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ENVIRONMENTAL RESEARCH

The occurrence and co-occurrence of aflatoxin and fumonisin along the maize value chain in southwest Nigeria

2019-10-15

Aflatoxin and fumonisin are two major foodborne mycotoxins: toxic chemicals produced by fungi that contaminate food commodities including maize, a staple food in sub-Saharan Africa. Aflatoxin causes liver cancer, and is associated with acute liver toxicity and immunotoxicity; while fumonisin is associated with neural tube defects in infants and oesophageal cancer. Both mycotoxins have been associated with child growth impairment. Previous studies suggest that co-occurrence of these mycotoxins may have potentially synergistic toxicological effects. Despite health risks associated with co-occurrence of these mycotoxins, no study has examined their co-occurrence along key food supply chains in Africa. This study is the first report that examines the occurrence and co-occurrence of aflatoxins and fumonisins along the maize value chain in Nigeria. All samples were analysed using LC-MS/MS. About 52% and 21% of the samples had aflatoxin levels above the Nigerian and US standards for human food, respectively. Though no regulatory limits exist for fumonisin in Nigeria, 13% of the samples contained fumonisin levels higher than the US regulatory limit. Aflatoxin levels can become dangerously high in maize stored four months or longer. Adequately addressing mycotoxin risk requires consideration of the entire maize value chain and associated value chains for food production.

Authors: Liverpool-Tasie LSO, Turna NS, Ademola O, Obadina A, Wu F.

Full Source: Food Chemistry & Toxicology. 2019 Jul; 129:458-465. doi: 10.1016/j.fct.2019.05.008. Epub 2019 May 11.

This study is the first report that examines the occurrence and co-occurrence of aflatoxins and fumonisins along the maize value chain in Nigeria.

Potential factors and mechanism of particulate matters explosive increase induced by free radicals oxidation

2019-10-15

Atmospheric particulate pollution in China has attracted much public attention. Occasionally, the particle number concentration increases sharply in a short time period, which is defined as a "particulate matter explosive increase". Heavy particulate matter pollution not only reduces visibility but also has an adverse effect on human health. Hence, there is an urgent need to discover the causes of particulate matter explosive increase. During this study, the particle number concentration and free radicals were measured at a tall building on the campus of Lanzhou

University of Technology. Additionally, we examined a series of chemicals to reproduce the observed particulate matter explosive increase in a smog chamber to determine its potential factors. Then, we analysed the mechanism of particulate matter explosive increase in the presence of free radicals. The authors found that, among the potential inorganic and organic sources analysed, a mixture of organic and SO₂ in the research region had a major effect on particulate matter explosive increase. Moreover, free radical oxidation has a large effect, especially in the formation of organic particulates.

Authors: Wang G, Jia S, Niu X, Tian H, Liu Y, Xie Z, Liu C, Dong Y, Su Y, Yu J, Shi G, Chen X, Li L, Zhang P.

Full Source: Journal of Environmental Science (China). 2019 Jul; 81:205-213. doi: 10.1016/j.jes.2019.01.011. Epub 2019 Jan 23.

Carcinogenicity assessment: Addressing the challenges of cancer and chemicals in the environment

2019-10-15

Cancer is a key public health concern, being the second leading cause of worldwide morbidity and mortality after cardiovascular diseases. At the global level, cancer prevalence, incidence and mortality rates are increasing. These trends are not fully explained by a growing and ageing population: with marked regional and socioeconomic disparities, lifestyle factors, the resources dedicated to preventive medicine, and the occupational and environmental control of hazardous chemicals all playing a role. While it is difficult to establish the contribution of chemical exposure to the societal burden of cancer, a number of measures can be taken to better assess the carcinogenic properties of chemicals and manage their risks. This study discusses how these measures can be informed not only by the traditional data streams of regulatory toxicology, but also by using new toxicological assessment methods, along with indicators of public health status based on biomonitoring. These diverse evidence streams have the potential to form the basis of an integrated and more effective approach to cancer prevention.

Authors: Madia F, Worth A, Whelan M, Corvi R.

Full Source: Environment International. 2019 Jul; 128:417-429. doi: 10.1016/j.envint.2019.04.067. Epub 2019 May 9.

Bioaccumulation, metabolism, and risk assessment of phenolic endocrine disrupting chemicals in specific tissues of wild fish

2019-10-15

Phenolic endocrine disrupting chemicals (EDCs) may pose a great hazard to wildlife and humans, owing to their ubiquitous presence in the environment and potential bioaccumulation ability. The authors investigated the bioaccumulation, metabolism, and human health risks of six phenolic EDCs, including bisphenol A (BPA), 4-tert-octylphenol (4-t-OP), 4-nonylphenol (4-NP), oestrone (E1), 17 β -oestradiol (E2), and 17 α -ethinylestradiol (EE2), in wild fish from the Pearl River system, South China. Except EE2, the other five EDCs were detected in at least one of the four fish tissues (bile, liver, plasma, and muscle). The concentrations of BPA and 4-NP were greater than those of 4-t-OP, E1, and E2 in all tissues. The median values of log bioaccumulation factors for EDCs at the range of 3.86-4.52 in bile, 2.06-3.16 in liver, 2.69-3.87 in plasma, and 1.34-2.30 in muscle, indicating a higher bioaccumulation potential in fish bile than in other tissues. Greater levels of glucuronide/sulfate conjugated EDCs were found in fish bile and liver than in the plasma and muscle, suggesting that the liver and bile played an important role in the metabolism and excretion of phenolic EDCs in fish. The calculated hazard quotient values were below 1 for each compound, implying low risk to human health by intake of edible fish.

Authors: Lv YZ, Yao L, Wang L, Liu WR, Zhao JL, He LY, Ying GG.

Full Source: Chemosphere. 2019 Jul; 226:607-615. doi: 10.1016/j.chemosphere.2019.03.187. Epub 2019 Apr 1.

The authors investigated the bioaccumulation, metabolism, and human health risks of six phenolic EDCs in wild fish from the Pearl River system, South China.

Spatial and temporal trends of melamine and its derivatives in sediment from Lake Shihwa, South Korea

2019-10-15

Occurrence, spatial distribution, and temporal trends of melamine and its derivatives (ammeline, ammelide, and cyanuric acid) were investigated in surface sediment and two sediment cores collected from Lake Shihwa, South Korea. Σ Melamine (sum of melamine and its three derivatives) was found in all surface sediment samples at concentrations that ranged from 16.6 to 4390 ng/g dry weight (dw), with an average value of 202 ng/g dw. Σ Melamine concentrations exhibited a clear spatial gradient, in decreasing order, as: creeks (mean: 577 ng/g dw) > inshore locations (41.9 ng/g dw) > offshore locations (24.3 ng/g dw). Σ Melamine concentrations were notably high in sediment collected near wastewater

treatment plant (WWTP) outfalls. Melamine was the most prevalent compound in sediment collected from creeks (87%) and WWTP outfall locations (48%), whereas cyanuric acid was the dominant compound in sediment from inshore (51%) and offshore (63%) locations. The historical profiles of Σ Melamine in sediment cores corresponded with coastal development and environmental changes in this region. This is the first study to document the occurrence and temporal distribution of melamine in sediment cores, and this information is useful in understanding the fate of these relatively less-studied chemicals in the environment.

Authors: Zhu H, Lee S, Moon HB, Kannan K.

Full Source: Journal of Hazardous Material. 2019 Jul 5; 373:671-677. doi: 10.1016/j.jhazmat.2019.03.128. Epub 2019 Mar 30.

Evaluation of morpho-physiological traits and contaminant accumulation ability in *Lemna minor* L. treated with increasing perfluorooctanoic acid (PFOA) concentrations under laboratory conditions

2019-10-15

There is increasing concern about the effects of releasing emerging contaminants (i.e. endocrine-disrupting chemicals, pharmaceuticals, personal-care products and flame retardants) into the environment. Particular attention is being paid to perfluoroalkyl substances (PFAS) because of their persistence and bioaccumulation, especially in the aquatic environment. In this study, the authors present results of a study aimed at evaluating the effects of different perfluorooctanoic acid (PFOA) concentrations (2, 20 and 200 $\mu\text{g/L}$) on morpho-physiological traits in *Lemna minor* L. plants. The accumulation of PFOA in the plant's tissues was also monitored. *L. minor* was selected as a model plant for ecotoxicological studies, and a seven-day assay was performed for this investigation. The results highlight the lack of inhibitory effects on biometric parameters such as mean frond area, total frond number, multiplication rate, doubling time of frond number and average specific growth rate, for each of tested PFOA concentrations. Also, at photosynthetic level, physiological measurements showed that chlorophyll content and electron transport rate (ETR) were not affected by the exposure to PFOA. Remarkably, the chlorophyll fluorescence images, used for the first time in a study on PFOA, evidenced no impairment to the photosynthetic efficiency, measured by the maximum quantum yield of photosystem II (PSII) photochemistry (F_v/F_m), the quantum efficiency of PSII photochemistry (Φ_{PSII}) and the non-photochemical quenching (NPQ) over the leaf surface of PFOA-treated plants, in comparison to control. Quantification of PFOA in the growth

In this study, the authors present results of a study aimed at evaluating the effects of different perfluorooctanoic acid (PFOA) concentrations on morpho-physiological traits in *Lemna minor* L. plants.

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medium at the end of the seven-day test revealed no statistically different concentrations in plates with or without *L. minor* plants. The authors detected increasing PFOA accumulation in plant tissues, in accordance with the PFOA concentrations in the medium. Therefore, the *L. minor* plants were capable of taking up and accumulating PFOA. The ecological impact of the environmentally relevant PFOA concentrations tested in this work on biological organisms of the aquatic environment is discussed.

Authors: Pietrini F, Passatore L, Fischetti E, Carloni S, Ferrario C, Polesello S, Zacchini M.

Full Source: Science of the Total Environment. 2019 Aug 7; 695:133828. doi: 10.1016/j.scitotenv.2019.133828. [Epub ahead of print]

MEDICAL RESEARCH

The epidemic of methylisothiazolinone contact allergy in Europe: follow-up on changing exposures

2019-10-15

Methylisothiazolinone (MI) has caused an unprecedented epidemic of contact allergy in Europe and elsewhere. Subsequently, regulatory action has been taken, at least in Europe, aiming at reducing risk of MI sensitisation. In this study, the authors followed-up on the prevalence of contact allergy to MI in consecutively patch tested patients and assess the spectrum of products containing MI or methylchloroisothiazolinone (MCI)/MI in patients positive to MI which elicited current allergic contact dermatitis. A cross-sectional survey was performed in 2016 and 2017, including all adult patients patch tested with the baseline series (including MI 0.2% aq.) between 1 May and 31 October at 14 centres in 11 European countries. Patients with positive reactions (+ to +++) to MI were further examined regarding history, clinical characteristics and eliciting products, which were categorised into 34 types and 4 classes (leave-on, rinse-off, household, occupational). The results were compared with the reference year 2015. A total of 317 patients, $n = 202$ of 4278 tested in 2016 (4.72%) and $n = 115$ of 3879 tested in 2017 (2.96%), had positive reactions to MI; the previous result from 2015 was 5.97% ($P < 0.0001$). The share of currently relevant contact allergy among all positive reactions declined significantly as well ($P = 0.0032$). Concerning product classes, a relative decline of leave-on and a relative increase of rinse-off and household products was noted. The prevalence of MI contact allergy decreased by 50% from 2015 to 2017. As a consequence of regulation, the share of cosmetics products (leave-on in particular) eliciting allergic contact dermatitis is decreasing. The chosen method of analysing causative

In this study, the authors followed-up on the prevalence of contact allergy to MI in consecutively patch tested patients and assess the spectrum of products containing MI or methylchloroisothiazolinone (MCI)/MI in patients positive to MI which elicited current allergic contact dermatitis.

products in sensitised patients has proven useful to monitor effects of intervention.

Authors: Uter W, Aalto-Korte K, Agner T, Andersen KE, Bircher AJ, Brans R, Bruze M, Diepgen TL, Foti C, Giménez Arnau A, Gonçalo M, Goossens A, McFadden J, Paulsen E, Svedman C, Rustemeyer T, White IR, Wilkinson M, Johansen JD; European Environmental Contact Dermatitis Research Group. Full Source: Journal of the European Academy of Dermatology and Venereology. 2019 Aug 16. doi: 10.1111/jdv.15875. [Epub ahead of print]

The cholinergic anti-inflammatory pathway in resistant hypertension treated with renal denervation

2019-10-15

Renal denervation (RDN) reduces sympathetic tone and may alter the sympathetic-parasympathetic balance. The autonomic nervous system is partly a regulator of innate immunity via the cholinergic anti-inflammatory pathway (CAP) which inhibits inflammation via the vagus nerve. Placental Growth Factor (PIGF) influences a neuro-immunological pathway in the spleen which may contribute to hypertension. The aim of this study was to investigate if modulation of renal sympathetic nerve activity affects CAP in terms of cytokine release as well as levels of PIGF. Ten patients treated with RDN (Medtronic Inc), were analysed for TNF, IL-1b and IL-10 and Lipopolysaccharide (LPS)-stimulated cytokine release before RDN, 1 day after and at 3- and 6-months follow-up. Four patients who underwent elective coronary angiography served as disease controls (DC). Baseline TNF was significantly lower 1 day after RDN ($p = 0.03$). LPS-stimulated (0, 10 and 100 ng/mL) TNF and IL-1b were significantly lower 1 day after RDN (TNF $p = 0.0009$, $p = 0.0009$ and $p = 0.001$, IL-1b; $p = 0.0001$, $p = 0.002$ and $p = 0.005$). IL-10 was significantly higher one day after RDN ($p = ns$, $p = 0.02$ and $p = 0.01$). These differences however declined during follow up. A more marked TNF reduction was achieved with a cholinergic analogue, GTS-21, in LPS-stimulated whole blood as compared with samples without GTS-21. Cytokine levels in controls did not differ before and 1 day after coronary angiography. PIGF was significantly higher in RDN patients and DC compared with healthy controls but did not change during follow-up. RDN has an immediate effect on TNF in vivo and cytokine release ex vivo but seems to wane over time suggesting that current RDN techniques may not have long-lasting immunomodulatory effect. Repeated and extended stimulation of CAP in resistant hypertension by targeting neural

The aim of this study was to investigate if modulation of renal sympathetic nerve activity affects CAP in terms of cytokine release as well as levels of PIGF.

circuits may be a potential therapeutic strategy for treatment of both hypertension and inflammation.

Authors: Hilderman M, Qureshi AR, Abtahi F, Witt N, Jägren C, Olbers J, Delle M, Lindecrantz K, Bruchfeld A.

Full Source: *Molecular Medicine*. 2019 Aug 15;25(1):39. doi: 10.1186/s10020-019-0097-y.

The Effects of Endocrine Disrupting Chemicals on Biomarkers of Inflammation Produced by Lipopolysaccharide Stimulated RAW264.7 Macrophages

2019-10-15

Endocrine disrupting chemicals (EDCs) are common pollutants in the environment and can induce disruption of the endocrine and immune systems. The present study evaluated the effects of selected common environmental EDCs on secretion of inflammatory biomarkers by RAW264.7 cells. The EDCs investigated were Oestradiol (E2), 5 α -dihydrotestosterone (DHT), and Bisphenol A (BPA). To evaluate if the effects caused by EDCs were modulated by steroid hormone receptors, antagonists of oestrogen and androgen receptors were used. The steroid receptor antagonists used were Tamoxifen, an oestrogen receptor antagonist, and Flutamide, an androgen receptor antagonist. Secretion of biomarkers of inflammation, namely nitric oxide (NO) and interleukin 6 (IL-6), were monitored. The NO was determined using Griess reaction and IL-6 was measured by enzyme linked immunosorbent assay (ELISA). Although 5 μ g/mL E2, DHT, and BPA were not toxic to RAW264.7 cell cultures, the same treatments significantly ($p < 0.001$) reduced both NO and IL-6 secretion by lipopolysaccharide (LPS)-stimulated RAW264.7 cell cultures. The suppression of NO and IL-6 secretion indicate inhibition of inflammation by DHT, E2, and BPA. The inhibitory effects of DHT, E2 and BPA are partially mediated via their cellular receptors, because the effects were reversed by their respective receptor antagonists. Flutamide reversed the effects of DHT, while Tamoxifen reversed the effects of E2 and BPA. In conclusion, E2, BPA, and DHT inhibit the synthesis of inflammation biomarkers by LPS-stimulated RAW264.7 cells. The inhibitory effects of EDCs can be partially reversed by the addition of an estrogen receptor antagonist for E2 and BPA, and an androgenic receptor antagonist for DHT. The inhibition of inflammatory response in stimulated RAW264.7 cells may

The present study evaluated the effects of selected common environmental EDCs on secretion of inflammatory biomarkers by RAW264.7 cells.

be a useful bioassay model for monitoring estrogenic and androgenic pollutants.

Authors: Makene VW, Pool EJ.

Full Source: International Journal of Environmental Research & Public Health. 2019 Aug 14;16(16). pii: E2914. doi: 10.3390/ijerph16162914.

Urinary trichloroacetic acid and high blood pressure: A cross-sectional study of general adults in Shijiazhuang, China

2019-10-15

Exposure to trichloroacetic acid (TCAA) and its parent chemicals potentially linked to cardiovascular disease. However, the association between TCAA and blood pressure (BP) has not been studied to date. The purpose of this study was to examine the potential association between urinary TCAA levels and BP in a Chinese population. The authors measured BP parameters (including systolic BP, diastolic BP and pulse pressure) and TCAA concentrations in the urine of 569 adults from a primary health care clinic in Shijiazhuang, China. Logistic and linear regressions were used to investigate the relationships between the urinary TCAA levels and BP parameters. To evaluate the robustness of the results, sensitivity analyses was conducted by re-analysing data after excluding urine samples with extreme specific creatinine values. It was found that urine TCAA levels were positively associated with systolic BP and pulse pressure based on trend tests after adjusting for potential confounders (both p for trend < 0.05). Finally, only the association of TCAA with systolic BP remained significant in the sensitivity analyses ($p < 0.05$). Our results suggested that TCAA exposure was associated with increased BP in adults. Because urinary TCAA has been proposed as a valid biomarker of disinfection by-product (DBP) ingestion through disinfected drinking water, our results further suggest that exposure to drinking water DBPs may contribute to high BP in humans. Additional research is needed to confirm these findings and to evaluate opportunities for intervention.

Authors: Zhang SH, Guo AJ, Zhao WX, Gu JL, Zhang R, Wei N.

Full Source: Environmental Research. 2019 Oct; 177:108640. doi: 10.1016/j.envres.2019.108640. Epub 2019 Aug 9.

The purpose of this study was to examine the potential association between urinary TCAA levels and BP in a Chinese population.

Technical

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Medroxyprogesterone acetate alters the vaginal microbiota and microenvironment in a Kenyan sex worker cohort and is also associated with increased susceptibility to HIV-1 in humanised mice

2019-10-15

The hormonal contraceptive Medroxyprogesterone Acetate (MPA) is associated with increased risk of Human Immunodeficiency Virus (HIV), via incompletely understood mechanisms. Increased diversity in the vaginal microbiota modulates genital inflammation and is associated with increased HIV-1 acquisition. However, the effect of MPA on diversity of the vaginal microbiota is relatively unknown. In a cohort of female Kenyan sex workers, negative for sexually transmitted infections (STIs), with Nugent Scores <7 (N=58 of 370 screened), MPA correlated with significantly increased diversity of the vaginal microbiota as assessed by 16S rRNA gene sequencing. MPA was also significantly associated with decreased levels of oestrogen in the plasma, and low vaginal glycogen and α -amylase, factors implicated in vaginal colonisation by lactobacilli, bacteria believed to protect against STIs. In a humanised mouse model, MPA treatment was associated with low serum oestrogen, low glycogen, and enhanced HIV-1 susceptibility. The mechanism by which the MPA mediated changes in the vaginal microbiota may contribute to HIV-1 susceptibility in this cohort of Kenyan sex workers with Nugent Scores <7 appears to be independent of inflammatory cytokines and/or activated T cells. Altogether these results suggest MPA-induced hypo-estrogenism may alter key metabolic components necessary for vaginal colonization by certain bacterial species including lactobacilli, and allow for greater bacterial diversity in the vaginal microbiota.

Authors: Wessels JM, Lajoie J, Cooper MIJH, Omollo K, Felker AM, Vitali D, Dupont HA, Nguyen PV, Mueller K, Vahedi F, Kimani J, Oyugi J, Cheruiyot J, Mungai J, Deshiere A, Tremblay MJ, Mazzulli T, Stearns JC, Ashkar AA, Fowke KR, Surette MG, Kaushic C.

Full Source: Disease Models & Mechanisms. 2019 Sep 19. pii: dmm.039669. doi: 10.1242/dmm.039669. [Epub ahead of print]

The hormonal contraceptive Medroxyprogesterone Acetate (MPA) is associated with increased risk of Human Immunodeficiency Virus (HIV), via incompletely understood mechanisms.

OCCUPATIONAL RESEARCH

Occupational swine exposure and Hepatitis E virus, *Leptospira*, *Ascaris suum* seropositivity and MRSA colonization in Austrian veterinarians, 2017-2018-A cross-sectional study

2019-10-15

The authors investigated the prevalence of Hepatitis E Virus (HEV), *Leptospira* and *Ascaris suum* (A. suum) seropositivity, and of nasal methicillin-resistant *Staphylococcus aureus* (MRSA) colonisation among Austrian practising veterinarians, and assessed the association with occupational swine livestock exposure. The 261 participants completed a questionnaire on demographics, intensity of occupational swine livestock contact and glove use during handling animals and their secretions. Participants' blood samples were tested for HEV, *Leptospira* and A. suum seropositivity and nasal swabs cultured for MRSA. Swine veterinarians (defined as >3 swine livestock visits/week) were compared to non-swine veterinarians (≤ 3 swine livestock visits/week) with regard to the outcomes through calculating prevalence ratio (PR) and 95% confidence interval (CI). Furthermore, the relationship between occupational swine livestock contact and the study outcomes was examined by age ($</\geq 55$ years) and glove usage. The prevalence of nasal MRSA colonisation was 13.4% (95% CI: 9.3-17.6), of HEV seropositivity 20.8% (95% CI: 15.8-25.7) and A. suum seropositivity 44% (95% CI: 37.7-50.2). The highest anti-leptospiral antibodies titres were 1:200 (*L. hebdomadis*) and 1:100 (*L. autumnalis*, *L. caicola*) found in three non-swine veterinarians. Compared to non-swine veterinarians, swine veterinarians were 1.9 (95% CI: 1.0-3.4) and 1.5 (95% CI: 1.0-2.3) times more likely HEV seropositive and A. suum seropositive, respectively, and 4.8 (95% CI: 2.5; 9.3) times more likely nasally colonised with MRSA. Among glove-using veterinarians, occupational swine contact was no longer a determinant for HEV seropositivity (PR 1.6; 95% CI: 0.8-2.9). Similar was found for A. suum seropositivity, which was no longer associated with occupational swine livestock contact in the subgroup of glove using, ≥ 55 -year-old veterinarians (PR: 1.07; 95% CI: 0.4-3.3). Our findings indicate that >3 occupational swine livestock visits per week is associated with HEV and A. suum seropositivity and nasal MRSA colonisation and that glove use may play a putative preventive role in acquiring HEV and A. suum. Further

The authors investigated the prevalence of Hepatitis E Virus (HEV), *Leptospira* and *Ascaris suum* (A.

analytical epidemiological studies have to prove the causality of these associations.

Authors: Taus K, Schmoll F, El-Khatib Z, Auer H, Holzmann H, Aberle S, Pekard-Amenitsch S, Monschein S, Sattler T, Steinparzer R, Allerberger F, Schmid D.

Full Source: Zoonoses Public Health. 2019 Aug 16. doi: 10.1111/zph.12633. [Epub ahead of print]

lncRNAVNN3 mediated benzene-induced hematotoxicity through promoting autophagy and apoptosis

2019-10-15

The potential toxicity of low-dose benzene exposure to human health has received attention, but the mechanisms of low-dose benzene-induced hematotoxicity remain largely unknown. The purpose of our study was to investigate the relationships between lncRNAVNN3 expression with benzene-induced autophagy and apoptosis in control and benzene-exposed workers. Seventy benzene-exposed workers and seventy non-benzene-exposed healthy workers were recruited. The expression of lncRNAVNN3, serum autophagy-associated and apoptosis-associated proteins were evaluated, and the relationship among them were also analysed. Furthermore, the mechanism of lncRNAVNN3 on autophagy and apoptosis induced by benzene metabolite (1, 4-benzoquinone, 1, 4-BQ) was investigated in vitro. The results showed that the expression of lncRNAVNN3 increased in benzene-exposed workers ($p < 0.05$). A positive correlation was found between lncRNAVNN3, serum autophagy-associated and apoptosis-associated proteins. In addition, the authors found that the knockdown of lncRNAVNN3 reduced phosphorylation of beclin1 and Bcl-2, which mediated 1, 4-benzoquinone-induced autophagy and apoptosis. Overall, lncRNAVNN3 mediated 1, 4-benzoquinone-induced autophagy and apoptosis through regulating phosphorylation of beclin1 and Bcl-2, suggesting that lncRNAVNN3 might be a novel early sensitive biomarker of benzene-induced hematotoxicity.

Authors: Chen Y, Zhang W, Guo X, Ren J, Gao A.

Full Source: Ecotoxicology & Environmental Safety. 2019 Sep 18; 185:109672. doi: 10.1016/j.ecoenv.2019.109672. [Epub ahead of print]

The purpose of our study was to investigate the relationships between lncRNAVNN3 expression with benzene-induced autophagy and apoptosis in control and benzene-exposed workers. Seventy benzene-exposed workers and seventy non-benzene-exposed healthy workers were recruited.

Occupational Exposures Among Hair and Nail Salon Workers: A Scoping Review

2019-10-15

The present study reviewed the literature published from 2014 to 2019 on hair and nail salon workers concerning exposure assessment, reproductive and respiratory endpoints, and endocrine disruption, in relation to workplace exposures. The authors identified 29 relevant peer-reviewed publications. Overall, there were insufficient studies to determine whether working in these settings is associated with reproductive health endpoints, although prior studies suggest that reproductive effects are of concern. There is consistent evidence that working in hair and nail salons may increase the risk of respiratory effects. Also, despite the fact that many hair and nail care products contain endocrine disrupting compounds, no recent studies have evaluated endocrine-related endpoints. Moreover, few studies have evaluated chemical exposures in these settings and biomonitoring studies are sparse. Improved exposure assessment of chemical hazards in hair and nail salons is necessary to properly characterise occupational exposures and assess their potential health risks. Further studies on endpoints related to endocrine disruption and reproductive health outcomes among hair and nail salon workers are needed. Improved exposure and epidemiologic studies will help inform chemical exposure mitigation efforts in a vulnerable occupational population, as well as policies related to workplace and consumer product safety.

Authors: Quiros-Alcala L, Pollack AZ, Tchangalova N, DeSantiago M, Kavi LKA.

Full Source: Current Environmental Health Reports. 2019 Sep 21. doi: 10.1007/s40572-019-00247-3. [Epub ahead of print]

Industry Derived Occupational Exposure Limits: A Survey of Professionals on the Dutch System of Exposure Guidelines

2019-10-15

The Netherlands' system for occupational exposure limits (OELs) encompasses two kinds of OELs: public and private. Public OELs are set by the government. Private OELs are derived by industry and cover all substances without a public OEL. In parallel, the regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) has introduced an exposure guidance value similar to the OEL, namely the Derived No-Effect Level (DNEL) for workers' inhalation exposure. This study aimed to investigate issues encountered by

The present study reviewed the literature published from 2014 to 2019 on hair and nail salon workers concerning exposure assessment, reproductive and respiratory endpoints, and endocrine disruption, in relation to workplace exposures.

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occupational health professionals regarding private OELs, and how they perceive the DNELs for workers in relation to private OELs. Towards this aim, the authors sent out a web-based questionnaire to the members of the Dutch professional organisation for occupational hygienists (Nederlandse Vereniging voor Arbeidshygiëne [NVVA], n = 513) and to members of the Dutch professional organization for safety engineers (NVVK, n = 2916). Response rates were 27% (n = 139) and 7% (n = 198), respectively. More occupational hygienists (59%) than safety engineers (17%) reported to derive private OELs themselves. The respondents reported several challenges with the derivation of private OELs. Fifty-one percent of the occupational hygienists and 20% of the safety engineers stated to see a role of REACH Registrants' worker DNELs as private OELs. However, more than half of the respondents were undecided or unfamiliar with worker DNELs. In addition, stated opinions on where worker DNELs fit in the hierarchy of private OELs varied considerably. To conclude, both these professional groups derive private OELs and stated that they need more guidance for this. Furthermore, there is a lack of clarity whether worker DNELs may qualify as private OELs, and where they would fit in the hierarchy of private OELs.

Authors: Schenk L, Visser MJ, Palmen NGM.

Full Source: *Annals of Work Exposure & Health*. 2019 Aug 24. pii: wxz069.

doi: 10.1093/annweh/wxz069. [Epub ahead of print]

PUBLIC HEALTH RESEARCH

Sources and dynamics of semivolatile organic compounds in a single-family residence in northern California

2019-10-15

Semivolatile organic compounds (SVOCs) emitted from building materials, consumer products, and occupant activities alter the composition of air in residences where people spend most of their time. Exposures to specific SVOCs potentially pose risks to human health. However, little is known about the chemical complexity, total burden, and dynamic behaviour of SVOCs in residential environments. Furthermore, little is known about the influence of human occupancy on the emissions and fates of SVOCs in residential air. In the present study, the authors present the first-ever hourly measurements of airborne SVOCs in a residence during normal occupancy. State-of-the-art semivolatile thermal-desorption aerosol gas chromatography (SV-TAG) was used. Indoor air is shown consistently to contain much higher levels of SVOCs than outdoors, in terms of both abundance and chemical complexity. Time-series data are characterised

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by temperature-dependent elevated background levels for a broad suite of chemicals, underlining the importance of continuous emissions from static indoor sources. Substantial increases in SVOC concentrations were associated with episodic occupant activities, especially cooking and cleaning. The number of occupants within the residence showed little influence on the total airborne SVOC concentration. Enhanced ventilation was effective in reducing SVOCs in indoor air, but only temporarily; SVOCs recovered to previous levels within hours.

Authors: Kristensen K, Lunderberg DM, Liu Y, Misztal PK, Tian Y, Arata C, Nazaroff WW, Goldstein AH.

Full Source: Indoor Air. 2019 Jul; 29(4):645-655. doi: 10.1111/ina.12561.

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Concentrations of selected chemicals in indoor air from Norwegian homes and schools

2019-10-15

Both building materials and consumer products have been identified as possible sources for potentially hazardous substances like phthalates, polychlorinated biphenyls (PCBs), organophosphorous flame retardants (OPFRs), polybrominated diphenyl ethers (PBDEs) and short chain chlorinated paraffins (SCCPs) in indoor air. Thus, indoor air has been suggested to contribute significantly to human exposure to these chemicals. There is lack of data on the occurrence of several of the aforementioned chemicals in indoor air. Therefore, indoor air (gas and particulate phase) was collected from 48 households and 6 classrooms in two counties in Norway. In both the households and schools, median levels of low molecular weight phthalates (785 ng/m³), OPFRs (55 ng/m³) and SCCPs (128 ng/m³) were up to 1000 times higher than the levels of PCBs (829 pg/m³) and PBDEs (167 pg/m³). Median concentrations of dimethyl phthalate (DMP), diethyl phthalate (DEP), di-isobutyl phthalate (DiBP) and SCCPs were 3-6 times higher in households compared to schools. The levels of OPFRs, PCBs and PBDEs were similar in households and schools. In univariate analysis, the indoor concentrations of different environmental chemicals were significantly affected by location of households (OPFRs), airing of living room (some PCBs and PBDEs), presence of upholstered chair/couch (OPFRs), pet animal hold (some PBDEs) and presence of electrical heaters (selected PCBs and PBDEs). Significant correlations were also detected for the total size of households with OPFRs, frequency of vacuuming the living room with selected PCBs and PBDEs, frequency of washing the living room with selected PCBs and the total number of TVs in the households with selected phthalates

and SCCPs. Finally, intake estimates indicated that indoor air contributed more or equally to low molecular weight phthalates and SCCPs exposure compared to food consumption, whereas the contribution from indoor air was smaller than the dietary intake for the other groups of chemicals.

Authors: Sakhi AK, Cequier E, Becher R, Bølling AK, Borgen AR, Schlabach M, Schmidbauer N, Becher G, Schwarze P, Thomsen C.

Full Source: Science of the Total Environment. 2019 Jul 15; 674:1-8. doi: 10.1016/j.scitotenv.2019.04.086. Epub 2019 Apr 9.

Peak Exposures in Epidemiologic Studies and Cancer Risks: Considerations for Regulatory Risk Assessment

2019-10-15

The authors reviewed approaches for characterising “peak” exposures in epidemiologic studies and methods for incorporating peak exposure metrics in dose-response assessments that contribute to risk assessment. The focus was on potential etiologic relations between environmental chemical exposures and cancer risks. The epidemiologic literature on environmental chemicals classified as carcinogens in which cancer risks were described in relation to “peak” exposures was searched. These articles were evaluated to identify some of the challenges associated with defining and describing cancer risks in relation to peak exposures. It was found that definitions of peak exposure varied considerably across studies. Of nine chemical agents included in our review of peak exposure, six had epidemiologic data used by the U.S. Environmental Protection Agency (US EPA) in dose-response assessments to derive inhalation unit risk values. These were benzene, formaldehyde, styrene, trichloroethylene, acrylonitrile, and ethylene oxide. All derived unit risks relied on cumulative exposure for dose-response estimation and none, to the authors knowledge, considered peak exposure metrics. This is not surprising, given the historical linear no-threshold default model (generally based on cumulative exposure) used in regulatory risk assessments. With newly proposed US EPA rule language, fuller consideration of alternative exposure and dose-response metrics will be supported. “Peak” exposure has not been consistently defined and rarely has been evaluated in epidemiologic studies of cancer risks. The authors recommend developing uniform definitions of “peak” exposure to facilitate fuller evaluation of dose response for environmental chemicals and cancer risks, especially where

The authors reviewed approaches for characterising “peak” exposures in epidemiologic studies and methods for incorporating peak exposure metrics in dose-response assessments that contribute to risk assessment.

mechanistic understanding indicates that the dose response is unlikely linear and that short-term high-intensity exposures increase risk.

Authors: Checkoway H, Lees PSJ, Dell LD, Gentry PR, Mundt KA.

Full Source: Risk Analysis. 2019 Jul;39(7):1441-1464. doi: 10.1111/risa.13294. Epub 2019 Mar 29.

Polymers Used in US Household Cleaning Products: Assessment of Data Availability for Ecological Risk Assessment

2019-10-15

The purpose of this study was to identify, characterise, and assess data needs for ecological risk of household cleaning product polymers currently being used in the United States (US). Because of their range in properties and functions, polymers are used in a wide variety of household cleaning products, including fabric, dish, and hard surface cleaners. Understanding their potential environmental impact is essential for good ingredient and product stewardship. The household cleaning product polymers were first identified using several databases. Of the 185 polymers initially identified, 120 were eliminated from the list because they did not fit the definition of a polymer, were not well defined (e.g., no Chemical Abstracts Service [CAS] or trade name only), or were not in current use. Forty-seven of the remaining polymers had either adequate environmental fate and hazard data and/or sufficient data for conducting a comprehensive ecological risk assessment and were determined to be of low concern by either the United States Environmental Protection Agency (USEPA), the European Chemicals Agency (ECHA), and/or the Human and Environmental Risk Assessment (HERA) Project. The remaining 18 polymers were determined to need further review because of a lack of publicly available information for conducting ecological risk assessments. Additional data for these 18 polymers could be obtained by accessing privately held data, conducting laboratory tests on their fate and effects in aquatic environments, or by conducting read-across of similar structured polymers. These steps can be utilized by industry to determine where best to dedicate future environmental stewardship efforts.

Authors: Pecquet A, McAvoy D, Pittinger C, Stanton K.

Full Source: Integrated Environmental Assessment & Management. 2019 Jul;15(4):621-632. doi: 10.1002/ieam.4150.

The purpose of this study was to identify, characterise, and assess data needs for ecological risk of household cleaning product polymers currently being used in the United States (US).

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Altered Sex Ratios in Offspring of U.S. Submariners Urban Legend or Fact – Do Submariners Have More Daughters?

2019-10-15

There is a widespread and long-held belief in the submarine community that submariners father more daughters than the general population. The U.S. Sex Ratio at birth (males/females) has remained around 1.05 since the early 2000s. Limited evidence exists that certain environmental exposures including chemicals, heavy metals, radiation and g-forces may influence sex ratio at birth. A reduction in male births in a population has been associated with lower male fertility. A 1970 single site study showed a higher ratio of female offspring in personnel serving aboard U.S. Navy nuclear submarines than the general population. A 2004 study concluded that this was probably not true. However, this study was small, and did not evaluate the difference between children conceived during sea duty versus shore duty. They did note a higher chance of female offspring correlated with a longer time in the community, as well as an increased ratio in sonar technicians. These findings warrant further investigation. An electronic survey was e-mailed to submariners, after receiving required IRB and Navy approvals. Participants were asked birth year, year they entered submarine service, and how many children they had. For each child they were asked sex, child's birth year, mother's birth year, and whether they were on sea duty or shore duty at the time of conception. Those who were on sea duty at the time of conception were asked what their job was, where they were stationed and what type of submarine they were on. Those who were on shore duty at the time of conception were asked whether they were in contact with submarines on a regular basis, whether they were officer or enlisted, and what region they were stationed in for shore duty. Four thousand eight hundred responses were received with a total of 6,958 children included in the analysis. Respondents had a SR of 0.95 compared to 1.05 U.S. population in 2015 ($p < 0.0001$). Submariners on sea duty had a SR of 0.88 compared to 1.02 on shore duty ($p = 0.007$). Those who had regular submarine contact on shore duty had a SR of 0.72 compared to 1.17 in those who did not ($p < 0.001$). Geographical location during shore duty did show differences that were statistically significant ($p = 0.018$). Geographical location during sea duty did not show significant differences. No significant differences were seen for paternal age, maternal age, job during sea duty, type of submarine assigned to or time in community. The submariners surveyed reported greater numbers of daughters than the general population, especially when on sea duty or in regular contact with submarines during shore duty. Further study should

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be done to confirm results and explore possible aetiologies of differences in sex ratio.

Authors: Kramer K, Raiciulescu S, Olsen C, Hickey K, Ottolini M.

Full Source: Military Medicine. 2019 Jul 1;184(7-8): e321-e328. doi: 10.1093/milmed/usy390.