



## **53rd Symposium / 53e Symposium**

November 29th – December 3rd, 2021

Virtual Learning Event / Événement d'apprentissage virtuel

**THE BROAD SPECTRUM OF TOXICOLOGY:  
FROM MECHANISMS TO HEALTH OUTCOMES**

**LE LARGE SPECTRE DE LA TOXICOLOGIE : DES MÉCANISMES JUSQU'AUX  
EFFETS SUR LA SANTÉ**

**Organized by / Organisé par:**

SOCIETY OF TOXICOLOGY OF CANADA  
LA SOCIÉTÉ DE TOXICOLOGIE DU CANADA

President: Géraldine Delbès, INRS

Vice President: Jayadev Raju, Health Canada

Past President: Angela Hofstra, Syngenta Canada Inc.

**Programme Committee / Comité du Programme**

Isabelle Plante, INRS, Chair and Academic Member

Anne Marie Gannon, Health Canada, Government Member

Albert Licollari, Nucro-Technics, Industry Member

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## President's welcome

On behalf of the STC Board of Directors, it is our pleasure to welcome you to the 53rd STC Symposium. We are excited to present a virtual meeting to discuss existing and emerging priorities in the field of toxicology with perspectives from the three sectors of academia, government and industry. We thank the Programme Committee, chaired by Dr. Isabelle Plante (INRS), for bringing forth a broad spectrum of toxicology topics (forensic toxicology, environmental toxicology, pharmaco-toxicology, etc.). We are very pleased to welcome Dr. Sue Fenton (NIEHS) as our keynote speaker on December 1 at 4:30 pm who will speak to us about the effects of PFAS exposure.

Building on the success of the virtual meeting last year, we have included more ways to interact including: the afternoon sessions, poster presentations, celebrating the 2021 recipients of the V.E. Henderson and Gabriel L. Plaa awards and a social event. You won't want to miss the social event on Tuesday, November 30th, from 5:00 to 7:00 pm EDT in Gathertown. We've created an online pub to continue STC's tradition of networking and socializing! We will be celebrating our 2021 awardees and hosting the famous *ToxQuiz*. So, get ready and bring your drink!

We are very grateful for the support of our sponsors, without whom we would not be here. We also thank the many of you who chose to present your work at our meeting. 39 excellent abstracts will be presented as posters on *Gathertown*, accessible all week, and in an interactive special session on Wednesday. MSc and PhD finalists for the STC/INTERTEK graduate student research awards will have the opportunity to present their work in a short-talk session on Tuesday and 4 selected oral presentations will take place on Thursday.

Although disappointed we could not meet in person again this year, we trust you will safely enjoy this virtual way to learn, connect, and share your research.

Géraldine Delbès, President  
Jayadev Raju, Vice President  
Angela Hofstra, Past President

## Sponsors

The Society of Toxicology of Canada is grateful to the following organizations for their valued contributions and financial support.

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## Symposium programme

Monday November 29<sup>th</sup>, 2021 [1:00 to 5:00 pm EST]

- 1:00**            **Welcome & Opening Remarks**  
Géraldine Delbès, President STC
- 1:10-1:15**        **SESSION I: Pharmacotoxicology Related to Vaccines**  
*Chair: Albert Licollari, Nucro-Technics*
- 1:15-1:45**        **Trina Racine, VIDO**  
Acute Toxicity Studies in Rabbits in the Development of two COVID-19 Vaccine Candidates
- 1:45-2:15**        **Warren Casey, NIH**  
Establishment of an International MicroPhysiologicalSystems for COVID Research (MPSCoRe) working group
- 2:15-2:45**        **Dean Smith, Health Canada**  
Key Scientific and Regulatory Principles that Support Expedited Authorization of COVID-19 Vaccines
- 2:45-3:15**        **Marie-Claude Rousseau, INRS**  
Bacillus Calmette-Guerin (BCG) and COVID-19: Could a 100-year-old tuberculosis vaccine play a role in the pandemic response?
- 3:15-3:30**        **Break**
- 3:30-5:00**        **Annual Business Meeting (members only)**

**Tuesday November 30<sup>th</sup>, 2021 [1:00 to 7:00 pm EST]**

- 1:00-1:05**      **SESSION II: Ecotoxicology (In collaboration with EcotoQ)**  
*Chair: Patrice Couture, INRS, EcotoQ, (<https://ecotoq.ca/>)*
- 1:05-1:35**      **Magali Houde, Environment and Climate Change Canada**  
Contaminants in marine mammals – from the St. Lawrence to the Arctic
- 1:35-2:05**      **Juan Manuel Gutierrez-Villagomez, INRS**  
Are biopesticides potentially toxic to wildlife?
- 2:05-2:35**      **Niladri Basu, McGill University**  
EcoToxChip: A toxicogenomics tool for chemical prioritization and environmental Management
- 2:35-3:05**      **Jonathan Verreault, UQAM**  
Landfills: A neglected source of exposure to halogenated flame retardants for urban-adapted birds?
- 3:05-3:25**      **Break**
- 3:25-4:00**      **Short communications session**  
*Chair: Christopher Nicol, Queens University*
- Natasha Iaboni, Queen University (Poster 5)**  
Differentiating Colorectal Cancer Pathological Regions Using Desorption Electro spray Ionization-Mass Spectrometry Imaging
- Nicole L. Washuck, University of Ottawa (Poster 6)**  
Extracellular vesicles as biomarkers for arsenic induced urothelial injury
- Lilit Gasparyan, University of Montreal (Poster 7)**  
Density of hydraulic fracturing wells and concentrations of trace elements in urine, hair, nails and drinking water samples from pregnant women living in Northeastern British Columbia
- Alison Jee, University of Toronto (Poster 8)**  
Nevirapine-associated immunosuppressive effects in mice are associated with increased corticosterone
- Allison Loan, University of Ottawa (Poster 9)**  
Low-dose methylmercury promotes prenatal differentiation of mouse cortical precursors by stimulating CREB activation

**Laiba Jamshed, McMaster University** (Poster 10)

Perturbations in hepatic stress response pathways following exposure to a water-accommodated fraction of bitumen

**Samantha C. Sernoskie, University of Toronto** (Poster 11)

What causes idiosyncratic drug-induced agranulocytosis? Mechanisms of immune activation induced by clozapine

**4:00-4:10**

**Gabriel Plaa award Presentation**

*Chair: Géraldine Delbès, President, Grazyna Kalabis, University of Toronto, and Adam Socha, MECP*

**4:10-5:00**

**Gabriel Plaa Lecture, David Josephy, Guelph**

Colourful Life – vignettes from my research career

**5:00-7:00**

**Social Event (Gathertown)**

Meet us in the pub on Gathertown to meet everyone, play the ToxTrivia and celebrate our 2021 awardees!

Wednesday December 1<sup>st</sup>, 2021 [13:00 to 5:30 pm EST]

- 1:00-1:05**      **SESSION III: Safety of Vaping Products**  
*Chair: Anne Marie Gannon, Health Canada*
- 1:05-1:35**      **Alison Holloway, McMaster University**  
E-cigarette use during pregnancy and offspring health
- 1:35-2:05**      **Ashley Cabecinha, Health Canada**  
Legal Cannabis Vaping Products in Canada: Compositions as Determined Through  
Voluntary Requests for More Information
- 2:05-2:35**      **Daniela Schwotzer, Lovelace Biomedical**  
Lung Injury after Phytol Inhalation in Rats
- 2:35-3:05**      **David Hammond**  
E-cigarettes and vaping in Canada: implications for public health.
- 3:05-3:25**      **Break**
- 3:25-4:30**      **Poster viewing session**
- 4:30-5:30**      **Keynote Speaker**  
*Chair: Isabelle Plante, INRS*
- Suzanne Fenton, National Institute of Environmental Health Sciences**  
Developmental PFAS Exposures and a Lifetime of Health Effects




**Thursday December 2<sup>nd</sup>, 2021 [13:00 to 5:30 pm EST]**

- 1:00-1:10 VE Henderson award Presentation**  
*Chair: Géraldine Delbès, President of STC, Health Canada and Barbara Hales, McGill*
- 1:10-2:00 VE Henderson Lecture, Tara Barton-MacLaren, Health Canada**  
Dare to be Different: Embracing change at the forefront of an evolving toxicity paradigm
- 2:00-3:05 SELECTED ORAL PRESENTATIONS**  
*Chair: Mike Wade, Health Canada*
- Amira M. Aker, CRCHUQ (Poster 1)**  
Proximity and density of unconventional natural gas wells and mental illness and substance use among pregnant women: An exploratory study in Canada
- Angela Hofstra, Syngenta Canada Inc. (Poster 2)**  
Assessing Chronic and Carcinogenicity Risk of an Agrochemical Without Performing Cancer Bioassays
- Laura Pelland-St-Pierre, CRCHUM (Poster 3)**  
Influence of occupational exposure to endocrine disruptors on colorectal cancer risk in the Ontario Health Study
- Carolyn Baglole, McGill University (Poster 4)**  
Impact of JUUL on pulmonary immune modulation and oxidative stress responses
- 3:05-3:25 Break**
- 3:25-3:30 SESSION IV: Environmental Toxicology: Northern Pollution**  
*Chair: Élyse Caron-Beaudoin, University of Toronto*
- 3:30-4:00 Marc-André Verner, Université de Montréal**  
Exposure science in fractured land: Findings and research perspectives
- 4:00-4:30 Brian Laird, University of Waterloo**  
Biomonitoring for Evaluating Contaminant Risk Among Northern First Nations: Future Directions Post COVID-19
- 4:30-5:00 Aline Philibert, UQAM**  
Mercury exposure and premature mortality in the Grassy Narrows First Nation community: a retrospective longitudinal study
- 5:00-5:30 Pierre Ayotte, Université Laval, INSPQ**  
Selenoneine in the Arctic marine food web: a natural antidote to methylmercury toxicity?

Friday December 3<sup>rd</sup>, 2021 [13:00 to 3:30 pm EST]

- 1:00-1:15**      **SESSION V: Forensic Toxicology**  
*Chair: Bernard Robaire, McGill*
- 1:15-1:45**      **Aaron Shapiro, University of British Columbia**  
Forensic Toxicology: Crime Scenes, Court, and Beyond!
- 1:45-2:15**      **Cynthia Côté, Laboratoire de sciences judiciaires et de médecine légale du Québec**  
Postmortem redistribution of THC
- 2:15-2:45**      **Karen Woodall, University of Toronto**  
Expert testimony in the era of novel psychoactive substances
- 2:45-3:00**      **Poster Award Winner and Closing Remarks**  
Géraldine Delbès, President STC

## Speaker Bios

<b>Trina Racine</b> VIDO	
<b>Title:</b> Acute Toxicity Studies in Rabbits in the Development of two COVID-19 Vaccine Candidates	
<b>Abstract:</b> Dr Racine will first present who they are at VIDO, and some of their vaccine candidates. She will then present some pre-clinical data that led them to perform the toxicological studies, and the results of those studies.	
<b>Bio:</b> Dr. Trina Racine received her PhD in Microbiology and Immunology from Dalhousie University in 2010. She then joined the Special Pathogens Program at the National Microbiology Laboratory, part of the Public Health Agency of Canada. While at the NML Dr. Racine worked on the development of vaccines and therapeutics for various emerging and re-emerging infectious diseases, including Ebola, Zika and MERS. Dr. Racine has coordinated clinical trials and has provided diagnostic support to the Ebola outbreak in West Africa in 2014-2016. Prior to joining VIDO, Dr. Racine was a Scientific and Regulatory Affairs Consultant for GeneOne Life Science, Inc., a South Korean based biopharmaceutical company.	

**Warren Casey**  
NIEHS



**Title:** Establishment of an International MicroPhysiologicalSystems for COVID Research (MPSCoRe) working group

**Abstract:** NICEATM, the UK National Centre for the 3Rs (NC3Rs), and collaborators are organizing a working group, the MPS for COVID Research (MPSCoRe) working group, that will coordinate the use of MPS to reduce animal use in studies of COVID-19 and future emerging infectious diseases. Information about activities of the MPSCoRe working group will be presented.

**Bio:** Warren Casey, Ph.D., DABT, is acting Chief of the Predictive Toxicology Branch in the Division of the National Toxicology Program at the National Institutes of Environmental Health Sciences (NIEHS). He serves as Executive Director of the US Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) and previously directed the National Toxicology Program's Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM). Prior to joining NIEHS Dr. Casey worked at GlaxoSmithKline for 15 years in a variety of roles, including preclinical biomarker discovery and investigative toxicology. He co-chairs the OECD Validation Management Group – Non-Animal (2015-present) and serves as the NIEHS principal representative for the Tox 21 interagency consortium. Dr Casey is past President of the SOT In Vitro and Alternative Methods specialty section and received the 2016 Society of Toxicology Animal Welfare Award. He has been a Diplomate of the American Board of Toxicology (DABT) since 2007.

**Dean Smith**  
Health Canada



**Title:** Key Scientific and Regulatory Principles that Support Expedited Authorization of COVID-19 Vaccines

**Abstract:** At all times, it is important for regulatory authorities to support innovation through appropriate and efficient risk/benefit driven review pathways to come to timely evidence-based decisions. The current COVID-19 pandemic highlights the importance of Health Canada’s (HC’s) regulatory lessons learned over the past twenty years. These lessons have been drawn from our regular vaccine review activities, as well as preparedness efforts related to the bioterrorist threats of the post-911 US Anthrax attacks, Smallpox vaccine preparedness review work, the 2003 SARS-CoV-1 outbreak experience, the 2009 H1N1 pandemic vaccine response, and the 2014/2016 large-scale Ebola outbreaks in West Africa, during which HC provided regulatory support to WHO and National Authorities in Africa. As a result of the above experiences, and prior to the current pandemic, HC had embarked on regulatory renewal to provide a more agile regulatory framework to support ongoing regular review and authorization activities, as well as to deal with emergency situations. The presentation will provide an overview into how HC’s experience has driven our approach to the life-cycle management of vaccines from early product development and authorization to post-approval change management, as well as post-market surveillance that feeds back to our regulatory actions. Also highlighted will be HC’s internal activities and international collaboration to support industry with its development of appropriately designed in vitro (non-animal based) quality control (QC) assays systems. Our work with our EU regulatory partners has resulted in the deletion of scientifically unjustified long standing in vivo assays and the development of a new “substitution” regulatory option to implement appropriately designed in vitro potency and safety assays for several legacy vaccines. Advantages of in vitro QC approaches are exemplified with recently developed vaccines, including the currently authorized COVID-19 vaccines in Canada, the US, and the EU. Our work to support the use of early phase 1/2 dose ranging studies with well-characterized immunogenicity studies to establish robust, defensible clinically-linked/patient-centric harmonized specifications at authorization will be highlighted. This approach is relevant for non-pandemic vaccines and was utilized during the authorized mRNA COVID-19 vaccines from Pfizer-BioNTech and Moderna. With the benefit of clinically justified specifications for these mRNA vaccines, both manufacturers and their respective regulators could expedite urgent manufacturing scale-up and regulatory approvals for these products, with confidence provided through dose ranging studies and the demonstrated process capabilities of each manufacturer. The use of dose ranging and immunogenicity studies in pre-clinical models and clinical studies, when combined with phase 3 efficacy and disease break through data, also supports correlates of protection (CoP) analyses and new vaccine development. Current thinking on CoP and immunobridging options for new COVID-19 vaccine authorizations

will be presented, as will the evaluation of post-market vaccine effectiveness studies against variants of concern (VOC) and insights into COVID-19 vaccine pharmacovigilance.

**Bio:** Dean Smith is an Associate Director in the Center for Biologics Evaluation (CBE) at Health Canada. Dr. Smith has over 20-years of experience in regulatory science in support of innovation in vaccine development, manufacturing and quality control. He has a wide range of biologics-based scientific and regulatory experience from his Senior Scientific Evaluator and management roles in CBE Divisions, including Bacterial and Viral Vaccines, as well Hemostatic Agents and Blood Substitutes. Representing Health Canada, Dr. Smith contributes to WHO's vaccine and vaccine stability guidance development initiatives. He is Health Canada's representative to the European Directorate of Quality of Medicines (EDQM), Group 15 (Vaccines), with the European Pharmacopeia, and serves on the Science and Ethics Advisory Committee for VAC2VAC under the European Vaccines Initiative. Dr. Smith's Ph.D. in Immunology is from the University of Alberta, Alberta, Canada, where his research dealt with vaccine antigen discovery, autoimmunity and viral vector-based gene therapy.

**Marie-Claude Rousseau**  
INRS



**Title:** Bacillus Calmette-Guerin (BCG) and COVID-19: Could a 100-year-old tuberculosis vaccine play a role in the pandemic response?

**Abstract:** This presentation will provide an overview of the recent and ongoing epidemiological research on BCG vaccination and COVID-19. Epidemiological studies have covered the entire spectrum: from initial correlational studies suggesting an inverse correlation between BCG vaccination and COVID-19 incidence/mortality at the country level, to ongoing randomized clinical trials. Some recent Canadian contributions to this area of research will be highlighted.

**Bio:** Dr. Rousseau is a Professor at INRS – Centre Armand-Frappier Santé Biotechnologie. She initially trained in biochemistry, and completed a M.Sc. and Ph.D. in Epidemiology and Biostatistics at McGill University. After a postdoctoral fellowship in Environmental Epidemiology at Université de Montréal, she joined INRS as Faculty in 2005. Her research consists in epidemiological studies on the etiology of inflammatory, autoimmune, and infectious diseases. Particularly interested in the long-term nonspecific effects of bacillus Calmette-Guerin (BCG) vaccination, she established a vast research infrastructure linking the Quebec BCG vaccination registry to provincial administrative databases. The Quebec Birth Cohort on Immunity and Health enables her team to conduct powerful longitudinal studies among over 400,000 persons followed over several decades for their use of health services. Her research has been funded by the Canadian Institutes of Health Research, Canada Foundation for Innovation, Canadian Cancer Society, Multiple Sclerosis Society of Canada, Fonds de la recherche du Québec – Santé, and several other governmental agencies and foundations. She recently completed a case-control study on BCG vaccination and COVID-19, and is leading a new CIHR-funded study on the nonspecific effects of BCG vaccination on mortality and infections, including COVID-19.

## Magali Houde

Environment and Climate Change Canada



**Title:** Contaminants in marine mammals – from the St. Lawrence to the Arctic

**Abstract:** The talk will focus on the work and programs of the federal government that are in place to investigate existing and emerging environmental contaminants in marine mammals from different ecosystems as well as their potential biological effects. Specific projects will be discussed including the St. Lawrence beluga whales and Canadian Arctic ringed seals.

**Bio:** Magali Houde has a Ph.D. in Environmental Biology from the University of Guelph. She joined Environment and Climate Change Canada as a research scientist in 2010. Her research aims to evaluate the distribution of contaminants in the environment and their effects on the health of aquatic species. She is actively involved in the Northern Contaminants Program assessing trends of contaminants in country foods from the Canadian Arctic. Her work also focuses on outreach to Inuit communities. In addition to managing a research team, Magali is also co-supervising the work of graduate students as an adjunct professor at the University of Quebec in Montreal and McGill University.



**Juan Manuel  
Gutierrez-Villagomez**  
INRS



**Title:** Are biopesticides potentially toxic to wildlife?

**Abstract:** Biopesticides are pesticides derived from natural materials as animals, plants, bacteria, and certain minerals. It is generally believed that *Bacillus thuringiensis* var. *israelensis* (Bti) based insecticides are harmless to non-target organisms and the environment; however, new research shows controversial results. We exposed acutely and chronically *Lithobates sylvaticus* and *Anaxyrus americanus* tadpoles until metamorphic climax to VectoBac 200G (granules) and VectoBac 1200L (aqueous suspension) at 300–20,000 ITU/L covering field relevant concentrations and higher. The data show that the exposure parameters tested did not affect significantly the survival, total length, total weight, hepatosomatic index, gonadosomatic index, the expression of genes of interest (i.e., related to xenobiotic exposure, oxidative stress, and metamorphosis), and the intestine tissue layer detachment of *L. sylvaticus* and *A. americanus* in a concentration–response pattern. In contrast, VectoBac 200G significantly increased the median time to metamorphosis of *L. sylvaticus* tadpoles by up to 3.5 days and decreased the median by up to 1 day in *A. americanus*. VectoBac 1200L significantly increased the median time to metamorphosis of *L. sylvaticus* and *A. americanus* tadpoles by up to 4.5 days. Also, the exposure to VectoBac 200G and 1200L altered the intestine bacterial community composition in *A. americanus* at application rates recommended by the manufacturer, which led to an increase in the relative abundance of Verrucomicrobia, Firmicutes, Bacteroidetes, and Actinobacteria. Changes in the intestine microbiota might impact the fitness of individuals, including the susceptibility to parasitic infections. This work provides valuable information for the use and regulation of bio-insecticides in the environment.

**Bio:** In 2018, Juan Manuel Gutierrez-Villagomez obtained a Ph.D. degree in Chemical and Environmental Toxicology from the University of Ottawa. His doctoral project evaluated the toxicity of oil-derived byproducts from the oil sands industry in amphibians. Currently, Juan Manuel is a postdoctoral fellow at the Institut National de la Recherche Scientifique in Quebec, where he investigates the toxicity of pesticides in amphibians, of oil in fish, and of nanoplastics and metals in oysters. His work is multidisciplinary and involves areas of chemical and environmental toxicology, endocrine disruption, pollution, remediation processes, and environmental microbiology.

**Niladri (Nil) Basu**  
McGill University



**Title:** EcoToxChip: A toxicogenomics tool for chemical prioritization and environmental management

**Abstract:** The objective of the EcoToxChip project ([www.ecotoxchip.ca](http://www.ecotoxchip.ca)) is to develop, test, validate, and commercialize quantitative polymerase chain reaction arrays (EcoToxChips) and a data evaluation tool (EcoToxXplorer.ca) for the characterization, prioritization, and management of environmental chemicals and complex mixtures of regulatory concern. Here a broad overview of the work will be given, along with select examples of cases studies under pursuit with a coalition of partners (in government and industry who drive the work).

**Bio:** Nil Basu is a Professor at McGill University where he holds a Canada Research Chair in Environmental Health Sciences. Prior to joining McGill in 2013, he was an Assistant Professor of Environmental Health Sciences at the University of Michigan School of Public Health in Ann Arbor (2007-2013). He holds an Adjunct Professorship at the University of Michigan School of Public Health. The objective of his research is to design, validate, and apply innovative and sustainable approaches to address pressing societal concerns over toxic chemicals in our environment. This is tackled by investigating mercury pollution and more broadly, chemicals management.

**Jonathan Verreault**  
UQAM



**Title:** Landfills: A neglected source of exposure to halogenated flame retardants for urban-adapted birds?

**Abstract:** A suite of halogenated flame retardants (HFRs) including polybrominated diphenyl ethers (PBDEs) and emerging HFRs have been determined in tissues of ring-billed gulls (*Larus delawarensis*) nesting in the Montreal region (Quebec, Canada). More specifically, elevated concentrations of the highly hydrophobic DecaBDE were reported in ring-billed gull plasma, and spatial tracking showed that these concentrations in males were correlated with the time spent in landfills. Gulls feeding in and around landfills may be exposed to HFRs via dust and particle ingestion and inhalation, which prompted us to design a miniature passive air sampler that can be carried by gulls and collect gas- and particle-phase HFRs. The overall objective of this study was to investigate the atmospheric exposure of urban-breeding ring-billed gulls to PBDEs and selected emerging HFRs. We equipped nesting gulls during four field seasons with a miniature passive air sampler and a GPS datalogger in order to collect HFRs in air while monitoring their movements outside the colony during two weeks. HFRs were extracted from the sorbents of the samplers (polyurethane foam and glass fiber). The major PBDE congeners determined in the samplers were characteristic components of the commercial mixtures PentaBDE and DecaBDE. Also, a few emerging HFRs were detected, although at lower levels. The sampling rates of PBDE mixtures in passive air sampler were positively correlated with the presence of gulls in landfills, but not the emerging HFRs, which suggests alternative sources for these chemicals. This study showed that landfills represent major environmental sources of atmospheric exposure to toxic PBDEs for birds that use these sites to forage on predictable energy-rich human food resources.

**Bio:** Dr Verreault is Professor in the Department of Biological Sciences at the University of Quebec at Montreal (UQAM) and holder of the Canada Research Chair in Comparative Avian Toxicology. He is also member of the UQAM's Environmental Toxicology Research Center (TOXEN). Dr Verreault's research program aims to better understand the fate, sources and effects of organic contaminants (mainly flame retardants) on the health of birds and marine mammals from urbanized and remote regions (e.g. Arctic). His research allows developing new tools to assess the health of terrestrial and aquatic species that are vulnerable to chemical pollution. His research generates essential information for decision makers that have an impact on the management of emerging chemicals for which little toxicological data exists in Canada and internationally.

**David Josephy**  
University of Guelph



**Title:** Colourful Life – vignettes from my research career

**Abstract:** Ultraviolet: my role in the Apollo program (1973); Rose-coloured glasses (1976); Yellow and orange: reduction of misonidazole (1980); Blue, green, and yellow (but not brown): oxidation of 3,5,3N,5N-tetramethylbenzidine (1982); Red or green: thionitrites (1984); Brown: recombinant cytochrome P450 (1998); Fluorescent blue: azo disperse dyes and a cyclic DNA adduct (2020); Yellow turning violet: tartrazine metabolism (2022?)

**Bio:** Dr. Josephy obtained his Masters degree in Physics at the University of Toronto (Physics) and Ph.D. in Medical Biophysics at the University of British Columbia. He pursued post-doctoral training with Dr. Ronald P. Mason at the National Institute of Environmental Health Sciences, NC, USA. Dr. Josephy retired from a successful faculty tenure (1983-2020) at the Department of Biochemistry & Molecular Biology at the University of Guelph. Dr. Josephy taught thousands of undergraduate students in the biochemistry and toxicology programmes. He supervised 30+ graduate students and mentored many postdoctoral trainees.

Dr. Josephy's toxicology research has included work on the metabolism and mutagenicity of azo dyes, aromatic amines, and other carcinogens, as well as the enzymes that catalyze their bioactivation, including P450s and NATs. He is the author of the textbook "Molecular Toxicology" and a co-author of well over 100 scientific publications.

A long-standing active member of the Society of Toxicology of Canada, he has served as a Councillor and as its President. Dr. Josephy was a member of the Organizing Committee for the International Congress on Toxicology ICT-XI (Montreal, 2007); and is currently in the Steering Committee for our Society's bid to hold ICT-XVIII in Vancouver in 2028. Concurrently, he will be chairing the session "Human and environmental toxicology of synthetic dyes: a global concern" at ICT-XVI in Maastricht, Netherlands, in 2022. Dr. Josephy was a member of the panel that evaluated the cancer risk of exposure to aniline and related compounds (International Agency for Research on Cancer, Monograph 127, June 2021). In retirement, he continues to serve as an Editor-in-Chief of the journal Mutation Research – Genetic Toxicology and Environmental Mutagenesis. Dr. Josephy hopes to enjoy time for birding, photography, chess, and politics; he was Campaign Manager for the Guelph NDP in the recent federal election.

**Alison Holloway**  
McMaster University



**Title:** E-cigarette use during pregnancy and offspring health

**Abstract:** Exposure to maternal cigarette smoke during fetal development is a significant modifiable risk factor for childhood obesity in the offspring. Although there is no argument that smoking cessation is beneficial for both the mother and fetus, abstinence for most women is very challenging. Recently, electronic nicotine delivery systems (e-cigarettes) have become available, marketed as effective smoking cessation tools and their use is increasing at an astonishing pace. Indeed, recent studies suggest that the use of e-cigarettes during pregnancy is now comparable to the use of traditional tobacco cigarettes. More alarmingly, many pregnant women view e-cigarette use as much safer for their fetuses than conventional cigarette smoking despite the lack of evidence to support this belief. This talk will explore the impact of maternal e-cigarette use during pregnancy with a focus on offspring health.

**Bio:** Dr. Holloway received her PhD in Zoology from the University of Guelph in 1997 followed by a post-doctoral fellowship with Dr. John Challis at the University of Toronto. She then moved to McMaster University in 2001 where she is currently a Professor in the Department of Obstetrics and Gynecology. Her laboratory studies how exposure to chemical insults during pregnancy can lead to metabolic deficits in the offspring and the mechanisms underlying these effects. The chemicals that are of interest to her laboratory include pharmaceuticals, chemicals we may intentionally expose ourselves to through lifestyle choices such as cigarette smoking and man-made chemicals present in the environment. She is funded by CIHR and NSERC.

<p><b>Ashley Cabecinha</b> Health Canada</p>	
<p><b>Title:</b> Legal Cannabis Vaping Products in Canada: Compositions as Determined Through Voluntary Requests for More Information</p>	
<p><b>Abstract:</b> In response to the outbreak of vaping-associated lung illness in 2019, Health Canada decided to gather information on the composition of cannabis vaping products about to enter the retail market. Voluntary Request for More Information letters were issued to license holders producing cannabis vaping products, asking for the ingredients and amounts used in the products. The letters were intended to identify any potentially harmful ingredients proposed for use in cannabis vaping products. However, responses from the letters also provided a baseline for the ingredients and amounts being used in legal cannabis vaping products. This presentation will focus on trends in the composition of cannabis vaping products as determined from the voluntary responses to the Request for More Information letters.</p>	
<p><b>Bio:</b> Ashley Cabecinha graduated from the University of Victoria with a BSc. in Chemistry and Biochemistry. She has been working for Health Canada as a chemist for over a decade, initially focussing on mass spectrometric analysis of environmental contaminants. In 2017 she took a brief leave from Health Canada and moved to California, where she worked for a biotechnology start-up discovering novel protein targets for therapeutic applications. Since 2018, she has worked in the Office of Cannabis Science and Surveillance of Health Canada's Controlled Substances and Cannabis Branch. She is responsible for co-ordinating laboratory testing of cannabis to achieve the office's research objectives, co-chairs the Health Canada Cannabis Standards Working Group, and provides scientific support to the regulatory, policy and compliance areas of the branch. She was integral in developing the current Notice of New Cannabis Product framework, and still works closely with the Notice of New Cannabis Products Unit. First-in-class products and novel formulations particularly interest her.</p>	

## Daniela Schwotzer

Lovelace Biomedical



**Title:** Lung Injury after Phytol Inhalation in Rats

**Abstract:** I will discuss the results of a 14 day inhalation toxicology study in rats we performed at Lovelace Biomedical in order to investigate the effects of phytol after inhalation, in comparison to propylene glycol (PG). PG is commonly used as thinning agent in vaping devices and is generally considered safe. Phytol was considered a suitable alternative to PG. However, the outcome of our study raised concern regarding the use of phytol in vaping pens due to the unexpected toxicity.

**Bio:** I grew up in Wesel, Germany. Living close to the German-Dutch border brought me to the Radboud University Nijmegen, the Netherlands, where I obtained my Bachelor of Science degree in Medical Biology. After that, I went back to Germany to study Toxicology and obtain a Master of Science degree in Toxicology at the Heinrich-Heine University Dusseldorf, Germany. From there I moved to Hannover, Germany and got my Dr. rer. nat. in Inhalation Toxicology at the Fraunhofer Institute for Toxicology and Experimental Medicine, Hannover, Germany. Part of my time as a doctoral candidate was a 3-month internship at Lovelace Biomedical, Albuquerque, New Mexico, USA. I enjoyed living in the US and therefore moved after finishing my thesis at Fraunhofer and started a position as a Study Director at Lovelace Biomedical. My work focuses on pre-clinical studies for the development of treatments against respiratory diseases

## David Hammond

University of Waterloo



**Title:** E-cigarettes and vaping in Canada: implications for public health.

**Abstract:** The presentation will provide a brief overview of e-cigarette use in Canada, including patterns of use among consumers, risk communication and implications for public health within the context of the broader tobacco and nicotine market.

**Bio:** David Hammond is a Professor in the School of Public Health at the University of Waterloo. His research focuses upon tobacco control and vaping in the areas of health communications, packaging, and product regulation, as well as cannabis and nutrition policies. Professor Hammond works closely with governments around the world and has served as an Advisor for the World Health Organization. Professor Hammond also serves as an Expert Witness in court cases, primarily on behalf of governments defending health regulations from legal challenges by the food and tobacco industries. Professor Hammond's research has been recognized by awards from CIHR, the Canadian Cancer Society, the Canadian Medical Association, the Royal Statistical Society of Canada, and the World Health Organization.



**Suzanne Fenton**  
NIH/NIEHS



**Title:** Developmental PFAS Exposures and a Lifetime of Health Effects

**Abstract:** Over twenty years of research evaluating the many health effects of per- and polyfluoroalkyl substances (PFAS) have clarified the importance of protecting the developing fetus and child from exposures. Most PFAS tested bioaccumulate in the pregnant female and transfer to the fetus via the placenta and to the offspring during lactation. The health effects of a small number of legacy PFAS are known and replacement compounds tested recapitulate several of the adverse health conditions. This presentation will present data on PFOA and its replacement, GenX; two PFAS that seem to have similar health effects in offspring following developmental exposures and require regulatory action.

**Bio:** Dr. Suzanne “Sue” Fenton earned her M.S. and Ph.D. from the University of WI-Madison in the Endocrinology/Reproductive Physiology Program. Following her postdoctoral fellowship at the UNC-Chapel Hill Lineberger Cancer Center, she led a research laboratory at the US EPA’s Reproductive Toxicology Division for 11 years before she joined the National Institute of Environmental Health Sciences in Oct 2009. She is currently a senior scientist, leading the Reproductive Endocrinology group, in the Division of the National Toxicology Program. Her laboratory has published numerous manuscripts enhancing the methodology used in mammary gland assessment and determining early life chemical exposures that lead to persistent developmental changes in breast tissue, altered function, or disease susceptibility over the life course. She has received several NIH and EPA-based awards for her research on perfluorinated chemicals and endocrine disruptors. She is also a 2019 NIH Mentoring Award recipient.

## Tara Barton McLaren

Health Canada



**Title:** Dare to be Different: Embracing change at the forefront of an evolving toxicity paradigm

**Abstract:** From academic studies to chemical risk assessment to translational research – the passion for innovation in science has been the motivation to step out of the comfort zone to bridge advancements in toxicology research and human health risk assessment for the protection of Canadians against the risks posed by chemicals. Introduced in 2006, Canada’s Chemicals Management Plan set out ambitious risk assessment mandates and required the development and use of novel methods and streamlined risk-based approaches to ensure focus on those substances of higher concern. Looking forward and building a path for program modernization, there is now an amplified need to integrate emerging technologies and New Approach Methods (NAM) to deliver sound science and evidence-based decisions through integrated knowledge and keep pace with the global shift to alternative and non-animal testing. Taking the road less traveled is not always easy but it is always exciting and embracing the unfamiliar is not possible without robust research and regulatory collaborations and partnerships. The challenges, opportunities and successes achieved along the path will be highlighted as we strengthen the foundations for integrating NAM in assessment activities in Canada.

**Bio:** Dr. Tara Barton McLaren obtained her BSc Honours from the University of Guelph with a specialization in Biomedical Science in 2000 and her PhD in Reproductive Toxicology in the Department of Pharmacology and Therapeutics from McGill University in 2007.

Upon completion of her graduate studies, she joined Health Canada in the Existing Substances Risk Assessment Bureau and has led various risk assessment files as well as hazard methodology initiatives. She is currently Manager of the Emerging Approaches Unit in the Existing Substances Risk Assessment Bureau, Safe Environments Directorate.

Through the years of employment in the chemicals management program at Health Canada, she has acquired broad experience in human health risk assessment as well as innovations in hazard testing and assessment. With the provision of science leadership for applied regulatory science in the Directorate, she focuses on advancing hazard and risk assessment modernization through the development of strategies to integrate emerging data and novel methodologies for screening and assessment of chemicals existing in the Canadian marketplace.

In support of the global transition to 21st Century Risk Science, she participates in initiatives under the Organization for Economic Cooperation and Development (OECD) and engages in various scientific collaborations both nationally and internationally in the areas of QSAR, Integrated Approaches to Testing and Assessment, endocrine disruption and new approaches to support regulatory decision-making.

## Marc André Verner

Université de Montréal



**Title:** Exposure science in fractured land: Findings and research perspectives

**Abstract:** I will discuss how a talk from Caleb Behn at the 2014 STC meeting was the catalyst for two different studies on exposure to environmental chemicals in a region of hydraulic fracturing in Northeastern British Columbia. I will present the findings from our studies on exposure to volatile organic compounds and trace elements in pregnant women from this region, with a focus on specific exposures experienced by women who self-identified as Indigenous. I will also highlight ongoing research, and research perspectives in the context of environmental justice.

**Bio:** Marc-André Verner received his M.S. and Ph.D. in Biology from the Université du Québec à Montréal, and did his postdoctoral training at the Karolinska Institute (Sweden) and Harvard Medical School/Brigham and Women's Hospital (USA). Marc-André is currently an Associate Professor at the Department of Occupational and Environmental Health, School of Public Health, Université de Montréal. He is also a member of the Center for Public Health Research. His current research projects mostly focus on developmental exposure to environmental chemicals in the womb and postnatally through breastfeeding in the context of epidemiologic studies and risk assessment.

## Brian Laird

U of Waterloo



**Title:** Biomonitoring for Evaluating Contaminant Risk Among Northern First Nations: Future Directions Post COVID-19

**Abstract:** Biomonitoring studies were conducted in 10 First Nations/Métis communities across the Northwest Territories and Yukon between 2016 and 2020 to investigate levels, determinants, and sources of contaminant exposure in these northern populations. Findings from these studies showed that, although elevated mercury levels have been observed in particular fish species and lakes in these regions, population exposures have remained well below available health-based guidelines. In contrast, elevated levels of other contaminants (e.g., lead, hexachlorobenzene or HCB, perfluorononanoic acid or PFNA) were observed in some regions and subpopulations. Follow-up studies to further investigate the sources and exposure pathways for these contaminants have been planned/implemented among participating communities (integrating public health safety measures in response to COVID-19). Lessons learned conducting such studies during the pandemic may inform future approaches on ways to strengthen capacity building initiatives of biomonitoring projects in partnership with northern populations.

**Bio:** Dr. Brian Laird, PhD is an Associate Professor within the School of Public Health Sciences at the University of Waterloo. Dr. Laird's research focuses on developing tools that: (i) quantify the health risks from contaminants in food, water, and soil, (ii) inform the design of risk mitigation strategies, and (iii) improve the link between external dose and target organ concentration. To these ends, Dr. Laird is: a) examining population level contaminant exposure through biomonitoring in the Northwest Territories and Yukon; and b) investigating the ways and means by which nutrients occasionally counter the health risks posed by contaminants.

**Aline Philibert**  
UQAM



**Title:** Mercury exposure and premature mortality in the Grassy Narrows First Nation community: a retrospective longitudinal study

**Abstract:** Little is known about the influence of toxic exposures on reduced life expectancy in First Nations people in Canada. The Grassy Narrows First Nation community have lived with the consequences of one of the worst environmental disasters in Canadian history. In the early 1960s, 10 000 kg of mercury (Hg) was released into their aquatic ecosystem. Although Hg concentration in fish, their dietary staple, decreased over time, it remains high. We aimed to examine whether elevated Hg exposure over time contributes to premature mortality (younger than 60 years) in this community. We did longitudinal and case-control analyses with data for individuals of the Grassy Narrows First Nation community. A matched-pair approach allowed us to compare longitudinal hair Hg concentration between cases (individuals who died aged younger than 60 years) and controls (individuals who lived beyond 60 years). Analyses included change-point detection, interrupted time series, mixed models, and Cox survival models. We analysed data for 657 individuals for whom we assembled a retrospective database of yearly measures of hair Hg concentration (n=3603). Hair Hg concentration decreased over time. A subgroup of 222 individuals reached or could have reached 60 years old by August, 2019. There was an increased risk of dying at a younger age among those with at least one hair Hg measure of 15 µg/g or more (adjusted hazard ratio 1.55, 95% CI 1.11–2.16; p=0.0088). Among the deceased individuals (n=154), longevity decreased by 1 year with every 6.25 µg/g (4.35–14.29) increase in hair Hg concentration. Analyses of 36 matched pairs showed that hair Hg concentration of those who died aged younger than 60 years was 4.7 µg/g higher (3.4–5.9) than controls.

**Bio:** Throughout my career, I have been enthusiastically engaged in international and humanitarian projects that embrace participatory research and action-driven initiatives, which recognize the socio-cultural dimensions of complex public health challenges. My personal convictions have motivated me to engage in projects that embrace interdisciplinary studies addressing women health, environment sustainability, equity and justice. I have developed an expertise in the impacts of contaminants (mainly mercury) on health and wellbeing in Canada, Central Asia (Kyrgyzstan) and Africa (Mali and RDCongo). Recently, I have concentrated my work on a First Nation community in Western Ontario (Grassy Narrows) that has been poisoned by mercury over decades through freshwater fish consumption. I have worked on the direct and indirect effects of mercury exposure at various times of life (prenatal, childhood and lifetime stages) on neurological effects and wellbeing. I have been also interested in intergenerational transmission of effects. Another key element of my expertise is the use of new statistical techniques that assess and quantify health/risk factors outcomes. I am currently a joint professor at the Université du Québec à Montréal, co-research at the Panzi foundation in DR Congo, and epidemiologist for Doctors without borders MSF.

## Pierre Ayotte

Université Laval  
INSPQ



**Title:** Selenoneine in the Arctic marine food web: a natural antidote to methylmercury toxicity?

**Abstract:** In 2010, Yamashita and Yamashita reported the identification of selenoneine (2-selenyl-N $\alpha$ ,N $\alpha$ ,N $\alpha$ -trimethyl-L-histidine), a novel organoselenium compound with strong antioxidant properties and methylmercury detoxifying capacity, which was first extracted from the blood of bluefin tuna. Nunavimmiut (Inuit of Nunavik, Northern Quebec, Canada) exhibit one of the highest blood selenium status in the world because of their frequent consumption of marine mammals, also a source of exposure to methylmercury. Indirect evidence from our previous studies had suggested that selenoneine may be accumulating in the blood of Nunavimmiut. We first produced a selenoneine standard through biosynthesis, which allowed its quantification by elemental mass spectrometry techniques. Selenoneine was identified as a major selenocompound in red blood cells of Nunavimmiut and beluga mattaq (skin and blubber), a delicacy in Nunavik and elsewhere in the Arctic (Achouba et al., *Chemosphere*, 229, 549-558, 2019). Ongoing collaborative work aims at identifying the origin of selenoneine in the local marine food web and deciphering its interaction with methylmercury using toxicological experiments with erythroid cell lines and zebrafish embryos (funding provided by the Northern Contaminants Program - Crown-Indigenous Relations and Northern Affairs Canada and the Sentinel North Strategy at Université Laval).

**Bio:** Pierre Ayotte is professor at the Department of social and preventive medicine, Faculty of Medicine at Université Laval and Research Coordinator at the Quebec Toxicology Centre of the Institut national de santé publique du Québec. Dr Ayotte is an acknowledged expert in environmental toxicology and epidemiology. He was involved during the past 25 years in several studies investigating relations between exposure to environmental contaminants and health, especially among Indigenous populations in the Arctic. Dr Ayotte has authored or co-authored more than 250 peer-reviewed articles and book chapters. He is a Senior Editor of the *Canadian Journal of Public Health*.

**Aaron Shapiro**  
UBC



**Title:** Forensic Toxicology: Crime Scenes, Court, and Beyond!

**Abstract:** Forensic toxicology is the application of toxicology testing and interpretation in a medico-legal setting. The purpose of this presentation is to introduce the audience to the field of forensic toxicology, its sub-disciplines, and current areas of research. Examples of interesting cases in postmortem forensic toxicology will also be discussed.

**Bio:** Aaron Shapiro is the Associate Scientific Director of the BC Provincial Toxicology Centre and a clinical assistant professor at the University of British Columbia. Prior to moving to Vancouver, he worked as a forensic toxicologist at the Ontario Centre of Forensic Sciences. Aaron completed a BSc at the University of Guelph in Biomedical Toxicology, an MSc at the University of Northern BC in Interdisciplinary Studies under Laurie H.M. Chan, and a PhD at the University of Toronto in Pharmaceutical Sciences under Peter G. Wells. His current research involves the characterization of the illicit drug supply for early threat detection and surveillance.

## Cynthia Côté

Laboratoire de sciences judiciaires et de  
médecine légale du Québec



**Title:** Postmortem redistribution of THC

**Abstract:** The aim of the presented study is to understand the complex postmortem behavior of THC and its metabolites and provide potential indicators of postmortem redistribution. A database with concentration of THC and its metabolites was filled from 2018 to 2019. Statistical analysis performed on the database demonstrate PMR of THC toward peripheral blood, COOH-THC toward central blood and no PRM for OH-THC. Four indicators of PMR were identified and will be presented. Meta-analysis performed on available literature confirmed the PMR of some cannabinoids. In postmortem cases, many factors may contribute to the overestimation of THC concentration, therefore it should be interpreted carefully.

**Bio:** Cynthia Côté is a forensic toxicologist at the Laboratoire de sciences judiciaires et de médecine légale, Québec's forensic sciences laboratory. She received her B.Sc. in biochemistry from Université du Québec à Montréal and her M.Sc. in chemistry from McGill University. She began her career in the pharmaceutical industry as analyst at CTBR and Theratechnologies. She subsequently joined Algorithme Pharma as a senior scientist in method development. She has more than twenty years of research experience in bioanalytical chemistry and mass spectrometry method development. Ms Côté has several peer-reviewed publications, as well as oral and poster presentations at international conferences and meetings. She is a member of the Ordre des chimistes du Québec and Canada's Scientific Working Group in Forensic Toxicology.



**Karen Woodall**  
University of Toronto



**Title:** Expert testimony in the era of novel psychoactive substances

**Abstract:** This presentation will focus on the role that a forensic toxicologist has in providing expert testimony and the challenges of working on cases involving novel psychoactive substances (NPS). There is often limited scientific data available regarding the toxicity of NPS due to lack of clinical studies and limited testing availability in forensic laboratories. Examples of cases involving NPS where toxicological evidence has been used in court proceedings will be provided.

**Bio:** Dr. Karen Woodall is an Assistant Professor and Forensic Toxicologist within the Forensic Science Program at the University of Toronto. She graduated in 1996 from the University of Bradford, UK with a Ph.D. in Pharmacology. She worked as a Forensic Toxicologist at the Centre of Forensic Sciences in Toronto for 20 years before joining the University of Toronto. As a forensic toxicologist, she regularly testifies in court as an expert witness in many different types of trials including drug trafficking, homicide, sexual assault and impaired driving cases. Karen is also a member of the Canadian Drugs and Driving committee which acts as an advisory body to the Department of Justice with respect to issues of drug impaired driving. Her research interests include toxicology and the opioid crisis, the role of drugs in motor vehicle fatalities and oral fluid drug testing equipment.

## Poster abstract list

### **1- Proximity and density of unconventional natural gas wells and mental illness and substance use among pregnant women: An exploratory study in Canada**

Amira M Aker, Kristina W. Whitworth, Delphine Bosson-Rieutort, Gilles Wendling, Ahmed Ibrahim, Marc-André Verner, Anita C. Benoit and Élyse Caron-Beaudoin

### **2- Assessing Chronic and Carcinogenicity Risk of an Agrochemical Without Performing Cancer Bioassays**

Angela Hofstra, Michael Munday, Natalia Ryan

### **3- Influence of occupational exposure to endocrine disruptors on colorectal cancer risk in the Ontario Health Study**

Laura Pelland-St-Pierre, Marc-André Verner, and Vikki Ho

### **4- Impact of JUUL on pulmonary immune modulation and oxidative stress responses**

Terek Been, Hussein Traboulsi, Sofia Paoli, Bayan Alakhtar, Koren K. Mann, David H. Eidelman and Carolyn J. Baglole

### **5- Differentiating Colorectal Cancer Pathological Regions Using Desorption Electrospray Ionization-Mass Spectrometry Imaging**

Natasha Iaboni, David Hurlbut, Martin Kaufmann, Kevin Yi Mi Ren, Amoon Jamzad, Vanessa Wiseman, Parvin Mousavi, Gabor Fichtinger, John F. Rudan, Antonio Caycedo-Marulanda and Christopher JB Nicol

### **6- Extracellular vesicles as biomarkers for arsenic induced urothelial injury**

Nicole L. Washuck, Yingxi Li, Laurie H. M. Chan

### **7- Density of hydraulic fracturing wells and concentrations of trace elements in urine, hair, nails and drinking water samples from pregnant women living in Northeastern British Columbia**

Lilit Gasparian, Juliette Duc, Lucie Claustre, Delphine Bosson-Rieutort, Michèle Bouchard, Maryse F. Bouchard, Élyse Caron-Beaudoin, Marc-André Verner

### **8- Nevirapine-associated immunosuppressive effects in mice are associated with increased corticosterone**

Alison Jee, Samantha Sernoskie, Jack Uetrecht

### **9- Low-dose methylmercury promotes prenatal differentiation of mouse cortical precursors by stimulating CREB activation**

Allison Loan, Joseph Wai-Hin Leung, Jing Wan, and Hing Man Chan

### **10- Perturbations in hepatic stress response pathways following exposure to a water- accommodated fraction of bitumen**

Laiba Jamshed, Angela Schmidt, Zaineb Hamoodi, Philippe J. Thomas, Alison C. Holloway

**11- What causes idiosyncratic drug-induced agranulocytosis? Mechanisms of immune activation induced by clozapine**

Samantha C. Sernoskie, Alison Jee, and Jack Uetrecht

**12- Examining Relationships between Lead Exposure and Nutrient Intake in the Sahtu, Northwest Territories**

Calin Lazarescu, Mylène Ratelle, Larisse Melo, Yvonne Lamers, Kelly Skinner, Brian Laird

**13- Establishment of an in vitro model using immortal cell lines derived from trout (*Oncorhynchus mykiss*) to assess the epigenetic toxicity of the flame retardant triphenyl phosphate**

Logan S. Germain, Sidra Shafique, Louise M. Winn

**14- Lung biomarker CC16 and kidney biomarker KIM-1 are associated with inorganic arsenic and other metal contaminants in urine of children in Yellowknife, Northwest Territories**

Janet SJ Cheung, Asish Mohapatra & Hing Man Chan

**15- The Role of Human MRP2 on [(GS)<sub>2</sub>AsSe]- Transport**

Janet R. Zhou, Gurnit Kaur, Elaine M. Leslie

**16- Evaluating the impact of arsenic exposure on cancer risk among Canadian adults**

Katherine Pullella, Vicky C. Chang, Shelley A. Harris, Anthony J. Hanley, John R. McLaughlin, Jan Lubi\_ski , Steven A. Narod, Joanne Kotsopoulos

**17- Chemical and In Vitro Toxicological Characterization of the JUUL2 Product Aerosol and Comparison with 3R4F & 1R6F Reference Cigarette Smoke**

Jenny Yao, Kubilay Demir, Adam Ozvald, David K. Cook, Gene I. Gillman, Guy Lalonde

**18- Standardized cannabis smoke extract induces inflammation in human lung fibroblasts**

Noof Aloufi, Hussein Traboulsi, Yoon Namkung, Emily Wilson, Stephane A. Laporte, Parameswaran Nair, David H. Eidelman and Carolyn J. Baglole

**19- Methylmercury inhibits carcinogen-activating enzyme Cyp1a1 induced by dioxin via transcriptional and posttranslational mechanisms**

Mohammed A. Alqahtani and Ayman O.S. El-Kadi

**20- Chronic Dietary Exposure of Arsenic Perturbs Reproductive Performance In Adult Zebrafish (*Danio rerio*) And Developmental Deformities (Maternal and Paternal exposure) in Offspring**

Mahesh Rachamalla, Som Niyogi

**21- Maternal and Paternal Exposure of Chronic Dietary Arsenic Induces Impaired Reproductive Performance And Developmental Deformities in Zebrafish (*Danio rerio*)**

Mahesh Rachamalla, Som Niyogi

**22- Exposure to brominated flame retardants during sensitive periods of development: an increased risk for breast cancers?**

Melany Juárez, Alec McDermott, Isabelle Plante, Mike Wade

**23- Differential regulation of insulin-signaling genes in major metabolic tissues following ozone exposure**

Mercedes Rose, Alain Filiatreault, Josée Guénette, Errol M. Thomson

**24- Benchmark Concentration (BMC) Modeling and ToxPi Analyses for Potency Ranking of Organophosphate Esters (OPEs) in KGN Human Granulosa Cells**

Xiaotong Wang, Barbara F. Hales, Bernard Robaire

**25- Effects of an environmentally-relevant mixture of organophosphate esters on human adreno-carcinoma (H295R) cells**

Zixuan Li, Bernard Robaire, Barbara F. Hales

**26- Using Time Course of Histopathological and Behavioural Changes to Identify Target Organ Toxicity in a Rat Model Following Oral Exposure to Contaminated Groundwater from an Industrial Site**

Boamah, B., S. Siciliano, N. Hogan, M. Hecker, M. Hanson, P. Campbell, R. Peters, A. Manek, A.N. Al-Dissi, and L. Weber

**27- High content imaging analyses of the effects of two organophosphate esters in the HepG2 cell line**

Dongwei Yu, Barbara F. Hales, Bernard Robaire

**28- Disruption of testosterone secretion by fetal rat testis exposed to environmentally- relevant concentrations of trace elements associated with hydraulic fracturing activity**

G. Balbaaki, MA Verner, C. Vaillancourt, E. Caron-Beaudoin, G. Delbes

**29- Exposure to Volatile Organic Compounds during Pregnancy and Associations with Density and Proximity of Natural Gas Wells: Findings from the Exposures in the Peace River Valley (EXPERIVA) study**

Élyse Caron-Beaudoin, Kyle Powys Whyte, Maryse F. Bouchard, Jonathan Chevrier, Sami Haddad, Ray Copes, Katherine L. Frohlich, Dean Dokkie, Treaty, Tribal Association, Sonje Juul, Michèle Bouchard, Marc-André Verner

**30- Changes in Biomarkers of Cigarette-Smoke-Related Toxicants After 6 Days of Switching Exclusively or Partially to JUUL in Two Nicotine Concentrations: A Randomized Controlled Study in Adult Smokers**

Gal Cohen, Nicholas I. Goldenson, Patrick Bailey, Christopher M. Harris, Saul Shiffman

**31- Evaluation of aerosol constituents in JUUL System Virginia Tobacco 5.0% using non-targeted analysis**

Lena N. Jeong, Mark R. Crosswhite, J. Brian Jameson, Anastasia Lioubomirov, Clarissa Yang, Adam Ozvald, Roxana Weil, I. Gene Gillman

**32- Effects of replacement bisphenols on steroid hormone production by human adrenal tumour H295R cells**

Michael G. Wade, Alice Kawata

**33- Developing a new approach to assess crop protection chemical safety that minimizes reliance on vertebrate testing and protects human health and the environment**

Natalia Ryan, Douglas C. Wolf, Anna Shulkin, Tharacad Ramanarayanan, Haitian Lu, Angela Hofstra, David Dreier, Richard A. Currie, Odette Alexander, John Abbott

**34- Portrait of urinary creatinine concentrations found in biological monitoring studies and identification of the main factors associated with creatinine level**

Feriel Chiali

**35- Assessing Human Carcinogenicity Risk without the Rodent Cancer Bioassay**

Amber Goetz, Natalia Ryan, Alaina Sauve-Ciencewicks, Caleb Lord, Gina M. Hilton, Douglas C. Wolf

**36- Arsenic Cellular Protection by Endogenous Mouse Multidrug Resistance Protein**

Yingze Ma, Elaine M. Leslie

**37- Emerging evidence on exposure to electromagnetic fields and risk of brain cancers**

Gomes J, Demnati A, Kumarathasan K, Tan Q

**38- Cellular cytotoxicity and protein-level changes after metal oxide nanoparticle exposures**

N. Nazemof , D. Breznan, E. Blais, Y. Dirieh, A. Tayabali , J. Gomes, L. Johnston, P. Kumarathasan

**39- Early low-dose exposure of methylmercury promotes premature neuronal differentiation in embryo and impairs postnatal cortical development**

Joseph Wai-Hin Leung, Allison Loan, Emmanuel Yumvihoze, Jing Wang and Hing-Man Chan