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PUBLIC HEALTH RESEARCH

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Technical

CHEMWATCH

ENVIRONMENTAL RESEARCH

Species turnover reveals hidden effects of decreasing nitrogen deposition in mountain hay meadows

2019-06-03

Nitrogen (N) deposition is a major threat to biodiversity in many habitats. The recent introduction of cleaner technologies in Switzerland has led to a reduction in the emissions of nitrogen oxides, with a consequent decrease in N deposition. In this study, the authors examined different drivers of plant community change, that is, N deposition, climate warming, and land-use change, in Swiss mountain hay meadows, using data from the Swiss biodiversity monitoring program. Indicator values of species that disappeared from or colonised a site (species turnover) were compared with the indicator values of randomly chosen species from the same site. While oligotrophic plant species were more likely to colonise, compared to random expectation, only a weak shift was found in plant community composition. In particular, the average nutrient value of plant communities remained stable over time (2003-2017). The authors found that the largest deviations from random expectation in the nutrient values of colonising species, suggesting that N deposition or other factors that change the nutrient content of soils were important drivers of the species composition change over the last 15 years in Swiss mountain hay meadows. In addition, an overall replacement of species with lower indicator values for temperature was observed with species with higher values. Apparently, the community effects of the replacement of eutrophic species with oligotrophic species was outweighed by climate warming. The authors concluded that the results add to the increasing evidence that plant communities in changing environments may be relatively stable regarding average species richness or average indicator values, but that this apparent stability is often accompanied by a marked turnover of species.

Authors: Roth T, Kohli L, Bühler C, Rihm B, Meuli RG, Meier R, Amrhein V.

Full Source: PeerJ. 2019 Feb 6; 7:e6347. doi: 10.7717/peerj.6347.

eCollection 2019.

In this study, the authors examined different drivers of plant community change, that is, N deposition, climate warming, and land-use change, in Swiss mountain hay meadows

Application of essential oils as a natural and alternate method for inhibiting and inducing the sprouting of potato tubers

2019-06-03

Use of harmful chemicals and expensive maintenance of cold-storage conditions for controlling sprouting are among the major problems in potato storage. In the present study, the authors tested 20 essential oils (EOs) for their sprouting-inhibiting and sprouting-inducing activities. Overall, treatments of lemon grass (LG) and clove (CL) oils could induce sprouting whereas palmarosa (PR) and ajwain (AZ) oils could inhibit sprouting of potato tubers at normal-room-temperature ($25 \pm 2^\circ\text{C}$) storage. Selected-EOs treatments affected sprouting by modulation of accumulation of reducing sugars, ethylene, and expression of genes involved in tuber-sprouting such as ARF, ARP, AIP and ERF. Surprisingly, 7-days AZ-treatments could inhibit sprouting for 30-days which was mediated via damaging apical meristem. However, LG- and CL-treated tubers could produce enhanced potato yield as well. Present work clearly demonstrates that selected-EOs can be used as a promising eco-friendly approach for inducing/inhibiting sprouting of potato tubers during potato storage and those enhancing sprouting can be used for enhancing productivity.

Authors: Shukla S, Pandey SS, Chandra M, Pandey A, Bharti N, Barnawal D, Chanotiya CS, Tandon S, Darokar MP, Kalra A.

Full Source: Food Chemistry. 2019 Jun 30; 284:171-179. doi: 10.1016/j.foodchem.2019.01.079. Epub 2019 Jan 18.

The objective of this study was to compare the sensitivity of the two assays for detecting genotoxicity.

A comparison of transgenic rodent mutation and in vivo comet assay responses for 91 chemicals

2019-06-03

A database of 91 chemicals with published data from both transgenic rodent mutation (TGR) and rodent comet assays has been compiled. The objective was to compare the sensitivity of the two assays for detecting genotoxicity. Critical aspects of study design and results were tabulated for each dataset. There were fewer datasets from rats than mice, particularly for the TGR assay, and therefore, results from both species were combined for further analysis. TGR and comet responses were compared in liver and bone marrow (the most commonly studied tissues), and in stomach and colon evaluated either separately or in combination with other GI tract segments. Overall positive, negative, or equivocal test results were assessed for each chemical across the tissues examined in the TGR and

comet assays using two approaches: 1) overall calls based on weight of evidence (WoE) and expert judgement, and 2) curation of the data based on a priori acceptability criteria prior to deriving final tissue specific calls. Since the database contains a high prevalence of positive results, overall agreement between the assays was determined using statistics adjusted for prevalence (using AC1 and PABAK). These coefficients showed fair or moderate to good agreement for liver and the GI tract (predominantly stomach and colon data) using WoE, reduced agreement for stomach and colon evaluated separately using data curation, and poor or no agreement for bone marrow using both the WoE and data curation approaches. Confidence in these results is higher for liver than for the other tissues, for which there were less data. Our analysis finds that comet and TGR generally identify the same compounds (mainly potent mutagens) as genotoxic in liver, stomach and colon, but not in bone marrow. However, the current database content precluded drawing assay concordance conclusions for weak mutagens and non-DNA reactive chemicals.

Authors: Kirkland D, Levy DD, LeBaron MJ, Aardema MJ, Beevers C, Bhalli J, Douglas GR, Escobar PA, Farabaugh CS, Guerard M, Johnson GE, Kulkarni R, Le Curieux F, Long AS, Lott J, Lovell DP, Luijten M, Marchetti F, Nicolette JJ, Pfuhrer S, Roberts DJ, Stankowski LF Jr, Thybaud V, Weiner SK, Williams A, Witt KL, Young R.

Full Source: Mutation Research. 2019 Mar; 839:21-35. doi: 10.1016/j.mrgentox.2019.01.007. Epub 2019 Jan 18.

Toxic effects of combined treatment of 1,2-dichloroethane and ethanol on mouse brain and the related mechanisms

2019-06-03

The aim of this study was to explore the mechanisms of brain damage induced by the combined treatment of mice with 1,2-dichloroethane (1,2-DCE) and ethanol. Mice were divided into control group; 1,2-DCE-intoxicated group; ethanol-treated group; and low-, medium-, and high-dose combined treatment groups. Histological observations along with brain organ coefficients and water content were used to measure the brain damage directly and indirectly. The levels of nonprotein sulfhydryls, malondialdehyde (MDA), and superoxide dismutase activity were used as parameters to evaluate oxidative stress in the brain. Protein and messenger RNA (mRNA) levels of cytochrome P450 2E1 (CYP2E1), zonula occludens-1 (occluding and zo-1), aquaporin-4 (AQP4), nuclear factor erythroid 2-related factor 2 (Nrf2), heme oxygenase (HO)-1, and the γ -glutamyl cysteine synthetase catalytic and modulatory subunits (γ -GCSc, GR, and γ -GCSm) in the brain were examined by Western blot analysis and

The aim of this study was to explore the mechanisms of brain damage induced by the combined treatment of mice with 1,2-dichloroethane (1,2-DCE) and ethanol.

quantitative polymerase chain reaction analysis, respectively. Effects of the combined treatment of 1,2-DCE and ethanol were evaluated by analysis of variance with a factorial design. The results suggested that combined exposure to ethanol and 1,2-DCE synergistically increased CYP2E1 protein and mRNA levels, accelerated the metabolism of ethanol and 1,2-DCE in the brain tissue, induced high production of reactive oxygen species (ROS), and increased MDA levels, thereby damaging the blood-brain barrier and causing obvious pathological changes in brain tissue. However, the increased level of ROS activated the Nrf2 signal transduction pathway, promoting the expression of HO-1 and glutathione-related antioxidant enzymes in the brain to protect the cells from oxidative damage.

Authors: Zhang L, Jin YP.

Full Source: Journal of Biochemical and Molecular Toxicology. 2019 Jan 21:e22294. doi: 10.1002/jbt.22294. [Epub ahead of print]

Towards a harmonised method for the global reconnaissance of multi-class antimicrobials and other pharmaceuticals in wastewater and receiving surface waters

2019-06-03

Antimicrobial resistance is a worldwide problem that is both pressing and challenging due to the rate at which it is spreading, and the lack of understanding of the mechanisms that link human, animal and environmental sources contributing to its proliferation. One knowledge gap that requires immediate attention is the significance of antimicrobial residues and other pharmaceuticals that are being discharged from wastewater treatment plants (WWTPs) on the dissemination of antimicrobial resistance in the environment. In this study, the authors provide an approach to develop a harmonised analytical method for 8 classes of antimicrobials and other pharmaceuticals that can be used for global monitoring in wastewater and receiving waters. Analysis of these trace organic chemicals in the influent and effluent wastewater, and in the respective upstream and downstream receiving waters from different countries across the globe is not trivial. The authors demonstrated that sample preparation using solid-phase extraction (SPE) not only provides a convenient and cost-effective shipping of samples, but also adds stability to the analytes during international shipping. It is important that SPE cartridges are maintained at cold temperature during shipment if the duration is longer than 7 days because a significant decrease in recoveries were observed after 7 days in the cartridges stored at room temperature, especially for sulfonamides and tetracyclines. To compensate

In this study, the authors provide an approach to develop a harmonised analytical method for 8 classes of antimicrobials and other pharmaceuticals that can be used for global monitoring in wastewater and receiving waters.

for sample degradation during shipment, and matrix effects in liquid chromatography/mass spectrometry, the use of stable isotope labelled compounds should be employed when available and affordable. The importance of applying a defined tolerance for the ion ratios (Q/q) that have been optimised for wastewater and surface water is discussed. The tolerance range was set to be the mean Q/q of the analyte standard at various concentrations $\pm 40\%$ for the influent, and $\pm 30\%$ for the effluent, upstream, and downstream samples; for tetracyclines and quinolones, however, the tolerance range was $\pm 80\%$ in order to minimise false negative and false positive detection. The optimized procedures were employed to reveal differences in antimicrobial and pharmaceutical concentrations in influent, effluent, and surface water samples from Hong Kong, India, Philippines, Sweden, Switzerland, and United States. The antimicrobials with the highest concentrations in influent and effluent samples were ciprofloxacin (48,103 ng/L, Hong Kong WWTP 1) and clarithromycin (5178 ng/L, India WWTP 2), respectively. On the other hand, diclofenac (108,000 ng/L, Sweden WWTP 2), caffeine (67,000 ng/L, India WWTP 1), and acetaminophen (28,000 ng/L, India WWTP 1) were the highest detected pharmaceuticals in the receiving surface water samples. Hong Kong showed the highest total antimicrobial concentrations that included macrolides, quinolones, and sulfonamides with concentrations reaching 60,000 ng/L levels in the influent. Antidepressants were predominant in Sweden, Switzerland, and the United States.

Authors: Singh RR, Angeles LF, Butryn DM, Metch JW, Garner E, Vikesland PJ, Aga DS.

Full Source: Environment International. 2019 Mar; 124:361-369. doi: 10.1016/j.envint.2019.01.025. Epub 2019 Jan 17.

In the present study, the authors investigated whether cigarette smoke combined with lipopolysaccharides induces pulmonary fibrosis in mice.

MEDICAL RESEARCH

Cigarette smoke exposure combined with lipopolysaccharides induced pulmonary fibrosis in mice

2019-06-03

Cigarette smoke (CS) is a risk factor for pulmonary fibrosis and lipopolysaccharides (LPS) are associated with human occupational lung diseases; however, their combined role in pulmonary fibrosis remains unknown. Therefore, in the present study, the authors investigated whether CS combined with LPS induces pulmonary fibrosis in mice. C57BL/6 mice were exposed to CS or normal air for 21 or 35 days, followed by LPS or saline instillation on day 14, 21, and 28. Lung function was tested, and lung tissues were harvested for histological and molecular

analyses. Compared to the control, CS and LPS groups, the CS + LPS group showed reduced body weight and survival rate, increased respiratory resistance, decreased lung compliance, marked alveolar structure destruction, and fibrotic lesion formation. Lung tissues showed a considerable increase in IL-6, TNF- α , IL-1 β , α -SMA, and TGF- β levels and collagen content. Our results indicate that cigarette smoke exposure followed by LPS in mice induces pulmonary fibrosis with pathophysiology consistent with that of human pulmonary fibrosis.

Authors: Fang L, Cheng Q, Zhao F, Cheng H, Luo Y, Bao X, Li Y, Liang X, Huang Y, Xu J, Han J, Tang Y, Tang S, Liu W, Luo Z, Feng D.

Full Source: *Respiratory Physiology & Neurobiology*. 2019 Apr 22; 266:9-17. doi: 10.1016/j.resp.2019.04.010. [Epub ahead of print]

Exposure to carbon black nanoparticles during pregnancy persistently damages the cerebrovascular function in female mice

2019-06-03

Maternal exposure to carbon black nanoparticles (CBNPs) during pregnancy have been well documented to induce harmful outcomes of offspring on brain function. However, it remains largely unknown whether females exposed to CBNPs during sensitive period of pregnancy can cause the neurotoxic effects on their own body after parturition. In this study, the authors results showed that pregnancy CBNPs exposure induced the persistent pathological changes in the cerebral cortex tissues and impaired cerebrovascular function of mice manifested by significant alterations of endothelin-1, endothelial nitric oxide synthase, vascular endothelial growth factor-A and ATP-binding cassette transporter G1. Intriguingly, it was observed that these deleterious effects on brain and cerebrovascular functions in mice could persist for 49 days after delivery of pups. By using in vitro human umbilical vein endothelial cells, the authors further verified the potential vascular dysfunction after CBNPs exposure. In summary, the results provide the first evidence that pregnancy CBNPs exposure-induced brain pathological changes and cerebrovascular dysfunction can persist for a relative long time. These finding suggest exposure to CBNPs during sensitive stages of pregnancy may not only show the harmful effects on offspring neurodevelopment, but also result in the irreversible brain damage on mother body.

Authors: Zhang Y, Tu B, Jiang X, Xu G, Liu X, Tang Q, Bai L, Meng P, Zhang L, Qin X, Zou Z, Chen C.

Full Source: *Toxicology*. 2019 Apr 22; 422:44-52. doi: 10.1016/j.tox.2019.04.014. [Epub ahead of print]

Low-normal haemoglobin levels and anaemia are associated with increased risk of end-stage renal disease in general populations: A prospective cohort study

2019-06-03

The impact of low-normal haemoglobin (Hb) levels and anaemia on the risk of end-stage renal disease (ESRD) in general populations has rarely been examined. 510,620 Korean adults aged 40-80 years without known chronic kidney disease (CKD) underwent health examinations during 2002-2003 and were followed-up until 2013. Incidence of ESRD was identified by hospital discharge and clinical visit records. During a mean follow-up of 10.5, 575 women and 1047 men were diagnosed with ESRD. Lower Hb levels were associated with an increased risk of ESRD at given severity of albuminuria and at given estimated glomerular filtration rate (eGFR). Hb 13-13.9 g/dL in men, Hb 11-11.9 g/dL in women, and trace albuminuria assessed by dipstick urinalysis were associated with more than doubled risk. The risk associated with lower Hb was stronger in older (≥ 60 years) than younger women. Among 349,993 participants with information on eGFR, the multivariable-adjusted HRs associated with 1 g/dL lower Hb in participants with eGFR values ≥ 60 , 30-59, and < 30 mL/min/1.73 m² were 1.34 (95% CI, 1.17-1.54), 1.55 (1.38-1.74), and 1.75 (1.47-2.09), respectively (Pinteraction between eGFR groups = .06). Low-normal Hb levels and anaemia are risk factors for ESRD incidence in person without CKD and for CKD progression to ESRD. Lower Hb increases the risk of ESRD through synergistic biological interactions with lower eGFR and albuminuria. The impacts of lower Hb may be stronger in older than younger women. Proper management and screening at earlier stage of Hb decline and anaemia might reduce the burden of CKD.

Authors: Yi SW, Moon SJ, Yi JJ.

Full Source: PLoS One. 2019 Apr 25;14(4): e0215920. doi: 10.1371/journal.pone.0215920. eCollection 2019.

The impact of low-normal haemoglobin (Hb) levels and anaemia on the risk of end-stage renal disease (ESRD) in general populations has rarely been examined.

Prognosis Prediction of Colorectal Cancer Using Gene Expression Profiles

2019-06-03

Investigation on prognostic markers for colorectal cancer (CRC) deserves efforts, but data from China are scarce. This study aimed to build a prognostic algorithm using differentially expressed gene (DEG) profiles and to compare it with the TNM staging system in their predictive accuracy for CRC prognosis in Chinese patients. DEGs in six paired tumour and corresponding normal tissues were determined using RNA-

Sequencing. Subsequently, matched tumour and normal tissues from 127 Chinese patients were assayed for further validation. Univariate and multivariate Cox regressions were used to identify informative DEGs. A predictive index (PI) was derived as a linear combination of the products of the DEGs and their Cox regression coefficients. The combined predictive accuracy of the DEGs-based PI and tumours' TNM stages was also examined by a logistic regression model including the two predictors. The predictive performance was evaluated with the area under the receiver operating characteristics (AUCs). Results: Out of 75 candidate DEGs, we identified 10 DEGs showing statistically significant associations with CRC survival. A PI based on these 10 DEGs (PI-10) predicted CRC survival probability more accurately than the TNM staging system [AUCs for 3-year survival probability 0.73 (95% confidence interval: 0.64, 0.81) vs. 0.68 (0.59, 0.76)] but comparable to a simplified PI (PI-5) using five DEGs (LOC646627, BEST4, KLF9, ATP6V1A, and DNMT3B). The predictive accuracy was improved further by combining PI-5 and the TNM staging system [AUC for 3-year survival probability: 0.72 (0.63, 0.80)]. Prognosis prediction based on informative DEGs might yield a higher predictive accuracy in CRC prognosis than the TNM staging system does.

Authors: Pan F, Chen T, Sun X, Li K, Jiang X, Försti A, Zhu Y, Lai M.

Full Source: *Frontiers in Oncology*. 2019 Apr 9; 9:252. doi: 10.3389/fonc.2019.00252. eCollection 2019.

Serum carbohydrate antigen 125 levels and incident risk of type 2 diabetes mellitus in middle-aged and elderly Chinese population: The Dongfeng-Tongji cohort study

2019-06-03

The aim of this study was to investigate the association between serum carbohydrate antigen 125 concentrations and incident type 2 diabetes mellitus risk in a prospective cohort. The authors included 18,983 eligible participants aged 63.1 years derived from the Dongfeng-Tongji cohort at baseline from September 2008 to June 2010, and they were followed until October 2013. Cox proportional-hazards models were used to estimate the hazard ratios and 95% confidence interval of type 2 diabetes mellitus incidence in relation to carbohydrate antigen 125 concentrations. In all, 1594 incident cases of type 2 diabetes mellitus were observed after a median follow-up of 4.6 years. Carbohydrate antigen 125 concentrations were categorised into four groups according to the quartiles of distribution: <1.1, 1.1-5.6, 5.6-10.0 and 10 U/mL. Compared with participants in the lowest quartile, the hazard ratio (95% confidence interval) of type 2 diabetes mellitus was 0.97 (0.81-1.15), 1.23 (1.05-1.45)

The aim of this study was to investigate the association between serum carbohydrate antigen 125 concentrations and incident type 2 diabetes mellitus risk in a prospective cohort.

and 1.48 (1.27-1.74) for quartile 2-quartile 4 of carbohydrate antigen 125 concentrations after adjustment for potential confounders (p for trend < 0.001). With per-standard deviation increase in carbohydrate antigen 125 levels, the hazard ratio of type 2 diabetes mellitus increased 12% (95% confidence interval, 8-16). Findings from this study indicated that serum carbohydrate antigen 125 concentrations were positively correlated with incident type 2 diabetes mellitus risk among a middle-aged and elderly Chinese population.

Authors: Yu C, Lei Q, Wang J, Han X, Wang F, Yuan J, Yao P, Wei S, Wang Y, Liang Y, Zhang X, Guo H, Yang H, He M.

Full Source: Diabetes and Vascular Disease Research. 2019 Apr 26;1479164119843095. doi: 10.1177/1479164119843095. [Epub ahead of print]

OCCUPATIONAL RESEARCH

Urinary trimethyl tin reflects blood trimethyl tin in workers recycling organotins

2019-06-03

A recent case report of organotin intoxication showed higher ratio of urinary trimethyl tin (TMT) to dimethyl tin (DMT) than those of the previous cases exposed to only DMT, suggesting co-exposure to DMT and TMT occurred. The present study investigated how urinary TMT and DMT reflect blood TMT and DMT, respectively, to evaluate them as biomarkers for TMT/DMT exposure. DMT and TMT from blood collected at different time points from three patients intoxicated with organotins were measured with HPLC-ICP/MS. Previously published data of urinary DMT and TMT were used for comparison. Regression analyses were conducted with dependent variable of blood DMT and TMT and independent variable of urinary DMT and TMT, respectively. Multiple regression analysis with dummy variables of individual was also conducted. Regression analysis did not show significant relation of urinary TMT to blood TMT or relation of urinary DMT to blood DMT, although the former was marginal. Multiple regression analysis showed significantly positive relation of urinary TMT to blood TMT. The authors concluded that the study shows that urinary TMT reflects blood TMT. In co-exposure to TMT and DMT, urinary TMT can be an internal exposure marker of TMT, which might be not only derived from external exposure to TMT but also converted from DMT in human body.

Authors: Ichihara G, Iida M, Watanabe E, Fujie T, Kaji T, Lee E, Kim Y.

Full Source: Journal of Occupational Health. 2019 Mar 28. doi: 10.1002/1348-9585.12052. [Epub ahead of print]

The present study investigated how urinary trimethyl tin and dimethyl tin reflect blood trimethyl tin and dimethyl tin, respectively, to evaluate them as biomarkers for TMT/DMT exposure.

Technical

CHEMWATCH

The quantitative and qualitative parameters of rhythytcograms in methanol and formaldehyde impact in production environment

2019-06-03

This study assessed the state of the mucous membrane of the upper respiratory tract of the workers of chemical production of methanol and formaldehyde. A total of 450 workers were examined by rhinocytogram (RCH) evaluation. As a result of the study, studies have found that people with work experience of up to 10 years in the production of methanol and formaldehyde in the RCH the signs of chronic inflammation is more likely to be detected. More experienced patients (more than 10 years of work experience) studies have found the establishment of morphological signs of protective and degenerative changes in ciliated epithelium, and there is a high degree of connection between the development of protective changes and the exposure to chemicals (RR = 2.71, aetiological share, EF = 56.4%) and the development of degenerative changes (RR = 3.28, EF = 65.4%). These results are considered by the authors as the biomarkers of the development of a professionally conditioned lesion of the upper respiratory tract.

Authors: Bankovskaya LA, Shchekotova AP, Malyutina NN.

Full Source: Kliniceskaja Laboratornaja Diagnostika. 2019;64(2):78-82. doi: 10.18821/0869-2084-2019-64-2-78-82.

Health Risks of Polybrominated Diphenyl Ethers (PBDEs) and Metals at Informal Electronic Waste Recycling Sites

2019-06-03

Concerns about the adverse public health consequences of informal electronic waste (e-waste) recycling are increasing. This study adopted a cross-sectional study design to gain insights into health risks (cancer and non-cancer risks) associated with exposure to e-waste chemicals among informal e-waste workers via three main routes: Dermal contact, ingestion, and inhalation. The e-waste chemicals (PBDE and metals) were measured in the dust and top soils at e-waste sites (burning, dismantling, and repair sites). Adverse health risks were calculated using the EPA model developed by the Environmental Protection Agency of the United States. The concentrations of the e-waste chemicals and the health risks at the e-waste sites increased as the intensity of the e-waste recycling activities increased: control sites < repair sites < dismantling sites < burning sites. Dermal contact was the main route of exposure while exposure via inhalation was negligible for both carcinogenic and

This study assessed the state of the mucous membrane of the upper respiratory tract of the workers of chemical production of methanol and formaldehyde.

non-carcinogenic risks. Cumulative health risks via all routes of exposure (inhalation, ingestion, and dermal contact) exceeded the acceptable limits of both non-cancer effects and cancer risk at all e-waste sites. This indicates that overall the e-waste workers are at the risk of adverse health effects. Therefore, the importance of occupational safety programs and management regulations for e-waste workers cannot be over emphasised.

Authors: Ohajinwa CM, van Bodegom PM, Osibanjo O, Xie Q, Chen J, Vijver MG, Peijnenburg WJGM.

Full Source: International Journal of Environmental Research & Public Health. 2019 Mar 13;16(6). pii: E906. doi: 10.3390/ijerph16060906.

Lifestyle and occupational factors affecting exposure to BTEX in municipal solid waste composting facility workers

2019-06-03

Composting facilities workers are potentially exposed to different volatile organic compounds (VOCs). This study aims to investigate the potential exposure to benzene, toluene, ethylbenzene and xylenes (BTEX) compounds among workers of composting facilities by measuring un-metabolised BTEX in urine and to investigate the effect that several lifestyle factors (i.e. smoking and residential traffic), using personal protective equipment, and religious practices such as Ramadan fasting can have on the urinary BTEX concentrations. The authors assessed concentrations of BTEX in the urine of a composting facility workers. Samples were collected in May 2018. Overall, 25 workers chosen as the exposed group and 20 inhabitants living close to the composting facility as a control group. The urine samples were collected from studied subjects. Identification and quantification of un-metabolized BTEX was performed using a headspace gas chromatography-mass spectrometry (GC-MS). Detailed information of participants was gathered by a comprehensive questionnaire. The geometric mean levels of urinary benzene, toluene, ethylbenzene, m-p xylene, and o-xylene in the exposed subjects were 1.27, 2.12, 0.54, 1.22 and 1.51 µg/L, respectively; 1.4 to 3.7-time higher than values in control group ($p < 0.05$). Post-shift levels were significantly higher than pre-shift for all chemicals ($p < 0.05$). Smoking habits, exposure to environmental tobacco smoke, and Ramadan fasting predicted urinary BTEX levels. Personal protective equipment which included a simple N95 mask did not protected workers from BTEX emissions. Composting facilities represent a significant source BTEX

This study aims to investigate the potential exposure to benzene, toluene, ethylbenzene and xylenes (BTEX) compounds among workers of composting facilities by measuring un-metabolised BTEX in urine

emissions and exposure for staff. More effective protective strategies are required to minimize exposure and related occupational hazards.

Authors: Rafiee A, Delgado-Saborit JM, Sly PD, Amiri H, Hoseini M.

Full Source: Science of the Total Environment. 2019 Mar 15; 656:540-546.

doi: 10.1016/j.scitotenv.2018.11.398. Epub 2018 Nov 27.

Para-tertiary butyl catechol (PTBC), an industrial antioxidant induces human platelet apoptosis

2019-06-03

The catecholic derivative para-tertiary butyl catechol (PTBC) is a conventional antioxidant and polymerisation inhibitor, which exhibits melanocytotoxic effects and contact dermatitis often leading to occupational leucoderma or vitiligo. Although numerous industrial workers will be in constant exposure to PTBC and its chances of getting entry into blood are most expected, its effect on blood components is still undisclosed. As platelets play a prominent role in dermatitis, inflammation, and immunity, in this study, the authors have evaluated the effect of PTBC on human platelets in vitro. Exposure of platelets to PTBC showed increased reactive oxygen species (ROS), intracellular calcium, cardiolipin oxidation, mitochondrial permeability transition pore (MPTP) formation, activation of caspases, phosphatidylserine (PS) externalisation and decreased mitochondrial membrane potential. In addition, there was a significant decrease in cellular glutathione level, increased γ -glutamyltransferase (GGT) activity and cell death. These findings demonstrate that PTBC could induce toxic effects on blood components, which is often ignored field of research. Since dermal exposure of humans to toxic chemicals covers an important issue in various industries, there is a need of such work to understand and update the long-term toxicities induced by PTBC usage in industrial sectors and public domain.

Authors: Vishalakshi GJ, NaveenKumar SK, Hemshekhar M, Mahendra M, Kemparaju K, Girish KS.

Full Source: Environmental Toxicology. 2019 Mar; 34(3):262-270. doi:

10.1002/tox.22681. Epub 2018 Nov 21.

In this study, the authors have evaluated the effect of PTBC on human platelets in vitro.

PUBLIC HEALTH RESEARCH

Skin Bleaching Among African and Afro-Caribbean Women in New York City: Primary Findings from a P30 Pilot Study

2019-06-03

The application of skin bleaching products to inhibit melanogenesis is a common practice within the African diaspora. Despite the adverse health effects of skin bleaching, rigorous studies investigating skin bleaching behaviour among these populations in the United States are limited. In our P30 pilot study, the authors explored predictors of skin bleaching practice intensity among African and Afro-Caribbean women. In collaboration with our Community Engagement Core, we conducted a cross-sectional study to investigate the relationship between demographic and psychosocial predictors and skin-bleaching-related practice patterns among African and Afro-Caribbean women in New York City. Among the 76 participants recruited, the median age at the initiation of skin bleaching was 19.5 (16-25) years, yielding a median duration of 13.5 (6-23) years. Although pregnant women were not actively recruited for the study, 13.2% (n = 10) of the participants used skin bleaching products while pregnant or possibly breastfeeding. Nativeness and education were associated with various components of skin bleaching practice intensity, including duration of skin bleaching, daily use of products, and bleaching of the entire body. Participants' perceived skin-color-related quality of life was not associated with skin bleaching practice intensity. Skin bleaching is a habitual practice that likely requires culturally sensitive interventions to promote behavioural change. The existence of prenatal and postnatal exposure to mercury, hydroquinone, and other potentially harmful chemicals in skin bleaching products highlights an urgent need to explore the adverse effects of skin bleaching practices on birth outcomes and the growth and neurodevelopment of young babies.

Authors: Benn EKT, Deshpande R, Dotson-Newman O, Gordon S, Scott M, Amarasiriwardena C, Khan IA, Wang YH, Alexis A, Kaufman B, Moran H, Wen C, Charles CAD, Younger NOM, Mohamed N, Liu B.

Full Source: *Dermatology and Therapy*. 2019 Apr 24. doi: 10.1007/s13555-019-0297-y. [Epub ahead of print]

This technique for setting guideline values differs from that currently used by regulatory agencies throughout the world.

Use of toxicant sensitivity distributions (TSD) for development of exposure guidelines for risk to human health from benzene

2019-06-03

This technique for setting guideline values differs from that currently used by regulatory agencies throughout the world. Data for benzene were evaluated from epidemiological studies on human populations (29 studies). Exposure durations were evaluated in terms of Long Term Exposure (LTE) and Lifetime Exposure. All data was reported as Lowest Observed Adverse Effect Levels (LOAEL) and converted into exposure doses using Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD). These values were plotted as a Toxicant Sensitivity Distribution (TSD) which was the cumulative probability of LOAEL-ADD and LOAEL-LADD. From the TSD plots, linear regression equations gave correlation coefficients (R²) ranging from 0.69 to 0.97 indicating normal distributions. Guideline Values (GVs) for LTE (8hr/day) and Lifetime (24hr/70yrs) exposure to benzene were calculated using data from human epidemiological studies as 5% level of cumulative probability (CP) of LOAEL-ADD and LOAEL-LADD from the cumulative probability distributions (CPD). The derived guideline values from the human epidemiological studies were 92 µg/kg/day for LTE and 3.4 µg/kg/day for lifetime exposure. GV for LTE is appropriate for occupational exposure and GV derived for lifetime exposure appropriate for the general population. The guideline value for occupational exposure limit was below all the guideline values developed by regulatory agencies. But the general population guideline is within the range of values formulated by European Union, ATSDR, EPAQS, USEPA and OEHHA for air quality for the general population. This is an alternative method which eliminates the application of safety factors and other sources of errors in deriving guideline values for benzene.

Authors: Edokpolo B, Yu QJ, Connell D.

Full Source: Environmental Pollution. 2019 Apr 10; 250:386-396. doi: 10.1016/j.envpol.2019.04.001. [Epub ahead of print]

Organochlorine pesticides air monitoring near a historical lindane production site in Spain

2019-06-03

The landfilling and dumping of persistent organic pollutants (POPs) and other persistent hazardous chemicals, such as hexachlorocyclohexane (HCH) isomers can have significantly adverse environmental consequences and cause contamination in soil, water, and atmosphere systems.

Technical

CHEMWATCH

Approximately 115,000 t of HCH wastes were generated by INQUINOSA Factory located in Sabiñánigo (Aragón, Spain) from 1975 to 1992, and were mainly dumped at Bailín and Sardas landfills. Under the frame of the project plan approved by the Government of Aragón, remediation and containment measures were implemented at the derelict production facility and landfill sites. To protect and assess the local environment, the concentrations of HCH isomers, pentachlorobenzene (PeCB) and hexachlorobenzene (HCB) in air were periodically monitored in the Sardas landfills and surroundings by passive sampling devices. The influence of meteorological parameters was evaluated, showing positive correlations between temperature and HCH and HCB concentrations. The highest HCH levels were detected in Sardas landfill and INQUINOSA Factory sites. PeCB values were statistically higher in Sardas landfill than in Sabiñánigo urban core, nevertheless, HCB concentrations were similar in both sampling points. Statistically positive correlations were found among HCH isomers in all sampling points, showing a major common source. The chlorobenzenes also correlated positively with each other. The α -/ γ -HCH ratios were calculated (1.46 ± 1.25 ; mean \pm S.D.), corroborating that concentrations detected were mainly originated from the historical production, storage and waste disposal of technical HCH.

Authors: Navarro I, de la Torre A, Sanz P, Arjol MA, Fernández J, Martínez MA.

Full Source: Science of the Total Environment. 2019 Jun 20; 670:1001-1007. doi: 10.1016/j.scitotenv.2019.03.313. Epub 2019 Mar 21.

Endotoxin and Contamination in Electronic Cigarette Products Sold in the United States

2019-06-03

Cigarette smoke contains microbes and microbial toxins, such as endotoxins, that may have adverse respiratory effects. To the authors knowledge, the potential for contamination of electronic cigarette (EC) products sold in the United States has not been investigated. 37 cartridges and 38 e-liquid products with the highest nicotine content were selected from the ten top-selling U.S. brands. Flavours were classified into four groups: tobacco, menthol, fruit, and other. Endotoxin and glucan were measured using an endotoxin-specific kinetic turbidimetric assay and a GlucateLL® Kinetic Assay (Associates of Cape Cod, Inc.), respectively. Endotoxin concentrations were over the limit of detection (LOD) in 17 of 75 products tested (23%), and glucan concentrations were greater than LOD in 61 of 75 products (81%). After adjusting for brand and flavour, the mean glucan concentration was 3.2 times higher [95% confidence interval

In this study, the authors aimed to determine whether popular cartridge and e-liquid EC products were contaminated with endotoxin or glucan and to examine differences according to the type and flavour of products.

(CI): 18.4] in cartridge vs. e-liquid samples. After adjusting for brand and type of product, glucan concentrations in tobacco- and menthol-flavoured ECs were 10.4 (95% CI: 1.8, 44.9) and 3.5 (95% CI: 0.1, 17.3) times higher than concentrations found in fruit-flavoured products. EC products may be contaminated with microbial toxins. Further studies with large representative samples of products are needed to confirm the findings, identify sources and routes of contamination, and evaluate health effects associated with the use of contaminated products.

Authors: Lee MS, Allen JG, Christiani DC.

Full Source: Environmental Health Perspectives. 2019 Apr;127(4):47008. doi: 10.1289/EHP3469.

Pathway analysis of a genome-wide gene by air pollution interaction study in asthmatic children

2019-06-03

The authors aimed to investigate the role of genetics in the respiratory response of asthmatic children to air pollution, with a genome-wide level analysis of gene by nitrogen dioxide (NO₂) and carbon monoxide (CO) interaction on lung function and to identify biological pathways involved. A two-step method for fast linear mixed model computations was used for genome-wide association studies, exploring whether variants modify the longitudinal relationship between 4-month average pollution and post-bronchodilator FEV₁ in 522 Caucasian and 88 African-American asthmatic children. Top hits were confirmed with classic linear mixed-effect models. The authors used the improved gene set enrichment analysis for GWAS (i-GSEA4GWAS) to identify plausible pathways. Two SNPs near the EPHA3 (rs13090972 and rs958144) and one in TXNDC8 (rs7041938) showed significant interactions with NO₂ in Caucasians but we did not replicate this locus in African-Americans. SNP-CO interactions did not reach genome-wide significance. The i-GSEA4GWAS showed a pathway linked to the HO-1/CO system to be associated with CO-related FEV₁ changes. For NO₂-related FEV₁ responses, the authors identified pathways involved in cellular adhesion, oxidative stress, inflammation, and metabolic responses. The host lung function response to long-term exposure to pollution is linked to genes involved in cellular adhesion, oxidative stress, inflammatory, and metabolic pathways.

Authors: Ierodiakonou D, Coull BA, Zanobetti A, Postma DS, Boezen HM, Vonk JM, McKone EF, Schildcrout JS, Koppelman GH, Croteau-Chonka DC, Lumley T, Koutrakis P, Schwartz J, Gold DR, Weiss ST.

Full Source: Journal of Exposure Science & Environmental Epidemiology. 2019 Apr 26. doi: 10.1038/s41370-019-0136-3. [Epub ahead of print]

The authors aimed to investigate the role of genetics in the respiratory response of asthmatic children to air pollution, with a genome-wide level analysis of gene by nitrogen dioxide (NO₂) and carbon monoxide (CO) interaction on lung function and to identify biological pathways involved.