Bulletin Board

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Contents

Technical

ENVIRONMENTAL RESEARCH

Recent progress on carbon nanomaterials for the electrochemical detection and removal of environmental pollutants

2019-08-05

Rapid global industrialisation and explosive population growth have resulted in an increase in the discharge of harmful and toxic compounds. These toxic inorganic gases, volatile organic compounds, heavy metals, personal care products, endocrine-disrupting chemicals, dyes, and pharmaceuticals are destroying the balance in the Earth and increasing environmental toxicity at an alarming rate. Thus, their detection, adsorption and removal are of great significance. Various carbon nanomaterials including carbon nanotubes, graphene, mesoporous carbon, carbon dots, and boron-doped diamond have been extensively utilised and further proven to be ideal candidates for resolving environmental problems, emerging as adsorbents, electrochemical sensors and electrodes. In the present review, the authors discuss recent advances, progress and achievements in the design and properties of carbon nanomaterials and their applications for the electrochemical detection and removal of environmental pollutants.

Authors: Zhang YN, Niu Q, Gu X, Yang N, Zhao G.

Full Source: Nanoscale. 2019 Jul 7;11(25):11992-12014. doi: 10.1039/c9nr02935d. Epub 2019 May 29.

In the present review, the authors discuss recent advances, progress and achievements in the design and properties of carbon nanomaterials and their applications for the electrochemical detection and removal of environmental pollutants.

Identification of DNA and glutathione adducts in male Sprague-Dawley rats exposed to 1-bromopropane

2019-08-05

Occupational exposure of workers to 1-bromopropane (1-BP) has raised concerns in industry for many years. Despite the known toxicity of this chemical, molecular events attributed to exposure to 1-BP have not been extensively studied. The aim of the present study was to examine the effects of 1-BP exposure on adduct formation with DNA and glutathione (GSH) in male Sprague-Dawley rats in an attempt to determine the early stages of toxicity. Following 6 h after either single or daily exposure to 1-BP for 3 days, N7-propyl guanine and S-propyl GSH were quantified in several organs by using liquid chromatography-mass spectrometry (LC-MS/MS). The results showed that N7-propyl guanine was maximally formed in liver followed by spleen, testes, and lung in both dose- and time-dependent manners. However, DNA adduct was not detected in cardiac tissue. In

the case of S-propyl GSH, this compound was formed in the following order in various organs: liver > testes > spleen > kidney > lung > heart. In a subsequent in vitro study, formation of N7-propyl guanine initiated by 1-BP in calf thymus DNA was not markedly affected by addition of liver homogenates, which indicated that this chemical may be acting as a direct alkylating agent. In contrast, an in vitro study with free GSH demonstrated that 1-BP reduced GSH and elevated production of S-propyl GSH, and that the production of this adduct was significantly higher in the presence of active liver homogenates. Data indicated that formation of GSH adducts initiated by 1-BP might be associated with an enzyme-driven process. Although further characterisation is necessary, it would appear that N7-propyl guanine and S-propyl GSH might serve as useful markers in cases of exposure assessment of 1-BP.

Authors: Nepal MR, Noh K, Shah S, Bist G, Lee ES, Jeong TC.
Full Source: Journal of Toxicology & Environmental Health A. 2019;82(8):502-513. doi: 10.1080/15287394.2019.1622830. Epub 2019 May 29.

Myco-Remediation of Xenobiotic Organic Compounds for a Sustainable Environment: A Critical Review

2019-08-05

In the present study, the utilisation of fungi for the degradation of xenobiotic organic compounds (XOCs) from different wastewater and aqueous solutions has been reviewed. The myco-remediation (myco-enzymes, myco-degradation, and myco-sorption) process is widely used to remove XOCs, which are not easily biodegradable. The removal of XOCs from textile wastewaters through chemical and physical processes has been addressed by many researchers. Currently, the application of oxidative enzymes [manganese peroxidase (MnP), lignin peroxidase (LiP), and laccase] and myco-adsorption is becoming more common for the removal of XOCs from wastewater. Although the advanced oxidation process (AOPs) is a preferred technology for removing XOCs, its use is restricted due to its relatively high cost, which led to research studies on non-traditional and low-cost technology. The current review aimed to organise the scattered available information on the potential of myco-remediation for XOC removal. Moreover, the utilisation of agricultural wastes as a production substrate for oxidative enzymes has been reported by many authors. Agricultural waste materials are highly inducible for oxidative enzyme production by fungi and are cost-effective in comparison to commercial substances. It is evident from the literature survey of 80 recently published papers that myco-enzymes

In the present study, the utilisation of fungi for the degradation of xenobiotic organic compounds (XOCs) from different wastewater and aqueous solutions has been reviewed.

have demonstrated outstanding XOC removal capabilities. Fungal laccase enzyme is the first step to degrade the lignin and then to get the carbon source form the cellulose by cellulose enzyme.
Authors: Noman E, Al-Gheethi A, Mohamed RMSR, Talip BA.
Full Source: Topics in Current Chemistry. 2019 May 27;377(3):17. doi: 10.1007/s41061-019-0241-8.

Occurrence of two novel triazine-based flame retardants in an E-waste recycling area in South China: Implication for human exposure

2019-08-05
The recent increase in the use of alternative flame retardants (FRs) in consumer products has led to emerging contaminants in the environment. Identification of novel FRs is urgently needed because the potential threat posed by these chemicals has provoked considerable attention, but the details of the threat are not yet widely understood. In this study, two novel triazine-based FRs, tris(2,3-dibromopropyl) isocyanurate (TDBP-TAZTO) and 2,4,6-tris(2,4,6-tribromophenoxy)-1,3,5-triazine (TTBP-TAZ), were identified in dust samples from an e-waste recycling area in China. Two legacy FRs, namely, tetrabromobisphenol A (TBBPA) and hexabromocyclododecane (HBCDD), were also analysed for comparison. The mean level of TDBP-TAZTO in the e-waste dust samples was found to be much higher (2060 ng g-1) than that of HBCDD (526 ng g-1), while the mean level of TTBP-TAZ in residential dust samples was moderately higher (119 ng g-1) than that of HBCDD (35.7 ng g-1). A comparison of the TDBP-TAZTO and TTBP-TAZ concentrations with those of other alternative and legacy FRs indicated that TDBP-TAZTO is a major FR that is currently used in China. The estimated daily intake of TDBP-TAZTO via dust ingestion for occupational workers was much higher than that of HBCDD and was also much higher than for local adults and children. Exposure to TDBP-TAZTO poses a potentially high risk to the health of the local population, especially for the occupational workers, when the multicomponent chemical 'cocktail' effects are taken into account. More investigations on the environmental behaviours and risk factors of TDBP-TAZTO and TTBP-TAZ in various environmental matrices, as well as their toxicological effects, should be performed in the future.
Authors: Shen M, Ge J, Lam JCW, Zhu M, Li J, Zeng L.
Full Source: Science of the Total Environment. 2019 Sep 15; 683:249-257. doi: 10.1016/j.scitotenv.2019.05.264. Epub 2019 May 20.

In this study, two novel triazine-based FRs, tris(2,3-dibromo-propyl) isocyanurate (TDBP-TAZTO) and 2,4,6-tris(2,4,6-tribromophenoxy)-1,3,5-triazine (TTBP-TAZ), were identified in dust samples from an e-waste recycling area in China.

Technical

Cyanobacteria as a bioreactor for synthesis of silver nanoparticles-an effect of different reaction conditions on the size of nanoparticles and their dye decolorisation ability

2019-08-05

The green synthesis of metallic nanoparticles has paved the way for improving and protecting the environment by decreasing the use of toxic chemicals and eliminating biological risks in biomedical applications. Biological synthesis of metal nanoparticles is gaining more importance due to simplicity, rapid rate of synthesis and eco-friendliness. In the present study, cyanobacterial (Microchaete NCCU-342) cell free aqueous extract has been used for optimising biosynthesis of silver nanoparticles (AgNP). The optimised reaction parameters for efficient synthesis of AgNP were: biomass quantity of 80 µg/ml, pH 5.5, 60 °C temperature, duration of 60 min UV light exposure and 1 mM AgNO3 concentration. AgNP was characterised by UV-Visible Spectrophotometery, Transmission Electron Microscopy and Dynamic light scattering. The smallest nanoparticles (obtained from biomass parameter were spherical, polydisperessed and in the range of 60-80 nm) were characterised further in a degradation study of azo dye methyl red. Degradation of methyl red within 2 h was more with AgNP (84.60%) as compared to cyanobacterial extract (49.80%).

Authors: Husain S, Afreen S, Hemlata, Yasin D, Afzal B, Fatma T.

Full Source: Journal of Microbiology Methods. 2019 Jul; 162:77-82. doi: 10.1016/j.mimet.2019.05.011. Epub 2019 May 24.

In the present study, cyanobacterial (Microchaete NCCU-342) cell free aqueous extract has been used for optimising biosynthesis of silver nanoparticles (AgNP)

MEDICAL RESEARCH

Pancreatic safety of vildagliptin in patients with type 2 diabetes mellitus: A European, noninterventional, post-authorisation safety study

2019-08-05

This cohort study assessed the pancreatic safety of vildagliptin versus other non-insulin antidiabetic drugs (NIADs) based on data from five European electronic health care databases. Patients with type 2 diabetes aged ≥18 years on NIAD treatment were enrolled. Adjusted incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were estimated separately for acute pancreatitis and pancreatic cancer for vildagliptin (± other NIADs) compared with other NIADs using negative binomial regression. Approximately 2.8% of the enrolled patients (n = 738 054) used vildagliptin during the study, with an average follow-up time of 1.4 years. For acute pancreatitis, adjusted IRRs ranged between 0.89 and

2.58 with all corresponding 95% CIs crossing 1. For pancreatic cancer adjusted IRRs ranged from 0.56 to 3.64, with the lower limit of 95% CIs >1 in some analyses. Post hoc sensitivity analyses taking latency time into account markedly lowered the risk estimates with corresponding 95% CIs crossing 1. Overall, the results do not suggest an increased pancreatitis risk with vildagliptin, while the observation for pancreatic cancer have to be interpreted carefully as this study was not designed to assess pancreatic cancer and rather be explained by certain underlying limitations including latency -time, chance findings and/or bias and confounding.
Authors: Williams R, Kothny W, Serban C, Lopez-Leon S, Schlienger R.
Full Source: Endocrinology & Diabetes Metabolism. 2019 Jan 24;2(2):e00052. doi: 10.1002/edm2.52. eCollection 2019 Apr.

Modelling Cardiovascular Risks of E-Cigarettes With Human-Induced Pluripotent Stem Cell-Derived Endothelial Cells

2019-08-05

Electronic cigarettes (e-cigarettes) have experienced a tremendous increase in use. Unlike cigarette smoking, the effects of e-cigarettes and their constituents on mediating vascular health remain understudied. However, given their increasing popularity, it is imperative to evaluate the health risks of e-cigarettes, including the effects of their ingredients, especially nicotine and flavourings. The purpose of this study was to investigate the effects of flavoured e-cigarette liquids (e-liquids) and serum isolated from e-cigarette users on endothelial health and endothelial cell-dependent macrophage activation. Human-induced pluripotent stem cell-derived endothelial cells (iPSC-ECs) and a high-throughput screening approach were used to assess endothelial integrity following exposure to 6 different e-liquids with varying nicotine concentrations and to serum from e-cigarette users. The cytotoxicity of the e-liquids varied considerably, with the cinnamon-flavoured product being most potent and leading to significantly decreased cell viability, increased reactive oxygen species (ROS) levels, caspase 3/7 activity, and low-density lipoprotein uptake, activation of oxidative stress-related pathway, and impaired tube formation and migration, confirming endothelial dysfunction. Upon exposure of ECs to e-liquid, conditioned media induced macrophage polarisation into a pro-inflammatory state, eliciting the production of interleukin-1β and -6, leading to increased ROS. After exposure of human iPSC-ECs to serum of e-cigarette users, increased ROS linked to endothelial dysfunction was observed, as indicated by impaired pro-angiogenic properties. There was also an observed increase in

The purpose of this study was to investigate the effects of flavoured e-cigarette liquids (e-liquids) and serum isolated from e-cigarette users on endothelial health and endothelial cell-dependent macrophage activation.

inflammatory cytokine expression in the serum of e-cigarette users. Acute exposure to flavoured e-liquids or e-cigarette use exacerbates endothelial dysfunction, which often precedes cardiovascular diseases.
Authors: Lee WH, Ong SG, Zhou Y, Tian L, Bae HR, Baker N, Whitlatch A, Mohammadi L, Guo H, Nadeau KC, Springer ML, Schick SF, Bhatnagar A, Wu JC.
Full Source: Journal of American College of Cardiology. 2019 Jun 4;73(21):2722-2737. doi: 10.1016/j.jacc.2019.03.476.

Reduction of exposure to plasticisers in stored red blood cell units

2019-08-05
Plastic can be toxic and hazardous to an organism's health, but it is being widely used in our daily lives. Di-2-ethylhexyl-phthalate is the most common plasticiser in medical devices made of polyvinylchloride and is commonly found in soft bags storing red blood cell units. Di-2-ethylhexyl-phthalate and its degradation product mono-2-ethylhexyl-phthalate can migrate into human body fluids, for example, blood and tissues. The aim of the study was to assess the concentration of plasticisers in red blood cell units according to storage time and after mechanical rinsing using a cell salvage device. Levels of di-2-ethylhexyl-phthalate and mono-2-ethylhexyl-phthalate were analysed in 50 unwashed red blood cell units using liquid chromatography coupled with tandem mass spectrometry. In addition, phthalate concentrations were measured before and after mechanical rinsing in six more washed red blood cell units with storage times ranging between 36 and 56 days. A linear regression model was determined by the daily increase of di-2-ethylhexyl-phthalate and mono-2-ethylhexyl-phthalate in the stored red blood cell units subject to their storage time (range = 4-38 days), and the effect of mechanical rinsing on their phthalate concentration was calculated. A linear correlation was found between storage time of unwashed red blood cell units and the concentration of di-2-ethylhexyl-phthalate ($p < 0.001$) or mono-2-ethylhexyl-phthalate ($p < 0.001$). Stored red blood cell units older than 14 days had significantly higher concentrations of both contaminants than red blood cell units of shorter storage time ($p < 0.001$). Mechanical rinsing in washed red blood cell units attained a reduction in the di-2-ethylhexyl-phthalate and mono-2-ethylhexyl-phthalate concentration by a median of 53% (range = 18-68%; $p = 0.031$) and 87% (range = 68-96%; $p = 0.031$), respectively. Leaching of di-2-ethylhexyl-phthalate and mono-2-ethylhexyl-phthalate into red blood cell units depends on the duration of storage time. Plasticisers can be significantly reduced by mechanical

The aim of the study was to assess the concentration of plasticisers in red blood cell units according to storage time and after mechanical rinsing using a cell salvage device

rinsing using cell salvage devices, and thus, red blood cell units can be regenerated with respect to chemical contamination.
Authors: Münch F, Göen T, Zimmermann R, Adler W, Purbojo A, Höllerer C, Cesnjevar RA, Rüffer A.
Full Source: Perfusion. 2019 May 31:267659119851403. doi: 10.1177/0267659119851403. [Epub ahead of print]

Exposure to environmental toxicants reduces global N6-methyladenosine RNA methylation and alters expression of RNA methylation modulator genes

2019-08-05
The epitranscriptome comprises more than 100 forms of RNA modifications. Of these, N6-methyladenosine (m6A) is the most abundant form of RNA methylation, with roles in modulating mRNA transcript processing and regulation. The aims of the study were to examine changes inm6A RNA methylation in A549 lung epithelial cells in response to environmental toxicants, and differential gene expression of m6A modulator genes ('readers', 'writers' and 'erasers') in human subjects exposed to particulate matter (PM) and in lung cancer tissue using publicly-available microarray datasets. Global m6A methylation levels were measured in total RNA after exposure to two carcinogens (PM and sodium arsenite) for 24- and 48-h, and to two endocrine disruptors (bisphenol A and vinclozolin)for 24-h.Global m6A methylation level significantly decreased with exposure to >62 μg/mlPM, >1 μM sodium arsenite, >1 μM bisphenol A (BPA), and0.1 μM vinclozolin. In an analysis of a published dataset derived from a population study, the authors observed that m6A writers (METTL3 and WTAP), erasers (FTO and ALKBH5) and readers (HNRPC) showed significantly higher expression among participants in the high-PM2.5 exposure group compared to those in the low-exposure control group (all $p < 0.05$). Further, the m6A writer METTL3shows reduced expression in lung tumours in comparison to normal lung epithelia ($p < 0.0001$). Our findings reveal that m6A RNA methylation can be modified by exposure to environmental toxicants, and exposure to particulate matter is associated with differential expression level of m6A RNA methylation modification machinery.
Authors: Cayir A, Barrow TM, Guo L, Byun HM.
Full Source: Environmental Research. 2019 Aug; 175:228-234. doi: 10.1016/j.envres.2019.05.011. Epub 2019 May 14.

The aims of the study were to examine changes inm6A RNA methylation in A549 lung epithelial cells in response to environmental toxicants, and differential gene expression of m6A modulator genes in human subjects exposed to particulate matter (PM) and in lung cancer tissue using publicly-available microarray datasets.

Technical

Reviewing the effects of thiazide and thiazide-like diuretics as photosensitising drugs on the risk of skin cancer

2019-08-05

Thiazide diuretics and particularly hydrochlorothiazide were recently linked to an increased risk of skin cancer, which was attributed to the photosensitising properties of these drugs. Given the widespread use of thiazide diuretics, a potential skin cancer promoting effect would impose an important public health concern. In this study, the reviewed the association between use of thiazide and thiazide-like diuretics and risk of skin cancer. The chemical structures and photosensitising potential of selected thiazide and thiazide-like diuretics were evaluated. Moreover, the authors searched PubMed up to December 2018 for observational studies assessing the association between use of thiazide or thiazide-like diuretics and risk of skin cancer. Study quality was assessed for major methodological biases. Commonly used thiazide and thiazide-like diuretics carry resonating structural components, such as sulfonamide groups that contribute to their photosensitising activity. Overall, 13 observational (9 case-control, 4 cohort) studies assessed the association between use of different thiazide or thiazide-like diuretics and risk of several skin cancer types. Of those, nine studies showed positive associations ranging from 3% increased risk for bendroflumethiazide and basal cell carcinoma to 311% increased risk for thiazide diuretics and squamous cell carcinoma. All studies had important design-related methodological limitations including potential confounding by indication, detection bias, and time-window bias. Commonly used thiazide and thiazide-like diuretics have photosensitising potential, and some observational studies with important methodological limitations have linked their use to an increased risk of skin cancer. The authors concluded that well-designed observational studies are needed to provide more solid evidence on this possible association.

In this study, the reviewed the association between use of thiazide and thiazide-like diuretics and risk of skin cancer.

Authors: Kreutz R, Algharably EAH, Douros A.

Full Source: Journal of Hypertension. 2019 Jun 5. doi: 10.1097/HJH.0000000000002136. [Epub ahead of print]

OCCUPATIONAL RESEARCH

Nuclear medicine: workplace monitoring and internal occupational exposure during a ventilation/perfusion single-photon emission tomography

2019-08-05

The administration of 99mTc-HDP to diagnose pulmonary thromboembolisms leads to the presence of 99mTc in the environment of a nuclear medicine department, which could pose a potential risk of internal contamination to medical staff. Therefore, air samples from the administration room, gamma camera room and corridor of such a department were taken for the purpose of performing a workplace monitoring program of the medical centre under study, with maximum activity values of 640 ± 30 kBq/m3, 1.5 ± 0.1 kBq/m3 and 54 ± 3 kBq/m3, respectively, being obtained. These results correspond to committed effective doses received by exposed employees, via inhalation, when one ventilation/perfusion single-photon emission tomography study was performed, of 0.7 µSv, 0.004 µSv and 0.2 µSv, respectively. As inhalation is the employees› main exposure pathway to radio-aerosols, the internal dose of the nuclear medicine department's medical staff was also evaluated via urine bioassay measurements. Nuclear medicine nurses showed the highest 99mTc activity in 24-h urine samples (2100 ± 130 Bq/day), resulting in a committed effective dose of 21 µSv for each diagnostic study performed. Even so, the performance of ventilation/perfusion diagnostic studies did not constitute a substantial radiological risk since the annual dose limit for exposed employees was not exceeded.

Authors: Martínez J, Baciu T, Artigues M, Danús M, Peñalver A, Aguilar C, Borrull F.

Full Source: Radiation and Environmental Biophysics. 2019 Aug;58(3):407-415. doi: 10.1007/s00411-019-00798-x. Epub 2019 May 28.

Exposure of Canadian electronic waste dismantlers to flame retardants

2019-08-05

Exposure of e-waste workers to eight halogenated and five organophosphate ester flame retardant chemicals (FRs) was studied at a Canadian e-waste dismantling facility. FR concentrations were measured in air and dust samples collected at a central location and at four work benches over five-24 hour periods spanning two weeks. The highest concentrations in air from workbenches were of BDE-209 (median

Exposure of e-waste workers to eight halogenated and five organophosphate ester flame retardant chemicals (FRs) was studied at a Canadian e-waste dismantling facility.

156 ng m-3), followed by Tris(2-chloroethyl) phosphate (TCEP, median 59 ng m-3). Dust concentrations at the workbenches were higher than those measured at the central location, consistent with the release of contaminated dust during dismantling. Dust concentrations from the workbenches were also dominated by BDE-209 (median 96,300 ng g-1), followed by Triphenyl phosphate (TPhP, median 47,000 ng g-1). Most FRs were in coarse particles 5.6-18 µm diameter and ~30% were in respirable particles (<~3 µm). Exposure estimates indicated that dust ingestion accounted for 63% of total FR exposure; inhalation and dermal absorption contributed 35 and 2%, respectively. Some air and dust concentrations as well as some estimated exposures in this formal facility in a high-income country exceeded those from informal e-waste facilities located in low- and middle-income countries. Although there is demonstrated toxicity of some FRs, FR exposure in the e-waste industry has received minimal attention and occupational limits do not exist for most FRs.

Authors: Nguyen LV, Diamond ML, Venier M, Stubbings WA, Romanak K, Bajard L, Melymuk L, Jantunen LM, Arrandale VH.

Full Source: Environment International. 2019 Aug; 129:95-104. doi: 10.1016/j.envint.2019.04.056. Epub 2019 May 21.

Non-invasive tools beyond lung function before and after specific inhalation challenges for diagnosing occupational asthma

2019-08-05

This study assessed the diagnostic accuracy of non-invasive tests before and after SIC for the diagnosis of occupational asthma.

Increases of fractional exhaled nitric oxide (FeNO), sputum eosinophils, and methacholine responsiveness have been described after specific inhalation challenges (SIC) with occupational allergens, but limited information is available about their comparative performance. It was the aim of the study to assess the diagnostic accuracy of these non-invasive tests before and after SIC for the diagnosis of occupational asthma (OA). A total of 122 subjects with work-related shortness of breath were included. The 'gold standard' was defined as airway obstruction (pulmonary responders) and/or an increase of FeNO of at least 13 ppb after SIC. The results were compared with those obtained using the pulmonary responder status alone as 'gold standard'. If the pulmonary responder status and/or an increase of FeNO was used as 'gold standard' for SIC, 28 out of 39 positives (72%), but also 20 out of 83 negatives (24%) showed an increase of sputum eosinophils and/or bronchial hyperresponsiveness after SIC. If the pulmonary responder status alone was used as 'gold standard', an increase of FeNO with a sensitivity of 0.57 and a specificity of 0.82 showed a higher accuracy than increases of sputum eosinophils

(0.52/0.75) or bronchial hyperresponsiveness (0.43/0.87). Individual case analyses suggest that a few cases of OA may be detected by increases of sputum eosinophils or bronchial hyperresponsiveness alone, but probably false-positive tests dominate. It is recommended to use both lung function and increase of FeNO as primary effect parameters of SIC. Changes of sputum eosinophils and bronchial hyperresponsiveness after SIC have a low additional diagnostic value, but may be useful in individual cases.
Authors: Engel J, van Kampen V, Gering V, Hagemeyer O, Brüning T, Raulf M, Merget R.
Full Source: International Archives in Occupational & Environmental Health. 2019 May 29. doi: 10.1007/s00420-019-01439-y. [Epub ahead of print]

Occupational exposure to polybrominated diphenyl ethers or decabromodiphenyl ethane during chemical manufacturing: Occurrence and health risk assessment

2019-08-05

Field investigations were conducted on a decabrominated diphenyl ether (BDE-209) manufacturing plant and a decabromodiphenyl ethane (DBDPE) manufacturing plant, and worker exposure to polybrominated diphenyl ethers (PBDEs) or DBDPE was assessed. Workshop air was collected and tested to measure levels of external exposure to corresponding chemicals via air inhalation. Paired human serum and urine samples taken from 202 workers were tested to assess levels of internal BFR exposure. Levels of BDE-209 in air for the BDE-209 plant ranged from 10.6 to 295 μg m-3, accounting for at least 99% of the total PBDEs in the workshop air, and those of DBDPE in air samples from the DBDPE plant ranged from 12.7 to 435 μg m-3. Maximum estimated daily intakes (EDIs) of BDE-209 and DBDPE accumulated via air inhalation exceeded the corresponding RfD level recommended by the U.S. Environmental Protection Agency, indicating that for some workers, occupational exposure is likely to create significant health problems. The levels of BDE-209 measured in serum taken from BDE-209 workers ranged from 0.202 to 57.1 μg g-1 lw, and those of DBDPE in serum taken from DBDPE workers ranged from 0.087 to 54.4 μg g-1 lw. These values are several orders of magnitude higher than those detected in general areas and e-waste recycling sites. BDE-209 and DBDPE were detected in all of the urine samples with median levels of 1.12 and 8.6 ng mL-1, respectively, and levels of BDE-209 and DBDPE in the

Field investigations were conducted on a decabrominated diphenyl ether (BDE-209) manufacturing plant and a decabromodiphenyl ethane (DBDPE) manufacturing plant, and worker exposure to polybrominated diphenyl ethers (PBDEs) or DBDPE was assessed.

urine were significantly and positively correlated with those observed in the serum.
Authors: Wang D, Chen T, Fu Z, Yang L, Li R, Sui S, Wang Y, Shi Z.
Full Source: Chemosphere. 2019 Sep; 231:385-392. doi: 10.1016/j.chemosphere.2019.05.165. Epub 2019 May 21.

Occupational Risk of Severe Fever With Thrombocytopenia Syndrome in Healthcare Workers

2019-08-05
The authors identified a healthcare-associated infection of severe fever with thrombocytopenia syndrome (SFTS) virus (SFTSV), transmitted through direct blood contact with an index case. Following further epidemiological and clinical investigations, SFTSV seropositivity in 2 healthcare workers and 2 family members, who were positive for anti-SFTSV immunoglobin G were identified. It is important to prevent SFTSV transmission by early diagnosis of SFTS and universal precautions.
Authors: Yoo JR, Choi JH, Kim YR, Lee KH, Heo ST
Full Source: Open Forum of Infectious Diseases. 2019 May 6;6(5): ofz210. doi: 10.1093/ofid/ofz210. eCollection 2019 May.

PUBLIC HEALTH RESEARCH

Secondary product creation potential (SPCP): a metric for assessing the potential impact of indoor air pollution on human health

2019-08-05
Indoor air is subject to emissions of chemicals from numerous sources. Many of these emissions contain volatile organic compounds (VOCs), which react to form a wide range of secondary products, some with adverse health effects. However, at present we lack a robust, standardised approach to rank the potential for different VOCs to cause harm, which prevents effective action to improve indoor air quality and reduce impacts on human health. This study uses a detailed chemical model to quantify the impact of 63 VOCs on indoor air quality. Then authors define a novel method for ranking the VOCs in terms of potentially harmful product formation through a new metric, the Secondary Product Creation Potential (SPCP). SPCPs were established for a range of ventilation rates, different proportions of transmitted outdoor light, as well as for varying outdoor concentrations of ozone and nitrogen oxides. The species having the largest SPCPs are the alkenes, terpenes and aromatic VOCs. trans-2-Butene

This study uses a detailed chemical model to quantify the impact of 63 VOCs on indoor air quality.

has the largest individual SPCP owing to the ratio of its rate coefficient for reaction with the hydroxy radical relative to ozone. Increasing the proportion of outdoor transmitted light increased most SPCPs markedly. This is because oxidant levels increased under these conditions and promoted more chemical processing, suggesting that there may be more harmful products closer to a window than further from the attenuated outdoor light. The SPCP is the first metric for assessing the impact of different VOCs on human health and will be an essential tool for guiding the composition of products commonly used indoors.

Authors: Carslaw N, Shaw D.

Full Source: Environmental Science & Process Impacts. 2019 May 29. doi: 10.1039/c9em00140a. [Epub ahead of print]

Dietary Predictors of Phthalate and Bisphenol Exposures in Pregnant Women

2019-08-05

Endocrine disrupting chemicals (EDCs) can disrupt foetal developmental processes during pregnancy, leading to long-term adverse outcomes in humans. A major source of exposure to EDCs, such as phthalates and bisphenols, is the food supply, primarily due to contamination from processing and packaging. Therefore, this review aimed to 1) review food-monitoring sources of phthalates and bisphenols, and 2) evaluate methodologies and provide future directions needed to establish EDC-limiting dietary recommendations in pregnancy. Using PubMed, 10 peer-reviewed studies were found on dietary predictors of EDC exposure in pregnancy, and all were selected for review. Use of plastic containers in pregnancy was associated with higher urinary phthalate metabolites, whereas canned food consumption was associated with higher urinary bisphenol A (BPA) concentrations. Foods and dietary patterns associated with healthier food choices (e.g., organic/grown/raised/caught foods, folic acid supplements, vegetarianism) were generally associated with lower urinary phthalate metabolite and BPA concentrations. Despite the many food-monitoring studies reporting high BPA and phthalate concentrations in various foods, the designs of most studies described here were not sufficiently robust to consistently detect associations of specific foods/food groups with phthalates and BPA. Given the limitations of currently available research, future studies should incorporate more valid questionnaires to accurately assess dietary EDC exposure, strive for concurrent diet and exposure assessment, and assess whether geographical and cultural differences modify associations of diet with gestational EDC exposures. Such progress will be critical for developing

dietary recommendations that ensure the safety and health of pregnant women.
Authors: Pacyga DC, Sathyanarayana S, Strakovsky RS.
Full Source: Advances in Nutrition. 2019 May 30. pii: nmz029. doi: 10.1093/advances/nmz029. [Epub ahead of print]

A link between environmental pollution and civilization disorders: a mini review

2019-08-05
Most civilisation disorders have a complex aetiology, involving factors such as genetics, lifestyle, and environmental pollution (EP) due to different chemicals. Among harmful chemicals, the major ones include particulate matter (PM), nitrogen oxides, polycyclic aromatic hydrocarbons (PAHs), heavy metals, pesticides, plasticisers, polychlorinated biphenyls (PCBs), dioxins, furans, some food additives, hormones, and antibiotics. In fact, potential pollutants are countless and most of them have never been evaluated in terms of their toxicity and health risks, especially that new chemicals emerge all the time due to interactions between the existing ones. It is almost impossible to determine the effects of these new compounds on health. Previous studies have revealed a broad spectrum of diseases related to pollution. EP has been associated with an increased incidence of some malignancies, an increased rate of all-cause mortality, development or exacerbation of cardiovascular diseases, recurrent infections, impairment of intellectual and psychomotor development in children, development of type 2 diabetes, respiratory and immune system diseases, and also brain degenerative disorders. EP is an important cause of morbidity and mortality worldwide, generating high health care costs. Global pollution questions the common recommendation to eat vegetables, fruit, and fish regularly as part of a healthy diet, if they do not have ecological certification. Research in the fields of ecology, biology, and toxicology is needed to determine which environmental contaminants are the most hazardous to wildlife and humans and at what levels. Only an interdisciplinary cooperation and measures to raise public awareness could help improve environmental protection.

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Author: Konduracka E.
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Metabolomics Profiling before, during, and after the Beijing Olympics: A Panel Study of Within-Individual Differences during Periods of High and Low Air Pollution

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The metabolome is a collection of exogenous chemicals and metabolites from cellular processes that may reflect the body's response to environmental exposures. Studies of air pollution and metabolomics are limited. In this study, the authors explored changes in the human metabolome before, during, and after the 2008 Beijing Olympics Games, when air pollution was high, low, and high, respectively. Serum samples were collected before, during, and after the Olympics from 26 participants in an existing panel study. Gas and ultra-high-performance liquid chromatography/mass spectrometry were used in metabolomics analysis. Repeated measures ANOVA, network analysis, and enrichment analysis methods were employed to identify metabolites and classes associated with air pollution changes. A total of 886 molecules were measured in our metabolomics analysis. Network partitioning identified four modules with 65 known metabolites that significantly changed across the three time points. All known molecules in the first module were lipids (e.g., eicosapentaenoic acid, stearic acid). The second module consisted primarily of dipeptides e.g., isoleucylglycine) plus 8 metabolites from four other classes (e.g., hypoxanthine, 12-hydroxyeicosatetraenoic acid). Most of the metabolites in Modules 3 (19 of 23) and 4 (5 of 5) were unknown. Enrichment analysis of module-identified metabolites indicted significantly overrepresented pathways, including long- and medium-chain fatty acids, polyunsaturated fatty acids (n3 and n6), eicosanoids, lysolipid, dipeptides, fatty acid metabolism, and purine metabolism [(hypo) xanthine/inosine-containing pathways]. The authors identified two major metabolic signatures: one consisting of lipids, and a second that included dipeptides, polyunsaturated fatty acids, taurine, and xanthine. Metabolites in both groups decreased during the 2008 Beijing Olympics, when air pollution was low, and increased after the Olympics, when air pollution returned to normal (high) levels.

Authors: Mu L, Niu Z, Blair RH, Yu H, Browne RW, Bonner MR, Fanter T, Deng F, Swanson M.

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Mothers and children are related, even in exposure to chemicals present in common consumer products

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Phthalates, bisphenol A (BPA) and triclosan (TCS) are detectable in the vast majority of people. Most humans are continuously exposed to these chemicals due to their presence in food or in everyday consumer products. The measurement of these compounds in family members may help to explore the impact of major lifestyle factors on exposure. Mothers and (young) children are especially interesting to study, as they mostly share considerable parts of daily life together. Phthalate metabolites, bisphenol A (BPA) and triclosan (TCS) were measured in first morning void urine, collected in mother-child pairs (n = 129) on the same day. The mothers (27-45y) and their children (6-11y) were recruited in the Brussels agglomeration and rural areas of Belgium in the context of the European COPHES-DEMOCOPHES human biomonitoring project. Face-to-face questionnaires gathered information on major exposure sources and lifestyle factors. Exposure determinants were assessed by multiple linear regression analysis. The investigated compounds were detectable in nearly all mothers (92.8-100%) and all children (95.2-100%). The range (P90 vs. P10) of differences in urinary concentrations within each age group was for most compounds around 10-20 fold, and was very high for TCS up to 35 and 350-fold in children and mothers respectively. Some participants exceeded the tolerable daily intake guidelines as far as they were available from the European Food Safety Authority (EFSA). Overall, for BPA, the urinary concentrations were similar among both age groups. Most urinary phthalate metabolites were higher in children compared to the mothers, except for monoethyl phthalate (MEP). TCS levels were generally higher in the mothers. Despite the difference in mothers' and children's urinary concentrations, the creatinine-corrected levels were correlated for all biomarkers (Spearman rank $r = 0.32$ to 0.66, $p < 0.001$). Furthermore, for phthalates, similar home and lifestyle factors were associated with the urinary concentrations in both age groups: home renovation during last two years or redecoration during the last year for di-ethyl phthalate (DEP); PVC in home for di-n-butyl phthalate (DnBP), di-iso-butyl phthalate (DiBP) and butyl benzyl phthalate (BBzP), and personal care products use for DiBP and DnBP. Based on questionnaire information on general food type consumption patterns, the exposure variability could not be explained. However, comparing the phthalate intake from the current study with earlier assessed Belgian food intake calculations for both ages, food in general was estimated to be the major intake source for di-ethyl hexyl phthalate (DEHP), with diminishing importance for BBzP, DiBP and DnBP.

Technical

The authors concluded that the results confirm, that children and their mothers, sharing diets and home environments, also share exposure in common consumer products related chemicals. By collecting morning urine levels on the same day, and using basic questionnaires, suspected exposure routes could be unravelled.

Authors: Koppen G, Govarts E, Vanermen G, Voorspoels S, Govindan M, Dewolf MC, Den Hond E, Biot P, Casteleyn L, Kolossa-Gehring M, Schwedler G, Angerer J, Koch HM, Schindler BK, Castaño A, López ME, Sepai O, Exley K, Bloemen L, Knudsen LE, Joas R, Joas A, Schoeters G, Covaci A.

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