International Society of Exposure Science

- ISES AWARDS NOMINATION TIME
- ENHANCING DIVERSITY IN EXPOSURE SCIENCE
- GENERAL SCIENTIFIC MEETINGS COMMITTEE
- PAVING THE WAY TO BUILD A EUROPEAN STRATEGY ON EXPOSURE SCIENCE
- WORKING ACROSS DISCIPLINES FOR CLEAN AIR, GOOD HEALTH
- ISES PROFESSIONAL DEVELOPMENT AND MENTORSHIP PROGRAM
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- TOOLS FOR EXPOSURE SCIENTISTS CONDUCTING COMMUNITY-ENGAGED RESEARCH
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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President’s Message

Environmental Research Design, Implementation and Interpretation: Exposure Scientists Should Have a Seat at the Table

by Judy S. LaKind, PhD

Twenty-four years ago a document titled the London Principles was published (Federal Focus Inc., 1994 http://www.fedfocus.org/science/london.html). Nineteen esteemed scientists worked to develop guidance for Evaluating Epidemiologic Data in Regulatory Risk Assessment. Interestingly, the document stated that: “application of these principles and interpretation of the data for risk assessment should be done by the risk assessor with the assistance of expert epidemiologists, and preferably with the assistance of a multidisciplinary team that includes not only epidemiologists, but also experts from other relevant disciplines, such as toxicology, medicine, biology, and industrial hygiene.”

ISES (ISEA at the time) was a fledgling society in 1994, and perhaps the field was not sufficiently mature to warrant inclusion of exposure scientists in this list of experts needed to evaluate epidemiology research for regulatory risk assessment. However, the ISES founders had the wisdom and foresight to name our journal so as to be inclusive of both “exposure” and “environmental epidemiology” – a natural pairing then and now.

That pairing is currently getting more attention as exposure science has come into its own. We have now grown into a professional society of several
hundred members and have a recognized, critical contribution to make to this conversation. We need to revisit the London Principles with a mind towards recognizing the importance of exposure science and the issues that prevent environmental epidemiology from achieving its full potential for use in regulatory risk assessment.

Let me share an anecdote from my early days as a risk assessor. We often needed to assess risks associated with contaminants in surface soil from such activities as playing in parks. The lack of prior consultation by those collecting the samples with the risk assessors resulted in collection of soil samples from cores that went down a foot – soil which would not be a source of exposure to those playing in the park. Since risk assessors were not consulted during the sampling phase of these assessments, our exposure information suffered!

While perhaps the situation is improved for risk assessors today, we still need to emphasize the importance of exposure scientists having a seat at the table during the design, implementation and interpretation of epidemiological research. While there is increased interest in utilizing environmental epidemiology research as the foundation for decision-making both for hazard identification and dose-response assessment, inadequacies in exposure assessments for risk assessment remain (e.g., Christensen et al. 2015) and the “...impact of exposure measurement error can be profound and complex and...it is difficult to anticipate its impact on effect estimates in an individual study” (Gustafson 2004). Recently, a European Food Safety Authority Panel (EFSA 2017) examination of the pesticides epidemiology literature found that “poor exposure characterisation primarily defined the major limitation” of pesticide epidemiology studies. Raffaele et al. (2011) also observed that “the greatest limitation in epidemiological data is accurate exposure assessment, an issue that is often exacerbated by the retrospective ascertainment of data after an outcome of interest has occurred.”

How can our Societies and members work together to help alleviate this problem? Please join in the conversation at this year’s joint ISES/ISEE meeting for the first Presidents’ Roundtable where a panel will discuss the Intersection of Epidemiology, Exposure and Decision-Making.

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

References


JESEE News
by Richard Peltier, MPH, PhD

JESEE brings our community new and exciting research that spans a wide range of topics – from air quality to foodborne contaminants to toxicokinetics and beyond. Collectively, we aim to be able to provide meaningful insight on the implications of exposure to past, current and future contaminants. One such class of contaminants, and one that appears to be generally under-studied in the literature, are long chain poly- and perfluoroalkyl substances (PFAS) as well as their newly developed alternative compounds. As a result, JESEE is pleased to request your work for a special issue that is focused on PFAS compounds.

Why would JESEE focus on this topic, you ask? PFAS compounds are long-lived and very useful compounds which were used across a very wide range of commodities. From non-stick pans to food packaging to stain protection in carpeting and fabric, to floor wax, PFAS compounds were, and are, important commercial chemicals. PFAS compounds have persisted in the environment in our soil and water and air, and are still present in many of our consumer goods.

As a result, PFAS exposures continue today, and there is a growing body of evidence showing that PFAS exposure leads to low infant birth weight, cancer, and endocrine disruption (to name a few). These are some of the reasons why long-chain PFAS use was curtailed around 2 decades ago. Short
chain PFAS molecules are now replacing many of their long-chain cousins, yet we do not yet know whether these newer compounds have implications for human exposure.

PFAS is an exciting and relevant topic to the ISES community, and we encourage you to submit your work. There is rapidly growing interest in PFAS, especially over the past 2-3 years (Fig 1), as we recognize just how important these exposures could be. As exposure scientists, we are well positioned to better understand both legacy and emerging PFAS, and our findings to this important topic will be useful in solving many of the environmental health problems associated with PFAS compound exposure. We are very much looking forward to your submission!

**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.
ISES Awards Nomination Time

It is time for nominations for the ISES Awards. ISES recognizes outstanding scientists with the Excellence in Exposure Science, Daisey, Best JESEE Paper, Best Student Paper, JESEE Young Investigator Meeting, and Young Scientist Awards.

The deadline for award nominations is May 30. However, it is important to contact Tom McKone (temckone@berkeley.edu) or Bert Hakkinen (berthakkinen@gmail.com) as soon as possible if you plan to nominate someone so we can guide you through the nomination process. Also, if you have a suggestion for someone you think is worthy, but do not want to nominate them, send us their name right away and we can work to identify an appropriate person to nominate them.

Here are the nomination categories we have for this year. More details on the NEW Excellence in Exposure Science Award are provided at the end of this message. Details, criteria, and nomination procedures for all the awards are provided on the ISES website.

Excellence in Exposure Science Award (New Award)

With the end of funding for the Constance L. Mehlman Award and a need to redefine the Jerome J. Wesolowski Award, the ISES Board has established a new award to recognize individuals who have left an indelible mark in the field of exposure science. This award is inspired by the work of visionary individuals who have helped shape the field of exposure science and who supported the origins and growth of the ISES and have now passed on but left a strong legacy.

Joan M. Daisey Outstanding Young Scientist Award

To recognize outstanding contributions to the science of human exposure analysis by a young scientist.
ISES Award for Best JESEE Paper

To recognize ISES members for work published in the Journal of Exposure Science and Environmental Epidemiology (JESEE) that exemplifies the best in the field of exposure science.

ISES Award for Best Student Paper

To recognize student or recent graduate ISES members for published work that exemplifies the best student-authored papers in the field of exposure science.

JESEE Young Investigator Meeting Award

This award supports student and new researcher (researcher within 10 years of terminal degree) participation at the ISES annual meetings.

IPA/DGUV Award for Young Exposure Scientists

To foster research in exposure areas with linkages to biomonitoring for superior doctoral students working on their dissertation or superior first-year postdoctoral exposure scientists

The Awards Committee looks forward to receiving nominations for a number of our outstanding members!

Tom McKone and Bert Hakkinen
Chairs, ISES Awards Committee

More About the New Excellence in Exposure Science Award

The motivation for this award is the recent losses of iconic and ground-breaking researchers exemplified by Paul Lioy, Larry Needham, Michael Lebowitz, and Natalie Freeman. The award will recognize individuals who produce significant advances in the development and/or translation of exposure science and exhibit leadership and service in ISES and/or the exposure science community. The award is designed to recognize basic research as well as collaborative research or practice that brings together scientists of complementary disciplines to translate exposure science into clinical or policy advances. The awardee will receive an honorarium, a plaque, and letter of recognition; be an invited speaker at the next ISES meeting following the award; receive free registration and reimbursement of hotel and airfare for the ISES meeting at which they speak; and be invited (but not required) to prepare a review paper or commentary in the winner’s area of expertise in JESEE with waived publication page fees. Donations to support this award can be made through the ISES web site.
Looking Ahead

Enhancing Diversity in Exposure Science and Environmental Health Research at all Levels To Address Environmental Health Disparities

by Lesliam Quirós-Alcalá, PhD, MS

Ethnically diverse, low-income communities, and tribal populations remain disproportionately exposed to environmental contaminants and are at an increased risk of adverse health effects. These disproportionate exposures may arise by virtue of where people live, play, learn, and work, in addition to general consumer patterns and behaviors that may, in part, be driven by cultural norms, financial limitations and access, and personal lifestyle factors. Environmental health disparities may also arise from differences in susceptibility and may be exacerbated by exposure to non-chemical stressors, such as psychosocial stress.

While we continue to make progress towards understanding and mitigating environmental health disparities, much remains to be done. Successful engagement and recruitment of underrepresented and understudied populations are crucial for addressing environmental health disparities as failure to do so will limit generalizability of research findings and further increase these disparities. So how do we ensure the ethical engagement and recruitment of underrepresented and understudied populations in research? Over the years, we have learned important lessons from longitudinal studies focusing on underrepresented populations. Successful research teams that have ethically and effectively engaged these populations in environmental health research have not only recruited participants from these diverse groups in their research studies, but also formed and engaged community advisory boards, hired people from the target community as part of their staff, and included investigators that come from racially/ethnically diverse populations. This comprehensive team approach informs the research process and can support recruitment and data collection efforts.

Why is it so critical to have a diverse research team? If you were to enter a room full of people speaking a different language than yours, would you gravitate towards someone you cannot understand or go over to the one person in the room that can speak your language and with whom you would be able to sustain a conversation? It’s human nature: we often gravitate towards environments and people that
make us feel more comfortable and with whom we have things in common, whether it’s language, race/ethnicity, professional background, etc. This is why it is essential to have staff and investigators on your team that are of similar (or the same) background as your target study population. This helps build trust between investigators and participants, and also makes participants feel more at ease and more open to sharing critical information. Additionally, staff and investigators that share things in common with study participants can provide insight into cultural norms and beliefs in the target population, providing additional information on exposures and factors to consider when designing and implementing exposure reduction strategies and sustainable interventions. The team can also assist with developing study instruments that are culturally sensitive to the target population further informing future exposure prevention strategies.

It is also key not to engage in “helicopter research” — that is, going into a community, acquiring the information needed to address the research question and leaving—never to be heard from again. While this can be challenging based on the resources at hand, we should strive for conducting scientifically sound work that not only advances our field, but also give back to these communities. For example, you can hold town hall meetings to report study results and increase environmental health awareness, offering strategies on how to reduce environmental exposures while engaging in dialogue to assess the feasibility of these strategies in the affected community. This latter action can be done independent of whether study results are available in a timely manner. This is also a prime opportunity to arm these communities with knowledge so that they become better-informed advocates and consumers. Staff and investigators that represent your target population can suggest best practices for delivering resources and communicating information in a manner that is culturally appropriate and that may be useful to the target population, further reducing their risk of experiencing disparate exposures. In doing so, it is also critical that the knowledge imparted to affected populations is delivered in a manner that captures wide audiences (e.g., children, parents, workers), is easy to digest, offers practical and sustainable strategies to further reduce environmental exposures, and considers limitations and barriers faced by this population. Inclusion of key members from your target population during this process is also essential so that they may become part of the solution.

Developing a network and pipeline of professionals in our field from underrepresented backgrounds, including women and minorities, is also critical not only for studying and mitigating environmental health disparities, but for advancing public health in general. While currently lacking from many academic programs, it is also important that we include training on cultural sensitivity, becoming self-reflective researchers aware of our own personal biases and how these may shape the research process, and building trust when ethically engaging and recruiting underrepresented and understudied populations in public health research. Such diversity in our pipeline and in our training can extend the scope of research questions we ask and allow us to take into account cultural sensitivity when engaging in research and when designing sustainable exposure mitigation strategies in understudied and underrepresented populations. Additionally, a diversified pipeline of professionals can serve as mentors and role models for aspiring young scholars in our field.¹

While this article is not meant to offer exhaustive strategies on “diversifying our field,” my intention

¹ Become a mentor (or mentee)! To learn more about how you can get more involved and become a mentor (or mentee) check out the ISES mentor webpage at https://www.intlexposurescience.org/Public/Resources/Mentorship_Program/Public/Resources/Mentor_Program.aspx?hkey=d832b97a-1514-4fd6-b808-2675d74cf4d4 or email us for more information at: isesmentorship@gmail.com.
is to raise awareness on this issue among our membership so that we can continue this conversation. With regards to research in underrepresented and understudied populations, we also need to work towards establishing and developing strategies to effectively build trust with these populations so that the burden does not fall entirely on new investigators who may not have the necessary institutional support needed to move forward during and after their research funding has ended.

Dr. Lesliam Quirós-Alcalá has been an ISES member since 2007 and is currently one of the ISES Academic Councilors. She is an Assistant Professor at the Maryland Institute of Applied Environmental Health at the School of Public Health at the University of Maryland; Affiliate Faculty at the UMD Department of Epidemiology and Biostatistics, the UMD Maryland Population Research Center, and the Johns Hopkins School of Medicine, Pulmonary and Critical Care Division; and Affiliate Researcher at the UC Berkeley Center for Environmental Research and Children’s Health. She has worked with underrepresented and understudied populations in environmental health research, including Latino and African American populations, for over a decade.

Additional Resources


Readings


We Need Your Financial Support

INES’s efforts on public health and environmental protection occur through our global community of members.

We need your support to recognize individuals who have left an indelible mark in the field.

Support the new Excellence in Exposure Science Award by making a tax deductible donation today.

(https://bit.ly/2k7QueL)

Your donation can make an impact, whether you donate $5 or $500.

Every little bit helps!
General Scientific Meetings Committee

by Lisa Jo Melnyk, PhD

The annual meeting of the International Society of Exposure Science (ISES) is our primary source of revenue and provides a venue for exposure scientists to gather and discuss research and pertinent information. Maintaining a meaningful and entertaining conference is vital to the continuation of the Society. The success of a meeting can be partly measured by the attendance. Since 2012, our meetings have continually increased in scope and size, which mirrors the growing importance of exposure science in improving our world (Figure 1).

The mission of the General Scientific Meetings (GSM) Committee is to solicit, review, and evaluate nominations for site location and Chair(s) of the ISES Technical Organizing Committee (TOC) for future ISES Annual Meetings. With this mission in mind, the GSM Committee will strive to select sites and identify TOC Chairs for several years into the future (three years, if possible). The Committee will be accessible and provide mentorship/advice to the Technical Organizing Committees via regular conference calls and/or electronic communication (e.g., e-mail, texts, etc.). The Committee maintains a history of past meetings and collects relevant documents/advice to assist the Chair(s) in planning future meetings. The Committee will document its operations in the GSM Annual Meeting Handbook, which will be updated, as necessary. The Committee will interact with other professional societies to develop opportunities for joint meetings. The Committee Chair, or representative, will make recommendations and periodic reports to the ISES Board on future meeting progress.

Since 2015, the following are some highlights/accomplishments of the Committee:

- Successfully reviewed, evaluated, and chosen sites for annual meetings that have increased in

Figure 1. Total paid participation in the ISES Annual Meetings. Data from 2013 are not provided because it was a joint meeting.
participation and provided members and prospective members an opportunity to interact with exposure scientists in a comfortable atmosphere.

- Reviewed proposals for the organizing contractor to provide the best accommodations for our attendees.

- Partnered with other societies and has developed the required meeting documents, which are thoroughly reviewed by the Committee and has solidified each society’s commitment to successful meetings.

- Provided guidance/mentoring to meeting chairs to maintain the highest quality and ensure a positive experience for all conference participants.

- Updated the GSM Annual Meeting Handbook to reflect the current state of operations.

Currently, the Committee is in the process of soliciting future meeting sites in the western portion of the USA (2020), the eastern portion of the USA (2021), and an international (2022) location. The Committee continues to provide guidance to current meeting chairs and looks for opportunities to partner with professional societies having a complimentary mission.

Get involved! Joining a committee provides you with an opportunity to shape the future of the Society. Influence the future directions taken by the Society. If the GSM Committee appeals to you, contact Lisa Melnyk, Chair at Melnyk.lisa@epa.gov or Eric S. Hall, Vice-Chair at hall.eric@epa.gov.

Lisa Jo Melnyk, Ph.D. is a Research Chemist at US Environmental Protection Agency and can be reached at Melnyk.lisa@epa.gov.
Paving the Way to Build a European Strategy on Exposure Science

by Yuri Bruinen de Bruin, Peter Fantke, Urs Schlüter, Alison Connolly, Natalie von Götz, and Jos Bessems

Regulatory changes in the EU during the last decade increased the demand for high-quality exposure information in Europe more than elsewhere. However, in the case of insufficient or missing exposure information, default assumptions are frequently used. These are often not well argued or very conservative, which in some cases lead to incorrect risk estimates due to underestimations or severe overestimations of a risk hampering decision making. Diverse parts of legislation put unique demands on the European exposure science community, including REACH, the Biocides Regulation, the General Food Law, the Regulation on Medical Devices and Construction Products, but also regulations on general product safety, classification, labelling and packaging, control of air quality and major-accident hazards. Furthermore, EU strategies add additional challenges. These include challenges related to moving toward a Non-Toxic Environment by 2050, striving toward a circular and bio-based economy, promoting green and sustainable chemistry, and

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better understanding the potential of ICT and Omics in revealing individual patterns of diseases, which would help design future health (care) measures. In Europe, exposure science is closely related to regulation, because a large part of exposure science is driven by regulatory needs. However, recent scientific advances face difficulties in finding their way into regulatory common practices. Therefore, during the ISES 2016 meeting in Utrecht, the Netherlands, European exposure professionals representing a wide range of stakeholders met and agreed that it was time to join forces and to work together building a highly needed European exposure science strategy and community.

In 2017, ISES Europe was founded and after its Board members were elected, the Board started to work out the best way to promote advancements of exposure sciences. This year, European exposure professionals from academia, industry, public stakeholder groups, and regulatory authorities (national and EU level) will meet at a first workshop in Germany in June, organised by the ISES Europe Board and the German Federal Institute for Occupational Safety and Health (BAuA). The main aim will be to develop a European strategy for “promoting exposure science in support of public and environmental health research, practices and policy-making.”

The workshop is structured along six overarching exposure science themes:

- Regulatory exposure assessment,
- Data repositories,
- Building partnerships and collaboration,
- Exposure education and communication,
- Exposure assessment methods and tools and
- Exposure data production and monitoring.

Together with the strategy, the workshop organisers aim to develop an accompanying roadmap for 2020-2030, prepare a work programme and establish working groups targeting each of the six overarching themes. The idea is that each Working Group will work on the implementation of the strategy and jointly publish its progress.

The workshop will take place on 19-20 June in Dortmund at the premises of BAuA, the German Federal Institute for Occupational Safety and Health. Interested professionals are invited to participate (registration required), and to submit an abstract relevant to one of the overarching themes. To learn more about the European Chapter, visit their website: https://iseseurope.wixsite.com/ises4europe/about

Want to become an ISES Europe member? Please send an email to info@ises-europe.org.

Authors

Yuri Bruinen de Bruin obtained his PhD in Occupational Medicine and Environmental Hygiene in 2003. Ever since, he works in research and policy-supporting science in the field of human and environmental health. His work incorporates coordination, planning, management, provision of research, technical and policy support, capacity-building, guidance development, stakeholder engagement, prioritization and policy support. Yuri is the President of ISES Europe and is a scientific officer at the European Commission Knowledge Management Service.

Peter Fantke is Associate Professor for Quantitative Sustainability Assessment at the Technical University of Denmark. He develops quantitative methods for evaluating exposure and human and environmental toxicity impacts from chemicals released along product life cycles to address some of society’s grand challenges, including reducing air pollution, human disease burden, and ecosystem degradation. He chairs several international task forces under the auspices of the Life Cycle Initiative hosted at the United Nations Environment Program. He is Managing Director of the USEtox International Centre, which develops global scientific consensus models for characterizing toxicity of chemical emissions and Councilor for a European Exposure Science Strategy in
the European Chapter of the International Society of Exposure Science.

**Urs Schlüter** is head of the unit Exposure Scenarios at the Federal Institute for Occupational Safety and Health (BAuA) which is the German Competent Authority for the REACH and the Biocides regulations. This unit is responsible for regulatory exposure assessments for workplaces. He participated in a number of national and European working committees for Biocides and REACH. Since 2011 he has been a member of the ECHA’s Committee for Risk Assessment (RAC).

**Alison Connolly** is a final year PhD candidate in the Centre of Climate and Air Pollution Studies (C-CAPS) in the National University of Ireland Galway (NUIG), researching occupational pesticide exposure among amenity horticulturists. This study involves completing exposure assessments using biomonitoring, dermal and inadvertent ingestion sampling methods. Alison obtained a Bachelor of Science (B.Sc.) honorary degree in Health and Safety Systems from the National University of Ireland, Galway (NUIG) in 2014.

**Natalie von Götz** is scientific officer for exposure at the Swiss Federal Office of Public Health. Previously, she worked at the Technical University ETH Zurich, where for 10 years she lead a research group for modelling consumer exposure to chemicals of concern, with focus on the development of methodology for aggregate exposure modelling. She is member of several international and national working groups, such as e.g. the SCCS-WG on ‘Nanomaterials in Cosmetic Products’ or the EFSA-WG on ‘uncertainty in risk assessment’.

**Jos Bessems** is a regulatory toxicologist and risk assessor since 1996. His has extensive knowledge in toxicokinetics and the use of non-animal approaches. At present, his focus is on the exposure pillar of human health risk assessment to include consumer, worker and environmental exposure, (molecular) epidemiology and human biomonitoring. Jos Bessems is founder and current secretary of ISES Europe.

**Tatsiana Dudzina** received a Ph.D. in Environmental Science from the Swiss Federal Institute of Technology in Zurich in 2014. Since graduation she has been working as an Exposure Scientist at ExxonMobil Biomedical Science Inc. (EMBSI) in Brussels headquarter, providing advice to ExxonMobil’s operating businesses and sites on a broad range of health topics.

Tatsiana is a member of ECETOC Human Exposure Data Task Force and ECETOC TRA Steering Team. Since 2015 Tatsiana has been co-chairing CEFIC Exposure Scenario Working and continues to be involved in the wider field of human health risk assessment science by advising Concawe on exposure research aspects, as well as activities at OECD level.

**References**


Mukuru is an informal settlement on the border of a major industrial area of Nairobi, Kenya. In January 2018 a diverse group of people from Kenya, the United Kingdom and other European countries gathered there to discuss clean air and health. The group included exposure scientists, musicians, geographers, artists, atmospheric scientists, dramatists, community health workers, lawyers, psychologists, medical anthropologists, and game designers. This is AIR Network – Action for Interdisciplinary air pollution Research, an innovative project jointly funded by the British Medical Research Council and the British Arts and Humanities Research Council. The project builds on previous pilot work of air monitoring and local perceptions of air pollution in this community. The goal is to raise awareness of air pollution amongst Mukuru residents and to try to affect change to reduce air pollution.

Mukuru has dirt roads and narrow alleys between homes constructed of tin or aluminum. Stalls and shops sell fruits and vegetables, meat, sweets and household goods, including cookstoves. Charcoal and balls made of charcoal and clay are sold as fuel for cooking and heating. High walls mark the border between the settlement and the factories on the other side. Rubbish litters the streets and open
areas. Smoldering fires occur in various rubbish heaps, whether in an open area or by the side of the road. Goats, pigs and chickens wander freely through the settlement.

At the workshop stories are told about inhalation of hazardous vapors while working in one of the nearby factories, headaches from the fumes from unventilated stoves in the homes, and the foul smells that permeate the air from the factories. Stories are a theme throughout the workshop, which is an experience of brainstorming, planning and creativity, with fun and games, as we try to learn from and understand each other. Together, we discuss interdisciplinary qualities and set up a contract to work by these principles (see Text box). The facilitator tells us that the point is to be outside of your comfort zone and to learn from those who have different views and approaches to the same issues. As an exposure scientist used to working within a certain set of environmental and biomedical sciences, this is definitely outside of my comfort zone (to be, for example, part of a forum theatre piece) but it’s a lot of fun. I learn what a ‘moment of crisis’ is, and how this can be used to engage an audience to try and find solutions to a challenge. For example, in our piece, the challenge is to consider ways that emissions from a stove can be prevented. The workshop ends by us agreeing on a set of mini-projects, each based on ideas generated during the workshop, and which include raising awareness, developing solutions, and engaging local industries and policy-makers. The projects will use tools such as participatory mapping, music, murals, and community events to achieve their goals. Throughout the workshop and in the project overall we keep reflection diaries, which help us process and record our experiences. These diaries also provide information about what works and what doesn’t, and facilitate the project to adapt to the group’s needs as we progress.

Beyond this workshop, the AIR Network convenes monthly in a virtual fashion via teleconferences, and we keep in touch with Mukuru residents using Whatsapp (mobile phone app for messaging), email, and social media. The monthly meetings are a chance to get together to discuss our mini-projects, updates on the situation in Mukuru, the usual project administration, and have an interdisciplinary journal club. We have read papers on local perceptions of air quality in some of the Nairobi informal settlements, air pollution’s health effects, and syndemics, or the clustering of health and social problems. Our next journal club will be about storytelling. These experiences are all relevant for exposure science and environmental health. Successful awareness-raising and
successful interventions require more than understanding the scientific elements of a situation.

The exposome concept describes all exposures from before conception to death, where exposure involves interaction with our social, physical, chemical, and biological environments. There has been a lot of emphasis on technological and biomedical methods to define the exposome, but to truly understand how the environment influences health we must examine the social and economic contexts in which we exist. Looking outside of the sciences to the creative fields can provide a powerful way of fully understanding the exposome. The AIR Network is at an early stage, but it is encouraging to see a group of dedicated community participants and researchers working together to solve and environmental problem, and planning for collaboration beyond the end of this project.

Miranda Loh, ScD is a Senior Scientist at the Institute of Occupational Medicine. Miranda can be contacted at miranda.loh@iom-world.org. This work has been funded through MRC/AHRC grant number AH/R006059/1.

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IES Professional Development and Mentorship Program

*Just as iron sharpens iron, so does one person to another*

by Paloma Beamer, PhD and Crystal E. Romeo Upperman, PhD

Ever wonder about those scientists who seem to know how to play the game? They can make strategic decisions at just the right time, and they expertly negotiate for things that you never even knew were possible! Long gone are the days (if those ever existed) of just focusing on doing good science and teaching your classes. Being a successful scientist in this ever-changing political and economic landscape is about knowing all of these techniques (i.e., tricks).

The reality is that most of us, no matter how it appears on the outside, have bumbled our way through our career, just like everyone else. If you look behind the scenes of those that seem to be most successful, oftentimes you will find one or more excellent mentors who provided guidance along the path. While mentorship and professional development are essential for career and leadership growth in all fields, it is even more so for exposure scientists and practitioners.

Although ISES has existed for more than 25 years, exposure science is still a relatively small discipline. Both students and professionals often work and conduct research with little interaction with other exposure scientists. In many cases, students, new researchers, and professionals are mentored by those external to the field. Even after finding a professional home in ISES, it can be difficult for students and new researchers to break in and feel comfortable approaching leaders in the field.

However, once they do, they realize that ISES is an interconnected group with people committed to the next generation of exposure scientists. Since 2009, the ISES Mentorship Program has engaged with over 115 students and new researcher members. Mentees have consistently reported that the most useful part of the program is having access to a more senior exposure scientist who can give them expert advice on their specific research and help them meet other experts. For example, at an ISES conference one mentor took her mentee out to dinner with three other experts in her specific research area and requested that the senior researchers be available to the mentee for any future questions.

Importantly, the ISES Mentorship Program is not limited to students and new researchers. We have had requests from senior scientists in other fields, such as nutrition, who would like ISES mentorship as they expand their work to include exposure science. Further, because exposure science is a field with many career options outside of academia, students and new researchers in the ISES Mentorship program have benefited from having access to mentors with careers in a diverse set of sectors from government to private industry. While faculty advisors typically have limited experience...
in navigating this terrain, our ISES mentors helped students identify different career opportunities and prepare more effectively for them. We have also had senior members seek out the ISES Mentorship program when they are considering crossing over into a new work sector.

With the esoteric nature of exposure science, the mentorship program serves to supplement the key technical expertise of our member base with strong professional skills. Students and new researchers may not have direct access to these skills prior to entering new careers. The Mentorship Program is instrumental to providing access to networks that can inform career decisions. Moreover, the intent of the program is to provide soft skills—such as leading a meeting, drafting an agenda, and marketing and selling yourself—that can ready our members for assuming leadership positions in their respective places of work. In particular, members that are more senior have also requested mentorship from ISES as they begin to take on more management and administrative roles. This allows them to get advice on how to navigate this new terrain from experienced mentors not ingrained in their work politics.

To be clear, the ISES Mentorship program is not meant to counteract or undercut the excellent wisdom of students’ advisors nor other mentors. Yet multiple perspectives on topics—even those unrelated to exposure science—can be helpful. Some of the more common topics include: work-life balance; how to network and develop collaboration; being published; and finding and being successful with grant opportunities. Mentees have frequently commented that being able to get a fresh perspective from someone outside of their institution has helped them make it through the “doldrums” of grad school when there does not seem to be an end in sight.

One of our greatest sources of pride is the incredible support that ISES provides students and new researchers compared to other scientific societies. This is something we often brag about when meeting new potential student members. But with the changing times we would like to expand the program to better serve all of our members and take advantage of our senior mentors that have been so committed for these years.

ISES has consistently maintained a database of over 40 mentors. Those included in the database have been hand-selected because they are easily accessible and responsive and take this commitment seriously. Mentors have consistently reported that they find getting to know and assist junior colleagues a rewarding process. They particularly like hearing the fresh ideas that come from the mentees. Our mentors do wish that more students would take advantage of the program!

We want to hear ideas from you! Please let us know if you would like to join the Mentorship Committee or have thoughts on how ISES can better help with professional development.

Please join us! For those looking for help navigating the world of exposure science, use this very important membership benefit! For more information about the ISES Mentor Program please check out the website (https://www.intlexposurescience.org/Public/Resources/Mentorship_Program/Public/Resources/Mentor_Program.aspx?hkey=d832b97a-1514-4fd6-b808-2675d74cf4d4). Do not forget to watch the video (https://www.youtube.com/watch?v=EGjo1uFergI), with testimonies from previous mentees. You can also email isesmentorship@gmail.com for information.

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Wearable Monitor for Ultrafine Particles

by Patrick Ryan, PhD

Sensor technology is changing the way researchers characterize air pollution exposure, but until recently measuring the tiniest of airborne particles still required large, bulky, or immobile devices. Using a newly developed wearable monitor – the Personal Ultrafine Particle counter (PUFP) – Dr. I am directing a new study to understand adolescents’ exposure to ultrafine particles (UFPs) and their health effects. There are a lot of real-time sensors for larger particles and other air pollutants, but very few wearable monitors exist that are capable of accurately measuring ultrafine particles and GPS location in real-time. The really novel and exciting part of this research is not only the ability to identify places and times where ultrafine particle exposures are occurring – but potentially to intervene and reduce these exposures in future studies.

I have been working with the sensor developer, Dr. Sang Young Son, since 2006 when the concept of a wearable UFP monitor was initially proposed and funded as part of the NIH Genes, Environment and Health Initiative. Together with Dr. Son and study co-investigators Drs. James Lockey and Grace LeMasters from the University of Cincinnati, I have led two previous field tests of the PUFP. We learned a lot from field testing the prototype sensors with children and we’ve used the data and the feedback from the kids and their caregivers to modify the sensor.

After initial funding for the sensor development was complete, I received an R21/R33 grant from the National Institute of Environmental Health Sciences (NIEHS) to further refine the PUFP and deploy it for the first time in a large epidemiologic study. This study, called the Ecological Momentary Assessment and Personal Particle Exposure Study (EcoMAPPE) is currently recruiting 100 adolescents, half with asthma, to wear the PUFP for two weeks. In addition to wearing the PUFP, study participants wear a Fitbit and measure lung function multiple times per day. All of the sensors are linked to a smartphone that records location and serves as the platform for participants to complete ecological momentary assessments (EMA) of their surroundings and health.

It’s very exciting to see the large amount of exposure and health data that is made possible through these new technologies. Combining novel exposure sensors with other monitors and EMA allows us to collect more data than ever before, explore new research questions, and most importantly, begin to consider the possibility of interventions based on real-time exposure and health data.

Patrick Ryan, PhD is an Associate Professor of Pediatrics and Environmental Health at Cincinnati Children’s Hospital Medical Center and the Department of Environmental Health at the University of Cincinnati. He has conducted multiple studies of air pollution exposure and respiratory and neurobehavioral health in children. Patrick previously served as an Associate Editor for the Journal Of Exposure Science and Environmental Epidemiology and currently is a member of the ISES Publications Committee.
Dr. Patrick Ryan with the PUFP C100. Photo credit: CCHMC Research Horizon 2014

Personal Ultrafine Particle Counter (PUFP C200). EnMont, LLC. For more information visit www.enmont.com.

**Personal UFP exposure by time and location.** (A) Real-time UFP exposure (p/cc) annotated with EMA responses, (B) photograph of truck logged on the EMA app at 17:28, (C) Locations of UFP exposures corresponding to (A).
ISES-ISEE 2018 Joint Annual Meeting

Addressing Complex Local and Global Issues in Environmental Exposure and Health

The Joint Annual Meeting of the International Society of Exposure Science and the International Society for Environmental Epidemiology (ISES-ISEE 2018) will bring together scientific experts and practitioners from academia, government, industry, and non-governmental organizations dedicated to the protection of health and environment.

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

- Markey Johnson, Health Canada, Ottawa, ON, Canada
- Angelika Zidek, Health Canada, Ottawa, ON, 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 to organize the meeting! http://isesisee2018.org/generalinformation/technical-organizing-committee/

Pre-Conference Courses

Pre-Conference Courses will be offered on Sunday, August 26th at the Shaw Centre. Both half and full day courses are available on the website now (http://isesisee2018.org/pre-conference-courses/), including the detailed descriptions and specific learning objectives. Courses cover diverse topics including advanced statistical and modeling methods and other tools to support exposure science, epidemiology, and risk assessment.
Full Day Courses (9am-4pm with a lunch break from 12-1pm)

**Big data, machine learning techniques to investigate health effects in environmental health studies**

- Youssef Oulhote, Department of Environmental Health, Harvard T. H. Chan School of Public Health; Boston, USA
- Laura Balzer, Department of Biostatistics & Epidemiology, School of Public Health & Health Sciences, UMass Amherst; Amherst, USA
- Chirag J Patel, Department of Biomedical Informatics, Harvard Medical School; Boston, USA
- Martin Tondel, Department of Medical Sciences, Occupational and Environmental Medicine, Uppsala University; Uppsala, Sweden

**Consumer Exposure Modeling for Human Health Risk Assessment – Advanced Tools**

- Eva Wong, U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics, Consumer Exposure Model (CEM); Washington, DC, USA

Morning Courses (9am-12pm)

**Bayesian methods for environmental health researchers**

- Ghassan B Hamra, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health; Baltimore, USA


- John Wambaugh, National Center for Computational Toxicology, U.S. Environmental Protection Agency; Research Triangle Park, USA
Katherine Phillips, Computational Exposure Division, National Exposure Research Laboratory, U.S. Environmental Protection Agency; Research Triangle Park, USA

Kristin Isaacs, Human Exposure and Atmospheric Sciences Division, National Exposure Research Laboratory, U.S. Environmental Protection Agency; Research Triangle Park, USA

Model-Based Geostatistics and Spatial Epidemiology: a practical introduction with R

Patrick Brown, Centre for Global Health Research, St Michael's Hospital, Department of Statistical Science, University of Toronto, Toronto, Canada

Afternoon Courses (1pm-4pm)

Predicting microscale urban features using street-level images – an introduction to machine learning

Mahdi Shooshtari, Canadian Urban Environmental Health Research Consortium (CANUE) Department of Geography, University of Victoria; Victoria, Canada

Evan Seed, Canadian Urban Environmental Health Research Consortium (CANUE), Dalla Lana School of Public Health, University of Toronto; Toronto, Canada

Causal inference foundations and applications in environmental health sciences

Jay Kaufman, Department of Epidemiology, Biostatistics and Occupational Health, McGill University; Montreal, Canada

Alexander Keil, Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina; Chapel Hill, USA

Advanced modelling techniques for time series analysis using R

Antonio Gasparrini, Ana Maria Vicedo-Cabrera and Francesco Sera, Department of Social and Environmental Health Research, London School of Hygiene and Tropical Medicine; London, UK

Online Registration is Now Open!

Please log in to your ISES membership account to access the member registration fees. Register now to apply for the Early Bird rate! The registration process provides the following options:

- Registration for the meeting by category (Full Meeting ISES Member, Postdoc, Student/Retiree/Developing Country)
- Select Pre-Conference Courses - half or full day
- Purchase tickets for the Conference Dinner and Women's Networking Event
- Confirm participation in the Welcome Reception, Technology and Sensor Fair, and Chapters and Committees Fair
- Support Students and Delegates from Developing Countries by contributing to the ISES-ISEE 2018 student and developing countries fund. You can choose whether your contribution will be used to fund travel awards, registration, or tickets to the Conference Dinner or Women's Networking Event, and whether it will be used to support students or delegates from developing countries.
› Purchase at least a half tonne of carbon offsets during your registration in an effort to mitigate the climate impact of holding this event.

**ISES-ISEE 2018 is Going Green**

In an effort to minimize the carbon footprint of the joint annual meeting, we are proud to highlight the environmentally friendly aspects of our conference. The *Shaw Conference Center* is a Gold Certified Leadership in Energy and Environmental Design (LEED) facility offering green initiatives in food, energy, and maintenance. The conference program will be easily accessible via phone and tablet app. We encourage conference attendees to take advantage of these paperless options; however, paper programs will also be available at extra cost. The menu at the conference dinner, held at the beautiful *National Arts Centre*, will be locally-sourced and sustainable. We encourage attendees to also consider the environment when making their hotel and travel choices. The *Westin Ottawa* offers options for conserving water and energy, and will plant a tree if you “Make a Green Choice” when making a reservation. When registering for the meeting, you can opt to purchase carbon offsets that will help fund carbon-reducing projects. We are taking steps to mitigate our environmental impact and appreciate your support in doing so!

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

› Welcome Reception on Sunday, August 26
› Plenary speakers addressing interesting and diverse topics
› Student Poster Competition on Sunday and Monday, August 26-27
› Women’s Networking Event on Monday, August 27
› Conference Dinner on Tuesday, August 28
› Technology and Sensor Fair and Chapters and Committees Fair on Wednesday August 29
› Networking and social events for students and new researchers throughout the program
› Social activities including fun runs, sight-seeing, post-conference tours, and more!
Tools For Exposure Scientists Conducting Community-engaged Research

by Robin Dodson, ScD

As a nonprofit scientific organization focused on the links between environment chemicals and women's health, we are often asked: “How can I get my body tested for chemicals?” People routinely contact us for help in understanding hazardous chemicals in their everyday environment. Like the participants in our exposure studies, overwhelmingly, they want more information. They want to know where these chemicals come from, how they can avoid them, and how chemicals might affect their health. And they want to know all of this, even when the science is uncertain.

Last year, we launched the first-ever crowdfunded biomonitoring study: Detox Me Action Kit (https://silentspring.org/detoxmeactionkit/). This novel approach allows us to recruit people interested in their own exposures to participate in a research study, to develop a large cohort of bio-monitored individuals. This project also provides a platform for community-initiated biomonitoring studies by removing barriers to access, such as cost, by taking advantage of efficiencies of scale.

A main goal of our project is to identify important sources of exposure to common commercial chemicals. After providing informed consent, participants are sent a kit for collecting two urine samples, and are asked to complete a detailed survey about their exposure-related behaviors (e.g., using “paraben free” products). The analytes that we test for include commercial chemicals such as disinfectants, parabens, a UV filter, and BPA and its substitutes. All study protocols have been reviewed by an independent IRB to ensure human subject protection. To date, we have enrolled close to 700 participants and analyzed nearly 300 samples.
So who is participating? The majority of the first 300 participants are well-educated females connected to an environmental health network, and most report avoiding products with at least one of the target chemicals (i.e., they report avoiding BPA, parabens, and triclosan). And, what have we learned so far? All participants had at least two chemicals in their bodies, and most had at least nine chemicals. Participants generally have lower levels of most chemicals than the NHANES population. However, even those deeply engaged in research on consumer product chemicals can’t avoid these chemicals, highlighting both the ubiquity of these chemicals and the limitations of consumer product labeling.

Participants receive personalized results using Silent Spring’s Digital Exposure Report-Back Interface (DERBI) (1). Individual results are presented graphically, in comparison with other study participants and with national biomonitoring data. In addition, each report includes information on potential sources of chemical exposure, what is known and unknown about the health effects associated with each, strategies for reducing exposures, and study-wide findings.

More information on reducing exposures to common household chemicals is also available on Silent Spring’s smartphone app called Detox Me. The free app, available for iOS and Android, compiles research-based tips into an easily accessible format.

DERBI—developed with funding from NIH—is based on years of research on best practices and ethical considerations for sharing study results with participants (2). Because of its digital format, participants can explore their data to various depths; delving deeper into areas that particularly interest them. The DERBI reports are automated and also include an interface for researchers to further investigate study results. (Continued on next page).
DERBI is available to participants in print or online, with a mobile phone responsive platform soon to be released. It has been used in CDC’s Green Housing Study (https://silentspring.org/resource/green-housing-study-family-report-2015) in Boston and Cincinnati (in English, Spanish, and Mandarin) and the Child Health Development Study (http://45.33.82.210/). It is also currently being used in the PROTECT project (https://web.northeastern.edu/protect/) in Puerto Rico (in English and Spanish) and in an occupational cohort study in California which includes female firefighters, office workers, and nurses.

Silent Spring created all of these tools—Detox Me app, Detox Me Action Kit, and DERBI—to enhance community access to environmental health research. DERBI, in particular, is a tool that exposure scientists should consider integrating into their research projects. The use of DERBI to date has resulted from ongoing research collaborations, and we’re always seeking new collaborations to aid in sharing results with study participants.

**Robin Dodson, Sc.D.** is a Research Scientist at Silent Spring Institute (www.silentspring.org) and an ISES Board member. Her research focuses on development of novel exposure measurements for epidemiological and community-based studies, analysis of environmental exposure data with a particular emphasis on semi-volatile organic compounds such as phthalates and flame retardant chemicals, and intervention studies aimed at reducing chemical exposures. Dr. Dodson can be contacted at dodson@silentspring.org.

**References**

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.