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ENVIRONMENTAL RESEARCH

Exploiting monitoring data in environmental exposure modelling and risk assessment of pharmaceuticals

2015-02-18

In order to establish the environmental impact of an active pharmaceutical ingredient (API), good information on the level of exposure in surface waters is required. Exposure concentrations are typically estimated using information on the usage of an API as well as removal rates in the patient, the wastewater system and in surface waters. These input data are often highly variable and difficult to obtain, so model estimates often do not agree with measurements made in the field. During this study, the authors present an approach, which uses inverse modelling to estimate overall removal rates of pharmaceuticals at the catchment scale using a hydrological model as well as prescription and monitoring data for a few representative sites for a country or region. These overall removal rates are then used to model exposure across the broader landscape. Evaluation of this approach for APIs in surface waters across England and Wales showed good agreement between modelled exposure distributions and available monitoring data. The use of the approach, alongside estimates of predicted no-effect concentrations for the 12 study compounds, to assess risk of the APIs across the UK landscape, indicated that, for most of the compounds, risks to aquatic life were low. However, ibuprofen was predicted to pose an unacceptable risk in 49.5% of the river reaches studied. For diclofenac, predicted exposure concentrations were also compared to the Environmental Quality Standard previously proposed by the European Commission and 4.5% of river reaches were predicted to exceed this concentration. The authors concluded that while the current study focused on pharmaceuticals, the approach could also be valuable in assessing the risks of other ‘down the drain’ chemicals and could help inform our understanding of the important dissipation processes for pharmaceuticals in the pathway from the patient to ecological receptors.

Authors: Boxall AB, Keller VD, Straub JO, Monteiro SC, Fussell R, Williams RJ.

Amino polyphosphonates - chemical features and practical uses, environmental durability and biodegradation

2015-02-18

Growing concerns about the quality of the environment led to the introduction of complex system of safety assessment of synthetically manufactured and commonly applied chemicals. Sometimes, however, our knowledge of consequences that result from the usage of these substances, appears far later, than at the beginning of their application. Such a situation is observed in the case of aminopolyphosphonates being an important subgroup of organophosphorus compounds. The increasing industrial and household applications, led to introducing a thousand tons of polyphosphonates every year into the environment. These substances are difficult to determine in environmental samples because of lack of appropriate analytical procedures. On the other hand they are suspected to influence the ecological equilibrium in aquatic ecosystems. Thus, studies on their fate in the environment, especially on the routes of their degradation seem to be of interest to both industrial and environmental chemistry. Therefore this review contains recent available data on the impact of aminophosphonates on environment, microbial degradation methods and evaluation of the possibility for using microorganisms to remove aminophosphonates from wastewater.

Authors: Studnik H, Liebsch S, Forlani G, Wieczorek D, Kafarski P, Lipok J.


PCB and organochlorine pesticide burden in eels in the lower Thames River (UK)

2015-02-18

Thirty-five European eels (Anguilla anguilla), caught in 2007 in the river Thames upstream and downstream of both London and the tidal limit, were analysed for PCBs and organochlorine pesticides. Most chemicals were detectable in every fish, although they have been banned or severely restricted for many years. In general, the tidal eels were more contaminated than upstream ones, which was related to their higher lipid contents. The ICES7 indicator PCB concentrations ranged overall from 4.2 to 124μgkg(-1) fresh weight with averages of 33 and 56μgkg(-1) for the upstream and tidal eels; 3.5-104μgkg(-1), average 26 and 48μgkg(-1) of that were ICES6 PCBs. Total DDT was on average 16μgkg(-1) (1.7-38μgkg(-1).
This study investigated Fe(3+) advancement for biomass production in starch wastewater under light-anaerobic condition.

Improving the growth of Rubrivivax gelatinosus cultivated in sewage environment.

Rubrivivax gelatinosus cultivated in wastewater environment can combine the biomass resource recycling for generating chemicals with sewage purification. However, low biomass accumulation restricts the exertion of this advantage. Thus, this study investigated Fe(3+) advancement for biomass production in starch wastewater under light-anaerobic condition. Results showed that addition of Fe(3+) was successful in enhancing biomass production, which certainly improved the feasibility of biomass recycling in R. gelatinosus starch wastewater treatment. With optimal Fe(3+) dosage (20 mg/L), biomass production reached 4,060 mg/L, which was 1.63 times that of control group. Amylase activity was improved by 48 %. Both COD removal and starch removal reached 90 %. Hydraulic retention time was shortened by 25 %. Proper Fe(3+) dosage enhanced biomass production, but excess Fe(3+) was harmful for biomass accumulation.

Authors: Wu P, Li JZ, Wang YL, Tong QY, Liu XS, Du C, Li N.


1)) upstream and 18µgkg(-1) (8.6-35µgkg(-1)) downstream with about half of that provided by pp'DDE. Lindane (γ-HCH) was found at up to 2.8µgkg(-1) (averages 0.58

and 1.1µgkg(-1) upstream and downstream) and hexachlorobenzene (HCB) was on average 1.9 and 2.5µgkg(-1) in the two groups with a maximum of 6.4µgkg(-1) in each. Therefore all individuals passed the European Environmental Quality Standard (EQS) of 10µgkg(-1) for HCB. PCB contamination was fairly typical for recent UK eel data, whilst DDE and lindane concentrations were lower than most previous UK eel studies, perhaps reflecting a downward trend. Although not as highly contaminated as some eels from previous UK and European studies, the presence of so many of these chemicals, with their known health effects may represent a stress for the fish or higher predators, such as birds.

Authors: Jürgens MD, Chaemfa C, Hughes D, Johnson AC, Jones KC.

This study investigated the LC50 (96 h) values for 4,4′-dihydroxydiphenyl ether, 4,4′-difluorodiphenyl ether, 4,4′-dichlorodiphenyl ether, and 4,4′-dibromodiphenyl ether in adult zebrafish.

Diphenyl ether and its derivatives are widely used in the industry of spices, dyes, agrochemicals, and pharmaceuticals. Following a previous study, the authors selected 4,4′-dihydroxydiphenyl ether, 4,4′-difluorodiphenyl ether, 4,4′-dichlorodiphenyl ether, and 4,4′-dibromodiphenyl ether as research objects. The LC50 (96 h) values for these compounds in adult zebrafish were determined with the acute test. Also, developmental toxicities of the four substances to zebrafish embryos were observed at 24, 48, 72, and 96 hpf. All the LC50 (96 h) values of these compounds were between 1 and 10 mg/L, suggesting that they all had moderate toxicity to adult zebrafish. The embryonic test demonstrated that with increasing doses, 4,4′-dihydroxydiphenyl ether decreased the hatching rate, while 4,4′-difluorodiphenyl ether, 4,4′-dichlorodiphenyl ether, and 4,4′-dibromodiphenyl ether delayed the hatching time but had little effect on final hatchability at 96 hpf. All of these compounds inhibited larval growth, especially 4,4′-dihydroxydiphenyl ether. Exposure to these chemicals induced embryo yolk sac and pericardial oedema. Spine deformation was visible in hatched larvae after 96 hpf 4,4′-dihydroxydiphenyl ether exposure, while tail curvature was observed for the halogenated compounds. The authors concluded that the overall results indicated that 4,4′-dihydroxydiphenyl ether, 4,4′-difluorodiphenyl ether, 4,4′-dichlorodiphenyl ether, and 4,4′-dibromodiphenyl ether all had significant toxicity on adult and embryonic zebrafish.


A simple and rapid liquid chromatography-ion trap mass spectrometric (LC-IT/MS) method has been developed and validated for quantification of wilfordmine in human plasma. After the protein precipitation was carried out by acetonitrile and the solution was cleaned by solid-phase extraction, the chromatographic separation was performed on a Zorbax Plus RRHD C18 column by using a mixture of acetonitrile and 10.0 mmol/L ammonium acetate solution (70:30, v/v) as the mobile phase at a flow rate of 0.7 mL/min. Detection was performed on an atmospheric-pressure chemical ionisation source in the positive multiple reaction monitoring mode using aconitine as an internal standard (IS) with transitions of m/z 806→710 for wilfordmine, and 646→586 for IS, respectively. The obtained calibration curve was linear (r = 0.9992) over the concentration range of 0.5-100.0 μg/L with a lower limit of quantification of 0.5 μg/L in plasma. The intra- and interday relative standard deviations were <7.0 and 12.3%, respectively. The recoveries were between 86.0 and 97.0%. The authors concluded that the proposed method was found to be applicable to clinical studies.

Authors: Zhou L, Zhu H, Ouyang X, Zhao J, Chen X.


A simple and rapid liquid chromatography-ion trap mass spectrometric (LC-IT/MS) method has been developed and validated for quantification of wilfordmine in human plasma.
This study investigated the genes regulated in mesenchymal stem cells (MSCs) and diffuse-type gastric cancer (GC), gene expression was analysed. Regulated genes in mesenchymal stem cells and gastric cancer

2015-02-18

This study investigated the genes regulated in mesenchymal stem cells (MSCs) and diffuse-type gastric cancer (GC), gene expression was analysed. Gene expression of MSCs and diffuse-type GC cells were analysed by microarray. Genes related to stem cells, cancer and the epithelial-mesenchymal transition (EMT) were extracted from human gene lists using Gene Ontology and reference information. Gene panels were generated, and messenger RNA gene expression in MSCs and diffuse-type GC cells was analysed. Cluster analysis was performed using the NCSS software. The gene expression of regulator of G-protein signalling 1 (RGS1) was up-regulated in diffuse-type GC cells compared with MSCs. A panel of stem-cell related genes and genes involved in cancer or the EMT were examined. Stem-cell related genes, such as growth arrest-specific 6, musashi RNA-binding protein 2 and hairy and enhancer of split 1 (Drosophila), NOTCH family genes and Notch ligands, such as delta-like 1 (Drosophila) and Jagged 2, were regulated. The authors concluded that thousand and eighty-six lymphoblastoid cell lines from the 1000 Genomes Project, representing 9 populations from 5 continents, were used to assess variation in cytotoxic response to 179 chemicals. Analysis included assessments of population variation and heritability, and genome-wide association mapping, with attention to phenotypic relevance to human exposures. For about half the tested compounds, cytotoxic response in the 1% most “sensitive” individual occurred at concentration within a factor of 10⁰½ (i.e., approximately 3) of that in the median individual; however, for some compounds, this factor was >10. Genetic mapping suggested important roles for variation in membrane and trans-membrane genes, with a number of chemicals showing association with SNP rs13120371 in the solute carrier SLC7A11, previously implicated in chemoresistance. This experimental approach fills critical gaps unaddressed by recent large-scale toxicity testing programs, providing quantitative, experimentally based estimates of human toxicodynamic variability, and also testable hypotheses about mechanisms contributing to inter-individual variation.


Full Source: Environmental Health Perspectives. 2015 Jan 13. [Epub ahead of print]
The current review attempts to summarise adverse effects of these toxicants on mammalian testes, with emphasis on alteration of steroidogenesis, spermatogenesis, and histopathological effects.

**Effect of Environmental Contaminants on Mammalian Testis**

2015-02-18

Exposure of humans and wildlife to pollutants released in the environment is a centre of attention nowadays. Many of these chemicals (generally referred to as environmental pollutants) have been shown to interfere with normal hormonal signalling and biological functions, leading to reproductive disorders or infertility, which has been a matter of concern within the recent decades. The current review attempts to summarise adverse effects of these toxicants on mammalian testes, with emphasis on alteration of steroidogenesis, spermatogenesis, and histopathological effects. From the reviewed papers, it appears that environmental toxicants, especially heavy metals and organic chemicals of synthetic and microbiological origins, disrupt hormone production and action in the mammalian testes. Endocrine disruption leads to disorders of testicular function and thereby compromises the normal phenotypic development of male sexual characteristics, initiation and maintenance of spermatogenesis. The toxicants also induce impairment of testicular cells function, testicular histology, and sperm cells function directly. The release of the toxicants in the environment is still ongoing, despite alarming quantities that already exist in the atmosphere. If appropriate measures are not taken, their impact on the male reproductive function and especially on testicular function will be more serious.

Authors: Tsagué Manfo FP, Nantia EA, Mathur PP.

Full Source: Current Molecular Pharmacology. 2015 Jan 26. [Epub ahead of print]
Quantification of proteins using (13)C7-labelled and unlabelled iodoacetanilide by nano liquid chromatography/nanoelectrospray ionisation and by selected reaction monitoring mass spectrometry

The combination of cysteine-specific modifiers, iodoacetanilide (IAA) and (13)C7-labelled iodoacetanilide ((13)C7-IAA), has been applied to absolute quantification of proteins. The selected reaction monitoring (SRM) with the use of nano liquid chromatography/nanoelectrospray ionisation ion trap mass spectrometry (nano LC/nano-ESI-IT-MS) analysis was applied to precise quantification of three commercial proteins. Good correlation was observed between the theoretical ratios and observed ratios for all these proteins both in a simple buffer solution and in a complex protein environment. Due to efficient tagging, this method does not require separate synthesis of isotope-labelled peptides for the SRM studies. Therefore, this method is expected to be a useful tool for proteomics research.

Authors: Kurono S, Kaneko Y, Matsuura S, Niwayama S.


OCCUPATIONAL RESEARCH

Potential health effects associated with dermal exposure to occupational chemicals

The combination of cysteine-specific modifiers, iodoacetanilide (IAA) and (13)C7-labelled iodoacetanilide ((13)C7-IAA), has been applied to absolute quantification of proteins.

There are a large number of workers in the United States, spanning a variety of occupational industries and sectors, who are potentially exposed to chemicals that can be absorbed through the skin. Occupational skin exposures can result in numerous diseases that can adversely affect an individual’s health and capacity to perform at work. In general, there are three types of chemical-skin interactions of concern: direct skin effects, immune-mediated skin effects, and systemic effects. While hundreds of chemicals (metals, epoxy and acrylic resins, rubber additives, and chemical intermediates) present in virtually every industry have been identified to cause direct and immune-mediated effects such as contact dermatitis or urticaria, less is known about the number and types
In this study, the authors report a series of three accidents of six storage room workers in a medium sized company regularly importing electronic production parts from abroad.

Accidental exposure to gas emissions from transit goods treated for pest control
2015-02-18
International phytosanitary standards ISPM 15 require (since 2007) fumigation or heat treatment for shipping and storage. Those dealing with fumigated freight might be accidentally exposed. In this study, the authors report a series of three accidents of six storage room workers in a medium sized company regularly importing electronic production parts from abroad. Patients (n=6, aged from 32-54 yrs.) and control group (n=30, mean 40 yrs.) donated blood and urine samples. The fumigants: ethylene oxide, methyl bromide, chloropicrin, ethylene dichloride, other halo-alkanes and solvents were analysed by headspace gas chromatography/ mass spectrometry (GCMS). For the quantitation of long term exposure/s, macromolecular reaction products (haemoglobin adducts) were used (with GCMS) as molecular dosimeter; additionally 8-OHdG and circulating mtDNA (cmtDNA) were analysed as nonspecific biological effect markers. The haemoglobin adducts N-methyl valine (MEV) and N-(2-hydroxy ethyl) valine (HEV) were elevated after exposure to the alkylating chemicals methyl bromide and ethylene oxide. Under the consideration of known elimination kinetics and the individual smoking status (biomonitored with nicotine metabolite cotinine and tobacco specific haemoglobin adduct: N-(2 cyan ethyl) valines, CEV), the data allow theoretical extrapolation to the initial protein adduct concentrations at the time of the accident (the MEV/CEV levels were from 1,616 pmol/g globin to 1,880 pmol/g globin and HEV/CEV levels from 1,407 pmol/g globin to 5,049 pmol/g globin,
and correlated with inhaled 0.4-1.5 ppm ethylene oxide. These integrated, extrapolated internal doses, calculated on the basis of biological exposure equivalents, confirmed the clinical diagnosis for three patients, showing severe intoxication symptoms. Both, mtDNA and 8-OHdG, as non-specific biomarkers of toxic effects, were elevated in four patients. The cases reported here, stress the importance of a suitable risk assessment and control measures. We put emphasis on the necessity of human biomonitoring guidelines and the urgency for the relevant limit values.

Authors: Kloth S, Baur X, Göen T, Budnik LT.


Co-exposure with fullerene may strengthen health effects of organic industrial chemicals

2015-02-18

In vitro toxicological studies together with atomistic molecular dynamics simulations show that occupational co-exposure with C60 fullerene may strengthen the health effects of organic industrial chemicals. The chemicals studied are acetophenone, benzaldehyde, benzyl alcohol, m-cresol, and toluene which can be used with fullerene as reagents or solvents in industrial processes. Potential co-exposure scenarios include a fullerene dust and organic chemical vapour, or a fullerene solution aerosolised in workplace air. Unfiltered and filtered mixtures of C60 and organic chemicals represent different co-exposure scenarios in in vitro studies where acute cytotoxicity and immunotoxicity of C60 and organic chemicals are tested together and alone by using human THP-1-derived macrophages. Statistically significant co-effects are observed for an unfiltered mixture of benzaldehyde and C60 that is more cytotoxic than benzaldehyde alone, and for a filtered mixture of m-cresol and C60 that is slightly less cytotoxic than m-cresol. Hydrophobicity of chemicals correlates with co-effects when secretion of pro-inflammatory cytokines IL-1β and TNF-α is considered. Complementary atomistic molecular dynamics simulations reveal that C60 co-aggregates with all chemicals in aqueous environment. Stable aggregates have a fullerene-rich core
and a chemical-rich surface layer, and while essentially all C60 molecules aggregate together, a portion of organic molecules remains in water.


**Ethics in biomonitoring for occupational health**

**2015-02-18**

Biological monitoring, i.e., the use of biomarkers for the measurement of systemic human exposure, effects and susceptibility to chemicals has increased considerably in recent years. Biomonitoring techniques, originally limited to a few metals and other chemicals in the workplace, are currently applied to a large number of exposure situations and have become a useful tool for occupational and environmental health risk assessment. Almost any biomonitoring program, however, entails a number of relevant ethical issues, which concern all the phases of the entire process, from the selection of the biomarker to the study design, from the collection, storage and analysis of the biological sample to the interpretation, communication and management of the results, from the informed consent of the worker to the independence and autonomy of the occupational health professional. These issues require a balanced assessment of the interests and responsibilities of all the parties, the worker primarily, but also the employer, the occupational health professional, the health authorities and, for research studies on new biomarkers, also the scientists involved. Ideally, decisions of ethical relevance concerning biomarkers should be based on, and respectful of the best scientific, legal and ethical evidence available. When, however, a conflict should arise, before any decision is taken a thorough risk-benefit analysis should be done, at the beginning of the process and after listening to the workers and the management involved, by the occupational physician or scientist, based on his/her professional experience, independent judgement and individual responsibility.

Authors: Manno M, Sito F, Licciardi L.

Characterisation of cleaning and disinfecting tasks and product use among hospital occupations
2015-02-18
Healthcare workers have an elevated prevalence of asthma and related symptoms associated with the use of cleaning/disinfecting products. The objective of this study was to identify and characterise cleaning/disinfecting tasks and products used among hospital occupations. Workers from 14 occupations at five hospitals were monitored for 216 shifts, and work tasks and products used were recorded at five-minute intervals. The major chemical constituents of each product were identified from safety data sheets. Cleaning and disinfecting tasks were performed with a high frequency at least once per shift in many occupations. Medical equipment preparers, housekeepers, floor strippers/waxers, and endoscopy technicians spent on average 108-177 min/shift performing cleaning/disinfecting tasks. Many occupations used products containing amines and quaternary ammonium compounds for >100 min/shift. The authors concluded that this analysis demonstrates that many occupations besides housekeeping incur exposures to cleaning/disinfecting products, albeit for different durations and using products containing different chemicals.

Authors: Saito R, Abbas Virji M, Henneberger PK, Humann MJ, LeBouf RF, Stanton ML, Liang X, Stefaniak AB.


PUBLIC HEALTH RESEARCH
Preconception Maternal and Paternal Exposure to Persistent Organic Pollutants and Birth Size: The LIFE Study
2015-02-18
Persistent organic pollutants (POPs) are developmental toxicants, but the impact of both maternal and paternal exposures on offspring birth size is largely unexplored. This study examined associations between maternal and paternal serum concentrations of 63 POPs, comprising five major classes of pollutants, with birth size measures. Parental serum concentrations of 9 organochlorine pesticides, 1 polybrominated biphenyl (PBB), 7 perfluoroalkyl chemicals (PFCs), 10 polybrominated diphenyl ethers (PBDEs), and 36 polychlorinated biphenyls (PCBs) were measured.
The present study aimed to investigate the relationships of different sets of urinary environmental chemical concentrations and high blood pressure in a national, population-based study.

Higher urinary heavy metal, phthalate and arsenic concentrations accounted for 3-19% of the population attributable risk for high blood pressure: US NHANES, 2009-2012

The link between environmental chemicals and human health has emerged, but has not been completely examined in terms of its risk factors. Therefore, the present study aimed to investigate the relationships of different sets of urinary environmental chemical concentrations and high blood pressure (BP) in a national, population-based study. Data were retrieved from the United States National Health and Nutrition Examination Surveys, 2009-2012, including demographics, BP readings and urinary environmental chemical concentrations. Analyses included \( \chi^2 \)-test, t-test, survey-weighted logistic regression models and
population attributable risk estimation. Urinary caesium (odds ratio (OR) 1.52, 95% confidence interval (CI) 1.06-2.18, P=0.026), molybdenum (OR 1.45, 95% CI 1.04-2.02, P=0.029), lead (OR 1.49, 95% CI 1.12-1.98, P=0.009), platinum (OR 1.66, 95% CI 1.14-2.21, P=0.002), antimony (OR 1.44, 95% CI 1.12-1.86, P=0.008) and tungsten (OR 1.48, 95% CI 1.22-1.79, P<0.001) concentrations were observed to be associated with high BP. Similar results were observed for mono-2-ethyl-5-carboxypentyl (OR 1.29, 95% CI 1.04-1.59, P=0.024), mono-n-butyl (OR 1.36, 95% CI 1.11-1.67, P=0.005), mono-2-ethyl-5-hydroxyhexyl (OR 1.21, 95% CI 1.01-1.46, P=0.041), mono-n-methyl (OR 1.24, 95% CI 1.01-1.46, P=0.014), mono-2-ethyl-5-oxohexyl (OR 1.21, 95% CI 1.01-1.45, P=0.036), mono-benzyl (OR 1.41, 95% CI 1.15-1.74, P=0.002), dimethylarsinic acid (OR 1.38, 95% CI 1.08-1.76, P=0.012) and trimethylarsine oxide (OR 2.56, 95% CI 1.29-5.07, P=0.010) concentrations. Each chemical could account for 3-19% of the population attributable risk for high BP. A small sex difference was found. However, there are no associations between environmental parabens and pesticides and high BP. Urinary heavy metal, phthalate and arsenic concentrations were associated with high BP, although a causal effect cannot be established. Elimination of environmental chemical exposure in humans still needs to be pursued.

Authors: Shiue I, Hristova K.


The adverse cardiac effects of Di(2-ethylhexyl)phthalate and Bisphenol A

2015-02-18

The ubiquitous nature of plastics has raised concerns pertaining to continuous exposure to plastic polymers and human health risks. Of particular concern is the use of endocrine-disrupting chemicals in plastic production, including di(2-ethylhexyl)phthalate (DEHP) and bisphenol A (BPA). Widespread and continuous exposure to DEHP and BPA occurs through dietary intake, inhalation, dermal and intravenous exposure via consumer products and medical devices. This study reviews the literature examining the relationship between DEHP and BPA exposure and cardiac toxicity. In vitro and in vivo experimental reports are outlined, as well as epidemiological studies which examine the association between these chemicals and cardiovascular outcomes. Gaps in our current knowledge are also discussed, along with future investigative endeavours that may
help resolve whether DEHP and/or BPA exposure has a negative impact on cardiovascular physiology.

Author: Posnack NG.


Higher urinary heavy metal, arsenic, and phthalate concentrations in people with high blood pressure: US NHANES, 2009-2010

2015-02-18

A link between environmental chemicals and human health has emerged but not complete in risk factors. This study examined the relationships of different sets of urinary environmental chemical concentrations and risk of high blood pressure (BP) in a national, population-based study. Data was retrieved from United States National Health and Nutrition Examination Surveys, 2009-2010, including demographics, BP readings and urinary environmental chemical concentrations. Analyses included t-test and survey-weighted logistic regression models. Urinary mercury concentrations were not associated with high BP (OR =1.19, 95% CI 0.97-1.48, p = 0.095). Urinary cobalt (OR = 1.35, 95% CI 1.01-1.81, p = 0.044), lead (OR = 1.77, 95% CI 1.31-2.38, p = 0.001), antimony (OR = 1.37, 95% CI 1.09-1.72, p = 0.010) and tungsten (OR = 1.52, 95% CI 1.27-1.81, p < 0.001) concentrations were observed to increase the risk of high BP. There are no clear associations between environmental parabens and high BP. The effect of environmental bisphenol A (OR = 1.14, 95% CI 1.00-1.30, p = 0.051) disappeared after additionally adjusting for subsample weighting (OR = 1.12, 95% CI 0.93-1.35, p = 0.225). People with higher urinary mono-2-ethyl-5-carboxypentyl phthalate (OR = 1.26, 95% CI 1.00-1.58, p = 0.051), mono-n-butyl phthalate (OR = 1.19, 95% CI 1.01-1.41, p = 0.042) and mono-n-methyl phthalate metabolites (OR = 1.16, 95% CI 1.03-1.32, p = 0.021) tended to have high BP. Moreover, urinary o-phenyl phenol concentrations (OR = 1.49, 95% CI 1.25-1.77, p < 0.001) and dimethylarsionic acid concentrations (OR = 1.35, 95% CI 1.06-1.73, p = 0.019) were also seen to be associated with high BP. The author concluded that urinary environmental chemical concentrations were associated with risk of high BP, although the causal effect cannot be
established. Elimination of environmental chemicals in humans would need to be continued.

Author: Shiue I


**Urinary concentrations of bisphenol A and phthalate metabolites and weight change: a prospective investigation in US women**

2015-02-18

Both bisphenol A (BPA) and phthalates are known endocrine-disrupting chemicals for which there is widespread general population exposure. Human exposure occurs through dietary and non-dietary routes. Although animal studies have suggested a potential role of these chemicals in obesity, evidence from human studies is sparse and inconsistent, and prospective evidence is lacking. This study evaluated urinary concentrations of BPA and major phthalate metabolites in relation to prospective weight change. The study population was from the controls in a prospective case-control study of type 2 diabetes in the Nurses’ Health Study (NHS) and NHSII. A total of 977 participants provided first-morning-void urine samples in 1996-2002. Urinary concentrations of BPA and nine phthalate metabolites were measured using liquid chromatography-mass spectrometry. Body weights were self-reported at baseline and updated biennially thereafter for 10 years. On average, the women gained 2.09 kg (95% confidence interval (CI), -2.27 to 6.80 kg) during the 10-year follow-up. In multivariate analysis with adjustment of lifestyle and dietary factors, in comparison with women in the lowest quartile of BPA concentration, those in the highest quartile had 0.23 kg per year (95% CI, 0.07-0.38 kg per year) greater weight gain during the 10-year follow-up (P-trend=0.02). Several phthalate metabolites, including phthalic acid, MBzP and monobutyl phthalate, were also associated with faster prospective weight gain in a dose-response fashion (P-trend<0.01), whereas other phthalates metabolites, including MEP and monoethylhexyl phthalate, were not monotonically associated with body weight change. The authors concluded that these data suggest urinary concentrations of BPA and certain individual phthalate metabolites that were associated with modestly greater weight gain in a dose-response fashion. These data are
consistent with a potential role of BPA and phthalates in obesity, although more prospective data are needed to corroborate these observations.

Authors: Song Y, Hauser R, Hu FB, Franke AA, Liu S, Sun Q.