–20 Years—Do New Studies Support the Values?** S. Milanez. Oak Ridge National Laboratory, Oak Ridge, TN.

#2810

**Poster Board Number: #2810**

**Simulation-Based Assessment of Model Selection Criteria during the Application of Benchmark Dose Method to Quantal Response Data.** K. Yoshii1, H. Nishiura1, K. Inoue2, and A. Hirose1. 1Hokkaido University, Sapporo, Japan; and 2National Institute of Health Sciences, Kawasaki, Japan.

#2811

**Poster Board Number: #2811**

**Freshly Isolated Primary Proximal Tubule Cells as an In Vitro Platform for Nephrotoxicity Testing.** P. Bajaj1, G. Chung1, C. Brown1, Y. Dragan1, and M. Wagoner1. 1Takeda Pharmaceuticals, Cambridge, MA; and 2Newcells Biotech, Newcastle, United Kingdom.

#2812

**Poster Board Number: #2812**

**Lead (Pb2+)–Induced Increases in Calcium Oxalate Crystal Formation Is Ameliorated via lP₃-Receptor Knockdown.** A. J. Branco, and G. M. Landry. Massachusetts College of Pharmacy and Health Sciences, Boston, MA.

#2813

**Poster Board Number: #2813**

**Diglycic Acid, the Toxic Metabolite of Diethylene Glycol, Affects Calcium Homeostasis, Mitochondrial Respiration, and the Aspartate-Glutamate Carrier Citrin in Human Proximal Tubule Cells.** C. N. Jamison, and K. E. McMartin. Louisiana State University Health Sciences Center Shreveport, Shreveport, LA.

#2814

**Poster Board Number: #2814**

**Efflux Pathways of Diglycic Acid in Primary Human Proximal Tubule Cells.** J. Dagenhardt, C. Robinson, and K. McMartin. Louisiana State University Health Sciences Center Shreveport, Shreveport, LA.

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**Program Schedule—Wednesday | 205**
Cytotoxity, Mitochondrial Function, and Endoplasmic Reticulum (ER) Stress Associated with the Radiocntast Agent Diatrizoate (DA) in a Human Proximal Tubular Cell Line.  D. Ward, K. C. Brown, and M. Valenti.  Marshall University School of Medicine, Huntington, WV.

Effects of the SGLT-2 Inhibitor Canagliflozin on Adenine-Induced Chronic Kidney Disease in Rats.  B. Ali, S. Al-Salam, Y. Al Suleimani, M. Al Za’abi, A. Abdelrahman, N. Schupp, and A. Nemmar.  Sultan Qaboos University, Al Khod, Oman; United Arab Emirates University, Al Ain, United Arab Emirates; and University of Düsseldorf, Düsseldorf, Germany.


Cytotoxicity, Mitochondrial Function, and Endoplasmic Reticulum (ER) Stress Associated with the Radiocntast Agent Diatrizoate (DA) in a Human Proximal Tubular Cell Line.  D. Ward, K. C. Brown, and M. Valenti.  Marshall University School of Medicine, Huntington, WV.

Confirmed Biphenyl-Dependent Formation of Calculi Observed in SD Rats Have Been Shown to Initiate Bladder Tumors in Rodents Only.  J. Thomas, J. Kapace, B. R. Hannas, C. L. Zablotny, W. Faber, S. M. Green, and S. Marty.  Dow Chemical Company, Midland, MI; Corteva Agriscience, Newark, DE; WFTC, LLC, Victor, NY; and Eastman Chemical Company, Kingsport, TN.

Effect of 4-Methylpyrazole on Acetaminophen-Induced Nephrotoxicity.  H. Ohan, J. Y. Akakpo, A. Ramachandran, and H. Joeschke.  University of Kansas Medical Center, Kansas City, KS.

Program Schedule—Wednesday | 206
Poster Board Number: 2832

**Effect of LevoSimeDian, an Inodilator, on Cisplatin-Induced Nephrotoxicity in Rats.** B. Ali, Y. Al Sulaimani, A. Abdelrahman, and A. Shafaby. Sultan Qaboos University, Al Khod, Oman.

Poster Board Number: 2833

**Analytical Methods Impact Estimates of TCE’s GSH Conjugation and Risk Assessment.** C. Bevan1, F. Zhang2, J. Bus1, R. Budinsky3, L. Pottenger4, M. Bartels5, and S. Marty6. 1Halogenated Solvents Industry Alliance, Inc., Arlington, VA; 2Dow Chemical Company, Midland, MI; 3Exponent, Midland, MI; and 4Olin Corporation (Retired), Midland, MI.

Poster Board Number: 2834

**Sexual Difference of Renal Pathogenic Responses in Type-1 Diabetic Ove26 Mice during the Aging Process.** W. Wang1,2, S. Jiang1,2, X. Tang1,2, Z. Xu1, and L. Cai1. 1University of Louisville, Louisville, KY; 2First Hospital of Jilin University, Changchun, China; and 3First Affiliated Hospital of Wenzhou Medical University, Wenzhou, China.

Poster Board Number: 2835

**Combined Toxicity of Ochratoxin A and Acrylamide through Phase I and Phase II Pathway in HK-2 and HepG2 Cells.** K. Lee. Korea University, Seoul, Korea, Republic of. Sponsor: J. Lee

Poster Board Number: 2836

**Ochratoxin A Induces Fibrosis and Epithelial to Mesenchymal Transition through TGF-β, Smad 2/3 Signaling Pathways in Human Proximal Tubule HK-2 Cells.** M. Pyo1, S. Chae1, H. Yoo1, H. Lee1, J. Bae2, and K. Lee1. 1Korea University, Seoul, Korea, Republic of; and 2Korean National Food Cluster FOODPOLIS, Iksan, Korea, Republic of.

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**Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Medical Devices**

**Chairperson(s):** Niranjan S. Goud, Cook Medical, Bloomington, IN; and Shelby Skoog, US FDA, Silver Spring, MD.

Displayed: 9:15 AM–4:30 PM  |  Author Attended: 1:30 PM–3:00 PM

**Abstract #**

**Poster Board Number:**

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<th>Abstract #</th>
<th>Title</th>
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<tr>
<td>2837</td>
<td>Evaluation of Substance Identification Results in a Screening Extractables Study</td>
<td>E. M. Sussman, K. Nahan, G. Peng, B. Oktem, and S. Wickramasekara. US FDA, Silver Spring, MD</td>
<td>Sponsor: P. Goering</td>
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<td>2838</td>
<td>A Case Study: Solvent Extract Analysis as a Way to Bridge Biocompatibility Data for a Material Change</td>
<td>Y. Zhou1, M. Posgai1, D. Malek2, and R. Przygoda3. 1Johnson &amp; Johnson, Cincinnati, OH; 2Malek Toxicology Delaware LLC, Greenville, DE</td>
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<td>2839</td>
<td>Derivation of Short-Term Threshold of Toxicological Concern Values for Extractable Chemicals from Medical Devices</td>
<td>P. Alwin1, M. Cabonce1, V. Haase1, J. Lyons1, B. Moeller1, K. Ohneswere1, S. Parker2, and F. Wang1. 1WuXi AppTec Inc., St. Paul, MN; and 2Fresenius Medical Care, Waltham, MA</td>
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<td>2840</td>
<td>Establishing a Tolerable Intake Level for a Medical Device Extractable Using Methyl Isobutyl Ketone as a Surrogate</td>
<td>M. Boylan, B. Wang, and M. H. Whittaker. ToxServices LLC, Washington, DC</td>
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<td>2841</td>
<td>Risk Assessment of Leachable Substances from a Drug Coated Balloon Catheter Classified as a Combination Product</td>
<td>R. Sloboda, D. Sadhu, and L. Desai. Toxikon, Bedford, MA. Sponsor: X. Hie</td>
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<td>2843</td>
<td>Proposal for the Application of Threshold Potency and Severity of Harm When Assessing Toxicological Risk of Non-cancer Systemic Toxicity of Medical Device Constituents</td>
<td>A. Hood. US FDA, Silver Spring, MD</td>
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<td>2844</td>
<td>Predicting Exposure and Toxicity to Nickel Released from Cardiovascular Devices Using Multi-scale Modeling</td>
<td>D. Simon, D. Saylor, V. Chandrasekar, S. Skoog, P. Turner, and E. Sussman. US FDA, Silver Spring, MD</td>
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<td>2845</td>
<td>Chemical Analysis of Medical Device Materials to Probe Material Equivalency</td>
<td>B. Oktem, K. S. Nahan, E. M. Sussman, and S. Wickramasekara. US FDA, Silver Spring, MD. Sponsor: P. Goering</td>
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<td>2846</td>
<td>Correlation of Micro-CT Imaging with Histology Sections, an Important Tool for Understanding the Structural Function and Biological Response to Implantable Medical Devices</td>
<td>L. Guy1, M. Assad1, N. Jackson1, M. Chagnon1, F. Soza1, and G. Leclerc1,2, 1AccelLAB Inc. (a Citoxlab Company), Boisbriand, QC, Canada; and 2University of Montreal, Montreal, QC, Canada</td>
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Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Ocular Toxicity**

**Chairperson(s):** Nathalie Alepee, L’Oréal, Aulnay-sous-Bois, France; and Hajime Kojima, National Institute of Health Sciences, Tokyo, Japan.

**Displayed: 9:15 AM–4:30 PM | Author Attended: 1:30 PM–3:00 PM**

### Abstract #

**#2957**

**Poster Board Number**

**In Vitro Sensitization Assays for Medical Device Industry per ISO-10993-10: Challenges and Opportunities.** B. R. Alzua, S. Howard, and Y. Chen. American Preclinical Services, Minneapolis, MN.

**#2958**

**Poster Board Number**


**#2959**

**Poster Board Number**

**Alternative Tests to Replace Ocular Irritation Animal Test in Medical Device Using Reconstructed Human Corneal Epithelium.** S. Yang1, J. Kwon1, J. Ryu1, C. Pellevoisin1, K. Lim1, B. Kim1, I. Kim1, and K. Kim1. 1Yonsei University College of Dentistry, Seoul, Korea, Republic of; 2EPISKIN, Lyon, France; 3Ewha Womans University, Seoul, Korea, Republic of; 4Keimyung University, Daegu, Korea, Republic of; and 5Korea Testing and Research Institute, Jeollanamdo, Korea, Republic of.

**#2960**

**Poster Board Number**

**Development and Validation of a RHE Model with Impaired Barrier Function to Assess Class IIb Medical Device Biocompatibility**. S. Balzaretti, L. Ceriotti, F. Carriero, and M. Meloni. VitroScreen, Milan, Italy. Sponsor: E. Dufour

**#2961**

**Poster Board Number**

**Assessment of Thrombogenicity of the CardioGard Gen2 Emboli Protection Cannula in a Fully Anti-coagulated Swine Cardiopulmonary Bypass Model.** J. Heitke1, D. Post2, Y. Chen1, T. van Valkenburg1, M. Beckel1, and M. E. Smith1. 1American Preclinical Services, Minneapolis, MN; and 2CardioGard, Medford, MA.

**#2962**

**Poster Board Number**

**Investigation of Neonatal IPA Exposure from IPA-Filled Caps Used to Disinfect Luer Valves.** H. Shin, B. Oktem, and A. Hood. US FDA, Silver Spring, MD.

**#2963**

**Poster Board Number**

**Synergistic Toxicity of a Dental Monomer and Nicotine.** J. Samuels1, T. Tanner1, S. Usvakko1, H. V. Rukke1, and R. Becher1,2. 1NIOM, Oslo, Norway; 2University of Oulu, Oulu, Finland; and 3NIPH, Oslo, Norway.

**#2964**

**Poster Board Number**

**Chemical Characterization of Acrylonitrile Butadiene Styrene 3D Printed Medical Devices.** K. Nahan, E. Sussman, B. Oktem, and S. Wickramasekara. US FDA, Silver Spring, MD. Sponsor: P. Going

**#2965**

**Poster Board Number**

**Aerosol Dispersion Measurement of Lung Mixing Volume.** M. McCawley, T. Petitte, R. Sangani, and S. Hadique. West Virginia University, Morgantown, WV.

**#2966**

**Poster Board Number**

**Color Hazard and Risk Calculator.** D. Saylor, V. Charsadsekar, D. Simon, P. Turner, L. Markley, and A. Hood. US FDA, Silver Spring, MD.

**#2967**

**Poster Board Number**

**Bioabsorbable Polymers in Medical Devices: Effects of Lactic Acid, Glycolic Acid, and pH on Cellular Response and Hemocompatibility.** S. Skoog. US FDA, Silver Spring, MD.

**#2968**

**Poster Board Number**

**The Needleless Injection Site Swabbable Connector (NISSC): A Practical and Reliable Tool That Permits Dogs to Be Exercised on Continuous Intravenous Infusion Studies.** A. Zakaryan, J. Younan, D. Bennamane, and A. Bocan. ITR Laboratories, Montreal, QC, Canada. Sponsor: W. Rudder
| #2962 | Poster Board Number | Predictive Capacity of Vitrigel-ELT (Eye Irritancy Test) Method. | H. Yamaguchi1,2, H. Kojima2, and T. Takezawa1. National Agriculture and Food Research Organization, Tsukuba, Japan; 1Kanto Chemical Co., Inc., Isehara, Japan; and 2National Institute of Health Sciences, Kawasaki, Japan. |
| #2963 | Poster Board Number | Implementation of In Vitro Eye Irritation Test Method Using Skinethic HCE and Between-Laboratory Reproducibility Evaluation in China. | N. Li1, Y. Yang2, G. He3, Y. Li4, P. Wu5, J. Wu6, Q. Qin7, and Z. Cai8. L’Oreal Research & Innovation, Shanghai, China; and 1Guangdong Province Center for Disease Control and Prevention, Guangzhou, China. Sponsor: E. DuFour |
| #2964 | Poster Board Number | Comparing Therapies to Reduce Ocular Sulfur Mustard-Induced Injuries. | D. Durante1, R. Hahn2, and M. Gordon3. Pennsylvania State University, University Park, PA; and 1Ernest Mario School of Pharmacy, Piscataway, NJ. |
| #2965 | Poster Board Number | Regulators of Toxicant-Induced Cornea Epithelial Injury Identified by High-Throughput siRNA Screening. | A. L. Ruff, J. G. Lehman, R. D. Causey, C. V. LaGrasta, K. K. Hoetzter, and J. A. Koenig. USAMRICD, Aberdeen Proving Ground, MD. |
| #2966 | Poster Board Number | Distinctive Roles of NURR1 in Modulating Inflammation, Autophagy and Cell Migration in Human Retinal Pigment Epithelial Cells. | P. Yao, and G. Malek. Duke University, Durham, NC. |
| #2967 | Poster Board Number | Ocular Toxicity Associated with a Structurally Related PI3Kβ Selective Inhibitor. | F. Ajimand1, A. Tomkinson1, S. Perreault1, P. Thomford2, J. Detert2, P. Miller3, J. Ver Hoeve4, P. Miller5, and L. Burns-Naas6. Gilead Sciences, Inc, Foster City, CA; 1Covance, Madison, WI; and 2OSOD, Madison, WI. |
| #2968 | Poster Board Number | Effects of Dosing Time on UNC569-Induced Retinal Toxicity through Mertk Inhibition in Mice. | A. Sayama1, Y. Kinpara1, K. Okado2, M. Yamaguchi1, N. Samata2, M. Imaoka1, K. Kai1, and K. Mori1. Daiichi Sankyo Co., Ltd, Tokyo, Japan; and 1Daiichi Sankyo RD Novare Co., Ltd., Tokyo, Japan. |
| #2969 | Poster Board Number | Evaluation of AAV-Based Gene Delivery to Retinal Cells in Histological Sections in Animal Toxicity Studies. | G. Bondarenko, S. D. Sorden, B. J. Christian, S. Webster, and A. Sharma. Covance Inc, Madison, WI. |

**Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Epigenetics**

**Chairperson(s):** Sarah J. Blossom, University of Arkansas for Medical Sciences, Little Rock, AR; and Suzanne Martos, NIEHS, Research Triangle Park, NC.

**Displayed:** 9:15 AM–4:30 PM  |  **Author Attended:** 10:45 AM–12:15 PM

| #2970 | Poster Board Number | Arsenic Induces Surfactant Protein B Dysregulation through Hypermethylation. | S. Cao, K. Bein, A. Barchowsky, and G. Leikauf. University of Pittsburgh, Pittsburgh, PA. |
| #2972 | Poster Board Number | Arsenite Binds to the RING Finger Domain of ZNF598 E3 Ubiquitin Ligase and Results in the Loss of Regulatory Ubiquitination in Ribosomal Proteins. | L. M. Tom, J. Jiang, and Y. Wang. University of California Riverside, Riverside, CA. |
| #2973 | Poster Board Number | Tissue-Specific Epigenetic Effects of 1,3-Butadiene in a Collaborative Cross Mouse Population. | L. Lewis1, B. Borowa-Mazgaj2, A. de Conti1, G. Chappell1, W. Bodnar1, I. Pogribnya1, and I. Rusyn1. 1Texas A&M University, College Station, TX; 2US FDA/NCTR, Jefferson, AR; and 3University of North Carolina, Chapel Hill, NC. |
| #2974 | Poster Board Number | Effect of Smoking and Air Pollution on Peripheral Blood RNA Modifications in the Beijing Truck Driver Air Pollution Study. | A. Kupsc1, G. Gonzalez1, Y. Zheng1, S. Wang2, D. Chang3, J. Schwartz4, L. Hou5, Y. Wang6, and A. A. Bacchelli1. 1Columbia University Mailman School of Public Health, New York, NY; 2University of California Riverside, Riverside, CA; 3Northwestern University Feinberg School of Medicine, Chicago, IL; 4Peking University Health Science Center, Beijing, China; 5China Institute of Industrial Relations, Beijing, China; and 6Harvard T.H. Chan School of Public Health, Harvard University, Boston, MA. |
Program Schedule—Wednesday
**Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**Poster Session: Gene Regulation**

*Chairperson(s): Bruce Seligmann, BioSpyder Technologies, Inc., Tucson, AZ; and Mohammad Shoeb, CDC/NIOSH, Morgantown, WV.*

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 1:30 PM–3:00 PM
Wedneday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Receptors

Chairperson(s): Jason Matthews, University of Oslo, Oslo, Norway; and Jennifer Schlezinger, Boston University School of Public Health, Boston, MA.

Displayed: 9:15 AM–4:30 PM | Author Attended: 10:45 AM–12:15 PM

Abstract #

#3012 Poster Board Number
Assessing the Role of Arsenite in Disrupting the EGFR Signaling Axis. C. Kim, and B. P. Ceresa. University of Louisville, Louisville, KY.

#3013 Poster Board Number

#3014 Poster Board Number
Characterization of the Aryl Hydrocarbon Receptor-Kruppel-Like Factor 6 Interaction. K. Pereira de Castro. University of Texas Medical Branch, Galveston, TX.

#3015 Poster Board Number

#3016 Poster Board Number

#3017 Poster Board Number
Uterine Goalpha11 Signaling Regulates the Progesterone-Dependent Acquisition of Uterine Receptivity. J. Schaefer, V. de Oliveira, M. Battacharya, S. Radovich, and A. Babwah. Rutgers, The State University of New Jersey, New Brunswick, NJ.

#3018 Poster Board Number
Hepatic Loss of Aryl Hydrocarbon Receptor (AhR), but Not AhR Nuclear Translocator, Mitigates High-Fat Dietary Challenge. N. Gierer, I. Patrakeev, M. Motamed, and C. Ellerink. University of Texas Medical Branch at Galveston, Galveston, TX.

#3019 Poster Board Number
Characterizing Compounds from the Tox21 10K Compound Library as Activators of the Human Constitutive Androstane Receptor. C. Lynch1, B. Mackowiak1, R. Huang1, L. Li1, S. Sakamuru1, H. Wang2, and M. Xia2. 1. NIH/NCATS, Rockville, MD; and 2. University of Maryland Baltimore, Baltimore, MD.

#3020 Poster Board Number
Aryl Hydrocarbon Receptor-Mediated Changes in Histone Mobility. E. Wright, A. Joshi, and C. Ellerink. University of Texas Medical Branch, Galveston, TX.

#3021 Poster Board Number
Triphenyl Phosphate, an Environmental Contaminant, Is a Selective PPARγ Ligand That May Not Be So Brite. S. Kim1, N. Rabhi1, S. Farmer1, and J. Schlezinger1. 1. Boston University School of Public Health, Boston, MA; and 2. Boston University School of Medicine, Boston, MA.

#3022 Poster Board Number

#3023 Poster Board Number
Phenobarbital is an Agonist of Human but Not Mouse PXR. L. Li1, Z. Li1, B. Mackowiak1, S. Heyward1, and H. Wang1. 1. University of Maryland Baltimore, Baltimore, MD; and 2. BioVNT, Baltimore, MD.

#3024 Poster Board Number
AhR2, but Not AhR1α or AhR1β, Is Required for Craniofacial and Fin Development and TCDD-Dependent Cardiotoxicity in Zebrafish. J. P. Souder1, and D. A. Gorelick1. 1. University of Alabama at Birmingham, Birmingham, AL; and 2. Baylor College of Medicine, Houston, TX.

#3025 Poster Board Number
AhR Signaling Regulation by ARNT Isoform Modification and Co-regulator Recruitment. L. Bounser, I. Muro, A. Cooper, B. Chaudhury, K. Gardella, G. Fang, K. Sarkar, and C. Wright. The University of Texas Medical Branch, Galveston, TX.
Poster Session: Inflammation

Chairperson(s): Deepa Ashwarya Kuttappan, University of Connecticut, Storrs, CT; and Lynette K. Rogers, Ohio State University, Columbus, OH.

Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

Display: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM

Abstract #

#3026 Poster Board Number

Regulation of ARNT Alternative Splicing. A. Cooper, M. Kuyumcu-Martinez, and C. Wright. University of Texas Medical Branch, Galveston, TX.

#3027 Poster Board Number


#3028 Poster Board Number

Aryl Hydrocarbon Receptor Activation by Para-benzoquinones Are Substitution Dependent. T. A. Thompson, D. A. Mackenzie, T. Borunda, G. Timmins, and T. Oprea. University of New Mexico Health Sciences Center, Albuquerque, NM.

#3029 Poster Board Number

Microbiome-Derived Aryl Hydrocarbon Receptor Ligands Ameliorate Intestinal Inflammation in Mice. P. Tu, L. Chi, and K. Lu. University of North Carolina at Chapel Hill, Chapel Hill, NC.
Abstract #3041

**Poster Board Number**

Anti-Inflammatory, Immune Modulatory Activity, and Safety Evaluation of Nine Under-Investigated Bioactive South African *Eugenia and Syzygium (Myrtaceae) Species*. 1. Famuyide1, A. Aro2, E. Njoeja1, and L. McGavi1. 1University of Pretoria, Pretoria, South Africa; and 2University of South Africa, Johannesburg, South Africa.

**Poster Board Number**

AhR Ligation Prevents TNBS-Induced Colitis and Pro-inflammatory Response by Regulating miRNA Targeting CD4+Foxp3+ T Regulatory Cells. H. Alrufa, P. Busbee, M. Nagarkatti, and P. Nagarkatti. University of South Carolina School of Medicine, Columbia, SC.

**Poster Board Number**

Tryptamine Treatment Leads to Amelioration of Experimental Autoimmune Encephalomyelitis by Induction of T Regulatory Cells Mediated by Regulation of Gut Dysbiosis. N. Dopkins, M. Nagarkatti, and P. Nagarkatti. University of South Carolina School of Medicine, Columbia, SC.

**Poster Board Number**

Tissue Transglutaminase Cross-Linking Activity Alters Fibrinogen-Mediated Pro-inflammatory Responses in Macrophages. L. G. Poole1, A. K. Kopec1, M. J. Flick2, and J. P. Luyendyk1. 1Michigan State University, East Lansing, MI; and 2Cincinnati Children's Hospital, Cincinnati, OH.

**Poster Board Number**


**Poster Board Number**

Modeling of Ligand-Induced Acute and Chronic Inflammation in the Gastrointestinal Tract Using In Vitro 3D-Human Small Intestinal Tissues. S. Ayehunie1, J. Markus2, T. Landry1, Z. Stevens2, A. Armento1, M. Klausner1, and P. Hayden1. 1MatTek Corporation, Ashland, MA; and 2MatTek IVLSL, Bratislava, Slovakia.

**Poster Board Number**


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**Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall**

**PS Poster Session: Mixtures**

*Chairperson(s): Emily Marques, University of Rhode Island, West Kingston, RI; and Moiz Mumtaz, CDC/ATSDR, Atlanta, GA.*

*Displayed: 9:15 AM—4:30 PM | Author Attended: 3:00 PM—4:30 PM*

**Abstract #**

**#3048**

Poster Board Number

Development of Novel Threshold of Toxicological Concern (TTC) for Botanical Extracts; Botanical-TTC. T. Kawamoto1, A. Fuchs2, R. Fautz3, and O. Morita4. 1Kao Corporation, Ichikai-machi, Japan; and 2Kao Germany GmbH, Darmstadt, Germany. Sponsor: J. Avalos

**#3049**

Poster Board Number

Using the Aggregate Exposure and Adverse Outcome Pathways to Create a Taxonomy of Chemical Interactions Relevant to the Assessment of Human Health and Environmental Risks. P. S. Price1, and J. Leonard2. 1US EPA, Research Triangle Park, NC; and 2Oak Ridge Institute for Science and Education, Oak Ridge, TN.

**#3050**

Poster Board Number

Exposure to a Mixture of Suspected Thyroid Disrupting Chemicals Alters T Cell Differentiation in Xenopus laevis Tadpoles. C. McGuire, F. De Jesus Andino, F. Kim, and J. Robert. University of Rochester Medical Center, Rochester, NY. Sponsor: P. Lawrence

**#3051**

Poster Board Number


**#3052**

Poster Board Number

Virtual Cell Simulations to Probe the Effects of Complex Mixtures from Low to Higher Concentrations. L. D. Burgoon. US Army Engineer Research and Development Center, Apex, NC.

**#3053**

Poster Board Number

A Novel Risk Assessment Model for Incorporating Co-exposures Provides Preliminary Guideline Values for Unregulated Chemicals. E. M. Tanner1, C. Bornehag1, and C. Gennings1. 1Mount Sinai School of Medicine, New York, NY; and 2Karlstad University, Karlstad, Sweden.

**#3054**

Poster Board Number

Multiple Environmental Stressors in Tropical Coastal Ecosystems Exert Biological Responses in *Caenorhabditis elegans*. M. Alcala-Orozco1, K. Caballero-Gallardo1, M. Duran-Izquierdo1, K. Fuentes-Lopez2, J. Osorio-Martinez1, J. De la Rosa1, C. Corada-Fernandez1, and J. Olivero-Verbel1. 1University of Cartagena, Cartagena, Colombia; 2University of Huelva, Huelva, Spain; and 3University of Cadiz, Cadiz, Spain.

**#3055**

Poster Board Number

Human-Relevant Potency-Threshold (HRPT) for ERA Agonism. C. J. Borgert1, J. C. Matthews1, S. P. Baker1, S. L. Levine1, and A. Bone1. 1University of Florida, Gainesville, FL; 2Applied Pharmacology & Toxicology, Inc., Gainesville, FL; 3University of Mississippi School of Pharmacy, University, MS; 4Bayer Crop Science, Chesterfield, MO; and 5Bayer Crop Science, Research Triangle Park, NC.
Effects of Combinatorial Pesticide Treatment on Tox Protein and mRNA Biomarker Profiles in HepaRG Cells. F. F. Schmidt, H. S. Hammer, D. Lichtenstein, A. Mertzt, J. Kalinowski, A. Braeuning, A. Lampen, T. O. Joos, and O. Poetz. ‘Natural and Medical Sciences Institute at the University of Tuebingen, Reutlingen, Germany; SIGNATOEF GmbH, Reutlingen, Germany; German Federal Institute for Risk Assessment, Berlin, Germany; and University of Bielefeld, Bielefeld, Germany.


An Organotin Mixture Inhibits Tributyltin's Adipogenic Differentiation in 3T3-L1 Cells. Y. Pu, V. J. Adomshick, and A. Veiga-Lopez. Michigan State University, East Lansing, MI.

Predicting the Activation of the Androgen Receptor by Mixtures of Ligands Using Generalized Concentration Addition. J. J. Schleizenger, W. Heiger-Bernays, and T. F. Webster. Boston University School of Public Health, Boston, MA.

Identifying Mixture Constituents Responsible for the Majority of Effect: Haloacetic Acid (HAA) Mixtures. J. E. Simmons, C. A. Tripplett, M. J. Plewa, E. D. Wagner, L. L. Aume, and P. I. Feder. US EPA, Research Triangle Park, NC; Battelle, Columbus, OH; and University of Illinois at Urbana-Champaign, Urbana, IL.


Reconstruction of a Novel Primary Human Cell-Based 3D Colon Tissue Model. A. Armento, S. Bogojevic, T. Landry, M. Klauser, P. Hayden, and S. Ayehunie. MatTek Corporation, Ashland, MA; and MatTek Corporation, Natick, MA.


Improving Efficiency in Systematic Reviews by Automated Data Extraction: A Case Study Using NTP’s SRIIE Challenge Dataset. A. Varghese, Y. Ahmad, and A. Williams. ICF, Durham, NC; and ICF, Fairfax, VA. Sponsor: J. Wignall


Program Schedule—Wednesday | 215
#3070 Poster Board Number.......................................................... P607


#3071 Poster Board Number.......................................................... P608

A Practical High-Throughput Co-culture Plate to Screen Paracrine and Endocrine Interactions. B. P. Johnson1,2, J. Jimenez-Torres1,2, M. Morgan1, and D. Beebe1,2. University of Wisconsin-Madison, Madison, WI; and 3Onexio Biosystems LLC, Madison, WI.

#3072 Poster Board Number.......................................................... P609

Evaluation of Transdermal Drug Delivery and Toxicity in a Microphysiological Body-on-a-Chip System. C. Pestana Pires de Mello1, C. McAleen2, C. Carmona-Moran1, C. Oleaga1, A. Riu1, R. Note1, S. Teissier1, and J. J. Hickman1. University of Central Florida, Orlando, FL; 2Hesperos Inc., Orlando, FL; and 3L’Oreal Research and Innovation Division, Aulnay-sous-Bois, France.

#3073 Poster Board Number.......................................................... P610

Comparing Tanimoto Coefficient Values Calculated by Toxmatch and OECD QSAR Toolbox. R. Galante, M. Zachary, and M. H. Whitaker. ToxServices LLC, Washington, DC.

#3074 Poster Board Number.......................................................... P611


#3075 Poster Board Number.......................................................... P612

Combining Trans-Epithelial Electrical Resistance (TEER) Measurements with a Microfluidic Gut-on-a-Chip System for Real-Time Assessment of Drug-Induced Barrier Disruption. J. W. Lowman1, R. van Vught1, E. Naumovska2, S. J. Trietsch1, A. Nicolas1, H. Lanz2, D. Kurek2, K. Bircak1, and P. Vulto1. 1Mimetas, Gaithersburg, MD; and 2Mimetas, Leiden, Netherlands.

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Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Epidemiology and Human Population Studies

Chairperson(s): Gunnar Boysen, University of Arkansas for Medical Sciences, Little Rock, AR; and Darryl B. B. Hood, Ohio State University, Columbus, OH.

Displayed: 9:15 AM–4:30 PM | Author Attended: 10:45 AM–12:15 PM

Abstract #

#3076 Poster Board Number.......................................................... P617

Neurodevelopmental Effects of Prenatal Co-exposure to Heavy Metals and Phthalates. D. Sarigiannis1, K. Polanska2, W. Hanke2, A. Gabrieli1, N. Papaioannou1, and S. Karakiitsios1. Aristotle University of Thessaloniki, Thessaloniki, Greece; and 2Nofer Institute of Occupational Medicine, Lodz, Poland.

#3077 Poster Board Number.......................................................... P618

Application of the Public Health Exposome Framework to Estimate Endo-Phenotypes of Resilience in a Model Ohio African-American Woman’s Cohort. P. Clifuentes1, J. Reichard2, W. Im3, S. Smith1, C. Colen1, C. Giurgescu1, K. Williams1, S. Gillespie1, P. Juarez3, and D. Hood1. Ohio State University, Columbus, OH; 2University of Cincinnati, Cincinnati, OH; and 3Meharry Medical College, Nashville, TN.

#3078 Poster Board Number.......................................................... P619

Dietary Influence on the Metabolism and Biological Effects of Arsenic Exposure: A Double-Blind, Placebo-Controlled Folate Supplementation Trial in Inner Mongolia, China. X. Chen1, X. Guo1,2, P. He1, J. Nie1, G. Mao3, Z. Liu1, D. Aga1, H. Wui1, and X. Ren1. 1State University of New York at Buffalo, Buffalo, NY; 2Inner Mongolia Medical University, Hohhot, China; and 3Wenzhou Medical University, Wenzhou, China.

#3079 Poster Board Number.......................................................... P620

Strategies to Analyze Risk of Lead Contamination in Drinking Water in Mississippi: Contributions from Community-Based Research. K. L. Willett1, S. S. Ott1, J. J. Green1, L. C. Woo1, M. A. Fratesi1, R. Haggard1, C. Janasie1, C. J. Surbeck1, C. Thornton1, K. Smith1, J. Rhymes1, and K. T. Good4. University of Mississippi, MS; Foundation for the MidSouth, Jackson, MS; TriCounty Workforce Alliance, Clarksdale, MS; and Working Together Jackson, Jackson, MS.

#3080 Poster Board Number.......................................................... P621


#3081 Poster Board Number.......................................................... P622

A Case-Control Study of Newborn Hearing Screen Outcomes and Neonatal Dried Blood Spot Metals. K. Carlson1, S. Park2, N. Basu2, and R. Neitzel1. University of Michigan, Ann Arbor, MI; and 2McGill University, Montreal, QC.

#3082 Poster Board Number.......................................................... P623

Amniotic Fluid Exposomics Identifies Novel Prenatal Exposures and Metabolic Signatures in Relation to Preterm Birth: A Prospective Case-Control Study. Y. Lai. University of North Carolina at Chapel Hill, Chapel Hill, NC. Sponsor: K. Lu

#3083 Poster Board Number.......................................................... P624

Diabetes and Persistent Organic Pollutants in the Anniston Community Health Survey Follow-Up. M. Pavuk1, T. Serio1, M. Cave2, and L. Bimbaum3. 1CDC/ATSDR, Atlanta, GA; 2University of Louisville School of Medicine, Louisville, KY; and 3NIEHS/NTP, Research Triangle Park, NC.
#3084 Poster Board Number........................................................................................................P625
Urinary Metals and Pre-eclampsia in the LIFECODES Birth Cohort: A Single-Contaminant and Mixture-Based Approach.  
P. A. Bommarito1, S. S. Kim1, J. D. Meeker1, R. C. Fry2, D. E. Cantonwine1, T. F. McElrath1, and K. K. Ferguson1. 1University of North Carolina at Chapel Hill, Carrboro, NC; 2NIH, Research Triangle Park, NC; 3University of Michigan School of Public Health, Ann Arbor, MI; and 4Harvard Medical School, Boston, MA.

#3085 Poster Board Number........................................................................................................P626

#3086 Poster Board Number........................................................................................................P627
Military Occupation as a Surrogate Measure of Potential Exposure to Fuels and Associated Long-Term Health Effects.  T. D. Irons1, W. J. Culpepper1, F. Akhtar1, J. Escobar2, E. Iishi1, J. Leon1, and A. Schneiderman1. 1Department of Veterans Affairs, Washington, DC; and 2United States Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH.

#3087 Poster Board Number........................................................................................................P628
Alterations in Profiles of Metabolome and Gut-Microbiome Due to Exposure of PCBs and p,p'-DDE in C-MACH Cohort.  A. Eguchi1, K. Sakurai1, T. Kato1, Y. Nakaniishi1, H. Tanabe1, Y. Sato1, M. Yamamoto1, M. Watanabe1, H. Ohno1,2, and C. Moei1. 1Chiba University, Chiba, Japan; 2RIKEN Center for Integrative Medical Sciences, Kanagawa, Japan; and 3Kanagawa Institute of Industrial Science and Technology, Kanagawa, Japan.

#3088 Poster Board Number........................................................................................................P629

#3089 Poster Board Number........................................................................................................P630
Evaluating the Impact on IQ of Short-Term Increases in Blood Lead Levels.  T. Bowers, and X. Liu. Gradient, Cambridge, MA.

#3090 Poster Board Number........................................................................................................P631
Environmental and Genetic Drivers of Telomere Length Variation in Ethnically Diverse Africans.  M. McQuillan1, M. Hansen1, A. Ranciari1, E. Mbanue1, S. Fan2, W. Beggs1, A. Avi2, and S. A. Tishkoff1. 1University of Pennsylvania, Philadelphia, PA; and 2New Jersey Medical School, Newark, NJ. Sponsor: P. Beck

#3091 Poster Board Number........................................................................................................P632
Examination of the US FDA Adverse Event Reporting System to Assess the Halo Effect and Potential Reporting Bias.  K. Towle1, D. Drechsel2, E. Fung3, D. Paustenbach4, and A. Monnot1. 1Cardno ChemRisk, San Francisco, CA; 2Cardno ChemRisk, Boulder, CO; 3Cardno ChemRisk, Alisha Viejo, CA; and 4Cardno ChemRisk, Jackson, WY.

#3092 Poster Board Number........................................................................................................P633
Increased Opioid-Related Overdose Deaths Are Associated with Increased Abuse of Illicit Fentanyl in the United States.  S. Fang1, and F. Liu1. 1Winston Churchill High School, Potomac, MD; and 2US FDA/NCTR, Jefferson, AR.

#3093 Poster Board Number........................................................................................................P634
The Risk of Lung Cancer Due to Occupational Exposure to Talc: A Meta-analysis of Miners and Millers.  S. M. Benson1, A. Bowman1, K. A. Keeton1, R. C. Reid1, E. S. Fung1, and N. S. Egnot1. 1Cardno ChemRisk, Pittsburgh, PA; 2Cardno ChemRisk, Chicago, IL; and 3Cardno ChemRisk, Orange County, CA.

#3094 Poster Board Number........................................................................................................P635
Five-Year Lung Cancer Mortality Risk Analysis and Topography in Xuan Wei: A Spatio-temporal Correlation Analysis.  J. Li1,2, W. Guo1, J. Ran1, R. Tang1, H. Lin1, Y. Huang1, L. Tian1, and L. Chen1. 1New York University, New York, NY; 2University of Hong Kong, Hong Kong, Hong Kong; 3University of Oxford, Oxford, United Kingdom; 4Sun Yat-sen University, Guangzhou, China; and 5Kunming Medical University, Kunming, China.

Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Biotransformation and Cytochrome P450 Metabolism**

**Chairperson(s):** Danica DeGroot, US EPA/NCTR, Research Triangle Park, NC; and Gary Rankin, Marshall University, Huntington, WV.

**Displayed:** 9:15 AM–4:30 PM | **Author Attended:** 3:00 PM–4:30 PM

**Abstract #**

#3095 Poster Board Number........................................................................................................P647

#3096 Poster Board Number........................................................................................................P648
Comparison of Cytochrome P450-Related NADPH Oxidase Activity in Rat Liver Microsomes Expressing CYP2E1, CYP1A1/2, and CYP3A1/2.  V. Mishin1, N. Tryon1, D. Heck1, D. Laskin1, and J. Laskin1. 1Ernest Mario School of Pharmacy, Piscataway, NJ; 2Rutgers, The State University of New Jersey School of Public Health, Piscataway, NJ; and 3New York Medical College, Valhalla, NY.
Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

**Poster Session: Disposition and Pharmacokinetics**

Chairperson(s): Wei Qu, NIEHS/NTP, Research Triangle Park, NC; and John Szilagyi, University of North Carolina at Chapel Hill, Chapel Hill, NC.

Displayed: 9:15 AM–4:30 PM | Author Attended: 3:00 PM–4:30 PM

Abstract #

#3097 Absorption, Distribution, Metabolism, and Excretion of 10 CYP2A6 from Different Sources by Assessing Nicotine C-Oxidation Activities.  H. Wang, X. Li, L. Xu, K. Liu, H. Liu, and F. Xie. Zhengzhou Tobacco Research Institute of CNTC, Zhengzhou, China. Sponsor: R. Meng


#3099 Effect of the CYP2C8*3 Variant on Asthma Symptom Control and Montelukast Efficacy.  M. Almestica, C. E. Deering-Rice, and C. A. Reilly. University of Utah, Salt Lake City, UT.


#3102 Hypersensitivity to Cisplatin and Gentamycin Induced Nephrotoxicity in Mice with Decreased Expression of the NADPH-Cytochrome P450 Reductase.  L. Ding, Q. Zhang, and X. Ding. University of Arizona, Tucson, AZ.

#3103 Comparative Analysis of Epigenetic and Gene Expression Levels Using hGFP1A1 Transgenic Mice with Different Mouse Strains Exposed to 3-Methycholanthrene.  P. Motiaturi, W. Jiang, L. Wang, and M. Bhagavathula. Baylor College of Medicine, Houston, TX.

#3104 The Emerging Contaminant 3,3'-Dichlorobiphenyl (PCB-11) Impedes AhR Activation and Cyp1a Activity to Modify Embryotoxicity of AhR Ligands in the Zebraspis Embryo Model (Danio rerio).  M. A. Roy1, K. E. Sant1,2, O. L. Venezia1, and A. R. Timme-Laragy1. University of Massachusetts Amherst, Amherst, MA; and 2San Diego State University, San Diego, CA.

#3105 Effects of Four Marine Toxins: Ciguatoxin, Maitotoxin, Brevetoxin, and Saxitoxin on Mouse Liver Detoxification Enzymes.  S. González Santiago1, and B. Jiménez Vélez2. 1University of Puerto Rico, San Juan, PR; and 2University of Puerto Rico Medical Science Campus, San Juan, PR.


#3107 Evolutionary Patterns in Expression of UDP-Glucuronosyltransferases in Vertebrates.  P. van den Hurk. Clemson University, Clemson, SC.

#3108 Poster Board Number

#3109 Absorption, Distribution, Metabolism, and Excretion of Didecyl Dimethyl Ammonium Chloride (DDAC) in Rats.  B. L. Burruss, L. C. Fisher, and K. A. Hostetler. Toxicology Regulatory Services, A SafeBridge Consultants Company, Charlottesville, VA.

#3110 Absorption, Distribution, Metabolism, and Excretion of Alkyl Dimethyl Benzyl Ammonium Chloride (ADBC) in Rats.  L. C. Fisher, B. L. Burruss, and K. A. Hostetler. Toxicology Regulatory Services, A SafeBridge Consultants Company, Charlottesville, VA.

#3111 Metabolite Profiling and Identification in Dog Plasma and Tissues of Edsalonehexen (CAT-1004), a Conjugate of Docosahexaenoic Acid (DHA) and Salicylic Acid (SA) Using Smart Linker Technology.  R. Dagher1, M. Fonsi1, C. Erratico2, H. Liu1, R. Forster1, and A. Nichols1. 1Catabasis Pharmaceuticals, Inc., Cambridge, MA; and 2Citoxlab, Evreux, France.

#3112 2,4,6-Tribromophenol Disposition and Kinetics: Effects of Dose, Route, Sex, and Species.  G. A. Knudsen1, A. W. Trexler1, A. C. Richards1, S. M. Hall1, M. F. Hughes2, and L. S. Birnbaum3. 1NIEHS, Research Triangle Park, NC; and 2US EPA/NHEERL, Research Triangle Park, NC.
Pharmacokinetics of a Lymphatic-Targeted Macromolecular Emtricitabine Prodrug. D. M. Stevens1, P. Adiseshaiah1, S. Skoczyn1, K. S. Snapp1, M. B. Schuweiler1, S. E. McNeil1, M. Dobrowolska1, K. Busman-Sahay1, C. Sykes1, M. Cottrell1, J. Estes2, A. D. Kashuba3, and S. T. Stern4. Frederick National Laboratory, Frederick, MD; 3Oregon Health & Science University, Beaverton, OR; and 4University of North Carolina at Chapel Hill, Chapel Hill, NC.

1,3-Dichloropropene Kinetics and Dose Proportionality in Mice Exposed by Nose-Only Inhalation and Its Implication for Risk Assessment. M. W. Himmelstein1, S. P. Ng1, M. J. Hackett1, M. R. Perry1, J. A. Taylor1, M. J. Bartels1, J. W. Green1, C. Walker1, and Z. Yan2. Corteva Agrisciences, Agriculture Division of DowDuPont, Newark, DE; Battelle, Columbus, OH; ToxMetrics, Midland, MI; Corteva Agrisciences, Agriculture Division of DowDuPont, Johnston, IA; and 3Corteva Agrisciences, Agriculture Division of DowDuPont, Indianapolis, IN.

Toxicokinetics of Bisphenol S in Male and Female Harlan Sprague Dawley Rats and B6C3F1/N Mice following Oral Gavage Administration. S. R. Black1, T. R. Fennell1, P. R. Patel1, S. L. Watson1, B. L. Fletcher1, S. D. Cooper1, M. A. Silinski1, R. A. Fernando1, V. G. Robinson1, V. Sutherland1, and S. Waidyanatha1. RTI International, Research Triangle Park, NC; and NIEHS/NTP, Research Triangle Park, NC.

Comparison of Plasma Pharmacokinetics of Intravenous and Intramuscular Administration of Midazolam in Male Sprague-Dawley Rats. K. Walker1, M. Pennington1, T. Armstrong1, S. Litvin1, M. Stone1, C. Schultz1, S. O’Brien1, E. Kundrick1, B. Marrero-Rosado1, and L. Lumley1. USAMRICD, Aberdeen Proving Ground, MD; and DSTL, Porton Down, Wiltshire, United Kingdom. Sponsor: J. Younck.

Cyfluthrin Toxicokinetics in Plasma and Nervous Tissues after Oral Administration in Rats. A. Anadón1, J. Rodríguez1, A. T. O’Neal3, M. Martinez1, B. Lopez-Torres1, M. Martinez-Larrañaga1, and M. Martinez1. Universidad Complutense de Madrid, Madrid, Spain.


Comparative Toxicokinetic Study of Three Bisphenols (BPA, BPS, and BPF) in a Sheep Pregnancy Model. J. Gingrich1, Y. Fu1, R. Ehrhardt1, R. Karthikraj1, C. K. Kannari2, and A. Veiga-Lopez1. 1Michigan State University, East Lansing, MI; and 2Wadsworth Center, New York State Department of Health, Albany, NY.

In Vitro ADMET and Pharmacokinetic Screening of Novel Epac1 Inhibitors for the Treatment of Rickettsiosis. L. V. Iyer1, A. M. Furimsky1, P. Byrge1, K. O’Loughlin1, L. Rauchsch1, K. Kim1, L. Tang1, R. Sweezy2, N. Ye3, Y. Zhu3, F. C. Meil1, Z. Liu1, P. Wang3, J. Zhou1, X. Zheng3, and T. Parman1. 1SRI International, Menlo Park, CA; 2University of Texas Medical Branch, Galveston, TX; and 3University of Texas Health Science Center, Houston, TX.

Comparisons of High-Dose Test Agent Levels in Plasma and Liver over 28 Days of Dosing. J. Davis1, R. Council-Troche1, J. Hinckley1, S. Werre1, K. Boes1, B. Jortner1, M. Ehrlich1, A. Leber1, R. Hontecillas1, and J. Basso-Ganya-Riera1. Virginia-Maryland College of Veterinary Medicine, Blacksburg, VA; and 3Landos Biopharma, Blacksburg, VA.

Development and Validation of an Analytical Method for Quantitation of Alpha-Pinene Oxide in Rodent Blood and Mammary Tissue by GC/MS. T. Fennell1, S. Watson1, R. Fernando1, V. G. Robinson1, and S. Waidyanatha1. RTI International, Research Triangle Park, NC; and NIEHS/NTP, Research Triangle Park, NC.

Assessing Delivery Efficiency of Nanoparticles to Tumors in Tumor-Bearing Mice Using a Physiologically Based Pharmacokinetic Modeling and Simulation Approach. Y. Cheng1, J. Riviere1, N. Monteiro-Riviere1, and Z. Lin1. Kansas State University, Manhattan, KS.

Physiologically-Based Pharmacokinetic Modeling for Optimization of Sustained Release Buccal Formulations of Clonidine. M. Li1, H. Jiang1, Y. Jin1, J. Fohey1, and V. Walsh1. Covance Laboratories Inc., Madison, WI; and 3Beijing Institute of Radiation Medicine, Beijing, China.

Characterization of Acute Impairment Effects from Inhalation of Ethanol during E-cigarette Use. S. L. More1, S. A. Thornton1, A. Sharma1, J. R. Maskrey1, E. S. Fung2, E. J. de Gandiaga2, T. J. Cheng2, A. K. Madi1, and A. J. Bernal3. Cardno ChemRisk, Aliso Viejo, CA; and 3Cardno ChemRisk, Pittsburgh, PA.

Optimization of Metabolic Parameters Using Physiologically Based Pharmacokinetic (PBPK) Modeling and Vapor Uptake Inhalation Chloroform (CHCl3) Data in F344 Rats. M. Evans1, C. Eklund1, D. Williams1, Y. Sey1, and J. Simmons1. US EPA, Research Triangle Park, NC; and 3Oak Ridge Institute for Science and Education, Oak Ridge, TN.

Developing Databases and Models to Integrate Toxicokinetic Data for Human Health Assessment. J. Arnot1, J. Armitage2, K. Foster3, A. Looky1, A. Sangioni1, L. Bertato1, I. Casartelli1, L. Toots1, M. Embry1, and E. Papa1. ARC Arnot Research and Consulting, Toronto, ON, Canada; 2University of Toronto, Toronto, ON, Canada; 3AES Armitage Environmental Sciences, Ottawa, ON, Canada; Karen Foster Environmental Research, Peterborough, ON, Canada; University of Insubria, Varese, Italy; and HESI, Washington, DC.

Poster Session: Endocrine Toxicology

Chairperson(s): Remi G. Bars, Bayer SAS, Sophia-Antipolis Cedex, France; Andrea Hindman, Silent Spring Institute, Newton, MA; and Christopher K. Thompson, Virginia Tech, Blacksburg, VA.

Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Endocrine Toxicology

Abstract #

#3129  
**Poster Board Number**  
Cell Model for Studying Nucleoside Transporters, a Key Component of the Blood-Testis Barrier.  

#3130  
**Poster Board Number**  
Interaction of Organophosphate Flame Retardants with the MDR1 Efflux Transporter.  
D. Viramontes1, S. M. Marcon1, X. Wen2, J. R. Richardson3, B. B. Bickey3, and L. M. Aleksunes1. University of Nevada Reno, Reno, NV; 2Rutgers, The State University of New Jersey, Piscataway, NJ; and 3Florida International University, Miami, FL.

#3131  
**Poster Board Number**  
Pharmacological Inhibition of HDAC Enzymes Up-Regulates Hepatic Efflux Transporter Expression in Mice.  

#3132  
**Poster Board Number**  
Enhanced Histone Acetylation and Renal Efflux Transporter Expression in Mice Treated with Histone Deacetylase Inhibitors.  

#3133  
**Poster Board Number**  
Brain Region-Specific Histone Acetylation and Up-Regulation of Mdr1 and Bcrp Transporters in Mice.  
D. You1, H. Shin1, F. Mosaad2, J. R. Richardson3, and L. M. Aleksunes1. Rutgers, The State University of New Jersey, Piscataway, NJ; and 3Florida International University, Miami, FL.

#3134  
**Poster Board Number**  
Area under Curve and Maximum Concentration Exposures and Time-Kill Response Relationships In Vitro Hollow Fiber Infection Model System.  
N. Garimella. US FDA, Silver Spring, MD.

#3135  
**Poster Board Number**  
A. Shah, S. J. Schriever, and K. E. Howard. US FDA, Silver Spring, MD.

#3136  
**Poster Board Number**  
Where is the Chemical?! The In Vitro Disposition of Tox21 Chemicals.  

#3137  
**Poster Board Number**  
QSAR Modeling of Caco-2 Permeability for the Estimation of Oral Bioavailability.  
G. Honda1,2, R. Sayre2, C. Strock3, D. Angus3, R. Dinello1, R. Pearce1,2, R. Thomas, and J. Wambaugh. 1US EPA/NCT, Research Triangle Park, NC; 2Oak Ridge Institute for Science and Education, Oak Ridge, TN; and 3Cyprotec US LLC, Watertown, MA.

#3138  
**Poster Board Number**  
An Open-Source, Generalized Workflow for IVIVE Analysis.  
X. Chang1, K. Mansouri, F. Hermes, J. Phillips, S. M. Bell, D. G. Allen, W. Casey, and N. C. Kleinsteuber1. 1ILS, Research Triangle Park, NC; 2Scione LLC, Research Triangle Park, NC; 3NIHES, Research Triangle Park, NC; and 4NIH/NICEATM, Research Triangle Park, NC.

#3139  
**Poster Board Number**  
Integration of Toxicokinetics into Toxicity Studies: TK Decision Tree/Framework for Agrichemicals.  
J. Y. Domoradzki, M. W. Himmelstein1, L. Murphy1, R. T. Mingoia1, M. P. Chan1, and T. Claire1. 1Corteva Agriscience, Agricultural Division of DowDupont, Indianapolis, IN; and 2Corteva Agriscience, Agricultural Division of DowDupont, Newark, DE.

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**Displayed: 9:15 AM–4:30 PM | Author Attended: 10:45 AM–12:15 PM**

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#3140  
**Poster Board Number**  
Ca2+-Dependent Gene Expression in Response to PCB95 and Triclosan Exposure.  
J. Alfaro, and E. Holland. California State University Long Beach, Downey, CA.

#3141  
**Poster Board Number**  
Calcium Signaling Disruption Causes Changes in Gene Transcription as Mediated by DREAM.  
N. Schuko1, J. Alfaro1, J. Lepe1, and E. Holland1. 1California State University Long Beach, Downey, CA; and 2University of California Irvine, Irvine, CA.

#3142  
**Poster Board Number**  
Assessment of Avobenzone, Ensulizole, Homosalate, and Padimate-O in Endocrine Disruptor Screening Panel Studies.  
B. McIntyre1, L. Zorrilla1, S. Borchhoff1, and P. Foster1. 1NIHES/NTP, Research Triangle Park, NC; 2Bayer CropScience, Research Triangle Park, NC, and 3ToxStrategies Inc., Cary, NC.
Poster Board Number: P722
Toxic Effects of UV Filter Chemicals (Benzophenones and Octocrylene) on Zebrafish Embryo-Larvae. K. Chan, Q. Meng, and K. Yeung. Chinese University of Hong Kong, Sha Tin, Hong Kong.

Poster Board Number: P723
CLARITY-BPA Core Study: Analysis for Non-monotonic Dose-Responses. M. Badding, L. Barraj, A. Williams, and R. Reiss. Exponent, Alexandria, VA; and Exponent, Washington, DC.

Poster Board Number: P724

Poster Board Number: P725
In Vitro and In Vivo Evidence Suggest Estrogenic Potency of Cyanobacterial Microcystin-LR via Stimulating Steroidogenesis. L. Li, J. Hou, Y. Su, W. Lin, and D. Anderson. Huazhong Agricultural University, Wuhan, China; Hubei Provincial Engineering Laboratory for Pond Aquaculture, Wuhan, China; and Woods Hole Oceanographic Institution, Woods Hole, MA.

Poster Board Number: P726

Poster Board Number: P727

Poster Board Number: P728

Poster Board Number: P729

Poster Board Number: P730
In Vivo High-Throughput Screening System for Estrogenic Endocrine Disruptors Using a Fluorescently-Labeled Zebrafish Line. A. Abdelmaleiem, and M. Mukai. Cornell University, Ithaca, NY.

Poster Board Number: P731
Targeted Expression Profiling Identifies Potential ER Independent Mechanisms of Mammary Toxicants. V. De La Rosa, M. Milanovic, E. Lehnert, M. Jordanski, C. Vulpe, and R. Rudel. S. Silent Spring Institute, Newton, MA; Seven Bridges Genomics, Cambridge, MA; University of Belgrade, Belgrade, Serbia; and University of Florida, Gainesville, FL.

Poster Board Number: P732
Sex-Specific Associations of Prenatal Exposure to Persistent Organic Pollutants with Placental DNA Methylation of Thyroid Hormone Related Genes among Koreans. S. Kim, Y. Cho, S. Won, J. Ku, H. Moon, J. Park, G. Choi, S. Kim, and K. Choi. Seoul National University of Science & Technology, Seoul, Korea; Republic of; University of Montana, Missoula, MT; Seoul National University, Seoul, Korea, Republic of; Seoul National University College of Medicine, Seoul, Korea, Republic of; Hanyang University, Ansan, Korea, Republic of; Soonchunhyang University, Asan, Korea, Republic of; and Soonchunhyang University, Seoul, Korea, Republic of.

Poster Board Number: P733

Poster Board Number: P734

Poster Board Number: P735

Poster Board Number: P736

Poster Board Number: P737
Development of an In Vitro Human Thyroid Microtissue Model for Chemical Screening. C. Deisenroth, V. Soldatow, W. Stewart, C. Brinkman, E. LeCluyse, and R. Thomas. US EPA, Durham, NC; and LifeNet Health, Virginia Beach, VA.

Poster Board Number: P738


Brain Damage and Neurological Symptoms Induced by T-2 Toxin in Rat Brain. X. Wang, Z. Yuan, A. Anadon, and D. Peng. National Reference Laboratory of Veterinary Drug Residues (HZAU) and MAO Key Laboratory for Detection, Wuhan, China; and ‘Universidad Complutense de Madrid, Madrid, Spain.

Hypothesis-Driven Weight-of-Evidence Analysis for the Endocrine Disruption Potential of Benzene. C. J. Borgert1,2, and E. M. Mihaiuch1,4. ‘University of Florida, Gainesville, FL; ‘Applied Pharmacology & Toxicology, Inc., Gainesville, FL; ‘Duke University, Durham, NC; and ‘Environmental & Regulatory Resources, LLC, Durham, NC.


Sex-Dependent Alterations of Energy Homeostasis Due to Organophosphate Flame- Retardant Exposure in an Adult Mouse Model of Diet-Induced Obesity. G. Vail, A. Maeng, A. Yasrebi, and T. Roepke. Rutgers, The State University of New Jersey, New Brunswick, NJ.

Acute Toxic Effects of Polyethylene Microbeads on Adult Zebrafish. K. Chan, C. Nak, and K. Yeung. Chinese University of Hong Kong, Sha Tin, Hong Kong.


Wednesday, March 13, 9:15 AM to 4:30 PM, CC Exhibit Hall

Poster Session: Alternatives to Mammalian Models III

Chairperson(s): David Allen, ILS, Research Triangle Park, NC; and Shirisha Chittiboyina, Purdue University, West Lafayette, IN.

Displayed: 9:15 AM–4:30 PM | Author Attended: 9:15 AM–10:45 AM

Abstract #

Poster Board Number


Effects of Polybrominated Diphenyl Ether-47 (BDE-47) on Sensory Avoidance Behaviors in Caenorhabditis elegans. K. Morrison, J. Sands, and C. Dodd. Fort Valley State University, Fort Valley, GA.

Evaluating the Potential for MC-Induced Transgenerational Toxicity through Epigenetic Modifications. C. E. Moore, and P. Alliard. University of California Los Angeles, Los Angeles, CA.
Wednesday, March 13, 9:30 AM to 4:30 PM, CC Room 336

Research Funding Insights

Hosted by: Career Resource and Development Committee

Representatives from federal agencies will be available in the Research Funding Insights Room for individual conversations. Make an appointment with your Program Officer in advance or check the posted schedule to meet with a staff member who can discuss aspects of scientific review or specific grant opportunities. New investigators are especially encouraged to meet with program staff.
Wednesday, March 13, 10:30 AM to 11:30 AM, CC Room 339

Exhibitor-Hosted Session: Case Studies and Challenges of Risk Assessments Using Physical and/or Chemical Information per ISO 10993 Part 1

Presented by: WuXi AppTec

In this session, we will outline case studies that show challenges for risk assessment due to incomplete and/or limited chemical characterization. Case studies will demonstrate how risk assessment is affected when limited existing chemical characterization is provided, when compounds are not identified, and an example of a risk assessment with a complete chemical characterization.

Wednesday, March 13, 10:30 AM to 11:30 AM, CC Room 337

Exhibitor-Hosted Session: Immunotoxicology in the Emerging CAR T Cell Therapeutics Field

Presented by: Miltenyi Biotec

Breakthrough discoveries are being made in immuno-oncology through the use of chimeric antigen receptor (CAR) T cell therapies, which have rapidly translated into the clinic. During this session, we will explore solutions for immune monitoring and long-term evaluation of these therapies by leveraging automation to deliver robustness and reproducibility.

Wednesday, March 13, 10:30 AM to 11:30 AM, CC Room 340

Exhibitor-Hosted Session: Molecular Imaging in Preclinical Drug Development

Presented by: Charles River and Université de Sherbrooke

Current in vivo imaging modalities offer unique sensitivity, specificity, and resolution to longitudinally evaluate drug metabolism; efficacy endpoints; physiological, pathological, and molecular changes; and off-target effects. Morphological and functional imaging methods are becoming an integral part of drug development as early and translational biomarkers in drug discovery and safety assessment.

Wednesday, March 13, 10:30 AM to 11:30 AM, CC Room 338

Exhibitor-Hosted Session: Three-Dimensional Human Organoids for Drug Toxicity, Metabolism, and Disease State Studies

Presented by: Lonza

Dr. Colin Bishop, Wake Forest University, will detail the development of several 3D multicellular human organoids for more accurately modeling normal function of human organs. The presentation will also show the integration of organoids into a closed circulatory microfluidic body-on-a-chip platform to facilitate normal inter-organ responses found in the body.
EUROTOX Bo Holmstedt Memorial Lecture: Metabolism, Inflammation, and Cancer

Lecturer: Nigel J. Gooderham, Imperial College London, London, United Kingdom.

Born in the southern part of Sweden in 1918, Professor Bo Holmstedt was an internationally renowned toxicologist. He was known for his outstanding research contributions and his engagement in education and was a leading figure in the toxicology community. In his memory, EUROTOX established the Bo Holmstedt Memorial Lecture. This merit award recognizes excellence in toxicological sciences and is presented to an outstanding European toxicologist at the EUROTOX Annual Congress. The SOT Scientific Program Committee is pleased to present a lecture exchange of eminent scientists between SOT and EUROTOX. As part of the exchange, Dr. Nigel Gooderham (2018 Bo Holmstedt Memorial Lecture awardee) will present at the SOT Annual Meeting, and an SOT Merit Award recipient will present at the 2019 EUROTOX Annual Congress in Helsinki, Finland, in September.

Publication of Detoxication Mechanisms (R. Tecwyn Williams, 1947) established the discipline of drug metabolism as a pillar of toxicology and chemical carcinogenesis. In exploring this role of metabolism in carcinogenesis, we and others studied the metabolism of food-derived heterocyclic amines (HA) and their potential role in diet-associated human cancer. It was established that HAs are metabolically activated via amine oxidation, catalysed by CYP1 enzymes then esterification. The food-derived HA, 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP), determined to be genotoxic and potently estrogenic, emerged as a strong candidate for involvement in diet-associated cancer. The hypothesis that HAs contributed to colorectal cancer was examined in a case-control study. The data failed to support the hypothesis but characterized the inflammation phenotype of colorectal tumor tissue (COX2, IL-1β, IL-6, NF-kB, and IKK-α). An inflammation-cancer association was first reported more than a century ago, and inflammation was shown to reduce CYP-mediated metabolism 40 years ago. Yet in our clinical samples, although tumor CYP expression differed from that of adjacent normal tissue, there was selective induction of CYP1B1 and 2E1. Turning to mechanistic studies, we confirmed that IL6 treatment induced CYP1B1 and CYP2E1, and that IL6-mediated CYP2E1 regulation occurred via STAT3 and CYP1B1 expression through transcriptional and epigenetic mechanisms. We hypothesized that this could increase metabolic activation and DNA damage and showed that the dietary carcinogens benzo[a]pyrene (BaP) and PhIP induced genotoxicity that was enhanced by IL6. Tumors are infiltrated by stromal cell types that interact with malignant cells. This microenvironment is thought to be regulated by the tumor to promote survival and progression. We showed that IL6 secreted by immune cells not only increases selective metabolic competency but also promotes colorectal cancer cell invasiveness and secretion of microRNAs such as miR21 and miR29b. In turn, these microRNAs induce immune cell IL6 production and release miR21 into the microenvironment. Thus, cancer and immune cells communicate via IL6 and miRNAs to sustain chronic inflammation, promote selective metabolic competency and pro-metastatic cancer cell behavior. These findings identify key players that metabolically empower colon cancer cells and mediate intercellular communication and offer therapeutic opportunities to target the cancer microenvironment.
Wednesday, March 13, 11:00 AM to 12:20 PM, CC Room 310

**Informational Session: Toxicology Education and Risk Assessment Training in Africa: Status, Challenges, and Role of SOT Special Interest Groups in Moving Forward**

*Chairperson(s): Darryl Hood, Ohio State University, Columbus, OH; and Abdel-Razak Kadry, US EPA/ORD, Washington, DC.*

*Primary Endorser: Toxicologists of African Origin Special Interest Group*

Reliable information about formal toxicology curricula and education-training in Africa is very scarce. Illustrative of that example is the fact that in the last 20 years there has been few publications (fewer than five) that have discussed toxicology education in South Africa and veterinary toxicology education in Africa. The continent of Africa is in a stage of rebirth after a long time in stagnation. Africa is now home to seven of the world's 10 fastest growing economies. Africa is very rich in human capital, and today nearly 50% of Africans are under age 15. Africa has the fastest-growth rate in the world (due to dropping child mortality and high fertility), with the continent expected to have an estimated 2.8 billion people by 2060. Overall, the education in Africa is slowly improving. However, there is outstanding improvement in children’s primary education. The number of children enrolled in primary schools more than doubled, from 62 million to 149 million children, within 22 years (1990–2012). A systematic review indicates that university education continues to pose a significant challenge in Africa. In the continent’s 10 most-populous nations, there are 740 universities serving some 660 million Africans. This ratio in terms of the number of universities compared to the US represents a meek 10%, with the US has some 5,300 universities and colleges serving a population of over 323 million people. Historically Africa hosts the two oldest universities in the world: the University of Al Qarawiyyin in Fez, Morocco, which opened in AD 859, and Al-Azhar University in Egypt, part of the larger complex of institutions associated with Al-Azhar Mosque and which currently enrolls two million students. This session will provide an overview of the educational and training challenges within the toxicology diaspora and present research findings from studies that can inform the approach that SOT Special Interest Groups (SIGs) take to address the dilemma going forward. Desired outcome: as the majority of presenters in this session have experience in improving the toxicology and risk assessment training in various parts of Africa, the presenters will share this experience and explore innovative strategies to address the educational and training curricula in Africa despite the lack of meaningful investment in educational and research infrastructure by most African governments. A summary of the session presentations and recommendations will be shared with various organizations working in Africa.

**Abstract #3188**

**11:00**  
Toxicology Education and Risk Assessment Training in Africa: Status, Challenges, and Role of SOT Special Interest Groups in Moving Forward.  
D. Hood. Ohio State University, Columbus, OH.

**11:00**  

**11:15**  
Roles of Nonprofit Organizations in Promoting Toxicology and Risk Assessment Training in Africa.  
B. K. Gadagbui. TERA, Cincinnati, OH.

**11:30**  
The Relevance of Veterinary Toxicology in Africa.  
W. K. Rumbeiha. Iowa State University, Ames, IA.

**11:45**  
D. Hood. Ohio State University, Columbus, OH.

**12:00**  
Web-Based Global Classes, New Model for Toxicology and Risk Assessment Education: Advantages and Challenges.  
O. S. El-Tawil. Cairo University, Giza, Egypt.

**12:15**  
Panel Discussion/Q&A.
Wednesday, March 13, 11:00 AM to 12:20 PM, CC Room 309

**Education-Career Development Session: Stepping Out of the Lab: Maximizing Access and Experience for Internships in Toxicology**

*Chairperson(s): Natalie Malek, Johnson, Texas A&M University, College Station, TX; and Amy Roe, Procter & Gamble Company, Cincinnati, OH.*

*Primary Endorser: Education Committee*

*Other Endorser(s): Career Resource and Development Committee; Graduate Student Leadership Committee*

A major goal of the SOT Education Committee is to expand opportunities for students to engage in internships within industry, government, and nonprofit organizations. Immersion in internships provides students unique appreciation of the day-to-day activities of toxicologists and paths for success in these sectors. Such opportunities can help students establish their professional network, build confidence in career choices, and ultimately better prepare for transitioning into these sectors upon graduation. While numerous industries and governmental agencies have internship programs, or comparable opportunities, identifying these opportunities can be challenging. There are also barriers associated with funding, mentor buy-in, timing of the internship relative to the student’s graduate training, and feasibility for international student participation. The goal of this session is to bring together the various stakeholders—graduate students, faculty, and those hosting interns—to discuss best practices for developing internships, and strategies for increasing the number of available internships as well as improving awareness and access to available internships. The session will consist of five presentations followed by a group discussion on strategies that the SOT Graduate Education Subcommittee might develop to increase internship opportunities and overcome barriers for industry and government to host interns, and for graduate students to attain highly competitive internships. The formal talks will begin with a presentation by an individual who completed an internship as a graduate student discussing the benefits and logistical challenges of internship experiences, followed by presentations from representatives of two graduate training programs that have used different approaches for identifying internship opportunities and overcome barriers for industry and government to host interns, and for graduate students to attain highly competitive internships.

**Abstract #

#3189 11:00  Stepping Out of the Lab: Maximizing Access and Experience for Internships in Toxicology. N. Johnson. Texas A&M University, College Station, TX.

11:00  Benefits and Challenges of Performing an Internship as a Graduate Student. A. Karmaus. ILS, Research Triangle Park, NC.

11:12  “Real-World” Training Experience through Internships at the Interface of Toxicology and Regulatory Science. N. M. Johnson. Texas A&M University, College Station, TX.

11:24  Private-Public Partnerships as a Foundation for the Training of Toxicology Students. L. Aleksunes. Rutgers, The State University of New Jersey, Piscataway, NJ.

11:36  Industry Perspective on Providing Successful Training Opportunities to Graduate Students. A. Roe. Procter & Gamble Company, Cincinnati, OH.


12:00  Moderated Group Discussion. A. Bowman. Purdue University, West Lafayette, IN.

Wednesday, March 13, 12:00 Noon to 1:00 PM, CC Room 338

**Exhibitor-Hosted Session: Advances in High-Throughput DNA Damage Detection Using the Comet Assay and CometChip® Technologies**

*Presented by: Bio-Techne*

This session presents advances for Comet assay as a high-throughput DNA damage genotoxicity assay, demonstrating versatility on primary cells, stem cells, and organoids. Integrated Laboratory Systems also will discuss validating a HepaRG™ CometChip® assay as an in vitro alternative to current regulatory agency-required in vivo assays.

Wednesday, March 13, 12:00 Noon to 1:00 PM, CC Room 340

**Exhibitor-Hosted Session: Göttingen Minipigs in Dermal Studies**

*Presented by: Ellegaard Göttingen Minipigs and Marshall BioResources*

This session will give examples of the use of Göttingen Minipigs in dermal studies, including in juvenile animals and using advanced read-outs. Also, new data on development of the dermal immune system will be presented. Göttingen Minipigs is the preferred species for dermal studies.
**Wednesday, March 13, 12:00 Noon to 1:00 PM, CC Room 337**

**E** Exhibitor-Hosted Session: How to Choose the Right Nonhuman Primate Model for Safety, Pharmacology, and Toxicology Studies

*Presented by: CrownBio*

Choosing the right nonhuman primate model can be complex. Learn when and how to best utilize NHPs for efficacy, pharmacology, and toxicology. We will discuss a unique platform of capabilities, including CGM, noninvasive ultrasound, non-GLP toxicology, and reproductive and ocular study techniques to move compounds forward with confidence.

**Wednesday, March 13, 12:00 Noon to 1:00 PM, CC Room 339**

**E** Exhibitor-Hosted Session: Strategies for Development of Immuno-oncology and Cellular/Gene Therapy Products

*Presented by: ToxStrategies*

Navigating the clinical development of high-risk biologic products such as immunostimulatory biologics and cell and gene therapies can be challenging. ToxStrategies consultants will offer insights on the regulatory expectations, the nonclinical/toxicology data needed to address regulatory concerns regarding patient safety, and the strategic scientific/regulatory considerations for these products.

**Wednesday, March 13, 12:00 Noon to 1:30 PM, CC Room 330**

Regional Chapter Collaboration and Communication Committee (RC4) Meeting

**Wednesday, March 13, 12:00 Noon to 1:15 PM, CC Room 345**

Risk Assessment and Regulatory and Safety Evaluation Specialty Sections Joint Mentoring Event

**Wednesday, March 13, 12:00 Noon to 1:30 PM, CC See room listing below.**

**Specialty Section Meetings/Luncheons: Cardiovascular Toxicology (Room 302); Clinical and Translational Toxicology (Room 347); Comparative and Veterinary (Room 343); Computational Toxicology (Room 324); Toxicologic and Exploratory Pathology (Room 341)**

**Wednesday, March 13, 12:30 PM to 1:30 PM, CC Ballroom III**

**FS** Keynote Medical Research Council (MRC) Lecture: Ageing and Multimorbidity: Time for a New Approach

*Lecturer: Janet M. Lord, University of Birmingham Institute of Inflammation and Ageing, Birmingham, United Kingdom.*

The lecture will review current demographic trends and also describe data for the incidence of multimorbidity in older adults. Dr. Lord’s recent analysis of patients admitted to the Queen Elizabeth Hospital Birmingham, United Kingdom, in 2016 revealed that 75% of the emergency admissions were for those aged over 50 and of those patients 83% had three or more diseases and 70% had four or more. Age is the biggest single risk factor for multimorbidity, yet we continue to treat the composite diseases individually, resulting in polypharmacy. A case will be made for targeting core ageing processes as a way to make clinical impact in multimorbid patients. The lecture will describe recent advances in biogerontology that have revealed the core processes that drive the ageing process, including cell senescence, reduced DNA damage repair, and loss of proteostasis, and review interventions in these processes in mice that have extended life span and health span.

The second half of the lecture will cover work on the contribution made to the ageing phenotype of a decline in immune function. This work has shown that reduced neutrophil function contributes to increased susceptibility to infection as well as the frailty associated with infections in the elderly. The lecture will describe recent work showing that neutrophil migratory defects are driven by constitutive signaling through PI3 kinase delta and can be reversed either by inhibition of this pathway by selective PI3k inhibition, or by targeting downstream GTPases through statins. Data will be presented on the reversal of neutrophil ageing by statins *in vitro* and *in vivo* and report on a clinical trial with statins that showed improved recovery from pneumonia in older patients. The lecture will conclude with a presentation of unpublished data on the role played by NK cells in the accumulation of senescent cells with age, one of the core ageing drivers.
Symposium Session: Consideration for Safety Assessment of Chemically Synthesized Therapeutic Peptides: A Drug Development Paradigm between the Large and Small

Chairperson(s): Mayur Mitra, Genentech, Inc., South San Francisco, CA; and Evan Thackaberry, Ra Pharmaceuticals, Cambridge, MA.

Primary Endorser: Biotechnology Specialty Section

Other Endorser(s): Drug Discovery Toxicology Specialty Section; Regulatory and Safety Evaluation Specialty Section

Abstract #


#3191 1:30 The Past, Present, and Future of Peptide Therapeutics. E. Thackaberry. Ra Pharmaceuticals, Cambridge, MA.

#3192 2:00 General Toxicology Assessment of Peptide Therapeutics: Leveraging Regulatory Guidelines for Small and Large Molecule Drugs. M. Mitra. Genentech, Inc., South San Francisco, CA.

#3193 2:30 Impurity Limits for Synthetic Peptides: A Nonclinical Approach. S. Leuenroth-Quinn. US FDA, Silver Spring, MD. Sponsor: M. Mitra

#3194 3:00 Genotoxicity Testing of Peptides. L. Custer. Bristol-Myers Squibb, New Brunswick, NJ.

#3195 3:30 Dasiglucagon, a Glucagon Analogue: Toxicity Profile following Chronic Administration in Rats and Dogs. M. Elander. Zealand Pharma, Copenhagen, Denmark.

4:00 Panel Discussion/Q&A.

Symposium Session: Role of Oxidative Stress in Health and Disease: Mechanisms, Methods of Detection, and Biomarkers

Chairperson(s): Bhagavatula Moorthy, Baylor College of Medicine, Houston, TX; and Lynette Rogers, Research Institute at Nationwide Children’s Hospital, Columbus, OH.

Primary Endorser: Molecular and Systems Biology Specialty Section

Other Endorser(s): Mechanisms Specialty Section

Oxidative stress is an imbalance between oxidants and antioxidants in favor of the oxidants, leading to a disruption of redox signaling, which in turn leads to cellular injury. Damage mediated by reactive oxygen species (ROS) can have a profound effect on many cellular functions. Oxidative stress occurs with many toxic exposures and appears to provide a mechanistic link between exposure and disease, yet free radical scavenging antioxidants showed little health benefit in large-scale human interventional trials. The major goal of this symposium is to discuss the molecular and cellular mechanisms by which ROS, including free radicals, contribute to oxidative stress and alter various signaling pathways, which could in turn lead to toxicities in target organs, and ultimately human diseases including pulmonary diseases such as bronchopulmonary dysplasia (BPD), acute respiratory distress syndrome (ARDS), and cancer. The novel aspect of the proposed symposium is to discuss the chemistry of ROS, the ultra-sensitive methods to detect and analyze them in vivo, and the mechanisms by which they contribute to organ toxicities. The research presented here will offer opportunities for preventative and therapeutic interventions in human diseases that are caused by oxidative stress. The recent findings of the novel roles of ROS in multiple human diseases warrant the need for a symposium to discuss the latest mechanistic research in this area and its impact on human health. Specifically, the symposium will discuss methods of detection and measurement of oxidative stress including integrated metabolomics, the role of epigenetic mechanisms in the developing lung, the mechanistic role of cytochrome P450 (CYP) enzymes and Nrf2 in oxidative stress, and novel biomarkers to distinguish between oxidative stress and inflammation. The symposium will also discuss new opportunities for translational research, which leads to the develop-
The performance of many alternative methods for developmental toxicity testing has been evaluated over the last 20 years; however, their application as new approach methods (NAMs) in a regulatory setting is still poorly defined. Several groups and regulatory agencies are working on ways to address this limitation through the development of strategic roadmaps and updating current testing requirements, including ICCVAM, US FDA, US EPA, ICH, ECVAM, JACVAM, and the EU-ToxRisk consortium. Given the numerous complex processes involved in fetal development, it is unlikely that a single assay or adverse outcome pathway (AOP) concept will be sufficient for understanding and/or predicting the developmental toxicity potential of chemicals. Defining the applicability domain of each NAM, in terms of both chemical and biological space, establishing scientific confidence in their validity, and characterizing how they are best used in integrated testing strategies will be key for gaining regulatory acceptance of alternative methods. Evaluating well-defined groups of reference chemicals, such as the list proposed in the draft ICH S5(R3) Guideline on Detection of Toxicity to Reproduction for Human Pharmaceuticals or environmental chemicals identified by ICCVAM with robust strategies will be key for gaining regulatory acceptance of alternative methods. Evaluating well-defined groups of reference chemicals, such as the list proposed in the draft ICH S5(R3) Guideline, can help provide insight into the limitations of NAMs and how they can be combined. Systematic review techniques can integrate the draft ICH Guideline S5(R3) on Detection of Toxicity to Reproduction for Human Pharmaceuticals or environmental chemicals identified by ICCVAM with robust strategies to inform the discussion on how these approaches can help the field move toward regulatory acceptance. Experts from industry, academia, and government will present the results from a broad spectrum of reference chemicals (pharmaceutical, agrochemical, industrial, etc.) evaluated with integrated testing strategies, and will inform the discussion on how these approaches can help the field move toward regulatory acceptance. Experts from industry, academia, and government will present the results from integrated testing strategies, and will inform the discussion on how these approaches can help the field move toward regulatory acceptance.

**Abstract #**

**#3196 1:30** Role of Oxidative Stress in Health and Disease: Mechanisms, Methods of Detection, and Biomarkers. *B. Moorthy*. Baylor College of Medicine, Houston, TX.

**#3197 1:35** ROS-Mediated Epigenetic Changes in Developing Lungs. *L. K. Rogers*. Research Institute at Nationwide Children’s Hospital, Columbus, OH.

**#3198 2:04** NRF2, Oxidative Stress, and Inflammatory Lung Injury. *D. Zhang*. University of Arizona, Tucson, AZ.

**#3199 2:33** Validation of Best Detection Methods for Oxidized Macromolecules In Vivo and In Smokers. *M. Kadiiska*. NIEHS, Research Triangle Park, NC.

**#3200 3:02** Redox Metabolism and Oxidative Stress. *D. P. Jones*. Emory University, Atlanta, GA.

**#3201 3:31** Mechanistic Role of Cytochrome P4501A and 1B1 Enzymes in the Metabolism of Reactive Oxygen Species (ROS)-Mediated Formation of Lipid Hydroperoxides: Implications for Hyperoxic Lung Injury and Human ARDS. *B. Moorthy*. Baylor College of Medicine, Houston, TX.

**#3202 1:30** Understanding the Utility of In Vitro Developmental Toxicity Assays and Building Integrated Testing Strategies. *J. Palmer*. Stemina Biomarker Discovery, Inc., Madison, WI.


**#3204 2:00** Retrospective Analysis: Can Existing Literature Be Used to Compare the Results from the Zebrafish to Mammalian Embryotoxicity Tests? *K. Taïoun*. Johns Hopkins University Center for Alternatives to Animal Testing (CAAT), Baltimore, MD.


**#3206 3:00** EU-ToxRisk DART Case Study Evaluating a Chemical Series across Multiple NAMs. *D. Kroese*. Netherlands Organization for Applied Scientific Research (TNO), The Hague, Netherlands. Sponsor: *J. Palmer*

**#3207 3:30** Current and Future Opportunities for US Regulatory Application of Developmental Toxicity NAMs. *N. Kleinstreuer*. NIEHS/NICEATM, Research Triangle Park, NC.

**Panel Discussion/Q&A.**
Exposure to ambient air pollution is a leading cause of death worldwide. It has been linked globally to 7 million premature deaths and $5 trillion in costs per year. With continuing industrialization and urbanization, this disease burden is expected to increase even further. Interestingly, the majority of air pollution-associated deaths are due to cardiovascular disease (CVD). It has been estimated that in 2016, exposure to ambient and household air pollution combined was responsible for 3.5 million cardiovascular deaths. Because of this, air pollution exposure is now recognized as a modifiable risk factor that contributes to cardiovascular morbidity and mortality. Regardless of the strong evidence that air pollution exposure increases the risk for developing CVD, it remains unclear how the exposure to polluted air induces cardiovascular injury. Previous work has shown that chronic exposure to polluted air is associated with decreased endothelial function, suggesting that long-term inhalation of air pollution might result in endothelial injury and dysregulation of vascular homeostasis—effects that could accelerate CVD or trigger adverse cardiovascular events. Current research suggests that vascular homeostasis and endothelium health are maintained, at least in part, by endothelial progenitor cells (EPCs). These cells are a subpopulation of proangiogenic cells that reside in the bone marrow and circulate in the peripheral blood. Upon hypoxia or vascular injury, EPCs are mobilized from the bone marrow and home to the site of tissue damage where they contribute to vasculogenesis and/or angiogenesis either through terminal differentiation into mature endothelial cells or by paracrine stimulation of wound healing processes. Interestingly, recent studies show that EPCs are early and direct targets of air pollutant exposure. For instance, air pollution-induced impairments in EPC number and function have been found in humans exposed to particulate or volatile air pollution and in controlled exposure studies in rodents. These exposure studies demonstrated that inhalation of polluted air affects both circulating and bone marrow EPCs. This is important because chronically low circulating EPC levels and EPC dysfunction have been associated with vascular dysfunction and an increase in the risk and severity of CVD. Moreover, treatments that improve the number and function of EPCs (e.g., exercise, antihypertensive drugs) attenuate cardiovascular dysfunction. Because of the critical and non-redundant roles of EPCs in vascular health, air pollution exposure-induced EPC depletion and dysfunction could disturb vascular maintenance and repair, impairing vascular function, and consequently increase the risk for CVD. Hence, addressing how air pollution exposure induces EPC depletion and dysfunction is of high significance because it would help to discern the specific mechanism by which exposure to polluted air increases the risk for CVD. Understanding such mechanisms is important to develop effective therapeutic interventions and evidence-based regulations to mitigate against the major harmful health effects of air pollution. This session will highlight human studies and animal research that investigate the effects of air pollution exposure on EPCs. The specific presentations of the session will show that (1) inhalation of secondhand smoke modulates EPC number and function in healthy nonsmokers; (2) acute exposure to increased levels of ambient fine particulate matter (PM2.5) or the exposure to volatile organic components (benzene, acrolein) of polluted air are associated with changes in the number of these circulating proangiogenic cells; (3) the exposure to metal-rich particles impairs circulating EPC levels in humans and decreases number and function of bone marrow derived EPCs in mice; and (4) exposure to concentrated PM2.5 (CAP), by inducing oxidative stress, impairs circulating EPC levels and induces an anti-angiogenic dysfunctional EPC phenotype with a reduced ability to promote vascular tissue repair. Taken together, this session will provide a comprehensive overview that summarizes novel aspects and new mechanistic insights to understand the adverse effects of air pollutant exposure on cardiovascular health associated with changes in EPC number and function.

Abstract #

#3208 1:30  Air Pollution-Induced Cardiovascular Toxicity: Endothelial Progenitor Cells as Critical Mediators.  P. Haberzettl. University of Louisville, Louisville, KY.

#3209 1:40  Smoke and Endothelial Homeostasis.  C. Heiss. University of Surrey, Guildford, United Kingdom. Sponsor: P. Haberzettl.

#3210 2:15  Exposure to Airborne Particulate Matter (PM2.5) and Volatile Pollutants Impacts the Levels of Circulating Angiogenic Cells in Humans.  T. E. O’Toole. University of Louisville, Louisville, KY.

#3211 2:50  The Role of Endothelial Progenitor Cells in Ambient Fine Particulate Matter (PM2.5)-Induced Atherosclerosis.  L. Chen¹, E. N. Liberda¹, A. K. Cuevas¹, Q. Qu¹, J. Niu¹, and M. Lippmann¹. New York University School of Medicine, Tuxedo Park, NY; and ‘Lanzhou University School of Public Health, Lanzhou, China.

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Drug development is a slow, inefficient, and expensive process. The latest estimates from the Tufts Center for the Study of Drug Development show that total cost and time to bring one drug to market is now more than $2.6 billion and is in excess of 10 years. One contributing reason for this attrition rate is that current animal models have limited predictivity for efficacy and toxicity in humans despite their high cost and long study times. As a consequence, 89% of drugs that make it into the clinic still fail in clinical trials and for neurological therapies, the clinical failure rate rises to 94%. Simple monolayer in vitro models have been developed to accelerate testing throughput and to better understand the mechanisms’ underlying effects. In neurological studies, parameters such as neurite outgrowth, cellular area, apoptosis, and electrophysiology are used to evaluate success. However, 2D cell cultures poorly represent human organ function, as they lack the numerous structural and physiological complexities found in vivo. Therefore, it is recognized that more complex systems are needed to improve the success of drug development and toxicity testing. The nervous system is a challenge to model in vitro, as it consists of neurons and glial cells, where intimate cell-cell interactions are critical to development and function. The improved cell-cell interaction in a multi-cellular 3D structure enhances cellular processes such as neurogenesis, synapse formation, and axon myelination. In addition to the improved structure and cell connectivity, these systems have shown increased survival and improved neuronal differentiation compared with traditional monolayer cultures. Furthermore, simple 2D models may not recapitulate exposure of compounds because the nervous system is protected by barriers (blood-brain or retina-barrier), which limit their accessibility. For toxicology, this aspect is of great relevance and several complex 3D models have begun first attempts to integrate barriers in their systems (e.g., a blood-brain barrier (BBB)). The session will discuss the current and future uses of complex neural cell models and microphysiological systems (MPS) in neurotoxicology. The presentations will provide attendees with an in-depth perspective from across government, academia, and industry, and present applications of novel neuroMPS that recapitulate a broad spectrum of the nervous system in toxicology and drug development: BBB, CNS, PNS, and retina. The first presentation will provide a pharmaceutical industry perspective on the need to develop better neural systems due to limitations of current animal models and monolayer cultures. The integration of complex MPS in drug development and toxicity screening will be discussed. The second talk will introduce a microfluidic-based human BBB, which is used to study early neurodevelopment and drug delivery across the barrier. The BBB is a bottleneck in drug development for neurological disorders, as it can block entry into the brain of many chemical agents that would otherwise be potentially useful drugs. The third presentation will focus on a human iPSC 3D neural model consisting of most cell types of the CNS, such as neurons, astrocytes, and oligodendrocytes. It is used for testing compounds for developmental neurotoxicity using transcriptomics and imaging approaches with a primary focus on myelination. Myelination is rarely found in cell cultures; thus, this model represents an important component of the nervous system that can be affected by chemicals. The fourth presentation will describe a 3D Nerve-on-a-Chip platform and its application to peripheral and lower motor neurotoxicity. Peripheral neuropathy is experienced by >40% of patients undergoing chemotherapy and is a common side effect of several therapeutic classes such as antibody-drug conjugates. Additionally, the experience of an MPS model developer working with pharmaceutical companies will be discussed. The final talk will present a Retina-on-a-Chip platform that recapitulates the complex structure and interplay between neuronal cell types and epithelial cells in human retinal tissue and incorporates more than eight different cell types all derived from iPSC. This system is used in screening for retinal toxicity and disease modeling. All presenters will discuss advantages, challenges, and current limitations with their approaches. Following the five presentations there will be an interactive panel discussion where audience participation is encouraged.

Abstract #


#3216  2:30  A Complex Human 3D Neural Cell System to Study Developmental Neurotoxicity.  H. T. Hogberg. Johns Hopkins University, Baltimore, MD.


3:45  Panel Discussion/Q&A.
The science of complex systems has demonstrated that while some things about noisy, real-world data are unknowable, certain patterns and structures can emerge from the chaos. Given the increasing complexity of data related to assessing potential risk posed to human health by chemicals, this session is intended to incubate new methodologies for mining “Big Data” to inform functional human health outcomes. Driven by innovations in computational techniques, many problems that were once intractable can now be understood in terms of these recurring patterns. While the areas of research in this session are diverse, there is surprising commonality about the challenges faced by researchers and potential cross-domain applicability of the approaches used to solve the problems. The session begins with an exposomics-based approach to understanding the role that environmental chemical exposures may play in public health outcomes. The workshop continues by addressing metabolomics and novel, non-target analysis (NTA) of chemicals in environmental and biological media. NTA analysis generates thousands of chemical features per sample, and each sample contains information about the potential upstream chemical sources or pathways. Algorithms can identify unique feature signatures associated with sample groups, allowing understanding of sample content and history and development of source hypotheses. The session will then explore the world of in vitro testing where, among the hundreds of cell lines available, efforts are being made to identify a parsimonious few that explain as much phenotypic variability as possible. The final presenter is from a large, multi-national consulting firm. The presentation will examine prediction of human health outcomes using new analytics techniques to identify environmental toxic “Hot Spots” using Big Data. In all five presentations, identifying patterns in complex data to allow for more informed decision-making. Each presentation will consider: (1) What are the challenges of the system of study? (2) What aspects of human health outcomes using new analytics techniques to identify environmental toxic “Hot Spots” using Big Data. (3) What patterns emerge for the complexity of the system? (4) What tools are available for identifying these patterns? (5) What are the health implications for the patterns that can be recognized?

Abstract #

#3221 2:03 Finding Patterns within Complex Metabolomics Datasets. B. van Ravenzwaay. BASF SE, Ludwigshafen, Germany.
#3223 2:59 Parsimonious Selection of Cell Lines to Reproduce Phenotypic Variability. N. Sipes. NIEHS/NTP, Research Triangle Park, NC.
3:55 Panel Discussion/Q&A.

Wednesday, March 13, 1:30 PM to 4:15 PM, CC Room 308

Workshop Session: Risk Assessment of Consumer Products and Articles: Critical Considerations and Case Studies for Characterizing and Quantifying Consumer-Relevant Exposures to Chemicals and Nanomaterials

Chairperson(s): Susan Felter, Procter & Gamble Company, Mason, OH; and Treye A. Thomas, Consumer Product Safety Commission, Rockville, MD.

Primary Endorser: Exposure Specialty Section

Other Endorser(s): Nanotoxicology Specialty Section; Risk Assessment Specialty Section

Increasingly, toxicologists are challenged to do risk assessments for consumer products for which the determination of relevant exposure is not straightforward. Quantification of potential exposure from many types of existing and emerging consumer products (e.g., textiles, toys, furniture, diapers, 3D printed products) is still an emerging science and the application of nanomaterials introduces even further challenges. Quantifying exposure that mimics actual and foreseeable consumer use associated with a range of consumer products can require advanced sampling approaches and analytical capability. This raises the question of how we should define what is “reasonably conservative" versus “not relevant” when developing methods. Given the limitations/absence of these capabilities and/or accepted methods, overly conservative methods and assumptions are often used that are not relevant to consumer exposures or represent extreme worst-case use scenarios. The session will provide examples of frameworks and sampling and analytical methods that have been developed to determine exposures from products and articles that are relevant for actual consumer use scenarios. Case studies include the estimation of chemical migration and relevant consumer exposure estimates.
to engineered nanomaterials along the product value chain, release of silver from nanotechnology-based children’s products, and the potential for migration of any constituents above a TTC-based threshold from a disposable diaper. Factors that are important to consider when developing extraction methods for mimicking consumer use scenarios, including relevant solvents, will be discussed. These data can then be used in robust risk assessments leading to informed decisions on the safety of chemicals in such products under normal usage conditions and improve product safety and risk communication to the public. This session will also consider what exposure data are needed by regulators associated with the new Frank R. Lautenberg Chemical Safety for the 21st Century Act and how end uses of a chemical are considered when estimating the potential for consumer exposure.

Abstract #

#3225 1:30  **Risk Assessment of Consumer Products and Articles: Critical Considerations and Case Studies for Characterizing and Quantifying Consumer-Relevant Exposures to Chemicals and Nanomaterials.** S. Felter. Procter & Gamble Company, Mason, OH.


#3227 1:45  **Understanding the Changing Exposure and Toxicity Profile of Engineered Nanomaterials from Production to Application.** A. Erdely. NIOSH, Morgantown, WV.


#3229 2:45  **Safety Assessments for Disposable Diapers: Determining Relevant Exposure under Conditions of Use.** K. Woeller. Procter & Gamble Company, Mason, OH.

#3230 3:15  **Overview of Approaches to Assess Consumer Exposures under Amended TSCA.** C. Fehrenbacher. US EPA, Washington, DC. Sponsor: S. Felter

3:45  **Panel Discussion/Q&A.**

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**Wednesday, March 13, 1:30 PM to 4:15 PM, CC Ballroom IV**

**Workshop Session: This Is Your Teen Brain on Drugs: In Search of Biomarkers Unique to Dependence Toxicity in Adolescents**

**Chairperson(s):** Abby A. Li, Exponent Health Science, San Francisco, CA; and Leslie Y. Kwan, George Washington University Public Policy and Public Administration, Washington, DC.

**Primary Endorser: Neurotoxicology Specialty Section**

**Other Endorser(s):** Clinical and Translational Toxicology Specialty Section; Occupational and Public Health Specialty Section

Human variability is an important consideration in toxicology and risk assessment. Significant advances have been made to address differences between the adult and fetus/children or the elderly. In contrast, adolescent teenagers are generally considered to be smaller adults when considering the toxic effects of drugs and chemicals. With the recent legalization of recreational marijuana in several states (California in 2018) and introduction of new electronic nicotine delivery systems (ENDS; e.g., electronic cigarettes, e-hookahs, and other flavorful vapor emitting devices), perceptions around the increased accessibility and decreased risk of harm from cannabis and nicotine use are changing among teens. Historically, these factors have been associated with increased substance use. Emerging evidence from animal and human studies suggests that there are social, psychological, and neurobiological differences between adolescents and adults that increase vulnerability of adolescents to the dependence potential of CNS-active substances. Recently published animal studies suggest that there are behavioral, neurochemical, and/or anatomical changes following adolescent exposures that may be candidates for biomarkers unique to dependence toxicity in adolescents. This session brings together leading experts in the research on dependence toxicity potential of nicotine, cannabis, and/or other illicit drugs during adolescence. The participants will evaluate the strength and limitations of the experimental evidence for increased vulnerability in adolescents compared with adults and the extent to which proposed neurocircuit targets and biological markers are unique to teenage vulnerability for dependence. They will also evaluate whether approaches are generalizable to toxicity testing to screen for effects of chemical and drugs that may increase susceptibility of teenagers to substance use disorders (SUD). Participants will discuss implications of unique patterns of behavioral, neurochemical, and other biomarker changes in adolescents for public health. Ms. Kwan, a graduate student in Public Policy and Public Administration at George Washington University, who has been involved with research on age of initiation of nicotine on public health outcomes, will briefly introduce the topic and frame the overarching questions for the session. Dr. Eaton will set the stage by presenting recently published (2018) results from one of the most comprehensive studies by the National Academies that he chaired on human health effects of e-cigarettes, including youth initiation. Dr. Levin will begin with a brief introduction on neurochemical and anatomical pathways of addiction followed by presentation of ongoing research on behavioral, anatomic, and signaling pathway markers of nicotine dependence in adolescent and adult rats. Dr. Dow-Edwards will compare and contrast the effects of delta-9-tetrahydrocannabinol (d9THC), the chemical responsible for most of marijuana’s psychological effects, on adolescent brain-behavior relationships with emphasis on male-female differences in alterations of neural circuits mediating these relationships. Dr. Andersen will present a state-of-the-art translational approach showing how a dopamine receptor mediated “switch” underlies age-related periods of drug-induced “protection” or drug-induced vulnerability associated with addiction with the ultimate goal of developing treatments that can be used in teenagers to reduce addiction. The workshop will end in a 40-minute panel discussion led by Dr. Vorhees and Dr. Talpos on the evidence for increased susceptibility and identification of data gaps that will encourage cross-fertilization of ideas for development of novel screens for the potential of chemicals and drugs to increase susceptibility of teenagers to SUD. This session introduces an important new scientific area to SOT; namely, the vulnerability of the adolescent brain to chemical/drug exposure. It will be of interest to a broad audience, including those interested in neurotoxicology, public health, clinical and translational toxicology, drug discovery toxicology, and social implications of this science.
Abstract #3231
1:30  This Is Your Teen Brain on Drugs: In Search of Biomarkers Unique to Dependence Toxicity in Adolescents.
A. Li.

Introduction.

Abstract #3232
1:45  Public Health Consequences of E-cigarettes: A Focus on Special Concerns for Youth and Young Adults.
D. L. Eaton. University of Washington, Seattle, WA.

Abstract #3233
2:10  Rat Models of Adolescent-Onset Nicotine Self-Administration and Persisting Effects of Gestational Nicotine.
E. D. Levin. Duke University Medical Center, Durham, NC.

Abstract #3234
2:40  Sex-Dependent Effects of Delta-9-Tetrahydrocannabinol on Adolescent Brain-Behavior Relationships.
D. Dow-Edwards. SUNY Downstate Medical Center, Brooklyn, NY. Sponsor: A. Li

Abstract #3235
3:10  Translational Approaches for Identifying Biomarkers of Adolescent Risk for Transition to Drug Dependence.
S. L. Andersen1, and C. J. Jordan1. 1Harvard Medical School, Belmont, MA; and 2National Institute for Drug Abuse, Baltimore, MD. Sponsor: A. Li

Abstract #3236
3:45  Panel Discussion with Drs. Charles Vorhees (Cincinnati Children’s Hospital) and John Talpos (US FDA/NCTR).
C. V. Vorhees1, and J. C. Talpos1. 1Cincinnati Children’s Hospital Medical Center, Cincinnati, OH; and 2US FDA/NCTR, Jefferson, AR.

Wednesday, March 13, 1:30 PM to 4:15 PM, CC Room 321

Platform Session: Immunotoxicity

Chairperson(s): Tejas S. Lahoti, Celgene Corporation, San Diego, CA; and Michael A. Lynes, University of Connecticut, Storrs, CT.

Abstract #3237
1:30  Crosstalk between AhR Signaling and Viral Virulence Factors Influence Host Immune Responses during Influenza A Viral Infection.

Abstract #3238
1:45  Mechanism(s) of Th2 Polarization in Mouse CD4+ T Cells Exposed to the Food Preservative, tBHQ.

Abstract #3239
2:00  SR-A1-Targeted Macromolecular PI3K/mTOR Inhibitor Prodrug for Cancer Immunotherapy.

Abstract #3240
2:15  Anti-metallothionein Management of Chronic Inflammatory Disease.

Abstract #3241
2:30  Gulf War Chemicals-Induced Virome Alterations and Its Effect on Gastrointestinal Immunotoxicity.
D. A. Kimono1, S. K. Ratanesh1, S. Sarkar1, M. Albadrani1, P. Nagarkatti1, M. Nagarkatti1, K. Sullivan1, P. Janulewicz2, S. M. Lasley3, and C. Saurabh1. 1University of South Carolina, Columbia, SC; 2Boston University, Boston, MA; and 3University of Illinois College of Medicine, Chicago, IL.

Abstract #3242
2:45  Sex-Specific Effects of Arsenic on Immune Function, Vaccine Immunogenicity, and Infectious Disease Risk.

Abstract #3243
3:00  Developmental Activation of the Aryl Hydrocarbon Receptor Reduces CD4+ T Cell Responses by Altering DNA Methylation Patterns.
C. G. Burke, J. R. Myers, and P. Lawrence. University of Rochester Medical Center, Rochester, NY.

Abstract #3244
3:15  The Effects of the Food Additive tBHQ on Primary Human CD4 T Cell Activation: The Role of Nrf2.
A. E. Turley, and C. E. Rockwell. Michigan State University, East Lansing, MI.

Abstract #3245
3:30  Lipopolysaccharides Increased the Expressions of Interleukin-8 and Interleukin 1-Beta in the Macrophages Differentiated from ML-1 Monocytes and Upregulation of Cellular Antioxidants Reduced Lipopolysaccharides-Induced Inflammation.
H. Ahmed1, L. Smith1, J. Fowler1, D. Pitts1, C. Griffith1, J. A. Rifai1, H. Zhu1, R. Li, and Z. Jia1. 1University of North Carolina at Greensboro, Greensboro, NC; and 2Campbell University School of Osteopathic Medicine, Buies Creek, NC.

Abstract #3246
L. Blevis, J. Zhou, N. Wawee, R. Crawford, S. Bhattacharya, and N. Kaminski. Michigan State University, East Lansing, MI.

Abstract #3247
4:00  The Synthetic Food Additive tBHQ Impairs Host-Defense to Influenza Infection.
Wednesday, March 13, 1:30 PM to 2:30 PM, CC Room 339

Exhibitor-Hosted Session: Applications of Health-Based Limits for Patient and Drug Product Safety

Presented by: SafeBridge Consultants, Inc.

An overview of health-based daily exposure limits (ADE/PDE) in pharmaceutical manufacturing and their applications to patient and product safety will be presented. Compounds of interest may include impurities (both genotoxic and non-genotoxic), extractables and leachables, and active contaminants (navigating cross-contamination issues—from small molecules to large biologicals).

Wednesday, March 13, 1:30 PM to 2:30 PM, CC Room 338

Exhibitor-Hosted Session: Biomimetic Culture Environments to Enhance In Vitro Assays

Presented by: NanoSurface Biomedical, Inc.

Interpreting results from in vitro experiments rely on using cells that exhibit natural phenotypes. However, many cells lose key phenotypes in vitro. NanoSurface Biomedical provides a suite of products and screening services that integrate cues from a cell’s natural niche to enhance assay results and that can be integrated into nearly all existing workflows.

Wednesday, March 13, 1:30 PM to 2:30 PM, CC Room 337

Exhibitor-Hosted Session: Chronic Arsenic Exposure and Type II Diabetes: The Role of Prolonged Changes in the NRF2 Transcriptome

Presented by: QIAGEN

Chronic exposure to arsenic is associated with an enhanced risk of developing a number of diseases, including type II diabetes. Utilization of state-of-the-art next-gen sequencing technology to determine the transcriptomic changes associated with prolonged arsenic exposure will help identify new therapeutic targets to treat arsenic-promoted diseases.

Wednesday, March 13, 1:30 PM to 2:30 PM, CC Room 340

Exhibitor-Hosted Session: Room Air Is Irrelevant: Temperature, ROS, and the Translatability of In Vitro Assays

Presented by: BioSpherix

What is physiologically relevant about conventional in vitro assays? Not the incubator. Outside the incubator, it is even worse. We will present the latest research and technologies for incubating/handling cells under physiological gases. We also will show that constant temperature helps eliminate “edge effect” in 96-well plate cell-based assays.

Wednesday, March 13, 2:00 PM to 3:00 PM, CC Room 311

Trainee Discussion with Medical Research Council (MRC) Lecturer: Dr. Lord

Lecturer: Janet M. Lord, University of Birmingham Institute of Inflammation and Ageing, Birmingham, United Kingdom.

Dr. Lord will meet informally for discussion with graduate students and postdoctoral scholars after her Keynote MRC Lecture. Registration is limited to SOT Student and Postdoctoral members.

Wednesday, March 13, 4:15 PM to 5:45 PM, Hilton Baltimore Key 9

Immunotoxicology Specialty Section Mentoring Event
The capability to detect chemicals in the environment is crucial for animals to identify and evaluate food sources, to initiate social and reproductive behaviors, and to evade toxic chemical exposures. Chemosensory neurons of the somatosensory system, originating in the trigeminal, vagal, and dorsal root ganglia, play a key role in exposure detection, triggering pain, itch, irritation, and essential reflex responses such as cough. Studies by the Jordt laboratory identified Transient Receptor Potential (TRP) ion channels as key sensory receptors for reactive aldehydes such as acrolein, the major irritant in tobacco smoke; for extremely painful tear gas agents and toxic isocyanates; and for oxidants such as chlorine gas and ozone.

While TRP channels trigger essential protective reflexes, continuous activity during chronic toxic exposures and inflammatory sensitization contribute to chronic environmental diseases. TRP channels maintain inflammation and airway hyperreactivity in asthma, contribute to the runaway inflammatory response and pulmonary edema following toxic inhalation exposures, and promote neuropetide-driven skin pathologies upon exposures to blistering agents and other chemicals. Innovative animal models revealed a key role for chemosensory neurons as mediators of chronic pruritus and inflammation in contact dermatitis to poison ivy allergens and other hapten.

Recent work revealed key contributions of TRP channels to tobacco-use initiation and nicotine dependence, as receptors for irritants in smoke and e-cigarettes, and for flavors such as menthol that suppress irritation and increase nicotine intake. Whole transcriptome analysis of sensory neurons revealed the plasticity of the chemosensory system and essential mechanisms controlling toxicant sensitivity.
Wednesday, March 13, 4:30 PM to 5:50 PM, CC Room 308

**Education-Career Development Session: Navigating Turbulent Waters: How to Address Conflict throughout Your Career**

Chairperson(s): Manushree Bharadwaj, NIEHS, Research Triangle Park, NC; and Brita Kilburg-Basnyat, Covance Inc., Madison, WI.

Primary Endorser: Postdoctoral Assembly

Other Endorser(s): Career Resource and Development Committee; Graduate Student Leadership Committee

In science-based work environments, it can be difficult to navigate personality differences, differing opinions on research directions, project responsibilities, and other work-related situations. Addressing these situations head-on—especially in work environments structured around a rigid hierarchy—can be intimidating to graduate students, postdoctoral trainees, and scientists at all career levels. This session focuses on how to manage and overcome conflict in the workplace to achieve a favorable outcome for all. Throughout this session, attendees will gain insight into how to approach these difficult situations successfully through proper communication, problem-solving, and conflict resolution techniques. To achieve this, we have identified successful leaders from diverse backgrounds, career stages, and workplace environments to discuss the dynamics of the workplace and the skills for navigating challenging situations and coworkers. The session will focus on (1) civil skepticism and fair fighting in the workplace and how to disagree with grace; (2) how to overcome recurring negative judgments and feelings in scientific relationships, in both academia and other scientific organizations; (3) struggles when working with teams or groups; and (4) the importance of providing constructive feedback. These interactive presentations will not only include examples from the presenters’ professional careers, but also present hypothetical situations and discuss appropriate responses to resolve these workplace conflicts and manage tough conversations at all career levels. Thus, these presentations will be highly relevant to all student and postdoctoral attendees that want to improve their conflict management skills, as well as managers, PIs, Directors, and others who regularly interact with and manage a team. This session will enable the audience to learn and implement an essential skill set that will improve professional relationships throughout their careers.

Abstract #

#3249  
4:30  **Navigating Turbulent Waters: How to Address Conflict throughout Your Career.**  M. Bharadwaj, NIEHS, Research Triangle Park, NC.

4:30  **Civil Skepticism and Fair Fighting.**  M. M. Mitchell. The Mitchell Organization, Seattle, WA. Sponsor: M. Bharadwaj

4:50  **De-energizing Relationships in Academia and Science and How to Manage Them.**  D. Dolinoy. University of Michigan School of Public Health, Ann Arbor, MI.

5:10  **Managing Workplace Relationships by Setting Clear Expectations.**  J. Henkin. STEM Career Services, Washington, DC. Sponsor: M. Bharadwaj

5:30  **Giving Effective Feedback: Tips for Telling the “Good” or “Bad”.**  T. Collins. NIEHS, Research Triangle Park, NC. Sponsor: M. Bharadwaj

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Wednesday, March 13, 4:30 PM to 6:00 PM, Pratt Street Ale House

**Ohio Valley Regional Chapter Reception**

Wednesday, March 13, 4:45 PM to 7:00 PM, Hyatt Regency Baltimore Constellation F

**Women in Toxicology Special Interest Group Reception**
Wednesday, March 13, 5:00 PM to 6:00 PM, Hilton Baltimore Key 6
Medical Device and Combination Product Specialty Section Mentoring Event

Wednesday, March 13, 6:00 PM to 7:30 PM, Hilton Baltimore See room listing below.

Specialty Section Meetings/Receptions: Drug Discovery (Johnson); Food Safety (Peale); Immunotoxicology (Key 9); Medical Device and Combination Product (Key 6); Metals (Key 11); Neurotoxicology (Key 5); Risk Assessment (Holiday 3)

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www.toxicology.org
Thursday, March 14, 8:30 AM to 11:15 AM, CC Room 309

Symposium Session: Nerve Agent and Pesticide Poisoning: Best Practice Methodologies for Assessing Long-Term Health Effects

Chairperson(s): Laurie E. Roszell, Army Public Health Center, Aberdeen Proving Ground, MD; and David Jett, NIH-Countermeasures Against Chemical Threats (CounterACT) Research Program, Bethesda, MD.

Primary Endorser: Neurotoxicology Specialty Section

Other Endorser(s): Risk Assessment Specialty Section

Exposure to nerve agents, such as chemical warfare agents and organophosphorus pesticides, is a highly topical subject in toxicology, unfortunately because of their recent use in civilian and military conflict. Nerve agent poisoning after acute high doses is often fatal; however, if life-threatening symptoms can be controlled through medical intervention, many people can survive the acute lethal toxicity. There is an existing body of literature that strongly suggests that nonlethal adverse health effects occur in survivors of acute nerve agent exposure. These “long-term” health effects include neurochemical, neuropathological, and behavioral deficits that occur within days, weeks, or even many years after the exposure. The acute lethal effects of organophosphorus (OP) nerve agents and pesticides have been well described, and data exist for the assessment of hazard and risk. However, understanding and assessing the risk of long-term sequelae is less clear due to the heterogeneity and rigor of human and animal studies. Data on the long-term effects are also important for developing effective medical interventions, since some of the studies describe persistent effects that can significantly reduce quality of life. Often risk assessments are largely retrospective, relying on qualitative data by estimating signs and symptoms at the time of exposure and how long it took for them to develop. The session will present examples of methods for assessing long-term effects in humans and animals following acute exposures to OP nerve agents and pesticides. The session will begin with an overview of the issue, including examples of significant incidents and efforts to retrospectively link exposures to outcomes. The next presenter will describe an NIH/NTP Systematic Review of long-term neurological effects of sarin. This will be followed by a presentation describing a toxidrome-based, subject-matter expert (SME)-informed approach for assessing the risk of long-term health effects following acute exposures to OP nerve agents and pesticides, and the fourth presentation will discuss preclinical models for assessing the neuropathological changes induced by acute intoxication with OPs, and the short- and long-term functional deficits associated with the acute exposures. The session will conclude with a panel discussion.

Abstract #


#3251  8:30  Overview: Why Do We Need to Understand Long-Term Adverse Health Outcomes following Acute Exposures to Nerve Agents?  L. E. Roszell. Army Public Health Center, Aberdeen Proving Ground, MD.

#3252  8:50  A Systematic Approach for Assessing Long-Term Effects of Sarin.  D. A. Jett¹, R. Blain², C. Sibrizzi², P. Hartman³, and A. Rooney⁴. ¹NIH-Countermeasures Against Chemical Threats (CounterACT) Research Program, Bethesda, MD; ²ICF International, Fairfax, VA; ³ICF International, Durham, NC; and ⁴NIEHS, Research Triangle Park, NC.

#3253  9:25  A Novel SME-Informed Approach to Assess the Likelihood of Long-Term Injury following Acute Exposures.  K. Wegman. Battelle Memorial Institute, Columbus, OH. Sponsor: L. Roszell

#3254  10:00  Preclinical Models to Assess Long-Term Neurological Sequelae of Acute Intoxication with Organophosphate Nerve Agents.  P. J. Lein. University of California Davis, Davis, CA.

10:35  Panel Discussion/Q&A.  L. E. Roszell¹, D. A. Jett², K. Wegman³, and P. J. Lein⁴. ¹Army Public Health Center, Aberdeen Proving Ground, MD; ²NIH-Countermeasures Against Chemical Threats (CounterACT) Research Program, Bethesda, MD; ³Battelle Memorial Institute, Columbus, OH; and ⁴University of California Davis, Davis, CA.
Metal contamination impacts hundreds of millions of people in the world. Metal exposure can cause human diseases including cancer. Carcinogenic metals are in general considered to be weak mutagens, suggesting that mechanisms other than genetic changes play major roles in metal-induced carcinogenesis. Epigenetic mechanisms have recently emerged as important players in response to metal exposure. Epigenetic regulations include DNA methylation, histone modifications, microRNA expression, incorporation of histone variants, and nucleosome positioning and chromatin accessibility. Most studies of metal-induced epigenetic dysregulation have focused on changes in epigenetic profiles in terms of DNA methylation, global histone modifications, and microRNA expression. However, mechanisms that control these changes and consequences of these changes are not well examined. Moreover, little is known about genome-wide changes in chromatin accessibility and assembly of variant histones following metal exposures. While high-throughput sequencing technologies such as RNA-seq, ChIP-seq, and Methyl-seq have recently been applied for studies of metal-induced epigenetic regulation, newer technologies such as ATAC (Assay for Transposase-Accessible Chromatin) have not been as widely used in studies involving metal toxicity. This symposium aims to highlight recent advances in environmental epigenetics, focusing on new molecular insights into epigenetic dysregulation by metal exposure and on the use of cutting-edge new technologies in studies of environmental epigenetics. The first speaker identifies a set of differentially methylated genes in exfoliated urothelial cells (EUCs) in a cohort study. Promoter analysis shows that the arsenic-associated genes are enriched for the binding sites of common transcription factors known to play roles in carcinogenesis. The second speaker demonstrates hsa-miR-186 induction by arsenic exposure and how overexpression of hsa-miR-186 induces chromosomal instability in keratinocytes, providing a mechanism for induction of aneuploidy by arsenic exposure. In the third presentation, the speaker presents the changes in the levels of histone variants during arsenic-induced epithelial to mesenchymal transition (EMT) as well as a possible mechanism that causes differential methylation at specific genomic loci in arsenic-transformed cells. The fourth speaker uses cutting-edge new technologies such as DANPOS (Dynamic Analysis of Nucleosome Positioning and Occupancy by Sequencing) and ATAC (Assay for Transposase-Accessible Chromatin) to show how nucleosome positioning and chromatin accessibility are changed by chromium exposure. The fifth speaker uses an animal model to demonstrate polyadenylation of canonical histone mRNAs following nickel and arsenic exposures. In vitro studies further reveal that increase in polyadenylated canonical histone mRNAs disrupts nucleosome assembly of histone variants at active promoters. In summary, this symposium will provide attendees mechanistic and new aspects of epigenetic dysregulation by metal exposure and their implications in metal-induced carcinogenesis, as well as better understanding of new approaches for studying chromatin landscape following environmental exposures. Potential use of these epigenetic changes in cancer risk assessment will be discussed.

Abstract #

#3255 8:30  **New Mechanistic Insights into Causes and Outcomes of Epigenetic Dysregulation by Carcinogenic Metals.**  C. Jin. New York University School of Medicine, New York, NY.

#3256 8:35  **Introduction.**  C. Jin. New York University School of Medicine, New York, NY.

#3257 9:07  **Links between Arsenic-Associated DNA Methylation and Bladder Cancer.**  J. Rager. University of North Carolina at Chapel Hill, Chapel Hill, NC.

#3258 9:39  **hsa-miR-186 Overexpression Induces Aneuploidy in Human Keratinocytes.**  J. States. University of Louisville, Louisville, KY.


#3260 10:43  **Hexavalent Chromium Disrupts Chromatin Architecture.**  A. VonHandorf, and A. Puga. University of Cincinnati College of Medicine, Cincinnati, OH.

#3261 11:15  **Polyadenylation ofCanonical Histone mRNA by Carcinogenic Metals Nickel and Arsenic Disrupts Chromatin Homeostasis and Is Highly Carcinogenic.**  M. Costa. New York University School of Medicine, New York, NY.
Exposure to toxicants during critical windows of in utero or early postnatal development can alter coordinated differentiation and growth programs, resulting in significant impacts on the trajectory of development and adverse health outcomes in later life. Recently, it has been recognized that the preconception window of exposure is an overlooked critical period during which toxicants can alter the processes required for successful gametogenesis. Gametogenesis, like early development, requires precisely timed cell division and differentiation to produce mature gametes with appropriate genetic and epigenetic contents, organelles, and RNAs necessary for fertilization and development. This session will explore how toxicants adversely affect gametogenesis, impair gamete quality, and contribute to health and disease states in offspring. The session will begin with an overview presentation on the background and rationale for this research area, after which speakers will discuss experiments demonstrating preconception exposure effects of a range of compounds, including ethylene glycol monomethyl ether, phthalates, perfluorinated alkyl substances, and mitochondrial toxicants, on oogenesis and spermatogenesis in rats, mice, zebrafish, C. elegans, and humans. The goal of this session will be to answer the following questions: How do toxicant exposures adversely alter gametogenesis; how can those effects be measured; and what are the impacts on offspring health outcomes? These presentations will demonstrate that the preconception window of exposure is a sensitive window for the development of health and disease states in later life, with potentially broad ramifications for understanding the mechanisms of toxicity contributing to transgenerational effects and for regulatory testing of reproductive toxicants.

Abstract #

#3261 8:30 Preconception Exposure to Toxicants: Assessing Gamete Quality and Reproductive Outcomes. D. Spade. Brown University, Providence, RI.
#3262 8:35 Introduction. D. Spade. Department of Pathology and Laboratory Medicine, Brown University, Providence, RI.
#3263 9:05 Testicular Toxicants as Modifiers of Sperm Epigenetic States: Ethylene Glycol Monomethyl Ether as a Case Study. A. Stermer. Brown University, Providence, RI.
#3264 9:35 Male Preconception Phthalates on Sperm Epigenetics and Early-Life Development. J. Pilsner. University of Massachusetts Amherst, Amherst, MA. Sponsor: A. Timme-Laragy
#3265 10:05 Maternal Preconception Exposure to PFOS Affects Nutrient Content of Oocytes and Later-Life Pancreas Development. K. Sant. San Diego State University, San Diego, CA.
#3266 10:35 Does Exposure to Mitochondrial Toxicants during Germ Cell Development Result in Lifelong Alterations in Mitochondrial Function Mediated by Epigenetic Changes? J. Meyer. Duke University, Durham, NC.
11:05 Panel Discussion/Q&A.

Thursday, March 14, 8:30 AM to 11:15 AM, CC Ballroom IV

Symposium Session: Preconception Exposure to Toxicants: Assessing Gamete Quality and Reproductive Outcomes

Chairperson(s): Daniel Spade, Brown University, Providence, RI; and Alicia Timme-Laragy, University of Massachusetts Amherst, Amherst, MA.
Primary Endorser: Reproductive and Developmental Toxicology Specialty Section
Other Endorser(s): Mechanisms Specialty Section; Molecular and Systems Biology Specialty Section

Program Schedule—Thursday | 242

Brief Overview and Introduction to Systematic Review and Related Products. B. Beverly, NIEHS/NTP, Research Triangle Park, NC.

Rigor and Resources for Systematic Reviews in Toxicology: Case Study Applications in Food Safety, Consumer Product Safety, and Environmental Health Risk Assessment. D. Wikoff, ToxStrategies, Inc., Asheville, NC.

Systematic Mapping as a Tool for Regulatory Risk Assessment in Environmental Health: Tetrabromobisphenol A (TBBPA) as a Proof of Concept. T. Harrison, Lancaster University, Lancaster, United Kingdom. Sponsor: B. Beverly

Illustrating Fit for Purpose in Systematic Evidence Maps: Case Study Mapping of the Evidence of Transgenerational Health Effects. V. Walker. NIEHS/NTP, Research Triangle Park, NC. Sponsor: B. Beverly


Panel Discussion. V. Walker1, C. Kwiatkowski2, T. Harrison3, and D. Wikoff4. 1NIEHS/NTP, Research Triangle Park, NC; 2The Endocrine Disruption Exchange, Eckert, CO; 3Lancaster University, Lancaster, United Kingdom; and 4ToxStrategies, Inc., Asheville, NC.

Inhalation is a major route of human exposure to airborne substances. This may cause portal-of-entry effects in the respiratory tract and can also lead to systemic uptake and subsequent effects. Several adverse outcomes in the airways are known, including acute lethal effects and chronic diseases. Adverse outcome pathways (AOPs) can be used to describe the mechanism through which a substance causes toxicity and inform the selection of in silico and in vitro methods to include in integrated approaches to testing and assessment (IATAs). In this session, speakers from government, industry, academia, and NGOs will discuss mechanisms relevant to adverse outcomes following inhalation exposure, including lung inflammation and irritation, and the in silico and in vitro methods that can be used to assess key events. Case study examples showing how AOPs have been used to design testing approaches that inform risk assessment decisions will be highlighted. The presentations will discuss the implementation of IATAs that combine the use of existing data with dosimetry considerations, physicochemical property information, in vitro, and computational approaches to fulfill current data needs. Specifically, the first presentation will set the stage for the remaining talks by highlighting the importance of and providing an example of material characterization and dosimetry considerations that must proceed in vitro testing. The second talk will describe a computational and in vitro approach based on an AOP for squamous metaplasia that has been submitted to the US EPA for the registration of a fungicide. The third talk will discuss an integrated approach for testing reactive gases using an AOP for ILC-2-mediated respiratory remodeling to inform assay selection and interpretation of study results. The fourth presentation will detail the use of precision-cut lung slices to query key events in an AOP for chronic obstructive pulmonary disease. The final talk will present a regulatory perspective on processes in place to accept alternative approaches for inhalation toxicity testing, the use of mechanistic and exposure information to facilitate regulatory acceptance, and remaining hurdles.

Use of Adverse Outcome Pathways to Design Nonanimal Testing Strategies for Assessing Inhalation Toxicity. A. Clippinger. PETA International Science Consortium Ltd., Norfolk, VA.

Introduction. R. Landsiedel1, and A. J. Clippinger2. 1BASF SE, Ludwigshafen, Germany; and 2PETA International Science Consortium Ltd., Norfolk, VA.
Thursday, March 14, 8:30 AM to 11:15 AM, CC Room 308

**Platform Session: Nanotoxicology: In Vitro Test Platform**

Chairperson(s): Richard L. Salisbury, US Air Force, Wright-Patterson AFB, OH; and Christa Wright, Georgia State University, Tucker, GA.

Abstract #

#3288 8:30  **An Integrative Lipidomic and Proteomic Approach to Understanding the Nanoparticle-Biocorona.**  L. Kobos, and J. Shannahan. Purdue University, West Lafayette, IN.

#3289 8:45  **Pyroptosis: A New Form of Cell Death Induced by Nanomaterials.**  T. Xia. University of California Los Angeles, Los Angeles, CA.
Thursday, March 14, 8:30 AM to 11:15 AM, CC Room 321

Platform Session: Safety Assessment: Pharmaceutical—Drug Development II

Chairperson(s): Sreenivasa Ramaiyahgari, NIEHS, Research Triangle Park, NC; and Likun Gong, Shanghai Institute of Materia Medica, Shanghai, China.

Abstract #

#3290 9:00 Transcriptional Signatures in Human LP9 Mesothelial Cells after Treatment with Differentially Purified and Surface Functionalized Multiwalled Carbon Nanotubes. C. Ziemann1, S. Reamon-Buettner1, D. Lison2, S. van den Brüle3, J. C. Bonner3, and O. Creutzenberg1. 1Fraunhofer Institute for Toxicology and Experimental Medicine ITEM, Hannover, Germany; 2Université Catholique de Louvain, Louvain, Belgium; and 3North Carolina State University, Raleigh, NC. Sponsor: C. Wright, Environmental Mutagenesis and Genomics Society

#3291 9:15 Induction of Oxidative DNA Damage and Promotion of Epithelial Mesenchymal Transitions through Engineered Nanoparticle Exposure in Human Primary Small Airway Epithelial Cells. C. Wright, K. Pearce, R. Faiththalab, and I. Okon. Georgia State University, Atlanta, GA. Sponsor: C. Wright, Environmental Mutagenesis and Genomics Society

#3292 9:30 Long-Fiber Carbon Nanotubes Induce Pleural Mesothelioma via Silencing and/or Loss of Key Tumour Suppressor Genes: A Major Role for Epigenetic Mechanisms in Disease Development. T. Chernova1, J. Zacarias-Cabeza1, S. Galavotti1, F. A. Murphy1, X. Sun1, A. Craxton1, I. R. Powley1, S. Grosso1, J. Bennett1, A. Nakas1, P. Greaves1, A. Smith1, K. Donaldson1, C. A. Poland1, A. E. Willis1, and M. MacFarlane1. 1University of Cambridge, Leicester, United Kingdom; 2UHL NHS Trust Glenfield Hospital, Leicester, United Kingdom; 3University of Leicester, Leicester, United Kingdom; and 4MRC/University of Edinburgh, QMRI, Edinburgh, United Kingdom.

#3293 9:45 An In Vitro Approach to Assess the Pulmonary Fibrosis of Nanomaterials. M. Sharma1, B. Rothen-Rutishauser2, H. Barosova2, S. Chortarea3, F. Zerimariam4, M. Cliff4, V. Stone5, P. Hayden5, A. Maione6, and A. Clippinger1. 1PETA International Science Consortium, London, United Kingdom; 2Adolphe Merkle Institute, University of Fribourg, Fribourg, Switzerland; 3In Vitro Toxicology Group, Swansea University Medical School, Swansea, United Kingdom; 4Heriot-Watt University, Edinburgh, United Kingdom; and 5MatTek Corporation, Ashland, MA.

Platform Session: Safety Assessment: Pharmaceutical—Drug Discovery II

Chairperson(s): Jean-Pierre Valentin, UCB, Braine l’Alleud, Belgium; and Youngha Xing, University of Wisconsin-Madison, Madison, WI.

Abstract #


#3307 8:45 **Trial to Detect Significant Metric Parameters and to Find Novel Methodologies for Drug-Induced Seizure Liability Using Microelectrode Arrays Data Analysis and Primary Rodent Neurons.** N. Miyamoto1,2, A. Ojima1,2,3, S. Inaba1,3, T. Kitamura4, T. Osada2,5, I. Suzuki2,6, A. Odawara3, N. Matsuda4, and T. Yoshinaga1,2. 1Eisai Co., Ltd., Tsukuba, Japan; 2Consortium for Safety Assessment using iPS Cells (CSAHii), Kawasaki, Japan; 3TechnoPro R&D Company, Tsuchitura, Japan; 4LSI Medience Corporation, Kamisu, Japan; 5LSI Medience Corporation, Chiyoda, Japan; and 6Tohoku Institute of Technology, Sendai, Japan. Sponsor: A. Suganuma

#3308 9:00 **Evaluation of a High-Content Cytometry Screen to Predict Rat Organ Toxicity through Machine Learning Analysis of Acute Cell Stress.** A. A. Bieberich1, V. Shankey1, B. Rajwa2, R. Fatig1, M. Kuhls1, and T. Johnson3. 1AsedaSciences AG, West Lafayette, IN; 2Purdue University, West Lafayette, IN; and 3Merck Research Laboratories, West Point, PA.

#3309 9:15 **The Validation of New In Vitro Assays from a Chemical Toxicologist’s Perspective: The Important Role of Both Local and Global Validation Training Sets.** T. Yukawa, Y. Dragan, and R. Naven. Takeda Pharmaceuticals International Co., Cambridge, MA.

#3310 9:30 **Development of a High-Throughput High Content Imaging Based Mitobiogenesis Assay.** E. Greenhaw, M. Barnes, S. Qin, and C. Strock. Cyprotex US, LLC, Watertown, MA.

#3311 9:45 **A Comprehensive Approach Using In Vitro Assays to Detect and Identify Mechanism of Mitochondrial Toxicity.** P. Walker, C. Bauch, B. Park, and J. Eakins. Cyprotex Discovery, Alderley Park, Macclesfield, United Kingdom. Sponsor: C. Strock


10:30 Q&A.

Poster Session: Late-Breaking Poster Session

The abstracts for these posters are available in the SOT Event App and as part of the The Toxicologist: Late-Breaking Supplement PDF.
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