About ISES

Mission

ISES works to meet humanity’s needs for public health and environmental protection through a global community of exposure science professionals. ISES encourages the open exchange of information, provides opportunities for career development, acknowledges and promotes excellence in the practice of exposure assessments and research in the field of exposure science.

For information on membership and to learn more about the ISES, please visit http://intlexposurescience.org.

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JOINT ISES-ISEE 2018
ANNUAL MEETING
Happy New Year!

A friend and colleague suggested a book to me called *The Vaccine Race*, by Meredith Wadman. In the prologue, the author described the first polio vaccine, which was later found to be inadvertently contaminated with simian virus 40, for polio vaccines administered between 1955 and 1963. The discovery came after many of us had already been part of the first wave of vaccinations. Don’t get me wrong: I am grateful to have been part of a generation of kids who did not worry about contracting polio. But the observation that about 100 million of us were exposed to simian virus 40 has led to many studies about possible health risks associated with the vaccine (Poulin and DeCarpio 2006). This exposure occurred around the same time that new environmental chemicals came into the market and that dietary patterns and food sources began to be transformed (the products in today’s grocery stores do not resemble the fare at our New Jersey A&P from the 1960’s). So this
generation has experienced many changing exposures from an array of sources. Some dietary and pharmaceutical exposures have been studied for their association with health outcomes (e.g., Tylenol and childhood asthma [Eyers et al. 2011]; aspartame and neurobehavioral/cardio-metabolic health [Lindseth et al. 2014; Azad et al. 2017]) but I am not aware of a solid literature that includes aggregate exposure assessments from these varied exposure sources, which are all part of what has been described as the exposome.

So while we will continue to have conversations at our Society meetings about risks associated with chemical exposures that are new to our generation and the ones following, we could also be considering other exposures that fall outside our own silos. Perhaps we should be exploring how ISES can attract researchers from other silos (e.g., nutrition science, medicine) so that we can think more expansively about exposures we should be contemplating in the context of public health research (see Lichtveld et al. 2018 for a nice example of this kind of thinking). We also need to develop methods to address these complex multi-source exposures as they are identified.

Thanks for reading.

Judy S. LaKind, PhD
President, International Society of Exposure Science

References cited:


JESEE News
by Rick Peltier, PhD

Most of us are around 12 years old when we are first taught about the scientific method. We all know it well – ask a question, gather data, formulate hypotheses, analyze your data, and then communicate your findings. For me, that last step – as a 12 year old budding scientist - was usually in the form of a two-page paper with extra wide margins or an illegible hand-written poster with pictures cut out from magazines.

Now, we spend a great deal of time crafting our communication, inflected with the jargon of our discipline, including citations pointing to influential work, and writing with scientific, direct language. This is important for disseminating your work in an efficient, fact-based assessment of your findings, and, like most journals, we use this as a criterion for peer evaluation in JESEE. After some revisions and editorial review, your hard work is polished to a sheen, and published for your professional peers to consume and utilize. We add another line to our CV, and move to the next project.

But the work we do in exposure is really meaningful, and has importance beyond just our professional peers through JESEE. Certainly communicating your results to your peers is valuable for your professional standing, and improves science on the whole. But for most of us, we deal with important issues of exposure that affect populations, and only a tiny fraction of these individuals would ever read a scientific journal. These individuals – who need access to exposure science results – rely on mass media, websites, and non-peer reviewed information.
sources to understand these issues. Because of this, I encourage you to publish your work in JESEE, and then go even further.

Think of this as just another type of science communication that talks about our work in less technical terms directly to populations who need this kind of information. Does your work deal with urban air pollution exposures for asthmatic kids? Maybe we should craft effective messages for teachers or parents. Interested in longitudinal pesticide exposure on farms? Perhaps communicating with farm workers would be meaningful. Do you work on pharmacokinetic models of phthalate exposures in consumer products? It might make sense to tell the people who consume these products. Compared to the average ISES member, teachers and farm workers and ordinary consumer product users are not very likely to read your work, and even if they did, they might not understand it.

To do this effectively, we have to realize that it’s not just our professional peers who value these results. I would argue that we need to engage the public in more meaningful, public health-oriented ways. There are so many different avenues one can take – from crafting press releases with your local press or public relations office, to writing directly for the numerous online mass media periodicals that are comprised of articles written for the general public. The Hill, The Conversation, and major city (or even small town) newspapers are great resources to spread your science. It’s not uncommon to write an article and have it read worldwide by tens of thousands of people. Sit for an interview with a local reporter. Answer their questions, and have empathy for what they do, and do not, know. Quite often, you might work with an excellent journalist who can best capture your strengths (science reasoning) with their own professional abilities (like editing and messaging to target audiences). Be warned that it is a very different experience engaging these types of publications, and you’ll likely go through more drafts than you think, but it is no less important to get these messages out effectively. And it’s always a good idea to cite your work in these types of publications – especially if the work is in a journal like JESEE.

I’m glad we have a resource like JESEE where we can disseminate our most important science. But I’m also confident that we need to engage the public through other means, and do so in ways that are a lot more effective than that old tri-fold poster presentation in the science classroom. There are countless ways to bring these messages to the masses by producing high quality and well-edited publications that directly help the public, while supported by outstanding journalism professionals.

And that is a good thing, especially since, after all these years, my hand writing is still illegible.

About the Author

Rick Peltier is the Deputy Editor-in-Chief of JESEE and has been an associate editor for more than six years. He is an Associate Professor in the Department of Environmental Health Science at the University of Massachusetts Amherst. Contact him anytime - to talk shop, ask a question about the journal, or just send a friendly hello - at rpeltier@umass.edu.
Future of Exposure Assessment in Occupational Health Studies

by Gayle DeBord, PhD and Mark D. Hoover, PhD

Exposure assessment is part of the modern industrial hygiene framework. It forms the basis of the process to anticipate and recognize hazards, evaluate exposures, and control and confirm protection from risks to safety, health, well-being, and productivity in the workplace (Figure 1). To address the complexities of understanding, communicating, and managing risks from the gamut of chemical, physical, biological and psychological hazards, the framework includes a strong integration between the assessment of hazards and the assessment of exposures. Exposure-informed hazard assessment ensures that realistic information about actual workplace exposure is factored into any laboratory-based studies that are conducted.

Exposure-response relationships are better understood when they are informed by knowledge of the exposure compositions, concentrations, and conditions where the workplace hazards occur. Hazard-informed exposure assessment ensures that the relevant exposures are assessed in the appropriate locations and at the appropriate times.

Exposure assessment in occupational health studies has evolved over the years to keep pace with the ever-changing nature of both work and the U.S. and global workforces, along with the changing nature of exposures outside the workplace. Traditional occupational health studies generally ignored exposures to hazards in the environment and only looked at exposures found in the workplace. Assessments assumed that the workplace exposure levels were so high that they would overwhelm the contributions of any other environmental exposures. While some
Figure 1. Industrial hygiene framework and process to protect safety, health, well-being, and productivity in the workplace.

Figure 2. Hierarchy of controls to protect workers from exposures to hazards.
NIOSH identified exposure assessment methods and tools as a top-21 priority area as part of the first decade of the National Occupational Research Agenda (NORA) (https://www.cdc.gov/niosh/nora/default.html) in 1996. The NIOSH Exposure Assessment Program (https://www.cdc.gov/niosh/programs/exap/) was continued during the second decade of NORA; and for the current third decade of NORA, exposure assessment has been named a core area for NIOSH research and practice. Over these years, priorities for exposure assessment have been articulated in two overarching goals: (1) developing or improving exposure assessment strategies and (2) developing or improving specific exposure assessment tools or methods. To advance those goals, NIOSH also created its virtual NIOSH Center for Direct Reading and Sensor Technologies (http://www.cdc.gov/niosh/topics/drst) in 2014 to evaluate the role of sensors and other direct reading methods in the workplace. Recent exposure assessment activities (https://www.cdc.gov/niosh/docs/ppop/pdfs/EXAP-PPOP-2017.pdf) include sensor evaluation, development of new sensors, and publication of the new 5th edition web-book version of the NIOSH Manual of Analytical Methods (https://www.cdc.gov/niosh/nmam/5th_edition_web_book.html). Sensors are likely to have a large impact on occupational health studies as new sensors and applications are being developed every day. Issues regarding a framework for the ethical use of sensors in the workplace (https://blogs.cdc.gov/niosh-science-blog/2017/01/20/wearable-sensors-ethics/) are also being addressed, including how monitoring programs that involve wearable sensors should apply wearable sensors to benefit or contribute to society (justification), use the least intrusive means necessary to accomplish the objectives (optimization), and anticipate and avoid or minimize potential adverse consequences (minimization of harm).

Recently, key occupational health areas have been identified (https://blogs.cdc.gov/niosh-science-blog/2017/01/10/howard/) where research into new strategies and new tools for the assessment of exposure are needed to aid in the identification of hazards in these fields. These areas include:

- Oil and Gas Extraction – Innovative exploration and extraction technologies such as directional drilling and high volume hydraulic fracturing have led to a boom in domestic oil and gas production in the U.S. Worker exposures to crystalline silica and hydrocarbon gas and vapors have been identified during the process to extract oil and gas. Work is needed to identify other exposures and especially to evaluate potential diseases that might occur due to these exposures.
As worksites have evolved, today's occupational health studies need to take a multifaceted approach towards exposure assessment. Worksites today are more complex as are the factors that combine to result in occupational diseases. New strategies such as those being applied in exposomic studies (https://academic.oup.com/aje/article/184/4/302/2236658) are needed to thoroughly investigate workplace exposures, as well as the myriad exposures that occur in settings beyond the workplace. New occupational exposure assessment tools and methods, such as sensors, can have a major impact on advancing our ultimate goal of making it easier for everyone to get the right things done right regarding health by building and sustaining connected, protected, and respected communities of leaders, cultures, and systems with the tools, training, and experience needed to protect safety, health, well-being, and productivity in all the places we live, learn, work, and play.

Dr. Gayle DeBord, Cincinnati, OH, dgdebord@zoomtown.com, managed the NIOSH Exposure Assessment Program for the last 7 years and was the Director of the NIOSH Center for Direct Reading and Sensor Technologies. She is recently retired following a 30-year career of research and leadership as a commissioned corps officer in the U.S. Public Health Service at NIOSH.

Dr. Mark D. Hoover, National Institute for Occupational Safety and Health, Morgantown, WV, mhoover1@cdc.gov, is coordinator of the NIOSH Exposure Assessment Program and co-director of the NIOSH Center for Direct Reading and Sensor Technologies. Questions about and collaborations with the program and center are enthusiastically encouraged.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.
Seeking To Understand Exposures From Hydraulic Fracturing

With a new grant from the Environmental Protection Agency (EPA), ISES member Nicole Deziel, Assistant Professor at the Yale School of Public Health, will investigate potential water-based exposures and health effects of unconventional oil and gas production (UO&G).

Dr. Deziel is directing an interdisciplinary team of scientists who will investigate the impact of hydraulic fracturing, more commonly known as “fracking,” and related activities on drinking water quality and neonatal health outcomes within the Appalachian Basin.

Thousands of wells have been hydraulically fractured within the Appalachian Basin—an area stretching from Alabama to New York—during the past decade and the practice is expected to continue for years to come. Hydraulic fracturing is initiated after a gas or oil well has been drilled and involves pumping a mixture of water, sand and chemicals into the wellbore under high pressures to fracture the surrounding rock and liberate the trapped oil and gas. Currently, more than 9 million people in the United States alone have drinking water sources within 1.6 km (1 mile) of a hydraulically fractured well. Exposure data are critically needed to understand whether UO&G development is associated with water contamination, human exposure, and human health impacts in such communities.

“This research connects exposure scientists with physical scientists, engineers and epidemiologists from across the Yale campus to evaluate the likelihood of drinking-water contamination and adverse birth outcomes resulting from these new industrial activities,” stated Deziel. “Research from these disciplines has generally been occurring separately, and integration of exposure science with hydrogeology, chemistry and epidemiology will provide critical scientific evidence for policymakers, health officials and other researchers. The project leverages the intrinsically inter-disciplinary nature of exposure science.”

The Appalachian Basin has contributed significantly to the nation’s oil and gas boom. Energy production from the Basin’s northern tier has skyrocketed over the last decade as the Marcellus and Utica Shales have been targeted intensively for oil and gas extraction. Advances in drilling and hydraulic fracturing have unlocked these reserves, which has increased domestic supplies and made oil and gas cheaper, but widespread deployment of these extraction technologies have been accompanied by concerns about environmental contamination, social stressors and health problems that may be felt acutely by lower-income communities. Through the grant, the EPA is seeking multidisciplinary research that illuminates the impacts of unconventional oil and gas production, with the ultimate goal of using this research to inform policy decisions and best practices for oil and gas drilling within the Appalachian Basin and elsewhere.

The study began in September 2017 and will continue for three years. This project expands upon Nicole’s prior work in the region. She and Yale post-doctoral fellow and ISES member Dr. Elise Elliott led a team of Yale scientists in conducting the Ohio Water and Air Quality Study in the summer of 2016, which was a community-based study examining the water contamination, air quality, and health among residents in a county in Ohio with the largest number of permitted shale gas wells. Dr. Elliott, who is also part of the new research effort, looks forward to following up on the results gleaned from the initial study. “Collection of water samples from
hundreds of homes should greatly advance our understanding of the potential chemical exposures occurring in the Marcellus and Utica Shale regions,” stated Elliott.

About the Author

Nicole Deziel is an Assistant Professor at the Yale School of Public Health. Dr. Deziel serves as Principal Investigator of a study funded by the American Cancer Society investigating co-exposures to multiple flame retardants, pesticides, and other persistent pollutants and thyroid cancer risk. She is also PI of a new inter-disciplinary project entitled “Drinking water vulnerability and neonatal health outcomes in relation to oil and gas production in the Appalachian Basin,” which was recently selected for a three-year, $2 million EPA Grant. Nicole has served on four ISES Technical Organizing committees, founded and chaired our Diversity Committee from 2014-2017, and currently serves on the Publications Committee and the JESEE Editorial Board. Please feel free to contact Nicole at nicole.deziel@yale.edu

Figure 1. Ohio home with nearby drilling rig.

Figure 2. ISES members Nicole Deziel (right) and Elise Elliott (left) conducting water quality research in Ohio.
Cincinnati Researchers and Firefighters Collaborate to Develop Occupational Cancer Prevention Strategies

Danger to firefighters doesn’t stop when the fire is out. Firefighters are exposed to harmful substances at both the scene of the fire and the firehouse. In a meta-analysis of 32 studies on cancer risk among firefighters, Grace Lemasters, PhD, a faculty member at the University of Cincinnati (UC) in Ohio and researcher for the university’s NIEHS-funded environmental health center, found that firefighters have an elevated risk to certain cancers that may be related to their exposure to complex mixtures, such as polyaromatic hydrocarbons (PAHs). The study assessed the probable, possible, or unlikely risk of 21 cancers and found that firefighters have a probable risk for multiple myeloma, non-Hodgkin lymphoma, prostate, and testicular cancers. Eight additional cancers were also listed as having a possible association with firefighting.

Science and research can give back to firefighters, though, through collaborative work to develop prevention strategies. Erin Haynes, DrPH, researcher at UC’s Environmental Health Center and director of the Center’s Community Engagement Core (CEC), collaborated with the Cincinnati Fire Department (CFD) to measure airborne particulate and PAHs at the firehouse and during overhaul. Her research found elevated levels of both hazardous compounds, so Dr. Haynes and her team made 3 prevention recommendations: Wear your Air, Wash Yourself and Wash Your Gear. This message was shared with Cincinnati firefighters, the Cincinnati Firefighter Union and the Firefighter Safety Committee. The CFD recommended the prevention message be communicated via a
high-impact video featuring local firefighters who had developed cancer in the line of duty. Dr. Haynes and her team then collaborated with the CFD to develop the video, which was shared with the Ohio Association of Professional Firefighters (OAPF) and has received 60,000 views on their Facebook page and via the CEC YouTube channel, where it has been viewed 5,800 times (https://www.youtube.com/watch?v=Y-7IoU3323Y&t=124s).

Since the development of the first video, the CFD has invested resources to provide firefighters with tools to wash their gear and themselves on scene following a fire. The CFD even requested a second video to train firefighters how to properly use to the new resources (https://www.youtube.com/watch?v=SfYSO1dJ4Dc).

The impact of the research and prevention strategies developed in Cincinnati has reached far beyond the city fire department. Dr. Lemasters provided an expert testimony to educate policy makers on cancer risk while they successfully advocated for Ohio Senate Bill 27, which provides preemptive cancer coverage in Ohio. These successes demonstrate the power and impact of partnership between researchers and firefighters. Collaborations such as this can continue to reduce the risk of cancer in firefighters and save lives.

About the Author

Erin Haynes, DrPH, MS is an Associate Professor of Environmental Health at the University of Cincinnati College of Medicine. She has been conducting community-engaged exposure science for over a decade. Please feel free to contact Erin at haynesen@ucmail.uc.edu

Above Cincinnati Firefighters Joe Gunnewick, Joe Lonneman, and Jack Klosterman.

Above Right Cincinnati Firefighters-in-training implementing the “Wash Yourself” prevention strategy.
URBAN VEGETATION
and Traffic-Related Air Pollution

by Jun Wu, PhD
Traffic-related air pollution (TRAP) is a major environmental health problem in densely populated urban cities worldwide (1). Street canyons, relatively narrow streets with tall, continuous buildings on both sides, are abundant within city environments (2). Road-side air quality is a particular concern in street canyons, where lowered wind speeds, in-canyon air recirculation, and high traffic emissions can result in high concentrations of TRAP. Various strategies have been applied to improve street-level air quality, including source and emission control and the inclusion of green infrastructures such as trees and vegetation barriers. Despite a common belief that green vegetation can reduce ambient air pollution, the latter strategy has been intensely debated regarding its value for reducing air pollution in the urban canyon environment (3).

Vegetation can affect air quality through both direct and indirect mechanisms. Gaseous pollutants can be directly removed by absorption through leaf stomata (4), while filtering/intercepting effect of plants is one of the major direct mechanisms in removing particulate matter (PM) through dry deposition (5). The capture efficiency for PM differs by thickness and density of plants, PM characteristics, meteorology, and plant properties, such as leaf size, stomata, vegetation structure and leaf microstructure (e.g. the occurrence of leaf hairs, the availability of waxes) (6). The reported velocities of particle deposition on tree leaves can vary widely by 3 orders of magnitude (7). After deposition, particles can be resuspended to the air or washed off by precipitation dripping from the plants to the soil. Only the latter process represents a net-removal of PM from the atmosphere. During dry periods, deposited particles are constantly resuspended through a wind-dependent process. A case study in Belgium showed that about three quarters of intercepted PM was resuspended and only one quarter was washed off (8).

Another direct mechanism is the influence of vegetation on local microclimate. Street trees or hedges may act as solid barriers between emission sources and receptors, and can change urban ventilation and air pollutant dispersion (9). Tree crowns can act as obstacles to the wind for the exchange of mass between the in-canopy and above-canopy space, but turbulence from wind direction fluctuations may also be generated below the tree crown (10). Thus, vegetation can speed up or slow down the turbulent exchange of mass depending on different planting configurations and meteorological conditions (3). Consequently, air pollutants are either better or
more poorly ventilated.

In a street canyon environment, reduced local ventilation has been found to be the dominant mechanism of the effect of trees (11). Reduced ventilation prevents outside fresh air from entering and disturbs vertical mixing between the air above the roof and within the canyon and hence leads to pollutant accumulation inside the canyon. Most of the previous studies show an adverse effect of street trees on air quality, or higher canyon-average pollutant concentration at pedestrian height in street canyon with trees (3). The majority of these studies were based on computational fluid dynamics modeling and wind tunnel tests, or the combination of measurement and modeling approach. A much smaller number of studies examined the influence of hedges or shrubs with complete coverage from the ground to the top of the canopy (3). Hedges can divert air pollutant from reaching footpath area by generating local vortices, and hence generally show a positive effect on air quality, or reduce pollution levels at the footpath areas in street canyons (3). An optimum height of hedges for air pollution reduction in street canyons was found to range from 1 to 2.5 m based on the limited number of studies. Although the interception effect of vegetation on PM is not the major mechanism in street canyons, it plays a non-negligible role in removing PM from the atmosphere over a large region (8).

Further, vegetation has been found to affect TRAP concentrations in non-street canyon microenvironments in urban areas. A U.S. study observed reduced TRAP levels in urban parks in the metropolitan Los Angeles area (12). Another U.S. study showed slightly lower TRAP concentrations at street sites with higher tree density in New York City in the summer time (13). A study in Barcelona, Spain associated higher greenness with lower indoor and outdoor TRAP levels in schools (14). Reduction in indoor TRAP levels was partly mediated by the reduction in outdoor TRAP levels. This study further suggested stronger associations for schools with a higher number of trees around them. The lower TRAP concentrations might partially be attributed to lower local traffic emissions in areas with higher vegetation. However, a study in Lancaster, northwest England demonstrated that a carefully-selected tree line can effectively reduce indoor PM10 (PM<10 µm) levels by comparing the PM10 concentrations before and after installing a curbside tree line (15), suggesting the potential effectiveness of interception and deposition of PM by street trees with a high PM deposition velocity. Further studies are warranted to investigate the impacts of urban vegetation on concentrations of PM from traffic emissions.

In addition to the direct effects, urban vegetation can provide a cooling effect (16), which decreases energy use and associated pollutant emissions and indirectly improves air quality by decelerating smog formation (17). Vegetation is also an important source of biogenic volatile organic compounds that can engage in complex photo-chemical reactions with other air pollutants like ozone and nitrogen oxides and can participate in the generation of secondary organic aerosols (18). There is an increasing interest in understanding how urban vegetation can mediate air pollution and other environmental stressors at the street, city, and regional levels and further how urban vegetation can influence the health outcomes of urban population.

**About the Author**

Dr. Wu is an Associate Professor in the Program of Public Health at University of California, Irvine. Her research focuses on environmental exposure assessment and environmental epidemiology. Recent and current studies involve human exposure assessment of air pollutants and built environment factors, applications of GIS and spatial modeling in tracking human time-activity patterns, environmental exposures, and diseases, and investigation of the influence of air pollution and built environment factors on pregnancy and other health outcomes. She can be contacted at junwu@uci.edu.
References (Urban Vegetation and Traffic-Related Air Pollution)


The 2018 ISES-ISEE Joint Annual Meeting will bring together scientific experts and practitioners from academia, government, industry, and non-governmental organizations dedicated to the protection of health and environment. Exposure science and environmental epidemiology are dynamic fields that:

- Develop and apply traditional and innovative methods for assessing exposures to environmental stressors and their health effects.
- Address exposures to a broad array of environmental stressors as well as factors that contribute to or mitigate exposure.
- Elucidate potential health effects from environmental stressors during the life cycle including outcomes from in utero development to death.
- Promote interdisciplinary approaches to solving complex environmental public health problems.

**Co-Chairs for the ISES-ISEE 2018 Joint Annual Meeting**

- Markey Johnson, Health Canada, Ottawa, ON, Canada
- Angelika Zidek, Health Canada, Ottawa, ON, Canada, Canada
- Audrey Smargiassi, Université de Montréal, Montreal, QC, Canada
- Veronica Vieira, University of California, Irvine, CA, USA

The co-chairs appreciate the contribution of the 120+ TOC members who are helping us organize the meeting! [http://isesisee2018.org/general-information/technical-organizing-committee/](http://isesisee2018.org/general-information/technical-organizing-committee/)

**Call for General Abstract Submission**

General abstract submission will be open from February 15 until April 1, 11:59 PM ET. Abstracts...
submitted will undergo expedited expert review. We will notify the submitters of the format of their meeting presentation (oral or poster) and the day and session time assigned by May 1.

For the ISES-ISEE 2018 Joint Meeting we aim to highlight issues that reflect the complexities in environmental exposure and health research and policy development. For example, complexity can refer to methodological development, exposure assessment, or epidemiologic studies of:

- Interactions between social and environmental determinants;
- Combined assessments of both exposure and health;
- Exposures across multiple media, sources, and stressors;
- Exposures in different microenvironments;
- Temporally and spatially varying exposures;
- Mixtures and cumulative exposures;
- Gene-environment interactions;
- The vast array of clinical and subclinical health impacts;
- Translation of research into policy and other decision making.

The ISES-ISEE 2018 Joint Annual Meeting will leverage this expertise to address complex, locally and globally significant topics in environmental exposure and epidemiology. We invite you to submit an abstract if your work investigates complexities in exposure and health from very big (macro/ecosystem) to very small (micro/molecular) environments. A detailed summary of the specific conference themes can be found at: http://isesisee2018.org/scope-of-the-meeting.

**Important Dates**

- **January 12** – Symposium proposal submissions close
- **January 15** – Online registration opens
- **February 15** – General abstract submissions open
- **April 1** – General abstract submissions close
- **June 15** – Final program available online
- **July 1** – Early bird registration deadline
- **August 16** – Regular registration deadline

(Continued on next page)
Program Overview

Welcome Reception

Sunday August 26, 2018 - Shaw Centre Ottawa (meeting venue)

Join us as we kick off the ISES-ISEE 2018 Joint Meeting. The reception will provide a relaxed opportunity to catch up with colleagues and socialize while enjoying appetizers and drinks. All conference participants are invited to attend the Welcome Reception.

Women’s Networking Event

Monday August 27, 2018 – National Arts Centre (NAC)

We are excited to invite delegates to attend the first ISES-ISEE Joint Women’s Networking Event and the fifth ISES Women’s Networking Event! Enjoy an early evening of mingling and networking activities at the National Arts Centre with other women engaged in science and research. This event is a great opportunity for women in exposure and epidemiological sciences to share research ideas, discuss challenges and successes, and expand professional networks. Tickets are $30, and student tickets are $25. Refreshments will include appetizers and a drink (plus cash bar). Register early as space for this popular event is limited! http://isesisee2018.org/registration/

Conference Dinner

Tuesday August 28, 2018 – National Arts Centre (NAC)

We are happy to announce that the Conference Dinner will take place at the National Arts Centre (NAC). The NAC collaborates with artists and arts organizations across Canada to help create a national stage for the performing arts, and to catalyze performance, creation and learning across the country. The newly renovated NAC lies across the canal, less than a 5 minute walk from the Shaw Centre where the conference will be held. The rooms selected for the Conference Dinner and Women’s Networking Event feature floor to ceiling windows with views of the canal and historic buildings. The NAC also has an outdoor terrace for mingling and cocktails before dinner, weather permitting.

Technology & Sensor Fair

Wednesday August 29, 2018 - Shaw Centre Ottawa (meeting venue)

The Technology & Sensor Fair is an opportunity for researchers in the fields of exposure science and environmental epidemiology to participate in interactive, hands-on demonstrations of new, updated, or emerging technology, tools, and software. Participants will have an opportunity to interact with the technology, and determine how it might be integrated in their current or future research. Contact us if you are interested in exhibiting your new technology and applications to leading environmental exposure and epidemiology experts!

What else can you expect during the ISES-ISEE 2018 Joint Meeting?

- Pre-Conference Courses on Sunday August 26 (both half and full day courses will be offered)
- Student Poster Competition to showcase student research
- ISES-ISEE Chapters and Committees Fair on Wednesday August 29 (concurrent with the Technology & Sensor Fair)
- Student/New Researcher Events to provide opportunities for students and new researchers to network and socialize
- Social activities including fun runs, sight-seeing, and more!
Thanks for reading!

Past Issues
Missed a past issue of the ISES newsletter? Catch up at http://bit.ly/2nvDReO

Membership Opportunities
Interested in learning more about membership opportunities with the International Society of Exposure Science? Check out https://intlexposurescience.org for more information.