Contents

ENVIRONMENTAL RESEARCH
Transcriptional profiles of Glutathione-S-Transferase isoforms, Cyp, and AOE genes in atrazine-exposed zebrafish embryos ........................................ 3
Multiresidue determination of pyrethroid pesticide residues in pepper through a modified QuEChERS method and gas chromatography with electron capture detection .............................................. 4
A toxicokinetic and toxicodynamic modelling approach using Myriophyllum spicatum to predict effects caused by short-term exposure to a sulfonylurea .................................................................................. 4
Multistress effects on goldfish (Carassius auratus) behaviour and metabolism ..................................................................................................................... 5
Broflanilide: A meta-diamide insecticide with a novel mode of action .......... 6

MEDICAL RESEARCH
Cytochrome c adducts with PCB quinoid metabolites .................................. 7
Complement C5a-C5aR interaction enhances MAPK signalling pathway activities to mediate renal injury in trichloroethylene sensitized BALB/c mice ............................................................................................ 8
Prenatal Exposure to Bisphenol A Disrupts Mouse Foetal Liver Maturation in a Sex-Specific Manner ........................................................................ 9
Connectivity mapping uncovers small molecules that modulate neurodegeneration in Huntington’s disease models ............................................. 9
GSK-3β controls autophagy by modulating LKB1-AMPK pathway in prostate cancer cells ......................................................................................... 10

OCCUPATIONAL RESEARCH
Risk of Pancreatic Cancer in Female Textile Workers in Shanghai, China, Exposed to Metals, Solvents, Chemicals, and Endotoxin: Follow-Up to a Nested Case-Cohort Study ........................................................................ 11
An Overview of Occupational Risks from Climate Change ........................ 12
Mortality among World Trade Centre rescue and recovery workers, 2002-2011 ......................................................................................................................... 13
Factors affecting adherence to national malaria treatment guidelines in management of malaria among public healthcare workers in Kamuli District, Uganda ........................................................................ 14
An assessment of nursing staffs’ knowledge of radiation protection and practice .................................................................................................................. 15

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Contents

PUBLIC HEALTH RESEARCH

Preliminary safety assessment of C-8 xylitol monoester and xylitol phosphate esters .............................................................................................................16

Environmental Chemicals in Urine and Blood: Improving Methods for Creatinine and Lipid Adjustment ........................................................................17

Organochlorine insecticides DDT and chlordane in relation to survival following breast cancer .................................................................18

Toward a multi-country monitoring system of reproductive health in the context of endocrine disrupting chemical exposure ..........19

Prenatal exposure to persistent organic pollutants and offspring allergic sensitisation and lung function at 20 years of age ..................20
Transcriptional profiles of Glutathione-S-Transferase isoforms, Cyp, and AOE genes in atrazine-exposed zebrafish embryos

2016-03-11

Glutathione-S-transferase (GST) superfamily consists of multiple members involved in xenobiotic metabolism. Expression pattern of the GST isoforms in adult fish has been used as a biomarker of exposure to environmental chemicals. However, GST transcriptional responses vary across organs, thus requiring a cross-tissue examination of multiple mRNAs for GST profiling in an animal after chemical exposure. Zebrafish embryos express all GST isoforms as adult fish and could therefore represent an alternative model for identification of biomarkers of exposure. To evaluate such a possibility, the authors studied a set of cytosolic and microsomal GST isoform-specific expression profiles in the zebrafish embryos after exposure to atrazine, a widely used herbicide. Expression of the GST isoforms was compared with that of CYP genes involved in the phase I of xenobiotic metabolism and antioxidant enzyme (AOE) genes. Using quantitative real-time PCR, dynamic changes were shown in the expression pattern of twenty GST isoforms, cyp1a, cyp3a65, ahr2, and four AOEs in early development of zebrafish. Acute (48 and 72 h) exposure of 24 h-old embryos to atrazine, from environmentally relevant (0.005 mg/L) to high (40 mg/L) concentrations, caused a variety of transient, albeit minor changes (<2.5-fold) in the GST isoforms, ahr2 and AOE genes response. However, expression of cyp1a and cyp3a65 mRNA was markedly and consistently induced by high doses of atrazine (5 and 40 mg/L). The authors concluded that an analysis of the response of multiple systems in the zebrafish embryos provided a comprehensive understanding of atrazine toxicity and its potential impact on biological processes.

Authors: Glisic B, Hrubik J, Fa S, Dopudj N, Kovacevic R, Andric N.

Multiresidue determination of pyrethroid pesticide residues in pepper through a modified QuEChERS method and gas chromatography with electron capture detection

This study developed and used a modified quick, easy, cheap, efficient, rugged and safe (QuEChERS) method coupled with gas chromatography with electron capture detection to determine eight pyrethroid pesticide residues in green, red and dehydrated red peppers. Pyrethroids were extracted with acetonitrile, partitioned with sodium chloride and purified with primary secondary amino and graphitised carbon black in hexane. The QuEChERS extraction conditions were optimised, and the matrix effects that might influence recoveries were evaluated and minimised using matrix-matched calibration curves. Under the optimised conditions, the calibration curves for pyrethroid pesticides showed good linearity in the concentration range of 0.05-20 µg/mL with determination coefficients (R²) >0.997. The limits of quantification of eight pyrethroids were 0.004-0.04 mg/kg for green and red pepper and 0.04-0.5 mg/kg for dehydrated red pepper. These values are below the suggested regulatory maximum residue limits. The mean recoveries ranged between 79.0 and 104%, and the relative standard deviations were <11%. The developed method was successfully applied to commercial samples. Some samples were found to contain pyrethroid pesticides with levels below the legal limits.

Authors: Zhang Y, Hu D, Zeng S, Lu P, Zhang K, Chen L, Song B.


A toxicokinetic and toxicodynamic modelling approach using Myriophyllum spicatum to predict effects caused by short-term exposure to a sulfonylurea

Toxicokinetic and toxicodynamic models are a promising tool to address the effects of time-variable chemical exposure. Standard toxicity tests usually rely on static concentrations, but these chemical exposure patterns are unlikely to appear in the field, where time-variable exposure of chemicals is typical. In the present study, toxicodynamic processes
The aim of the present study was to assess the individual and crossed effects of temperature rising and pesticide contamination on fish.

Multistress effects on goldfish (Carassius auratus) behaviour and metabolism

Crossed effects between climate change and chemical pollutions were identified on community structure and ecosystem functioning. Temperature rising affects the toxic properties of pollutants and the sensitiveness of organisms to chemicals stress. Inversely, chemical exposure may decrease the capacity of organisms to respond to environmental changes. The aim of the present study was to assess the individual and crossed effects of temperature rising and pesticide contamination on fish. Goldfish, Carassius auratus, were exposed during 96 h at two temperatures (22 and 32°C) to a mixture of common pesticides (S-metolachlor, isoproturon, linuron, atrazine-desethyl, aclofen, pendimethalin, and tebuconazo1) at two environmentally relevant concentrations (total concentrations MIX1 = 8.4 μg L (−1) and MIX2 = 42 μg L (−1)). The authors investigated the sediment reworking behaviour, which has a major ecological functional role. In addition, they focused on three physiological traits from the cellular up to the whole individual level showing metabolic status of fish (protein concentration in liver and muscle, hepatosomatic index, and Fulton’s condition factor). Individual thermal stress and low concentrations of pesticides decreased the sediment reworking activity of fish and entrained metabolic compensation with global depletion in energy stores. The results showed that combined chemical and thermal stresses impaired the capacity of fish to set up an
efficient adaptive response. The authors concluded that the findings from the present study strongly suggest that temperature will make fish more sensitive to water contamination by pesticides, raising concerns about wild fish conservation submitted to global changes.

Authors: Gandar A, Jean S, Canal J, Marty-Gasset N, Gilbert F, Laffaille P.


Broflanilide: A meta-diamide insecticide with a novel mode of action

2016-03-11

Broflanilide is a meta-diamide [3-benzamido-N-(4-(perfluoropropan-2-yl) phenyl) benzamide] that exhibits high larvicidal activity against Spodoptera litura. It has been suggested that broflanilide is metabolised to desmethyl-broflanilide and that it acts as a noncompetitive resistant-to-dieldrin (RDL) γ-aminobutyric acid (GABA) receptor antagonist. The binding site of desmethyl-broflanilide was demonstrated to be distinct from that of conventional noncompetitive antagonists such as fipronil. It has been proposed that the site of action for desmethyl-broflanilide is close to G336 in the M3 region of the Drosophila RDL GABA receptor. However, although the site of action for desmethyl-broflanilide appears to overlap with that of macrocyclic lactones, different modes of actions have been demonstrated for desmethyl-broflanilide and the macrocyclic lactones. The mechanisms underlying the high selectivity of meta-diamides are also discussed in this review. Broflanilide is expected to become a prominent insecticide because it is effective against pests with resistance to cyclodienes and fipronil.

Authors: Nakao T, Banba S.

Cytochrome c adducts with PCB quinoid metabolites

2016-03-11

Polychlorinated biphenyls (PCBs) are a group of 209 individual congeners widely used as industrial chemicals. PCBs are found as by-products in dye and paint manufacture and are legacy, ubiquitous, and persistent as human and environmental contaminants. PCBs with fewer chlorine atoms may be metabolised to hydroxy- and dihydroxy-metabolites and further oxidised to quinoid metabolites both in vitro and in vivo. Specifically, quinoid metabolites may form adducts on nucleophilic sites within cells. In this study, the authors hypothesise that the PCB-quinones covalently bind to cytochrome c and, thereby, cause defects in the function of cytochrome c. Synthetic PCB quinones, 2-(4'-chlorophenyl)-1,4-benzoquinone (PCB3-pQ), 4-4'-chlorophenyl)-1,2-benzoquinone (PCB3-oQ), 2-(3', 5'-dichlorophenyl)-1,4-benzoquinone, 2-(3',4', 5'-trichlorophenyl)-1,4-benzoquinone, and 2-(4'-chlorophenyl)-3,6-dichloro-1,4-benzoquinone, were incubated with cytochrome c, and adducts were detected by liquid chromatography-mass spectrometry (LC-MS) and matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI TOF). Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) was employed to separate the adducted proteins, while trypsin digestion and liquid chromatography-tandem mass spectrometry (LC-MS/MS) were applied to identify the amino acid binding sites on cytochrome c. Conformation change of cytochrome c after binding with PCB3-pQ was investigated by SYBYL-X simulation and cytochrome c function was examined. The authors found that more than one molecule of PCB-quinone may bind to one molecule of cytochrome c. Lysine and glutamic acid were identified as the predominant binding sites. Software simulation showed conformation changes of adducted cytochrome c. Additionally, cross-linking of cytochrome c was observed on the SDS-PAGE gel. Cytochrome c was found to lose its function as electron acceptor after incubation with PCB quinones. These data provide evidence that the covalent binding of PCB quinone metabolites to cytochrome c may be included among the toxic effects of PCBs.

Authors: Li M, Teesch LM, Murry DJ, Pope RM, Li Y, Robertson LW, Ludewig G.

Complement C5a-C5aR interaction enhances MAPK signalling pathway activities to mediate renal injury in trichloroethylene sensitized BALB/c mice

2016-03-11

In a previous study, the authors have shown complement activation as a possible mechanism for trichloroethylene (TCE) sensitisation, leading to multi-organ damage including the kidneys. In particular, excessive deposition of C5 and C5b-9—the membrane attack complex, which can generate significant tissue damage, was observed in the kidney tissue after TCE sensitisation. The present study tested the hypothesis that anaphylatoxin C5a binding to its receptor C5aR mediates renal injury in TCE-sensitised BALB/c mice. BALB/c mice were sensitised through skin challenge with TCE, with or without pretreatment by the C5aR antagonist W54011. Kidney histopathology and the renal functional test were performed to assess renal injury, and immunohistochemistry and fluorescent labelling were carried out to assess C5a and C5aR expressions. TCE sensitisation up-regulated C5a and C5aR expressions in kidney tissue, generated inflammatory infiltration, renal tubule damage, glomerular hypercellularity and impaired renal function. Antagonist pretreatment blocked C5a binding to C5aR and attenuated TCE-induced tissue damage and renal dysfunction. TCE sensitisation also caused the deposition of major pro-inflammatory cytokines IL-2, TNF-α and IFN-γ in the kidney tissue (P < 0.05); this was accompanied by increased expression of P-p38, P-ERK and P-JNK proteins (P < 0.05). Pretreatment with the C5aR antagonist attenuated the increase of expression of P-p38, P-ERK and P-JNK proteins (P < 0.05) and also consistently reduced the TCE sensitisation-induced increase of IL-2, TNF-α and IFN-γ (P < 0.05). The authors concluded that these data identify C5a binding to C5aR, MAP kinase activation, and inflammatory cytokine release as a novel mechanism for complement-mediated renal injury by sensitisation with TCE or other environmental chemicals.


Prenatal Exposure to Bisphenol A Disrupts Mouse Foetal Liver Maturation in a Sex-Specific Manner

Bisphenol A (BPA) is one of the most prevalent endocrine disrupting chemicals in the environment. Developmental exposure to BPA is known to be associated with liver dysfunction and diseases, such as hepatic steatosis, liver tumours, metabolic syndrome, and altered hepatic gene expression, and DNA methylation profiles. However, the effects of BPA on rodent liver development are unknown. The present study was undertaken to address this important question using the mouse as an experimental model. Pregnant mice were exposed to BPA via diet from embryonic day 7.5 (E7.5) to E18.5. At E18.5, foetal livers were collected, and analysed for changes in the expression of key hepatocyte maturation markers. The authors observed the following significant alterations in BPA-exposed female but not male foetal livers: (a) levels of the mature hepatocyte markers, albumin and glycogen synthase proteins, were decreased (-65% and -40%, respectively); (b) levels of the immature hepatocyte marker, α-fetoprotein, were increased (+43%); (c) the level of C/EBP-α protein, the master transcription factor essential for hepatocyte maturation, was down-regulated (-50%); and (d) the level of PCNA protein (marker of proliferation) was elevated (+40%), while that of caspase-3 protein and activity (markers of apoptosis) was reduced (-40% and -55%, respectively), suggestive of a perturbed balance between cell proliferation and apoptosis in BPA-exposed female foetuses. Taken together, these findings demonstrate that prenatal exposure to BPA disrupts the mouse foetal liver maturation in a sex-specific manner, and suggest a foetal origin for BPA-induced hepatic dysfunction and diseases.

Authors: DeBenedictis B, Guan H, Yang K.


Connectivity mapping uncovers small molecules that modulate neurodegeneration in Huntington’s disease models

Huntington’s disease (HD) is a genetic disease caused by a CAG trinucleotide repeat expansion encoding a polyglutamine tract in the huntingtin (HTT) protein, ultimately leading to neuronal loss and consequent cognitive decline and death. As no treatments for HD...
In this study, the mechanisms involved in GSK-3β inhibition-triggered autophagy were dissected.

GSK-3β controls autophagy by modulating LKB1-AMPK pathway in prostate cancer cells

2016-03-11

Glycogen synthase kinase 3β (GSK3β, GSK-3β) is a multi-functional protein kinase involved in various cellular processes and its activity elevates after serum deprivation. The authors have shown that inhibition of GSK-3β activity triggered a profound autophagic response and subsequent necrotic cell death after serum deprivation in prostate cancer cells. In this study, the mechanisms involved in GSK-3β inhibition-triggered autophagy were dissected. Prostate cancer PC-3 and DU145 cells were used in the study. Multiple GSK-3β specific inhibitors were used including small chemicals TDZD8, Tideglusib, TWS119, and peptide L803-mts. Western blot assay coupled with phospho-specific antibodies were used in detecting signal pathway activation. ATP levels were assessed with ATPLite kit and HPLC methods. Autophagy response was determined by evaluating
The authors studied associations between pancreatic cancer and occupational exposures to metals, solvents, chemicals, and endotoxin in a cohort of female textile workers in Shanghai, China.
with solvent exposure, but no associations with any of the remaining occupational exposures, including endotoxin and metals. They concluded that these findings of increasing risk of pancreatic cancer with solvent exposures are consistent with published literature.

Authors: Reul NK, Li W, Gallagher LG, Ray RM, Romano ME, Gao D, Thomas DB, Vedal S, Checkoway H.


**An Overview of Occupational Risks from Climate Change**

Changes in atmosphere and temperature are affecting multiple environmental indicators from extreme heat events to global air quality. Workers will be uniquely affected by climate change, and the occupational impacts of major shifts in atmospheric and weather conditions need greater attention. Climate change-related exposures most likely to differentially affect workers in the USA and globally include heat, ozone, polycyclic aromatic hydrocarbons, other chemicals, pathogenic microorganisms, vector-borne diseases, violence, and wildfires. Epidemiologic evidence documents a U-, J-, or V-shaped relationship between temperature and mortality. Whereas heat-related morbidity and mortality risks are most evident in agriculture, many other outdoor occupational sectors are also at risk, including construction, transportation, landscaping, firefighting, and other emergency response operations. The toxicity of chemicals change under hyperthermic conditions, particularly for pesticides and ozone. Combined with climate-related changes in chemical transport and distribution, these interactions represent unique health risks specifically to workers. Links between heat and interpersonal conflict including violence require attention because they pose threats to the safety of emergency medicine, peacekeeping and humanitarian relief, and public safety professionals. Recommendations for anticipating how US workers will be most susceptible to climate change include formal monitoring systems for agricultural workers; modelling scenarios focusing on occupational impacts of extreme climate events including floods, wildfires, and chemical spills; and national research.
agenda setting focusing on control and mitigation of occupational susceptibility to climate change.

Authors: Applebaum KM, Graham J, Gray GM, LaPuma P, McCormick SA(5), Northcross A, Perry MJ.

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**Mortality among World Trade Centre rescue and recovery workers, 2002-2011**

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Rescue and recovery workers responding to the 2001 collapse of the World Trade Centre (WTC) sustained exposures to toxic chemicals and have elevated rates of multiple morbidities. Using data from the World Trade Centre Health Program and the National Death Index for 2002-2011, the authors examined standardised mortality ratios (SMR) and proportional cancer mortality ratios (PCMR) with indirect standardisation for age, sex, race, and calendar year to the U.S. general population, as well as associations between WTC-related environmental exposures and all-cause mortality. The authors identified 330 deaths among 28,918 responders (SMR 0.43, 95%CI 0.39-0.48). No cause-specific SMRs were meaningfully elevated. PCMRs were elevated for neoplasms of lymphatic and hematopoietic tissue (PCMR 1.76, 95%CI 1.06-2.75). Mortality hazard ratios showed no linear trend with exposure. The authors concluded that consistent with a healthy worker effect, all-cause mortality among responders was not elevated. There was no clear association between intensity and duration of exposure and mortality. Surveillance is needed to monitor the proportionally higher cancer mortality attributed to lymphatic/hematopoietic neoplasms.

Authors: Stein CR, Wallenstein S, Shapiro M, Hashim D, Moline JM, Udasin I, Crane MA, Luft BJ, Lucchini RG, Holden WL.

Factors affecting adherence to national malaria treatment guidelines in management of malaria among public healthcare workers in Kamuli District, Uganda

2016-03-11

Malaria remains a major public health threat accounting for 30.4 % of disease morbidity in outpatient clinic visits across all age groups in Uganda. Consequently, malaria control remains a major public health priority in endemic countries such as Uganda. Experiences from other countries in Africa that revised their malaria case management suggest that health workers adherence may be problematic. A descriptive, cross-sectional design was used and information collected on health system, health workers and patients. Using log-binomial regression model, adjusted prevalence risk ratios (PRRs) and their associated 95 % confidence intervals were determined in line with adherence to new treatment guidelines of parasitological diagnosis and prompt treatment with artemisinin combination therapy (ACT). Nine health centres, 24 health workers and 240 patient consultations were evaluated. Overall adherence to national malaria treatment guidelines (NMTG) was 50.6 % (122/241). It was significantly high at HC III [115 (53 %)] than at HC IV (29 %) [PRR = 0.28 (95 % CI 0.148 0.52), p = 0.000]. Compared to the nursing aide, the adherence level was 1.57 times higher among enrolled nurses (p = 0.004) and 1.68 times higher among nursing officers, p = 0.238, with statistical significance among the former. No attendance of facility malaria-specific continuing medical education (CME) sessions [PRR = 1.9 (95 % CI 1.29 2.78), p = 0.001] and no display of malaria treatment job aides in consultation rooms [PRR = 0.64 (95 % CI 0.4 1.03), p = 0.07] was associated with increased adherence to guidelines with the former showing a statistical significance and the association of the latter borderline statistical significance. The adherence was higher when the laboratory was functional [PRR = 0.47 (95 % CI 0.35 0.63)] when the laboratory was functional in previous 6 months. Age of health worker, duration of employment, supervision, educational level, and age of patient were found not associated with adherence to new treatment guidelines. The authors concluded that adherence to malaria treatment guidelines in Uganda is sub-optimal. There is an urgent need for deliberate interventions to improve adherence to these guidelines. Possible interventions to be explored should include: provision of job aides and improved access to laboratory services. There is also a need for continuous medical educational sessions for health workers, especially those at
This study aims to gauge the awareness of radiation safety among the nursing staff at a major hospital in different departments and recommend if further radiation safety training is required. A prospective multiple choice questionnaire was distributed to 200 nurses in 9 different departments. The questionnaire tested knowledge that would be taught at a basic radiation safety course. 147 nurses (74%) completed the survey with the average score of 40%. Furthermore, 85% of nurses surveyed felt there was a need for radiation safety training in their respective departments to assist with day to day work in the department. An increase in radiation safety materials that are specific to each department is recommended to assist with daily work involving radiation. Moreover, nursing staff that interact with radiation on a regular basis should undertake radiation safety courses before beginning employment and regular refresher courses should be made available thereafter.

Authors: Badawy MK, Mong KS, Paul Lykhun U, Deb P.

Preliminary safety assessment of C-8 xylitol monoester and xylitol phosphate esters

2016-03-11

Most of the cosmetic compounds with preservative properties available in the market pose some risks concerning safety, such as the possibility of causing sensitisation. Due to the fact that there are few options, the proper development of new molecules with this purpose is needed. Xylitol is a natural sugar, and the antimicrobial properties of xylitol-derived compounds have already been described in the literature. C-8 xylitol monoester and xylitol phosphate esters may be useful for the development of skincare products. As an initial screen for safety of chemicals, the combination of in silico methods and in vitro testing can aid in prioritising resources in toxicological investigations while reducing the ethical and monetary costs that are related to animal and human testing. This study was designed to evaluate the safety of C-8 xylitol monoester and xylitol phosphate esters regarding carcinogenicity, mutagenicity, skin and eye irritation/corrosion and sensitisation through alternative methods. For the initial safety assessment, quantitative structure-activity relationship methodology was used. The prediction of the parameters carcinogenicity/mutagenicity, skin and eye irritation/corrosion and sensitisation was generated from the chemical structure. The analysis also comprised physical-chemical properties, Cramer rules, threshold of toxicological concern and Michael reaction. In silico results of candidate molecules were compared to 19 compounds with preservative properties that are available in the market. Additionally, in vitro tests (Ames test for mutagenicity, cytotoxicity and phototoxicity tests and hen's egg test - chorioallantoic membrane for irritation) were performed to complement the evaluation. In silico evaluation of both molecules presented no structural alerts related to eye and skin irritation, corrosion and sensitisation, but some alerts for micronucleus and carcinogenicity were detected. However, by comparison, C-8 xylitol monoester, xylitol phosphate esters showed similar or better results than the compounds available in the market. Concerning experimental data, phototoxicity and mutagenicity results were negative. As expected for compounds with preservative activity, xylitol-derived substances presented positive result in cytotoxicity test. In hen's egg test, both molecules were irritants. The authors concluded that the findings from the present study suggested
that xylitol-derived compounds appear to be suitable candidates for preservative systems in cosmetics.

Authors: Silveira JE, Pereda MC, Nogueira C, Dieamant G, Cesar CK, Assanome KM, Silva MS, Torello CO, Queiroz ML, Eberlin S.


Environmental Chemicals in Urine and Blood: Improving Methods for Creatinine and Lipid Adjustment

2016-03-11

Investigators measuring exposure biomarkers in urine typically adjust for creatinine to account for dilution-dependent sample variation in urine concentrations. Similarly, it is standard to adjust for serum lipids when measuring lipophilic chemicals in serum. However, there is controversy regarding the best approach, and existing methods may not effectively correct for measurement error. In this study, the authors compared adjustment methods, including novel approaches, using simulated case-control data. Using a directed acyclic graph framework, the authors defined six causal scenarios for epidemiologic studies of environmental chemicals measured in urine or serum. The scenarios include variables known to influence creatinine (e.g., age and hydration) or serum lipid levels (e.g., body mass index and recent fat intake). Over a range of true effect sizes, each scenario was analysed using seven adjustment approaches and estimated the corresponding bias and confidence interval coverage across 1,000 simulated studies. For urinary biomarker measurements, our novel method, which incorporates both covariate-adjusted standardization and the inclusion of creatinine as a covariate in the regression model, had low bias and possessed 95% confidence interval coverage of nearly 95% for most simulated scenarios. For serum biomarker measurements, a similar approach involving standardization plus serum lipid level adjustment generally performed well. To control measurement error bias caused by variations in serum lipids or by urinary diluteness, the authors recommend improved methods for standardising exposure concentrations across individuals.

Authors: O’Brien KM, Upson K, Cook NR, Weinberg CR.

Organochlorine insecticides DDT and chlordane in relation to survival following breast cancer

2016-03-11

Organochlorine insecticides have been studied extensively in relation to breast cancer incidence, and results from two meta-analyses have been null for late-life residues, possibly due to measurement error. Whether these compounds influence survival remains to be fully explored. This study examined associations between organochlorine insecticides [p,p’-DDT (dichlorodiphenyltrichloroethane), its primary metabolite, p,p’-DDE, and chlordane] assessed shortly after diagnosis and survival among women with breast cancer. A population-based sample of women diagnosed with a first primary invasive or in situ breast cancer in 1996-1997 and with available organochlorine blood measures (n = 633) were followed for vital status through 2011. After follow-up of 5 and 15 years, we identified 55 and 189 deaths, of which 36 and 74, respectively, were breast cancer-related. Using Cox regression models, we estimated the multivariable-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for lipid-adjusted organochlorine concentrations with all-cause and breast cancer-specific mortality. At 5 years after diagnosis, the highest tertile of DDT concentration was associated with all-cause (HR = 2.19; 95% CI: 1.02, 4.67) and breast cancer-specific (HR = 2.72; 95% CI: 1.04, 7.13) mortality. At 15 years, middle tertile concentrations of DDT (HR = 1.42; 95% CI 0.99, 2.06) and chlordane (HR = 1.42; 95% CI: 0.94, 2.12) were modestly associated with all-cause and breast cancer-specific mortality. Third tertile DDE concentrations were inversely associated with 15-year all-cause mortality (HR = 0.66; 95% CI: 0.44, 0.99). This is the first population-based study in the United States to show that DDT may adversely impact survival following breast cancer diagnosis. Further studies are warranted given the high breast cancer burden and the ubiquity of these chemicals.


The aim of the study was to examine the associations between prenatal exposures to POPs and allergic sensitisation and lung function in 20-year-old offspring.

Toward a multi-country monitoring system of reproductive health in the context of endocrine disrupting chemical exposure

2016-03-11

Worrying trends regarding human reproductive endpoints (e.g. semen quality, reproductive cancers) have been reported and there is growing circumstantial evidence for a possible causal link between these trends and exposure to endocrine disrupting chemicals (EDCs). However, there is a striking lack of human data to fill the current knowledge gaps. To answer the crucial questions raised on human reproductive health, there is an urgent need for a reproductive surveillance system to be shared across countries. A multidisciplinary network named HUman Reproductive health and Global ENvironment Network (HURGENT) was created aiming at designing a European monitoring system for reproductive health indicators. Collaborative work allowed setting up the available knowledge to design such a system. Furthermore, the authors conducted an overview of 23 potential indicators, based upon a weight of evidence (WoE) approach according to their potential relation with EDC exposure. The framework and purposes of the surveillance system are settled as well as the approach to select suitable reproductive indicators. The indicators found with the highest scores according to the WoE approach are prostate and breast cancer incidence, sex ratio, endometriosis and uterine fibroid incidence, indicators related to the testicular dysgenesis syndrome, precocious puberty incidence and reproductive hormone levels. Not only sentinel health endpoints, but also diseases with high burdens in public health are highlighted as prior indicators in the context of EDC exposure. The authors concluded that this study can serve as a basis to construct, as soon as possible, the first multi-country reproductive monitoring system.


Prenatal exposure to persistent organic pollutants and offspring allergic sensitisation and lung function at 20 years of age

2016-03-11

Prenatal exposures to persistent organic pollutants (POPs) have been associated with asthma medication use and self-reported symptoms, but associations with lung function and allergic sensitisation have been minimally explored. The aim of the study was to examine the associations between prenatal exposures to POPs and allergic sensitisation and lung function in 20-year-old offspring. In a Danish cohort of 965 pregnant women established in 1988-1989, six polychlorinated biphenyl (PCB) congeners, hexachlorobenzene (HCB), and dichlorodiphenyldichloroethylene (p,p'-DDE) were quantified in archived maternal serum drawn in gestational week 30 (n = 872). Among those with available maternal exposure information, at age 20, 421 offspring attended a clinical examination including measurements of allergic sensitisation (serum-specific IgE ≥ 0.35 kUA/L) (n = 418) and lung function [forced expiratory volume in one second (FEV1) and forced vital capacity (FVC)] (n = 414). There were no associations between maternal concentrations of POPs and offspring allergic sensitisation at 20 years of age. Maternal concentrations of POPs were, however, positively associated with offspring airway obstruction (FEV1/FVC < 75%). Compared to offspring in the first tertile of exposure, offspring in the third tertile of dioxin-like PCB exposure had an OR of 2.96 (95% CI: 1.14-7.70). Similar associations for non-dioxin-like PCBs, HCB, and p,p'-DDE were 2.68 (1.06-6.81), 2.63 (1.07, 6.46), and 2.87 (1.09, 7.57), respectively. No associations were observed with reduced lung function (FEV1 % of predicted value < 90%). The authors concluded that these findings indicate that prenatal exposure to POPs appears to be associated with airway obstruction but not allergic sensitisation at 20 years of age. The findings support that chronic obstructive lung diseases may have at least part of their origins in early life.
