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ENVIRONMENTAL RESEARCH

Kinetic analysis and degradation mechanism for natural attenuation of xylenes under simulated marine conditions

2019-01-29

Microcosm experiments were conducted to examine the attenuation of selected chemicals, i.e. m-xylene (MX), o-xylene (OX) and p-xylene (PX), under simulated marine conditions. Natural attenuation and the contribution of oxidation, photodegradation, biodegradation and volatilisation to total attenuation were evaluated. The development of attenuation was in agreement with pseudo-first-order kinetics for all xylenes. The half-lives of MX, OX, and PX under optimal conditions were 0.76, 0.74 and 0.88 days, respectively. Attenuation kinetics were proposed to analyse the natural attenuation of xylenes. The leading attenuation type of MX, OX, and PX was volatilisation, and the attenuation rate constants (KV) were 0.5587, 0.6733, and 0.4821 d⁻¹, respectively. Biodegradation of OX (K_b: 0.0003 d⁻¹) was extremely inhibited. The attenuation kinetics presented the attenuation of xylenes in microcosm. The reaction kinetics could be applied to analyse the natural attenuation of chemicals. MX and OX can be converted to one another under certain conditions. Toluene and ethylbenzene were detected for OX in the OP (oxidation and photodegradation) experiment under simulated marine conditions. 4-Methylbenzyl alcohol, p-methyl benzaldehyde and p-toluic acid, as the major intermediates, were identified during the natural attenuation of PX using GC/MS.

Authors: Duan W, Meng F, Peng X, Lin Y, Wang G, Wu J.

Full Source: Ecotoxicology & Environmental Safety. 2018 Nov 5; 168:443-449. doi: 10.1016/j.ecoenv.2018.10.103. [Epub ahead of print]

Changes in responsiveness to allatostatin treatment accompany shifts in stress reactivity in young worker honey bees

2019-01-29

Exposing honey bees to isopentylacetate (IPA) can cause stress-related changes in learning performance. In bees of foraging age, IPA's effects on learning are mimicked by C-type allatostatins (AstCC, AstCCC) injected into the brain. In the present study, the authors ask whether allatostatins induce a similar response in young (6-day-old) bees and if so, whether their effects on learning performance are modulated by queen mandibular pheromone (QMP). It was found that young bees exposed

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to IPA responded less to the conditioned stimulus during training than controls (Type 1-like stress response). AstCC treatment induced a similar response, but only in bees maintained without QMP. Bees exposed to QMP responded to AstCC with increased odour responsiveness and odour generalisation in the 1-h memory test (Type 2-like response). Type 2-like responses could be induced also by the A-type allatostatin, AstA. However, in bees exposed to QMP, AstA-induced odour generalisation was absent. Effects of AstCCC treatment in young bees were weak, indicating that responsiveness to this peptide changes with age. The authors concluded that the findings are consistent with the hypothesis that honey bee allatostatins play a role in stress reactivity, but suggest in addition that allatostatin signalling is age dependent and susceptible to modulation by pheromone released by the queen bee.

Authors: Urlacher E, Devaud JM, Mercer AR.

Full Source: *Journal of comparative physiology. A, Neuroethology, sensory, neural, and behavioral physiology* 2018 Nov 7. doi: 10.1007/s00359-018-1302-0. [Epub ahead of print]

Marine vegetation analysis for the determination of volatile methylsiloxanes in coastal areas

2019-01-29

Volatile methylsiloxanes (VMSs) are massively produced chemicals that comprise a wide range of industrial and household applications. The presence of cyclic and linear VMSs in several environmental matrices and ecosystems indicates persistence associated with a potential of (bio) accumulation and food web transfer with possible toxicological effects. Due to the high anthropogenic pressure in its vicinities particularly in summer, coastal areas in Southern European countries are potential hotspots for the presence of VMSs. The massive afflux of tourists and consequent increase of the use of personal care products (PCPs) with VMSs in their formulations highlight the importance of VMSs assessment in such areas. In this study, different species of marine vegetation (algae and seaweed) were collected in three different geographical areas, covering the Atlantic Ocean (North coast of Portugal), as well as the Mediterranean Sea (coasts of the Region of Murcia, Spain and of the city of Marseille, France). Samples were analysed for the determination of 4 cyclic (D3, D4, D5, D6) and 3 linear (L3, L4, L5) VMSs employing a QuEChERS extraction methodology, followed by gas chromatography/mass spectrometry (GC/MS) quantification. VMSs were detected in 92% of the 74 samples analysed, with the sum of the concentrations per sample ranging from below the limit of detection (LOD) to 458 ± 26 ng·g⁻¹dw (dry weight). A

In this study, different species of marine vegetation were collected in three different geographical areas, covering the Atlantic Ocean and Mediterranean Sea and analysed for the determination of 4 cyclic and 3 linear volatile methylsiloxanes.

strong predominance of cyclic VMSs over linear ones was verified in almost all samples studied, with D5 and D6 found at higher concentrations. Seasonal variation was also assessed and despite higher levels of VMSs being identified mostly in summer months, clear seasonal trends were not perceived. It was also noted that generally the higher incidence of VMSs occurred in samples from urban and industrialised areas or in the vicinities of WWTPs, suggesting a direct input from these sources in the levels of siloxanes observed.

Authors: Rocha F, Homem V, Castro-Jiménez J, Ratola N.

Full Source: Science of the Total Environment. 2018 Oct 2;650(Pt 2):2364-2373. doi: 10.1016/j.scitotenv.2018.10.012. [Epub ahead of print]

Grand Challenges in Assessing the Adverse Effects of Contaminants of Emerging Concern on Aquatic Food Webs.

2019-01-29

Much progress has been made in the past decades to understand the sources, transport, fate and biological effects of contaminants of emerging concern (CECs) in aquatic ecosystems. Despite these advancements, significant obstacles remain to comprehensively assess the environmental risks associated with the presence of CECs. Many of these obstacles centre around the extrapolation of effects of single chemicals observed in the laboratory or effects observed in individual organisms or species in the field to impacts of multiple stressors on aquatic food webs. In the current review, the authors identified five challenges that need to be addressed to advance studies of CECs from singular exposure events to multi-species aquatic food web interactions: (i) more detailed information on the complexity of mixtures of CECs in the aquatic environment; (ii) understanding sub-lethal effects of CECs on a wide range of aquatic organisms; (iii) ascertaining the biological consequences of variable duration CEC exposures within and across generations in aquatic species; (iv) linkage of multiple stressors with CEC exposure in aquatic systems; and (v) documenting the trophic consequences of CEC exposure across aquatic food webs. The authors review the current literature to demonstrate how these challenges can be addressed to fill knowledge gaps.

Authors: Nilsen E, Smalling KL, Ahrens L, Gros M, Miglioranza KSB, Pico Y, Schoenfuss HL.

Full Source: Environmental Toxicology & Chemistry. 2018 Oct 8. doi: 10.1002/etc.4290. [Epub ahead of print]

In the current review, the authors identified five challenges that need to be addressed to advance studies of contaminants of emerging concern from singular exposure events to multi-species aquatic food web interactions

Analytical and bioanalytical assessments of organic micropollutants in the Bosna River using a combination of passive sampling, bioassays and multi-residue analysis

2019-01-29

Complex mixtures of contaminants from multiple sources, including agriculture, industry or wastewater enter aquatic environments and might pose hazards or risks to humans or wildlife. Targeted analyses of a few priority substances provide limited information about water quality. In this study, a combined chemical and effect screening of water quality in the River Bosna, in Bosnia and Herzegovina was carried out, with focus on occurrence and effects of contaminants of emerging concern. Chemicals in water were sampled at 10 sites along the Bosna River by use of passive sampling. The combination of semipermeable membrane devices (SPMDs) and polar organic chemical integrative samplers (POCIS) enabled sampling of a broad range of contaminants from hydrophobic (PAHs, PCBs, OCPs) to hydrophilic compounds (pesticides, pharmaceuticals and hormones), which were determined by use of GC-MS and LC-MS (MS). In vitro, cell-based bioassays were applied to assess (anti)androgenic, estrogenic and dioxin-like potencies of extracts of the samplers. Of a total of 168 targeted compounds, 107 were detected at least once. Cumulative pollutant concentrations decreased downstream from the city of Sarajevo, which was identified as the major source of organic pollutants in the area. Responses in all bioassays were observed for samples from all sites. In general, oestrogenicity could be well explained by analysis of target oestrogens, while the drivers of the other observed effects remained largely unknown. Profiling of hazard quotients identified two sites downstream of Sarajevo as hotspots of biological potency. Risk assessment of detected compounds revealed, that 7 compounds (diazinon, diclofenac, 17β -oestradiol, oestrone, benzo[k]fluoranthene, fluoranthene and benzo[k]fluoranthene) might pose risks to aquatic biota in the Bosna River. The study brings unique results of a complex water quality assessment in a region with an insufficient water treatment infrastructure.

Authors: Toušová Z, Vrana B, Smutná M, Novák J, Klučárová V, Grabic R, Slobodník J, Giesy JP, Hilscherová K.

Full Source: Science of the Total Environment. 2019 Feb 10;650(Pt 1):1599-1612. doi: 10.1016/j.scitotenv.2018.08.336. Epub 2018 Aug 27.

In this study, a combined chemical and effect screening of water quality in the River Bosna, in Bosnia and Herzegovina was carried out, with focus on occurrence and effects of contaminants of emerging concern.

MEDICAL RESEARCH

Impact of chronic lead exposure on liver and kidney function and hematologic parameters

2019-01-29

Lead, one of the most widely used metals because of its beneficial physical properties, has been reported to adversely influence several different organs and organ systems. The aim of the present study was to examine the effect of lead exposure on liver and renal function and haematologic parameters.

This was a case-cohort study comparing adults with occupational, environmental or opium-related lead exposure with blood lead levels [BLL] >10µg/dl (High blood lead level (HBLL) group and age- and gender-matched normal healthy subjects (Low blood lead level [LBLL] group with BLL<10µg/dl). The complete blood count and concentrations of serum creatinine, urea, aspartate aminotransferase (AST), alanine aminotransferase (ALT) were recorded for subsequent investigation. The mean BLL was significantly higher in the HBLL than the LBLL groups (51.36±44.72 vs. 4.17±1.97 µg/dl). The Spearman's rho revealed a significant association between BLL and urea (r=0.25, p<0.001), creatinine (r=0.16, p=0.02), AST (r=0.42, p<0.001) and ALT (r=0.27, p<0.001). The median [IQR] serum urea (34 mg/dl [27-221]) vs (30 [27-36]), creatinine (0.9 mg/dl [0.8-1]) vs (0.8 [0.7-0.9]), ALT (25 mg/dl [16-49]) vs (22 [16-30]) and AST concentrations (29 mg/dl [20-42]) vs (20 [18-24]), were all significantly higher (p<0.05) in the HBLL group compared to the LBLL group. The median [IQR] haemoglobin (12.6 g/dl [10.4-15.4]) vs (15.2 [14.6-16.3]) and haematocrit (36.9% [31-44.8]) vs (45.6 [43.6-48.2]) were both significantly lower (p<0.001) in the HBLL group than the LBLL group. The results indicated that people with chronic lead exposure with BLLs greater than 10 µg/dl are at risk of renal, liver and haematologic impairments.

Authors: Nakhaee S, Amirabadizadeh A, Brent J, Mehrpour O.

Full Source: Basic & Clinical Pharmacology & Toxicology. 2018 Nov 24. doi: 10.1111/bcpt.13179. [Epub ahead of print]

The aim of the present study was to examine the effect of lead exposure on liver and renal function and haematologic parameters

Organic Transistor-Based Chemical Sensors for Wearable Bioelectronics

2019-01-29

Bioelectronics for healthcare that monitor the health information on users in real time have stepped into the limelight as crucial electronic devices for the future due to the increased demand for "point-of-care"

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testing, which is defined as medical diagnostic testing at the time and place of patient care. In contrast to traditional diagnostic testing, which is generally conducted at medical institutions with diagnostic instruments and requires a long time for specimen analysis, point-of-care testing can be accomplished personally at the bedside, and health information on users can be monitored in real time. Advances in materials science and device technology have enabled next-generation electronics, including flexible, stretchable, and biocompatible electronic devices, bringing the commercialisation of personalised healthcare devices increasingly within reach, e.g., wearable bioelectronics attached to the body that monitor the health information on users in real time. Additionally, the monitoring of harmful factors in the environment surrounding the user, such as air pollutants, chemicals, and ultraviolet light, is also important for health maintenance because such factors can have short- and long-term detrimental effects on the human body. The precise detection of chemical species from both the human body and the surrounding environment is crucial for personal health care because of the abundant information that such factors can provide when determining a person's health condition. In this respect, sensor applications based on an organic-transistor platform has various advantages, including signal amplification, molecular design capability, low cost, and mechanical robustness (e.g., flexibility and stretchability). This Account covers recent progress in organic transistor-based chemical sensors that detect various chemical species in the human body or the surrounding environment, which will be the core elements of wearable electronic devices. There has been considerable effort to develop high-performance chemical sensors based on organic-transistor platforms through material design and device engineering. Various experimental approaches have been adopted to develop chemical sensors with high sensitivity, selectivity, and stability, including the synthesis of new materials, structural engineering, surface functionalisation, and device engineering. In this Account, we first provide a brief introduction to the operating principles of transistor-based chemical sensors. Then we summarise the progress in the fabrication of transistor-based chemical sensors that detect chemical species from the human body (e.g., molecules in sweat, saliva, urine, tears, etc.). The authors then highlight examples of chemical sensors for detecting harmful chemicals in the environment surrounding the user (e.g., nitrogen oxides, sulfur dioxide, volatile organic compounds, liquid-phase organic solvents, and heavy metal ions). Finally, this Account was concluded with a perspective on

the wearable bioelectronics, especially focusing on organic electronic materials and devices.

Authors: Lee MY, Lee HR, Park CH, Han SG, Oh JH.

Full Source: Accounts of Chemical Research. 2018 Nov 7. doi: 10.1021/acs.accounts.8b00465. [Epub ahead of print]

Targeted and Untargeted Detection of DNA Adducts of Aromatic Amine Carcinogens in Human Bladder by Ultra Performance Liquid Chromatography-High Resolution Mass Spectrometry

2019-01-29

Epidemiological studies have linked aromatic amines (AAs) from tobacco smoke and some occupational exposures with bladder cancer risk. Several epidemiological studies have also reported a plausible role for structurally related heterocyclic aromatic amines present in tobacco smoke or formed in cooked meats with bladder cancer risk. DNA adduct formation is an initial biochemical event in bladder carcinogenesis. In the present study, the authors examined paired fresh-frozen (FR) and formalin-fixed paraffin-embedded (FFPE) non-tumour bladder tissues from 41 bladder cancer patients for DNA adducts of 4-aminobiphenyl (4-ABP), a bladder carcinogen present in tobacco smoke, and 2-amino-9H-pyrido[2,3-b]indole, 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine, and 2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline, possible human carcinogens, which occur in tobacco smoke and cooked meats. These chemicals are present in urine of tobacco smokers or omnivores. Targeted DNA adduct measurements were done by ultra-performance liquid chromatography-electrospray ionization multi-stage hybrid Orbitrap MS. N-(2'-Deoxyguanosin-8-yl)-4-ABP (N-(dG-C8)-4-ABP) was the sole adduct detected in FR and FFPE bladder tissues. Twelve subjects (29%) had N-(dG-C8)-4-ABP levels above the limit of quantification, ranging from 1.4 to 33.8 adducts per 109 nucleotides (nt). DNA adducts of other human AA bladder carcinogens, including 2-naphthylamine (2-NA), 2-methylaniline (2-MA), 2,6-dimethylaniline (2,6-DMA), and lipid peroxidation (LPO) adducts were screened for in bladder tissue, by our untargeted data-independent adductomics method, termed wide-selected ion monitoring (wide-SIM)/MS2. Wide-SIM/MS2 successfully detected N-(dG-C8)-4-ABP, N-(2'-deoxyadenosine-8-yl)-4-ABP and the presumed hydrazo linked adduct, N-(2'-deoxyguanosin-N2-yl)-4-ABP, and several LPO adducts in bladder DNA. Wide-SIM/MS2 detected multiple DNA adducts of 2-NA, 2-MA and, 2,6-DMA, when calf thymus DNA was modified with reactive intermediates of these carcinogens. However, these AA-adducts were below the limit

In the present study, the authors examined paired fresh-frozen (FR) and formalin-fixed paraffin-embedded (FFPE) non-tumour bladder tissues for DNA adducts, which occur in tobacco smoke and cooked meats.

of detection in unspiked human bladder DNA (< 1 adduct per 108 nt). Wide-SIM/MS2 can screen for many types of DNA adducts formed with exogenous and endogenous electrophiles and will be employed to identify DNA adducts of other chemicals that may contribute to the aetiology of bladder cancer.

Authors: Guo J, Villalta PW, Weight CJ, Bonala R, Johnson F, Rosenquist TA, Turesky RJ.

Full Source: Chemical Research in Toxicology. 2018 Nov 2. doi: 10.1021/acs.chemrestox.8b00268. [Epub ahead of print]

Concentrations of perfluoroalkyl substances and bisphenol A in newborn dried blood spots and the association with child behaviour

2019-01-29

Experimental studies suggest that prenatal exposure to endocrine disrupting chemicals interferes with developmental processes in the foetal brain. Yet, epidemiological evidence is inconclusive. In a birth cohort (2008-2010, upstate New York), the authors quantified concentrations of perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and bisphenol A (BPA) in stored newborn dried blood spots using liquid chromatography/tandem mass spectrometry. Mothers reported on children's behaviour using the Strengths and Difficulties Questionnaire at age 7 (650 singletons and 138 twins). Difficulties in total behaviour (i.e., emotional, conduct, hyperactivity, and peer problems) and prosocial behaviour were classified using validated cut-offs. Logistic regression with generalised estimating equations was used to estimate the odds of having difficulties per exposure category. In total, 111 children (12.1%) had total behavioural difficulties and 60 (6.5%) had difficulties in prosocial behaviour. The median (interquartile range) of PFOS, PFOA, and BPA were 1.74 ng/ml (1.33), 1.12 ng/ml (0.96), and 7.93 ng/ml (10.79), respectively. Higher PFOS levels were associated with increased odds of having behavioural difficulties (OR per SD of log PFOS = 1.30, 95%CI: 1.03-1.65). Associations were observed between PFOS in the highest relative to the lowest quartile and behavioural difficulties (OR for PFOS_{1.14-1.74} = 1.65, 95%CI: 0.84-3.34; PFOS_{1.75-2.47} = 1.73, 95%CI: 0.87-3.43; and PFOS_{>2.47} = 2.47, 95%CI: 1.29-4.72 compared to PFOS_{<1.41}). The associations between higher concentrations of PFOS and behavioural difficulties at age 7 years were driven by problems in conduct and emotional symptoms. Higher PFOA levels were associated with difficulties in prosocial behaviour (OR = 1.35, 95%CI: 1.03-1.75). There was an inverse association between BPA concentrations and difficulties in prosocial

In a birth cohort (2008-2010, upstate New York), the authors quantified concentrations of perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and bisphenol A (BPA) in stored newborn dried blood spots using liquid chromatography/tandem mass spectrometry.

behaviour but only in the 2nd and 4th quartiles. No interactions were found between sex and chemical concentrations. Increasing prenatal exposure to PFOS and PFOA, as reflected in neonatal concentrations, may pose risk for child behavioural difficulties.

Authors: Ghassabian A, Bell EM, Ma WL, Sundaram R, Kannan K, Buck Louis GM, Yeung E.

Full Source: Environmental Pollution. 2018 Sep 27;243(Pt B):1629-1636.

doi: 10.1016/j.envpol.2018.09.107. [Epub ahead of print]

Improved lung function and patient-reported outcomes with co-suspension delivery technology glycopyrrolate/formoterol fumarate metered dose inhaler in COPD: a randomised Phase III study conducted in Asia, Europe, and the USA.

2019-01-29

COPD is a major global cause of mortality and morbidity. PINNACLE-4 evaluated the efficacy and safety of GFF MDI (glycopyrrolate/formoterol fumarate metered dose inhaler) in patients from Asia, Europe, and the USA with moderate-to-very severe COPD. In this double-blind, placebo-controlled, Phase III study, patients were randomised to treatment with GFF MDI 18/9.6 µg, glycopyrrolate (GP) MDI 18 µg, formoterol fumarate (FF) MDI 9.6 µg, or placebo MDI (all twice daily) for 24 weeks. Lung function, patient-reported outcomes (symptoms and health-related quality of life), and safety were assessed. Of the 1,756 patients randomized, 1,740 patients were included in the intent-to-treat population (mean age 64.2 years, 74.1% male, and 40.2% Asian). GFF MDI significantly improved morning pre-dose trough FEV1 at Week 24 (primary endpoint) vs placebo MDI, GP MDI, and FF MDI (least squares mean differences: 165, 59, and 72 mL, respectively; all $P < 0.0001$). GFF MDI also significantly improved other lung function endpoints vs placebo MDI, GP MDI, and FF MDI and patient-reported outcomes vs placebo MDI and GP MDI. A larger proportion of patients treated with GFF MDI achieved the minimum clinically important difference in Transition Dyspnea Index score vs GP MDI and placebo MDI and in St George's Respiratory Questionnaire score vs placebo MDI. Adverse event rates were similar across treatment groups. The authors concluded that these results demonstrated the efficacy of GFF MDI in

PINNACLE-4 evaluated the efficacy and safety of GFF MDI (glycopyrrolate/formoterol fumarate metered dose inhaler) in patients from Asia, Europe, and the USA with moderate-to-very severe COPD.

patients with moderate-to-very severe COPD. GFF MDI was well tolerated, with a safety profile commensurate with long-acting bronchodilators.

Authors: Lipworth BJ, Collier DJ, Gon Y, Zhong N, Nishi K, Chen R, Arora S, Maes A, Siddiqui S, Reisner C, Martin UJ.

Full Source: International Journal of Chronic Obstructive Pulmonary Disease. 2018 Sep 26; 13:2969-2984. doi: 10.2147/COPD.S171835. eCollection 2018.

OCCUPATIONAL RESEARCH

Occupational manganese exposure, reproductive hormones, and semen quality in male workers: A cross-sectional study

2019-01-29

It has been found that exposure to manganese (Mn) could induce reproductive dysfunction, but its occupational risk in male workers is unclear. This study aims to assess the association of occupational Mn exposure with reproductive hormones and semen quality in a cross-sectional study. Urinary Mn, semen quality, and reproductive hormones were explored in 84 male workers occupationally exposed to Mn and 92 referents. Multiple linear regression analyses were used to assess the relationship. Urinary Mn levels in Mn-exposed workers ranged from 0.56 to 34.25 $\mu\text{g/L}$, and the average level was $15.92 \pm 8.49 \mu\text{g/L}$. Compared with the control group, gonadotropin-releasing hormone (GnRH) levels and luteinising hormone (LH) levels increased significantly and the levels of testosterone (TSTO) decreased significantly in the Mn-exposed group. There was a significant positive linear association between urinary Mn and GnRH and LH, while the linear association between urinary Mn and TSTO was negative. Sperm progressive motility and total motility decreased significantly in the Mn-exposed group. There was a significantly negative linear association between urinary Mn and sperm progressive motility and total motility. In conclusion, occupational Mn exposure was inversely associated with reproductive health of male workers, resulting in the abnormality of hormones secretion and decrease of sperm motility.

Authors: Yang H, Wang J, Yang X, Wu F, Qi Z, Xu B, Liu W, Deng Y.

Full Source: Toxicology & Industrial Health. 2018 Nov 22:748233718810109. doi: 10.1177/0748233718810109. [Epub ahead of print]

This study aims to assess the association of occupational Mn exposure with reproductive hormones and semen quality in a cross-sectional study.

The reproducibility of urinary ions in manganese exposed workers

2019-01-29

Manganese (Mn) is found in environmental and occupational settings, and can cause cognitive and motor impairment. Existing Mn exposure studies have not reached consensus on a valid and reproducible biomarker for Mn exposure. Previously, global metabolomics data was generated from urine collected in October 2014 using mass spectrometry (MS). Nine ions were found to be different between persons exposed and unexposed to Mn occupationally, though their identity was not able to be determined. In the present study, the authors investigated these nine ions in a follow-up set of urine samples taken from the same cohort in January 2015, and in urine samples from a separate Mn-exposed cohort from Wisconsin. An elastic net model was fitted using the nine ions found in the October 2014 data. The elastic net correctly predicted exposure status in 72% of the follow-up samples collected in January 2015, and the area under the curve of the receiver operating characteristic (ROC) curve was 0.8. In the Wisconsin samples, the elastic net performed no better than chance in predicting exposure, possibly due to differences in Mn exposure levels, or unmeasured occupational or environmental co-exposures. This study underscores the importance of taking repeat samples for replication studies when investigating the human urine metabolome, as both within- and between-person variances were observed. Validating and identifying promising results remains a challenge in harnessing global metabolomics for biomarker discovery in occupational cohorts.

Authors: Baker MG, Lin YS, Simpson CD, Shireman LM, Searles Nielsen S, Racette BA, Seixas N.

Full Source: Journal of Trace Elements & Medical Biology. 2019 Jan; 51:204-211. doi: 10.1016/j.jtemb.2018.11.001. Epub 2018 Nov 3.

The main objective of this study is to identify and analyse the links and transitional spaces between the risk management of occupational accidents and major accidents.

Risk Management of Hazardous Materials in Manufacturing Processes: Links and Transitional Spaces between Occupational Accidents and Major Accidents

2019-01-29

Manufacturing processes involving chemical agents are evolving at great speed. In this context, managing chemical risk is especially important towards preventing both occupational accidents and major accidents. Directive 89/391/EEC and Directive 2012/18/EU, respectively, are enforced in the European Union (EU) to this end. These directives may be further complemented by the recent ISO 45001:2018 standard regarding

occupational health and safety management systems. These three management systems are closely related. However, scientific literature tackles the researching of these accidents independently. Thus, the main objective of this study is to identify and analyse the links and transitional spaces between the risk management of both types of accident. Among the results obtained, three transitional spaces can be pointed out which result from the intersection of the three systems mentioned. Similarly, the intersection of these spaces gives shape to a specific transitional space defined by the individual directives linked to Directive 89/391/EEC. These results are limited from a regulatory and technical perspective. Thus, the results are a starting point towards developing models that integrate the management systems studied.

Authors: Brocal F, González C, Reniers G, Cozzani V, Sebastián MA.

Full Source: Materials (Basel). 2018 Oct 9; 11(10). pii: E1915. doi: 10.3390/ma11101915.

Risk of various types of cataracts in a cohort of Mayak workers following chronic occupational exposure to ionising radiation

2019-01-29

This study is the first to report cataract type specific risks in a cohort of Russian Mayak Production Association workers following chronic occupational exposure to ionising radiation. In this retrospective cohort study, 22,377 workers (females 25.4%) first employed in 1948-1982 were followed up till the end of 2008. All cataract subtypes were significantly dependent on sex, attained age, diabetes mellitus, myopia and glaucoma. For each of posterior subcapsular (PSC), cortical and nuclear cataracts, the risk of cataract incidence significantly linearly increased with increasing radiation dose. Excess relative risk per unit effective dose (ERR/Sv) from external γ -rays based on the linear model was 0.91 [95% confidence intervals (CIs) 0.67, 1.20] for PSC, 0.63 (95% CIs 0.49, 0.76) for cortical, and 0.47 (95% CIs 0.35, 0.60) for nuclear cataracts. For all three types of cataracts, exclusion of an adjustment for neutron dose as well as inclusion of additional adjustments for body mass index and smoking index decreased ERR/Sv of external γ -rays. Inclusion of an additional adjustment for glaucoma, however, modestly increased incidence risks for cortical and nuclear cataracts, but not PSC cataracts. Inclusion of an adjustment for diabetes mellitus decreased ERR/Sv of external γ -rays only for PSC incidence. Both males and females had increased risks for all three types of cataracts, but ERR/Sv was significantly higher in females than in males ($p < 0.001$), particularly for PSC cataracts. The results suggest that chronic

This study is the first to report cataract type specific risks in a cohort of Russian Mayak Production Association workers following chronic occupational exposure to ionising radiation.

occupational radiation exposure significantly increases risks of PSC, cortical and nuclear cataracts, and that such risks are higher in females than in males.

Authors: Azizova TV, Hamada N, Grigoryeva ES, Bragin EV.

Full Source: European Journal of Epidemiology. 2018 Oct 10. doi: 10.1007/s10654-018-0450-4. [Epub ahead of print]

Chronic Exposure to Solvents Among Construction Painters: Reductions in Exposure and Neurobehavioral Health Effects

2019-01-29

In the present study, the authors assessed the neurobehavioral effects of lifetime solvent exposure by comparing the performance of painters and demographically comparable controls. Performance of exposed painters (N=133) was compared to unexposed painters, glaziers, or carpenters (N=78) on the following domains: motor/perceptual speed, visual contrast, attention, working memory/planning, and visual and verbal memory. Lifetime exposure was estimated with questionnaires, field measurements, and paint composition. After controlling for confounders, lifetime solvent exposure did not predict reduction in performance for overall domains of function. Lifetime solvent exposures predicted subtle alterations for individual tests of verbal learning, motor coordination, and visuospatial accuracy. Concentrations of solvents in paints have steadily declined during the working lifetime of subjects in this study. Although reduced performance was observed on individual tests, these alterations were not consistent across tests and unlikely to be of clinical significance.

Authors: Fiedler N, Weisel C, Nwankwo C, Kipen H, Lange G, Ohman-Strickland P, Laumbach R.

Full Source: Journal of Occupational & Environmental Medicine. 2018 Oct 10. doi: 10.1097/JOM.0000000000001470. [Epub ahead of print]

In the present study, the authors assessed the neurobehavioral effects of lifetime solvent exposure by comparing the performance of painters and demographically comparable controls.

PUBLIC HEALTH RESEARCH

Cement plant emissions and health effects in the general population: a systematic review

2019-01-29

Adverse health effects of cement plant exposure have been found in occupational contexts but are less defined for the general population living near plants. In the present study, the authors aimed to summarise the evidence on the health effects of people exposed to ambient air pollution by cement plants. A systematic review using Embase, PubMed

and Web of Science was performed. We included only non-occupational studies with a comparison group that focused on adverse health outcomes and biomarkers of internal dose or subclinical effect associated with cement plant exposure. Selection of articles was performed by two authors independently. Of 1491 articles identified by the initial search, 24 were included: 17 of them were included in the analysis of adverse health outcomes and 9 in the analysis of biomarkers of internal dose or subclinical effects. The studies were very heterogeneous in study design, measure of cement plant exposure, outcome detection, measure of association and adjustment for confounding. Almost all the studies found positive associations between cement plant exposure and respiratory diseases and symptoms. An excess risk of cancer incidence and mortality in both children and adults mainly concerning respiratory tract cancers was also reported in some studies. Higher values of heavy metals and of a biomarker of renal toxicity were found in the exposed compared to unexposed populations. In conclusion, there is some evidence for a possible role of cement plant exposure on health adverse effects, although many studies had serious or critical risk of bias and overall level of certainty was low.

Authors: Raffetti E, Treccani M, Donato F.

Full Source: Chemosphere. 2018 Nov 15; 218:211-222. doi: 10.1016/j.chemosphere.2018.11.088. [Epub ahead of print]

Atopic dermatitis at preschool age and contact allergy in adolescence: a population-based cohort study.

2019-01-29

Atopic dermatitis (AD) is characterised by an impaired skin barrier that can allow enhanced penetration of allergens. It is not clear whether AD influences the risk of developing contact allergy. In this study, the authors examined the association between AD at preschool age and contact allergy at 16 years of age. At 16 years of age, 2215 adolescents from the population-based cohort BAMSE were included. These adolescents had been followed with repeated questionnaires regarding AD throughout childhood, and contact allergy was assessed by skin patch test at 16 years. AD at preschool age was associated with contact allergy to at least one of the tested substances at 16 years of age among boys (adjusted odds ratio [OR] 1.51, 95% confidence interval 1.03-2.20), but not among girls (adjusted OR 0.77, 95% CI 0.54-1.10). AD at preschool age was not associated with contact allergy to nickel in either boys or girls. In contrast, AD at preschool age was associated

In this study, the authors examined the association between AD at preschool age and contact allergy at 16 years of age.

with contact allergy to fragrance mix I (adjusted OR 3.10, 95% CI 1.66-5.80). This association was observed especially for AD at preschool age in combination with immunoglobulin E (IgE) sensitisation to airborne or food allergens (adjusted OR 3.80, 95% CI 1.67-8.61). The results suggest that AD in early childhood may be associated with contact allergy to fragrances, but not to nickel, in adolescence.

Authors: Lagrelus M, Wahlgren CF, Matura M, Bergström A, Kull I, Lidén C.
Full Source: British Journal of Dermatology. 2018 Nov 22. doi: 10.1111/bjd.17449. [Epub ahead of print]

Variability of urinary concentrations of non-persistent chemicals in pregnant women and school-aged children.

2019-01-29

Exposome studies are challenged by exposure misclassification for non-persistent chemicals, whose temporal variability contributes to bias in dose-response functions. In the present study, the authors evaluated the variability of urinary concentrations of 24 non-persistent chemicals: 10 phthalate metabolites, 7 phenols, 6 organophosphate (OP) pesticide metabolites, and cotinine, between weeks from different pregnancy trimesters in pregnant women, and between days and between seasons in children. 154 pregnant women and 152 children from six European countries were enrolled in 2014-2015. Pregnant women provided three urine samples over a day (morning, midday, and night), for one week in the 2nd and 3rd pregnancy trimesters. Children provided two urines a day (morning and night), over two one-week periods, six months apart. The authors pooled all samples for a given subject that were collected within a week. In children, four daily pools (combining morning and night voids) were made during the last four days of the first follow-up week. Pools were analysed for all 24 metabolites of interest. Intraclass-correlation coefficients (ICC) were calculated and estimated the number of pools needed to obtain an ICC above 0.80. All phthalate metabolites and phenols were detected in >90% of pools whereas certain OP pesticide metabolites and cotinine were detected in <43% of pools. Fair (ICC = 0.40-0.59) to good (0.60-0.74) between-day reliability of the pools of two samples in children for all chemicals were observed. Reliability was poor (<0.40) to fair between trimesters in pregnant women and between seasons in children. For most chemicals, three daily pools of two urines each (for weekly exposure windows) and four weekly pools of 15-20 urines each would be necessary to obtain an ICC above 0.80. This quantification of the variability of biomarker measurements of many non-persistent chemicals during several time windows shows that for many of

In the present study, the authors evaluated the variability of urinary concentrations of 24 non-persistent chemicals: 10 phthalate metabolites, 7 phenols, 6 organophosphate (OP) pesticide metabolites, and cotinine, between weeks from different pregnancy trimesters in pregnant women, and between days and between seasons in children.

these compounds a few dozen samples are required to accurately assess exposure over periods encompassing several trimesters or months.

Authors: Casas M, Basagaña X, Sakhi AK, Haug LS, Philippat C, Granum B, Manzano-Salgado CB, Brochot C, Zeman F, de Bont J, Andrusaityte S, Chatzi L, Donaire-Gonzalez D, Giorgis-Allemand L, Gonzalez JR, Gracia-Lavedan E, Grazuleviciene R, Kampouri M, Lyon-Caen S, Pañella P, Petravičienė I, Robinson O, Urquiza J, Vafeiadi M, Vernet C, Waiblinger D, Wright J, Thomsen C, Slama R, Vrijheid M.

Full Source: Environment International. 2018 Oct 6;121(Pt 1):561-573. doi: 10.1016/j.envint.2018.09.046. [Epub ahead of print]

Endocrine disruptor compounds in environment: As a danger for children health

2019-01-29

Endocrine disrupting compounds (EDCs) are heterogenous in structure and include synthetic organic compounds such as pharmaceutical agents, plant protection products, plastics, plasticisers, polychlorinated biphenyls, dioxins, flame-retardants, and antifoulant paint additive, as well, as natural plant-derived EDCs termed phytoestrogens and mycoestrogens. Children and adults are exposed daily to EDCs during drinking contaminated water, eating, breathing polluted air or direct contact with chemicals. Prenatal and perinatal period, infancy, childhood, and puberty are critical time of development during which maturing systems are particularly sensitive to hormonal disruptions (small elimination of xenobiotics). Exposure to environmental chemicals with oestrogenic or antiandrogenic action may disrupt female reproductive tract development, also testosterone synthesis and sexual differentiation, leading to adult testis dysfunction and infertility. What is important, today there is still no definitive risk assessment tool for EDCs.

Authors: Beszterda M, Frański R.

Full Source: Pediatric Endocrinology Diabetes and Metabolism. 2018;24(2):88-95. doi: 10.18544/PEDM-24.02.0107.

Relationship between buprenorphine adherence and relapse, health care utilisation and costs in privately and publicly insured patients with opioid use disorder

2019-01-29

Treatment for opioid use disorder is important because of the negative health, societal and economic consequences of illicit opioid use, but treatment adherence can be a challenge. This study assessed the

This study assessed the association between buprenorphine medication-assisted treatment (MAT) adherence and relapse, health care utilisation and costs.

Technical

CHEMWATCH

association between buprenorphine medication-assisted treatment (MAT) adherence and relapse, health care utilisation and costs. Patients with opioid use disorder who were newly initiating a buprenorphine MAT regimen were identified in the 2008-2014 MarketScan® Commercial and Medicaid Databases and followed for 12 months after their earliest outpatient pharmacy claim for buprenorphine. Adherence was categorised using proportion of days covered (PDC) with buprenorphine, and patients with $PDC \geq 0.80$ were classified as adherent. Descriptive and adjusted analyses compared relapse prevalence, utilisation and costs, all measured in the 12 months following buprenorphine MAT initiation, of adherent patients to patients in non-adherent PDC categories ($PDC < 0.20$, $0.20 \leq PDC < 0.40$, $0.40 \leq PDC < 0.60$, $0.60 \leq PDC < 0.80$). Adherent patients were 37.1% of the Commercial sample (N=16,085) and 41.3% of the Medicaid sample (N=5,688). In both samples, non-adherent patients were significantly more likely than adherent patients to relapse and to have hospitalisations and emergency department visits. As a result, as buprenorphine MAT adherence increased, pharmacy costs increased, but medical costs decreased. Total costs (pharmacy plus medical costs) in the 12 months following buprenorphine MAT initiation decreased with adherence in Commercial patients (\$28,525 for $PDC < 0.20$ to \$17,844 for $PDC \geq 0.80$). A slight decrease in total costs in the 12 months following buprenorphine MAT initiation was also observed in Medicaid patients (\$21,292 for $PDC < 0.20$ to \$18,621 for $PDC \geq 0.80$). After adjustment, total costs of adherent patients in the Commercial sample (\$17,519) were significantly lower compared with those of non-adherent patients (range \$20,294-\$24,431). In the Medicaid sample, adjusted total costs were not significantly different between adherence groups. Buprenorphine MAT adherence in the 12 months following treatment was associated with reduced odds of relapse and reduced unadjusted medical costs. For Commercial patients who were adherent to treatment, the adjusted total costs were predicted to be 30% lower than those for patients with $PDC < 0.20$.

Authors: Ronquest NA, Willson TM, Montejano LB, Nadipelli VR, Wollschlaeger BA.

Full Source: Substance Abuse and Rehabilitation. 2018 Sep 21; 9:59-78. doi: 10.2147/SAR.S150253. eCollection 2018.