Dear Colleagues:

SOT Council and the Committees, individuals, and groups engaged in planning the SOT 63rd Annual Meeting and ToxExpo are thrilled to bring together over 5,000 toxicologists and professionals for this highly anticipated event, where cutting-edge research and the latest advancements in toxicology will take center stage. As we gather at the Salt Palace Convention Center, March 10–14, 2024, in Salt Lake City, Utah, we’re not just creating an atmosphere for scientific exchange but also are fostering a community where connections are made, friendships are renewed, and professional development thrives.

More than 70 Featured and Scientific Sessions, accompanied by an impressive showcase of 2,000+ poster presentations, are planned for the meeting. Featured and Scientific Sessions will, once again, be recorded for online viewing through the SOT Online Planner and SOT Event App—sessions will not be livestreamed.

The ToxExpo, spanning three days and featuring 250+ organizations, promises an enriching experience for all attendees. I encourage everyone to take time to visit the ToxExpo Exhibit Hall and interact with these potential partners, employees, and suppliers and to check out your colleagues’ latest research. It will be easier than ever to explore posters this year as they have been integrated into the ToxExpo floor plan instead of being around the perimeter. Don’t forget to enter exhibitor raffles and drop your business card in the SOT Diamond-level Supporter boxes throughout the Exhibit Hall to increase your chances of winning big!

Recognizing the environmental effects of a large meeting, our selected venue, the Salt Palace Convention Center, has a 70% diversion goal and offers amenities such as refillable water bottle stations. We also will be using recycled materials for our badges and continue to find ways to minimize waste through less printed materials, consolidated signage, and more.

While at the meeting, I hope you have an opportunity to explore the beautiful city of Salt Lake, known for its diverse culinary scene, museums, music venues, and shopping areas. Take advantage of discount passes available for dining and entertainment, ensuring a memorable stay beyond the conference.

I am excited to welcome you to Salt Lake City, where science meets camaraderie, and where the SOT Annual Meeting and ToxExpo becomes not just an event, but an unforgettable experience. Let’s embark on this journey of knowledge, collaboration, and discovery together!

Sincerely,

Dori R. Germolec, PhD
2023–2024 SOT President
# Program Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Program Overview</td>
</tr>
<tr>
<td>17</td>
<td>Venue Maps</td>
</tr>
<tr>
<td>23</td>
<td>Annual Meeting Support</td>
</tr>
<tr>
<td>25</td>
<td>Registration</td>
</tr>
<tr>
<td>29</td>
<td>Hotel and Travel</td>
</tr>
<tr>
<td>35</td>
<td>General Information</td>
</tr>
<tr>
<td>39</td>
<td>ToxExpo Exhibits</td>
</tr>
<tr>
<td>41</td>
<td>Program Schedule</td>
</tr>
<tr>
<td>156</td>
<td>Poster Sessions</td>
</tr>
</tbody>
</table>

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Dear Colleagues,

With artificial intelligence (AI) and machine learning dominating headlines in so many realms of life, our Opening Plenary speaker, Chris Gibson, PhD, will demonstrate how these technologies can interface with our science to advance the drug discovery process. Dr. Gibson is the co-founder and CEO of Recursion, a Salt Lake City–based company using AI to modernize therapeutics discovery.

Dr. Gibson’s presentation will be followed by additional Featured Sessions, 69 Scientific Sessions, 2,000+ poster presentations, luncheons, receptions, and more. I am pleased to share that the Featured and Scientific Sessions will once again be recorded and posted for on-demand viewing through the SOT Online Planner and SOT Event App.

The SOT Scientific Program Committee has worked hard to address feedback that we’ve received by making a few changes to the scientific program:

• There is minimal scientific programming during the lunch hour. This way, people can take a break, catch up, or visit the ToxExpo without missing Scientific Sessions.

• Speaking of the ToxExpo, poster boards will be more evenly distributed throughout the Exhibit Hall instead of clustered around the outer edges. This will allow a more seamless transition between poster viewing and exhibitor interactions.

• To increase the opportunity for interactions, the “Meet the Directors” Featured Session has been transitioned to Tiny Tox Talks. Plan on meeting Rick Woychik, PhD, NIEHS/NTP, and Maureen Gwinn, PhD, DABT, ATS, US EPA/ORD, in the Tiny Tox Theater, located in the ToxExpo Exhibit Hall.

• In conjunction with EUROTOX, we are introducing a new Featured Session. This Roundtable Session will address the question, “Is Mixture Risk Assessment Now Established Regulatory Practice?”

I am confident that the presentations prepared for the SOT 63rd Annual Meeting and ToxExpo will provide attendees with insights on a diverse array of specialties, technologies, and interests—touching on all that makes toxicology such an interesting and important discipline.

Sincerely,

Laurie C. Haws

Laurie Couture Haws, PhD, DABT, ATS
2023–2024 SOT Vice President
and Scientific Program Committee Chair
### Program Overview

#### Session Types (Listed by date, then time, then session type)

- **CE** Continuing Education Courses
- **EC** Education-Career Development Sessions
- **E** Exhibitor-Hosted Sessions
- **FS** Featured Sessions
- **HH** Historical Highlights Sessions
- **IS** Informational Sessions
- **PL** Platform Sessions
- **PS** Poster Sessions
- **R** Roundtable Sessions
- **S** Symposium Sessions
- **W** Workshop Sessions
- **IAT** Innovations in Applied Toxicology
- **ITS** Innovations in Toxicological Sciences

For the most up-to-date information on all Annual Meeting sessions, events, and activities, consult the SOT Online Planner and the SOT Event App. All events in this preview take place in the Salt Palace Convention Center unless otherwise noted.

#### Saturday, March 9

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</table>
| 5:15 PM to 7:30 PM | **UNDERGRADUATE DIVERSITY PROGRAM**  
  • Opening Event (CDI Travel Awardees and Invited Guests Only)  
    Grand Ballroom D, Marriott Downtown at City Creek |

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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| 7:30 PM to 8:30 PM | **COMMITTEE ON DIVERSITY INITIATIVES (CDI) REUNION**  
  • All meeting registrants are invited to attend, especially those who have previously participated in the CDI Undergraduate Diversity Program.  
    Grand Ballroom D, Marriott Downtown at City Creek |

#### Sunday, March 10

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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| 7:00 AM to 7:45 AM | **CONTINUING EDUCATION SUNRISE MINICOURSE**  
  (Separate Registration and Fee Required) |

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<tr>
<th>Time</th>
<th>Session</th>
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| SR01 7:15 AM to 7:45 AM | Plastic Chemical Additives: Determining Human Risk from Microplastic Exposure  
  Room 251 D  
  Abstract #: 1001 |

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<tr>
<th>Time</th>
<th>Session</th>
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| 8:00 AM to 5:00 PM | **UNDERGRADUATE EDUCATION PROGRAM**  
  • This daylong program introduces undergraduates to toxicology and includes opportunities to explore and interpret data, meet with academic program directors, and network with SOT mentors.  
    (Free Registration Required; Undergraduates Only)  
    Grand Ballroom D, Marriott Downtown at City Creek |

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<th>Time</th>
<th>Session</th>
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| 8:15 AM to 12:00 Noon | **CONTINUING EDUCATION MORNING COURSES**  
  (Separate Registration and Fee Required) |

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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| AM02 8:15 AM to 9:15 AM | Advances in Metal Toxicology: From Aging and Disease Causation to Detection and Regulatory Measures  
  Grand Ballroom J  
  Abstract #: 1002 |

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<tr>
<th>Time</th>
<th>Session</th>
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| AM03 9:15 AM to 10:15 AM | Foundations of Embryonic and Fetal Development and Application to Developmental Toxicity Testing  
  Room 250 D  
  Abstract #: 1003 |

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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| AM04 10:15 AM to 11:15 AM | High-Throughput In Vitro-In Vivo Extrapolation for Predictive Toxicology  
  Room 251 A  
  Abstract #: 1004 |

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<tr>
<th>Time</th>
<th>Session</th>
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| AM05 11:15 AM to 12:15 PM | Nix the Six: Strategies for Implementing Nonanimal Acute Toxicity Testing  
  Room 250 A  
  Abstract #: 1005 |

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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| AM06 12:15 PM to 1:15 PM | “Relax, Immune System,” Cell and Gene Therapy Here  
  Grand Ballroom F  
  Abstract #: 1006 |

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<tr>
<th>Time</th>
<th>Session</th>
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</table>
| AM07 1:15 PM to 2:15 PM | Weight of Evidence Analysis and Problem Formulation for Chemical Risk Assessment: Fundamental Principles and Application Through Case Example  
  Room 251 D  
  Abstract #: 1007 |

Find up-to-date information at [www.toxicology.org/2024](http://www.toxicology.org/2024) | #2024SOT | #ToxExpo
1:15 PM to 5:00 PM
CONTINUING EDUCATION AFTERNOON COURSES (Separate Registration and Fee Required)

PM08 Benchmark Dose Modeling and Its Applications in Drug, Food, and Chemical Safety Evaluation and Assessment
Room 250 D Abstract #: 1008

PM09 Bridge over Adverse Waters: Integrating Pathology Findings into the Interpretation of Toxicology Studies
Grand Ballroom F Abstract #: 1009

PM10 Harnessing Toxicology in Pregnancy: Traditional and Novel Approaches to Placental Toxicology Research
Room 250 A Abstract #: 1010

PM11 Next-Generation Data Transparency and Open Science Policies: What Toxicologists Need to Know
Grand Ballroom J Abstract #: 1011

PM12 Putting Theory into Practice: Using Computational New Approach Methodologies in Next-Generation Risk Assessment
Room 251 D Abstract #: 1012

PM13 Use of New Approach Methodologies for the Assessment of Inhaled Substances: Examples and Case Studies
Room 251 A Abstract #: 1013

4:45 PM to 6:30 PM
AWARDS CEREMONY AND MUSIC

• Join SOT in honoring its award recipients. Music begins at 4:45 pm, with the ceremony starting at 5:15 pm.
Grand Ballroom A

6:30 PM to 7:30 PM
WELCOME RECEPTION

• All are invited to attend this event, which includes a cash bar.
Hall E

7:00 PM to 8:00 PM
25-YEAR (OR MORE) MEMBER RECEPTION

• If you’ve been an SOT member for 25 years or more, come celebrate at this reception. (By Invitation Only)
Grand Ballroom I

7:30 PM to 10:00 PM
SOT COMPONENT GROUP EVENT

• Out Toxicologists and Allies Special Interest Group Reception
Laziz Kitchen

7:30 PM to 9:00 PM
STUDENT/POSTDOCTORAL SCHOLAR MIXER

• All students and postdocs are invited to attend. Complimentary refreshments and a cash bar will be available. (Free Reservation Required)
Room 355

Monday, March 11
6:15 AM to 7:45 AM
SOT MENTORING BREAKFAST

• This event is intended for all SOT members, from graduate students through established career toxicologists.
(Add-On Event; Limited Seating; SOT Members Only)
Room 255 D

6:30 AM to 8:00 AM
PAST PRESIDENTS’ BREAKFAST

• During this invitation-only event, the most recent SOT Past President hosts the other Past Presidents and leads discussions about topics of relevance to the Society.
(By Invitation Only)
Room 254 C

8:00 AM to 9:00 AM
OPENING PLENARY SESSION

The Evolution of BioTech into TechBio
Hall E

Speaker: Chris Gibson, Recursion, Salt Lake City, UT.

The use of artificial intelligence (AI) and other sophisticated technologies in areas of drug discovery and development, such as toxicology, represent the potential for a transformative leap forward in how we assess and manage the potential risks and opportunities associated with chemical substances, pharmaceuticals, and environmental contaminants. A graduate of Rice University with degrees in bioengineering and management and a PhD from the University of Utah, Dr. Gibson will discuss how AI, biology, chemistry, automation, data science, and engineering are converging to modernize drug discovery and development.

8:00 AM to 5:00 PM
UNDERGRADUATE DIVERSITY PROGRAM

• Undergraduate Diversity Program mentor groups attend Annual Meeting sessions and posters, participate in exclusive activities, and celebrate the weekend’s accomplishments. (By Invitation Only)
Various Locations
Platform Sessions

These 165-minute sessions are composed of 15-minute oral presentations that cover new areas, concepts, or data. The topics and presentations for these sessions, as well as the session days and times, are included in the Program Supplement: Platform and Poster Sessions.

SOT Regional Chapter, Special Interest Group, and Specialty Section Events

The full schedule of these breakfasts, luncheons, receptions, mentoring events, and other activities is available through the SOT Event App. Events are added as they are finalized.

Tiny Tox Theater

Located in the ToxExpo Exhibit Hall (Hall C), the Tiny Tox Theater is an intimate venue hosting 20-minute sessions on a variety of topics, ranging from working with a contract research organization and publishing to networking tips. The complete schedule of Tiny Tox Talks is available in the SOT Online Planner.
### 9:15 AM to 11:15 AM

**POSTER SESSIONS**

Exhibit Hall C
Authors will be in attendance for the following Poster Sessions:
- ADME/Toxicokinetics
- Autoimmunity/Hypersensitivity
- Human Exposure Assessment/Biomonitoring
- Immunotoxicity I
- Medical Devices
- Metals I
- New Approach Methods: General
- Safety Assessment: Pharmaceutical—Drug Development I
- Skin
- Skin Sensitization
- Systems Biology and Toxicology
Note that posters are displayed from 9:00 am to 4:30 pm.

### 9:15 AM to 10:15 AM

**INTOXICATING SCIENCE TALKS**

This special event features informal talks that are 15 minutes or less.

**Hall E**

### 9:30 AM to 11:30 AM

**GLOBAL COLLABORATION COFFEE**

Hosted by IUTOX and SOT, this event offers an opportunity for scientific leaders to connect and gain a better understanding of the initiatives of societies around the world.

**Room 255 D**

### 9:30 AM to 3:00 PM

**RESEARCH FUNDING INSIGHTS ROOM: NETWORK WITH GRANT PROGRAM OFFICERS**

Representatives from federal agencies will be available to answer general grant-related questions.

**Room 254 A**

### 9:30 AM to 10:30 AM

**TRAINEE DISCUSSION**

Plenary Session speaker Chris Gibson will meet informally for discussion with graduate students and postdoctoral scholars.

*(Free Reservation Required; Limited Seating; Grad Students and Postdocs)*

**Room 151 D**

### 10:30 AM to 11:30 AM

**EXHIBITOR-HOSTED SESSIONS**

- Cyprotex and Evotec
  **Room 155 E**
- Harvard Bioscience
  **Room 155 C**
- VJO Canada
  **Room 155 B**
- VRL Laboratories
  **Room 155 F**

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

**DISTINGUISHED TOXICOLOGY SCHOLAR AWARD LECTURE**

Neurotoxicity and Neuroinflammation Profiles in Animal Models: A Brief Review of Some Unexpected Response Modifiers of Likely Relevance to Toxicology

**Grand Ballroom A**

Lecturer:  
**James P. O’Callaghan, NIOSH, Morgantown, WV.**

### 11:45 AM to 1:45 PM

**POSTER SESSIONS**

Exhibit Hall C
Authors will be in attendance for the following Poster Sessions:
- Epidemiology and Public Health
- Epigenetics
- Genotoxicity/DNA Repair
- Molecular Toxicology
- Neurotoxicity: Metals
- Neurotoxicity: Neurodegeneration
- Safety Assessment: Non-pharmaceutical
Note that posters are displayed from 9:00 am to 4:30 pm.

### 12:00 Noon to 1:30 PM

**IN VITRO TOXICOLOGY LECTURE AND LUNCHEON FOR STUDENTS**

(Add-On Event; Limited Seating; Students and Postdocs Only)

AI Will Only Replace Toxicologists Who Do Not Use It!

**Room 255 A**

Lecturer:  
**Thomas Hartung, Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD.**

### 12:00 Noon to 2:00 PM (Exact Start and End Times Vary)

**SOT COMPONENT GROUP EVENTS**

- Comparative Toxicology, Pathology, and Veterinary Specialty Section Meeting/Lunch
  **Room 355 F**
- Mid-Atlantic Regional Chapter Annual Luncheon
  **Blue Iguana**
12:00 Noon to 1:00 PM
EXHIBITOR-HOSTED SESSIONS
- Fraunhofer ITEM
  Room 155 B
- Lhasa Limited
  Room 155 C
- MultiCASE
  Room 155 E
- Simulations Plus
  Room 155 F

12:10 PM to 1:30 PM
ROUNDTABLE SESSION
- Women's Health on the Frontlines: Science behind Sex-Specific Toxicology Differentials, Health Disparity, and Marginalization and Their Ethical Implications IAT
  Grand Ballroom E
  Abstract #: 1057

INFORMATIONAL SESSION
- Risk Communication of PFAS: Challenges and Opportunities
  Grand Ballroom F
  Abstract #: 1058

1:30 PM to 2:30 PM
EXHIBITOR-HOSTED SESSIONS
- Labcorp
  Room 155 E
- Sequani
  Room 155 F
- SynVivo
  Room 155 E
- WuXi AppTec
  Room 155 F

1:45 PM to 4:30 PM
SYMPOSIUM SESSIONS
- Advances in New Approach Methods for Thyroid Toxicity Testing
  Room 250 A
  Abstract #: 1059–1064
- Botanical-Induced Toxicity: Liver Injury and Botanical Drug Interactions
  Grand Ballroom A
  Abstract #: 1065–1070
- Defining Susceptibility to Ozone: A Window into Exposure Effects in a Changing Climate
  Grand Ballroom B
  Abstract #: 1071–1077
- Neuroinflammation as a Central Mediator of Neurotoxicity: Implications for Environmental Links to Chronic Neurodegenerative Diseases
  Grand Ballroom J
  Abstract #: 1078–1083
- Practical Applications of Machine Learning for Gaining Mechanistic Insights in Toxicology
  Grand Ballroom F
  Abstract #: 1084–1089

WORKSHOP SESSIONS
- Allergies Are More Than Skin Deep: Establishing Regulatory Test Methods for Respiratory Sensitization
  Room 251 A
  Abstract #: 1090–1095
- On the Edge of the NAMs Frontier: Pioneering Efforts toward Intra- and Internationally Harmonized Regulatory Applications of New Approach Methodologies
  Grand Ballroom E
  Abstract #: 1096–1101
- Using Geographical Information to Promote Environmental Health and Justice
  Room 251 D
  Abstract #: 1102–1107

1:45 PM to 4:15 PM
PLATFORM SESSION
- Developmental Toxicity–Diversity of Mechanisms and Models
  Room 250 D
  Abstract #: 2016–2025

2:15 PM to 4:15 PM
POSTER SESSIONS
- Exhibitor Hall C
  Authors will be in attendance for the following Poster Sessions:
  - Biomarkers
  - Chemical Threats and Bioterrorism
  - Educating Future Toxicologists and Communicating with the Public
  - Ethical, Legal, Social, Historical Issues
  - PFAS I
  - Risk Assessment I
  - Safety Assessment: Pharmaceutical—Drug Development II
  - Safety Assessment: Pharmaceutical—Drug Discovery
  - Tobacco and ENDS Toxicology I
  Note that posters are displayed from 9:00 am to 4:30 pm.

3:00 PM to 4:00 PM
EXHIBITOR-HOSTED SESSIONS
- Araceli Biosciences
  Room 155 F
- FDA Recruitment
  Room 155 C
- Instem
  Room 155 E
- Promega Corp
  Room 155 B

4:30 PM to 5:30 PM
UNDERGRADUATE EDUCATOR NETWORK MEETING
- All faculty involved in teaching toxicology to undergraduates and others interested in teaching are invited to attend.
  Room 355 A

4:45 PM to 6:15 PM
SOT/EUROTOX DEBATE
- Can the Microbiome Mediate the Toxicity of Environmental Chemicals?
  Grand Ballroom A

SOT Debater:
  Tamara Tal, Helmholtz Centre for Environmental Research, Leipzig, Germany.

EUROTOX Debater:
  Karsten Beekmann, Wageningen University, Wageningen, Netherlands.
5:45 PM to 6:05 PM

EDUCATION-CAREER DEVELOPMENT SESSION

- Decoding the Role of a Project Toxicologist in the (Bio)pharmaceutical Industry
  Grand Ballroom B  Abstract #: 1108

6:45 PM to 9:30 PM (Exact Start and End Times Vary)

SOT COMPONENT GROUP EVENTS

- American Association of Chinese in Toxicology Special Interest Group Distinguished Chinese Toxicologist Lectureship Award and Reception
  Regency Ballroom A, Hyatt Regency
- Association of Scientists of Indian Origin Special Interest Group Annual Meeting
  Salt Lake Ballroom D, Hyatt Regency
- Immunotoxicology Specialty Section Meeting/Reception
  Salt Lake Ballroom E, Hyatt Regency
- Immunotoxicology Specialty Section Mentoring Event
  Salt Lake Ballroom C, Hyatt Regency
- Korean Toxicologists Association in America Special Interest Group Dinner Reception
  J. Wong’s Thai & Chinese Bistro
- Michigan, Allegheny-Erie, and Lake Ontario Regional Chapters Joint Reception
  Zest Kitchen & Bar
- Mixtures Specialty Section Meeting/Reception
  Salt Lake Ballroom A, Hyatt Regency
- Mixtures Specialty Section Mentoring Event
  Salt Lake Ballroom A, Hyatt Regency
- Nanoscience and Advanced Materials Specialty Section Meeting/Reception
  Salt Lake Ballroom E, Hyatt Regency
- Ocular Toxicology Specialty Section Meeting/Reception
  Traverse, Hyatt Regency
- Risk Assessment Specialty Section Meeting/Reception
  Regency Ballroom B, Hyatt Regency
- Specialty Section and Special Interest Group Joint Mentoring Event
  Regency Ballroom C, Hyatt Regency
- Women in Toxicology Special Interest Group Career Panel: “Solutions-Based Strategies for Challenging Scenarios”
  Salt Lake Ballroom B, Hyatt Regency
GLOBAL GALLERY OF TOXICOLOGY

- The Global Gallery of Toxicology allows participating organizations to display posters showcasing their upcoming meetings, key accomplishments, strategic initiatives, journals, awards, and more.
  Exhibit Hall C

SOT COMPONENT GROUP POSTERS

- Dedicated poster space showcases the activities of the SOT Regional Chapters, Special Interest Groups, and Specialty Sections.
  Exhibit Hall C

9:00 AM to 4:30 PM

GLOBAL GALLERY OF TOXICOLOGY

9:00 AM to 10:00 AM

EXHIBITOR-HOSTED SESSIONS

- Clarivate
  Room 155 B
- EPL
  Room 155 E
- SenzaGen
  Room 155 F
- Xybion
  Room 155 C

9:15 AM to 11:15 AM

POSTER SESSIONS

Exhibit Hall C

Authors will be in attendance for the following Poster Sessions:
- Air Pollution: Ozone
- Air Pollution Toxicology
- Animal Models
- Climate Change and Effects
- Ecotoxicology
- Nanotoxicology: In Vitro
- Nanotoxicology: In Vivo
- Tobacco and ENDS Toxicology II

Note that posters are displayed from 9:00 am to 4:30 pm.

9:30 AM to 3:00 PM

RESEARCH FUNDING INSIGHTS ROOM: NETWORK WITH GRANT PROGRAM OFFICERS

- Representatives from federal agencies will be available to answer general grant-related questions.
  Room 254 A

10:30 AM to 11:30 AM

EXHIBITOR-HOSTED SESSIONS

- Altasciences
  Room 155 C
- Charles River
  Room 155 E
- JRF Global
  Room 155 F
- WuXi AppTec
  Room 155 B

11:00 AM to 12:00 Noon

LEADING EDGE IN BASIC SCIENCE AWARD LECTURE

Roles of NRF2-KEAP1 in Environmental Response: Continuing the Legacy of Dr. Yamamoto
Grand Ballroom A

Lecturer: Donna D. Zhang, Herbert Wertheim UF Scripps Institute for Biomedical Innovation and Technology, Jupiter, FL.

11:00 AM to 12:30 PM

WORKSHOP SESSIONS

- Addressing Health Inequities and Susceptibilities via Incorporation of Nonchemical Stressors within Toxicological Approaches and Cumulative Risk Assessments
  Grand Ballroom F
  Abstract #: 1151-1155
- It’s Not Easy Being Green: Applying Alternatives Assessment to Create Safer Consumer Products
  Room 250 A
  Abstract #: 1156-1160

11:00 AM to 12:20 PM

ROUNDTABLE SESSIONS

- Current Status of Diversity, Equity, Inclusion, and Accessibility in Toxicology: SOT Special Interest Groups as Models
  Grand Ballroom E
  Abstract #: 1161
- From Theory to Practice: Preparing Students for Careers in 21st-Century Toxicology
  Grand Ballroom J
  Abstract #: 1162

11:00 AM to 12:00 Noon

HISTORICAL HIGHLIGHTS SESSION

- Take Heart: Learning from Our Past to Improve Cardiovascular Safety Assessments of Pharmaceuticals in the Future
  Grand Ballroom B
  Abstract #: 1163
11:00 AM to 1:30 PM (Exact Start and End Times Vary)

SOT COMPONENT GROUP EVENTS

• American Association of Chinese in Toxicology Special Interest Group Career Development Workshop
  Salt Lake Ballroom D, Hyatt Regency

• Cardiovascular Toxicology Specialty Section Meeting/Luncheon
  Room 355 F

• Cardiovascular Toxicology Specialty Section Mentoring Event
  Room 355 F

• Clinical and Translational Toxicology Specialty Section Mentoring Event
  Room 355 A

• Clinical and Translational Toxicology Specialty Section Reception
  Room 355 A

• Drug Discovery Toxicology Specialty Section Mentoring Event
  Room 355 B

• Exposure Specialty Section Meeting/Luncheon
  Room 255 D

• Joint Mentoring Event, hosted by the Food Safety and Biotechnology Specialty Sections; and Hispanic Organization of Toxicologists Special Interest Group
  Room 355 C

• Sustainable Chemicals through Contemporary Toxicology Specialty Section Meeting/Luncheon
  Room 355 D

11:45 AM to 1:45 PM

POSTER SESSIONS

Exhibit Hall C

Authors will be in attendance for the following Poster Sessions:

• Developmental and Juvenile Toxicology
• Immunotoxicity II
• Inflammation
• Liver: In Vivo
• Neurodegenerative Disease: Parkinson's Disease
• POPs
• Reproductive Toxicology I
• Respiratory Toxicology I
• Respiratory Toxicology II
• Risk Assessment II

Note that posters are displayed from 9:00 am to 4:30 pm.

12:00 Noon to 1:00 PM

EXHIBITOR-HOSTED SESSIONS

• CN Bio
  Room 155 B

• Cyprotex
  Room 155 E

• emka TECHNOLOGIES
  Room 155 C

• InSphero
  Room 155 F

POSTDOCTORAL ASSEMBLY LUNCHEON

• This luncheon is a casual event that encourages engagement and networking among postdoctoral scholars.
  (Add-On Event; Postdocs Only)
  Room 255 A

12:30 PM to 1:45 PM

UNDERGRAD GAB WITH A GRAD OVER GRUB

• All undergraduates are encouraged to attend to learn about SOT programs and network with peers and graduate students; lunch is provided. (Undergraduates Only)
  Room 255 F

1:00 PM to 2:30 PM

SOT/EUROTOX ROUNDTABLE

Is Mixture Risk Assessment Now Established Regulatory Practice?

Grand Ballroom F

Panelists:

Jean-Lou C. M. Dorne, European Food Safety Authority, Parma, Italy.

Maureen R. Gwinn, US EPA/ORD, Research Triangle Park, NC.


Martin F. Wilks, University of Basel, Basel, Switzerland.

1:00 PM to 2:00 PM

TRANSLATIONAL IMPACT AWARD LECTURE

Approaches for Treatment of Nerve Agent Poisoning: From Experimental Laboratories to Intensive Care Units

Grand Ballroom A

Lecturer:

Horst Thiermann, Bundeswehr Institute of Pharmacology and Toxicology, Munich, Germany.
1:00 PM to 2:30 PM

**SYMPOSIUM SESSION**

- Translational Approaches to Study Transporters in Toxicology: From Liquid Biopsies and Endogenous Biomarkers to Machine Learning and Epidemiology
  
  **Grand Ballroom E**
  
  Abstract #: 1164–1168

**WORKSHOP SESSIONS**

- Complex Interpretations of Substance Detection and Impairment
  
  **Grand Ballroom B**
  
  Abstract #: 1169–1174

- Overcoming Barriers to More Scalable Environmental Health Science Research via Harmonized Language
  
  **Grand Ballroom J**
  
  Abstract #: 1175–1180

**EDUCATION-CAREER DEVELOPMENT SESSION**

- Preparing the Next Generation of Toxicologists: Integrating Practical Applications and Diverse Career Paths into the Student Experience
  
  **Room 251 D**
  
  Abstract #: 1181

**PLATFORM SESSIONS**

- Advancements in Cardiotoxicity Assessment
  
  **Room 250 D**
  
  Abstract #: 2037–2042

- Ecotoxicology
  
  **Room 251 A**
  
  Abstract #: 2043–2048

- Epigenetics
  
  **Room 250 A**
  
  Abstract #: 2049–2054

1:30 PM to 2:50 PM

**CAREER EXPLORATION THROUGH SPEED INFORMATIONAL INTERVIEWS**

- Groups of trainees will rotate through a series of short discussions with career representatives from academia, government, and industry.
  
  (Free Reservation Required; Limited Seating; Postdocs and Grad Students)
  
  **Room 255 A**

1:30 PM to 2:30 PM

**EXHIBITOR-HOSTED SESSIONS**

- BioIVT
  
  **Room 155 E**

- Fraunhofer ITEM
  
  **Room 155 B**

- FUJIFILM Cellular Dynamics
  
  **Room 155 C**

- Korea Institute of Toxicology
  
  **Room 155 F**

2:15 PM to 4:15 PM

**POSTER SESSIONS**

Exhibit Hall C

Authors will be in attendance for the following Poster Sessions:

- Air Pollution: Particulate Matter
- Endocrine Toxicology
- Neurotoxicity: Developmental I
- Neurotoxicity: General
- New Approach Methods: In Vitro I
- New Approach Methods: In Vitro II
- PFAS II
- Reproductive Toxicology II
- Risk Assessment III

Note that posters are displayed from 9:00 am to 4:30 pm.

3:00 PM to 4:00 PM

**MERIT AWARD LECTURE**

Are Humans REALLY Just Big Rats and Mice? A Tale of Three "Toxins"

**Grand Ballroom A**

Lecturer:

**David L. Eaton**, University of Washington, Tucson, AZ.

3:00 PM to 4:30 PM

**SYMPOSIUM SESSIONS**

- In Vitro to In Vivo Extrapolation to Predict Developmental Toxicity Potential
  
  **Grand Ballroom E**
  
  Abstract #: 1182–1186

- Taking a Closer Look at Biological Evaluations for Ocular Medical Devices and Combination Products
  
  **Grand Ballroom B**
  
  Abstract #: 1187–1190

**WORKSHOP SESSIONS**

- Applications of Annotations and Ontologies in Toxicology to Get Us on the Same Page for Maximizing Data Potential
  
  **Room 250 A**
  
  Abstract #: 1191–1195

- Reducing Use of Nonhuman Primates in Oncology Drug Development: A 3R-Based IQ DruSafe/Industry/US FDA Perspective
  
  **Grand Ballroom J**
  
  Abstract #: 1196–1200
3:00 PM to 4:20 PM

INFORMATIONAL SESSION

- Methods and Transdisciplinary Frameworks to Evaluate Cumulative Impacts to Advance Equity in Community Health, Well-Being, and Quality of Life
  Grand Ballroom F  
  Abstract #: 1201

EDUCATION-CAREER DEVELOPMENT SESSION

- Navigating Career Transitions and Acclimation: The Art of a Scientific Career
  Room 251 D  
  Abstract #: 1202

3:00 PM to 4:15 PM

PLATFORM SESSION

- Molecular Mechanisms of Toxic Kidney Injury
  Room 250 D  
  Abstract #: 2055–2059

3:00 PM to 4:00 PM

EXHIBITOR-HOSTED SESSIONS

- Instem
  Room 155 E
- Lhasa Limited
  Room 155 C
- NIEHS
  Room 155 F
- SIGNATOPE
  Room 155 B

4:45 PM to 6:15 PM

SYMPOSIUM SESSIONS

- Long Non-coding RNA Dysregulations in Metal Toxicity and Carcinogenesis
  Grand Ballroom E  
  Abstract #: 1203–1207
- Nitrosamines: Mechanistic Evidence to Support Subclasses with Varying Mutagenic Potency
  Grand Ballroom A  
  Abstract #: 1208–1211

4:45 PM to 6:05 PM

INFORMATIONAL SESSION

- From My Cosmetics to Smart Watch, Toxicology Touches It All!
  Grand Ballroom J  
  Abstract #: 1212

EDUCATION-CAREER DEVELOPMENT SESSION

- Toxicology in the Military: Unique Career Opportunities and Applications
  Grand Ballroom B  
  Abstract #: 1213

4:45 PM to 6:15 PM

HOT TOPIC SESSION

- Translational Insights into Reproductive Impacts of Micro- and Nanoplastics Contamination
  Grand Ballroom F

SOT ANNUAL BUSINESS MEETING

- SOT members are encouraged to attend.
  Room 250 D

5:00 PM to 10:00 PM (Exact Start and End Times Vary)

SOT COMPONENT GROUP EVENTS

- Computational Toxicology Specialty Section Mentoring Event
  Salt Lake Ballroom B, Hyatt Regency
- Computational Toxicology Specialty Section Reception
  Salt Lake Ballroom B, Hyatt Regency
- Food Safety Specialty Section Meeting/Reception
  Salt Lake Ballroom A, Hyatt Regency
- Hispanic Organization of Toxicologists Special Interest Group Annual Meeting/Reception
  Pierpont Place
- In Vitro and Alternative Methods Specialty Section Meeting/Reception
  Salt Lake Ballroom C, Hyatt Regency
- Joint Mentoring Event, hosted by the Medical Device and Combination Product, Risk Assessment, and In Vitro and Alternative Methods Specialty Sections
  Salt Lake Ballroom E, Hyatt Regency
- Mechanisms Specialty Section Meeting/Reception
  Regency Ballroom D, Hyatt Regency
- Medical Device and Combination Product Specialty Section Meeting/Reception
  Salt Lake Ballroom E, Hyatt Regency
- Metals Specialty Section Meeting/Reception
  Salt Lake Ballroom D, Hyatt Regency
- Northeast and Southern California Regional Chapters Combined Mixer
  Lake Effect Bar
- Northern California Regional Chapter SOT Annual Reception
  Squatters Pub Brewery
- Pacific Northwest Regional Chapter Reception
  Caffe Molise
- Regulatory and Safety Evaluation Specialty Section Meeting/Reception
  Regency Ballroom B, Hyatt Regency
- Reproductive and Developmental Toxicology Specialty Section Meeting/Reception
  Regency Ballroom C, Hyatt Regency
- Reproductive and Developmental Toxicology Specialty Section Mentoring Event
  Regency Ballroom C, Hyatt Regency
- Southeastern Regional Chapter and University of Georgia Joint Reception
  Gracie’s
- Toxicologists of African Origin Special Interest Group Annual Reception
  Dave and Busters

7:30 PM to 9:00 PM

TOX SHOWDOWN

- Three teams of three contestants participate in this quiz game, an event that also features a cash bar.
  Regency Ballroom A, Hyatt Regency
Wednesday, March 13

8:00 AM to 10:45 AM

**SOT AND JAPANESE SOCIETY OF TOXICOLOGY SYMPOSIUM**

**Exosome and Its Related Studies**

Room 250 A

Speakers:

**Takahiro Ochiya**, Tokyo Medical University, Tokyo, Japan.

**Anumantha Kanthasamy**, University of Georgia, Athens, GA.

**Ryuichi Ono**, National Institute of Health Sciences, Kawasaki, Japan.

**Irfan Rahman**, University of Rochester Medical Center, Rochester, NY.

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

**SYMPOSIUM SESSIONS**

- It Takes Two! Paternal Exposures and Their Impacts on Offspring Health
  
  **Grand Ballroom A**
  
  Abstract #: 1214–1219

- Take a Deep Breath: Opportunities and Challenges in Toxicology Studies for Inhaled Drug Development
  
  **Room 251 D**
  
  Abstract #: 1220–1225

- The "Cocktail Effect": Studying the Greatest Uncontrolled Experiment Ever Launched!
  
  **Room 251 A**
  
  Abstract #: 1226–1231

**WORKSHOP SESSIONS**

- Advancements in Utilizing Zebrafish-Based Behavioral Assays for Detecting Developmental Neurotoxicity and Understanding Associated Cellular and Molecular Changes
  
  **Room 250 D**
  
  Abstract #: 1232–1238

- Challenges and Future Perspectives on New Approach Methodologies for Developmental Immunotoxicity Testing
  
  **Grand Ballroom J**
  
  Abstract #: 1239–1243

- Next-Generation Risk Assessment Calls for an Evidence-Based Next-Generation Uncertainty Assessment
  
  **Grand Ballroom F**
  
  Abstract #: 1244–1249

8:00 AM to 10:15 AM

**PLATFORM SESSION**

- Endocrine Toxicology
  
  **Grand Ballroom B**
  
  Abstract #: 2060–2068

8:00 AM to 10:00 AM

**PLATFORM SESSION**

- Wildfire and Wood Smoke
  
  **Grand Ballroom E**
  
  Abstract #: 2069–2076

9:00 AM to 4:30 PM

**TOXEXPO EXHIBITS**

- Visit the exhibitors for product, service, and career insights.

  **Exhibit Hall C**

**TINY TOX TALKS**

- These are 20-minute presentations on a variety of topics, ranging from working with a contract research organization and publishing to networking tips. The complete schedule of Tiny Tox Talks is available in the **SOT Online Planner**.

  **Exhibit Hall C**

**GLOBAL GALLERY OF TOXICOLOGY**

- The Global Gallery of Toxicology allows participating organizations to display posters showcasing their upcoming meetings, key accomplishments, strategic initiatives, journals, awards, and more.

  **Exhibit Hall C**

**SOT COMPONENT GROUP POSTERS**

- Dedicated poster space showcases the activities of the SOT Regional Chapters, Special Interest Groups, and Specialty Sections.

  **Exhibit Hall C**
9:00 AM to 10:00 AM
EXHIBITOR-HOSTED SESSIONS
- Charles River
  Room 155 E
- Lhasa Limited
  Room 155 C
- US EPA/Office of Research and Development
  Room 155 F
- WuXi AppTec
  Room 155 B

9:15 AM to 11:15 AM
POSTER SESSIONS
Exhibit Hall C
Authors will be in attendance for the following Poster Sessions:
- Cardiovascular Toxicology/Hemodynamics
- Clinical and Translational Toxicology
- Food Safety/Nutrition
- Natural Products
- Oxidative Injury and Redox Biology
- Stem Cell Biology and Toxicology
Note that posters are displayed from 9:00 am to 4:30 pm.

9:30 AM to 3:00 PM
RESEARCH FUNDING INSIGHTS ROOM:
NETWORK WITH GRANT PROGRAM OFFICERS
- Representatives from federal agencies will be available to answer general grant-related questions.
  Room 254 A

10:30 AM to 11:30 AM
EXHIBITOR-HOSTED SESSIONS
- Fraunhofer ITEM
  Room 155 B
- Evotec
  Room 155 E
- NIEHS
  Room 155 F
- STEMCELL Technologies
  Room 155 C
- SCIREQ an emka TECHNOLOGIES company
- Sinclair Bio Resources
  Room 155 B

11:00 AM to 12:00 Noon
EUROTOX AWARD LECTURE
Opioid-Related Toxicity: From Respiratory Depression to the Overdose Epidemic
Grand Ballroom A
Lecturer: Bruno Mégarbane, Université Paris Cité, Paris, France.

11:00 AM to 12:20 PM
ROUNDTABLE SESSION
- Is Less More? Reduction of Animal Use through Virtual Control Groups
  Abstract #: 1250
  Room 250 A

11:00 AM to 12:20 PM
INFORMATIONAL SESSIONS
- The Modernization of the Cosmetic Regulation Act: Perspectives on Recent Implementation Activities and Confirming Safety in Cosmetic Products
  Grand Ballroom E
  Abstract #: 1251
- Through the Lens: Translational Insights in Ocular Toxicology
  Grand Ballroom B
  Abstract #: 1252

11:45 AM to 1:45 PM
POSTER SESSIONS
Exhibit Hall C
Authors will be in attendance for the following Poster Sessions:
- Carcinogenesis
- Computational Toxicology I
- Kidney
- Liver: In Vitro
- Mixtures
- Neurotoxicity: Developmental II
- Neurotoxicity: Pesticides
- Pesticides
Note that posters are displayed from 9:00 am to 4:30 pm.

12:00 Noon to 1:00 PM
EXHIBITOR-HOSTED SESSIONS
- Instem
  Room 155 E
- Militenyi Biotec
  Room 155 F
- SCIREQ an emka TECHNOLOGIES company
  Room 155 C
- Sinclair Bio Resources
  Room 155 B
12:30 PM to 1:30 PM

KEYNOTE MEDICAL RESEARCH COUNCIL (MRC) LECTURE

Drug Safety Pharmacogenomics—Moving from Discovery to Implementation

Grand Ballroom F

Lecturer:
Sir Munir Pirmohamed, University of Liverpool, Liverpool, United Kingdom.

1:30 PM to 4:15 PM

SYMPOSIUM SESSIONS

• Accelerating Discovery in Parkinson’s Disease: A Blueprint for Modeling Environmentally Relevant Exposures through Cross-Disciplinary Collaboration
  Room 250 A  Abstract #: 1254–1259

• Evaluation of Human Health Safety of Cosmetics and Personal Care Products in Minority and Sensitive Populations
  Grand Ballroom J  Abstract #: 1260–1266

• Preclinical Development of RNA-Editing, Gene, and Cell Therapies: Risks and Challenges
  Grand Ballroom E  Abstract #: 1267–1273

• Thyroid System–Disrupting Chemicals and the Developing Brain
  Grand Ballroom A  Abstract #: 1274–1279

WORKSHOP SESSIONS

• Application of Early Molecular Measurements to Develop Points of Departure for Risk Assessment
  Grand Ballroom B  Abstract #: 1280–1286

• Update on the Development of Medical Countermeasures and Biomarkers against Pulmonary Chemical Threat Agents
  Room 251 D  Abstract #: 1287–1293

1:30 PM to 4:00 PM

PLATFORM SESSION

• Micro- and Nanoplastics
  Room 250 D  Abstract #: 2077–2086

1:30 PM to 3:45 PM

PLATFORM SESSION

• Safety Assessment Pharmaceutical: Drug Development
  Room 251 A  Abstract #: 2087–2095

1:30 PM to 2:30 PM

EXHIBITOR-HOSTED SESSIONS

• BASI Research Products
  Room 155 E

• Certara
  Room 155 B

• DefiniGEN
  Room 155 C

• Gentronix Limited
  Room 155 F

2:15 PM to 4:15 PM

POSTER SESSIONS

Exhibit Hall C

Authors will be in attendance for the following Poster Sessions:
• Bioinformatics
• Computational Toxicology II
• Drugs of Abuse
• Mathematical Modeling
• Metals II
• New Approach Methods: Computational
• Regulation/Policy

Note that posters are displayed from 9:00 am to 4:30 pm.

3:00 PM to 4:00 PM

EXHIBITOR-HOSTED SESSIONS

• Gradient
  Room 155 C

• Inotiv
  Room 155 B

• LifeNet Health LifeSciences
  Room 155 F

• MN-AM Molecular Networks
  Altamira
  Room 155 E

4:30 PM to 7:30 PM (Exact Start and End Times Vary)

SOT COMPONENT GROUP EVENTS

• Biological Modeling Specialty Section Meeting/Reception
  Salt Lake Ballroom D, Hyatt Regency

• Biological Modeling Specialty Section Mentoring Event
  Salt Lake Ballroom D, Hyatt Regency

• Biotechnology Specialty Section Reception
  Park City, Hyatt Regency

• Dermal Toxicology Specialty Section Meeting/Reception
  Aspen, Hyatt Regency

• Drug Discovery Toxicology Specialty Section Meeting/Reception
  Salt Lake Ballroom A, Hyatt Regency

• Inhalation and Respiratory Specialty Section Meeting/Reception
  Salt Lake Ballroom C, Hyatt Regency

• Inhalation and Respiratory Specialty Section Mentoring Event
  Salt Lake Ballroom C, Hyatt Regency

• Midwest and Ohio Valley Regional Chapters Joint Mixer
  Squatters Pub Brewery

• Molecular and Systems Biology Specialty Section Meeting/Reception
  Salt Lake Ballroom B, Hyatt Regency

• Neurotoxicology Specialty Section Meeting/Reception
  Salt Lake Ballroom E, Hyatt Regency

• Stem Cells Specialty Section Meeting/Reception
  Solitude, Hyatt Regency

• Women in Toxicology Special Interest Group Reception
  Regency Ballroom C, Hyatt Regency

7:00 PM to 8:30 PM

SPECIAL EVENT

• President’s Reception (By Invitation Only)
  Regency Ballroom A, Hyatt Regency
Thursday, March 14

8:30 AM to 11:15 AM

HOT TOPIC SESSION

Where the Rubber Meets the Road: Impact of Tire Wear Particles on the Environment and Human Health
Grand Ballroom A

SYMPOSIUM SESSIONS

• Capturing Unknowns: Increasing Utility of Epidemiologic Studies as Key Evidence in Chemical Risk Assessment
  Grand Ballroom E  Abstract #: 1294–1299
• Current Status, Challenges, and Future Considerations: Advancing NAMs for Assessing Inhalation Toxicity
  Room 251 D  Abstract #: 1300–1305
• Error-Corrected Next-Generation Sequencing Strategies for Direct Assessment of Mutagenesis and Early Identification of Cancer Risk
  Room 251 A  Abstract #: 1306–1312
• Multi-‘omics Approaches to Unravel PFAS-Mediated Metabolic Dysfunction
  Grand Ballroom B  Abstract #: 1313–1317
• Qualification of Complex In Vitro Models as Drug Development Tools: How Do We Translate Exciting Science into Regulatory Decisions?
  Room 250 A  Abstract #: 1318–1323
• The Lifesaver or the Devil? Identifying Key Molecular-Signaling Pathways and Their Roles in Chronic Exposure-Induced Neurological Diseases
  Grand Ballroom F  Abstract #: 1324–1329

WORKSHOP SESSIONS

• Making Sense of Chaos: Recent Advances in Complex Mixtures Research and Regulation
  Room 250 D  Abstract #: 1330–1335
• Overcoming Unique Challenges Associated with Biological Evaluation of Absorbable/Degradable Medical Devices and Combination Products: Regulatory and Scientific Considerations from Successful Case Studies
  Grand Ballroom J  Abstract #: 1336–1341

8:30 AM to 11:30 AM

LATE-BREAKING POSTER SESSIONS

Hall E

• Poster Sessions will be announced in February 2024.
Venue Maps

Salt Palace Convention Center
Third Level

In This Space
Specialty Section Events
See SOT Event App for Room Info

Second Level

In This Space
Continuing Education (CE) Courses (Add-On Events) Rooms 250 A, 250 D, 251 A, and 251 D
Research Funding Insights Room Room 254 A
Scientific Sessions Rooms 250 A, 250 D, 251 A, and 251 D
SOT Annual Business Meeting Room 250 D
SOT Office Room 254 B

East Registration Area Second Level
Registration and Badge Pickup; Coat/Luggage Check; General Information Counter; Housing Desk; Visit Orlando Desk; and @SOT Center
Hyatt Regency Salt Lake City
Level 2

In This Space

<table>
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<tr>
<th>Category</th>
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<td>Special Interest Group Events</td>
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<tr>
<td>Specialty Section Events</td>
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Find up-to-date information at www.toxicology.org/2024 | #2024SOT | #ToxExpo
**Hyatt Regency Salt Lake City**

**Level 4**

**Venue Maps**

In this space:

- **President’s Reception** (By Invitation Only) - Regency Ballroom A
- **Regional Chapter Events** - See SOT Event App for Room Info
- **Special Interest Group Events** - See SOT Event App for Room Info
- **Specialty Section Events** - See SOT Event App for Room Info
In This Space

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<td>Committee on Diversity Initiatives (CDI) Reunion</td>
<td>Grand Ballroom D</td>
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<tr>
<td>Undergraduate Diversity and Education Programs (Undergrads Only)</td>
<td>Grand Ballroom D</td>
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</table>
Become an Annual Meeting Supporter

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

Supporters receive prominent recognition throughout the SOT Annual Meeting and ToxExpo, with visibility varying by the level of support. In addition, Silver-level Supporters and above are invited to attend the SOT President’s Reception, an invitation-only event, as an expression of appreciation for their support.

If you are interested in supporting the SOT Annual Meeting, contact Jenna Pelsey by email or by phone at 703.438.3115.

Strengthen Your Visibility

Increase awareness of your organization during the meeting through SOT marketing and advertising opportunities. SOT offers opportunities to fit all budgets. Escalator clings and charging cube branding are some of the on-site possibilities, while banner ads in the SOT Event App and on the Wi-Fi welcome page are available for those looking for an online presence.

Pledge Your Support

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

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

www.toxicology.org/support

Thank you to our Diamond Supporters.*

*As of December 6, 2023

View all our generous Supporters by visiting www.toxicology.org/support.
Supporter Contributions Keep Registration Fees Low—Meaning Scientists at ALL Career Levels Can Attend!

Make your contribution today!
Supporters receive prominent recognition throughout the SOT Annual Meeting and ToxExpo.*

www.toxicology.org/support

*Benefits vary by level of support.
Toxicologists, trainees, individuals from related fields, and others working in toxicology are invited to register to attend the SOT 63rd Annual Meeting and ToxExpo, where you will have access to:

- 70+ Featured and Scientific Sessions (begin Monday, March 11), including on-demand recordings
- 30+ Poster Sessions (begin Monday, March 11)
- 250+ ToxExpo Exhibits (begin Monday, March 11)
- 40+ Exhibitor-Hosted Sessions and other exhibitor-hosted events (begin Monday, March 11)
- Special events, such as the Welcome Reception, Awards Ceremony, and Tox ShowDown (begin late afternoon Sunday, March 10)
- Luncheons, mentoring events, and receptions hosted by SOT Regional Chapters, Special Interest Groups, and Specialty Sections (begin the evening of Sunday, March 10)

### Three Ways to Register in Advance

<table>
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<th></th>
<th>Online: <a href="http://www.toxicology.org/register">www.toxicology.org/register</a></th>
<th>Mail or Fax: Registration form must be received by March 7.</th>
<th>Tel: Monday–Friday, 9:00 AM–5:00 PM (ET) Available through March 7</th>
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<td><strong>Early-Bird</strong> (By Jan. 19)</td>
<td><strong>Standard</strong> (Jan. 20–Feb. 16)</td>
<td><strong>Final</strong> (After Feb. 16)</td>
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SOT Registration Department Contact Information

- Mail: SOT Headquarters
  11190 Sunrise Valley Drive
  Suite 300
  Reston, VA 20191
- Tel: 703.438.3115
- Fax: 703.438.3113
- Email: sotmeetings@toxicology.org

Find up-to-date information at [www.toxicology.org/2024](http://www.toxicology.org/2024) | #2024SOT | #ToxExpo
Registration Policies

By registering for the 2024 SOT Annual Meeting, you are agreeing to the terms and conditions of the Annual Meeting Policies. All requests for cancellations and/or refunds must be received in writing at SOT Headquarters by February 16, 2024. These refunds will be processed, less a $50 fee, after the SOT Annual Meeting and ToxExpo. Refund requests received after February 16, 2024, will not be processed.

Badge Pickup and On-Site Registration

Registration is on the Upper Concourse in the East Registration area in the Salt Palace Convention Center. All attendees and exhibitors will need to visit Registration upon arrival to pick up their badges. If you elected to attend any add-on events, your reservations (i.e., tickets) for those activities are embedded as part of the electronic code on your badge; your badge will be scanned to allow entry into restricted events.

 TripAdvisor Hours of Operation:

Saturday ........................... 2:00 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

Add-On Activities

All registrants can add on additional meeting experiences when registering or any time before or during the meeting, pending space availability. Some of these events are complimentary but require a reservation; others have an associated fee. Also, some events are limited to student and postdoc registrants. If you have already registered for the meeting, to add a special activity, visit the “My Events” area of your SOT account. Select “Annual Meeting 2024” and then “Add Tracks/Sessions” to register for one of the add-on events.

The add-on events are:

- Continuing Education courses (Sunday, March 10; see next page)
- Career Exploration through Speed Informational Interviews (Tuesday, March 12; complimentary but limited space for graduate student and postdoc attendees; registration required)
- In Vitro Lecture and Luncheon (Monday, March 11; $10 and limited to student and postdoc attendees)
- Postdoctoral Luncheon (Tuesday, March 12; $12 per attendee; limited to postdoc attendees)
- SOT Mentoring Breakfast (Monday, March 11; $10 per attendee and limited to SOT members)
- Student/Postdoctoral Scholar Mixer (Sunday, March 10; complimentary but reservation required)
- Trainee Discussion with the Plenary Speaker (Monday, March 11; complimentary but limited to graduate student and postdoc attendees; reservation required)
- Undergraduate Education Program (Sunday, March 10; complimentary but limited to undergraduate students)
Continuing Education Courses

The Continuing Education (CE) Program offers a wide range of courses that cover established knowledge and new developments in toxicology and related disciplines. By attending a CE course, you:

- Earn CE credit for professional certification and licensing
- Expand your knowledge of novel concepts and methods
- Learn from an array of regulatory, industry, and academic perspectives
- Receive CE course materials digitally weeks before the course

The 13 CE courses require a separate fee and registration and take place on Sunday, March 10, during three time blocks: Sunrise, 7:00 am to 7:45 am; Morning, 8:15 am to 12:00 Noon; and Afternoon, 1:15 pm to 5:00 pm.

Sunrise Minicourse Registration Fees

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<tr>
<td>SOT Member/Global Partner</td>
<td>$65</td>
<td>$100</td>
<td>$135</td>
</tr>
<tr>
<td>SOT Retired/Emeritus Member</td>
<td>$65</td>
<td>$100</td>
<td>$135</td>
</tr>
<tr>
<td>Nonmember</td>
<td>$85</td>
<td>$120</td>
<td>$155</td>
</tr>
<tr>
<td>Postdoctoral Member/Nonmember</td>
<td>$65</td>
<td>$100</td>
<td>$135</td>
</tr>
<tr>
<td>Student Member/Nonmember</td>
<td>$35</td>
<td>$70</td>
<td>$105</td>
</tr>
</tbody>
</table>

CE Morning and Afternoon Course Registration Fees (price per course)

<table>
<thead>
<tr>
<th></th>
<th>Early-Bird (By Jan. 19)</th>
<th>Standard (Jan. 20–Feb. 16)</th>
<th>Final (After Feb. 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOT Member/Global Partner</td>
<td>$170</td>
<td>$205</td>
<td>$240</td>
</tr>
<tr>
<td>SOT Retired/Emeritus Member</td>
<td>$130</td>
<td>$165</td>
<td>$200</td>
</tr>
<tr>
<td>Nonmember</td>
<td>$320</td>
<td>$355</td>
<td>$390</td>
</tr>
<tr>
<td>Postdoctoral Member/Nonmember</td>
<td>$110</td>
<td>$145</td>
<td>$180</td>
</tr>
<tr>
<td>Student Member/Nonmember</td>
<td>$65</td>
<td>$100</td>
<td>$135</td>
</tr>
</tbody>
</table>

On-Demand Access

CE course registrants will have access to the recording(s) of the course(s) for which they registered through SOT CEd-Tox, the Society’s online CE program. Recordings of the CE courses will not be available on demand through the SOT Event App and the SOT Online Planner to general meeting attendees.

Exhibitor Registration

Exhibitors should register using the Exhibitor Service Center. If your organization would like information on exhibit opportunities, visit ToxExpo.com or contact the SOT Exhibits Team by email or by phone 703.438.3115.
The Society of Toxicology has established a special category for private, public, and not-for-profit organizations that wish to contribute to the success of the Society through year-round support. You, too, can become among those organizations that demonstrate their commitment to the SOT mission of “creating a safer and healthier world by advancing the science and increasing the impact of toxicology.” Organizations interested in becoming an SOT Global Partner should contact SOT Headquarters.

Here’s Why You Should Support SOT

By becoming an SOT Global Partner, organizations are:

- Supporting the premiere toxicology society in increasing the scientific impact of and advocating for the value of toxicology
- Promoting the importance of education and building for the future of toxicology
- Contributing to the success of scientific meetings in toxicology and attracting scientists at all stages of their careers from around the globe
- Encouraging activities aligned with the prediction and prevention of toxicity and disease

As of October 27, 2023

AbbVie, Inc.
North Chicago, Illinois

Bristol-Myers Squibb
Princeton, New Jersey

Chemical Insights Research Institute of UL Research Institutes
Marietta, Georgia

Chevron Technical Center
Houston, Texas

Colgate-Palmolive Company
Piscataway, New Jersey

Corteva Agriscience
Indianapolis, Indiana

DuPont de Nemours, Inc.
Wilmington, Delaware

ExxonMobil Biomedical Sciences, Inc.
Annandale, New Jersey

Genentech, Inc.
South San Francisco, California

Gilead Sciences, Inc.
Foster City, California

J.S. Held LLC
Redmond, Washington

Lanza Bioscience
Walkersville, Maryland

Novartis Pharma AG
Basel, Switzerland

Oxford University Press
Oxfordshire, United Kingdom

Pfizer, Inc.
Cambridge, Massachusetts

Procter & Gamble Company
Mason, Ohio

Regeneron Pharmaceuticals, Inc.
Tarrytown, New York

Sanofi
Framingham, Massachusetts

Syngenta Crop Protection, Inc.
Greensboro, North Carolina

Find up-to-date information at www.toxicology.org/2024 | #2024SOT | #ToxExpo
Hotel and Travel

Housing

SOT has reserved rooms and negotiated exclusive rates at many hotels near the Salt Palace Convention Center.

While SOT recognizes that other housing arrangements are possible, booking through Connections Housing helps reduce SOT expenses and provides you with the benefit of free housing assistance before or during the meeting.

Hotel Reservation Information

Connections Housing is the only SOT-approved partner designated to make reservations at the hotel that best meets your needs for the SOT Annual Meeting and ToxExpo. You can book your reservation at no additional cost, 24-7 through the SOT and Connections Housing website, which offers real-time availability with full hotel descriptions, amenity listings, distances from the Salt Palace Convention Center, maps, and other information to help make your decision easier.

You may make new reservations or modify or cancel existing reservations by using the online housing system or by contacting Connections Housing directly.

- **Book Online:**
  - www.toxicology.org/housing

- **Tel:**
  - 404.842.0000

- **Fax:**
  - 725.218.1546

- **Mail:**
  - Housing Reservation Form
  - Connections Housing
  - 950 Scales Road, Building 200
  - Suwanee, GA 30024

Reservation Confirmations, Changes, and Cancellations

A reservation acknowledgment will be emailed, faxed, or mailed to you once your reservation has been booked. You will not receive a confirmation from your hotel. If you do not receive an acknowledgment within three business days, please call Connections Housing.

The deadline to make a new reservation is Thursday, February 1, 2024. You can make changes and cancellations online or by contacting Connections Housing. The hotel will charge the first night’s room and tax to individuals who cancel their reservations within 72 hours of the day of arrival or who do not arrive at all. Early departures are subject to penalty fees set by each hotel.

Room-Share Program

SOT maintains a list of meeting registrants who have signified an interest in sharing a room. This list is available only to meeting registrants and only to those who voluntarily enroll in the program and accept the terms of the legal disclaimer. For more information on this program and to sign up, visit the SOT Annual Meeting website.
### Hotel Services

<table>
<thead>
<tr>
<th>Hotel Name and Address</th>
<th>Rewards Program</th>
<th>Distance In Miles</th>
<th>Single/Double Rate*</th>
<th>Complimentary Breakfast</th>
<th>In-Room Safe</th>
<th>Gym/fitness Center</th>
<th>Complimentary In-Room Wi-Fi</th>
<th>Gift Shop</th>
<th>Self-Parking All Night</th>
<th>Valet Parking All Night</th>
<th>AAA Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) AC by Marriott Salt Lake City Downtown</td>
<td>Marriott Bonvoy</td>
<td>0.3</td>
<td>$259</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Courtyard Salt Lake City Downtown</td>
<td>Marriott Bonvoy</td>
<td>0.4</td>
<td>$224</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Element Salt Lake City Downtown</td>
<td>Marriott Bonvoy</td>
<td>0.5</td>
<td>$209</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Fairfield Inn &amp; Suites Salt Lake City Downtown</td>
<td>Marriott Bonvoy</td>
<td>0.5</td>
<td>$219</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Grand America Hotel &amp; Towers</td>
<td>N/A</td>
<td>0.8</td>
<td>$299</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$24</td>
<td>$34</td>
</tr>
<tr>
<td>6) Hilton Salt Lake City Center</td>
<td>Hilton Honors</td>
<td>0.2</td>
<td>$239</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$25</td>
<td>N/A</td>
</tr>
<tr>
<td>7) Holiday Inn Express Salt Lake City Downtown</td>
<td>IHG One Rewards</td>
<td>0.2</td>
<td>$169</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$20</td>
<td>N/A</td>
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<tr>
<td>8) Homewood Suites by Hilton 423 West 300 South</td>
<td>Hilton Honors</td>
<td>0.7</td>
<td>$189 King/ $199 Double</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$10</td>
<td>N/A</td>
</tr>
<tr>
<td>9) Hotel Monaco 15 West 200 South</td>
<td>IHG One Rewards</td>
<td>0.3</td>
<td>$249</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
<td>$32</td>
</tr>
<tr>
<td>10) Hyatt House Salt Lake City Downtown 140 South 300 West</td>
<td>World of Hyatt</td>
<td>0.3</td>
<td>$224</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$20</td>
<td>N/A</td>
</tr>
<tr>
<td>11) Hyatt Regency Salt Lake City (SOT Headquarters Hotel) 170 South West Temple</td>
<td>World of Hyatt</td>
<td>135 Feet</td>
<td>$269</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>$36</td>
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<tr>
<td>12) Le Méridien Salt Lake City Downtown 131 South 300 West</td>
<td>Marriott Bonvoy</td>
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<td>$239</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$22</td>
<td>$36</td>
</tr>
<tr>
<td>13) Little America Hotel 500 South Main Street</td>
<td>N/A</td>
<td>0.7</td>
<td>$210 Garden/ $240 Tower</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$15</td>
<td>$18</td>
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<tr>
<td>14) Radisson Hotel Salt Lake City Downtown 215 West State Street</td>
<td>Choice Privileges</td>
<td>0.2</td>
<td>$249</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$22</td>
<td>$27</td>
</tr>
<tr>
<td>15) Salt Lake Marriott City Center 220 South State Street</td>
<td>Marriott Bonvoy</td>
<td>0.6</td>
<td>$239</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$25</td>
<td>$30</td>
</tr>
<tr>
<td>16) Salt Lake Plaza Hotel SureStay Collection by Best Western 122 West Temple</td>
<td>Best Western Rewards</td>
<td>0.3</td>
<td>$212</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$10</td>
<td>N/A</td>
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<tr>
<td>17) Sheraton Salt Lake City 150 West 500 South</td>
<td>Marriott Bonvoy</td>
<td>0.7</td>
<td>$249</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>$15</td>
<td>N/A</td>
</tr>
<tr>
<td>18) The Salt Lake Marriott Downtown at City Creek 75 South Temple</td>
<td>Marriott Bonvoy</td>
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<td>$259</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>$23</td>
<td>$30</td>
</tr>
<tr>
<td>19) TownePlace Suites Salt Lake City Downtown 133 West 200 South</td>
<td>Marriott Bonvoy</td>
<td>0.2</td>
<td>$215</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>$12</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*All hotel accommodations, room types, bed types, rates, taxes, internet access, and parking pricing are subject to change without notice. Rates shown are for single and double occupancy; additional fees may apply for additional guests. Early departures are subject to penalty fees set by the hotels. Parking rates are for hotel guests only, are subject to availability, and do not include taxes. The tax rate is 15.82% per night at all hotels, except the Hyatt Regency which is 16.83% per night. This document was compiled in July 2022. SOT and Connections Housing are not liable if a service or amenity listed is not accurate. If there is a specific service or amenity you require, it is best to confirm this directly with the hotel, as services listed herein can be changed or discontinued without notice.

Find up-to-date information at www.toxicology.org/2024 | #2024SOT | #Tox Expo Hotel & Travel
Transportation

Air Transportation
The closest airport to all local attractions, Salt Lake City International Airport (SLC) is five miles northwest of downtown Salt Lake City. SLC is home to 12 airlines, including major carriers and their regional partners, with more than 340 daily flights and nonstop service to 98 markets. It is a major hub for Delta Air Lines.

Preferred-Carrier Airfare Discounts
For the latest information on available discounts from select carriers, as well as instructions on how to secure reduced airfare prices, please visit the “Travel” web page on the SOT Annual Meeting website.

SOT Air Travel Provider—ATC Travel Management
ATC Travel Management is the official travel management firm for the SOT Annual Meeting and ToxExpo.

Book Online: ATC Travel Management

Hours of Operation: Monday–Friday, 8:30 AM–5:00 PM (ET)

Tel: 800.458.9383

Email: reservations@atcmeetings.com

Please note that depending on your reservation method, ATC Travel Management charges a $10 online service fee or a live agent reservation fee.

Before contacting ATC Travel Management, please gather the following information:

- Your name as it appears on your ID and your date of birth
- The desired dates of arrival to and departure from Salt Lake City
- Your home city or originating airport
- Your approximate time of departure from the originating airport
- Your number of persons traveling (adults/children)
- Your payment method—either credit card or check
- Your airline frequent flyer number(s), if applicable

To obtain the maximum discounted fares, call at least 60 days before departure and identify yourself as an SOT meeting attendee. ATC Travel Management will find the best fare for you and email you an itinerary.

Ground Transportation from the Airport and around Town

Taxis and Ride Shares
Yellow Cab Utah is the airport’s only on-demand taxi cab provider. You can catch a Yellow Cab at Curbside 9A outside the terminal. Up to five passengers may share a cab, and the maximum fee to the Salt Palace Convention Center is $27.

Transportation Network Companies (aka, ride-share services reserved through an app) can service passengers at the airport. The designated pick-up areas are indicated by curbside signs and are located in the middle traffic lane on the ground level outside of the terminal.

TRAX Light Rail
Light rail service (TRAX Green Line) is located on the ground level outside SLC on the east side. The ride from the airport to downtown Salt Lake City takes 20 minutes. There are two stops one-half block from the convention center: Arena Station and Temple Square Station. The cost is $2.50 for a one-way ticket. Cash or credit cards are accepted at the platform kiosks.
Car Rental
Nine rental car services are available on-site at the airport. The rental car counters are located in the Gateway Center, which is adjacent to the airport’s parking garage and accessible from the terminal by using the two bridges in the baggage claim area.

The Salt Palace Convention Center has two underground automated garages, and there is additional parking in the surrounding downtown area. More details on parking are available on the "Visit Salt Lake" website.

Bus
The Utah Transit Authority’s bus service has three routes that provide limited service to the airport on weekdays, with no service on weekends: Route 453, Route 454, and Route 551. Bus stops are located on the curb outside of the terminal. A one-way fare is $2.50.

Bike
The airport is accessible by bike by way of a 2.8-mile trail along the south side of the airport from North Temple at 2500 West to the terminal. If you plan to bike to the airport, access to the terminal is available by continuing north along 3700 West, a road that mostly serves local commercial traffic. The trail is open to the public from 5:30 am to 10:00 pm.

Salt Lake City also has a bike share program, GREENbike, with stations located throughout the city and at the Salt Palace Convention Center.

Electric Scooters
Lime electric scooters are available for rental in Salt Lake City.
Join the Society of Toxicology to engage with more than 7,500 members from 70+ countries and advance toxicology research.

Member Benefits Include:

Discounted Registration Rates for SOT-Hosted Meetings

Exclusive Award Opportunities
Nominate and Be Nominated for Prestigious Awards

Career and Education Resources, such as the SOT Job Bank and SOT Mentor Match, for All Career Levels

SOT Membership = Meeting Savings
The cost of an annual SOT membership and an Annual Meeting and ToxExpo registration at the member rate is less than the cost of a nonmember Annual Meeting registration. Apply for SOT membership by December 31 to save!
Meeting Overview

This event brings together 5,000+ toxicologists and those working in areas related to toxicology to share the latest science and technology in the field, as well as to make new connections, gather with friends, and engage in mentoring and professional development.

More than 70 Featured and Scientific Sessions will take place alongside 2,000+ poster presentations and the three-day ToxExpo.

The atmosphere during the SOT Annual Meeting and ToxExpo is relaxed, yet lively, with attendees dressed in business casual attire. The science is taken seriously, but presenters and registrants are friendly and approachable.

About Downtown Salt Lake City

The Salt Palace Convention Center in downtown Salt Lake City first opened in 1996 and underwent major expansions in 2000 and 2005. Since SOT was last in Salt Lake City for the 2010 meeting, a Hyatt Regency was built adjacent to the convention center and will serve as the SOT headquarters hotel, where many receptions and other events will take place.

Salt Lake City boasts many restaurants, museums, music venues, shopping areas, and more for the enjoyment of meeting attendees. The city also has discount passes available for those interested in a wide variety of dining and entertainment experiences. The “Visit Salt Lake” microsite for the SOT meeting has more information.

Health and Safety

Disease Prevention and Protection

The US Federal COVID-19 Public Health Emergency declaration ended on May 11, 2023, but SOT continues to monitor the advisories and guidelines of local, US, and world health advisory organizations. As such, the 2024 SOT Annual Meeting and ToxExpo will adhere to local and national health rules and guidance, as issued by governing bodies such as the US Centers for Disease Control and Prevention (US CDC) and the Salt Lake County Health Department. If those rules and guidance require specific policies and procedures associated with in-person meeting attendance, the Annual Meeting website and other Annual Meeting materials will be updated to inform potential registrants, and registrants will be notified directly through email.

First-Aid and Emergency Services

If an emergency should occur while at the Salt Palace Convention Center, use any white house phone located throughout the center. Those phones automatically dial Salt Palace Convention Center’s Guest Services which is staffed 24 hours a day. From an outside line or mobile phone, call 385.468.2220 to contact the Guest Services Office.

A first-aid room is located between Room 150 A and the North Ballroom Foyer (across from the women's restroom) and will be open each day of the meeting.
Inclusivity

A Commitment to All Meeting Participants
SOT and the Salt Palace Convention Center are committed to providing an inclusive, accessible, and enjoyable experience during the SOT Annual Meeting and ToxExpo. Information on available resources, as well as health, safety, and equality in Salt Lake City, is available on Annual Meeting website. If you need any services not listed on the website to support your full participation in the meeting, please indicate your needs while registering for the meeting and contact Maureen Bayley at SOT Headquarters by email or phone 703.438.3115.

Accessibility

Mobility
Automated doors are located at all entrances to the Salt Palace Convention Center. Motor scooter and wheelchair rental is available at the facility. Quantities are limited, so it is recommended that you make a reservation in advance of your arrival.

Language
If you need translation services while attending the meeting, SOT recommends:

- Interpreters Unlimited
  800.726.9891 | www.interpretersunlimited.com

- Language Services Associates Inc.
  800.305.9673 | www.lsaweb.com

Hearing
Elevate your SOT Annual Meeting experience with assisted listening devices! Pick up headphones from the AV technicians in the Continuing Education and Scientific Session meeting rooms to ensure crystal-clear audio reception, allowing you to capture every insightful word shared on stage. Don’t miss out—enhance your engagement and make the most of this valuable resource! Limited headsets are available in each room. For security and emergency purposes, there is a telephone equipped with Telecommunications Device for the Deaf technology across from Room 151 D.

Nursing Mothers and Families
CANCELED—SOT is offering a childcare service during the 2024 SOT Annual Meeting and ToxExpo, and children are allowed in Scientific Sessions and the ToxExpo Exhibit Hall. Visit the SOT Annual Meeting website to learn more about the childcare program and to register.

There also are three family/gender-neutral restrooms: one outside of Room 255, one just inside the entrance to the Hyatt Regency, and one in Hall 5.

The Salt Palace Convention Center has three Nursing Mother’s Lounges. Two are located on the first level: one between the built-in coffee stand near Room 150 A and the escalators across from the Grand Ballroom and the other next to the Guest Services Office at the north end of the Main Concourse across from Room 151. The third lounge is on the second level across from Room 254.

Quiet Room

- Location: Room 155 A
- Hours of Operation: Sunday–Wednesday 8:00 AM–5:00 PM

As you navigate the whirlwind of sessions, networking, and the constant stream of information, the quiet room beckons, offering you a tranquil haven to gather your thoughts, find solace, and savor a moment of personal reflection. To maintain a serene environment, we kindly request that attendees respect the hushed atmosphere by silencing phones, minimizing conversations, and avoiding disruptive activities within this space.
On-Site Services

This publication contains highlights of the on-site services available in Salt Lake City. For the complete list of and details about these services, visit the SOT Annual Meeting website.

Business Center

There is no business center located within the Salt Palace Convention Center. The nearest business center is a UPS Store that is located within 0.2 miles of the convention center (approximately a three-minute walk). There also is a FedEx Office Print & Ship Center near the Salt Palace Convention Center. It is between 0.3 and 0.4 miles away (approximately a six-minute walk).

Coat/Luggage Check

A coat/luggage check will be available near Registration. There is a small fee to use the service. Laptops, cameras, and other electronics will not be accepted.

 объявлён

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_www.toxicology.org/endowment_


Donate Today to Support Tomorrow’s Toxicologists!

[Image]

Find up-to-date information at [www.toxicology.org/2024](http://www.toxicology.org/2024) | #2024SOT | #ToxExpo
Sustainability at the Salt Palace Convention Center

The Salt Palace Convention Center generates Solar Renewable Energy Credits (SRECs) through its 600,000 square foot solar array, which helps generate about 17% of the building’s power. In addition, LED lighting is in use in the building, and the convention center has adopted an energy conservation policy.

Practices are in place to capture most of the materials left over from meetings and exhibits through single stream recycling. Signage from events finds a new home in surrounding school district classrooms. Leftover lanyards, bags, and other giveaway items from events are donated to a summer camp program. Carpet, exhibit booth materials, and other construction items are donated to Habitat for Humanity’s Re-Store.

The Salt Palace Convention Center also engages in water conservation through the use of waterless urinals, drip irrigation, and drought-tolerant landscaping.

Excess food is donated to community partners, and Salt Palace Convention Center engages in composting.

Ways SOT and Members Contribute

SOT is printing badges on-site, eliminating the use of mailing materials, and using recycled materials for the badges. SOT also is limiting paper waste by making meeting materials available exclusively in electronic format.

Attendees are encouraged to use the Salt Palace Convention Center’s recycling containers and to bring refillable water bottles to reduce plastic waste as water bottle filling stations are available throughout the facility.

The Salt Palace Convention Center is a sponsor of the Salt Lake City GREENbike program with multiple bike stations on facility grounds. SOT members also are encouraged to share rides when possible to limit traffic emissions.

SOT Job Bank

Reviewing job postings is free for SOT members, while employers can target the Society’s elite pool of toxicology students, postdocs, and professionals.

www.toxicology.org/jobbank
Visit the ToxExpo Exhibit Hall to connect with organizations and individuals who can support you with innovative solutions, services, and 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

Discover the exhibiting organizations by visiting the ToxExpo website and remember that the ToxExpo website is available year-round to connect you with valued partners.

Exhibitor-Hosted Sessions
For the most up-to-date list of Exhibitor-Hosted Sessions, use the SOT Online Planner or the SOT Event App.

Key Details

**WHO:**  
Exhibitors supporting scientists and researchers

**WHAT:**  
Access to first-rate resources, products, and connections

**WHEN:**  
Monday, March 11  
Tuesday, March 12  
Wednesday, March 13  
9:00 AM–4:30 PM

**WHERE:**  
Salt Palace Convention Center  
Exhibit Hall C

www.toxexpo.com
Other Activities in the ToxExpo Exhibit Hall

Networking Space
With small seating areas throughout, the ToxExpo Exhibit Hall also serves as a space for spontaneous conversations, scheduled appointments, and impromptu exchanges.

Poster Presentations
The ToxExpo Exhibit Hall features poster presentations over three days. Posters are displayed all day, with authors available during assigned Poster Sessions.

SOT Pavilion
Visit the SOT Pavilion (Booth #1119) to hold scheduled and impromptu meetings, learn about SOT programs and activities, and meet with Toxicological Sciences Editors.

Tiny Tox Talks
The ToxExpo Exhibit Hall hosts the Tiny Tox Theater (Booth #2027). Seating less than 40 people, this venue features short presentations (no longer than 20 minutes, including Q&A) by SOT members on topics ranging from career insights and publishing advice to how to support toxicology and toxicologists.

The "Program Schedule" portion of this publication contains information on when Tiny Tox Talks are occurring, as well as their topics.

Enroll in the SOT Mentor Match!
This program is a free benefit that allows members to become or find a mentor within the Society.

www.toxicology.org/mentormatch
Program Schedule

Session Types (Listed by date, then time, then session type)

- Continuing Education Courses
- Education-Career Development Sessions
- Exhibitor-Hosted Sessions
- Featured Sessions
- Historical Highlights Sessions
- Informational Sessions
- Platform Sessions
- Poster Sessions
- Roundtable Sessions
- Symposium Sessions
- Workshop Sessions
- Innovations in Applied Toxicology
- Innovations in Toxicological Sciences

For the most up-to-date information on all Annual Meeting sessions, events, and activities, consult the SOT Online Planner and the SOT Event App.

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.

» Session Type and Title
  Session type and title display in large white type within a solid blue banner.

» 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 SOT Online Planner or in The Toxicologist PDF via the SOT Annual Meeting website (free to all attendees).

More details and the most up-to-date information related to the 2024 Annual Meeting program schedule are available in the SOT Online Planner and the SOT Event App.

SOT Membership and Abstract Sponsors

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

The two best and most up-to-date resources for viewing the 2024 Annual Meeting schedule are the SOT Online Planner and SOT Event App. Both can be used anywhere, anytime.

SOT Online Planner

The SOT Online Planner is updated continually throughout the year and is designed to operate on a desktop or laptop computer. With the SOT Online Planner, you can:

» View the Schedule
  The planner includes the full meeting schedule and all session details such as the presentation titles, speakers, and abstracts.

» Search by Keyword
  You can search by keyword and filter the schedule by activity type (e.g., sessions, receptions).

» Build Your Calendar
  Once you have registered for the meeting, you can log in to the planner to build your customized schedule. Plus, you can add bookmarks and notes. Your customized schedule, bookmarks, and notes also will transfer to the SOT Event App once you log in to it.

For more information on the SOT Online Planner and to watch tutorials on how to use it, visit the SOT Annual Meeting website.

SOT Event App

The 2024 SOT Event App is your all-in-one tool for managing your time and maximizing your experience at the meeting. Build a custom schedule, access session and abstract descriptions, watch on-demand recordings, find speaker information, view venue maps, and more. With the SOT Event App, you can:

» View the Meeting Program
  The App provides full access to the meeting schedule, abstracts, presentation titles, and more.

» Build a Custom Schedule
  Use the App to access the schedule that you built with the SOT Online Planner (log in required), add sessions to your schedule, bookmark presentations of interest, and more.

» View On-Demand Recordings
  Recordings of the Featured and Scientific Sessions will be available exclusively for meeting registrants through the SOT Event App and the SOT Online Planner. Just look for the "View Recording" button in the session description area within 24 hours of a session’s conclusion.

» Plan Your ToxExpo Exhibit Hall Visit
  The App contains the full list of ToxExpo exhibitors—sortable by name, product or service offered, and booth number—as well as the complete map of exhibitor locations.

» Begin Discussions
  Through the App’s Chat Dashboard, you can send a message to any registrant, including speakers.

» Get Directions and Room Locations
  The App’s Route Me feature provides directions on how to get from one meeting room to another. You also can view every event’s location directly on the venue maps within the App.

For more details on the capabilities of the App, visit the SOT Annual Meeting website.
On-Demand Content

Session Recordings
Featured and Scientific Sessions will be available to registrants as on-demand recordings. Each session recording will appear within 24 hours of the session’s conclusion in the session’s description area of the SOT Online Planner and SOT Event App and will be viewable through June 2024. The on-demand recordings will only be accessible on the SOT Online Planner and SOT Event App. No Poster Sessions, Exhibitor-Hosted Sessions, or other Annual Meeting events or activities will be recorded. Continuing Education (CE) courses will not be available on demand as part of a meeting registration unless you registered for the CE course in question, but all CE courses will be available, for a fee, as part of SOT CEd-Tox, the Society’s online Continuing Education program.

Scientific ePosters
As in years past, poster presenters can share their research electronically, as well as during their assigned Poster Session, by uploading an ePoster. These ePosters are accessible through the SOT Online Planner and SOT Event App only. No Poster Sessions will be recorded on-site, and Poster Sessions will not be available on demand.

100+ Online Continuing Education Courses
Enhance your knowledge-base with the SOT CEd-Tox courses

Enroll at www.toxicology.org/cedtox
Saturday, March 9, 5:15 PM to 7:30 PM, Grand Ballroom D, Marriott Downtown at City Creek
(CDI Travel Awardees and Invited Guests Only)

**Undergraduate Diversity Program: Opening Event**

**Chair(s):** Corie A. Ellison, Procter & Gamble; and Tynisha D. Glover, Johnson & Johnson Innovative Medicines.

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

This is the kick-off event to 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 Saturday evening event includes networking in mentoring groups and an introduction to toxicology.

Saturday, March 9, 7:30 PM to 8:30 PM, Grand Ballroom D, Marriott Downtown at City Creek

**Committee on Diversity Initiatives (CDI) Reunion**

*(All Attendees Welcome)*

**Chair(s):** Corie A. Ellison, Procter & Gamble; and Tynisha D. Glover, Johnson & Johnson Innovative Medicines.

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

Join the CDI in celebration of the 35th year of the Undergraduate Diversity Program and the people who have made and continue to make it successful. The CDI Reunion is a great opportunity for former students, organizers, and volunteers of the program to gather and celebrate the Society’s success in encouraging the next generation of scientists. Please welcome and network with this year’s undergraduate student participants and mentors. This event will include the presentation of the 2024 Perry J. Gehring Diversity Student Travel Awards. Dessert, coffee, and tea will be served. Mark your calendars and begin the SOT 63rd Annual Meeting and ToxExpo by visiting with friends and colleagues at this energetic event highlighting the successes made possible by so many SOT members.

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**SOT Provides Opportunities for Undergraduates**

- SOT Undergraduate Student Affiliate status, providing access to toxicology news and resources
- Poster presentation and other award opportunities through SOT and its Regional Chapters, Special Interest Groups, and Specialty Sections
- Internships and research experiences in SOT members’ labs
- Activities at the SOT Annual Meeting and Regional Chapter meetings, as well as professional development opportunities and resources

www.toxicology.org/undergraduate
Microplastics, once relatively unknown, have become the focus of local, national, and global interest. Microplastic particles are one subset of plastic debris primarily characterized as having a size of less than five millimeters down to one micrometer; plastic particles smaller than this size are typically termed nanoplastic particles. Together, these particles also may be called NMPs for short (nano- and microplastics). Microplastic particles can either result from the discharge of plastic materials originally manufactured at that size (primary microplastics) or from the degradation of larger plastic debris (secondary microplastics). However, before researchers begin to tackle the question about microplastic risk, you must understand how plastic is manufactured. Plastic begins as polymers, and through the application of energy (e.g., heat) and incorporation of the desired additives, a plastic material is created. Additives are chemicals intentionally added to plastics to provide a function fit for the purpose to provide, improve, modify, or retain plastic properties such as preventing fire and providing flexibility, durability, or stability during the plastic lifecycle. Additives often are included in plastics because without additives, the plastic materials would have limited applications, be brittle, potentially degrade, and have a very limited shelf life. It is this combination of particle characteristics (e.g., size, shape, polymer type) and the presence of chemical additives that presents toxicologists with a sizable issue. Another challenge to understand the potential risks of microplastics is the number of potential chemistries used as additives. There is a vast amount of information available through existing regulatory programs; programs like the US Food and Drug Administration’s food contact notification and the Threshold of Toxicological Concern model, coupled with the European Chemicals Agency REACH registration, are sources of valuable exposure and toxicological information. If there is no exposure and toxicological data, scientists can turn to frameworks to predict potential exposures and risks. To reduce the complexity of the issue, scientists might look at human exposure to screen out chemical additives that are low risk due to low exposure potential. In this course, the first presenter will focus on modeling probabilistic estimates of both direct exposure (e.g., food packaging) and exposure from modifications to an existing numerical bioaccumulation food web model. The second presenter will discuss how risk can be estimated with a newly developed framework when traditional exposure and toxicity data have not been developed, but the molecular structure and chemical tonnage of a chemical is known. These presentations will provide attendees with a new perspective on critical issues toxicologists face when studying microplastics and their potential effects on human health.

Abstract #
#1001

**Plastic Chemical Additives: Determining Human Risk from Microplastic Exposure.**

**Microplastics and Chemical Additives: Migration Considerations for Human Exposure.**
T. Gouin. TG Environmental Research, Sharnbrook, United Kingdom. Sponsor: J. Norman

**Modeling Chemical Risk without Traditional Exposure or Toxicological Data.**
L. Li. University of Nevada School of Public Health, Reno, NV. Sponsor: J. Norman
Sunday, March 10, 7:15 AM to 7:45 AM, Grand Ballroom G, Marriott Downtown at City Creek
(SOT Undergraduate Research Award Recipients and FUTURE Members Only)

**SOT Undergraduate Research Award Welcome**

**Chair(s):** Jaime Mirowsky, SUNY College of Environmental Science and Forestry.

**Hosted by:** Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee

Members of the FUTURE Committee will welcome and recognize the students who have received the SOT Undergraduate Research Award before they attend the Undergraduate Education Program.

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Sunday, March 10, 8:00 AM to 5:00 PM, Grand Ballroom D, Marriott Downtown at City Creek
(Open to CDI Travel Awardees, Registered Undergraduates, and Invited Guests)

**Sunday Undergraduate Education Program**

**Chair(s):** Corie A. Ellison, Procter & Gamble; and Tynisha D. Glover, Johnson & Johnson Innovative Medicines.

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

**Endorser(s):** Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee

This daylong program introduces undergraduates to topics in various toxicology disciplines through three scientific presentations about diverse toxicological research and a case study that provides an opportunity for students to explore and interpret data. Students also meet with graduate students and academic program directors to learn how to submit strong graduate school applications and the merits of different types of graduate programs, as well as how to succeed in graduate school. During the program, students are given the opportunity to 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. Lastly, students will meet with toxicology graduate program directors and internship hosts from various institutions. For schedule details, see the "Undergraduate Education Program" web page on the SOT Annual Meeting website.

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Sunday, March 10, 8:15 AM to 12:00 Noon, Room TBA, Salt Palace Convention Center

**Continuing Education AM02: Advances in Metal Toxicology: From Aging and Disease Causation to Detection and Regulatory Measures**

**Chair(s):** Koren Mann, McGill University, Canada; and Johnny Wise, University of Louisville.

**Primary Endorser:** Metals Specialty Section

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

Of the 118 elements in the Periodic Table, 95 elements are classified as metals, and 34 of these have been identified to be hazardous to human health. Differing from organic chemicals, metals’ chemical forms may change, but their basic unit is neither created nor destroyed. Thus, a persistent distribution of metals in the ecosystem with no environmental half-life renders the body system susceptible to metal toxicity in every stage of human life. Exposure to metals occurs in daily life through one's lifestyle, food intake, occupation, or medical treatment. Considering a worldwide growing geriatric population, the possibility of metal exposure in accelerating the aging process has drawn public attention. For the past half century, assessment of total body...
metal burden and metal toxicity depends largely on conventional techniques such as atomic absorption spectrophotometry and bioassays; however, more recently, real-time analyses and molecular approaches for gene-environment interactions have been implemented. This advanced course invites experts to address interconnected subjects in metal toxicology. After a general introduction to metals, the first lecture introduces recently developed innovative technologies to determine level of exposure, such as x-ray fluorescence and neutron activation analysis for real-time, noninvasive, nondestructive quantitation of metal levels in bone, nail, hair, and other tissues. The second lecture discusses recent advancements in ‘omics-based technologies, such as whole genome and CRISPR-based screens, in understanding the genetic susceptibility that contributes to metal toxicities. The third lecture uses the body as a whole system to address metal toxicity in an aging population from the impact of aging itself on metal toxicity to the impact of metals on aging. The last lecture further discusses the role of the US Food and Drug Administration in the regulation and safety assessment of metals in food additives. Throughout the course, concerns related to human exposure to these metals and potential risk will be raised and discussed with particular emphasis on metals of concern, such as lead, arsenic, manganese, and mercury. The course serves well for those who desire an advanced knowledge on metal toxicity in lifespan, metal-gene interaction, risk assessment/regulation, and advanced technical approach for metal quantification. The course will be of interest to those engaged in wider aspects of metal toxicology, mechanism of chemical toxicity, neurotoxicology, carcinogenesis, risk assessment, regulatory and safety evaluation, and occupational and public health.

Abstract #

#1002

**Advances in Metal Toxicology: From Aging and Disease Causation to Detection and Regulatory Measures.** K. Mann. McGill University, Montréal, QC, Canada.

**Introduction: Chemical Properties of Metals Determine Unique Metal Toxicology.** W. Zheng. Purdue University, West Lafayette, IN.

**Advances in Metal Detection and Quantification in Human Subjects for Risk Assessment.** A. Specht. Purdue University, West Lafayette, IN. Sponsor: K. Mann

**Using ‘Omics to Advance Our Understanding of Metal-Induced Toxicity.** K. Mann. McGill University, Montréal, QC, Canada.

**Intersection of Toxicology and Aging: Current Understanding of Metal Exposure and Aging.** J. Wise. University of Louisville, Louisville, KY.

**Safety Assessment and Regulation of Metals in Food Packaging.** L. C. Markley. US FDA, College Park, MD.

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**Sunday, March 10, 8:15 AM to 12:00 Noon, Room TBA, Salt Palace Convention Center**

**CE**

**Continuing Education AM03: Foundations of Embryonic and Fetal Development and Application to Developmental Toxicity Testing**

Chair(s): Sarah Campion, Pfizer Inc.; and Jessica LaRocca, Corteva Agriscience.

**Primary Endorser:** Reproductive and Developmental Toxicology Specialty Section

**Other Endorser(s):** Women in Toxicology Special Interest Group

During the pre-implantation period, there are major developmental events that occur, and knowledge of these events is critical for understanding and interpreting potential effects on fertility and early embryonic development. Embryo-Fetal development is a complex process that initiates following implantation. The development of the major organ systems during gestation varies in timing across species and drives the design of nonclinical studies conducted to assess the potential human risks of drugs or chemicals. This course will focus on the basic biology of implantation, early embryonic development, and organogenesis, while discussing comparative cross-species timelines and critical periods during development.

In addition to reviewing the key developmental processes and events that occur during the pre-implantation and post-implantation periods, the first two speakers will provide examples of phenotypes that arise following exposures to chemicals or drugs during sensitive developmental periods. The information presented will provide attendees with a basis for interpreting the potential mode of action, as well as interspecies comparison to aid in human risk assessment.
After this critical background information that is the biological basis for prenatal developmental toxicity testing, the succeeding presentations will discuss the design of nonclinical developmental toxicity studies for agrochemicals and pharmaceuticals. These speakers also will present key information on how study outcomes are interpreted and impact human risk assessment. Specific case studies and mode-of-action studies for determining human relevance will provide attendees with real-world examples of how to apply the information presented in this course. Novel approaches for developmental toxicity testing, including the use of comprehensive toxicogenomics data and the use of alternative assays as outlined in ICH S5(R3), also will be discussed, with the aim of providing attendees with a perspective on the evolving future of developmental toxicity testing.

Abstract #
#1003


Fertilization to Implantation: Self-Organization of the Mammalian Conceptus. T. Frum. University of Michigan Medical School, Ann Arbor, MI. Sponsor: S. Campion

Comparative Embryo-Fetal Development. S. Campion. Pfizer Inc., Groton, CT.


Sunday, March 10, 8:15 AM to 12:00 Noon, Room TBA, Salt Palace Convention Center

Continuing Education AM04: High-Throughput In Vitro–In Vivo Extrapolation for Predictive Toxicology

Chair(s): John Wambaugh, US EPA; and Barbara A. Wetmore, US EPA.
Primary Endorser: Risk Assessment Specialty Section
Other Endorser(s): Biological Modeling Specialty Section; Women in Toxicology Special Interest Group

Next-Generation chemical risk assessment (NGRA) aims to replace and expand traditional toxicity testing via new approach methodologies (NAMs) including in vitro screening. Translating in vitro points of departure (PODs) to in vivo contexts requires in vitro–in vivo extrapolation (IVIVE) based on toxicokinetics. IVIVE methods for single chemicals were developed and vetted by the pharmaceutical industry. However, NGRA is intended to accelerate the pace of chemical risk assessment, potentially generating in vitro PODs for thousands of chemicals and endpoints. These data require chemical-specific IVIVE to be interpreted as in vivo PODs. To allow higher-throughput IVIVE, higher-throughput toxicokinetic (HTTK) methods are needed. Public health risk chemical prioritization efforts based on HTTK are under consideration at the US Environmental Protection Agency, Health Canada, and the European Food Safety Authority. This course, which focuses on high-throughput approaches for translating NAMs into PODs, complements but is distinct from fellow 2024 SOT Continuing Education (CE) course “Putting Theory into Practice: Using Computational New Approach Methodologies in Next-Generation Risk Assessment,” which focuses on integrating all NAMs needed for next-generation chemical risk assessment. Further, with its focus on high-throughput IVIVE, it is distinct from previous years’ CE course offerings focused on other aspects of physiologically based kinetic modeling and toxicokinetics. HTTK is playing an increasing role in creating more predictive toxicological methods by allowing (1) conversion of external dose metrics (such as mg/kg/day) to internal/tissue dose metrics and (2) relating in vitro PODs to human-relevant doses. With confirmed speakers that include subject matter experts with many years of experience in the development and application of these tools, this course aims to (1) educate researchers to use high-throughput IVIVE to estimate toxicological PODs in their work and (2) allow decision-makers considering the use of NAM-based PODs to be better informed about the capabilities and limitations of high-throughput IVIVE. Attendees of this course will become familiar with the types of data, models, and tools needed to create “bioactivity: exposure ratio” risk-based prioritizations and other rapid IVIVE techniques. These tools will include SimCyp, httk, and WebICE. While single chemical IVIVE has built a strong foundation, this course will focus on IVIVE to inform models of toxicity that can be applied to large numbers of chemicals. Each of the four main presentations will provide examples that can be easily adapted to the attendees’ research questions and risk assessments.
Abstract #

#1004

**High-Throughput In Vitro—In Vivo Extrapolation for Predictive Toxicology.** J. Wambaugh. US EPA, Research Triangle Park, NC.

**Introduction: Fifteen Years of High-Throughput Toxicokinetics.** B. A. Wetmore. US EPA, Research Triangle Park, NC.

**High-Throughput In Vitro Data and Tools for Toxicokinetics.** H. Khalidi. Certara, Sheffield, United Kingdom. Sponsor: J. Wambaugh

**R Package httk for High-Throughput IVIVE.** C. Ring. US EPA, Research Triangle Park, NC.

**In Vitro—In Vivo Extrapolation for New Approach Methodologies.** X. Chang. Inotiv, Research Triangle Park, NC.

**Moving toward Next-Generation Risk Assessment with High-Throughput IVIVE.** K. Paul Friedman. US EPA, Research Triangle Park, NC.

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Continuing Education AM05: Nix the Six: Strategies for Implementing Nonanimal Acute Toxicity Testing

**Chair(s):** Eryn Slankster-Schmierer, Physicians Committee for Responsible Medicine; and Elizabeth Baker, Physicians Committee for Responsible Medicine.

**Primary Endorser:** In Vitro and Alternative Methods Specialty Section

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

The acute toxicity of chemicals, mixtures, and formulations has traditionally been assessed with an animal-intensive in vivo battery of tests that in the context of pesticides is collectively referred to as the “six pack.” These tests include methods to address acute oral, dermal, and inhalation toxicity; primary eye irritation; and dermal irritation and sensitization. In light of recent retrospective reviews of in vivo test method performance, the ability of the individual components of the test battery to reliably predict human-relevant responses to chemicals has been in question. In recent years, international collaborations have led to partial and full replacements for several of these endpoints. In this course, attendees will receive an overview of ongoing efforts and an up-to-date strategy to implement reduction and replacement of animals used for acute toxicity in health hazard and risk assessment of chemicals and end-user product formulations for chemical markets, including drugs, pesticides, and consumer products. The first portion of the course will provide strategies for predicting, waiving, and measuring oral, dermal, and inhalation lethal doses in order to minimize animal use. LD50 tests have been used for nearly a century and still guide regulatory decision-making, with acute oral lethal dose studies the most prevalent, despite poor reproducibility for Globally Harmonized System of Classification and Labelling of Chemicals categorization. The first talk will cover computational approaches to predict acute oral toxicity using the OPERA suite, a free and open-source/open-data suite of QSAR models providing predictions on physicochemical properties, environmental fate, and toxicity endpoints. The second speaker will outline strategies for waiving in vivo acute dermal toxicity tests for US Environmental Protection Agency requirements, including the implementation of bridging principles to leverage data already gathered and reduce additional testing. The third talk will cover human-relevant approaches to overcome the anatomical and physiological respiratory differences that make rodents poor predictors for human inhalation toxicity. The second portion of the course will cover advanced in silico, in vitro, and ex vivo methods for non-lethal acute endpoint studies. The fourth speaker will cover in vitro methods showing improved reliability and human-relevance relative to the Draize test, as well as proposed avenues for the development of a defined approach for dermal irritation. The fifth speaker will cover the methods in the defined approaches for serious eye damage and irritation, offering a full replacement for the Draize eye test in rabbits. Finally, the last talk will round out the six-pack assessment by covering methods within and updates to the defined approach to skin sensitization, including presenting information on the first fully nonanimal defined approach as an effective replacement for the mouse Local Lymph Node Assay and guinea pig maximization tests.
for dermal sensitization. In sum, this course will prepare agency and commercial risk and hazard assessment attendees to replace and reduce animal use in acute toxicity testing batteries wherever possible by offering up-to-date guidance on modern nonanimal methods.

Abstract #

#1005 Nix the Six: Strategies for Implementing Nonanimal Acute Toxicity Testing. E. Slankster-Schmierer. Physicians Committee for Responsible Medicine, Washington, DC.


New Approach Methodologies for Primary Dermal Irritation: Implementing Human-Relevant Testing Approaches. H. Raabe. Institute for In Vitro Sciences, Gaithersburg, MD.


Sunday, March 10, 8:15 AM to 12:00 Noon, Room TBA, Salt Palace Convention Center

Continuing Education AM06: “Relax Immune System,” Cell and Gene Therapy Here

Chair(s): Ashwini Phadnis Moghe, Takeda; and Shermaine K. Mitchell-Ryan, HESI.

Primary Endorser: Immunotoxicology Specialty Section

Cell and gene therapies have emerged as an exciting breakthrough treatment for liquid and solid tumors in regenerative medicine and for the treatment of rare monogenic disorders as well as a wide range of acquired diseases with limited therapeutic options. While these therapies hold tremendous promise in treating complex diseases, they can be associated with significant immune safety concerns that should be carefully considered during preclinical and clinical development. Such risks may include off-target toxicities, integration-associated genomic toxicities, mutagenic transformation, organ/tissue damage, immunogenicity, and exaggerated activation of the immune system. These therapies also are accompanied by a unique set of challenges where standard safety assessments may not apply and additional testing is warranted, often involving novel de-risking approaches and post-marketing surveillance depending on the therapy in question. Recent advances in the field, along with the sustained momentum in developing safer and more effective next-generation cell and gene therapies, have encouraged a closer examination of the promise and the pitfalls associated with this rapidly evolving class of therapies. In the first talk of this course, attendees will be guided through the history of these advanced therapies, dating back to the first human gene and cell therapies to the present day approved therapies, along with a description of current nonclinical and clinical strategies designed to overcome hurdles associated with immune-related events. Then, the course will take a deeper dive into immune system considerations for cell and gene therapies with the second talk focusing on the immune barriers to in vivo gene therapies, such as immunogenicity to viral and nonviral (i.e., liposomes, nanoparticles) therapies. This talk also will provide pointers to toxicologists for assessing immunotoxicity issues in gene therapy. The third talk will focus on operational aspects of immune system monitoring during the conduct of a nonclinical study from the contract research organization perspective. The fourth speaker will focus on nonclinical safety assessment for engineered CAR-T therapies, with a focus on immunosafety risks posed by engineered Teff and Treg cells, paving the way for the fifth speaker to discuss the next generation of cellular and gene therapies, including an overview of gene editing to avoid graft vs. host disease.


Overcoming the Immune Barriers for In Vivo Gene Therapies. B. Assaf. Sanofi, Waltham, MA.


Overcoming the Immune Barriers for In Vivo Gene Therapies. B. Assaf. Sanofi, Waltham, MA.

Considerations for Immune System Monitoring during the Conduct of Nonclinical Studies for Novel Gene-Modifying Therapies. B. McIntosh. LabCorp, Madison, WI. Sponsor: A. Phadnis Moghe


Sunday, March 10, 8:15 AM to 12:00 Noon, Room TBA, Salt Palace Convention Center

Continuing Education AM07: Weight of Evidence Analysis and Problem Formulation for Chemical Risk Assessment: Fundamental Principles and Application through Case Examples

Chair(s): Anna Lowit, US EPA; and Gina M. Hilton, PETA Science Consortium International e.V., Germany.

Primary Endorser: Risk Assessment Specialty Section

Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Regulatory and Safety Evaluation Specialty Section

The depth and breadth of information used to characterize hazard and exposure have expanded beyond traditional in vivo studies to encompass ‘omics, in vitro, and computational approaches. Interpreting various lines of scientific evidence is rarely unambiguous or straightforward, as the same information can support multiple legitimate interpretations and conclusions. The weight of evidence (WOE) approach is, therefore, essential in toxicology and risk assessment to support decision-making. Although some tools are available to enhance transparency and consistency in WOE, professional judgement remains necessary in almost all cases to evaluate the strengths and limitations of each data source. Subject experts also are expected to provide knowledge-based insights on how various factors, such as experimental design, can influence data comparability. WOE is particularly challenging due to the diverse regulatory and scientific contexts involved in the analysis. Therefore, WOE must be fit for purpose and framed in problem formulation. This course will provide attendees with an understanding of the underlying concepts, principles, and techniques of WOE analysis in the context of chemical risk assessment. Since the WOE approach is flexible and adaptable (i.e., it can be tailored to fit specific risk assessment contexts or regulatory requirements), this course will use case examples to demonstrate the integration of various lines of scientific evidence generated from both conventional and new approach methods for different purposes, including ones from the industrial chemicals, personal care, fragrance, and agrochemical sectors. The case examples will illustrate the concept of fitting WOE to a specific purpose, including optimizing the design of animal toxicity studies (where required), estimating points of departure using nonanimal data, and predicting toxicity of a structurally similar chemical with limited or no toxicity data, as well as merging monitoring data and exposure model predictions. The introduction will describe the overarching, flexible, and adaptable principles in WOE and problem formulation that will be illustrated throughout the course. The first presentation will cover the fundamental principles in problem formulation, including defining resources and contexts, and computational tools to integrate and evaluate data for fit-for-purpose WOE. A WOE approach using multiple lines of evidence for contemporary study design for regulatory required animal studies to maximize the use of computational modeling, in vitro, and pharmacokinetic data will be shared in the second talk, while the third presenter will discuss a WOE approach for considering the appropriateness of new in vitro inhalation methods for the evaluation of fragrances in risk assessment. The fourth presentation will focus on interpreting multiple lines of evidence using in vitro and computational approaches for safety evaluation of cosmetics. The next presenter will show WOE across in vitro physiologically based kinetic and short-term in vivo data to consider human relevance of particular hazards.
The course's final presentation will focus on exposure assessment and a WOE approach for evaluating and applying measurements and models together in exposure characterization, followed by an interactive session where each presenter will pose a question to test attendee knowledge of fit-for-purpose WOE and problem formulation principles and application. The learning goals for this course are to (1) understand the value and content of problem formulation; (2) gain knowledge in the concept of fit-for-purpose WOE and its connection to problem formulation; (3) learn how WOE analysis can be used to analyze data and evaluate risks for chemicals that have varying degrees and types of available data; and (4) learn about different types of risk assessments and decision contexts.

Abstract #

#1007


**Problem Formulation: The Foundation That Supports Any Weight of Evidence Approach.** M. Embry. HESI, Washington, DC.

**Using a Weight of Evidence Approach to Optimize the Design of Animal Toxicity Studies.** C. Tan. US EPA, Durham, NC.

**Using Weight of Evidence for Inhalation Exposure Safety Evaluation of Fragrances.** N. Sadekar. Research Institute for Fragrance Materials, Mahwah, NJ.

**Using Computational Models to Build a Weight of Evidence in Safety Assessments of Cosmetic Ingredients.** A. Middleton. Unilever, Bedford, United Kingdom. Sponsor: A. Lowit

**Use of Weight of Evidence and Uncertainty Analysis in Hazard Characterization and Risk Assessment of Agrochemicals.** M. Corvaro. Corteva Agriscience, Rome, Italy. Sponsor: A. Lowit

**Merging Measurements and Models in a Weight of Evidence Approach for Exposure Estimation.** J. Arnot. 1ARC Arnot Research and Consulting, Toronto, ON, Canada; and 2University of Toronto, Toronto, ON, Canada.

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**Sunday, March 10, 1:15 PM to 5:00 PM, Room TBA, Salt Palace Convention Center**

**Continuing Education PM08: Benchmark Dose Modeling and Its Applications in Drug, Food, and Chemical Safety Evaluation and Assessment**

**Chair(s):** Kan Shao, Indiana University; and Antero Vieira da Silva, Karolinska Institutet, Sweden.

**Primary Endorser:** Risk Assessment Specialty Section

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

The rapid expansion of benchmark dose (BMD) modeling methodology has brought it into the spotlight of chemical risk assessment in a variety of applications, including evaluating the safety of substances as diverse as metals, pesticides, nutrients, and pharmaceuticals. This course aims to provide participants with a fundamental understanding of the concepts and principles of BMD modeling methodology and demonstrate its usefulness through a few applications and case studies, covering current practice, issues, and challenges. The first presentation will provide a general introduction on the BMD modeling methodology and demonstrate its utility to assess dose-response relationships and estimate critical doses using multiple types of data in the recently developed Bayesian Benchmark Dose Modeling system. The second presentation will discuss an application of the BMD modeling approach in drug development for the purposes of safety evaluation and discuss a variety of its advantages over the no-observed-adverse-effect-level method. The third presentation will bring up a critical issue in BMD modeling, the definition of benchmark response (BMR), and discuss how to standardize, refine, and enrich the BMD approach through the selection of adequate BMR to support prioritizations within food safety. The last presentation will demonstrate an alternative method to derive a human health-protective point of departure value from model organism exposure studies based upon a comprehensive analysis of the transcriptome. Throughout the course, the BMD modeling strategies will be consistently highlighted and demonstrated through case studies.
Abstract #

#1008

**Benchmark Dose Modeling and Its Applications in Drug, Food, and Chemical Safety Evaluation and Assessment.** K. Shao. Indiana University, Bloomington, IN.

**Benchmark Dose Modeling Strategies and Tools for Dose-Response Assessment Using Toxicological, Epidemiological, and Genomic Data.** K. Shao. Indiana University, Bloomington, IN.


**Sponsor:** K. Shao

**Application of a Benchmark Dose-Based Transcriptome Point of Departure in Chemical Safety Assessment.** K. Johnson. Corteva Agriscience, Indianapolis, IN.

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**Sunday, March 10, 1:15 PM to 5:00 PM, Room TBA, Salt Palace Convention Center**

**Continuing Education PM09: Bridge over Adverse Waters: Integrating Pathology Findings into the Interpretation of Toxicology Studies**

**Chair(s):** Jonathan Maher, Pliant Therapeutics; and Marie Lemper, UCB.

**Primary Endorser:** Drug Discovery Toxicology Specialty Section

**Other Endorser(s):** Biotechnology Specialty Section; Comparative Toxicology, Pathology, and Veterinary Specialty Section

Although the design and results of a toxicity study follow general guidelines, at certain times, the actual interpretation of a study can be complex. Such interpretation, which encompasses multiple functional areas with an array of different endpoints, ultimately needs to assess whether any findings are detrimental to the animal and whether such a finding poses a risk to human health. One critical piece of the interpretation relies on gross, clinical, and anatomical pathology endpoints. Proper incorporation of these pathology data—and as such communication and exchange between the pathologist and toxicologist—is critical for this integrated analysis. There are many subtleties that are not often appreciated in the equation, including the phase of drug development, duration of the toxicity study, translational aspects, indication and risk/benefit of the therapeutic, and weight of evidence supporting the interpretation. To address these aspects, this course is designed to first give an overview of toxicology studies and the pathology parameters and assessments during the drug development process. Once that basic understanding is established, the next step is to work through what adversity means in the context of toxicology and some of the challenges and implications of adverse findings. For example, can a finding be harmful to the animal but irrelevant to human health—or vice versa? How and where is such information communicated? When and how do investigational studies or endpoints help? An experienced set of speakers will address some of the best practices in interpreting pathology findings and walk through some challenging scenarios, including weight of evidence approaches that were utilized to contextualize a pathology finding where adversity was unclear. The last portion of the course will feature live polling to allow the audience to experience unique scenarios and make their own interpretations.

**Abstract #

#1009**

**Bridge over Adverse Waters: Integrating Pathology Findings into the Interpretation of Toxicology Studies.** J. Maher. Pliant Therapeutics, South San Francisco, CA.

**The Interconnectivity between Pathology and Toxicology.** S. Kakiuchi-Kiyota. Genentech, South San Francisco, CA.

**Understanding the Aversity to Adversity: Pathologists’ Perspectives on Adversity in Nonclinical Toxicity Studies.** H. Booler. Novartis, Basel, Switzerland.

**Integrating Clinical Pathology into the Assessment of Adversity.** P. Katavolos. BMS, New Brunswick, NJ. **Sponsor:** J. Maher


How to Efficiently Anchor Pathology Discussions to Toxicology. M. Lemper. UCB, Cambridge, MA.

Sunday, March 10, 1:15 PM to 5:00 PM, Room TBA, Salt Palace Convention Center

Continuing Education PM10: Harnessing Toxicology in Pregnancy: Traditional and Novel Approaches to Placental Toxicology Research

Chair(s): Almudena Veiga-Lopez, University of Illinois at Chicago; and Elana Elkin, San Diego State University.
Primary Endorser: Reproductive and Developmental Toxicology Specialty Section
Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Women in Toxicology Special Interest Group

Pregnancy is considered among the most vulnerable life stages, for both the mother and the child. Despite being a critical bridge between the maternal exposome and fetal development, the placenta is an overlooked and severely understudied organ in reproductive toxicology. An appreciation and understanding of the placenta are critical to study design, execution, and interpretation of effects on pregnancy and fetal and maternal health. This first-of-its-kind SOT Continuing Education course on the placenta is composed of a diversity of early, mid-career, and established investigators from academia and government with expertise in placental toxicology that spans from basic bench research to human studies that capitalize on placental tissue as the basis for epidemiological work. The objectives for this course are to provide attendees with an overview of the basic biology of placental function and comparative biology across commonly used animal models. The course also will include placental toxicology approaches spanning cell-based techniques, including more traditional/routine approaches, to state-of-the-art approaches, such as placental chemical transfer and microfluidics, and ways to incorporate high-throughput analyses that can ultimately help inform regulatory decisions. The use of animal models in placental toxicology research, sample collection considerations, and study design of human cohort studies also will be covered.

Abstract #
#1010
Harnessing Toxicology in Pregnancy: Traditional and Novel Approaches to Placental Toxicology Research. A. Veiga-Lopez. University of Illinois at Chicago, Chicago, IL.
Placental Biology Basics. E. Elkin. San Diego State University, San Diego, CA.
Current Models for Studying Placental Toxicology. S. Harris. University of Michigan, Ann Arbor, MI. Sponsor: A. Veiga-Lopez
Application of Molecular Epidemiological Approaches to Gain Mechanistic Understanding of How Prenatal Exposures Influence Fetal Development. A. Paquette. Seattle Children’s Research Institute, Seattle, WA.
Use of High-Throughput Analyses in Placental Toxicological Studies. B. Blake. US EPA, Durham, NC.
Capitalizing on Three-Dimensional and Microfluidic Technologies to Model the Placenta for Toxicological Studies. A. Veiga-Lopez. University of Illinois at Chicago, Chicago, IL.
Open science and data transparency policies, particularly implementation of FAIR (Findable, Accessible, Interoperable, and Reusable) data principles in research, have become a major priority of US, national, and global research governance and funding organizations. The purpose of these policies is to make it easier to find, validate, analyze, reproduce, and reuse scientific data in an era when evidence about the health effects of chemical exposures is being generated faster than it can be cataloged and processed. To help researchers and chemical assessment practitioners prepare for a near future in which open science standards are being implemented, this course will provide a comprehensive primer on what it means for data to be FAIR, a summary of what open science and data policies look like and how they support better regulatory science and public health decision-making, and a practical introduction to the open science workflows that researchers should anticipate engaging with to produce FAIR data. These workflows will include best practices for increasing credibility when working with sensitive or proprietary datasets that cannot be made openly available. To achieve this, the course will present five expert perspectives on FAIR data and open science practices, with senior figures in research and publishing providing actionable advice aimed at helping participants prepare strategies for benefiting from FAIR data policies rather than being disrupted by them. There also will be a practical exercise that demonstrates how to provide the necessary support materials to make research data, code, and materials FAIR and reproducible. Finally, specific information needs of participants will be addressed through an interactive question-and-answer panel with speakers. The target audiences for this session include (1) early career researchers who will need to implement open science policies at bench; (2) senior researchers running labs who need to know how to train their PhDs and postdocs in data standards compliance issues; (3) editors who, as the gatekeepers and publishers of research, will need to support scientists and the policy goals of funders and agencies; (4) contract research organizations and research consultancies that may be expected to comply with open data standards but also have to address proprietary concerns; and (6) funders who may want to support the policy goals of organizations such as the National Institute of Environmental Health Sciences through their independent grant programs. Participants should note that any opinions expressed in the session reflect those of the individual presenters and not their employers or otherwise affiliated organizations.

Abstract #

#1011

Next-Generation Data Transparency and Open Science Policies: What Toxicologists Need to Know. 
P. A. Whaley. Lancaster University, Lancaster, United Kingdom.

Housekeeping and Introduction to the Session. Co-presented by Co-Chairs.


An Unexpected Journey through Another Researcher’s Data. Practical Exercise with All Presenters.


Tools to Facilitate Compliance with Open Data Standards. D. Mellor. Center for Open Science, Charlottesville, VA. Sponsor: P. A. Whaley

Panel Q&A: Challenges and Opportunities in Data Standards—Your Questions Answered.
Next-Generation risk assessment (NGRA) is an approach to understanding the potential risks of ingredients and chemicals using new approach methodologies (NAMs)—specifically to assess the exposure, bioactivity, and metabolic and kinetic behavior of a chemical for a specified use. Following an NGRA approach for any given chemical or use scenario usually involves building an Integrated Approach to Testing and Assessment, including nonanimal computational and in vitro methods, as well as relevant chemical-specific information. There is a recognized need for increased education about the NGRA approach in general but especially how information sources are selected and the data from them analyzed to decide whether to continue gathering more information or whether a decision can be made. A number of case studies have been published in the literature and reviewed by regulatory authorities in different contexts. To show how NGRA concepts are being put into practice with a variety of tools and scenarios, this course will offer participants an opportunity to gain in-depth knowledge of the available computational approaches often used as the components of an NGRA through presentation of the basic structure and functional purpose of these approaches, supplemented by real-world application in case examples that have been or will be used in regulatory decision-making contexts. The course will begin with an introduction to NGRA concepts, the state-of-the-science, and the progress toward regulatory acceptance. In the second talk, participants will gain an understanding of key human exposure modeling approaches and how they can be used to estimate consumer and occupational exposure to a variety of ingredients and chemicals. Next, computational methods for deriving a quantitative effect level from in vitro bioactivity information using in vitro–in vivo extrapolation will be discussed, drawing on learnings from Health Canada and collaborative activities. Participants will understand how to integrate the information they have gathered as a weight of evidence and determine whether a safety decision can be made or more testing is needed after the fourth presentation by using case studies. The penultimate talk will discuss innovative activities to increase confidence in the use and acceptance of approaches for NGRA across regions and sectors, with special considerations relevant to computational approaches. Finally, additional educational resources to further the group’s overall knowledge of computational approaches to conduct NGRA will be provided by the last speaker, who also will incorporate audience participation. Together, these talks will help participants put NGRA approaches into daily practice through building a better understanding of how computational NAMs can support all stages of NGRA decision-making and by demonstrating available tools using case studies.

Abstract #

#1012


Bridging the Gap: Educational Needs and Resources. K. Sullivan. Institute for In Vitro Sciences, Ann Arbor, MI.
New approach methodologies (NAMs) anchored to known mechanisms of human toxicity are increasingly being used to assess the potential toxicity of inhaled substances. Various *in silico* and *in vitro* systems can be used to assess respiratory toxicity, and the selection of an appropriate system depends on multiple factors, including the goal of the study, physicochemical properties of the test substance, and biological effects of interest. Despite the need and the growing use, there is an obvious void in NAMs that are accepted for regulatory use related to respiratory toxicity. However, efforts are underway to fill the gap with NAMs that are anchored to known mechanisms of human toxicity and are well-characterized, which are critical parameters for their use for risk assessment in support of decision-making. This course will cover specific examples of methods that are currently available to assess respiratory toxicity, including their technical challenges and refined dosimetry characterizations. This course will discuss case studies of how data are generated using these methods, anchored to adverse outcome pathways, and incorporated into Integrated Approaches to Testing and Assessment for risk assessment and hazard identification of inhaled substances. This course also will explore how to build scientific confidence in such methods to facilitate their use in decision-making and in regulatory acceptance of NAMs.

**Abstract #1013**

*Use of New Approach Methodologies for the Assessment of Inhaled Substances: Examples and Case Studies.* M. Sharma. PETA Science Consortium International e.V., Rochester, MI.

*Establishing Confidence in New Approach Methodologies for Inhalation Toxicity Testing.* D. Allen. Inotiv-RTP, Contractor supporting NICEATM, Durham, NC.

*Human-Derived In Vitro and Ex Vivo Test Systems to Assess Respiratory Toxicity of Chemicals.* H. Behrsing. Institute for In Vitro Sciences, Gaithersburg, MD.


*Panel Discussion/Q&A.*
Sunday, March 10, 6:30 PM to 7:30 PM, Hall E, Salt Palace Convention Center

**Welcome Reception**

Partake in the complimentary hors d'oeuvres while connecting with friends, colleagues, and new acquaintances. A cash bar is available during this event.

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Sunday, March 10, 7:00 PM to 8:00 PM, Grand Ballroom I, Salt Palace Convention Center

*(By Invitation Only)*

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

If you have been an SOT member for 25 years or more, please join your colleagues to celebrate and recognize the contributions that you have made to the Society, helping it become the association that it is today. Be sure to wear (or pick up) your anniversary pin and ribbon in honor of your years of membership!

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Sunday, March 10, 7:30 PM to 9:00 PM, Room 355, Salt Palace Convention Center

*(Free Reservation 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, recognize the recipients of the GSLC Outstanding Graduate Student Leadership Award, and enjoy complimentary refreshments and a cash bar with other students and postdocs! Sign-up may be completed at no cost by registering for the mixer as part of your Annual Meeting registration. A meeting badge is required to attend.

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**Volunteer with SOT**

The “Volunteer” section in ToXchange gives SOT members the opportunity to express their interest in a wide variety of service positions within the Society, including leadership positions.

**Explore the opportunities today!**

[www.toxicology.org/volunteer](http://www.toxicology.org/volunteer)
Monday, March 11, Various Times and Locations

SOT Committee and Component Group Leadership Activities

SOT Committees, including Regional Chapter, Special Interest Group, and Specialty Section leadership, often hold business meetings and discussions as breakfast or lunch events. These meetings are limited to Committee members and Component Group officers. More specific information about these meetings, including the time, date, and location, is available in the SOT Online Planner and SOT Event App.

SOT Regional Chapter, Special Interest Group, and Specialty Section Events

Many Regional Chapters, Special Interest Groups, and Specialty Sections host breakfasts, luncheons, or receptions and/or facilitate mentoring events during the meeting. These activities act as social events, award ceremonies, and career development sessions all in one. These events are a great way to connect with colleagues, meet other members, or learn more about a group before becoming a member. The days, times, and locations of the SOT Component Group activities are available in the “Program Overview” section of this publication, as well as in the SOT Online Planner and SOT Event App.

Poster Tours for Trainees

(Advanced Sign-Up Required)

Hosted by: Postdoctoral Assembly

Graduate students and postdoctoral scientists participate in one-hour guided poster tours with an expert guide. These small group tours provide the opportunity for trainees to take part in critical evaluation of cutting-edge toxicology methods and research findings and network with a senior toxicologist. Advance sign-up is required.

Monday, March 11, 6:15 AM to 7:45 AM, Room 255 D, Salt Palace Convention Center

(Add-On Event; Limited Seating)

SOT Mentoring Breakfast

Hosted by: Education and Career Development Committee (ECDC)

This event is designed for SOT members from graduate students through established career toxicologists. SOT recognizes that mentoring is important at all career stages and has implemented a year-round program for mentors and mentees to develop fruitful and long-lasting connections through the SOT Mentor Match Program. During this breakfast, the SOT Education and Career Development Committee is providing an opportunity for mentees and mentors matched through the online Mentor Match Program to meet in person and to meet other interested members to discuss foundational topics pertaining to academia (publishing, grant writing, job search), industry (tips for career transitions), or career development (managing conflicts, burnout, DEI). SOT members who are interested in learning more about mentoring or being mentored through the SOT Mentor Match Program also are invited to attend and network with participants. A separate registration is required to attend. Registration is limited and is accepted on a first-come, first-served basis.
Monday, March 11, 6:30 AM to 8:00 AM, Room 254 C, Salt Palace Convention Center
(By Invitation Only)

Past Presidents’ Breakfast

During this invitation-only event, the most recent SOT Past President hosts the other Past Presidents and leads discussions about topics of relevance to the Society.

Monday, March 11, 8:00 AM to 9:00 AM, Hall E, Salt Palace Convention Center

FS Opening Plenary Session: The Evolution of BioTech into TechBio

Speaker: Chris Gibson, Recursion, Salt Lake City, UT.

The use of artificial intelligence (AI) and other sophisticated technologies in areas of drug discovery and development, such as toxicology, represent the potential for a transformative leap forward in how we assess and manage the potential risks and opportunities associated with chemical substances, pharmaceuticals, and environmental contaminants. Chris Gibson is Co-founder and CEO of Recursion, a clinical stage, leading TechBio company leveraging the latest technology tools to evolve the way we discover and develop medicines. A graduate of Rice University with degrees in bioengineering and management and a PhD from the University of Utah, Dr. Gibson will discuss how AI, biology, chemistry, automation, data science, and engineering are converging to modernize drug discovery and development.

Monday, March 11, 8:00 AM to 5:00 PM, Various Locations
(By Invitation Only)

Undergraduate Diversity Program

Chair(s): Corie A. Ellison, Procter & Gamble; and Tynisha D. Glover, Johnson & Johnson Innovative Medicines.

Hosted by: Committee on Diversity Initiatives (CDI)

The recipients of the Undergraduate Diversity Program Student and Advisor Travel Awards participate in Scientific Sessions, visit posters, and attend the In Vitro Toxicology Lecture and Luncheon for Students. Participants continue to network with toxicologists and have a special session to conclude this concentrated exposure to toxicology and opportunities in the biomedical sciences after graduate studies.

Witness the Tox ShowDown!

Tuesday, March 12 | 7:30 PM to 9:00 PM
Regency Ballroom A, Hyatt Regency
**Monday, March 11, 9:00 AM to 4:30 PM, Exhibit Hall C, Salt Palace Convention Center**

### ToxExpo Exhibits

Incorporating visits to the ToxExpo while at the SOT Annual Meeting connects attendees with 250+ exhibitors who support the toxicology community with cutting-edge solutions and services. Visit the ToxExpo to:

- Connect with exhibitors for product, service, and career insights
- Learn about the latest research from 700+ daily poster presentations
- Network with colleagues in the SOT Pavilion and ask questions about the Society
- Check out the Tiny Tox Theater for brief talks focused on a variety of topics
- Enjoy morning coffee and afternoon refreshments
- Grab lunch and relax with others
- Win big by visiting exhibitors with raffles and by dropping your business card in the SOT Diamond-level Supporter boxes
- Experience much, much more

### Global Gallery of Toxicology

Toxicology societies from around the world participate in the Global Gallery of Toxicology, where they display posters showcasing their upcoming meetings, key accomplishments, strategic initiatives, journals, awards, and more.

### SOT Regional Chapter, Special Interest Group, and Specialty Section Posters

Dedicated poster space showcases the activities of the SOT Regional Chapters, Special Interest Groups, and Specialty Sections.

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**Monday, March 11, 9:00 AM to 10:00 AM, Locations Vary, Salt Palace Convention Center**

### Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

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**TOX EXPO™ Connect with exhibitors for product, service, and career insights.**

Plus, view thousands of scientific posters in the ToxExpo Exhibit Hall.

Monday to Wednesday | 9:00 AM to 4:30 PM

[WWW.TOXEXPO.COM](http://WWW.TOXEXPO.COM)
Symposium Session: Burn Pit and Wildfire Aerosols—Chemical Composition and Health Consequences: What Is in Common?

Chair(s): Alexandra Noël, Louisiana State University; and Daniel Conklin, University of Louisville.

Primary Endorser: Inhalation and Respiratory Specialty Section

Other Endorser(s): Cardiovascular Toxicology Specialty Section

Exposure to air pollutants, such as volatile organic compounds (VOCs) and particulate matter (PM)—primary constituents of military burn pit and wildfire smoke—increases the risk of chronic inflammatory diseases, and >80% of the excessive mortality associated with air pollution is linked with pulmonary and cardiovascular disease (CVD). Although the specific mechanisms by which exposure to VOCs and PM increases and sustains inflammation remain unclear, elucidation of such mechanisms is critical to provide basic understanding of the pathophysiology of pollution-induced CVD and to implement prevention and mitigation strategies that can improve general health. However, insight into mechanisms of injury and persistence also could be used to develop treatments for those exposed acutely to high levels of air pollution, such as veterans suffering with Gulf War Illness and firefighters who fight wildfires occupationally. As CVD begins and persists as an inflammatory condition, air pollution exposures accelerate CVD by ramping up inflammation, especially under conditions of stress (e.g., sleep disruption, military service) and lifestyle choice (e.g., alcohol, tobacco use). In addition, social and economic factors influence the susceptibility to these health consequences. Thus, air pollution exposure represents a major cause of cardiopulmonary injury in the general population and in military and firefighter personnel. As it remains unclear how deposition of PM in the lung, the primary target of PM, spreads to cardiovascular organs and affects cardiopulmonary function, there is a need to utilize real-world exposures to better understand this process. Thus, this Symposium is focused on comparing and contrasting the state of knowledge regarding the chemical composition and consequences of exposures to burn pit and wildfire smoke. Experts in burn pit and wildfire smoke chemistry, toxicology, and epidemiology will provide insights to drive deeper understanding of the mechanisms and needs for the science to develop interventions, mitigation strategies, and therapeutics in exposed individuals and to protect public health.

Abstract #

#1014  9:15 AM  Burn Pit and Wildfire Aerosols—Chemical Composition and Health Consequences: What Is in Common?

9:15 AM  Introduction. A. Noël. Louisiana State University, Baton Rouge, LA.

#1015  9:20 AM  Small Particles and Small Airways: Large Problems for Deployed Military Personnel? M. Falvo. VA Airborne Hazards and Burn Pits Center of Excellence, East Orange, NJ. Sponsor: A. Noël

#1016  9:50 AM  Complex Combustion Emissions: Generation, Characterization, and Modeling of Open Burn Pit Exposures. T. Nurkiewicz. West Virginia University School of Medicine, Morgantown, WV.


#1019  11:20 AM  The Role of Wildfires in Susceptibility to Infection and Respiratory Disease. M. Rebuli. University of North Carolina at Chapel Hill, Chapel Hill, NC.

11:50 AM  Panel Discussion/Q&A.
Drug-Induced vascular injury (DIVI) refers to an adverse reaction caused by a drug that manifests as degenerative and hyperplastic alterations in endothelial cells and vascular smooth muscle cells. In addition, inflammation may be present, and there may be leakage of red blood cells into the smooth muscle layer, resulting in hemorrhage. DIVI is a significant challenge to drug development and clinical practice due to the lack of sensitive and predictive biomarkers of DIVI. Development of DIVI can result in early termination of development compounds due to the lack of predictive biomarkers for DIVI and the conservative nature of regulatory agencies, as well as drug withdrawal. The mechanism(s) leading to DIVI are multifaceted and are hypothesized to occur due to (1) direct damage to the endothelial cells lining the blood vessels, which can be caused by various chemical classes (e.g., chemotherapeutic agents, vasoactive drugs, immunosuppressants, and anti-inflammatory drugs) or (2) immune-mediated indirect mechanisms by biotherapeutics. Despite the significant impact of DIVI, our understanding of the underlying mechanisms and effective preventive and therapeutic strategies remains limited. The development of DIVI biomarkers and improved in vitro and in vivo models are critical to addressing this challenge and are currently being investigated. The use of these systems that may provide better clinical translation also will help in the understanding of the biology and mechanisms underlying DIVI, which is crucial for developing better safety biomarkers of DIVI as well as effective preventive and therapeutic strategies. This Symposium brings together experts in the field of vascular biology/toxicology and from the US Food and Drug Administration (US FDA) to present and discuss the latest research findings, explore potential underlying mechanisms (e.g., senescence and barrier function disruption), and highlight novel approaches (e.g., flow condition) to study DIVI. The session also will discuss the current status of the development of predictive safety biomarkers of DIVI being investigated by cross-industry consortia partners, such as the Predictive Safety Testing Consortium Vascular Injury Working Group, as well as provide insight and perspective from the US FDA Division of Applied Regulatory Science on the utilization of novel drug development tools such as the use of organ-on-a-chip complex in vitro models that hold promise to minimize both animal use in testing paradigms and clinical study requirements for drug development programs. The Symposium will conclude with an interactive panel discussion and question-and-answer session to engage with experts in the field and exchange ideas on the challenges and opportunities to better understand mechanisms associated with development of DIVI, as well as the use of complex in vitro models, for pharmaceutical development and biomarker science.

**Abstract #**

**#1020** 9:15 AM  

**#1021** 9:20 AM  
Mechanisms and Consequences of Endothelial Cell Senescence. A. Donato. University of Utah, Salt Lake City, UT. Sponsor: S. Lu

**#1022** 9:45 AM  

**#1023** 10:10 AM  

**#1024** 10:35 AM  

**#1025** 11:00 AM  

11:25 AM  
Panel Discussion/Q&A. D. Dalmas Wilk¹, and N. King². ¹GlaxoSmithKline plc, Collegeville, PA; and ²Critical Path Institute Predictive Safety Consortium, Tucson, AZ.
Algae are essential to the aquatic food web under ecologically balanced conditions. Harmful algal blooms (HABs) occur when algae grow out of control in fresh and marine bodies of water. Algal blooms, driven by climate change and human activity, can disrupt the ecosystem, damage the environment, contaminate drinking water and food supplies, and impact the local economy. The US National Office for Harmful Algal Blooms has estimated that the average annual cost of coastal HABs is $50 million nationwide, with public health representing $20 million and commercial fishing at $18 million. Human exposure occurs primarily though ingestion of contaminated seafood and water, direct dermal contact, and inhalation of aerosolized algae and algal components. Some algal species produce toxins, which can induce hepato-, neuro-, dermal, gastrointestinal, and respiratory toxicity. Cyanobacteria and algal toxins have been detected in the nasal cavity, respiratory tract, and airway mucosa of humans exposed to contaminated water. The Florida Department of Health reported that “red tide” HAB events were associated with increases in emergency room diagnoses for pneumonia (19%) and gastrointestinal (40%) and respiratory illnesses (54%, annual cost $0.5–4 million). Understanding the mechanisms of the toxins and the dynamics of these environmental events is essential to identifying the contribution of the toxins to disease etiology and to the development of recommendations by regulatory and public health agencies. These research efforts align with the translational toxicology and climate change concerns stated in the National Institutes of Health Climate Change and Health Initiatives and with the monitoring, research, and intervention efforts coordinated by the National Oceanic and Atmospheric Administration–led Interagency Working Group on HAB and Hypoxia Research and Control Act. This Symposium will provide interdisciplinary presentations relating algal toxin exposure with human health and stimulate discussion on the molecular mechanisms driving disease pathogenesis of the toxins using a variety of in vitro and in vivo models, including human hepatocytes, zebrafish, mice, and a human epidemiology study. The presenters represent federal environmental and health agencies, academia, and nonprofit research organizations. An introduction to the National Institute of Environmental Health Sciences-National Science Foundation Oceans and Human Health Program, which supports interdisciplinary investigation into the impact of HABs and other marine environmental exposure on human health, will begin the session. Subsequent presenters will highlight contemporary mechanistic studies evaluating the neuro- and hepatotoxic effects of four different algal toxins: domoic acid and brevetoxin (marine) and microcystin-LR and anatoxin-a (freshwater). These studies provide clarification on molecular pathways involved in the mechanisms of toxicity, contribute to public health risk assessment, provide health effects data for the development of US Environmental Protection Agency regulations, and demonstrate a dose-responsive correlation between algal cell count in coastal waters and adverse respiratory and neurologic symptoms experienced by exposed humans. Overall, this session will provide a unique platform for communication and interaction regarding the identification of adverse effects induced by HAB toxins, impact on human health, potential intervention strategies, and avenues for future investigation.

Abstract #

#1026 9:15 AM  Harmful Algal Blooms and Human Health.
#1027 9:15 AM  NIEHS-NSF Oceans and Human Health Program: Promotion of Interdisciplinary Science to Enable Transformative Research on Harmful Algae. A. Dzierlenga. NIEHS, Research Triangle Park, NC.
#1029 10:10 AM  Mechanisms of Microcystin-LR Hepatotoxicity in Healthy Liver and in Nonalcoholic Fatty Liver Disease. J. Clarke. Washington State University, Pullman, WA.
#1031 11:10 AM  Neurological Effects of Aerosolized Red Tide Neurotoxins. L. Abdullah. Roskamp Institute, Sarasota, FL. Sponsor: A. Dzierlenga
#1140 AM  Panel Discussion/Q&A.
Cannabis is one of the most used recreational drugs worldwide, with increasing use among young people (15–30 years old), as well as women during pregnancy to ease nausea. Studies in humans and animals have demonstrated that the predominant psychoactive constituent of cannabis, delta-9-tetrahydrocannabinol (THC), is lipophilic, allowing for potential fetal and neonatal exposure via placental and lactational transfer, respectively. As cannabis and its cannabinoid constituents (e.g., THC and cannabidiol [CBD]) are legalized across Canada and within individual states in the United States, data on use during pregnancy and potential effects on fertility and development are becoming more widely available. This Symposium is composed of speakers with expertise spanning from epidemiological to translational bench work that will provide an overview of some cutting-edge research on cannabis use and the impact on fertility, breastfeeding, and development. The session will begin with a presentation on the prevalence of cannabis use during pregnancy and the neurodevelopmental outcomes observed in children exposed perinatally. The second speaker will present on the effect of cannabis use on the composition of breastmilk in humans and complementary studies conducted in a murine epithelial cell line exposed to either THC or CBD. The third speaker will discuss a unique perspective regarding the effect of CBD and its main metabolites on Sertoli cells from experiments using human-derived and mouse cell lines. The fourth speaker will present research using the zebrafish model to evaluate the developmental effects of early life exposure to minor cannabinoids in comparison to the effects of THC and CBD. The fifth and final presenter will briefly describe an evidence map of the published literature evaluating the effects of CBD on reproduction and development before presenting a recently published Organisation for Economic Co-operation and Development–compliant reproductive toxicity study on CBD isolate in rats. The utility of such guideline studies in the overall safety and risk assessment for these products will be discussed.

Abstract #

#1032 9:15 AM  Looking through the Haze: Is the Picture Any Clearer on the Effects of Cannabis and Cannabis-Related Products on Reproduction and Development?

#1033 9:20 AM  Cannabis Use in Pregnancy: Associations with Perinatal Outcomes and Neurodevelopment in Offspring. D. Corsi. Ottawa Hospital Research Institute, Ottawa, ON, Canada. Sponsor: A. Holloway


#1035 10:20 AM  Cannabidiol and Its Main Metabolites Induced Toxicity in Mouse and Human Sertoli Cells. S. Chen. US FDA/NCTR, Jefferson, AR.

#1036 10:50 AM  The Developmental and Reproductive Toxicities of Cannabinoids following Early Life Exposure. K. Willett. University of Mississippi, Oxford, MS.

#1037 11:20 AM  Reproductive and Developmental Toxicity Evaluation of Cannabidiol to Support Risk Characterization. R. Henderson. ToxStrategies LLC, Wilmington, NC.

11:50 AM  Panel Discussion/Q&A.
Per- and polyfluoroalkyl substances (PFAS) are a large class of mostly unregulated, pervasive, mobile, and bioaccumulative chemicals. PFAS are extensively used in consumer and industrial products, resulting in daily PFAS exposure from food, drinking water, personal care products, dust, and air. PFAS are nearly universally detected in the serum of the US population. It is estimated that 200 million people in the US rely on tap water contaminated with PFAS and more than 2,000 communities in 49 states have PFAS levels that exceed levels of concern. Epidemiological studies show associations between PFAS exposure and adverse human health effects, including birth outcomes, immunologic effects, and endocrine/metabolic disruption. Increased concentrations of total cholesterol, non-HDL-C, and LDL-C in serum are among the best supported, most sensitive endpoints in both cross-sectional and longitudinal epidemiology studies. The liver is an essential regulator of whole-body lipid homeostasis, the organ with the highest concentrations of PFAS, and a target organ for PFAS-induced mechanisms of action. Activation of peroxisome proliferator activated receptor alpha (PPARα) is an important molecular initiating event in PFAS-induced toxicity; however, species differences in human and rodent PPARα have challenged our ability to understand the contribution of PPARα to human-relevant adverse health outcomes. The growing knowledge base and use of new models is making it clear that while human PPARα is activated by PFAS, its contribution to PFAS-induced effects on lipid homeostasis, both in the liver and systematically, is less than expected and also dependent upon the structure of PFAS. In this Symposium, we explore the contribution of PPARα, as well as alternate pathways, to PFAS-induced effects on liver biology and lipid homeostasis.

Abstract #

#1038 9:15 AM  Mechanisms of Per- and Polyfluorinated Substances Action: PPARα and Beyond.
#1040 9:45 AM  Importance of Evaluating Mode of Action and Human Relevance in Assessment of Human Health Risks of PFAS: Case Study with Short-Chain HFPO-DA. M. Heintz. ToxStrategies LLC, Asheville, NC.
#1041 10:15 AM  Is PPARα the Molecular Initiating Event Driving Human-Relevant Toxic Effects of PFAS? J. Schlezinger. Boston University School of Public Health, Boston, MA.
#1042 10:45 AM  Mechanisms Linking Mixtures of Per- and Polyfluoroalkyl Substances to Increased Circulating Cholesterol and Cardiovascular Disease Risk. M. Petriello. Wayne State University, Detroit, MI.
#1043 11:15 AM  Alternate Mechanisms of PFAS Toxicity. U. Apte. University of Kansas Medical Center, Kansas City, KS.
11:45 AM  Panel Discussion/Q&A.
Despite significant progress in our understanding of the central nervous system (CNS), drug discovery clinical development and identifying environmental compounds with neurotoxic potential remains a challenge. Recent studies have identified two primary reasons for high attrition rates of CNS drugs: failure to predict clinical safety issues and toxicity in late-stage nonclinical studies, with the inability to detect convulsions in early de-risking being one of the major concerns. Although significant advancements have been made in in vitro and complementary systems for developmental and acute neurotoxicity testing, these models are still not routinely applied in CNS drug testing or in environmental monitoring. This session aims to highlight the progress made thus far in utilizing in vitro and in silico approaches to identify potential neurotoxic hazards following environmental exposure and/or during early phases of drug development, thereby enabling prioritization and early de-risking strategies. In this session, speakers from academia, government, and industry come together to provide a global perspective on building confidence in new approach methodologies by connecting mechanisms to known human outcomes for both industrial chemicals and pharmaceuticals and shedding light on recent advancements in big data informatics and artificial intelligence and machine learning that can improve early screening of chemicals and drugs in the discovery process. We will discuss some novel QSAR models, adverse outcome pathways, and clinical outcome pathways to understand both therapeutic and adverse effects of compounds. This session will end with an interactive panel discussion where the speakers will discuss overlap in early screening methods and exchange ideas on how we can overcome barriers, such as sharing of data, transparency in method development, and translation to human toxicity.

Abstract #


#1045 9:20 AM Identifying Seizure-Inducing Biological Targets: A Collaborative Approach Using AOP Networks, In Vitro Assays, and Computational Tools. H. Hogberg-Durdock1, J. Hamm2, A. Borrel3, A. Karmaus2, T. Lane1, A. Unnikrishnan1, F. Urbina1, and M. Behl4. 1NIEHS/NICEATM, Research Triangle Park, NC; 2Inotiv, Research Triangle Park, NC; 3Collaborations Pharmaceuticals Inc., Raleigh, NC; and 4Neurocrine Biosciences Inc., San Diego, CA.


#1048 10:35 AM Improving Seizure Liability Detection in Drug Development: An In Vitro Approach Using hiPSC Neuronal Cells and Ion Channel Screening. K. Rockley1, M. Morton1, M. Davis1, P. Levesque3, and R. Roberts1. 1ApconiX, Cheshire, United Kingdom; and 3Bristol Myers Squibb, Princeton, NJ.

#1049 11:00 AM Defining Clinical Outcome Pathways with a Focus on Neurotoxicity. A. Tropsha. University of North Carolina at Chapel Hill, Chapel Hill, NC. Sponsor: H. Hogberg-Durdock

11:25 AM Panel Discussion/Q&A.
The issue of chemical residues in our food supply has been a long-term concern of toxicology in the human food safety domain. Chemical residues can enter meat, milk, or eggs either from drug administration; accidental exposure to agrochemicals, such as pesticides; or accidental environmental contamination. The quantitative prediction of when edible tissues and food products are below government-established tolerances is a “pure” application of pharmacokinetic modeling techniques since compared to pharmacodynamic and toxicodynamic endpoints (e.g., efficacy or toxicity), the endpoint is a single number and not a complex biological, and thus variable, endpoint. This session will (1) review the application of pharmacokinetic techniques to the prediction of tissue residues; (2) discuss how tolerances and maximum residue levels are determined; (3) explore the application of physiologically based pharmacokinetic (PBPK) modeling to this issue; (4) discuss how to apply new approach methodologies to generate absorption, distribution, metabolism, and excretion parameters to support development of PBPK models used to derive withdrawal times; (5) explore where machine learning and artificial intelligence techniques are used to assess global endpoints; and (6) summarize the differences encountered when regulatory policies are applicable and change.

Abstract #

#1050 9:15 AM Use of PBPK and Novel Pharmacokinetic Approaches for the Quantitative Prediction of Tissue Residue and Withdrawal Times for Human Food Safety Assessment.

#1051 9:20 AM Overview of the History of Drug and Chemical Residue Toxicology from the Perspectives of Both Risk Assessment and Their Prediction Using Pharmacokinetics. J. Riviere. North Carolina State University, Raleigh, NC.

#1052 9:40 AM Establishing Tolerances or Maximum Residue Levels in the US and International Jurisdictions. R. Baynes. North Carolina State University, Raleigh, NC.


#1056 11:20 AM New Approach Methodologies to Generate ADME Parameters for PBPK Models Used to Derive Withdrawal Times. R. DeWoskin. etioLogic LLC, Silver Spring, MD.

11:45 AM Panel Discussion/Q&A.
Poster Sessions

The presenting authors are available to discuss their research for the following Poster Sessions:

- ADME/Toxicokinetics
- Autoimmunity/Hypersensitivity
- Human Exposure Assessment/Biомonitoring
- Immunotoxicity I
- Medical Devices
- Metals I
- New Approach Methods: General
- Safety Assessment: Pharmaceutical—Drug Development I
- Skin
- Skin Sensitization
- Systems Biology and Toxicology

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

InTOXicating Science Talks

This special event features informal talks that are 15 minutes or less.

Global Collaboration Coffee: Can Microphysiological Systems Address Complex Toxicological Endpoints?

Chair(s): Emanuela Corsini, Universität degli Studi di Milano, Italy.

Organized by: International Union of Toxicology (IUTOX)

This annual event organized by IUTOX and hosted by SOT helps IUTOX Member Societies and other international attendees put ideas into action to advance information sharing and to solve common problems with available resources.

This year, an expert panel with diverse perspectives will discuss the question, “Can microphysiological systems address complex toxicological endpoints?” If the vision of Tox21 is the progressive elimination of the use of animals, this is currently a challenge for systemic toxicity. This event will include time for discussion and networking.

Research Funding Insights Room: Network with Grant Program Officers

Hosted by: Education and Career Development Committee (ECDC)

Representatives from federal agencies will be available in the Research Funding Insights Room to answer general grant-related questions. Check the posted information in the Research Funding Insights Room to make an appointment with a program officer who can discuss aspects of scientific review or specific grant opportunities. New investigators are especially encouraged to meet with program staff.
Monday, March 11, 9:30 AM to 10:30 AM, Room 151 D, Salt Palace Convention Center
(Free Reservation Required; Limited Seating; SOT Graduate Student and Postdoc Members Only)

Trainee Discussion with Plenary Session Speaker Chris Gibson

Chris Gibson will meet informally for discussion with graduate students and postdoctoral scholars after the Plenary Session. Participation is limited to SOT Student and Postdoctoral members; you can register when registering for the SOT Annual Meeting and ToxExpo or by adding the event to your registration later. Visit the SOT Annual Meeting website for more information.

Monday, March 11, 10:00 AM to 10:20 AM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Toxicology as a Path for Entrepreneurship

Speaker(s): Dushani Palliyaguru, HealthSurveil, Laurel, MD.

Monday, March 11, 10:30 AM to 11:30 AM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Monday, March 11, 10:40 AM to 11:00 AM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: From Passion to Prestige: The Nexus of Toxicology, Leadership, and Empowering Women in Science

Speaker(s): Hadil Al Muhisen, Inotiv, Gaithersburg, MD.

Monday, March 11, 11:00 AM to 12:00 Noon, Grand Ballroom A, Salt Palace Convention Center

Distinguished Toxicology Scholar Award Lecture: Neurotoxicity and Neuroinflammation Profiles in Animal Models: A Brief Review of Some Unexpected Response Modifiers of Likely Relevance to Toxicology

This lecture will be delivered by James O’Callaghan, PhD, NIOSH, the 2024 SOT Distinguished Toxicology Scholar Award recipient.

Monday, March 11, 11:20 AM to 11:40 AM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Current Status of Toxicology and Toxicologists in India

Speaker(s): Nitin Verma, Chitkara University Himachal Pradesh, Kalujhinda, India.
Monday, March 11, 11:45 AM to 1:45 PM, Exhibit Hall C, Salt Palace Convention Center

**Poster Sessions**

The presenting authors are available to discuss their research for the following Poster Sessions:

- Epidemiology and Public Health
- Epigenetics
- Genotoxicity/DNA Repair
- Molecular Toxicology
- Neurotoxicity: Metals
- Neurotoxicity: Neurodegeneration
- Ocular Toxicology
- Safety Assessment: Non-pharmaceutical

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

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Monday, March 11, 12:00 Noon to 1:30 PM, Room 255 A, Salt Palace Convention Center

(Add-On Event; Limited Seating; Students and Postdocs Only)

**In Vitro Toxicology Lecture and Luncheon for Students: ToxAIcology—AI Will Only Replace Toxicologists Who Do Not Use It!**

**Lecturer:** Thomas Hartung, Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD.

**Supported by:** An Educational Grant from the Colgate-Palmolive Company

**Hosted by:** Education and Career Development Committee (ECDC)

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.

**Abstract:** The synergy of data generation and improvement of computers and algorithms has increased the power of artificial intelligence (AI) more than a billion-fold since AI was coined in 1956. Data in the world doubles every 18 months (i.e., 90% of all data was produced in the last three years), computers double in capacity every 24 months (Moore’s law), and AI algorithms have doubled in capacity every three months since 2010. For most human skill tests, AI performs better than 90% of us.

For toxicity, AI promises support for data retrieval, evidence integration (systematic reviews, risk assessments), predictive toxicology of untested compounds, digital pathology, and support in reporting. The prospects of animal replacement with better accuracy in (human) prediction, ethical benefits, and cost-effectiveness are enormous. Beyond this, accelerated assessments with automated data analyses, real-time monitoring, and complex analyses come into reach with user-friendly prediction tools. These changes also promise to democratize knowledge by encouraging open-access databases, algorithms, and publications. As a copilot for toxicology, it empowers researchers, regulators, consumers, and industry.
Monday, March 11, 12:00 Noon to 1:00 PM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Monday, March 11, 12:10 PM to 1:30 PM, Grand Ballroom E, Salt Palace Convention Center

Roundtable Session: Women's Health on the Frontlines: Science behind Sex-Specific Toxicology Differentials, Health Disparity, and Marginalization and Their Ethical Implications

Chair(s): Laura Plunkett, BioPolicy Solutions LLC; and Judith Zelikoff, NYU Grossman School of Medicine.

Primary Endorser: Women in Toxicology Special Interest Group

Other Endorser(s): Ethical, Legal, Forensics, and Societal Issues Specialty Section; Reproductive and Developmental Toxicology Specialty Section

The topic of women's health is a daily headline for the public and can be anchored in toxicology as a core science. This session will address common themes that underscore the importance of community organizing and partnerships, sound science, and regulatory policy to prioritize women's health and achieve powerful and equitable health outcomes, impacting quality of life.

Four speakers from the broader scientific community and the public will use case studies and/or examples based on their unique backgrounds and experience. The speakers will address themes that include (1) health disparity concerns; (2) lack of consideration and discussion of sex-driven toxic responses and the value these considerations add to the resulting science; (3) marginalization of women and dismissal of concerns without a fulsome discussion of the limitations of existing science and/or policy; (4) women on the frontlines of toxic disasters; and (5) the impact of exclusion of women in health impact discussions. The ethical implications and full consideration of women's health that impact specific communities, as well as the general population, will be raised by each speaker and a call for action put forth.

Questions will be raised by the speakers during their short topic area discussions, and those, as well as any solicited from the audience, will receive a response during the panel discussion. The three-member panel brings a unique set of experiences and background to the discussion and includes (1) a government scientist who is dedicated to understanding the impact of environmental quality on human health and disease risk and has worked to increase the participation of women in science that impacts women’s health; (2) a member of the Stockbridge-Munsee Band of Mohican Nation/Community who works actively to put forward equity in Tribal Nations through culture and language but also has had to deal with the challenge of creating a healthy and safe environment for her community; and (3) an academic scientist who is a member of the LGBTQIA+ community and who has had to confront the issue of sex-driven differences in biological responses in his research but also has experienced and witnessed the impacts of sex-based marginalization.

Abstract #

#1057 12:10 PM Women's Health on the Frontlines: Science behind Sex-Specific Toxicology Differentials, Health Disparity, and Marginalization and Their Ethical Implications.
Per- and polyfluoroalkyl substances (PFAS) are a class of compounds that, owing to both their widespread usage in consumer and industrial products and their persistence in the environment, are found almost ubiquitously in environmental media (water, air, soil), as well as food products and in the blood of humans and other animals. For these reasons, there are concerns about health effects in humans and other animals related to PFAS exposure, and risks (as they are identified in assessments) need to be effectively communicated to the public. However, there are numerous challenges associated with conducting risk assessments and addressing questions regarding usage, exposure, and health effects of PFAS, including the types of compounds that should be classified as PFAS, how to detect PFAS compounds in environmental media and in animals, how to qualitatively or quantitatively measure exposure, how to assess how harmful these compounds may be to humans and/or the environment, and how to manage and dispose of these compounds. Moreover, although there are potentially thousands of compounds that can be categorized as PFAS, there are human health and ecological in vitro data on a few hundred and in vivo data on even fewer. This session will build on previous SOT sessions on PFAS but aims to address a unique aspect of the topic: risk communication challenges and opportunities associated with their usage, exposure, and hazards. Speakers with a wide range of perspectives—from government (US federal and state), industry, international organizations, and non-governmental organizations—will discuss how the potential risks and/or benefits of PFAS could be communicated to the public more effectively with a focus on how uncertainty associated with PFAS usage, exposure, and health effects are conveyed to audiences with varying degrees of knowledge on the subject (i.e., from scientists working in the field to the general population).

Abstract #

#1058 12:10 PM  **Risk Communication of PFAS: Challenges and Opportunities.**

12:10 PM  **Introduction.** K. Salinas. SRC Inc., Liverpool, NY.

12:15 PM  **Risky Business: Navigating the Challenges of PFAS Risk Communication.** S. Gannon. Chemours, Wilmington, DE.

12:25 PM  **PFAS Risk Communication and Public Health in Wisconsin.** S. Yang. Wisconsin Department of Health Services, Madison, WI. Sponsor: K. Salinas

12:35 PM  **PFAS Risk Communication from an NGO Perspective.** S. Faber. Environmental Working Group, Washington, DC. Sponsor: K. Salinas
1:05 PM  Panel Discussion/Q&A.

Monday, March 11, 12:40 PM to 1:00 PM, Exhibit Hall C, Salt Palace Convention Center
Tiny Tox Talk: The Toxicological Challenges of the Global Refugee Crisis
Speaker(s): Abdel-Razak M. Kadry, University of Maryland, College Park, MD.

Monday, March 11, 1:20 PM to 1:40 PM, Exhibit Hall C, Salt Palace Convention Center
Tiny Tox Talk: Undergraduate Toxicology Teaching Resources Available through ToxMSDT
Speaker(s): Wilson Kiiza Rumbeiha, University of California Davis, Davis, CA; Mindy Reynolds, Washington College, Chestertown, MD; and Joshua Gray, US Coast Guard Academy, New London, CT.

Monday, March 11, 1:30 PM to 2:30 PM, Locations Vary, Salt Palace Convention Center
Exhibitor-Hosted Sessions
Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Monday, March 11, 1:45 PM to 4:30 PM, Room 250 A, Salt Palace Convention Center
Symposium Session: Advances in New Approach Methods for Thyroid Toxicity Testing
Chair(s): Rashin Ghaffari, Corteva Agriscience; and Chad Deisenroth, US EPA.
Primary Endorser: Reproductive and Developmental Toxicology Specialty Section
Other Endorser(s): Mechanisms Specialty Section; Molecular and Systems Biology Specialty Section

Chemical perturbations to thyroid hormone homeostasis can result in thyroid-mediated adversities, including interference with normal neurodevelopment. Global regulatory agencies require critical evaluation of chemicals that have the potential to disrupt thyroid hormone signaling as part of a comprehensive chemical safety assessment. Due to the complexity of the thyroid system and regulatory reliance on animal testing, there is a need for new approach methodologies (NAMs) to provide testing modalities that improve mechanistic insight, predict mode of action, reduce the use of animal testing, and inform next-generation risk assessments for thyroid-mediated toxicity, particularly with regard to human health effects. Advances in the development, application, and validation of high-throughput screening assays and organotypic culture models aim to provide coverage of molecular initiating events and key events defined in the thyroid adverse outcome pathway (AOP) network. However, interpretation of the biological and mechanistic relevance of thyroid NAMs remains a key challenge. Efforts to provide more comprehensive NAM coverage for thyroid system modes of action, increase confidence in NAM standardization and implementation,
and promote the acceptance of NAM data are necessary to fully leverage the potential capabilities of these test systems for quantitative AOP modeling and prediction of thyroid toxicity. This session focuses on the current state-of-science regarding the evaluation of thyroid-disrupting chemicals, including validation of \textit{in vitro} test methods, emerging organotypic technologies, application of alternative model organisms, and filling data gaps in quantitative AOPs. This session will provide insight into the strength, limitation, and future direction of hazard and risk assessment for chemical-induced thyroid toxicity.

\textbf{Abstract #}

\textbf{#1059} 1:45 PM \textit{Advances in New Approach Methods for Thyroid Toxicity Testing.} \textit{Introduction.} R. Ghaffari. Corteva Agriscience, Newark, DE.

\textbf{#1060} 1:50 PM \textit{EU-NETVAL Validation Efforts of Existing Thyroid Assays and Possible Ways of Use in a Testing Strategy.} I. Langezaal. EURL ECVAM, Ispra, Italy. Sponsor: R. Ghaffari

\textbf{#1061} 2:20 PM \textit{SCREENED: Screening for the Influence of Endocrine Disruptors on the Male and Female Thyroid Gland.} F. Caiment. Maastricht University, Maastricht, Netherlands. Sponsor: R. Ghaffari

\textbf{#1062} 2:50 PM \textit{Advancing the Use and Acceptance of the Human Thyroid Microtissue Assay.} C. Deisenroth. US EPA, Research Triangle Park, NC.

\textbf{#1063} 3:20 PM \textit{New Approach Methodologies in Predictive Thyroid Toxicity Screening of Crop Protection Compounds Using Zebrafish and Triculture Tissue Models.} B. Bhattacharya. Corteva Agriscience, Indianapolis, IN.


\textbf{4:20 PM} Panel Discussion/Q&A.

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\textbf{Monday, March 11, 1:45 PM to 4:30 PM, Grand Ballroom A, Salt Palace Convention Center}

\textbf{Symposium Session: Botanical-Induced Toxicity: Liver Injury and Botanical Drug Interactions}

\textbf{Chair(s):} Amy Roe, Procter & Gamble; and Phil Yeager, US FDA/CFSAN.

\textbf{Primary Endorser:} Mixtures Specialty Section

\textbf{Other Endorser(s):} Clinical and Translational Toxicology Specialty Section; Food Safety Specialty Section

Botanical supplements and herbal remedies are widely used by consumers for various health conditions, and their popularity is increasing. Some of these natural products can have adverse effects on liver function and interact with prescription and OTC medications. Ensuring the safety of botanical supplements and herbal remedies is a crucial public health concern; however, many regulatory frameworks do not mandate toxicity testing and instead depend on data related to their historical safe usage. Botanicals are difficult to evaluate for toxicity due to the fact that they are complex mixtures, composed of hundreds to thousands of individual constituents. Additionally, there will be variation from plant to plant due to factors like growing conditions, solvent extraction, and combination with other botanicals in the final product. This session will address the latest research on botanical-induced liver toxicity and botanical drug interactions, including new approach methods to screen for toxicity, addressing the challenges in assessing the safety of botanicals, and relating human adverse events to specific products. The first talk will discuss botanical drug interactions and ADME related to a commonly used natural product. Subsequent talks will explore the mechanisms of liver toxicity and drug interactions associated with some botanicals, including potential new approach methods that can be used to assess potential hepatotoxicity of botanicals and potential for herb-drug interactions that can impact the efficacy and safety of prescription medications. The session will close by highlighting key botanical supplements and herbal remedies that have been associated with liver toxicity and drug interactions and providing insights into the clinical presentations and diagnosis of these adverse events, including discussions of dose and consumer exposure. The session will show the need for further research and collaboration to improve the safety and efficacy of botanical supplements and herbal remedies, with the ultimate goal of protecting consumer health.
Abstract #

#1065 1:45 PM  Botanical-Induced Toxicity: Liver Injury and Botanical Drug Interactions.  

#1066 2:00 PM  Clinical Pharmacokinetics and Drug Interaction Potential of the Psychotropic Natural Product Kratom.  
M. Paine.  Washington State University, Pullman, WA.  Sponsor:  A. Roe

#1067 2:25 PM  Predicting Human Liver Injury and Botanical Drug Interactions with 3D Liver Microtissues and High-Throughput Transcriptomics.  S. Ferguson.  NIEHS, Research Triangle Park, NC.

#1068 2:50 PM  Comprehensive Review of the Hepatotoxicity of Ashwagandha (Withania somnifera) Root Extracts.  
I. Koturbash.  University of Arkansas Medical Center, Little Rock, AR.

#1069 3:15 PM  Prediction of Botanical-Drug Clearance Interactions Using a Sandwich-Cultured Human Hepatocyte Model.  A. Roe.  Procter & Gamble, Mason, OH.

#1070 3:40 PM  Clinical and Mechanistic Insights into Herbal and Dietary Supplement-Induced Liver Injury.  V. Navarro.  Thomas Jefferson University, Philadelphia, PA.  Sponsor:  A. Roe

4:05 PM  Panel Discussion/Q&A.

Monday, March 11, 1:45 PM to 4:30 PM, Grand Ballroom B, Salt Palace Convention Center

Symposium Session: Defining Susceptibility to Ozone: A Window into Exposure Effects in a Changing Climate

Chair(s):  Alessandro Venosa, University of Utah; and Srikanth Nadadur, NIEHS.
Primary Endorser:  Inhalation and Respiratory Specialty Section
Other Endorser(s):  Immunotoxicology Specialty Section

Despite regulatory efforts, air quality modeling projects a worldwide steady increase in ground-level ozone (O₃) concentrations. This rise is a direct consequence of higher non-US anthropogenic emissions of methane and nitrogen oxides and a warming climate that favors O₃ generation. Alone or in combination, these toxicants produce a bundle of adverse human health effects, with a disproportional impact on underserved and economically disadvantaged populations, as well as children, the elderly, pregnant individuals, and those with chronic cardiopulmonary disease. By the same principle, O₃ has been recently touted to favor the pathogenesis and exacerbation of chronic cardiopulmonary conditions, such as asthma, COPD, and fibrosis. Expanding our understanding of the direct and indirect consequences of a changing climate, particularly O₃ exposure, to human health will require new mechanistic paradigms to mitigate risks for vulnerable populations. Foundational work has described in great detail the impact of varying doses of a single/acute O₃ exposure on parenchymal and inflammatory cell dynamics in the healthy lung. These effects include rapid and transient oxidative damage, disruption of vascular-epithelial barrier integrity, activation of pro-survival metabolic pathways (autophagy and mitophagy), and myeloid-dominant inflammation—all contributing to acute effects. However, the evidence pertaining to lung inflammation, structural injury, and cellular signaling in a sub-healthy lung are sporadic at best. To address these ever-expanding horizons in air pollution research, this Symposium will begin with an overview of the National Institute of Environmental Health Sciences’s goals on air pollution exposure research and the focus on air pollution effects in a changing climate. This will be followed by a discussion of the scientific foundations behind the regulatory standards set by the US Environmental Protection Agency and its Clean Air Act. Additionally, talks from a scientifically diverse group of investigators will provide a transdisciplinary look at the most recent advancements in O₃ research. Three major aspects related to immune-epithelial crosstalk will be covered: (1) alterations in parenchymal cell activation during air pollution co-exposure; (2) temporal and spatial immunological responses in the murine and human lung; and (3) O₃-mediated susceptibility to develop pulmonary disease and infection. Together, this Symposium offers a comprehensive platform to unite immunologists, pulmonary biologists, and exposure scientists with the goal of fostering these novel ideas and generating collaborative efforts for years to come.

Abstract #

#1071 1:45 PM  Defining Susceptibility to Ozone: A Window into Exposure Effects in a Changing Climate.
1:45 PM  **Climate Change and Air Quality: Need for Comprehensive Understanding.** S. Nadadur. NIEHS, Research Triangle Park, NC.

#1072  1:55 PM  **Ozone-Induced Susceptibility to Pulmonary Infections: The Past, Present, and Future.** K. Gowdy. Ohio State University, Columbus, OH.

#1073  2:20 PM  **Gene-Environment Interactions with Single and Repeated Ozone Exposures in Genetically Diverse Mice.** S. Kelada. University of North Carolina at Chapel Hill, Chapel Hill, NC.

#1074  2:45 PM  **Mouse and Human Immune Cell Dynamics Provide Insights into Mechanisms of Ozone-Induced Lung Injury.** R. Tighe. Duke University, Durham, NC.

#1075  3:10 PM  **Spatial Analysis of Ozone Exposure in the Healthy and Susceptible Lung.** A. Venosa. University of Utah, Salt Lake City, UT.

#1076  3:35 PM  **Novel Pathways of Epithelial-Immune Interactions in a Single (Ozone) or Multipollutant (Ozone and Ultrafine Particles) Inhalation Exposure Model.** S. Hussain. West Virginia University, Morgantown, WV.

#1077  4:00 PM  **The Scientific Foundation for Regulating Ozone in Ambient Air.** P. Duffney. US EPA, Research Triangle Park, NC.

4:25 PM  **Panel Discussion/Q&A.**

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**Symposium Session: Neuroinflammation as a Central Mediator of Neurotoxicity: Implications for Environmental Links to Chronic Neurodegenerative Diseases**

**Chair(s):** Ronald Tjalkens, Colorado State University; and Arthi Kanthasamy, University of Georgia.

**Primary Endorser:** Neurotoxicology Specialty Section

**Other Endorser(s):** Mechanisms Specialty Section

Neuroinflammation is closely linked to the pathogenesis of Alzheimer’s disease and Parkinson’s disease and is a key driver of susceptibility to the neurotoxic effects of many environmental factors, including pesticides and heavy metals. The field has long focused on end-stage changes in neurons when studying chronic neurodegenerative diseases; however, recent evidence supports that early stage neuroinflammation is a major trigger of pathological processes underlying the neurotoxicity of pesticides and heavy metals. These agents are associated with mechanisms such as mitochondrial impairment, oxidative stress, autolysosomal dysfunction, and protein aggregation that drive neuroinflammation in Parkinson’s disease, Alzheimer’s disease, and Lewy body dementia. This association links sterile inflammatory mechanisms to neurotoxic exposures in the context of age-related neurodegenerative diseases. Recent studies have demonstrated that environmental exposure to rotenone, manganese, and organophosphates can enhance neuroinflammation and alpha-synuclein pathology. Mechanistic studies of these neurotoxicants’ exposure revealed that aberrant activation of redox sensitive kinases, NF-κB transcriptional machinery, and inflammasome signaling in both microglial and astroglial cells orchestrate persistent and uncontrolled neuroinflammatory response leading to protein aggregation and neuronal pathology. These key discoveries have established a causal relationship between environmental exposure to neurotoxicants and neurodegeneration via persistent neuroinflammatory mechanisms and aggregation of proteins such alpha-synuclein and beta amyloid. Thus, incorporating neuroinflammation-related toxicity studies can help to identify molecular determinants of neuronal injury and to better understand disease mechanisms for the development of immunomodulatory therapies. This session will highlight the role of diverse mechanisms of neuroinflammation mediated by microglia and astrocytes, as well as key druggable signaling nodes to interdict neurodegeneration induced by exposure to environmental neurotoxicants. In this session, we will address key questions, such as (1) what are molecular underpinnings of microglia and astroglia-mediated neuroinflammation in environmental chemical exposure relevant to Alzheimer’s disease and Parkinson’s disease, (2) can we target NF-κB and other redox sensitive kinases to ameliorate neuroinflammation associated with neurotoxicant exposure, and (3) how can therapeutic targeting of neuroinflammatory mechanisms improve our understanding of the interrelationship between microglia- and astrocyte-mediated neurodegeneration? Following the completion of the session,
the attendees will have a better understanding of novel insights into glia-derived neuroinflammatory mechanisms underlying environmental neurotoxicants’ exposure as well as the benefits and challenges that are associated with the development of immunomodulatory therapy in environmentally linked neurodegenerative diseases.

Abstract #

#1078 1:45 PM  Neuroinflammation as a Central Mediator of Neurotoxicity: Implications for Environmental Links to Chronic Neurodegenerative Diseases.

1:45 PM  Introduction.  R. Tjalkens. Colorado State University, Fort Collins, CO.

#1079 1:50 PM  Ozone-Induced Neuroinflammation and Alzheimer’s Disease–Like Glia Pathology Is Regulated by Peripheral HMGB1. M. Block. Indiana University, Indianapolis, IN.

#1080 2:20 PM  NLRP3 Inflammasome Function in the Response to Parkinson's-Associated Pesticides. M. Havrda. Dartmouth College, Hanover, NH.

#1081 2:50 PM  c-Abl-Mediated Cathepsin B Activation Is Associated with Microglial Activation Response and Dopaminergic Neuronal Loss following Sequential Exposure to Parkinsonian Neurotoxicant Rotenone and Inflammagen Lipopolysaccharide. A. Kanthasamy. University of Georgia, Athens, GA.

#1082 3:20 PM  Innate Immune Responses to Alpha-Synuclein Facilitate Its Aggregation in Parkinson's Disease. N. Panicker. Cleveland Clinic Lerner Research Institute, Cleveland, OH. Sponsor: R. Tjalkens

#1083 3:50 PM  Molecular Regulation of Glial Reactivity for the Clearance of Alpha-Synuclein in the Rotenone Model of Parkinson's Disease. R. Tjalkens. Colorado State University, Fort Collins, CO.

4:20 PM  Panel Discussion/Q&A.
addition to generating predictions. Finally, the last speaker will share how classification approaches have transformed genotoxicity assessment, describing how ML is fundamental to the analysis and interpretation of complex data in an effective manner. Altogether, the speakers will demonstrate applications of ML and how all applications are leveraged specifically to gain deeper understanding into mechanisms relevant to toxicological areas of concern.

Abstract #

#1084 1:45 PM Practical Applications of Machine Learning for Gaining Mechanistic Insights in Toxicology.
1:45 PM Introduction. E. Oziolor. Pfizer Inc., Groton, CT.
#1085 1:50 PM Machine Learning Approaches to Predicting Chemical Occurrence in Environmental and Biological Media. K. Isaacs. US EPA/ORD, Research Triangle Park, NC.
#1086 2:20 PM Application of Machine Learning to Human Clinical and In Vitro Molecular Response Profiles to Unravel Key Mechanisms of Emerging Inhaled Toxicants. E. Hickman. University of North Carolina at Chapel Hill, Chapel Hill, NC.
#1087 2:50 PM Computational Chemistry and Read-Across Approaches for Pharmaceutical Impurity Safety Assessment. E. Watt. Pfizer Inc., Groton, CT.
#1088 3:20 PM Deep-Learning Profile QSAR Modeling to Impute In Vitro Assay Results and Predict Chemical Carcinogenesis Mechanisms. A. Borrel. Inotiv, Durham, NC.
4:20 PM Panel Discussion/Q&A.

Monday, March 11, 1:45 PM to 4:30 PM, Room 251A, Salt Palace Convention Center


Chair(s): Emily Reinke, Inotiv; and Kristie Sullivan, Institute for In Vitro Sciences Inc.
Primary Endorser: Regulatory and Safety Evaluation Specialty Section
Other Endorser(s): Occupational and Public Health Specialty Section; Women in Toxicology Special Interest Group

Occupational exposure to compounds that result in respiratory sensitization can be a serious and potentially life-threatening health issue. There is an unmet regulatory need for well-defined methods that discern respiratory sensitizers and are applicable for chemical hazard and risk assessment. Currently, there are no validated methods specific to the detection of respiratory sensitizers. Instead, when respiratory-specific methods are absent, regulatory approaches rely on dermal sensitization methods to make a regulatory decision, potentially resulting in overclassification of chemicals and implementation of safety controls that may not be necessary. Evidence shows these methods are not accurate for the detection of respiratory sensitizers, despite some overlap in their adverse outcome pathways (AOPs). Both a lack of reference method(s) and the lack of well-defined reference chemical lists place extra hurdles in the path to the development and validation of new methods. The goal of this Workshop is to bring together relevant regulatory, industry, and nongovernmental organization experts to discuss the needs, challenges, and opportunities for optimizing and gaining confidence in testing and assessment approaches for this endpoint given a lack of traditional in vivo methods. To introduce the session, the current understanding of the AOP for respiratory sensitization will be contrasted with the skin sensitization AOP to help illuminate why skin sensitization approaches appear to be insufficient for identifying respiratory sensitizers. This presentation will set the stage for discussion by comparing and contrasting the measurable key events in the clinical pathophysiology of chemical respiratory and dermal sensitization, from protein binding to systemic immune and target-organ responses. The following presentations will detail both US and EU regulatory perspectives regarding the identification of respiratory sensitizers and how geographic regions differ in their needs and approaches. Experts from industry and independent nonprofit research organizations will then describe recent collaborative efforts to generate data to support the optimization of a variety of approaches, including modeling and review of clinical literature. The session will conclude with a moderated panel discussion on how to gain confidence in new approaches for respiratory
sensitization in the absence of reference data from rodent studies, emphasizing the need for reliance on the mechanistic and biological relevance of candidate testing approaches. This discussion will include why and how methodological standards and reference lists can be developed from clinical exposure data, applying several efforts to modernize the validation process to this endpoint. Attendees will be invited to ask questions as well as share perspectives and experiences not represented in the panel to further expand upon the concepts presented and determine required activities to advance developing approaches to detect respiratory sensitization. This Workshop is recommended for regulators, risk assessors, occupational health professionals, and test method developers interested in emerging opportunities for engagement to meet the needs of all those working to protect human health.

Abstract #


1:45 PM  Introduction. E. Reinke. Inotiv, Morrisville, NC.


#1093 2:50 PM  Opportunities within the Partnership for the Assessment of Risks from Chemicals for Respiratory Sensitization. A. Gutleb. Luxembourg Institute of Science and Technology, Esch-sur-Alzette, Luxembourg.

#1094 3:20 PM  Working toward the Same Aim: Mitigating the Risk of Adverse Events from Chemical Sensitizers. N. Krutz. Procter & Gamble, Schaerbeek, Belgium.

#1095 3:50 PM  Enhancing the Science of Respiratory Sensitization: “What Are Respiratory Sensitizers?” N. Sadekar. Research Institute for Fragrance Materials, West Warwick, RI.

4:20 PM  Panel Discussion/Q&A.

Monday, March 11, 1:45 PM to 4:30 PM, Grand Ballroom E, Salt Palace Convention Center

Workshop Session: On the Edge of the NAMs Frontier: Pioneering Efforts toward Intra- and Internationally Harmonized Regulatory Applications of New Approach Methodologies

Chair(s): Amber Daniel, Inotiv; and Anna van der Zalm, PETA Science Consortium International e.V., Germany.

Primary Endorser: In Vitro and Alternative Methods Specialty Section

Other Endorser(s): Regulatory and Safety Evaluation Specialty Section; Women in Toxicology Special Interest Group

Regulatory authorities require toxicity test data for various human health–centered purposes (e.g., therapeutic development, chemical risk assessment, product safety) with data historically generated by laboratory animal–based in vivo test methods. However, the paradigm shift toward new approach methodologies (NAMs) has gained traction since many NAMs are more biologically relevant and as good as or better at predicting toxicity outcomes in humans. While regulatory authorities are becoming increasingly amenable to considering NAMs-generated data for use in safety evaluations, regulatory policies concerning acceptance of NAMs are not globally harmonized. Each regulatory agency is charged with overseeing their specific statutes and regulations. Therefore, criteria for considering a NAM to be acceptable for addressing a specific context of use may vary among regulatory agencies within an individual country. This variability is further complicated when regulations differ between countries such that NAMs may not be accepted internationally. Therefore, to streamline the regulatory acceptance process, it is imperative that method developers, validation organizations, and regulators work together to establish a more flexible approach to building scientific confidence in NAMs. This session builds on a previous SOT Workshop focused on modern processes for establishing scientific confidence in NAMs. The first talk will update attendees on selected efforts to apply NAMs for new chemical risk assessment and per- and polyfluoroalkyl substances while also addressing collaborative efforts to develop and
adopt the Organisation for Economic Co-operation and Development (OECD) Test Guidelines (TG) for in vitro ocular and dermal irritation studies. The second talk will summarize the history of the developmental neurotoxicity in vitro battery from conceptual design to regulatory acceptance via OECD TG 426. The second speaker also will address current international collaborations regarding development of additional assays, case studies aiming to reduce uncertainty, and current challenges for developmental neurotoxicity NAMs. The third talk will highlight goals and activities of the International Collaboration for Cosmetics Safety, which is an initiative focused on advancing widespread adoption of nonanimal safety assessments for cosmetics, personal care products, and associated ingredients. The fourth talk will share how the European Partnership for the Assessment of Risks from Chemicals is promoting next-generation risk assessment as an initial step in chemical risk assessment and how they are introducing a new online platform that expands knowledge and advances acceptance of NAMs for this purpose. The final talk will convey how the United Nations Globally Harmonized System for Classification and Labelling of Chemicals continues to include the use of NAMs to determine classification and labeling of hazardous substances. The final speaker also will discuss challenges encountered and suggest ways to accelerate the adoption of NAMs for chemical safety assessments. Following the presentations, a panel discussion focused on harmonizing regulatory acceptance of NAMs will provide the audience with an opportunity to engage in interactive dialogue with the speakers. A sixth panelist, who is a representative of a regulatory agency that is in the early stages of incorporating NAMs, will join the group to share a unique perspective on how to potentially overcome the barriers hindering NAMs acceptance in Brazil. Each panelist will have an opportunity to share their thoughts on key priorities for future harmonization efforts within their respective countries and abroad. This session will not only highlight progress and lessons learned toward globally harmonizing and advancing regulatory acceptance of NAMs but also explore potential opportunities for further international collaborations.

**Abstract #**

**#1096 1:45 PM**  On the Edge of the NAMs Frontier: Pioneering Efforts toward Intra- and Internationally Harmonized Regulatory Applications of New Approach Methodologies.  
A. Daniel. Inotiv, Research Triangle Park, NC.

**#1097 1:50 PM**  Update on Collaborations to Support Implementation of In Vitro and Computational Approaches from the US EPA Office of Pollution Prevention and Toxics.  
A. Lowit. US EPA, Washington, DC.

**#1098 2:15 PM**  The Developmental Neurotoxicity In Vitro Battery: The New Kid on the Block in the Regulatory Arena.  
E. Fritsche. IUF—Leibniz Research Institute for Environmental Medicine, Düsseldorf, Germany.

G. Maxwell. Unilever Safety and Environmental Assurance Centre, Sharnbrook, Bedfordshire, United Kingdom. Sponsor: A. Daniel

**#1100 3:05 PM**  Activities under the European PARC Partnership to Actively Promote the Uptake of NAMs and NGRA into Regulatory Risk Assessment Practice.  

**#1101 3:30 PM**  The Inclusion of NAMs in the United Nations Globally Harmonized System for Classification of Chemicals.  
A. Muller. Rijksinstituut voor Volksgezondheid en Milieu (RIVM), Utrecht, Netherlands. Sponsor: A. Daniel

**3:55 PM**  Panel Discussion/Q&A.  
C. Queiroz Moreira. Agência Nacional de Vigilância Sanitária (Anvisa), Brasilia, Brazil. Sponsor: A. Daniel
Environmental justice research is shedding light on the current inequities surrounding the protection of all people from environmental and health hazards. We currently recognize, for example, that Black, Indigenous, People of Color (BIPOC), as well as low-income communities, are more likely to be exposed to environmental hazards that negatively impact health. From the health research perspective, improved data-driven methodologies are now crucial to better identifying, understanding, and quantifying these inequities to ultimately inform community-based interventions and policy to better protect public health. To address this time-sensitive need, this session will discuss current methods to leverage geospatial data to improve information dissemination and community intervention with the goal of promoting environmental health and justice. Such information integration hinges upon the effective analysis of mixtures-relevant data sources spanning geological, environmental, social, and health-related variables. A brief overview will be provided on issues of environmental justice and current geospatial information-integration efforts. Then, the first speaker will provide an introduction to geospatial methodologies for toxicologists. Computational toxicology and exposure science–based approaches to link exposure data to toxicological response profiles and disease risk throughout the US will be presented as a case overview. The second speaker will highlight the use of electronic health records to improve the understanding of health risks for vulnerable populations, leveraging geographical approaches. The third speaker will provide an industry perspective and present on geospatial applications related to health indices that aim to capture overall/total health status of a community, while discussing current limitations of such tools. The fourth speaker will discuss the Community Vulnerability Index to assess and disseminate risks of toxicant exposures and climate change factors. A dissemination tool will be discussed that serves as a method to interact with community members and policymakers across Texas and surrounding states. The final speaker will cover critical advances in geospatial methods to study the environment and its relation to cancer health outcomes. Presented materials will include those from the Flint Community Cancer Consortium on the characterization of disparate exposure burdens in disadvantaged populations. Following the presentations, a short panel discussion and open question-answer session will take place and will include the following topics: ways we can improve geospatial methods to better address environmental health and justice; improving linkages between exposure to disease outcomes for at-risk communities; improving integration methods across geospatial, environmental, social, and health datasets representing multifaceted mixtures problems; what we can be doing better as scientists to contribute to environmental justice; ways that our existing tools and dissemination efforts can be improved; and how we can take what we learn from computational analyses to positively impact communities.

**Abstract #**

#1102  1:45 PM  **Using Geographical Information to Promote Environmental Health and Justice.**

**Introduction to Workshop on Using Geographical Information to Promote Environmental Health Justice.**  J. Rager. University of North Carolina at Chapel Hill, Chapel Hill, NC.

#1103  1:50 PM  **Geospatial Methodologies to Effectively Link Exposure, Toxicity, and Disease Profiles to Identify US Regions at Elevated Health Risks.**  K. Messier. NIEHS/DTT, Research Triangle Park, NC.


#1105  2:40 PM  **Understanding Considerations of GIS-Based Community Health Metrics.**  S. Rege. ExxonMobil Biomedical Sciences Inc., Annandale, NJ. Sponsor: J. Rager

#1106  3:05 PM  **Climate Vulnerability Index to Evaluate Risks of Toxicant Exposures and Climate Change: Tools to Complement Policy Implementation.**  E. Craft. Environmental Defense Fund, Austin, TX.
#1107 3:30 PM Use of Geospatial Methods in Studies of Environment and Cancer in At-Risk Communities.  
R. Jones. National Cancer Institute, Rockville, MD. Sponsor: J. Rager

3:55 PM Panel Discussion/Q&A.

Monday, March 11, 2:00 PM to 2:20 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Being a Toxicologist in a Contract Research Organization

Speaker(s): Deepa Ashwarya Kuttappan, Labcorp Drug Development, Fishers, IN.

Monday, March 11, 2:15 PM to 4:15 PM, Exhibit Hall C, Salt Palace Convention Center

Poster Sessions

The presenting authors are available to discuss their research for the following Poster Sessions:

- Biomarkers
- Chemical Threats and Bioterrorism
- Educating Future Toxicologists and Communicating with the Public
- Ethical, Legal, Social, Historical Issues
- PFAS I
- Risk Assessment I
- Safety Assessment: Pharmaceutical-Drug Development I
- Safety Assessment: Pharmaceutical-Drug Discovery
- Tobacco and ENDS Toxicology I

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

Monday, March 11, 2:40 PM to 3:00 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: We Have to Talk: Dealing with Difficult Conversations as a Postdoc

Speaker(s): Anke Tukker, Purdue University, West Lafayette, IN; and Olawande Olagoke, Harvard Medical School, Boston, MA.

Monday, March 11, 3:00 PM to 4:00 PM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Monday, March 11, 3:20 PM to 3:40 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Meet the Director: NIEHS

Speaker(s): Rick Woychik, NIEHS/NTP, Research Triangle Park, NC.
Monday, March 11, 4:30 PM to 5:30 PM, Room 335 A, Salt Palace Convention Center
(All Attendees Who Are Interested in Undergraduate Education Are Welcome)

Undergraduate Educator Network Meeting

Chair(s): Jaime Mirowsky, SUNY College of Environmental Science and Forestry.

Hosted by: Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee

This meeting is for all faculty involved in the teaching of 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.

Monday, March 11, 4:45 PM to 6:15 PM, Grand Ballroom A, Salt Palace Convention Center

**FS** SOT/EUROTOX Debate: Can the Microbiome Mediate the Toxicity of Environmental Chemicals?

Chair(s): Cynthia V. Rider, NIEHS; and Emanuela Corsini, Università degli Studi di Milano, Italy.

SOT Debater: Tamara Tal, Helmholtz Centre for Environmental Research, Leipzig, Germany.

EUROTOX Debater: Karsten Beekmann, Wageningen University, Wageningen, Netherlands.

Each year, the SOT Annual Meeting includes a debate in which leading toxicologists advocate opposing sides of an issue that has significant toxicological importance. The debate continues a tradition that originated in the early 1990s.

This year, the debaters will address the proposition, "Can the microbiome mediate the toxicity of environmental chemicals?" The debaters will provide an introduction to the intestinal microbiome and discuss how the community of microorganisms in our bodies could potentially influence the harmful effects of chemicals. Debaters will address questions such as (1) "Are microbiome-induced changes in chemical concentrations toxicologically meaningful?"; (2) "Are the effects of chemicals on the microbiome more important than the effects of the microbiome on chemicals?"; (3) "Does person-to-person variability make it impossible for us to understand the impact of the microbiome on chemicals?"; and (4) "Do model systems and organisms effectively reflect human microbiome-chemical interactions?"

In addition to inclusion as a Featured Session at this meeting, this debate will take place again (with the debaters taking the reverse positions) in Copenhagen, Denmark, during EUROTOX 2024, September 8–11.
A toxicologist plays a key role in the development of drugs and vaccines. A toxicologist in the (bio)pharmaceutical industry is responsible for identifying toxicities early in the discovery phase to “fail fast” and developing the nonclinical safety assessment strategy for a molecule to support its uninterrupted clinical development through marketing. However, the roles and responsibilities of a toxicologist can vary across the industry with different nomenclature such as discovery toxicologist, regulatory toxicologist, project toxicologist, and investigative toxicologist having distinct or overlapping roles. In a matrix environment, a project toxicologist often has to collaborate with various functions across the company to ensure that a sound nonclinical safety strategy is in place and seamlessly executed to support clinical development of the molecule. Hence, besides having strong knowledge of preclinical drug development and nonclinical toxicology science and methods, having a clear understanding of a project toxicologist’s role and basic understanding of clinical development of the drugs is essential to this role. This session will discuss the breadth of roles and responsibilities of a project toxicologist in the drug discovery and development arena in large and small (bio)pharma companies. Further, this session will cover some fundamentals of clinical development of a drug and soft skills that are critical to be successful in the role of a project toxicologist. The target audience for this session is students, postdocs, early career toxicologists in the role of or aspiring to be a project toxicologist, and mid-career project toxicologists.

Abstract #

#1108 4:45 PM Decoding the Role of a Project Toxicologist in the (Bio)pharmaceutical Industry.
5:05 PM Project Toxicologist: What Are They Supposed to Do and What Do They Need to Know? V. Kale. Bristol Myers Squibb, New Brunswick, NJ.
**ONGOING EVENTS**

**Tuesday, March 12, Various Times and Locations**

**SOT Committee and Component Group Leadership Activities**

SOT Committees, including Regional Chapter, Special Interest Group, and Specialty Section leadership, often hold business meetings and discussions as breakfast or lunch events. These meetings are limited to Committee members and Component Group officers. More specific information about these meetings, including the time, date, and location, is available in the SOT Online Planner and SOT Event App.

**SOT Regional Chapter, Special Interest Group, and Specialty Section Events**

Many Regional Chapters, Special Interest Groups, and Specialty Sections host breakfasts, luncheons, or receptions and/or facilitate mentoring events during the meeting. These activities act as social events, award ceremonies, and career development sessions all in one. These events are a great way to connect with colleagues, meet other members, or learn more about a group before becoming a member. The days, times, and locations of the SOT Component Group activities are available in the “Program Overview” section of this publication, as well as in the SOT Online Planner and SOT Event App.

**Poster Tours for Trainees**

*(Advanced Sign-Up Required)*

**Hosted by:** Postdoctoral Assembly

Graduate students and postdoctoral scientists participate in one-hour guided poster tours with an expert guide. These small group tours provide the opportunity for trainees to take part in critical evaluation of cutting-edge toxicology methods and research findings and network with a senior toxicologist. Advance sign-up is required.

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**Tuesday, March 12, 8:00 AM to 10:45 AM, Grand Ballroom E, Salt Palace Convention Center**

**S**ymposium Session: New Approach Methodology and Kinetic Modeling Approaches to Support Read-Across

Chair(s): Annette Bitsch, Fraunhofer Institute for Toxicology and Experimental Medicine, Germany; and Grace Patlewicz, US EPA.

Primary Endorser: Biological Modeling Specialty Section

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

The principles of the 3Rs (replacement, reduction, and refinement) were developed over 50 years ago to provide a framework for performing humane animal research. Alternative approaches such as read-across are closely aligned with these principles. To date, read-across is one of the first choices in regulatory risk assessment to predict the toxicological properties of data-poor compounds. This is especially relevant when testing is technically not feasible, such as in cases where compounds occur as contaminants or impurities in feed/food or other products. Within an analogue or category approach, the toxicity properties of the unknown compound, referred to as the target, are predicted through read-across using high-quality toxicological data from
“similar” source analogues. Typically, analogues are selected via structural similarity, although recent efforts have focused on leveraging new approach methodology (NAM) and in vitro kinetic modeling data to substantiate read-across predictions. This Symposium will provide an overview of these recent developments, both the refinement of read-across approaches to incorporate NAM and kinetic data as well as the regulatory application of read-across. Updates will include progress made on the US Environmental Protection Agency’s algorithmic read-across, known as Generalized Read-Across (GenRA), and a European Food Safety Authority–developed framework that aims to integrate metabolism information. Under the auspices of the EU risk assessment of chemicals integrating ‘HUman centric Next generation Testing strategies promoting the 3Rs’ (RiskHUNT3R) project, a tiered modeling approach has been developed that integrates kinetic data into read-across using in silico and in vitro absorption, distribution, metabolism, and excretion data. The uncertainty of read-across assessments also may be reduced by additional mechanistic data. The current view from the RiskHUNT3R project on the role that (quantitative) adverse outcome pathways can play in a weight of evidence assessment will be outlined. The integration of read-across in the regulatory decision-making framework of chemical risk assessment will be presented with particular focus on the food and feed sectors. The opportunities and challenges by different sectoral legislation in the applicability of read-across approaches also will be discussed.

Abstract#

#1109 8:00 AM  New Approach Methodology and Kinetic Modeling Approaches to Support Read-Across.  
#1110 8:00 AM  Comparing Expert-Driven Read-Across Assessments Using the Generalized Read-Across Framework.  
G. Patlewicz. US EPA, Washington, DC.

#1111 8:35 AM  Integration of Metabolite Data into Read-Across Assessments.  
S. Escher. Fraunhofer Institute for Toxicology and Experimental Medicine, Hannover, Germany. Sponsor: A. Bitsch.

#1112 9:05 AM  Kinetic Modeling of Parent Compounds and Their Metabolites in a Read-Across.  

#1113 9:35 AM  Quantification of Adverse Outcome Pathways to Add Weight of Evidence to Support Read-Across.  
M. Cronin. Liverpool John Moores University, Liverpool, United Kingdom. Sponsor: A. Bitsch.

#1114 10:05 AM  The Role of Read-Across Approaches in Regulatory Risk Assessment.  

10:35 AM  Panel Discussion/Q&A.
system works *in vivo*. Effective strategies will require an understanding of the normal constitution of the immune system and how to maintain that complex milieu when working with the cells *in vitro*. In addition, models will need to incorporate other human tissues to be effective at defining mechanisms for AOP development. The overarching goal of this Symposium is to present the state of the art for human immune modeling *in vitro* and its application to safety assessment. Our first speaker will provide a brief introduction to current advances in the application of AOPs to immunotoxicology and the role for human *in vitro* models. Our second speaker will discuss advanced applications of organ-on-a-chip technology to create human ex *vivo* 3D lymph nodes with physiologically relevant fluid flow and the potential for connection to other organs such as the brain. Our third speaker will offer insight into the application of diverse human *in vitro* immune models, including primary human immune cells; transformed cells; and 3D reconstructed immune tissues for testing chemicals for immunotoxicity and the advancement of AOPs. Our fourth speaker will share the contributions of human *in vitro* immune models to current understanding of the immunotoxicity of PFAS compounds and how these data can contribute to development of AOPs. Our final speaker will frame *in vitro* immune modeling of the human immune system in the context of regulatory and risk assessment. At the conclusion of this Symposium, the audience will have an appreciation for the advances and opportunities for modeling the human immune system using *in vitro* technologies.

**Abstract #**

| #1115  | 8:00 AM | State-of-the-Art *In Vitro* Immune Modeling: The Beginning of a Journey toward AOPs and Improved Safety Assessment. |
| #1116  | 8:05 AM | Introduction to Using Human Cells *In Vitro* to Model the Immune System: Applications to Immunotoxicology and Adverse Outcome Pathways. *V. Johnson*. Burleson Research Technologies, Morrisville, NC. |
| #1117  | 8:40 AM | Modeling Human Lymph Node Function and Multi-organ Immunity *In Vitro* Using Top-Down and Bottom-Up Organs-on-Chips. *R. Pompano*. University of Virginia, Charlottesville, VA. Sponsor: *V. Johnson* |
| #1119  | 9:50 AM | Using *In Vitro* Human Immune System Models to Understand the Immunotoxicity Risks Associated with PFAS Exposure. *E. Corsini*. Università degli Studi di Milano, Milan, Italy. |

**Tuesday, March 12, 8:00 AM to 10:45 AM, Room 251 D, Salt Palace Convention Center**

**Symposium Session: The State of the Science Linking Environmental Chemicals to Age-Related Neurocognitive Disease**

Chair(s): Danielle Carlin, NIEHS; and Pamela Lein, University of California Davis.

Primary Endorser: Neurotoxicology Specialty Section

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

Approximately seven million people in the US live with dementia or other age-related neurocognitive disease, and this number is expected to keep growing as the aging population increases. The costs associated with these diseases have been estimated at over $300 billion, and there continues to be no therapeutic strategy for preventing, curing, or even slowing disease. There is now credible evidence linking certain environmental exposures to accelerated brain aging. For example, particulate matter (PM$_{2.5}$), ozone (O$_3$), nitrogen oxides (NO$_x$ and NO$_2$), polycyclic aromatic hydrocarbons (PAHs), per- and polyfluorinated substances (PFAS), and metals (e.g., cadmium, manganese, and lead) have been linked to cognitive decline, brain atrophy, and increased incidence of dementia, including Alzheimer’s disease, in humans and animal models. However, it is still not known how environmental chemicals promote disease or which chemicals might accelerate aging or pose the greatest risk to the aging brain.
This Symposium will cover a broad spectrum of research areas that address these and other key research gaps from diverse research perspectives. Specific examples include discussion of real-world and relevant exposures, extracellular vesicles as biomarkers of disease, mechanisms of disease, the combinatorial effects of social stressors and environmental exposures, and the need for high-throughput chemical screening for the many environmental toxicants associated with cognitive decline. This session also will address the need for age-related neurocognitive disease prevention and intervention strategies and how environmental factors could be potentially modified to prevent cognitive decline before its manifestation and to promote healthier brain aging.

Abstract #

#1120 8:00 AM  The State of the Science Linking Environmental Chemicals to Age-Related Neurocognitive Disease. 
8:00 AM Introduction. D. Carlin. NIEHS, Research Triangle Park, NC.


#1122 8:35 AM  Extracellular Vesicles as Biomarkers and Mechanistic Mediators of Aging and Age-Related Neurodegenerative Diseases. Q. Lu. Harvard T.H. Chan School of Public Health, Boston, MA.

#1123 9:00 AM  The Effects of Chronic Exposure to Ambient Traffic-Related Air Pollution on Alzheimer’s Disease Phenotypes in Wildtype and Genetically Predisposed Male and Female Rats. P. Lein. University of California Davis, Davis, CA.

#1124 9:25 AM  Collection of Assays across the Zebrafish Lifespan to More Rapidly Detect Neurobehavioral Toxicants. R. Tanguay. Oregon State University, Corvallis, OR.


10:15 AM  Panel Discussion/Q&A.
talk will highlight recent efforts to provide in vitro plasma protein binding, hepatic clearance, and transporter evaluations across over 70 PFAS that span many functional groups, enabling evaluations of toxicokinetic trends with regard to physicochemical properties. Use of such data in in vitro–in vivo extrapolation approaches may accelerate efforts to understand PFAS toxicokinetics for those lacking in vivo data. The third speaker will highlight cross-species evaluations of protein binding in key target tissues for PFAS that span several functional groups, providing critical information about the utility of species comparisons for PFAS toxicokinetics, and will highlight use of knockout mouse models to evaluate contribution of specific proteins to PFOS toxicokinetics. The fourth speaker will describe the development of physiologically based toxicokinetic models parameterized with in vitro transport and binding data to simulate tissue-specific accumulation and elimination profiles of PFAS, which is in turn evaluated against human biomonitoring data and animal studies. The session will conclude with an analysis of the relative impact of various biokinetic processes on toxicokinetics and accumulation in humans and wildlife as evaluations go beyond legacy PFAS. Attendees should come away from the session with a nuanced understanding of the different components of PFAS toxicokinetics and their respective impacts on predicting PFAS persistence, bioaccumulation, and downstream implications for exposure and risk assessment.

Abstract #

#1126 8:00 AM  The Ties That Bind: Evaluating the Impact of PFAS Protein Binding and Transport on Persistence and Tissue Distribution.

8:00 AM  Introduction. B. Wetmore. US EPA, Research Triangle Park, NC.

#1127 8:05 AM  Interactions between PFAS and Liver Fatty Acid–Binding Protein: Structural and Isoform Selectivity. H. Peng. University of Toronto, Toronto, ON, Canada. Sponsor: B. Wetmore


#1129 9:05 AM  Tackling Thousands of Perfluoroalkyl Substances (PFAS): Use of Rat Liver Tissue as a Surrogate to Predict PFAS Tissue Binding for Human and Mouse Tissues. A. Slitt. University of Rhode Island, Kingston, RI.

#1130 9:35 AM  Integrating In Vitro Transport and Binding Data into Toxicokinetic Models to Elucidate the Mechanisms Driving Tissue Distribution and Elimination of Per- and Polyfluoroalkyl Substances in Humans. F. Fischer. University of Rhode Island, Kingston, RI. Sponsor: A. Slitt

#1131 10:05 AM  Considering the Influence of PFAS Binding and Transport on Dosimetry in Physiologically Based Pharmacokinetic Modeling of PFAS. H. Clewell. Ramboll US Corp, Durham, NC.

10:35 AM  Panel Discussion/Q&A.

Tuesday, March 12, 8:00 AM to 10:45 AM, Room 250 A, Salt Palace Convention Center

Workshop Session: Cardiac Arrhythmias in Toxicology: Getting to the Heart of the Matter

Chair(s): Mark Daley, Brown University; and Nikki Posnack, Children’s National Hospital.

Primary Endorser: Cardiovascular Toxicology Specialty Section

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

Cardiovascular toxicity is a major adverse outcome resulting from environmental exposures and the off-target effects of pharmaceuticals on the developing and mature heart. Among these off-target effects, arrhythmias continue to represent a substantial proportion and persist as a significant obstacle for environmental hazard identification and successful drug development. As such, there is an acute need to develop technologies and tools that enable high-throughput and mechanistic characterization of cardiac arrhythmias arising from exposure to a range of environmental and pharmaceutical chemicals. The goal of this session is to highlight the array of in vitro and in vivo approaches being developed to enable the next generation of pro-arrhythmia screening, hazard identification, and risk assessment in the field of cardiac toxicology. To achieve this goal, this session will highlight experts working to develop and apply technologies ranging from traditional cell- and stem cell–based
models to traditional and nontraditional animal models to study arrhythmias covering a broad swath of application areas, including pharmaceutical safety assessment, developmental cardiotoxicity, and public health. We will answer questions such as, "What will next-generation models of pro-arrhythmia cardiotoxicity look like? How can nontraditional animal models be utilized to identify the causes and mechanisms of arrhythmias? And can novel pro-arrhythmia models be applied to quantify human-level risk?" Following the session, attendees will have a better understanding of the challenges, advantages, and possible applications of novel models and technologies for assessing pro-arrhythmic cardiotoxicity. Attendees will additionally gain perspectives on how these technologies will be applied as next-generation tools for predicting cardiac arrhythmias to improve human cardiovascular health.

Abstract #
#1132 8:00 AM Cardiac Arrhythmias in Toxicology: Getting to the Heart of the Matter. Introduction. N. Posnack. Children's National Hospital, Washington, DC.
#1133 8:05 AM Leveraging In Vitro 3D Human Cardiac Microtissues and Pharmacokinetic Modeling for Ventricular Pro-arrhythmic Risk Assessment. M. Daley¹, and M. Moreau². ¹Brown University, Providence, RI; and ²Scitovation, LLC, Research Triangle Park, NC.
#1134 8:30 AM Depleted Living Conditions and High Ambient Temperatures Worsen Cardiac Arrhythmias and Autonomic Dysregulation in C57BL/6 Mice. M. Fiamingo¹,². ¹University of North Carolina at Chapel Hill, Chapel Hill, NC; and ²US EPA, Research Triangle Park, NC.
#1135 8:55 AM Evidence for the Cardiodepressive Effects of Di-2-Ethylhexyl Phthalate. N. Posnack. Children's National Hospital, Washington, DC.
#1136 9:20 AM Tissue Resident Macrophage as Critical Regulators of Cardiac Conduction and Heart Health. J. Plavicki. Brown University, Providence, RI.
#1137 9:45 AM Activin A Impairs Contractile Function and Induces Arrhythmia in Human Cardiomyocytes and Human-Engineered Cardiac Tissues, Indicating a Potential Role in Heart Failure Development. S. MacDonnell. Regeneron Pharmaceuticals, Tarrytown, NY. Sponsor: M. Daley
10:10 AM Panel Discussion/Q&A.

Tuesday, March 12, 8:00 AM to 10:45 AM, Grand Ballroom B, Salt Palace Convention Center

Workshop Session: Integrating Aggregate Exposure Pathways and Adverse Outcome Pathways for Comprehensive Risk Assessment of Chemical Mixtures

Chair(s): Kristin Eccles, Health Canada, Canada; and Paul Price, Risk Science International.
Primary Endorser: Mixtures Specialty Section
Other Endorser(s): Risk Assessment Specialty Section

The aggregate exposure pathway (AEP) and adverse outcome pathway (AOP) frameworks have been developed as tools that can be used for assessing chemical risks. The AEP framework focuses on characterizing the routes, sources, and levels of exposure to chemicals in different environmental media and the resulting internal exposures of the chemical and its metabolites, while the AOP framework elucidates the sequence of key molecular, cellular, and tissue-level events that lead to an adverse health outcome. Chemical exposures rarely occur in isolation, and humans and wildlife populations have constant exposure to chemicals in their diet, food, and consumer products. In these complex mixtures, chemicals can modify the concentration-response relationships of other chemicals. AEPs can help characterize real-world exposures to complex mixtures and connect external and internal exposures to the multiple molecular initiating events in AOPs to describe kinetic interactions. AOPs for chemicals with common key events can be merged to form AOP networks describing dynamic chemical interactions. Using new tools and applications, such as geospatial analysis for exposure assessment, new approach methodologies (NAMs), and in silico modeling are key to developing within the AEP-AOP framework and creating faster and more cost-effective methods for the risk assessment of real-world chemical mixtures. Further, the movement toward NAMs and less reliance on in vivo testing will profoundly impact mixture risk assessments as this field shifts away from adverse outcomes toward mechanistic target
Program Schedule—Tuesday

Abstract #

#1138  8:00 AM  Integrating Aggregate Exposure Pathways and Adverse Outcome Pathways for Comprehensive Risk Assessment of Chemical Mixtures.

#1139  8:00 AM  Geospatial and Computational Approaches to Support the Risk Assessment of Chemical Mixtures within an AEP-AOP Framework. K. Eccles. Health Canada, Ottawa, ON, Canada.

#1140  8:30 AM  Linking the AEP and AOP Frameworks Using a High-Throughput Approach for Mixtures Toxicokinetic Modeling. D. Hines. RTI International, Durham, NC.

#1141  8:55 AM  Considerations for Integrating AEP and AOP Frameworks for Polycyclic Aromatic Hydrocarbon Mixtures. S. Tilton. Oregon State University, Corvallis, OR.

#1142  9:20 AM  An Industry Perspective on Mixtures Risk Assessment in the Context of AEP-AOP. E. Jensen. Dow Chemical Company, Midland, MI.

#1143  9:45 AM  Integration of AEP and AOP Frameworks in Characterizing and Managing Risks from Chemical Mixtures. P. Price. Risk Sciences International, Cedar Rapids, IA.

10:10 AM  Panel Discussion/Q&A.

Tuesday, March 12, 8:00 AM to 10:45 AM, Room 250 D, Salt Palace Convention Center

Workshop Session: Into the Unknown: Unique Aspects of Evaluating Potential Reproductive and Developmental Toxicity of New Pharmaceutical Modalities

Chair(s): Natasha Catlin, Pfizer Inc.; and Michael Templin, Charles River Laboratories.

Primary Endorser: Reproductive and Developmental Toxicology Specialty Section

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

The last decade has seen a rapid expansion of new pharmacotherapeutic drug classes (gene therapies, ASOs, siRNAs, protein degraders, etc). However, there is limited public discussion or scientific consensus on the application of rigorous, consistent, and effective methods for assessment of their developmental and reproductive safety. Currently, many of these compounds are regulated as small molecules, but certain compound characteristics align more with biologics, and for some, such as gene therapies, the considerations are meaningfully different from traditional approaches. This raises the need to evaluate whether traditional small molecule developmental and reproductive (DART) assessments are appropriate when broadly applied across multiple drug classes. For example, assessing reproductive and developmental toxicity for gene therapies is generally conducted on a case-by-case basis related to tissue biodistribution, transgene expression, and integration risk. Additionally, there are many factors to consider for these new modalities that could impact DART strategy, including the intended patient population, proposed indication, and dosing frequency (gene therapies are typically a single lifetime dose). The goal of this Workshop is to introduce the unique aspects for these newer modalities and stimulate discussion on what needs to be considered when formulating a DART safety strategy. The first presenter will provide an overview and introduction to the topic and highlight the distinctive aspects of some of the newer pharmacotherapeutic drug classes, including gene therapies, oligonucleotides, and protein degraders. The second speaker will provide an overview of the current regulatory guidances for these different modalities and their limitations for informing the DART testing strategies. The next three presenters will each delve further into the specific DART considerations for oligonucleotides, protein degraders, and gene therapies.

Abstract #

#1144  8:00 AM  Into the Unknown: Unique Aspects of Evaluating Potential Reproductive and Developmental Toxicity of New Pharmaceutical Modalities.

departures informed by NAMs. This session will provide a unique opportunity to learn about the integration of AEP and AOP frameworks for chemical mixtures from leading experts in the field and to engage in discussions on how these frameworks can be used to improve risk assessment and decision-making for chemical mixtures.
#1145 8:00 AM  Overview of New Modalities and Attributes Relevant to DART Considerations. M. Templin.
Charles River Laboratories, Reno, NV.

#1146 8:15 AM  DART Assessment outside of the Small Molecule and Therapeutic Protein Space: A Regulatory Perspective. R. Wange. US FDA/CDER, Silver Spring, MD.

#1147 8:45 AM  DART Strategies for Oligonucleotides: Recap of the 2023 HESI Workshop. B. Hannas. Eli Lilly and Company, Indianapolis, IN.


10:15 AM  Panel Discussion/Q&A.

Tuesday, March 12, 8:00 AM to 10:45 AM, Grand Ballroom F, Salt Palace Convention Center

Informational Session: Five Decades of Evaluating the Safety of Aspartame Consumption: Has Anything Changed?

Chair(s): Susan Borghoff, ToxStrategies LLC; and Sabine Francke, US FDA/CFSAN.
Primary Endorser: Food Safety Specialty Section
Other Endorser(s): Carcinogenesis Specialty Section; Regulatory and Safety Evaluation Specialty Section

World Health Organization (WHO–sponsored reviews evaluate the evidence of health effects of low/no calorie sweeteners (LNCS). Specifically, WHO reviews of high-quality clinical trials show support for the useful role of LNCS in sugar and calorie reduction, important nutritional tools for many people globally. Additionally, this large WHO systematic review of observational human studies concluded no association between LNCS (and aspartame specifically) and cancer based on “very low” confidence in the evidence. Aspartame is among the most recognized LNCS in foods and beverages and has been repeatedly affirmed and re-affirmed as safe by numerous authoritative bodies. Nearly five decades of aspartame safety studies have led the US Food and Drug Administration (US FDA) and others to support aspartame’s safety. Before 2023, the latest safety assessments of aspartame were from the European Food Safety Authority (EFSA, 2013), US FDA (2021), Foods Standards Australia & New Zealand (FSANZ, 2022), French Agency for Food, Environmental and Occupational Health & Safety (ANSES, 2011), and the Joint FAO/WHO Expert Committee on Food Additives (JECFA, 1981). In June and July 2023, respectively, the WHO International Agency for Research on Cancer (IARC) program conducted a cancer hazard evaluation for aspartame while the JECFA program conducted a risk assessment. IARC acknowledged that the available human studies were weak, and “chance, bias and confounding” could not be ruled out. Based on three of the over 50 human studies on non-sugar sweeteners and cancer, they nevertheless concluded that there was “limited” evidence for potential carcinogenicity in humans. They also concluded “limited” evidence for the potential carcinogenicity in animal models despite nine out of 12 cancer studies being negative with the three positive studies questioned based on inadequacy of design, conduct, interpretation, and reporting. In contrast, JECFA concluded that aspartame at current exposures is safe for consumption and indicated that the available human studies were “not convincing.” JECFA further noted that the positive animal studies’ protocols were compromised and of “uncertain relevance” to risk assessment. In this session, aspartame will be used as a case study to highlight the differences in hazard and risk evaluations in food safety and the importance of considering the totality of epidemiological, experimental animal, and mechanistic data in making determinations so that public health can benefit.

Abstract #

#1150 8:00 AM  Five Decades of Evaluating the Safety of Aspartame Consumption: Has Anything Changed?

Introduction: Setting the Stage of LNCS Safety Assessment with Focus on the Aspartame Cancer Evaluation. S. Borghoff. ToxStrategies LLC, Research Triangle Park, NC.
Universidad Marista de Mérida, Mérida, Mexico. Sponsor: S. Borghoff

8:40 AM  **What Do Rodent Studies Investigating Aspartame and Cancer Suggest?** S. Francke. US FDA/CFSAN, College Park, MD. Sponsor: S. Borghoff

9:10 AM  **What Do Mechanistic Data Say about Aspartame and Key Events in Carcinogenic Outcomes?**
C. Corton. US EPA, Research Triangle Park, NC.


10:10 AM  **Panel Discussion on the Integration of Evidence in the Context of Safety Assessments.** S. Borghoff.
ToxStrategies LLC, Research Triangle Park, NC.

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### Tuesday, March 12, 9:00 AM to 4:30 PM, Exhibit Hall C, Salt Palace Convention Center

#### ToxExpo Exhibits

Incorporating visits to the ToxExpo while at the SOT Annual Meeting connects attendees with 250+ exhibitors who support the toxicology community with cutting-edge solutions and services. Visit the ToxExpo to:

- Connect with exhibitors for product, service, and career insights
- Learn about the latest research from 700+ daily poster presentations
- Network with colleagues in the SOT Pavilion and ask questions about the Society
- Check out the Tiny Tox Theater for brief talks focused on a variety of topics
- Enjoy morning coffee and afternoon refreshments
- Grab lunch and relax with others
- Win big by visiting exhibitors with raffles and by dropping your business card in the SOT Diamond-level Supporter boxes
- Experience much, much more

#### Global Gallery of Toxicology

Toxicology societies from around the world participate in the Global Gallery of Toxicology, where they display posters showcasing their upcoming meetings, key accomplishments, strategic initiatives, journals, awards, and more.

#### SOT Regional Chapter, Special Interest Group, and Specialty Section Posters

Dedicated poster space showcases the activities of the SOT Regional Chapters, Special Interest Groups, and Specialty Sections.

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### Tuesday, March 12, 9:00 AM to 10:00 AM, Locations Vary, Salt Palace Convention Center

#### Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.
Tuesday, March 12, 9:15 AM to 11:15 AM, Exhibit Hall C, Salt Palace Convention Center

PS Poster Sessions

The presenting authors are available to discuss their research for the following Poster Sessions:

- Air Pollution: Ozone
- Air Pollution Toxicology
- Animal Models
- Climate Change and Effects
- Ecotoxicology
- Nanotoxicology: In Vitro
- Nanotoxicology: In Vivo
- Tobacco and ENDS Toxicology II

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

Tuesday, March 12, 9:30 AM to 3:00 PM, Room 254 A, Salt Palace Convention Center

(Hours May Vary; Check Posted Information in the Research Funding Insights Room)

Research Funding Insights Room: Network with Grant Program Officers

Hosted by: Education and Career Development Committee (ECDC)

Representatives from federal agencies will be available in the Research Funding Insights Room to answer general grant-related questions. Check the posted information in the Research Funding Insights Room to make an appointment with a program officer who can discuss aspects of scientific review or specific grant opportunities. New investigators are especially encouraged to meet with program staff.

Tuesday, March 12, 10:00 AM to 10:20 AM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: From Specialization to Diversification: Building Your Scientist Brand in Toxicology

Speaker(s): Bonnie Coffa, Chemular Inc., Richmond, VA; Ed Carmines, Chemular Inc., Richmond, VA; and Manoj Misra, Chemular Inc., Richmond, VA.

Tuesday, March 12, 10:30 AM to 11:30 AM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Tuesday, March 12, 10:40 AM to 11:00 AM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Teaching the Dose-Response Concept to Laypersons: Candy Is Dandy

Speaker(s): Robert Roth, Michigan State University, East Lansing, MI.
Tuesday, March 12, 11:00 AM to 12:00 Noon, Grand Ballroom A, Salt Palace Convention Center

**Leading Edge in Basic Science Award Lecture: Roles of NRF2-KEAP1 in Environmental Response: Continuing the Legacy of Dr. Yamamoto**

This lecture will be delivered by Donna D. Zhang, PhD, Herbert Wertheim UF Scripps Institute for Biomedical Innovation and Technology, the 2024 SOT Leading Edge in Basic Science Award recipient.

Tuesday, March 12, 11:00 AM to 12:30 PM, Grand Ballroom F, Salt Palace Convention Center

**Workshop Session: Addressing Health Inequities and Susceptibilities via Incorporation of Nonchemical Stressors within Toxicological Approaches and Cumulative Risk Assessments**

**Chair(s):** William Klaren, ToxStrategies LLC; and Aleah Monae Bailey, University of North Carolina at Chapel Hill.

**Primary Endorser:** Regulatory and Safety Evaluation Specialty Section

**Other Endorser(s):** Ethical, Legal, Forensics, and Societal Issues Specialty Section; Risk Assessment Specialty Section

Recent policy and scientific publications have defined the need to consider disadvantaged communities within cumulative risk assessments, in part, to address existing health inequities. An important concern is studies that have demonstrated strong associations between stark health effects and environmentally mediated nonchemical stressors present in disadvantaged communities. Unfortunately, the quantitative impact that such nonchemical stressors have on toxicological response is unknown. This presents a gap in the understanding of susceptibility for communities that are commonly exposed to increased nonchemical stressors. While intrinsic population susceptibility has been investigated extensively within population-based *in vitro* and *in vivo* models, the extrinsic susceptibility coming from more temporal variables (e.g., diet, socioeconomic factors) have been less researched. Importantly, these extrinsic factors may potentially increase the sensitivity to a chemical exposure leading to an unaccounted for risk. This session will set out to provide a current understanding of how to utilize the available information and investigate additional questions that need to be addressed to adequately ensure that the role of nonchemical stressors in disadvantaged communities is appropriately considered in risk assessments. The first two talks will discuss information contained in current literature for human populations to understand the impact on cardiovascular endpoints, as well as better understand the nature (e.g., metrics used, endpoints considered) of chronic stress studies. The last two talks will discuss current models designed to understand nonchemical stressors and the ultimate impact to chemical response. Following the scientific talks, a panel discussion will help to consider existing gaps in current understanding. In all, this session will provide insight into incorporating nonchemical stressors into risk assessments to ensure that potentially disadvantaged communities are appropriately and adequately considered when calculating risk.

**Abstract #**

#1151 11:00 AM  
**Addressing Health Inequities and Susceptibilities via Incorporation of Nonchemical Stressors within Toxicological Approaches and Cumulative Risk Assessments.**

#1152 11:00 AM  
**Current Applications of Nonchemical Stressors and Incorporation into Risk Assessments.**

*W. Klaren.* ToxStrategies LLC, Asheville, NC.
<table>
<thead>
<tr>
<th>Session</th>
<th>Time</th>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
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<tr>
<td>#1153</td>
<td>11:10 AM</td>
<td>Scoping Report and Interactive Evidence Map on Studies of Environmental Exposures, Psychosocial Stressors, and Cardiovascular Diseases in Disproportionally Effected Populations.</td>
<td>S. Snow. ICF International Inc., Durham, NC.</td>
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<tr>
<td>#1154</td>
<td>11:30 AM</td>
<td>Evaluating the Immunomodulatory Effects of Allostatic Load and Pollutant Exposures.</td>
<td>A. Monae Bailey. University of North Carolina at Chapel Hill, Chapel Hill, NC.</td>
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<tr>
<td>#1155</td>
<td>11:50 AM</td>
<td>High Fructose Diet Modifies the Effects of Cadmium on Adverse Pregnancy Outcomes in CD-1 Mice.</td>
<td>C. Miller. US EPA, Research Triangle Park, NC.</td>
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12:10 PM Panel Discussion/Q&A.

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**Workshop Session: It’s Not Easy Being Green: Applying Alternatives Assessment to Create Safer Consumer Products**

**Chair(s):** Homer Swei, Environmental Working Group; and Muna Nahar, Exponent.

**Primary Endorser:** Sustainable Chemicals through Contemporary Toxicology Specialty Section

**Other Endorser(s):** Occupational and Public Health Specialty Section; Regulatory and Safety Evaluation Specialty Section

Alternatives assessment frameworks formalize approaches to selecting chemical replacements while avoiding regrettable substitutions. While the alternatives assessment field is relevant to all chemical use settings, it is particularly important with regard to consumer products. Consumer product safety is getting more attention from the public in recent years with terms like “clean beauty” and “green” products trending in the media. Product safety assessment is a diverse field with many players, but when it comes to questions of human health and environmental impacts, alternatives assessment provides a way forward for formulators, regulators, and advocates to collaborate and create safer products. Using alternatives assessment ensures that products contain the safest available ingredients, thereby simultaneously promoting public health and increasing consumer trust. Individual alternatives assessment frameworks weigh considerations differently. The 2014 National Research Council report *A Framework to Guide Selection of Chemical Alternatives* formalized the field of alternatives assessment and noted that while much of the existing assessments use Globally Harmonized System of Classification and Labelling of Chemicals criteria to evaluate hazard, other novel data streams also should be considered. More recent approaches have emphasized how certain parameters, such as exposure classification, should be incorporated to ensure that alternatives assessments are not solely based on hazard. Other groups have stressed the need to consider the potential environmental impacts of replacement chemicals in addition to their human health hazards. Furthermore, given that consumer product formulations require certain functionality for efficacy, assessment within functional-use classes is especially important. Moreover, many formulators are moving toward multifunctional ingredients, making comparison between ingredients more complex. In this session, academics, industry toxicologists, and nongovernmental organization scientists will come together in a unique “meeting of the minds” to discuss different approaches to alternatives assessment and how these approaches can be effectively applied to formulation approaches to ensure product safety. In addition to using case studies to highlight success stories, they will identify data gaps and challenges for the field. By tracing alternatives assessment from methodologic considerations through final product creation, this session will demonstrate applying toxicologic principles beyond the laboratory. After their presentations, the speakers will have a panel discussion moderated by the Co-Chair to answer audience questions and share perspectives about best practices, especially in cases where scientists from these different sectors may disagree. While approaches may differ, the goal across these sectors remains the same: create effective products that are safe for human health and the environment. Topics addressed during the panel discussion will include exposure assessment beyond direct consumer use, product lifecycle considerations, and validation approaches for alternatives assessment and third-party certifications. The panelists also will be invited to comment on the implications of formulation alternatives assessment for occupational health and how the field may account for consumer misuse. With the conclusion of this session, attendees will have a better understanding of both the creation of alternatives assessment frameworks and their application to real-world questions regarding consumer product safety. Unlike past sessions on safer chemical selection, this session goes beyond a methodologic review and directly addresses the results of the successful application of alternatives assessment. Attendees will be part of a dialogue on best practices and futurecasting in this field.
Tuesday, March 12, 11:00 AM to 12:20 PM, Grand Ballroom E, Salt Palace Convention Center

Roundtable Session: Current Status of Diversity, Equity, Inclusion, and Accessibility in Toxicology: SOT Special Interest Groups as Models

Chair(s): Annie Jarabek, US EPA; and Carmen Rubio-Armendáriz, Universidad de La Laguna, Spain.
Primary Endorser: Women in Toxicology Special Interest Group
Other Endorser(s): Hispanic Organization of Toxicologists Special Interest Group; Toxicologists of African Origin Special Interest Group

"Embracing diversity and optimizing inclusion maximizes engagement, creativity, and innovation among our members," SOT states in its "Commitment to Diversity, Equity, and Inclusion" statement. SOT holds its members accountable to the following core value: "The Society asserts that to be a diverse, equitable, and inclusive organization, we must be considerate of many factors including, but not limited to, gender identity, race/ethnicity, employment sector, nationality and cultural background, geographic location, physical ability, and scientific expertise and perspective." However, as representation is important but not sufficient to create a just and equitable environment, the SOT Special Interest Groups must play a relevant role since they represent the voices of diverse toxicologists. The SOT Special Interest Groups bring together scientists who share a common interest in issues germane to specific communities. The number of SOT members affiliated with one or more Special Interest Group has shown an exponential increase over the last decade, and this trend is expected to continue. Opportunities and challenges faced by toxicologists from underrepresented groups are similar; there is a need to reinforce collaborations among these groups to promote inclusivity and multiculturalism. The Special Interest Groups serve to attract members from a variety of backgrounds to develop strategies to promote toxicology among its diverse membership. There are several objectives that will be addressed in this session: (1) raise awareness among the SOT membership about the mission of the Special Interest Groups to promote multiculturalism, diversity, equity, and inclusion; (2) define diversity, equity, and inclusion (DEI) as it applies to the field of toxicology; and (3) serve as a platform to discuss and evaluate the effectiveness of DEI initiatives using the Special Interest Groups as a model. In addition, case studies will be presented to show the relationship between DEI initiatives and science, technology, engineering, and mathematics programs.

Abstract #

#1161 11:00 AM Current Status of Diversity, Equity, Inclusion, and Accessibility in Toxicology: SOT Special Interest Groups as Models.

11:00 AM Introduction. A. Jarabek. US EPA, Research Triangle Park, NC.
11:05 AM Accessibility and Equity of Women in a Changing World. J. Zelikoff. NYU Grossman School of Medicine, New York, NY.
Tuesday, March 12, 11:00 AM to 12:20 PM, Grand Ballroom J, Salt Palace Convention Center

Roundtable Session: From Theory to Practice: Preparing Students for Careers in 21st-Century Toxicology

Chair(s): Gina Hilton, PETA Science Consortium International e.V., Germany; and Antonio Baines, North Carolina Central University.

Primary Endorser: Education and Career Development Committee

Other Endorser(s): In Vitro and Alternative Methods Specialty Section; Sustainable Chemicals through Contemporary Toxicology Specialty Section

In an ever-expanding chemical universe, with ecological pressures and public safety concerns, in vitro and in silico models are progressively being implemented to improve toxicological assessment. Such methods will likely become a mainstay in safety evaluations with continued advances in technologies such as organoids, microphysiological systems, and physiologically based kinetic modeling. These methods hold promise to improve public health and environmental protection, especially in areas where alternative chemistries are sought to reduce risk through early detection and characterization of adverse effects. New chemicals and innovative products enter research and development every day. Although alternatives to animal testing and new approach methodologies are gaining traction within the field of toxicology for animal welfare purposes, they also are valuable because it may be the only way to keep up with the rate of innovation. It simply will not be feasible to screen all new chemistries through conventional animal testing batteries to inform safety decisions. Thus, related expertise is increasingly necessary in the fields of toxicology and regulatory science to support the evolving needs of industry and regulatory authorities. With new knowledge of biological systems and the advances that have emerged in the 21st century, academic curriculums have the opportunity to expand course content to keep pace with new methods used for safety assessment. Trainees should not only understand the biological foundation, history, and principles of toxicology but also develop relevant skills that diversify their "toolboxes" for toxicology (and related fields) in order to adapt to an ever-evolving paradigm that blends complex conventional and new approach methods. Expanding the toolbox will better equip trainees and students for careers, making them ready to leverage new methods to advance academic research, innovation in industry, and modify and uphold regulations. This session will focus on key opportunities for enhancing curriculums to train toxicologists in state-of-the-art technologies, as well as understanding their utility in toxicological assessments across sectors. The primary goals of this session are to share (1) academic insight into the current state of training in toxicology (and related) graduate programs, (2) graduate student perspectives related to readiness to join the toxicology workforce, (3) governmental perspective related to skills needed to uphold and advance public health and environmental protection, and (4) industry-related experience in keeping pace with new tools and technologies and how they can be applied to safety assessment. This session will facilitate discussion regarding ways toxicologists stay relevant (e.g., providing students with courses to learn about emerging technologies or more opportunities for career toxicologists to participate in workshops and continuing education training).

Abstract #

#1162 11:00 AM  From Theory to Practice: Preparing Students for Careers in 21st-Century Toxicology.

11:00 AM  Introduction. G. Hilton. PETA Science Consortium International e.V., Stuttgart, Germany.
11:05 AM  **Academic Toxicology Training Programs: What Are We Training In?**  I. Rusyn. Texas A&M University, College Station, TX.

11:20 AM  **Challenges Faced by Toxicology Graduate Students in Transitioning into the Workforce: The Need for Integrating Newer Methodologies into the Curriculum.**  D. Robarts. University of Kansas Medical Center, Kansas City, KS.

11:35 AM  **Training the Future Leaders of Computational Toxicology.**  K. Paul Friedman. US EPA, Research Triangle Park, NC.

11:50 AM  **Stepping Into That Industry Role and Staying Current with the Science.**  B. Baisch. Enko Chem, Mystic, CT.

12:05 PM  **Panel Discussion/Q&A.**  A. Baines1,2. 1 North Carolina Central University, Durham, NC; and 2 University of North Carolina at Chapel Hill, Chapel Hill, NC.

**Tuesday, March 12, 11:00 AM to 12:20 PM, Grand Ballroom B, Salt Palace Convention Center**

**Historical Highlights Session: Take Heart: Learning from Our Past to Improve Cardiovascular Safety Assessments of Pharmaceuticals in the Future**

**Chair(s):** Jean-Pierre Valentin, UCB S.A., Belgium; and Jennifer Pierson, HESI.

**Primary Endorser:** Cardiovascular Toxicology Specialty Section

**Other Endorser(s):** Drug Discovery Toxicology Specialty Section

Unintended cardiovascular drug-induced toxicities have been a major concern for decades for both marketed drugs and new therapeutics in development. A few examples include drug-induced arrhythmias, cardiac toxicities in anti-cancer drugs, cardiac valvulopathy associated with 5HT2B receptor agonism, changes in heart rate and blood pressure, and increased risk of thromboembolic disease, mortality, and morbidity. They account for more than 20% attrition in drug development, are cause for withdrawal from the market, and result in labeling and warning restrictions. As a result, cardiovascular issues remain a large focus in toxicology and nonclinical development studies. Scientists from the public and private sectors as well as regulatory agencies have collaborated over the past 20 years to address these issues and more. Working together to understand translation from nonclinical endpoints to clinical outcomes is as important as ever and understanding the history of these assessments will help inform and improve future evaluations. Integrated assessments, novel assays and technology platforms, and the push for new approach methodologies are changing the landscape and allowing greater understanding of mechanisms underpinning unintended cardiovascular effects. A thorough understanding of the history of cardiovascular safety evaluations will provide perspective on these new approaches and identify challenges with the current paradigm. From discovery to development and post-approval marketing of medicines, cardiovascular safety will remain in our hearts and minds. Can we use what we've learned over the past few decades to continue improvements for future safety assessments?

**Abstract #**

#1163  **11:00 AM**  Take Heart: Learning from Our Past to Improve Cardiovascular Safety Assessments of Pharmaceuticals in the Future.

11:00 AM  **Introduction.**  J. Pierson. HESI, Washington, DC.

11:05 AM  **Historical Perspectives of Cardiovascular Safety Assessment of Pharmaceuticals over the Past 20 Years: A Nonclinical Perspective.**  J. Valentin. UCB S.A., Belgium, Braine-l’Alleud, Belgium.

11:25 AM  **Historical Perspectives of Cardiovascular Safety Assessment over the Past 20 Years: A Clinical Perspective.**  C. Dota. AstraZeneca, Gothenburg, Sweden. Sponsor: J. Valentin


12:05 PM  **Panel Discussion/Q&A.**
Tuesday, March 12, 11:20 AM to 11:40 AM, Exhibit Hall C, Salt Palace Convention Center

**Tiny Tox Talk: Mathematical Grammar for Toxicologists (and Other Scientists)**

**Speaker(s):** Dustin Kapraun, US EPA, Research Triangle Park, NC.

Tuesday, March 12, 11:45 AM to 1:45 PM, Exhibit Hall C, Salt Palace Convention Center

**Poster Sessions**

The presenting authors are available to discuss their research for the following Poster Sessions:

- Developmental and Juvenile Toxicology
- Immunotoxicity II
- Inflammation
- Liver: *In Vivo*
- Neurodegenerative Disease: Parkinson’s Disease
- POPs
- Reproductive Toxicology I
- Respiratory Toxicology I
- Respiratory Toxicology II
- Risk Assessment II

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

Tuesday, March 12, 12:00 Noon to 1:00 PM, Locations Vary, Salt Palace Convention Center

**Exhibitor-Hosted Sessions**

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Tuesday, March 12, 12:00 Noon to 1:00 PM, Room 255 A, Salt Palace Convention Center

**Postdoctoral Assembly Luncheon**

*(Add-On Event; Postdoctoral Scholars Only)*

**Hosted by:** Postdoctoral Assembly

This ticketed event encourages networking and engagement among postdoctoral scholars. Stop in when you can to enjoy a buffet lunch with your fellow postdocs as well as SOT Council members. There is a short program at 12:15 pm to recognize the Best Postdoctoral Publication Award recipients and the Postdoctoral Assembly Officers and announce the raffle winners.

Tuesday, March 12, 12:00 Noon to 12:20 PM, Exhibit Hall C, Salt Palace Convention Center

**Tiny Tox Talk: Tox on Call: A Train Derailment Case Study**

**Speaker(s):** Julie Miller, Pennsylvania Department of Health, Harrisburg, PA.
**Tuesday, March 12, 12:30 PM to 1:45 PM, Room 255 F, Salt Palace Convention Center**
(Undergraduates Only)

**Undergrad Gab with a Grad over Grub**

**Chair(s):** Jaime Mirowsky, SUNY College of Environmental Science and Forestry; and AtLee Watson, Inotiv.

**Hosted by:** Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee

This informal session for all undergraduate students attending the SOT Annual Meeting is hosted by the SOT Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee. SOT undergraduate travel awardees participate in this event. Students will connect with peers and learn first-hand from graduate students about the graduate school experience, as well as gain a better understanding of the opportunities offered by SOT. This session includes free lunch.

**Tuesday, March 12, 12:40 PM to 1:00 PM, Exhibit Hall C, Salt Palace Convention Center**

**Tiny Tox Talk: The Contented Scientist**

**Speaker(s):** Ruth Roberts, ApconiX, Alderley Edge, UK.
Tuesday, March 12, 1:00 PM to 2:30 PM, Grand Ballroom F, Salt Palace Convention Center

**SOT/EUROTOX Roundtable: Is Mixture Risk Assessment Now Established Regulatory Practice?**

**Chair(s):** Cynthia V. Rider, NIEHS/DTT; and Heather M. Wallace, University of Aberdeen and EUROTOX, United Kingdom.

**Panelists:** Jean-Lou C. M. Dorne, European Food Safety Authority, Parma, Italy; Maureen R. Gwinn, US EPA/ORD, Research Triangle Park, NC; Joanna M. Matheson, US Consumer Product Safety Commission, Rockville, MD; and Martin F. Wilks, University of Basel, Basel, Switzerland.

Human health risk assessment of the combined exposure to multiple chemicals (known as mixture risk assessment or cumulative risk assessment) has been the subject of scientific and regulatory discussions for many years. A number of national and supra/international bodies, including the World Health Organization, Organisation for Economic Co-operation and Development, US Environmental Protection Agency (US EPA), European Food Safety Authority, and European Chemicals Agency (ECHA), have collaborated on initiatives to develop and implement science-based risk assessment of exposure to chemical mixtures that occur via the diet or in the environment, and there is broad consensus regarding the underlying assumptions and principles. Yet, in practice, the implementation of mixture risk assessment across regulatory domains is patchy and, where it is mandated, is often restricted to relatively few scenarios and chemical groups. Recent developments such as the new EU “Chemicals Strategy for Sustainability towards a Toxic-Free Environment” have rekindled the debate on whether there is an as-yet unrecognized or unaddressed problem of health effects in human populations linked to mixture exposure and whether there is an urgent need for action. Concurrently, multiple initiatives are aimed at advancing and implementing cumulative risk assessment, including updating the US EPA cumulative risk assessment guidelines, developing cumulative impacts research recommendations, and providing a proposed approach for considering cumulative risk under the US Toxic Substances Control Act. This Roundtable brings together regulatory toxicologists from Europe and the US who will explore the commonalities and differences in regulatory approaches to mixture risk assessment, raising the question whether this is now established regulatory practice across regulatory domains.

Tuesday, March 12, 1:00 PM to 2:00 PM, Grand Ballroom A, Salt Palace Convention Center

**Translational Impact Award Lecture: Approaches for Treatment of Nerve Agent Poisoning: From Experimental Laboratories to Intensive Care Units**

This lecture will be delivered by Horst Thiermann, PhD, Bundeswehr Institute of Pharmacology and Toxicology, the 2024 SOT Translational Impact Award recipient.
Given their physiochemical properties, medications and toxicants often require active transport using solute carriers (SLC) and ATP-binding cassette (ABC) transporters to cross tissue barriers. Some of these same transporters also are involved in the disposition of nutrients throughout the body, and one unintentional consequence of chemical exposure is disruption of this shared system. Over the past three decades, significant effort has enabled characterization of the localization of SLC and ABC proteins throughout the body and revealed mechanisms by which chemicals, nutrients, and pharmaceuticals interact with xenobiotic transporters. This has involved utilization of in vitro assays ranging from membrane vesicles and overexpressing cells to knockout mice. These approaches have led to key scientific discoveries regarding the active transport and toxicity of xenobiotics. Nonetheless, there is still much work to be done in de-orphanizing understudied transporters, identifying novel mechanisms of transporter regulation and function, and translating this work to human populations. The goal of this session is to discuss new experimental and modeling approaches to reveal the contribution of transporters to the toxicity of drugs, dietary supplements, and environmental chemicals. This session will highlight ongoing research projects that use novel machine learning and cheminformatics approaches as well as endogenous biomarkers and exosomes to better understand the regulation and function of transporters in the field of toxicology. Furthermore, the potential to integrate transporter genetics into new fields, such as environmental epidemiology, will allow researchers to better inform identification of susceptible populations to chemical toxicity.

Abstract #

#1164 1:00 PM Translational Approaches to Study Transporters in Toxicology: From Liquid Biopsies and Endogenous Biomarkers to Machine Learning and Epidemiology.
1:00 PM Introduction. A. Slitt. University of Rhode Island, Kingston, RI.

#1165 1:05 PM Liquid Biopsy Evaluation of Hepatic Metabolizing Enzymes and Transporters in Exosomes. B. Achour. University of Rhode Island, Kingston, RI. Sponsor: A. Slitt

#1166 1:25 PM Computational Approaches to Build Chemical Transporter Binding Signatures and Regulatory Networks. H. Zhu. Tulane University, New Orleans, LA.


#1168 2:05 PM Integrating Transporter Genetics in a Human Birth Cohort to Reveal the Perinatal Toxicity of Mycoestrogens. Z. Rivera-Nunez. Rutgers, The State University of New Jersey, Piscataway, NJ. Sponsor: L. Aleksunes
Substance abuse continues to be an endemic problem, with over 20.4 million diagnoses in the United States in 2022. Substance use and monitoring techniques are utilized in several sectors, including criminal law enforcement, motor vehicle operation licensing, medical pain management, family law and child custody disputes, and occupational/workplace testing. Some state jurisdictions also are allowing for the medical or recreational use (or decriminalization) of multiple categories of substances. Changes in laws and testing technologies, however, have outpaced the development of sound scientific-evaluation criteria as well as policy development in regulatory and legal settings where impairment assessment is critical. Moreover, the commercialization and legalization of certain substances (e.g., cannabis) is outpacing more thorough toxicological evaluation. It also has presented unique potential public health issues (e.g., pesticide/herbicide exposure in grow houses). This Workshop will examine the issues that many practicing toxicologists and members of our society face in the everyday interpretation of test results addressing substance use and in developing opinions on impairment.

Abstract #

#1169 1:00 PM Complex Interpretations of Substance Detection and Impairment.
1:05 PM Introduction. S. Bobst. ToxSci Advisors LLC, Houston, TX.
#1170 1:05 PM Sins of Our Fathers: Lessons Learned from the Evolution of Alcohol Per Se Limits to Driving under the Influence of Drugs Policy. M. McCabe. Exigent, Philadelphia, PA.
#1172 1:35 PM Neuropharmacological Drugs and Impairment: Not So Simple to Define. L. Plunkett. BioPolicy Solutions LLC, Houston, TX.
#1173 1:50 PM Polydrug Use and Gaps in Mechanistic Understanding: Case Study Examples in Forensic Cases. V. Fitsanakis. Robson Forensic Inc., Myrtle Beach, SC.
2:20 PM Panel Discussion/Q&A.
Environmental health science is poised for a sea change as more research focuses on integrated experimentation and analysis that better captures the current and evolving breadth of knowledge. Advances in computational resources, such as virtually unlimited computing capacity and artificial intelligence, can now be combined with experimental approaches, such as exposomics and other ‘omics approaches focused on biological endpoints, to deliver novel insights into the effect of environmental chemicals on human health. The effective use of these tools is hampered by the breadth of relevant science and the diversity of language that has evolved within those fields of study. The goal of this Workshop is to highlight the progress-to-date in overcoming these obstacles and discuss the path toward true interoperability across the environmental health sciences continuum. Individual research teams have overcome these obstacles by developing a common understanding among the project participants. This is seldom codified in a form that is readily interpreted by computers, however, which limits the scalability of these solutions. The lack of a formal harmonized language additionally limits the ability to identify, compare, and integrate broad categories of data across separate projects and thereby maximally leverage the wealth of data being collected. In response to this need, the National Institute of Environmental Health Sciences formed the Environmental Health Language Collaborative (EHLC) in 2021 “to advance community development and application of a harmonized language for describing Environmental Health Science (EHS) research.” In its first three years, the EHLC has built an active community of researchers focused on developing case studies and resources to guide the broader community in utilizing harmonized language in publishing research. This Workshop will review the progress-to-date in this area and consider what additional barriers must be overcome to realize the vision of a harmonized language covering all environmental health sciences domains. Following an overview of the EHLC initiative, we will consider the progress-to-date and barriers that remain for several ongoing use cases. The first considers the impact of using a common language on pooling and meta-analysis by reviewing specific examples from the epidemiology domain. The second example illustrates how metadata and common language aid in data discoverability to facilitate use of new approach methodologies for toxicological evaluations. The third use case focuses on biomarkers of exposure and effect with an emphasis on how a formal semantic description of the components and their relationships can better connect exposure pathways with biological effects. We will then conclude with a broader discussion of the need for precise metadata standards when describing exposure pathways to avoid errors due to inaccurate assumptions when connecting data regarding exposure and toxicology.

Abstract #

#1175 1:00 PM Overcoming Barriers to More Scalable Environmental Health Science Research via Harmonized Language.

#1176 1:00 PM How Did We Get Here? The Environmental Health Language Collaborative’s First Three Years. A. Rooney. NIEHS, Research Triangle Park, NC.

#1177 1:10 PM How Best to Combine Data from Multiple Independent Studies? J. Stingone. Columbia University, New York, NY. Sponsor: S. Edwards


#1179 1:40 PM Digitizing Relationships between Exposures, Biomarkers, and Clinical Outcomes to Enhance Reproducibility of Epidemiological and Toxicological Findings. C. Patel. Harvard University, Cambridge, MA. Sponsor: S. Edwards

#1180 1:55 PM Challenges and Opportunities to Improve Communication about Exposure and Risk for Collaboration and Information Exchange. E. Jensen. Dow Chemical Company, Midland, MI.

2:10 PM Panel Discussion/Q&A.
The science and engineering innovations over the past decade have impacted every sector of toxicology, including academia, industry, government, and consulting. Contemporary methods have revised the approach to evaluating the toxicity of compounds; consequently, interested stakeholders demand greater transparency in risk assessments and improvements in risk communication. This means educators should integrate new, innovative approaches into their syllabuses so the next generation of students will gain a strong foundation in both contemporary and traditional toxicology. Additionally, exploration of these multidisciplinary topics may attract a wider variety of students into the field of toxicology, including those with interests in biology, chemistry, bioengineering, computational modeling, data analytics, library science, and/or communications. This session will address how incorporating these concepts into curriculum will benefit students, as well as provide example case studies, tools, and resources for educators. The first speaker will provide an overview of how to recruit and prepare toxicology students for diverse professions by exposing them to contemporary approaches, as well as non-academic career options. The second speaker will discuss the importance of influencing academic curriculums to include practical application of toxicology, with the goal of producing a talented workforce for regulatory risk assessment. The third speaker will address the importance of familiarizing students with the concept of evidence-based toxicology. This presentation will provide educators with various sample assignments to instruct students on the fundamentals required to conduct research using a structured framework to summarize available evidence in a comprehensive, objective, and transparent manner (i.e., systematic review). The final speaker will address the need for the incorporation of principles of risk communication to varied stakeholders into toxicology education. Overall, attendees will gain insights on potential approaches to update toxicology curricula by incorporating contemporary approaches, practical experiences and applications, evidence-based practices, and risk communication principles. By doing so, students will be better equipped for their careers and future contributions to the advancement of the field of toxicology. The session will conclude with a question-and-answer period.

Abstract #

#1181 1:00 PM Preparing the Next Generation of Toxicologists: Integrating Practical Applications and Diverse Career Paths into the Student Experience.

1:00 PM Introduction. T. Damodaran. North Carolina State University, Raleigh, NC.

1:05 PM Increasing Recruitment and Success of Future Toxicologists via Exposure to Contemporary Toxicology and Nonacademic Career Opportunities. W. Chiu. Texas A&M University, College Station, TX.


1:35 PM Incorporating Evidence-Based Toxicology into Curriculums and Student Research. K. Zaccaria. SRC Inc., North Syracuse, NY.

1:50 PM Communicating Risk to Varied Stakeholders: Principles and Examples of Inserting Good Science into Conversations of Competing Biases. M. Lumpkin. CTEH, Evergreen, CO.

2:05 PM Panel Discussion/Q&A.
Tuesday, March 12, 1:20 PM to 1:40 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Effective Feedback: The Gift That Keeps Giving

Speaker(s): Anne Chappelle, SafeBridge Regulatory & Life Sciences Group, Chadds Ford, PA.

Tuesday, March 12, 1:30 PM to 2:50 PM, Room 255 A, Salt Palace Convention Center

(Add-On Event; Complimentary but Limited Space; Graduate Students and Postdoctoral Scholars Only)

Career Exploration through Speed Informational Interviews

Hosted by: Postdoctoral Assembly

Are you interested in learning more about toxicology careers in academia, government, and industry? This limited-seating and ticketed event is designed for graduate students and postdocs who want to gain insight into different career sectors in toxicology. Trainees will rotate through a series of short, informal conversations to learn about various career pathways. A great opportunity for networking!

Tuesday, March 12, 1:30 PM to 2:30 PM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Tuesday, March 12, 2:00 PM to 2:20 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Best Practices for Working with a Contract Research Organization

Speaker(s): James Randazzo and Angela Lynch, Attentive Science, Stilwell, KS.

Tuesday, March 12, 2:15 PM to 4:15 PM, Exhibit Hall C, Salt Palace Convention Center

Poster Sessions

The presenting authors are available to discuss their research for the following Poster Sessions:

- Air Pollution: Particulate Matter
- Endocrine Toxicology
- Neurotoxicity: Developmental I
- Neurotoxicity: General
- New Approach Methods: In Vitro I
- New Approach Methods: In Vitro II
- PFAS II
- Reproductive Toxicology II
- Risk Assessment III

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.
Tuesday, March 12, 2:40 PM to 3:00 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: A Career in Government

Speaker(s): Esra Mutlu, US EPA, Research Triangle Park, NC.

Tuesday, March 12, 3:00 PM to 4:30 PM, Room 251 A, Salt Palace Convention Center

American Academy of Clinical Toxicology Symposium

Speakers: Edward W. Cetaruk, University of Colorado Anschutz Medical Campus, Aurora, CO; and Dayne Laskey, University of Saint Joseph, West Hartford, CT.

For the third year, SOT is partnering with the American Academy of Clinical Toxicology (AACT) to produce a session focused on clinical/translational toxicology. The session topic and speakers are selected by AACT, with approval by SOT. This session represents a continuation of the Society’s strategic efforts to engage with sister organizations and disciplines.

Tuesday, March 12, 3:00 PM to 4:00 PM, Grand Ballroom A, Salt Palace Convention Center

Merit Award Lecture: Are Humans REALLY Just Big Rats and Mice? A Tale of Three “Toxins”

This lecture will be delivered by David L. Eaton, PhD, ATS, DABT, University of Washington, the 2024 SOT Merit Award recipient.
The ongoing development of new approach method (NAM) workflows promises to significantly refine, reduce, or replace the traditional dependence on mammalian studies in chemical risk assessment. This session focuses on the necessary components of a NAM workflow to predict developmental toxicity, where the complexity of the development process presents a particular challenge for translating in vitro media concentrations into human-equivalent doses. This session is organized to highlight each of the key elements in this process: (1) well-characterized, human-relevant in vitro assay; (2) kinetic modeling of the in vitro assay to estimate the free (effective) concentration associated with the nominal exposure; (3) physiologically based kinetic (PBK) modeling to determine the appropriate human-equivalent dose for the risk assessment, considering the relationship of the effect to the timing of development; and (4) interpretation of the predictivity and uncertainty in NAM-based results for developmental toxicity. The first speaker will provide an example of a human-relevant developmental model that can be rapidly applied to identify chemicals with the potential to cause developmental toxicity. The second talk will discuss the current state of the art for kinetic modeling of in vitro assays to determine the impact of chemical-specific characteristics, such as binding, evaporation, and metabolism, on the free concentration achieved in the media and its application to developmental assays. The third talk will describe the use of PBK models for translating relevant in vitro exposures to in vivo exposure estimates and aggregation of available in vitro and in vivo developmental toxicity data into publicly available and navigable datasets. The final speaker will provide an overview of the results of a set of chemical case studies designed to evaluate the capability of this developmental workflow to provide reliable information on the potential for human developmental toxicity. Each speaker will highlight the specific considerations that drove the creation and adaptation of the models in the workflow to understand the appropriate human dose context for the use of developmental toxicity information from NAMs.

Abstract #

#1182 3:00 PM  In Vitro to In Vivo Extrapolation to Predict Developmental Toxicity Potential.  
3:00 PM  Introduction. H. Clewell. Ramboll US Corp, Raleigh, NC.

#1183 3:05 PM  Use of High-Throughput Zebrafish Model for Screening of Potential Developmental Toxicants: Benefits over Cellular Models and Remaining Challenges in Translation. R. Tanguay. Oregon State University, Corvallis, OR.


#1185 3:45 PM  In Vitro–In Vivo Extrapolation of Developmentally Relevant Thyroid Bioactivity with Higher-Throughput Pregnancy Toxicokinetic Modeling. K. Truong, J. Wambaugh, and K. Paul Friedman. US EPA, Research Triangle Park, NC.

#1186 4:05 PM  Development of an In Vitro to In Vivo Workflow for Identification of Potential Developmental Toxicants. R. Clewell. 21st Century Tox Consulting, Chapel Hill, NC.

4:25 PM  Panel Discussion/Q&A.
Biocompatibility, or biological safety testing, for ocular medical devices is typically evaluated by toxicology safety experts prior to administration to humans. However, most people are unaware that there is more to biocompatibility testing than studies mimicking patient safety with the intraocular device itself. Leachable testing is a crucial aspect of manufacturing and product release to market. Leachables are chemical entities, both organic and inorganic, that migrate from the medical device itself or from components of a container closure system into a product during the shelf life of the product. Biocompatibility regulations primarily come from the International Organization for Standardization (ISO), a nongovernment body representing over 160 countries, with ISO 10993-1 describing the framework for evaluation and testing within a risk management process. ISO 10993-17 specifies current methods for determination of allowable limits for leachables from medical devices, although a contemporary update to this standard is currently under review. ISO 10993-18 (2020) describes chemical characterization of medical device materials, including extractables and leachables, supporting identification and control of biological hazards from material constituents. In this session, an overview of ISO 10993 will be presented, with an emphasis on Parts 17 and 18. Chemical characterization (presented in ISO 10993-18) and toxicological risk assessment practices (presented in ISO 10993-17) address how chemistry data should be evaluated by a toxicologist to identify and address risks to patients. The US Food and Drug Administration (US FDA) Center for Devices and Radiological Health’s expectations for biocompatibility testing of devices will be presented by a US FDA reviewer in the device sector. The biological evaluation plan, or testing strategy, are critical for successful review and US FDA clearance. Since March 2022, the US FDA intends to regulate container closure systems, such as eye dropper bottles, products as drug-led combination products composed of a drug constituent part that provides the primary mode of action and a device constituent part (an ophthalmic dispenser). Finally, a case study for a newly approved medical device, a drug-eluting contact lens, will be presented as an example of a successfully carried out biocompatibility evaluation plan. This session will benefit scientists and engineers interested in biocompatibility evaluations for development of medical devices and anyone interested in learning medical device development expectations and how to address leachable issues.

Abstract #

#1187 3:00 PM Taking a Closer Look at Biological Evaluations for Ocular Medical Devices and Combination Products.
3:00 PM Introduction. A. Rodrigues. AbbVie Inc., Irvine, CA.

#1188 3:05 PM An Eye on ISO 10993-17 and 10993-18 and the Establishment of Allowable Limits and Safety Threshold for Leachable Substances for Consumables, Medical Devices, and Combination Products.
M. Salvador-Silva. Alcon, Fort Worth, TX.

#1189 3:30 PM Biocompatibility Strategy for New Ocular Drug-Medical Device Combination Products.
B. Liang. Johnson & Johnson Innovation LLC, Jacksonville, FL.

#1190 3:55 PM Biocompatibility Assessment of Ophthalmic Medical Devices.
S. Bancos. US FDA/CDRH, Silver Spring, MD.

4:20 PM Panel Discussion/Q&A.
Applications of Annotations and Ontologies in Toxicology to Get Us on the Same Page for Maximizing Data Potential

Chair(s): Agnes Karmaus, Syngenta; and Aswani Unnikrishnan, Inotiv.
Primary Endorser: In Vitro and Alternative Methods Specialty Section
Other Endorser(s): Computational Toxicology Specialty Section; Molecular and Systems Biology Specialty Section

The rapidly increasing inventory of publicly available toxicological assay data is facilitating the development of integrative, weight of evidence, and computational approaches for chemical hazard assessment. Identifying relevant data, whether in the literature or from a new database, and utilizing it effectively requires being able to quickly interpret an abundance of information. Traditionally, the querying, interpreting, and structuring of data into useable formats in chemical assessment has been a manual process. As we move into an era where historical data can be leveraged in computational frameworks, it is important to develop annotations and ontologies that can facilitate data retrieval and standardize approaches to support data interoperability and widespread use. While assay developers may be interested in ensuring their assay is appropriately conducted, applied, and interpreted, assessors may want to identify and integrate relevant data, and computational toxicologists may bring this all together as they try to build tools to support storage of appropriate metadata and facilitate retrieval of data. Developing some form of standardized annotations or ontologies associated with assays and outcomes of chemical evaluations is critical to all these applications, making it relevant to different users and different sectors within toxicology. Annotated data can be leveraged for a multitude of applications, as will be addressed during this session. While many new approach methodologies (NAMs) are striving to provide annotations that define information about technology platform, assay design, and gene/molecular/biochemical pathway target, it remains a challenge to place assay outputs into a toxicological context in relation to apical adverse outcomes to ensure appropriate contextualization and interpretation for the use of NAM data. The session will start with an introduction from the Co-Chair to highlight the need for establishing curation, annotation, and standardized approaches to discretizing and defining toxicological data so that metadata support efforts for data integration. The first speaker will provide insight into the role of annotating data when developing public repositories for toxicologists, including ToxCast and ToxRef. In developing these databases and accompanying tools for public use, the US Environmental Protection Agency has established custom annotations and adopted Organisation for Economic Co-operation and Development guidance templates to ensure appropriate metadata are provided in a standardized and interpretable manner. The second speaker will provide examples of projects in which compiled data required accurate annotation to be applied in order to guide pharmaceutical projects to identify and mitigate risks for target safety assessments. The third speaker will discuss the ONTOX Physiological Maps project in which biological pathways are mapped to help define biological relationships that are then leveraged for toxicological applications by relying on assay annotations for mapping testing data onto the established maps; this example takes the reverse approach in which the framework is developed first, and assay annotations are essential to linking chemical data into the biological and toxicological context. Lastly, the fourth speaker will take the session into the world of alternative species and shed light on how establishing ontologies to help drive data interoperability among zebrafish assay outcomes was essential to the success of the Systematic Evaluation of the Application of Zebrafish in Toxicology (SEAZIT) project seeking to enable the broader adoption of zebrafish for toxicological screening. Altogether, audiences should walk away from this session with a better understanding of which metadata and in what format annotations are being developed, how annotations and ontologies are leveraged for multiple applications, and the state of the science on several sectors’ use of annotations for toxicological use.

Abstract #

#1191  3:00 PM  Applications of Annotations and Ontologies in Toxicology to Get Us on the Same Page for Maximizing Data Potential.

3:00 PM  Introduction. A. Karmaus. Syngenta, Greensboro, NC.


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<th>Time</th>
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<tr>
<td>3:40 PM</td>
<td>Physiological Maps as a Tool for Knowledge Integration and Sharing through FAIR-Aligned Structures. B. Staumont. Université de Liège, Liège, Belgium. Sponsor: A. Karmaus</td>
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<td>3:55 PM</td>
<td>Standardization of Alternative Species NAMs to Support Interoperability, Facilitate Interpretation, and Propel Adoption: Lessons Learned from the SEAZIT Program. K. Ryan. NIEHS/DTT, Research Triangle Park, NC.</td>
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4:10 PM Panel Discussion/Q&A.

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Tuesday, March 12, 3:00 PM to 4:30 PM, Grand Ballroom J, Salt Palace Convention Center

**Workshop Session: Reducing Use of Nonhuman Primates in Oncology Drug Development: A 3R-Based IQ DruSafe/Industry/US FDA Perspective**

Chair(s): Kaushik Datta, Bristol Myers Squibb; and Smita Salian-Mehta, Gilead Sciences Inc.

Primary Endorser: Regulatory and Safety Evaluation Specialty Section

Other Endorser(s): Association of Scientists of Indian Origin Special Interest Group; Women in Toxicology Special Interest Group

The use of animals for toxicity testing in pharmaceutical drug development programs is a balance between providing appropriate data that allows adequate risk assessment in humans and applying the 3Rs principles (replacement, reduction, and refinement) for animal use. Efforts by the International Consortium for Innovation and Quality in Pharmaceutical Development (IQ) DruSafe and the US Food and Drug Administration (US FDA) have played a crucial role in shaping drug development best practices. Recent discussions between these partners have focused on rationalizing nonclinical toxicity testing strategy for oncology therapeutics, taking into consideration nonhuman primate (NHP) shortages caused by supply constraints and prioritized biomedical research. For the nonclinical development of biologics in oncology indications, opportunities were identified for the acceptance of streamlined toxicology packages, without compromising a rigorous safety evaluation, utilizing (1) CD3-bispecific antibodies, (2) antibody-drug conjugates (ADCs) with cytotoxic payloads, and (3) biotherapeutics for well-characterized targets such as PD-1 or VEGF. Three industry speakers will present IQ DruSafe survey results and industry case studies on these topics where available. Industry speakers will focus on comparing toxicity findings between first-in-human (=one-month duration) and registration-enabling (>one-month duration) studies and assessing the need of studies greater than one-month duration, thus ensuring adequate safety assessment while optimizing NHP use to support both the first-in-human and later-stage clinical trials with the oncology therapeutics mentioned in this session. The US FDA speaker will provide perspective on retrospective data on NHP versus rodent use in three-month studies for ADCs. This Workshop will deliver a 3R-based IQ DruSafe/Industry/US FDA perspective on optimum NHP use for nonclinical development of oncology therapeutics.

**Abstract #**

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<td>Reducing Use of Nonhuman Primates in Oncology Drug Development: A 3R-Based IQ DruSafe/Industry/US FDA Perspective.</td>
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<td>3:05 PM</td>
<td>Introduction. K. Datta. Bristol Myers Squibb, New Brunswick, NJ.</td>
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<tr>
<td>4:05 PM</td>
<td>Panel Discussion/Q&amp;A.</td>
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Cumulative impact assessment is a scientific methodology aimed at informing transdisciplinary decisions for all communities but especially overburdened communities with environmental justice concerns. Cumulative impacts are defined as the totality of exposures to combinations of chemical and non-chemical stressors and their effects on health, well-being, and quality-of-life outcomes. While traditional risk assessment methods based on toxicology or epidemiology are typically concerned with exposure-response relationships for specific combinations of chemical stressors and adverse outcomes, cumulative impact assessments incorporate exposures to a broader set of stressors and different outcome categories. For example, cumulative impact assessments may focus on biological aging, or allostatic load, as a risk factor of interest, while also accounting for sources of biological stress, which include exposures to non-chemical stressors in combination with exposures to chemical stressors. The goal of this session is to share initiatives regarding recent developments in the science of cumulative impact assessment and how cumulative impacts inform decisions. This session will showcase scientists in government, academia, and non-governmental organizations working to advance cumulative impact assessments. One presentation will include an overview of how the Office of Research and Development of the US Environmental Protection Agency’s cumulative impacts research agenda was developed and its key focus areas. Another presentation will show how California is using various methodologies to advance the understanding of cumulative impacts for decision-making. The third presentation will describe the importance of cumulative impacts in protecting children’s health. The fourth presentation will explore community stressors and assets that may exacerbate or buffer impacts of climate-related exposures on child health. Collectively, this session will show how the science of cumulative impacts can be used to inform policies important to communities, highlighting examples from the federal, state, and local levels. The importance of place-based information regarding the built, natural, and social environments also will be addressed. In addition to presentations, this session will include a panel discussion focused on how planned research will bolster the basis to inform decisions to improve the health, well-being, and quality of life of overburdened communities.

Abstract #

#1201 3:00 PM  Methods and Transdisciplinary Frameworks to Evaluate Cumulative Impacts to Advance Equity in Community Health, Well-Being, and Quality of Life.

3:00 PM   Introduction. M. Gwinn. US EPA, Washington, DC.


3:45 PM   Panel Discussion/Q&A.
In the ever-evolving field of toxicology, professionals are increasingly faced with opportunities for career transitions between academia, industry, government, and consulting. This session aims to address the complexities of such transitions by bringing together a panel of distinguished experts from various sectors of the toxicology community. These experts will share their firsthand experiences, discuss the challenges they faced, and reveal the strategies and resources that contributed to their successful transitions. Emphasizing the importance of adaptability and resilience, the panelists will provide insights into how toxicologists can effectively navigate their career paths and acclimate to new environments. Topics to be explored include interdisciplinary collaboration, networking, personal branding, and staying informed of industry trends. Attendees will gain valuable knowledge and practical tips that can be applied to their professional journeys. Furthermore, the session will highlight the significance of effective communication in bridging the gap between different sectors within the toxicology field. Panelists will discuss how fostering mutual understanding and collaboration between academia, industry, government, and consulting can lead to innovations and advancements in toxicological research and practice. By focusing on the shared experiences and lessons learned from our panelists, attendees will be better equipped to make informed decisions about their career transitions. They will also gain a deeper appreciation of the diverse career paths available to them within the field of toxicology and understand the importance of continuous professional development. Ultimately, this session seeks to cultivate a more dynamic, versatile, and interconnected toxicology community. By empowering professionals with the knowledge and resources needed to successfully navigate their career paths, we can collectively contribute to the advancement of toxicology, public health, and environmental safety.

Abstract #
#1202 3:00 PM  
3:00 PM  
3:15 PM  
3:25 PM  
From Research to Relevance: Navigating Career Transitions in Academia. A. Abdelmoneim. Louisiana State University School of Veterinary Medicine, Baton Rouge, LA.  
3:35 PM  
Alternative Careers in Toxicology: Scientific Advocacy. E. Slankster-Schmierer. Physicians Committee for Responsible Medicine, Reno, NV.  
3:45 PM  
How to Develop Your Career with Agility: Perspective from a Mid-career Group Leader. J. LaRocca. Corteva Agriscience, Indianapolis, IN.  
3:55 PM  
4:05 PM  
Panel Discussion/Q&A.
Tuesday, March 12, 3:00 PM to 4:00 PM, Exhibit Hall C, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Tuesday, March 12, 3:20 PM to 3:40 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Finding Common Ground: Applied Lessons from the SOT Science Communications Training on How Empathetic Science Communication Can Make Science More Welcoming for All

Speaker(s): Claire Hamaji, Stantec, San Francisco, CA.

Tuesday, March 12, 4:45 PM to 6:15 PM, Grand Ballroom E, Salt Palace Convention Center

Symposium Session: Long Non-coding RNA Dysregulations in Metal Toxicity and Carcinogenesis

Chair(s): Chengfeng Yang, Stony Brook University; and Yvonne Fondue-Mittendorf, Van Andel Institute.
Primary Endorser: Metals Specialty Section
Other Endorser(s): Carcinogenesis Specialty Section; Mechanisms Specialty Section

The discovery and characterization of non-coding RNAs challenged the central dogma of molecular biology, representing a breakthrough in our understanding of RNA biology and functions. Long non-coding RNAs (lncRNAs) are a sub-class of ncRNAs, referring to RNA molecules that are more than 200 nucleotides in length and usually lack significant protein-coding capacities. With the completion of the Encyclopedia of DNA Elements Project and advances in genomic sequencing technologies, it is now believed that the human genome is pervasively transcribed, and a large portion of human genome is transcribed as ncRNAs, especially lncRNAs. The number of human IncRNA genes and transcripts are far more than protein-coding genes. Recent studies demonstrated that lncRNAs play critical roles in regulating gene expression, as well as many aspects of normal physiological processes. Dysregulations of lncRNA expressions and functions have been shown to be involved in the development and progression of many human diseases, especially cancer, although the underlying mechanisms remain largely unknown. Toxic metals are common environmental and occupational pollutants and important etiologic factors for cancer and other diseases, with the underlying mechanism not well understood. The effects of toxic metals and other environmental pollutants on lncRNA expression and functions are exciting and emerging research areas in toxicology. The goals of this Symposium are to introduce current lncRNA research in the field of toxicology and to discuss the role and mechanism of lncRNA dysregulations in metal toxicity and carcinogenesis. To achieve these goals, this session will convene a panel of outstanding lncRNA and metal researchers. The first speaker, an expert in studying the effect of environmental pollutant exposure on lncRNA expression and function, will present a brief overview on current lncRNA research, followed by his exciting work on xenobiotic-responsive hepatic lncRNAs. Next, three experts in metal toxicology research will present their cutting-edge studies to show how three toxic metals (arsenic, cadmium, and chromium) dysregulate lncRNA expression and how the dysregulated lncRNAs are involved in metal-induced neurotoxicity, cancer stem cell–like properties, and carcinogenesis. Since few compelling lncRNA studies have been done in the field of metal toxicology, we are only able to include recent research on the effects of arsenic, cadmium, and chromium on lncRNA expression and function in this Symposium. Outstanding diverse speakers from both inside and outside the US, including scientists from underrepresented groups, are recruited to this Symposium. These topics are of interest not just to metal researchers but also to those studying the mechanisms of action of other toxicants. This session will introduce the concept of lncRNAs to those not familiar with the subject and will attract an expanded SOT audience of metals and other toxicology researchers.
Nitrosamines have come under scrutiny from both regulatory authorities and the pharmaceutical industry in recent years. N-Nitrosamines are considered to be highly potent carcinogens. After metabolic activation via CYP450 enzymes, they induce DNA adducts followed by gene mutations ultimately resulting in cancer. N-Nitrosamines are of high regulatory interest as they occur as impurities in drug synthesis, degradation, and biotransformation from secondary and tertiary amines. Collectively, these are referred to as nitrosamine drug-related substance impurities (NDSRIs). It is estimated that over 30% of the marketed drugs may potentially form nitrosamines from secondary amine reactions. Few reliable two-year rodent cancer studies for N-Nitrosamines are available, and simple, small dialkyl nitrosamines have been used as references in establishing acceptable intake limits for NDSRIs using structure read-across approaches for risk assessment. In July 2023, the European Medical Agency (EMA) provided regulatory guidelines for the categorization of N-Nitrosamine potency using structure-activity relationships (SARs) rules with guidelines from other regulatory agencies expected soon. This Symposium will present the findings of the EMA-funded MUTAMIND project and US Food and Drug Administration (US FDA) experimental investigations, as well as discuss the latest regulatory guidelines for SAR-based potency assessment. The MUTAMIND project was established to better understand the different processes involved in the mutagenicity of N-Nitrosamines with a focus on NDSRIs with the goal to develop predictive SARs to distinguish N-Nitrosamine classes with different potency. This includes (1) investigation of the endogenous formation of N-Nitrosamines from pharmaceutical drugs under physiological conditions in the human gastrointestinal tract, (2) identification of the enzymes involved in the metabolic activation of N-Nitrosamines, (3) investigation into the biological processes leading to DNA adduct formation and DNA repair, and (4) the optimization of the Ames and in vitro comet assays for detection of mutagenicity. Progress in each of these areas will be presented. US FDA experimental investigations are focusing on developing approaches to detect the mutagenicity of N-Nitrosamine drug impurities and NDSRIs with the highest possible confidence. Toward that end, research projects will be described that are attempting to optimize the Ames test for detecting the mutagenicity of nitrosamines and NDSRIs and that further study Ames findings using assays that rely on human cell targets, human metabolic pathways, and mutational targets that detect a range of DNA alterations.

Abstract #
#1208 4:45 PM Nitrosamines: Mechanistic Evidence to Support Subclasses with Varying Mutagenic Potency.
4:45 PM Introduction. K. Cross. Instem, Columbus, OH.
Biocompatibility refers to the ability of a device material to perform with an appropriate host response in a specific situation per the US Food and Drug Administration (US FDA) Biocompatibility Guidance on Use of ISO 10993-1. The universe of products requiring biocompatibility assessment continues to expand and now includes over two million different medical devices on the global market, as well as wearable electronics, consumer apparel wearables, and cosmetics. Skin contact is an exposure route common to topical medical devices and consumer products (including cosmetics, clothing, cleaning products, and consumer electronics). Chemicals in such products can present potential local toxicity concerns either due to irritation or skin sensitization. This session will provide an overview of toxicological assessment methods used across different industries (i.e., cosmetics, medical devices, and wearable consumer electronics). Regulatory guidance for toxicology and biocompatibility review is quite varied across these industries. As an example, color additives in cosmetics and medical devices are evaluated under clearly defined regulatory programs by the US FDA, while regulatory requirements for biocompatibility of consumer electronics are not as clearly delineated. Speakers in this session will (1) provide an overview of regulatory frameworks for toxicology/biocompatibility review of devices and cosmetics, as well as opportunities to leverage these frameworks in other consumer products industries, such as electronics; (2) discuss the US FDA approach for safety assessment of color additives in cosmetics; (3) provide insight into the role of toxicology as part of the human health and environmental safety assessment of electronic wearables, such as a smart watch; and (4) leverage learnings between these closely related sister industries and discuss opportunities and challenges related to safety assessment of unique consumer electronics such as AR/VR products, in-ear audio products, etc. Reducing the use of traditional animal testing is an underlying theme throughout all product sectors, and the speakers will discuss evaluation of target toxicity endpoints using alternative methods, including read-across, \textit{in silico} screening tools, \textit{in vitro} methods, and data from new approach methods. Overall, attendees in this session will gain an understanding of how to assess biocompatibility of various products, the challenges toxicologists can face in performing and communicating the results of these assessments, and guidance for a path forward in terms of approaches for safety assessment of novel types of products, such as consumer electronics. This session aligns with the overall mission of SOT, raises awareness of the practical application of non-animal testing approaches, and ensures that the value and role of toxicology is understood beyond well-known sectors such as pharma, devices, cosmetics etc. This session also will serve as a resource for scientists pursuing careers in toxicology to understand the breadth of sectors where toxicology plays an integral role and promotes the utilization of appropriate and relevant science in risk assessment of less-known and unique consumer product categories, such as consumer electronics, thereby enhancing human, animal, and environmental health.

\textbf{Abstract #}

#1212  4:45 PM  \textbf{From My Cosmetics to Smart Watch, Toxicology Touches It All!}

Tuesday, March 12, 4:45 PM to 6:05 PM, Grand Ballroom B, Salt Palace Convention Center

Education-Career Development Session: Toxicology in the Military: Unique Career Opportunities and Applications

Chair(s): Krisa Camargo, Defense Centers for Public Health–Aberdeen; and Elaine Merrill, Defense Centers for Public Health–Portsmouth.

Primary Endorser: Women in Toxicology Special Interest Group

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

Toxicology is interdisciplinary and takes many forms in the United States military. Unless you have family or friends, are personally involved, or are interested in the military, one may be unaware of the unique toxicological research and its applications. One also may be unaware of how to pursue or collaborate with researchers in this career path. Each military branch and directorate have their respective mission(s), but a common goal across all military branches is to protect the health of the service member and their families, communicate the impacts and effects of toxicants, and assess military member exposures. Each speaker will discuss their respective research area(s) and the challenges they may face given their service branch’s unique work environment(s) and will briefly touch upon their respective career path(s). This session will be useful for toxicologists of all levels but is geared toward students and early career scientists interested in pursuing or exploring unique applications of toxicology. The session will highlight several unique research areas in the military, showcase several branches of service, provide attendees with points of contact for future consideration, and highlight the role women are playing in military toxicology. The first speaker will provide an overview of what toxicology looks like in the military and then be followed by a presentation that highlights the role of academia and government partnerships. This second speaker also will address how public health and exposure concerns along the Tijuana River have been identified and spatially mapped. The third speaker will discuss a new military research area, microbiome toxicology, and touch upon the role of military research on human performance. Since service members face diverse and atypical work environments, the fourth speaker will discuss how the naval submarine environment affects the derivation of occupational toxicity values, health effects, and exposure assessment. The final speaker is a current doctoral student who has conducted research with the military since high school. Her research career path and research will tie the previous talks together by illustrating unique collaborative efforts and novel current military toxicology research. The session will conclude with an open comment period where attendees are provided the opportunity to inquire about each speaker’s research, their collaborations, and their respective career paths.

Abstract #

#1213 4:45 PM  Toxicology in the Military: Unique Career Opportunities and Applications.


5:05 PM  Toxicomicrobiomics: New Directions in Understanding Individual Risk. C. Mauzy. Air Force Research Laboratory, Wright-Patterson AFB, OH. Sponsor: K. Camargo

5:35 PM Early Careers in Government Toxicology. P. Lee. US Army Combat Capabilities Development Command Chemical Biological Center, Aberdeen Proving Ground, MD. Sponsor: K. Camargo

5:50 PM Panel Discussion/Q&A.

Tuesday, March 12, 4:45 PM to 6:15 PM, Room 250 D, Salt Palace Convention Center

SOT Annual Business Meeting

SOT members are invited and encouraged to attend the SOT Annual Business Meeting. The agenda includes a financial summary and a review of the 2023–2024 accomplishments.

Tuesday, March 12, 7:30 PM to 9:00 PM, Regency Ballroom A, Hyatt Regency

Tox ShowDown

Captain: Cynthia Rider, NIEHS/NTP.

This is the twelfth year of the Tox ShowDown, the world’s greatest (only?) toxicological quiz game. 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 tangentially related to toxicology. Topics cover the gamut, including the role of toxicology in history, current events, arts, culture, society, and even occasionally science. This event has everything ... ridiculous questions, rules that barely make sense, spirited team competition, audience participation, and a judge! It is a great opportunity to see how many questions you can answer correctly, while enjoying a hearty belly laugh.

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Program Schedule | Wednesday

**ONGOING EVENTS**

**Wednesday, March 13, Various Times and Locations**

**SOT Committee and Component Group Leadership Activities**

SOT Committees, including Regional Chapter, Special Interest Group, and Specialty Section leadership, often hold business meetings and discussions as breakfast or lunch events. These meetings are limited to Committee members and Component Group officers. More specific information about these meetings, including the time, date, and location, is available in the SOT Online Planner and SOT Event App.

**SOT Regional Chapter, Special Interest Group, and Specialty Section Events**

Many Regional Chapters, Special Interest Groups, and Specialty Sections host breakfasts, luncheons, or receptions and/or facilitate mentoring events during the meeting. These activities act as social events, award ceremonies, and career development sessions all in one. These events are a great way to connect with colleagues, meet other members, or learn more about a group before becoming a member. The days, times, and locations of the SOT Component Group activities are available in the "Program Overview" section of this publication, as well as in the SOT Online Planner and SOT Event App.

**Poster Tours for Trainees**

*(Advanced Sign-Up Required)*

**Hosted by:** Postdoctoral Assembly

Graduate students and postdoctoral scientists participate in one-hour guided poster tours with an expert guide. These small group tours provide the opportunity for trainees to take part in critical evaluation of cutting-edge toxicology methods and research findings and network with a senior toxicologist. Advance sign-up is required.

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Presented by SOT
Extracellular vesicles (EVs), including exosomes, are secreted into body fluids from various types of cells and organs. Recent research has shown that EVs secreted by tumor cells are transported to surrounding cells and play a role in metastasis and infiltration. EVs derived from cancer cells contain cancer cell–specific miRNAs, mRNAs, and proteins and have been used as diagnostic biomarkers for early stage cancer since they are secreted into body fluids. Additionally, EVs released into the bloodstream from tissues and organs in response to exposure to chemical substances and drugs are expected to serve as novel biomarkers for toxicity assessment. Recently, there has been growing interest in the use of EVs derived from mesenchymal stem cells for regenerative medicine, raising the importance of safety assessments of EVs.

In this session, the first presentation will cover an introduction to EVs and discuss the toxicological evaluation of EVs, which is essential for considering their future medical applications. The second presentation will focus on the role of EVs in the propagation of neurotoxicity and their potential as biomarkers. The third presentation will introduce novel toxicity assessment methods using EVs as toxicity biomarkers. The fourth presentation will explore exosomes as mediators of lung cellular dysfunction resulting from environmental toxicant exposures. These presentations cover a wide range of topics related to EVs and are expected to generate interest among a diverse range of stakeholders, including regulatory authorities, cancer toxicologists, systems modelers, and industry scientists.

Takahiro Ochiya, Tokyo Medical University, Tokyo, Japan.

Role of Extracellular Vesicles in the Propagation of Neurotoxicity and Their Biomarker Potential. Anumantha Kanthasamy, University of Georgia, Athens, GA.

Extracellular Vesicles as Novel Toxicity Biomarkers.
Ryuichi Ono, National Institute of Health Sciences, Kawasaki, Japan.

Exosomes as Mediators of Lung Cellular Dysfunction by Environmental Toxicant Exposures. Irfan Rahman, University of Rochester Medical Center, Rochester, NY.
Exposure to environmental stressors in fathers is an important, yet understudied, mode of developmental toxicity in offspring. While maternal exposure is a critical route for both adverse birth outcomes and lifelong disease risk, emerging evidence demonstrates that what the father is exposed to prior to conception may hold just as much weight. Exposures to environmental stressors in fathers have been linked to several phenotypic changes in their offspring, including higher risks of cardiometabolic disease and neurobehavioral dysfunction. Importantly, this transfer of disease risk appears to be imparted primarily through epigenetic alterations in sperm that interfere with the early transcriptomic environment of the embryo. This Symposium will examine the current toxicological evidence for paternally mediated developmental reprogramming across various model organisms and discuss the potential implications on risk assessment. Furthermore, this session will explore the unique epigenetic mechanisms that drive these effects, including environmental influences on both the sperm non-coding RNA population and the DNA methylome and through histone modifications. These presentations will hopefully inspire researchers to parse out the unique, and potentially synergetic, contributions of both maternal and paternal exposures within their current research programs. Collectively, this Symposium will highlight a new paradigm in developmental toxicology to catalyze additional work in this area.

Abstract #

#1214  8:00 AM  It Takes Two! Paternal Exposures and Their Impacts on Offspring Health.

#1215  8:00 AM  Paternal Environmental Exposures and Their Influence on Development via the Sperm Epigenome.
S. Kimmins. McGill University, Montréal, QC, Canada. Sponsor: C. Miller

#1216  8:30 AM  Aberrant Sperm DNA Methylation following Wildfire Smoke Exposure in Mice and Humans.
L. Montrose. Colorado State University, Fort Collins, CO.

#1217  9:00 AM  Paternal Preconception Exposure to Delta-9-THC Alone or in Cannabis Extract Impacts Sperm DNA Methylation and Offspring Neurobehavioral Function.
E. Levin. Duke University, Durham, NC.

#1218  9:30 AM  Sperm RNA-Mediated Epigenetic Inheritance in Mammals: Challenges and Opportunities.
Q. Chen. University of Utah, Salt Lake City, UT. Sponsor: C. Miller

#1219 10:00 AM  The Impact of Biomass Smoke Exposure during Sperm Maturation on the Health of the Father and Their Offspring.
C. Miller. US EPA, Research Triangle Park, NC.

10:30 AM  Panel Discussion/Q&A.
Symposium Session: Take a Deep Breath: Opportunities and Challenges in Toxicology Studies for Inhaled Drug Development

Chair(s): Kai Wu, Genentech Inc.; and Yu-Mee Kim, Genentech Inc.
Primary Endorser: Inhalation and Respiratory Specialty Section
Other Endorser(s): Regulatory and Safety Evaluation Specialty Section

Respiratory diseases represent one of the greatest healthcare challenges and are driving an increasing need for more innovative and effective treatments. Inhaled drug administration provides unique advantages to treat respiratory disease, including rapid onset of action in the lung, as well as minimal systemic exposure and associated adverse effects. In the meantime, developing new and improved inhaled drugs presents unique challenges. The goal of this Symposium is to present (1) examples of drug-related toxicity findings in the lung, (2) challenges in conducting adequately designed inhalation toxicity studies, (3) how to further improve physicochemical properties of inhaled drugs and formulations to reduce pulmonary or systemic toxicities, and (4) the US Food and Drug Administration (US FDA) perspectives in evaluating adverse/non-adverse toxicity findings and nonclinical development of inhaled drugs. The first speaker will present a case example of adverse pulmonary pathology findings following inhalation of an insoluble small molecule drug. Innovative approaches to optimize physicochemical properties to model the risk of insoluble particle accumulation will be presented. Development of inhaled drugs for pediatric and neonatal populations poses unique challenges. The second presentation will discuss scientific considerations to design nonclinical safety studies including sheep and rabbit models of respiratory distress syndrome and toxicology studies in pre-weaned rats and dogs. This presentation also serves as a good example of collaboration between academic laboratories and a research institute. Particle engineering and formulation are crucial for pulmonary delivery of drugs to reduce systemic toxicity. The third presentation will compare two dry powder formulations, one for a pulmonary indication and one for a systemic indication, and describe the formulation development to achieve specific attributes for their intended target. Generation of respirable range of aerosol is one of the very important steps to adequately assess drug-related toxicities in the lung. The fourth speaker will present the optimization processes of aerosol generation and pulmonary delivery at a contract research organization. The final speaker, who is from the US FDA, will provide an overview and special considerations for the nonclinical development of inhaled drugs and also insights of adverse/non-adverse drug-related toxicities and the regulatory decision-making process. The speakers participating in this Symposium are from diverse organizations and backgrounds, including a nonprofit research organization, the US FDA Division of Clinical Evaluation and Pharmacology/Toxicology, a contract research organization, and pharmaceutical companies. The audience will gain broad understanding on the unique challenges of inhalation toxicology in drug development, innovative techniques and sciences to overcome the challenges, and regulatory perspectives on the development of inhaled drugs.

Abstract #

#1220 8:00 AM Take a Deep Breath: Opportunities and Challenges in Toxicology Studies for Inhaled Drug Development.

#1221 8:00 AM Predicting Insoluble Particle–Induced Accumulation and Toxicity in Inhaled Drug Discovery. K. Wu. Genentech Inc., South San Francisco, CA.

#1222 8:30 AM Safety and Efficacy of an Aerosol Dry Powder Surfactant Formulation Intended for Respiratory Distress Syndrome. M. Otieno. Bill & Melinda Gates Medical Research Institute, Boston, MA.

#1223 9:00 AM Development of Inhaled Formulations for Pulmonary and Systemic Delivery. A. Curran. Curran Nonclinical Consulting, Duxbury, MA. Sponsor: K. Wu


#1225 10:00 AM Regulatory Perspectives for Inhalation Toxicology and Nonclinical Development of Inhalation Drugs. J. Bonzo. US FDA/CDER, Silver Spring, MD. Sponsor: K. Wu

10:30 AM Panel Discussion/Q&A.
Historically, the relationship between human disease and environmental exposures has been studied through the lens of individual environmental chemicals. Standards set to protect human health have relied on the mechanistic information obtained from research on a single environmental chemical; yet, we are not exposed to a single chemical at a time. In fact, we are exposed to a mixture of various classes of chemicals throughout our lifetime (i.e., metals and organics). In a way, we are a human exposure cocktail experiment, involving hundreds of chemicals, and these mixtures may combine in a way that changes their toxicity. Given the abundant natural and anthropogenic sources of metals in everyday life, exposure to mixtures containing metals is of particular concern. Over the past decade, researchers have begun working across disciplines to characterize real-life exposures and examine the implications of these chemical mixtures in human health. Scientists are developing tools and experimental strategies to predict how chemical mixtures interact with biological systems to adversely impact human health. However, even the most complex tools and tests used today do not include all the chemicals that we are simultaneously exposed to throughout our life, with limited studies considering the impact of chemical mixtures during windows of susceptibility. The National Institute of Environmental Health Sciences has recognized these critical knowledge gaps, making assessment of mixtures and combined exposures a major component of their Strategic Plans. This Symposium will highlight the cutting-edge research being conducted across metal mixture exposure assessment, in vitro and in vivo toxicological assessments of mixtures’ effects, and human multi-metal exposures. Presentations include discussions of novel risk assessment approaches, biological media used for biomarker analyses, and models for whole-life exposures. Further, metal mixtures’ effects on human-relevant adverse outcomes and metal mixture exposures of emerging concern will be presented.

Abstract #

#1226 8:00 AM The “Cocktail Effect”: Studying the Greatest Uncontrolled Experiment Ever Launched!  
8:00 AM Introduction. J. Schlezinger. Boston University School of Public Health, Boston, MA.


#1228 8:35 AM The Risk of Cardiometabolic Diseases after Exposure to Mixtures of Low-Dose Arsenic and Cadmium in Mouse Models. N. Subramaniam. Lady Davis Institute, Montréal, QC, Canada.

#1229 9:05 AM Meconium: A Window into In Utero Metal Exposures and Health Outcomes. J. Fernandes. University of Oklahoma Health Sciences Center, Oklahoma City, OK.

#1230 9:35 AM Neurobehavioral Effects of Developmental Exposure to Cadmium and Polycyclic Aromatic Hydrocarbon Mixtures in Zebrafish and Rats. A. Hawkey. Midwestern University, Downers Grove, IL. Sponsor: J. Young

#1231 10:05 AM Wildfire Smoke Toxicology: A Component-Based Approach to a Complex Mixture. L. Miller. University of California Davis, Davis, CA.

10:35 AM Panel Discussion/Q&A.
Wednesday, March 13, 8:00 AM to 10:45 AM, Room 250 D, Salt Palace Convention Center

Workshop Session: Advancements in Utilizing Zebrafish-Based Behavioral Assays for Detecting Developmental Neurotoxicity and Understanding Associated Cellular and Molecular Changes

Chair(s): Ahmed Abdelmoneim, Louisiana State University; and Jessica Plavicki, Brown University.
Primary Endorser: Neurotoxicology Specialty Section
Other Endorser(s): Molecular and Systems Biology Specialty Section; Reproductive and Developmental Toxicology Specialty Section

Understanding how exposure to environmental contaminants and chemicals of concern affects the developing nervous system is crucial for identifying anthropogenic chemicals that contribute to the onset or aggravation of neurological and psychiatric disorders and for our ability to mitigate their effects on humans. Despite the presence of hundreds of thousands of chemicals in the biosphere, only a fraction have undergone rigorous evaluation and a small subset have been causally linked to developmental neurotoxicity. Toxicity testing has historically been hampered by low throughput and high costs associated with mammalian testing. More recently, the toxicology community has made efforts to reduce some of the existing obstacles in toxicity testing by embracing alternative approaches. The zebrafish has emerged as an effective tool for identifying chemical-induced developmental neurotoxicity in vivo due to its high-throughput capacity, genetic homology to mammals, including humans, conserved cellular and molecular mechanisms of brain developments and established behavioral assays. However, our understanding of these behavioral responses and their causal linkages to cellular or molecular changes remains incomplete. The objective of this session is to bring together experts from government, academia, and industry to discuss advances in applying zebrafish-based behavioral assays to identify chemicals with developmental neurotoxicity potential, demonstrate causal links with changes in the brain and human disease, and highlight areas requiring further research. This Symposium will (1) discuss the integration of zebrafish behavior and mechanistic in vitro assays to support the development of adverse outcome pathways; (2) examine new approach methodologies using a fingerprinting system to classify neuroactive chemicals and identify potential underlying mechanisms; (3) describe new statistical approaches for analyzing and visualizing zebrafish behavior; (4) discuss the discovery of unique patterns of electrical spike activity following chemical-induced seizures and electrophysiological methods for quantifying electrographic seizure-like activity in the zebrafish brain; (5) explore the use of stressor-stimulated locomotor responses as indicators of the functionality of the stress circuitry and stress-related disorders; and (6) discuss their suitability as predictive tools in the screening of discovery crop protection compounds for developmental neurotoxicity.

Abstract #

#1232 8:00 AM Advancements in Utilizing Zebrafish-Based Behavioral Assays for Detecting Developmental Neurotoxicity and Understanding Associated Cellular and Molecular Changes.
8:00 AM Introduction. A. Abdelmoneim. Louisiana State University, Baton Rouge, LA.
#1233 8:05 AM Behavioral Testing in Zebrafish Embryo as a Complementary Assay to Enhance the Developmental Neurotoxicity In Vitro Battery (DNT-IVB). H. Hogberg-Durdock. NIEHS/NICEATM, Research Triangle Park, NC.
#1234 8:25 AM Development and Evaluation of a Zebrafish Behavior-Based Fingerprinting System to Identify Neuroactive Environmental Chemicals. T. Tal. Helmholtz Centre for Environmental Research, Leipzig, Germany.
#1236 9:05 AM Studying Chemical-Induced Seizures in Larval Zebrafish. P. Lein. University of California Davis, Davis, CA.
#1237 9:25 AM Evaluating Chemical-Induced Risks for Stress-Related Disorders Using the Zebrafish Model. A. Abdelmoneim. Louisiana State University, Baton Rouge, LA.
Traditionally, the potential risk for developmental immunotoxicity from pharmaceutical and environmental exposures has been evaluated in animal models. However, the focus has been on a limited number of endpoints and windows of immune development, posing the risk that pathways leading to developmental immunotoxicity may not be fully captured. Moreover, *in vivo* animal developmental immunotoxicity studies struggle with inherent limitations in scalability, high throughput, and translatability to humans. Due to the ethical limitations to clinically evaluate the effects of drugs and other exposures on the developing immune system *in utero* in humans, sensitive *in vitro* assays that are translatable across species could be of great value. If data from conventional *in vivo* toxicology studies suggest that a specific developmental immune pathway is targeted, then a validated *in vitro* test for that specific pathway and species would be useful. When *in vivo* findings are recapitulated *in vitro*, then a similar human *in vitro* assay may allow translation to human relevance. To truly gain an understanding of the initiating events and key perturbations responsible for developmental immunotoxicity, the field must look to new approach methodologies (NAMs) designed to probe these early events in the developmental timeline of the immune system. To achieve this goal, development of informative and predictive *in vitro* technologies, in particular, will be critical. The development of NAMs has been widely acknowledged as a critical need for toxicity testing for various reasons, including the evaluation of more chemicals across a broader range of potential biological effects and evaluating more chemicals in a shorter time frame with fewer resources, while striving for an equal or greater level of human health protection. The development of NAMs for developmental immunotoxicity testing also is important in a regulatory context. For example, current Organisation for Co-operation and Development testing guideline methods for developmental immunotoxicity depend mainly on the extended one-generation study and limitations of the current *in vivo* methods for assessing developmental immunotoxicity. This session will provide an overview of the current status of and future perspectives on NAMs for developmental immunotoxicity testing. We will bring developmental immunotoxicologists and regulators together to discuss the challenges as well as advances in the development and regulatory adoption of precise, predictive, and translatable NAMs to probe the key events leading to developmental immunotoxicity. The discussion will be centered around relevant examples of NAMs with high potential for first level applied and regulatory developmental immunotoxicity screening purposes.
Wednesday, March 13, 8:00 AM to 10:45 AM, Grand Ballroom F, Salt Palace Convention Center

Workshop Session: Next-Generation Risk Assessment Calls for an Evidence-Based Next-Generation Uncertainty Assessment

Chair(s): Sebastian Hoffmann, Evidence-Based Toxicology Collaboration, Germany; and Gro Haarklou Mathisen, Norwegian Scientific Committee for Food and Environment, Norway.

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

Better toxicological understanding, new approach methods (NAMs), and the need for transparent, objective, and reproducible methodologies are bringing about a fundamental change in the toxicological data produced and the evidence distilled from it. Moving away from standard animal data and default assumptions, this development impacts tremendously on how chemical hazard and risk assessments will be conducted in the future. This has been recognized and is, for example, addressed by mode-of-action frameworks, integrated approaches to testing and assessment, and next-generation risk assessment frameworks. There is agreement that one of the major challenges associated with the implementation of these still relatively new types of evidence into regulatory decision-making processes is the assessment of uncertainty. To establish scientific confidence, a prerequisite for regulatory acceptance, a comprehensive approach to develop a next-generation uncertainty assessment is needed. This requires a review of current uncertainty components (e.g., the relevance of traditional uncertainty sources for NAM evidence) and operationalizing other uncertainty components, such as mechanistic understanding and model uncertainty. Emphasizing transparency and methodological rigor, an evidence-based approach to uncertainty concepts, such as biological plausibility, internal and external validity, and (in-)consistency, has the potential to guide such a process. In addition, the combination of various data types, all associated with individual uncertainties, requires a probabilistic and integrative uncertainty assessment approach. This Workshop will discuss approaches and case studies exploring how the uncertainty associated with the new type of evidence can be addressed and integrated in a way that will inform decision-making. Different points of view from academia, governmental authorities, and industry will be presented. The introduction will provide an overview of the challenges of and approaches to characterizing uncertainty related to NAM and mechanistic-based assessments. The first speaker will demonstrate how systematic review and other evidence-based techniques can directly inform uncertainty in risk assessment with case studies. The second presenter will focus specifically on internal and external validity of NAM evidence and introduce tools that operationalize validity assessment in a risk assessment context. The next talk will present how the European Food Safety Authority uses NAM evidence to characterize uncertainty in food and feed safety assessments. The last speaker will demonstrate the usefulness of probabilistic approach to assess uncertainty in hazard and risk contexts. The Workshop will close with an interactive panel discussion.

Abstract #

#1244 8:00 AM Next-Generation Risk Assessment Calls for an Evidence-Based Next-Generation Uncertainty Assessment.

#1245 8:00 AM Introduction to an Evidence-Based Uncertainty Assessment of NAM-Based and Mechanistic Risk Assessment. S. Hoffmann. Evidence-Based Toxicology Collaboration, Paderborn, Germany.


Program Schedule—Wednesday

#1248 9:15 AM Using NAMs to Integrate Variability and Uncertainty in Kinetics and Dynamics: Tiered Approaches from Data-Poor to Data-Rich Situations. J. Dorne. European Food Safety Authority, Parma, Italy.


10:15 AM Panel Discussion/Q&A.

Wednesday, March 13, 9:00 AM to 4:30 PM, Exhibit Hall C, Salt Palace Convention Center

ToxExpo Exhibits

Incorporating visits to the ToxExpo while at the SOT Annual Meeting connects attendees with 250+ exhibitors who support the toxicology community with cutting-edge solutions and services. Visit the ToxExpo to:

• Connect with exhibitors for product, service, and career insights
• Learn about the latest research from 700+ daily poster presentations
• Network with colleagues in the SOT Pavilion and ask questions about the Society
• Check out the Tiny Tox Theater for brief talks focused on a variety of topics
• Enjoy morning coffee and afternoon refreshments
• Grab lunch and relax with others
• Win big by visiting exhibitors with raffles and by dropping your business card in the SOT Diamond-level Supporter boxes
• Experience much, much more

Global Gallery of Toxicology

Toxicology societies from around the world participate in the Global Gallery of Toxicology, where they display posters showcasing their upcoming meetings, key accomplishments, strategic initiatives, journals, awards, and more.

SOT Regional Chapter, Special Interest Group, and Specialty Section Posters

Dedicated poster space showcases the activities of the SOT Regional Chapters, Special Interest Groups, and Specialty Sections.

Wednesday, March 13, 9:00 AM to 10:00 AM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.
Poster Sessions

The presenting authors are available to discuss their research for the following Poster Sessions:

- Cardiovascular Toxicology/Hemodynamics
- Clinical and Translational Toxicology
- Food Safety/Nutrition
- Natural Products
- Oxidative Injury and Redox Biology
- Stem Cell Biology and Toxicology

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

Research Funding Insights Room: Network with Grant Program Officers

Hosted by: Education and Career Development Committee (ECDC)

Representatives from federal agencies will be available in the Research Funding Insights Room to answer general grant-related questions. Check the posted information in the Research Funding Insights Room to make an appointment with a program officer who can discuss aspects of scientific review or specific grant opportunities. New investigators are especially encouraged to meet with program staff.

Tiny Tox Talk: A Multidisciplinary Approach to Risk Assessment: The Postdoc Experience

Speaker(s): Kelly Salinas and Kimberly Zaccaria, SRC Inc., Liverpool, NY.

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Tiny Tox Talk: Applied Toxicology: Totality of the Evidence

Speaker(s): Craig Llewellyn, Exponent, Atlanta, GA.
EUROTOX Award Lecture: Opioid-Related Toxicity: From Respiratory Depression to the Overdose Epidemic

Chair(s): Dori R. Germolec, NIEHS/DTT; and Thomas Weiser, F. Hoffmann-La Roche AG, Switzerland.
Lecturer: Bruno Mégarbane, Université Paris Cité, Paris, France.

For 20 years, opioids have represented the leading cause of drug-induced fatalities in the US. An epidemic of opioid overdose–related deaths is ongoing with four successive waves related to prescription opioids, heroin, fentanyl, and fentanyl/illicit stimulant combination, respectively. The objectives of this lecture are to understand the reasons for this epidemic, the mechanisms involved in opioid-induced respiratory effects, and the strategies used to reverse and prevent this threatening toxicity.

Roundtable Session: Is Less More? Reduction of Animal Use through Virtual Control Groups

Chair(s): Thomas Hartung, Johns Hopkins University Bloomberg School of Public Health; and Annette Bitsch, Fraunhofer Institute for Toxicology and Experimental Medicine, Germany.
Primary Endorser: In Vitro and Alternative Methods Specialty Section
Other Endorser(s): Computational Toxicology Specialty Section; Drug Discovery Toxicology Specialty Section

The concept of virtual control groups (VCGs) aims to replace or reduce concurrent control animals in toxicity studies with historical data collected from previously performed studies. To deploy VCGs, several pharmaceutical companies have started to share legacy toxicity study data of control animals for rodent and non-rodent species, covering all endpoints and parameters investigated in systemic toxicity studies. This activity was initiated in the frame of the Innovative Medicines Initiative project eTRANSAFE. The developed control-animal database serves as a source for constructing VCGs. In addition, statistical procedures for data assessment and quality control, computational tools for data selection, visualization software, and best practice documents for establishing adequate VCGs are under development. Implementing the concept will result in a significant reduction of animal use in preclinical safety studies (contribution to 3Rs and cost reduction, particularly for non-human primates), while safeguarding or even increasing the level of confidence in the results of the animal studies. However, the concept needs to be further developed in close collaboration with regulatory authorities to achieve broad acceptance. This session will consist of four brief statements describing the status of VCG implementation, the development of the VCG database, the statistical evaluation of the collected parameters, and results of proof-of-concept study. The statements will be followed by a discussion focusing on the challenges and strategies for implementation of VCGs in a regulatory context.

Abstract #
#1250 11:00 AM  Is Less More? Reduction of Animal Use through Virtual Control Groups.
11:00 AM  Introduction. T. Hartung. Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD.
Wednesday, March 13, 11:00 AM to 12:20 PM, Grand Ballroom E, Salt Palace Convention Center

**Informational Session: The Modernization of the Cosmetic Regulation Act: Perspectives on Recent Implementation Activities and Confirming Safety in Cosmetic Products**

**Chair(s):** Lauren Brown, ToxStrategies Inc.; and Kaley Beins, Environmental Working Group.
**Primary Endorser:** Regulatory and Safety Evaluation Specialty Section
**Other Endorser(s):** Dermal Toxicology Specialty Section; In Vitro and Alternative Methods Specialty Section

In December 2022, the Modernization of Cosmetics Regulation Act (MoCRA) was passed. This is the most substantial overhaul to the regulation of cosmetic ingredients and products in the United States in almost 85 years. Several major MoCRA provisions, including safety substantiation and adverse event reporting, have statutory dates for implementation by the US Food and Drug Administration (US FDA) at the end of 2023. The goal of this session is to discuss the status of the regulatory oversight by the US FDA in these areas and how toxicologists, both in industry and in non-governmental organizations, are working under the new paradigm. In addition, speakers will touch on how MoCRA fits into the quickly evolving science and regulatory frameworks at the intersection of cosmetics, toxicology, and public health—not only in the US but also internationally. The session will begin with an overview of MoCRA from the US FDA, including the agency’s latest communications and guidance on compliance with new provisions. With the foundation established, the session will then move to the concept of safety substantiation, touching on resources to use along with approaches and key considerations when assessing the safety of complex or novel ingredients in a cosmetic product. A presentation will follow highlighting how new approach methods can address specific challenges facing the cosmetic products and their ingredients in the US and abroad. To conclude, a speaker will discuss how adverse event tracking can support the overall cosmetic product safety assessment. After the presentations, a moderated discussion between presenters and the audience will take place with the goal of examining how MoCRA fits into the global landscape of safety substantiation approaches and potential obstacles in implementation.

**Abstract #**

#1251 11:00 AM  **The Modernization of the Cosmetic Regulation Act: Perspectives on Recent Implementation Activities and Confirming Safety in Cosmetic Products.**

11:00 AM  **Introduction.** K. Beins. Environmental Working Group, Washington, DC.

11:05 AM  **MoCRA in Action: An Update from the US FDA on the New Framework for Regulating Cosmetics.**

L. Katz. US FDA/CFSAN, College Park, MD. Sponsor: L. Brown

11:35 AM  **The Future of NAMs in Informing Safety for Cosmetic Ingredients and Products.** K. Sullivan. Institute for In Vitro Sciences, Ann Arbor, MI.


12:05 PM  **Panel Discussion/Q&A.**

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**Wednesday, March 13, 11:00 AM to 12:20 PM, Grand Ballroom B, Salt Palace Convention Center**

**Informational Session: Through the Lens: Translational Insights in Ocular Toxicology**

**Chair(s):** Tracey Papenfuss, StageBio; and Katharine Horzmann, University of Auburn.

**Primary Endorser:** Comparative Toxicology, Pathology, and Veterinary Specialty Section

**Other Endorser(s):** Immunotoxicology Specialty Section; Ocular Toxicology Specialty Section

Currently, there are billions of people across the globe suffering from some form of vision impairment or blindness. To meet the demand for novel ophthalmic therapeutics, the ophthalmic drug discovery and development market is rapidly expanding, supported by the growing field of ocular toxicology. Ocular toxicology focuses on the toxicologic effects of ophthalmic drugs (administered systemically, topically, or intraocularly) and ophthalmic medical devices. An important facet of ocular toxicology is that the evaluation of potential drug effects and toxicity must include an integrated multidisciplinary approach that includes pharmacology, toxicology, pathology, and ophthalmology and an understanding of translational considerations between animal and human studies. This session provides an overview by veterinary specialists on the comparative and translational considerations in ocular toxicology. First, a veterinary ophthalmologist will provide information on translational models and considerations in ocular toxicology. Then, a veterinary ophthalmologist will discuss the fundamentals of ocular biology (anatomy, physiology, immunology) and ophthalmologic examination techniques and will describe how important ocular anatomic differences of our commonly used laboratory species may impact clinical translatability. Next, a veterinary pathologist will highlight ocular-specific considerations for necropsy collection, tissue processing, and microscopic evaluation. Finally, a veterinary pathologist will discuss adversity and regulatory considerations specific to ocular toxicity studies.

**Abstract #** #1252

11:00 AM  **Through the Lens: Translational Insights in Ocular Toxicology.**

11:00 AM  **Introduction.** T. Papenfuss. StageBio, Mount Jackson, VA.

11:05 AM  **Translational Models and Considerations in Ocular Toxicology.** S. Eaton. University of Wisconsin–Madison School of Veterinary Medicine, Madison, WI. Sponsor: T. Papenfuss

11:20 AM  **Ophthalmic Examination: Clinical and Translational Considerations in Ocular Toxicity Studies.** R. Boyd. Charles River Laboratories, Mattawan, MI. Sponsor: T. Papenfuss

11:35 AM  **Necropsy, Histology, and Pathology Considerations in Ocular Toxicity Studies.** S. Shrader. StageBio, Mount Jackson, VA.

11:50 AM  **Adversity and Regulatory Considerations in Ocular Toxicity Studies.** B. Short. Independent Consultant, Laguna Beach, CA.

12:05 PM  **Panel Discussion/Q&A.**
In the dynamic landscape of career growth and personal development, fostering strong professional relationships, networks, and mentorship is crucial for individuals across all stages of their careers, both within and outside of their organizations. This interactive session will discuss the importance of mentoring for students, early-, mid-, and late-stage career professionals, emphasizing that even those in the late stages of their careers can benefit from mentorship. The session will present best practices for cultivating meaningful mentoring relationships by sharing personal experiences and anecdotal case studies from professionals in various sectors, such as academia, industry, government, and contract laboratories. The primary goal of this session is to equip attendees with the skills necessary to establish, nurture, and maintain an effective and successful network of mentors in the field of toxicology. To achieve these objectives, the session will commence with brief presentations from mentors at different career stages, who have both guided others and experienced the benefits of mentorship themselves. The roles of each relationship and strategies for maximizing valuable feedback from mentors will be explored. Presentations will include case studies to highlight the pivotal role of a mentor’s advice in career advancement, career advancement, the evaluation and impact of career choices, effective communication with managers about professional and personal goals, transitioning between careers, and seeking mentorship outside of one’s organization. Sufficient time is allocated to on-site mentoring through an interactive panel discussion featuring speakers and session participants. In summary, this session will cover essential elements for establishing effective mentoring relationships, building a robust professional network, evaluating relationships through self-assessment and peer assessment, gaining insights from early and advanced career professionals, and engaging in interactive on-site mentoring experiences. Mentoring is a critical aspect of personal and professional development irrespective of one’s professional status.

Abstract #

#1253  11:00 AM  Empowering Career Growth through Effective Mentoring and Networking for Toxicologists.
11:00 AM  Introduction. T. Parman. Sangamo Therapeutics, Brisbane, CA.
11:10 AM  Navigating the Shift from Academia to Industry: Harnessing the Power of Mentoring Networks and Transferable Skills. A. Rastogi. Ionis Pharmaceutical, Carlsbad, CA.
11:20 AM  Expanding Horizons: Maximizing Growth and Development through Multifaceted Mentorship and Networking. C. McLoughlin. Enhesa, Schuyler, VA.
11:25 AM  Dealing with Change: How Being Both a Mentor and Mentee Has Helped Steer through the Twists and Turns of Career and Life. N. Pechacek. Ecolab, Saint Paul, MN.
11:30 AM  Great, I’ve Found a Mentor! Now What? A. Curry. Texas Commission on Environmental Quality, Austin, TX.
11:40 AM  Panel Discussion and Interactive Session.
Wednesday, March 13, 11:20 AM to 11:40 AM, Exhibit Hall C, Salt Palace Convention Center

**Tiny Tox Talk: Considerations When Evaluating and Monitoring a Contract Research Organization for Nonclinical Studies**

*Speaker(s):* Angela Lynch, Tox Plus Monitoring, Westmont, IL.

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Wednesday, March 13, 11:45 AM to 1:45 PM, Exhibit Hall C, Salt Palace Convention Center

**Poster Sessions**

The presenting authors are available to discuss their research for the following Poster Sessions:

- Carcinogenesis
- Computational Toxicology I
- Kidney
- Liver: *In Vitro*
- Mixtures
- Neurotoxicity: Developmental II
- Neurotoxicity: Pesticides
- Pesticides

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

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Wednesday, March 13, 12:00 Noon to 1:00 PM, Locations Vary, Salt Palace Convention Center

**Exhibitor-Hosted Sessions**

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

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Wednesday, March 13, 12:00 Noon to 12:20 PM, Exhibit Hall C, Salt Palace Convention Center

**Tiny Tox Talk: Making Effective and Inspiring Educational Videos**

*Speaker(s):* Jennifer Plahovinsak, Ohio State University, Columbus, OH.

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[www.toxicology.org/memberapp](http://www.toxicology.org/memberapp)
Wednesday, March 13, 12:30 PM to 1:30 PM, Grand Ballroom F, Salt Palace Convention Center

FS Plenary Keynote Medical Research Council (MRC) Lecture: Drug Safety Pharmacogenomics—Moving from Discovery to Implementation

Lecturer: Sir Munir Pirmohamed, University of Liverpool, Liverpool, United Kingdom.

Professor Sir Munir Pirmohamed is a British clinical pharmacologist and geneticist. Since 2007, he has been the NHS Chair of Pharmacogenetics at the University of Liverpool. In 2022, he chaired a committee that produced a report on behalf of the Royal College of Physicians of London and the British Pharmacological Society which advocates for the implementation of pharmacogenomics into the UK NHS.

Wednesday, March 13, 12:40 PM to 1:00 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: No Scientist Is an Island: Tips for Successful Collaborations and Networking

Speaker(s): Courtney McClure, Delaware State University, Dover, DE.

Wednesday, March 13, 1:20 PM to 1:40 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: What Does It Mean to be Generally Recognized as Safe?

Speaker(s): Brinda Mahadevan, Brincor Associates LLC, New Albany, OH.

Wednesday, March 13, 1:30 PM to 4:15 PM, Room 250 A, Salt Palace Convention Center

Symposium Session: Accelerating Discovery in Parkinson’s Disease: A Blueprint for Modeling Environmentally Relevant Exposures through Cross-Disciplinary Collaboration

Chair(s): Briana De Miranda, University of Alabama at Birmingham; and Alison Bernstein, Rutgers, The State University of New Jersey.

Primary Endorser: Neurotoxicology Specialty Section

Parkinson’s disease is the fastest growing age-related neurological disease, and cases are predicted to more than double globally by 2040. These increases in prevalence outpace the effects of aging and increased longevity alone, with the most rapid increases occurring in newly industrialized areas, suggesting that environmental exposures are key risk factors. In fact, only a small minority of Parkinson’s cases can be linked to single genetic mutations, leaving the etiology of the large majority of cases as due to a complex combination of genetic and environmental risk factors (e.g., pollutants, pathogens, lifestyle, and diet). However, there is still much that is not understood about how these environmental factors contribute to disease pathogenesis. Increased understanding of the link between environmental exposures and the development of Parkinson’s disease will be critical to the long-term reduction in the global burden of the disease through preventative measures and disease-modifying
therapies. One of the key factors limiting mechanistic insight is the limited translation between human exposure to Parkinson's-related toxicants and experimental models of neurodegeneration. This is broadly due to a lack of high-quality, Parkinson's-relevant exposure data in epidemiological studies and the use of dosing paradigms that do not emulate environmentally relevant, real-world exposures. Additionally, there is little consensus between the toxicology and neuroscience fields regarding how experimental modeling can be properly used to identify disease mechanisms resulting from environmental risk factors. Success in understanding, and potentially modifying, environmental impact on Parkinson's etiology will require collaboration and funding across disciplines combined with the use of emerging technology (e.g., metabolomics, epigenetics, imaging, genetic tools) and application of basic toxicological principles. This session will bring together speakers from different fields related to Parkinson's research to discuss these challenges and provide a blueprint for how the field can accelerate discovery in the environmental influence of Parkinson's disease. Our experts will take a top-down approach and discuss (1) optimized design for epidemiological studies assessing Parkinson's-related toxicant exposures, (2) using high-resolution metabolomics to understand the exposome of Parkinson's disease, (3) integrating environmentally relevant exposures in animal models to better emulate real-life, Parkinson's-related exposures, (4) incorporating a broader range of pathological outcomes to better emulate the long-term and prodromal etiology of Parkinson's disease, (5) including assessment of exposures across the lifespan and in both biological sexes, and (6) the role of funding agencies in accelerating this approach through collaborative efforts. At the session's completion, attendees will have a greater understanding of the challenges of measuring and modeling environmentally relevant exposures in Parkinson's disease models and current work being done to address these challenges.

Abstract #

#1254 1:30 PM Accelerating Discovery in Parkinson's Disease: A Blueprint for Modeling Environmentally Relevant Exposures through Cross-Disciplinary Collaboration.

1:30 PM Introduction. B. De Miranda. University of Alabama at Birmingham, Birmingham, AL.

#1255 1:35 PM Challenges and Opportunities in Epidemiology to Identify Environmental Risk Factors for Parkinson's Disease. S. Goldman. University of California San Francisco, San Francisco, CA. Sponsor: B. De Miranda

#1256 2:05 PM Establishing an Analytical Base to Support the Exposome Disease Atlas for Neurodegenerative Disease. D. Walker. Emory University, Atlanta, GA. Sponsor: B. De Miranda

#1257 2:35 PM Evolving toward Environmentally Relevant Exposures in Models of Parkinson's Disease. B. De Miranda. University of Alabama at Birmingham, Birmingham, AL.

#1258 3:05 PM Modeling Environmental Risk for Parkinson's Disease: Developmental Dieldrin Exposure with Alpha Synuclein Pre-formed Fibrils. A. Bernstein. Rutgers, The State University of New Jersey, New Brunswick, NJ.


4:05 PM Panel Discussion/Q&A.

Wednesday, March 13, 1:30 PM to 4:15 PM, Grand Ballroom J, Salt Palace Convention Center

Symposium Session: Evaluation of Human Health Safety of Cosmetics and Personal Care Products in Minority and Sensitive Populations

Chair(s): Babasaheb Sonawane, Georgetown University; and Abdel-Razak Kadry, University of Maryland.

Primary Endorser: Risk Assessment Specialty Section

Other Endorser(s): Arab Toxicologists Association Special Interest Group; Toxicologists of African Origin Special Interest Group

The global cosmetic products industry is expected to be worth around $805 billion in 2023. In general, these products include facial makeup, skincare, hair care, fragrances, and other personal care items, such as feminine hygiene products. Cosmetics are used by people of all ages and genders around the world, and their popularity is growing because of factors such as changing lifestyles, rising disposable incomes, and increased awareness of the benefits of personal grooming. According to
some published reports, certain cosmetic and personal hygiene care products and their ingredients may be linked to adverse health outcomes. According to published data, there is a significant disparity in the use and adverse health effects of cosmetics use, which are often associated with factors such as race, ethnicity, cultural practices, and socioeconomic status. Recent studies show that ethnic groups such as Black, Asian, and Hispanic people are more likely than Caucasians to have negative health outcomes from certain types of cosmetics. This session will look to highlight the links between environmental justice and chemical exposures associated with the use and misuse of cosmetic products. The session will address racial, ethnic, and cultural differences in product use (such as facial and skin-lighting cosmetics, hair straighteners, feminine hygiene, fragranced products, and cosmetic eyeliners) and their potential chemical exposures and associated health risks (noncancer and cancer) for women's reproductive health throughout their lives. It will address a variety of issues related to assessing the health risks of contaminants in cosmetics. The role of the cosmetics industry, regulatory agencies, and academic scientists in reducing disparities will be highlighted to identify research needs relevant to health risk assessments of chemicals of concern to protect the health of vulnerable populations, particularly women, children, and minorities. The presentations of the session will focus on increasing awareness of human health safety of cosmetic ingredients and products used by the general population. It is expected to focus on scientific evidence only and not on any policy issues. Disclaimer: The views and opinions expressed are those of the authors and do not stand for policy or approval of their affiliation(s). The authors declare no conflict of interest.

Abstract #

#1260  1:30 PM  Evaluation of Human Health Safety of Cosmetics and Personal Care Products in Minority and Sensitive Populations.

#1261  1:30 PM  Evaluation of Human Health Safety of Cosmetics and Personal Care Products in Minority and Sensitive Populations. B. Sonawane¹, and A. Kadry². ¹Georgetown University, Washington, DC; and ²University of Maryland, College Park, MD.

#1262  1:50 PM  Using the Skin Deep Cosmetics Database to Identify Exposures and Reduce Health Hazards. K. Beins. Environmental Working Group, Washington, DC.


#1265  3:20 PM  Expanding Education on Skin-Lightening Products. C. Lee. US FDA/OMHHE, Silver Spring, MD. Sponsor: A. Kadry

#1266  3:50 PM  Beauty Justice at the Intersection of Corporate Leadership and Regulation. J. McPartland. Beautycounter, Santa Monica, CA. Sponsor: B. Sonawane

Wednesday, March 13, 1:30 PM to 4:15 PM, Grand Ballroom E, Salt Palace Convention Center

Symposium Session: Preclinical Development of RNA-Editing, Gene, and Cell Therapies: Risks and Challenges

Chair(s): Archit Rastogi, Ionis Pharmaceuticals; and Toufan Parman, Sangamo Therapeutics.
Primary Endorser: Biotechnology Specialty Section
Other Endorser(s): Mechanisms Specialty Section; Women in Toxicology Special Interest Group

This multifaceted session delves into the groundbreaking field of RNA-editing, gene, and cell therapies, providing insights into the risks and challenges faced during preclinical development. Featuring a diverse array of speakers and topics, the session will explore innovative therapeutic approaches, organ-specific delivery challenges, preclinical nerve conduction methods, CAR-T cell therapy considerations, and regulatory perspectives from the US Food and Drug Administration (US FDA). The session will begin with a novel approach for treatment of painful chronic peripheral neuropathic pain using zinc finger repressors (ZF-Rs) that target mouse and human Nav1.7 gene and can epigenetically repress this gene, which leads to significant reduction in
pain. The data from preclinical studies supporting the development of AAV-delivered ZF-Rs and selection of clinical candidate for the treatment of this indication will be presented and discussed in the context of current ongoing research in the field of AAV gene therapy, including the risks and challenges associated with developing such therapies. Case studies and real-world examples, such as one focusing on the progression of peripheral neuropathy in five sensory nerves over 12 months after intracerebroventricular administration of an AAV-based gene therapy test article in the cynomolgus monkey, will be presented. Furthermore, importance of route of exposure and preclinical species in antisense oligonucleotide delivery will be explored, and the challenges posed by different routes of exposure and the relevance of these findings to clinical applications will be discussed. Mechanistic learnings from preclinical studies in different species, which can inform the design of more effective preclinical studies, also will be presented. Cell therapies, particularly new generation of chimeric antigen receptor T-cell (CART) therapies have helped advance treatment of diseases with unmet medical need, such as lymphoma; however, their development as a new clinical therapy has faced many challenges, such as assessment of biodistribution and potential for tumorigenicity and immunogenicity. A regulatory overview on risk and challenges associated with RNA-editing, gene, and cell therapies also will be provided from a US FDA perspective. By attending this session, participants will gain a comprehensive understanding of the scientific breakthroughs, challenges, and risks during preclinical development of RNA-editing, gene, and cell therapies. With the inclusion of a panel discussion featuring all speakers, attendees will have the opportunity to engage in meaningful dialogue on this exciting and rapidly evolving field, making this a must-attend session for researchers, industry professionals, and others interested in the future of personalized medicine and transformative therapies. The panel discussion will allow for a more interactive experience, enabling the audience to address their questions to the experts and foster a deeper understanding of the topics discussed. This session aims to not only showcase the latest advancements but also provide practical knowledge on overcoming challenges in preclinical development for RNA-editing, gene, and cell therapies.

Abstract #

#1267 1:30 PM Preclinical Development of RNA-Editing, Gene, and Cell Therapies: Risks and Challenges.

#1268 1:30 PM Tracing the Evolution of Cell and Gene Therapies: A Historical Perspective. A. Rastogi1, and T. Parman2. 1Ionis Pharmaceuticals, Carlsbad, CA; and 2Sangamo Therapeutics, San Francisco, CA.


#1271 2:30 PM Challenges and Considerations for Organ-Specific Delivery of Antisense Oligonucleotides: The Importance of Route of Exposure and Preclinical Species. A. Rastogi. Ionis Pharmaceuticals, Carlsbad, CA.


3:45 PM Panel Discussion/Q&A. A. Rastogi1, T. Parman2, M. Metea3, and J. Cunningham4. 1Ionis Pharmaceuticals, Carlsbad, CA; 2Sangamo Therapeutics, San Francisco, CA; 3PCE Consult, Boston, MA; and 4RegenX Bio, Rockville, MD.
Thyroid hormones control many aspects of physiology and metabolism and are particularly critical in brain development. Human and animal studies have clearly established the essentiality of adequate supplies of thyroid hormone in both fetal and child brain structure and function. Epidemiological studies affirm associations between maternal and newborn thyroid hormones in the blood to brain grey matter volume and child IQ. The levels of hormone change in maternal serum from these clinical studies are within the range observed with environmental contaminant exposures. Genetically modified mouse models have revealed not only the complexity of the thyroid system but also the diversity of neurodevelopmental outcomes that can result from distinct molecular perturbations of thyroid signaling. To identify chemicals that may interact with the myriad target sites available within the thyroid system (i.e., molecular initiating events [MIEs]), a battery of tests have been developed and large-scale high-throughput screening efforts have been mounted. Despite significant progress on this front, large gaps remain in translating such outputs to in vivo effects in intact mammalian models. As in the clinic, the regulatory community relies on serum thyroid hormones to determine hazard and evaluate risk. They occupy a prominent key event in the adverse outcome pathway (AOP) for thyroid disruptors, sitting immediately downstream from many MIEs, yet remaining distinctly remote from the neurodevelopmental impairments of concern. There is a specific need for metrics of intermediate key events in the biological space between serum and neurological impairments, linking serum to brain, for the development of quantitative life stage-specific predictive models for extrapolation to human health risk. This Symposium brings together experts from the clinic and bench scientists in research laboratories from industry, government, and academia, spanning research areas of in vitro screening tools, neurobiology of the thyroid system, neurotoxicology of environmental contaminants, and children’s health, presented against the backdrop of the AOP framework.

Abstract #

#1274 1:30 PM  Thyroid System—Disrupting Chemicals and the Developing Brain.

#1275 1:35 PM  Setting the Stage: An Introduction to the Hypothalamic Pituitary Thyroid Axis. R. Ghaffari. Corteva Agriscience, Newark, DE.

#1276 1:55 PM  A Systems-Wide Approach for In Vitro Screening of Potential Thyroid System Disruptors. S. Degitz. US EPA, Duluth, MN. Sponsor: M. Gilbert

#1277 2:25 PM  What Have We Learned from Genetically Altered Mouse Models and How Has That Informed Neurotoxicology of Thyroid Disruptors? D. Sharlin. Minnesota State University, Mankato, MN. Sponsor: M. Gilbert

#1278 2:55 PM  Thyroid Hormone System Adverse Outcome Pathways and Developmental Neurotoxicity—Case Study: Perchlorate and Iodine Deficiency. M. Gilbert. US EPA, Research Triangle Park, NC.

3:55 PM  Panel Discussion/Q&A. L. Ramhøj†, and M. Gilbert‡. †Danmarks Tekniske Universitet, Copenhagen, Denmark; and ‡US EPA, Research Triangle Park, NC.
A crucial transformation is required in the way we make decisions about chemical safety to transition from relying solely on animal testing. There is a need to adopt a more comprehensive approach that includes in vitro testing and predictive toxicology methods. Efforts are currently underway to develop and demonstrate that new approach methodologies (NAMs) can effectively evaluate chemical hazards and estimate doses at which human exposure is expected to impact health. It is anticipated that NAMs can offer a more extensive range of biologically relevant and mechanistic data in a shorter time and with fewer resources, while maintaining or even surpassing the predictability of current animal models. While there is great promise for nonanimal NAMs and short in vivo tests using high-content technologies, there remains many uncertainties associated with using these tools in decision-making. The use of ‘omics and alternative measures for defining points of departure (PODs) in these different assays help integrate and better translate response to existing in vivo assays (e.g., two-year rodent assays) while providing data to decision-makers more quickly. A POD refers to the dose or concentration of a substance that marks the beginning of a low-dose extrapolation. It can be a lower bound estimate of a significant effect dose in a dose-response model (e.g., benchmark dose), or it could be chosen from a no- or low-observed-adverse-effect level (NOAEL or LOAEL) of a study. The choice of POD can have significant implications for risk assessment and regulatory decision-making, as different assumptions about toxicity and safety can lead to different conclusions about the acceptable levels of exposure. In this session, we will explore the use of multi-‘omics and alternative measures for identifying PODs and the added value of integrating response for better risk predictions. Results will be presented in the context of current “gold-standard” values, such as NOAELs, and traditional, chronic measures of toxicity. We will begin with an overview of NAMs, their challenges, and the use of PODs. We will then share various researchers’ experiences with calculating in vitro–based PODs from transcriptomics, cell painting, metabolomics, and extracellular vesicles, as well as using more established short-term, in vivo transcriptomic PODs in industry and regulatory settings. The overall goal of this Workshop is to reduce the need for chronic animal toxicity testing through building confidence and support for the use of molecular PODs to support chemical risk-assessment decisions across sectors.

Abstract #

#1280 1:30 PM Application of Early Molecular Measurements to Develop Points of Departure for Risk Assessment. Welcome and Introduction. L. Wehmas. US EPA, Research Triangle Park, NC.


#1283 2:15 PM Incorporating Extracellular Vesicle Mediators of PFAS Toxicity into NAMs-Based Points of Departure: A Comparison against Transcriptomic-Based Risk Values. C. Carberry. University of North Carolina at Chapel Hill, Chapel Hill, NC.


3:35 PM Panel Discussion/Q&A.
The lung is highly sensitive to chemical injuries caused by exposure to chemical threat agents in industrial or transportation accidents, occupational exposures, natural disasters, or deliberate use as weapons of mass destruction (WMD). During World War I, approximately 45 chemicals were used as chemical weapons. To date, many countries have stockpiles of chemical weapons from World Wars I and II. Member state parties of the Organization for Prohibition of Chemical Weapons have destroyed or abandoned significant amounts of stockpiles toward the complete disarmament of chemical weapons. However, many of the chemical weapons are industrial chemicals that are easy to synthesize with simple ingredients. The resurgence of the deployment of chemical weapons has increased during conflicts in the Middle East. There are no antidotes or biomarkers for the majority of the chemical threat agents and toxic inhalation hazards despite their use as WMDs for more than a century. As clinical trials are not feasible for developing medical countermeasures (MCMs) and biomarkers against chemical threat agent–induced injuries, the US Food and Drug Administration has instituted the animal rule. Under the animal rule, the efficacy of the potential MCMs has to be demonstrated in at least two animal models before getting approved as an MCM for that particular indication. In silico, in vitro, and in vivo (rodent and non-rodent) models of chemical threat agent–induced injuries play an important role in the drug approval process under the animal rule. In the United States, the Department of Defense and National Institutes of Health Countermeasures Against Chemical Threats (CounterACT) programs have been funding studies on basic pathophysiology, the natural history of disease progression, and initial translational studies to identify and develop potential MCMs and biomarkers. In the past decade, significant progress was made in understanding pulmonary chemical threat agent–induced injuries and identifying lead potential MCMs and biomarkers. In this Workshop, we will summarize the latest updates regarding potential drug targets based on the mechanism of action, identification, and optimization of lead MCMs and biomarkers against pulmonary chemical threat agents. The opportunities and challenges in modeling pulmonary injuries in preclinical models and the development of MCMs and biomarkers also will be highlighted. This session is relevant to all toxicologists (specifically inhalation toxicologists, researchers focusing on chemical threat agents, clinical and translational toxicologists, comparative toxicologists, toxicopathologists, drug discovery toxicologists, toxicologists with a focus on mechanisms, and in vitro and alternative modeling toxicologists), federal and regulatory agencies, and industry.
Program Schedule—Wednesday

#1292 3:05 PM  Phosgene Inhalation Injuries: Potential Medical Countermeasures and Biomarkers. S. Achanta. Duke University School of Medicine, Durham, NC.
#1293 3:30 PM  Beyond the Skin: Pulmonary Damage Due to Cutaneous Lewisite Exposure. A. Ahmad. University of Alabama at Birmingham, Birmingham, AL.
3:55 PM  Panel Discussion/Q&A.

Wednesday, March 13, 1:30 PM to 2:30 PM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.

Wednesday, March 13, 2:00 PM to 2:20 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Publishing

Speaker(s): Laura Van Winkle, University of California Davis, Davis, CA.

Wednesday, March 13, 2:15 PM to 4:15 PM, Exhibit Hall C, Salt Palace Convention Center

Poster Sessions

The presenting authors are available to discuss their research for the following Poster Sessions:

- Bioinformatics
- Computational Toxicology II
- Drugs of Abuse
- Mathematical Modeling
- Metals II
- New Approach Methods: Computational
- Regulation/Policy

Posters will be displayed from 9:00 am to 4:30 pm, with the author in attendance during the assigned Poster Session.

Wednesday, March 13, 2:40 PM to 3:00 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Giving a Powerful PowerPoint Talk: The Art of Active Listening

Speaker(s): Judy Zelikoff, NYU Grossman School of Medicine, New York, NY.

Wednesday, March 13, 3:00 PM to 4:00 PM, Locations Vary, Salt Palace Convention Center

Exhibitor-Hosted Sessions

Information on the Exhibitor-Hosted Sessions scheduled for this time period is available in the “Program Overview” section of this publication, and full details, including hosts, topics, and descriptions, are available in the SOT Online Planner and SOT Event App.
Wednesday, March 13, 3:20 PM to 3:40 PM, Exhibit Hall C, Salt Palace Convention Center

Tiny Tox Talk: Meet the Director: US EPA

Speaker(s): Maureen Gwinn, US EPA/ORD, Durham, NC.

Wednesday, March 13, 7:00 PM to 8:30 PM, Regency Ballroom A, Hyatt Regency
(By Invitation Only)

President’s Reception

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<table>
<thead>
<tr>
<th>Regional Chapters</th>
<th>Special Interest Groups</th>
<th>Specialty Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foster scientific exchange on a local level</td>
<td>Explore scientific issues related to specific communities</td>
<td>Discuss science around particular research areas</td>
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</table>

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Symposium Session: Capturing Unknowns: Increasing Utility of Epidemiologic Studies as Key Evidence in Chemical Risk Assessment

Chair(s): Heather Schaefer, US FDA/CFSAN; and Melissa Vincent, ToxStrategies LLC.
Primary Endorser: Risk Assessment Specialty Section
Other Endorser(s): Exposure Specialty Section

Recent methods and advancements in chemical risk assessment science encourage the integration of epidemiological evidence in the derivation of toxicological reference values. The causal inference movement has demonstrated that causality is usually not determined based on a single method or study but rather involves analyzing a wide variety of evidence and using a weight of evidence approach. For example, recent developments through the notion of triangulation of evidence in environmental epidemiology reinforce the weight of evidence concept where each approach has potential sources of bias; however, if the results all point to the same conclusion, the causal inference is strengthened. In addition, there are many advantages to the use and incorporation of epidemiological evidence for dose-response, including (1) confirmation of human relevance; (2) the potential to examine relevant exposure levels, and (3) incorporation of exposure-response uncertainties attributed to genetics, co-exposures, or other exposome or population-based considerations. Current risk assessment guidance does not, however, provide clear instruction for risk assessors on how to interpret the relevance of epidemiologic evidence for causal inference, nor is guidance provided on how to navigate challenges in interpretation of epidemiologic evidence due to uncertain exposure measurements, co-exposures and confounders, heterogeneity in response, or other study design limitations that may limit assessment of the temporal relationships between exposure and response. Despite these limitations, epidemiologic evidence can be a valuable tool and provide a more robust framework for reference value derivation with the integration of toxicological information. However, there is still a lack of guidance in how to best integrate human and animal evidence for quantitative reference value derivation, especially when considering inclusion of uncertainties that may impact confidence in causality. Interpretation of the evidence, including dose-response, outcome severity, and integration with toxicological evidence, must be considered as part of a robust risk assessment process. Growing methods, such as use of triangulation for evidence integration, address some of these concerns. For many analyses based on epidemiologic evidence, assumptions regarding the exposure and response must be made; uncertainty analyses that test the sensitivity of derived reference doses to deviations in these assessments are a critical step in the process. This session will open the dialogue regarding the use of epidemiological data in the hazard characterization and exposure assessment steps of chemical risk assessment. An overview of the general issues related to the use of observational studies in establishing causality will be provided. In addition, tools on how to address the uncertainty related to the derivation of toxicological reference values when using epidemiological data will be explored, including the application of methods for evidence synthesis such as triangulation to evaluate risk of bias across studies and for modeling the data to estimate effect concentrations. A communication/education tool for bridging the epidemiology/risk assessment gap—known as the “Matrix”—also will be described. The session will close with case studies that demonstrate the impact of uncertainties from study selection, exposure assumptions, and dose-response modeling assumptions and the impacts that these may have on toxicological reference values.

Abstract #

#1294 8:30 AM Capturing Unknowns: Increasing Utility of Epidemiologic Studies as Key Evidence in Chemical Risk Assessment.


Thursday, March 14, 8:30 AM to 11:15 AM, Room 251 D, Salt Palace Convention Center

Symposium Session: Current Status, Challenges, and Future Considerations: Advancing NAMs for Assessing Inhalation Toxicity

Chair(s): Xiaoqing Chang, Inotiv; and Andreas Stucki, PETA Science Consortium International e.V., Germany.
Primary Endorser: Regulatory and Safety Evaluation Specialty Section
Other Endorser(s): Inhalation and Respiratory Specialty Section; Risk Assessment Specialty Section

Data from animal tests to evaluate the toxicity of inhaled chemicals have limited applicability to humans due to species-specific anatomical differences in the respiratory tract relative to humans and complexities in the transport kinetics of inhaled substances through the respiratory tract. In vitro, in silico, and in chemico new approach methodologies (NAMs) have been developed to provide more human-relevant, mechanistically driven approaches to identify potential inhalation toxicity hazards. Many of these NAMs have shown promise for addressing screening needs and data gaps in various applications of inhalation risk assessment. This session will summarize current research efforts, trends, and next steps for developing NAMs to evaluate inhalation toxicity. Case examples will demonstrate recent advancements in the development and implementation of NAMs and their utility in integrated approaches to testing and assessment. Examples will include details on translating in vitro assay data into an in vivo context relevant for humans through consideration of pharmacokinetics and modeling the deposition or retention of particles within the respiratory tract. Current challenges, best practices, and critical steps in confidence building that should be taken to fully characterize the usefulness and limitations of NAMs to inform various inhalation assessment applications will be discussed.

Abstract #

#1300 8:30 AM Current Status, Challenges, and Future Considerations: Advancing NAMs for Assessing Inhalation Toxicity.

#1301 8:30 AM Current Efforts Using NAMs to Evaluate Inhalation Toxicity. A. Stucki. PETA Science Consortium International e.V., Stuttgart, Germany.

#1302 9:00 AM Challenges in Developing High-Throughput Assays to Evaluate Inhalation Toxicity of Volatile Organic Compounds and Aerosols. J. Murray. US EPA, Research Triangle Park, NC.

#1303 9:30 AM In Vitro to In Vivo Extrapolation Application to Promote the Use of NAMs for Assessing Inhalation Toxicity. X. Chang. Inotiv, Research Triangle Park, NC.

#1304 10:00 AM Deployment of the US EPA Multiple-Path Particle Dosimetry MPDD v2.0 (2023) Model to Achieve Exposure Alignment for Evidence Integration. A. Jarabek. US EPA, Research Triangle Park, NC.


11:00 AM Panel Discussion/Q&A.
Innovations in Applied Toxicology

Thursday, March 14, 8:30 AM to 11:15 AM, Room 251 A, Salt Palace Convention Center

Symposium Session: Error-Corrected Next-Generation Sequencing Strategies for Direct Assessment of Mutagenesis and Early Identification of Cancer Risk

Chair(s): Connie Chen, HESI; and Stephanie Smith-Roe, NIEHS/DTT.
Primary Endorser: Drug Discovery Toxicology Specialty Section
Other Endorser(s): Carcinogenesis Specialty Section; Regulatory and Safety Evaluation Specialty Section

Mutagenesis is a well-established, early biomarker of many human diseases, increases risk for cancer, and is a key characteristic of carcinogens. Several global laboratories from academia, industry, and government are evaluating novel error-corrected next-generation sequencing (ecNGS) technologies that are so highly accurate, it has become possible to reliably detect mutagenesis following exposure to xenobiotics and at a level of less than one error in 10 million bases sequenced. Such ultra-accurate mutation detection sequencing strategies can be used to inform drug-induced genotoxicity, cancer risk, and risk from environmental exposures. Because ecNGS can directly quantify genomic mutagenesis associated with clonal amplification, including low-frequency variants, ecNGS has the potential to transform the field of genetic toxicology for drugs, genetic medicines, impurities, and chemicals by enabling the identification and quantification of mutations in any species/tissue with exceptional precision. Furthermore, because ecNGS technologies can measure clonal expansion of cancer driver gene mutations, this application makes early identification of non-genotoxic carcinogens possible, which may serve as a powerful new regulatory tool to replace the gold standard rodent two-year cancer bioassay, which uses hundreds of animals, takes several years to complete, and costs millions of dollars. ecNGS is poised to address regulatory and industry testing needs for new emerging therapies (e.g., cell/gene therapies and genetic medicines), including off-target structural rearrangements, that present unique challenges and for which are presently no established methods for genotoxicity and carcinogenesis safety testing. This Symposium will provide an overview of ecNGS technology, outline a roadmap for regulatory applications, and provide attendees with ground-level demonstrations of how the technology has been evaluated thus far for detection of mutagenesis and biomarkers of genotoxicity, carcinogenesis, transferability, and interlaboratory reproducibility.

Abstract #

#1306 8:30 AM Error-Corrected Next-Generation Sequencing Strategies for Direct Assessment of Mutagenesis and Early Identification of Cancer Risk.

8:30 AM Introduction. S. Smith-Roe. NIEHS/DTT, Research Triangle Park, NC. Sponsor: C. Chen

#1307 8:35 AM Error-Corrected Next-Generation Sequencing to Advance Human Health Risk Assessment.
S. Minocherhomji. Eli Lilly and Company, Indianapolis, IN.

#1308 8:45 AM Introduction to Duplex Sequencing Technology with a Data-Driven Overview of Applications in Genetic Toxicology.

C. Yauk. University of Ottawa, Ottawa, ON, Canada.

#1310 9:35 AM Advancing In Vivo Mutagenesis Studies Using Duplex Sequencing to Characterize Chemical Mutagenic Mechanisms in Mouse Somatic Tissues and Germ Cells.
F. Marchetti. Health Canada, Ottawa, ON, Canada. Sponsor: C. Yauk

#1311 10:05 AM Co-assessment of NDMA Mutagenesis Using the MutaMouse Transgenic Rodent Assay and Duplex Sequencing.
A. Lynch 1, J. Wils 1, A. Ashford 2, and J. Salk 3. 1GlaxoSmithKline plc, Stevenage, United Kingdom; 2AstraZeneca, Cambridge, United Kingdom; and 3TwinStrand Biosciences Inc., Seattle, WA. Sponsor: C. Chen

#1312 10:35 AM Next-Generation Sequencing Approaches for Early Identification of Cancer Hazards Using Experimental Models.
A. Pandiri. NIEHS/DTT, Research Triangle Park, NC. Sponsor: C. Chen

11:05 AM Panel Discussion/Q&A.
Symposium Session: Multi-‘omics Approaches to Unravel PFAS-Mediated Metabolic Dysfunction

Chair(s): Rebecca McCullough, University of Colorado Anschutz Medical Campus; and Danielle Carlin, NIEHS.
Primary Endorser: Mechanisms Specialty Section
Other Endorser(s): Molecular and Systems Biology Specialty Section; Women in Toxicology Special Interest Group

Per- and polyfluoroalkyl substances (PFAS) are ubiquitous environmental contaminants dubbed “forever chemicals” since they are not easily broken down or metabolized. PFAS are widely used in everyday products and in industrial settings, leading to groundwater contamination that affects the general public. Epidemiologic studies have linked PFAS with a number of chronic illnesses defined by dysregulated metabolism, suggesting that rather than exerting a classic toxic profile, PFAS may be perturbing metabolic function across cells and tissues. While there remain significant gaps in our understanding related to the specific and possible detrimental impact of low and moderate PFAS exposure, particularly with the newer next-generation and degradation moieties, there is increasing recognition that mechanisms need to be defined to support regulatory efforts. This Symposium will uncover how PFAS are associated with, and causal for, metabolic perturbations and chronic diseases. Importantly, epidemiologic evidence will be supported with integrated multi-omics technologies, including targeted metabolomics, proteomics, and single-cell sequencing to uncover novel mechanisms of PFAS-related toxicities.

Abstract #

#1313 8:30 AM Multi-‘omics Approaches to Unravel PFAS-Mediated Metabolic Dysfunction.
Introduction. D. Carlin. NIEHS, Research Triangle Park, NC.

#1314 8:35 AM PFAS-Induced Metabolic Dysregulations and Diabetes over the Lifespan: Recent Evidence from Population Studies and Moving Forward. D. Valvi. Icahn School of Medicine at Mount Sinai, New York, NY. Sponsor: R. McCullough

#1315 9:10 AM Applying Single-Cell RNA Seq to Elucidate Tissue-Specific Mechanisms of PFOS Embryotoxicity and Metabolic Insights in Zebrafish. A. Timme-Laragy. University of Massachusetts Amherst, Amherst, MA.

#1316 9:45 AM PFAS Hepatotoxicity: From Organoids to Humans. L. Chatzi. University of Southern California, Los Angeles, CA. Sponsor: R. McCullough

#1317 10:20 AM PFAS and Oxylipins: Metabolic Profiling and Mechanisms of Dysregulated Immunity in the Liver. R. McCullough. University of Colorado Anschutz Medical Campus, Aurora, CO.

10:55 AM Panel Discussion/Q&A.
decades; they are used to establish international confidence in, and encourage wide adoption of, *in vitro* and other alternative test methods. Many of these validated tests are now used routinely to evaluate the safety of drugs and environmental agents. It is increasingly clear, however, that existing procedures that typically involve a ring trial across many laboratories and evaluation of the outcomes through layers of expert committees may not be commensurate with the rapid pace of innovation in biomedical sciences. Some of the most exciting advances that pertain to drug and chemical safety evaluations are in the field of complex *in vitro* models, including microphysiological systems or tissue chips. It has been argued that these new models may address the shortcomings in current drug development, such as improving clinical efficacy, eliminating the need for animal-to-human extrapolation, and accelerating the pace of drug development and safety evaluation by increasing efficiencies and human relevance. Excitement about the promise of these models notwithstanding, the complexity and cost often present a challenge to their wide adoption by the prospective end users. One barrier between exciting science and its application in decision-making is that this technology is still rapidly evolving and has not undergone formal qualification in terms of its potential to replace animal or human tests in specific contexts of use. This session brings together a group of experts with experience in various aspects of “building confidence” in the use of complex *in vitro* models as decision-informing tools in regulatory science. The session will include diverse perspectives from a funding agency whose mission is to accelerate translation of research into practice, academic and industry scientists with experience in qualification of these models, and industry on the realities of adopting new tools into existing drug-development pipelines. Collectively, this session aims to describe the state of the art in a bottom-up approach to qualification of complex new models and share the experiences of how various end users are gaining confidence in their utility, as well as accepting their limitations. This Symposium will build on previous SOT sessions describing the opportunities afforded by the microphysiological systems and advance the dialogue to considerations on what is a “qualified” complex *in vitro* model and how the scientists and model developers may learn from the speakers’ experiences to streamline research translation.

### Abstract #

<table>
<thead>
<tr>
<th>#1318</th>
<th>8:30 AM</th>
<th>Qualification of Complex <em>In Vitro</em> Models as Drug Development Tools: How Do We Translate Exciting Science into Regulatory Decisions?</th>
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<td></td>
<td>8:30 AM</td>
<td><strong>Introduction.</strong> I. Rusyn. Texas A&amp;M University, College Station, TX.</td>
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<tr>
<td>#1320</td>
<td>9:00 AM</td>
<td>“Trust but Verify” for Microphysiological Systems: TEX-VAL Consortium’s Experience with Evaluating Academic and Commercial Tissue Chips. I. Rusyn. Texas A&amp;M University, College Station, TX.</td>
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<tr>
<td>#1322</td>
<td>9:50 AM</td>
<td>“We Are All in This Together”: Gaining Confidence in the Use of Liver Spheroids as an Alternative Liver Safety Model through a Cross-Pharma Qualification Approach. A. Wolf. InSphero, Brunswick, ME.</td>
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<td>#1323</td>
<td>10:15 AM</td>
<td>The Utility of Microphysiological Systems by the Pharmaceutical Industry: Lessons Learned and Perspective from the End Users. R. Villenave. Roche Pharma Research and Early Development, Basel, Switzerland. Sponsor: I. Rusyn</td>
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<td>10:40 AM</td>
<td>Panel Discussion/Q&amp;A.</td>
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Symposium Session: The Lifesaver or the Devil? Identifying Key Molecular-Signaling Pathways and Their Roles in Chronic Exposure-Induced Neurological Diseases

Chair(s): Xueqi Tang, Purdue University; and Helena Hogberg-Durdock, NIEHS.
Primary Endorser: Women in Toxicology Special Interest Group
Other Endorser(s): Mechanisms Specialty Section; Neurotoxicology Specialty Section

Against acute cytotoxicity induced by environmental exposures, the initiation of specific signaling transductions in the nervous system could be protective, acting as a lifesaver. However, as the exposure extends to a longer time scale, persistently altered activity or transcription level of pathways can be the devil that leads to homeostasis interruptions (e.g., nutrient sensing, hormonal regulations, or energy utilizations), thus triggering neurological disorders. Which pathways are involved in these cellular responses and what role they play are not yet defined. The complexity of this question is associated with the undefined mode of action between environmental chemicals and elements involved in the signaling transduction, as well as the massive interactions across pathways and biological processes. Therefore, specifying key pathways affected by chronic exposures is the critical first step to take. With the recent emergence of sequencing and computational approaches, we are now equipped with robust tools to evaluate pathway transcriptions and activities in a more comprehensive manner. Another integral perspective to understand the human relevance of signaling changes is to characterize their roles in disease development. Deciphering signaling pathway alterations will largely help to characterize the vulnerabilities of the central nervous system to environmental exposures. This urges us to delve deeper into the translational significance of our most up-to-date findings. This session will provide insights into (1) how signaling pathways are affected by environmental neurotoxicants, (2) how pathway alterations contribute to neurological disorders, (3) how signaling alterations affect vulnerability of different central nervous system cell populations, and (4) how these pathways can be applied in hazard assessment. Aiming to disentangle the roles of several key pathways in neurotoxicity, speakers will delve into different aspects of mechanisms, including inflammation driven by glial cells, oxidative stress in various types of neurons, and energy utilization balance. A wide range of environmental exposures, experimental models, and endpoints will be covered by geographically diverse speakers from academia, industry, and government, as well as from diverse training/career stages.

Abstract #

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<th>#1324</th>
<th>8:30 AM</th>
<th>The Lifesaver or the Devil? Identifying Key Molecular-Signaling Pathways and Their Roles in Chronic Exposure-Induced Neurological Diseases.</th>
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</thead>
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<tr>
<td>#1325</td>
<td>8:35 AM</td>
<td>LRRK2 Kinase Modulation of MAPK Signaling, Autophagy, and Inflammasomes in Manganese-Induced Neuroinflammation and Toxicity. E. Pajarillo. Florida A&amp;M University, Tallahassee, FL.</td>
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<tr>
<td>#1326</td>
<td>9:05 AM</td>
<td>Dopaminergic Neurodegeneration Is Induced by Inhibition of Mitochondrial Complex III but Not Mitochondrial Uncoupling in Caenorhabditis elegans. J. Huayta. Duke University, Durham, NC.</td>
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<td>#1327</td>
<td>9:35 AM</td>
<td>The Biphasic Role of Insulin-Like Growth Factor/Insulin Signaling Interruptions in hiPSC-Derived Neuron Vulnerability to Chronic Metal Exposure. X. Tang. Purdue University, West Lafayette, IN.</td>
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<tr>
<td>#1328</td>
<td>10:05 AM</td>
<td>Identifying Vulnerable Toxicity Pathways in Neurons. D. Gerhold. NIH/NCATS, Bethesda, MD.</td>
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<td>11:05 AM</td>
<td>Panel Discussion/Q&amp;A.</td>
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Complex mixtures or UVCBs (substances of unknown or variable composition, complex reaction products, or biological materials) are simultaneously an everyday exposure reality and an exceptionally challenging issue for toxicology and risk assessment. A diversity of complex mixtures ranging from commercial products (e.g., dietary supplements, cosmetics) to environmental exposures (e.g., wildfires, Superfund sites) require risk evaluation to protect public health. However, testing paradigms and risk assessment methods have typically been developed and applied to evaluate individual chemicals. Assessing the toxicity and risk associated with complex mixtures involves either reducing the mixture to well-characterized constituents in a component-based approach or treating the mixture of interest as a homogeneous single entity in a whole mixture approach. Adapting both testing approaches and risk assessment methods to accommodate complex mixtures necessitates concerted research attention. In this session, speakers will address active research areas aimed at advancing toxicological and risk assessment of complex mixtures. Great strides have been made in developing new approach methodologies, including in silico and in vitro methods with single chemicals (e.g., drug discovery and green chemistry applications). Ongoing efforts to evaluate the performance of these methods with complex mixtures and extend their domains of applicability will be discussed. Toward exposure characterization, novel non-targeted chemical analysis methods have been developed and applied to complex mixtures to better understand exposure and to aid in identifying unknown constituents that could drive toxicity. Finally, speakers will present available component-based and whole mixture methods for assessing risk associated with complex mixtures. Extension of the threshold of toxicological concern concept from single chemicals to mixtures represents a component-based approach. In whole mixtures risk assessments, advancements in evaluation of sufficient similarity to compare a well-characterized reference mixture to related exposures of concern will be presented. Throughout the session, speakers will use a broad range of case studies focusing on consumer products and environmental exposures to illustrate challenges and recommendations in complex mixture testing and risk evaluation.

Abstract #

#1330 8:30 AM  Making Sense of Chaos: Recent Advances in Complex Mixtures Research and Regulation.

#1331 8:30 AM  Challenges and Opportunities for Testing Complex Mixtures in New Approach Methodologies.
C. Rider. NIEHS, Research Triangle Park, NC.

#1332 8:45 AM  Future Directions in Extending the Toxicological Threshold of Concern Concept to Complex Mixtures.
H. Hollnagel. Dow Europe GmbH, Horgen, Switzerland. Sponsor: C. Rider

#1333 9:15 AM  Effect-Based Trigger Values Are Essential for the Uptake of Effect-Based Methods.
P. Neale. Griffith University, Southport, Australia. Sponsor: C. Rider

#1334 9:45 AM  Wildfires: Evaluating Sufficient Similarities and Identifying Drivers of Toxicity within Complex, Highly Variable Smoke Conditions.
J. Rager. University of North Carolina at Chapel Hill, Chapel Hill, NC.

L. Carlson. US EPA, Research Triangle Park, NC.

10:45 AM  Panel Discussion/Q&A.
Absorbable medical devices possess unique physicochemical material properties, such as solvent incompatibility during chemical characterization, complexity of degradation testing, limitation of preclinical models to predict long-term biological effects, and pitfalls when using in silico tools for toxicological risk assessment. A well-attended and highly interactive Workshop during the 2023 SOT Annual Meeting assembled subject matter experts (academia, industry, and government) involved in biocompatibility assessment of absorbable medical devices, who discussed some of the existing challenges when evaluating these products for pre-market application. Feedback received from attendees indicated the absence of successful case studies in the 2023 Workshop and suggested a continuation Workshop that describes solutions to tackle the existing challenges. This session will address this need by advancing the discussion of successful case studies that illustrate evaluation approaches in accordance with ISO 10993 that can be useful for addressing some of the existing challenges associated with absorbable/degradable medical devices. The Workshop will begin with a perspective on how local tissue reactions could impact the biological profile of biodegradable polymeric materials and how to account for this effect in preclinical models to better predict long-term biological effects of absorbable-based medical devices. This presentation will be followed by a discussion on what chemical toxicological information and other risk-based factors to consider when applying toxicological risk assessment principles to identified absorbable constituents in light of the new ISO 10993-17:2023. The next three speakers will describe successful case studies that illustrate evaluation approaches in accordance with ISO 10993 that can be useful for addressing some of the existing challenges associated with absorbable/degradable medical devices. In these case studies, the unique material-related factors, such as novel use and the rate and extent of absorption into tissue, and how they were successfully addressed during biocompatibility evaluation will be presented. The final case study will provide an overview of a new product classification for absorbable metallic bone fixation fasteners, the identified risks to health, the associated mitigation measures, and the special controls required to establish a reasonable assurance of their safety and effectiveness per the US Federal Food, Drug, and Cosmetic Act. Finally, a question-answer session to foster engagement among participants will be held after the presentations. This interaction between regulatory, industry, and academic stakeholders aims to evaluate the general applicability of the approaches highlighted in the case studies, as well as inform scientific regulatory considerations presented in this Workshop.

Abstract #

#1336 8:30 AM Overcoming Unique Challenges Associated with Biological Evaluation of Absorbable/Degradable Medical Devices and Combination Products: Regulatory and Scientific Considerations from Successful Case Studies.

#1337 8:35 AM Harnessing Biodegradable Materials to Study and Direct Immune Function Studies. C. Jewell. University of Maryland, College Park, MD. Sponsor: D. Diaz-Diestra

#1338 9:00 AM Chemical Toxicological Risk Assessment: What to Consider in Accordance with ISO 10993-17, ISO 10993-1, and ISO 14971. A. Hood. US FDA/CDRH, Silver Spring, MD.

#1339 9:25 AM Case Study 1: Chemical Characterization Methodology Challenges for Degradable Polymers. Y. Lu. Johnson & Johnson, Raritan, NJ. Sponsor: D. Diaz-Diestra

#1341 10:15 AM  Regulatory Considerations for Absorbable Metallic Bone Fixation Fasteners. R. Trombetta. US FDA/CDRH, Silver Spring, MD. Sponsor: T. Palacios-Hernandez

10:40 AM  Panel Discussion/Q&A.

Thursday, March 14, 8:30 AM to 11:30 AM, Hall E, Salt Palace Convention Center

Late-Breaking Poster Sessions

Poster Sessions will be announced in February 2024.

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Poster Sessions

Poster Sessions are held Monday through Wednesday. Authors are assigned to a specific Poster Session, and on the day of their assigned session, their posters are displayed all day during ToxExpo hours (9:00 am–4:30 pm), allowing attendees to visit the posters at their convenience. Authors will attend their posters only during the assigned Poster Session time frame.

Poster Session participants will be announced in January 2024, and information on the specific abstracts/posters that will be presented during each Poster Session will be available through the SOT Online Planner, SOT Event App, The Toxicologist PDF, and the Program Supplement—Platform and Poster Sessions PDF.

Poster Session Schedule at a Glance

MONDAY
All posters on display 9:00 AM to 4:30 PM

Author Attended:
9:15 AM to 11:15 AM
- ADME/Toxicokinetics
- Autoimmunity/Hypersensitivity
- Human Exposure Assessment/Biomonitoring
- Immunotoxicity I
- Medical Devices
- Metals I
- New Approach Methods: General
- Safety Assessment: Pharmaceutical—Drug Development I
- Skin
- Skin Sensitization
- Systems Biology and Toxicology

Author Attended:
11:45 AM to 1:45 PM
- Epidemiology and Public Health
- Epigenetics
- Genotoxicity/DNA Repair
- Molecular Toxicology
- Neurotoxicity: Metals
- Neurotoxicity: Neurodegeneration
- Ocular Toxicology
- Safety Assessment: Non-pharmaceutical

Author Attended:
2:15 PM to 4:15 PM
- Biomarkers
- Chemical Threats and Bioterrorism
- Educating Future Toxicologists and Communicating with the Public
- Ethical, Legal, Social, Historical Issues
- PFAS I
- Risk Assessment I
- Safety Assessment: Pharmaceutical—Drug Development II
- Safety Assessment: Pharmaceutical—Drug Discovery
- Tobacco and ENDS Toxicology I

Abstract Acceptances and Scheduling

Abstract acceptance notifications will be made by email in late December. Presenting authors also will receive instructions and information on session timing at that time. Please note that the complexity of the program planning process prevents any changes in the type of session, time, or location of any presentation.
### TUESDAY
**All posters on display 9:00 AM to 4:30 PM**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 9:15 AM - 11:15 AM | • Air Pollution: Ozone  
• Air Pollution Toxicology  
• Animal Models  
• Climate Change and Effects  
• Ecotoxicology  
• Nanotoxicology: In Vitro  
• Nanotoxicology: In Vivo  
• Tobacco and ENDS Toxicology II |
| 11:45 AM - 1:45 PM | • Developmental and Juvenile Toxicology  
• Immunotoxicity II  
• Inflammation  
• Liver: In Vivo  
• Neurodegenerative Disease: Parkinson’s Disease  
• POPs  
• Reproductive Toxicology I  
• Respiratory Toxicology I  
• Respiratory Toxicology II  
• Risk Assessment II |
| 2:15 PM - 4:15 PM  | • Air Pollution: Particulate Matter  
• Endocrine Toxicology  
• Neurotoxicity: Developmental I  
• Neurotoxicity: General  
• New Approach Methods: In Vitro I  
• New Approach Methods: In Vitro II  
• PFAS II  
• Reproductive Toxicology II  
• Risk Assessment III |

### WEDNESDAY
**All posters on display 9:00 AM to 4:30 PM**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 9:15 AM - 11:15 AM | • Cardiovascular Toxicology/Hemodynamics  
• Clinical and Translational Toxicology  
• Food Safety/Nutrition  
• Natural Products  
• Oxidative Injury and Redox Biology  
• Stem Cell Biology and Toxicology |
| 11:45 AM - 1:45 PM | • Carcinogenesis  
• Computational Toxicology I  
• Kidney  
• Liver: In Vitro  
• Mixtures  
• Neurotoxicity: Developmental II  
• Neurotoxicity: Pesticides  
• Pesticides |
| 2:15 PM - 4:15 PM  | • Bioinformatics  
• Computational Toxicology II  
• Drugs of Abuse  
• Mathematical Modeling  
• Metals II  
• New Approach Methods: Computational  
• Regulation/Policy |

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SOT staff and security staff will enforce the no photography policy. Attendees who violate the no photography policy risk ejection from the Annual Meeting.