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ENVIRONMENTAL RESEARCH

Anchoring Co(II) Ions into a Thiol-Laced Metal-Organic Framework for Efficient Visible-Light-Driven CO₂-to-CO Conversion

2019-04-29

Using solar energy to convert CO₂ into valuable fuels or chemicals offers a powerful solution to the urgent energy and environment problems. However, the development of efficient and selective catalysts remains a considerable scientific challenge. In this study, the authors report a versatile strategy for anchoring catalytically active Co(II) centres into the porous matrix of metal-organic frameworks (MOFs), by utilising a robust Zr-based MOF (Zr-DMBD) functionalised with self-standing thiol (-SH) groups to enable efficient post-synthetic metal insertion. The Zr-DMBD-Co MOF solids thus prepared are modified by well-defined Co-thiolate units and possess the capability of photocatalytically converting CO₂ to CO with high efficiency and selectivity under visible-light irradiation in a water-containing system. The turnover number (TON) and CO selectivity reach as high as 97941 and 98%, respectively.

Authors: Zhong DC, Liu DC, Ouyang T, Xiao R, Liu WJ, Xu Z, Lu TB.

Full Source: ChemSusChem. 2019 Feb 11. doi: 10.1002/cssc.201900338.

[Epub ahead of print]

Halogenated organics generated during online chemical cleaning of MBR: An emerging threat to water supply and public health

2019-04-29

The global wastewater treatment capacity of MBR has been constantly growing due to the strong needs in water reuse/cycle and restrictive availability of land. Recent research revealed generation of a variety of halogenated organics during online chemical cleaning of MBR with sodium hypochlorite (NaClO) which has been commonly practiced for fouling control and permeability recovery of MBR. These exogenous halogenated organics may likely migrate into natural water bodies and soils through the discharge of MBR permeate, while they tend to bioaccumulate in aquatic food chains (e.g. aquatic animals and plants), leading to a dangerous concentration level for human health. It should be realised that the potent environmental and public health risks associated with produced halogenated organics in MBR permeate have not yet been aware and assessed in consideration of the entire water life cycles.

In this study, the authors report a versatile strategy for anchoring catalytically active Co(II) centres into the porous matrix of metal-organic frameworks (MOFs), by utilising a robust Zr-based MOF (Zr-DMBD) functionalised with self-standing thiol (-SH) groups to enable efficient post-synthetic metal insertion.

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Therefore, this study attempts to express serious concern on, while raising scientific and public awareness on this emerging issue.

Authors: Zhang X, Liu Y.

Full Source: Science of the Total Environment. 2019 Mar 15; 656:547-549.

doi: 10.1016/j.scitotenv.2018.11.410. Epub 2018 Nov 29.

The quantification of chlorinated paraffins in environmental samples by ultra-high-performance liquid chromatography coupled with Orbitrap Fusion Tribrid mass spectrometry

2019-04-29

High-production-volume chemicals, chlorinated paraffins (CPs) have raised an increasing environmental concern in recent years. However, their accurate analysis and quantification is still a huge challenge due to the high complexity of their technical formulations and the interference from CPs congeners and other polychlorinated products. In this study, a novel method for the simultaneous analysis of short-chain (SC) and medium-chain (MC) CPs in a single injection has been developed using ultra-high-performance liquid chromatography coupled with Orbitrap Fusion Tribrid mass spectrometry (UHPLC-Orbitrap Fusion TMS). Compared with other analytical methods for CPs, this novel method can greatly shorten the measurement time and provides a lower limit of detection. A high resolution of 120,000 FWHM was set to avoid the self-interference of CPs congeners and to eliminate interferences from chlorinated olefins (COs). Accuracies for SCCPs and MCCPs standards were evaluated at 75-103% and 83-118%, respectively. The developed method was further validated by determining CPs in sediment, soil, and indoor dust samples. This novel method gives higher CPs concentrations than those achieved by gas chromatography-electron capture negative ionisation low-resolution mass spectrometry (GC-ECNI-LRMS), with factors of 1.1-12.5 for SCCPs and 0.7-2.7 for MCCPs, respectively. Some new CPs, such as C8Cl7-8 and C9Cl5-8, have been determined in soil samples for the first time, indicating great potential of this novel method for routine CP analysis in various environmental samples.

Wu Y, Gao S, Liu Z, Zhao J, Ji B, Zeng X, Yu Z.

Full Source: Journal of Chromatography A. 2019 Jan 31. pii: S0021-

9673(19)30129-3. doi: 10.1016/j.chroma.2019.01.077. [Epub ahead of print]

In this study, a novel method for the simultaneous analysis of short-chain and medium-chain chlorinated paraffins in a single injection has been developed using ultra-high-performance liquid chromatography coupled with Orbitrap Fusion Tribrid mass spectrometry.

River channel connectivity shifts metabolite composition and dissolved organic matter chemistry

2019-04-29

Biogeochemical processing of dissolved organic matter (DOM) in headwater rivers regulates aquatic food web dynamics, water quality, and carbon storage. Although headwater rivers are critical sources of energy to downstream ecosystems, underlying mechanisms structuring DOM composition and reactivity are not well quantified. By pairing mass spectrometry and fluorescence spectroscopy, the authors show that hydrology and river geomorphology interactively shape molecular patterns in DOM composition. River segments with a single channel flowing across the valley bottom export DOM with a similar chemical profile through time. In contrast, segments with multiple channels of flow store large volumes of water during peak flows, which they release downstream throughout the summer. As flows subside, losses of lateral floodplain connectivity significantly increase the heterogeneity of DOM exported downstream. By linking geomorphologic landscape-scale processes with microbial metabolism, the authors show DOM heterogeneity increases as a function of fluvial complexity, with implications for ecosystem function and watershed management.

Authors: Lynch LM, Sutfin NA, Fegel TS, Boot CM, Covino TP, Wallenstein MD.

Full Source: Nature Communications. 2019 Jan 28;10(1):459. doi: 10.1038/s41467-019-08406-8.

Partitioning and Bioaccumulation of Legacy and Emerging Hydrophobic Organic Chemicals in Mangrove Ecosystems

2019-04-29

Knowledge regarding partitioning behaviour and bioaccumulation potential of environmental contaminants is important for ecological and human health risk assessment. While a range of models are available to describe bioaccumulation potential of hydrophobic organic chemicals (HOCs) in temperate aquatic food webs, their applicability to tropical systems still needs to be validated. The present study involved field investigations to assess the occurrence, partitioning, and bioaccumulation behaviour of several legacy and emerging HOCs in mangrove ecosystems in Singapore. Concentrations of synthetic musk fragrance compounds, methyl triclosan (MTCS), polychlorinated biphenyls, organochlorine pesticides, and polycyclic aromatic hydrocarbons were measured in mangrove sediments, clams, and caged mussels. Freely dissolved

The present study involved field investigations to assess the occurrence, partitioning, and bioaccumulation behaviour of several legacy and emerging HOCs in mangrove ecosystems in Singapore.

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concentrations of the HOCs in water were determined using silicone rubber passive samplers. Results showed that polycyclic musks and MTCS are present in mangrove ecosystems and can accumulate in the tissues of molluscs. The generated HOC concentration data for mangrove water, sediments, and biota samples was further utilised to evaluate water-sediment partitioning (e.g., Koc values) and bioaccumulation behaviour (e.g., BAF and BSAF values). Overall, the empirical models fit reasonably well with the data obtained for this ecosystem, supporting the concept that general models are applicable to predict the behaviour of legacy and emerging HOCs in mangrove ecosystems.

Authors: Bayen S, Segovia Estrada E, Zhang H, Lee WK, Juhel G, Smedes F, Kelly BC.

Full Source: Environmental Science & Technology. 2019 Mar 5;53(5):2549-2558. doi: 10.1021/acs.est.8b06122. Epub 2019 Feb 11.

MEDICAL RESEARCH

Immunomodulatory effects of synthetic endocrine disrupting chemicals on the development and functions of human immune cells

2019-04-29

Endocrine disrupting chemicals (EDCs) are added to food, cosmetics, plastic packages, and children's toys and have thus become an integral part of the human environment. In the last decade, there has been increasing interest in the effect of EDCs on human health, including their impact on the immune system. So far, researchers have proved that EDCs (e.g. bisphenols, phthalates, triclosan, phenols, propanil, tetrachlorodibenzo-p-dioxin, diethylstilbestrol, tributyltin (TBT), and parabens) affect the development, functions, and lifespan of immune cells (e.g., monocytes, neutrophils, mast cells, eosinophils, lymphocytes, dendritic cells, and natural killers). In this study, the authors have summarised the current knowledge of the multivariable influence of EDCs on immune cells and underlined the novel approach to EDC studies, including dose-dependent effects and low-dose effects. The authors discuss critically the possible relationship between exposure to EDCs and immunity related diseases (e.g. allergy, asthma, diabetes, and lupus). Moreover, based on the literature, a model of possible mechanisms of EDC

In this study, the authors have summarised the current knowledge of the multivariable influence of EDCs on immune cells and underlined the novel approach to EDC studies, including dose-dependent effects and low-dose effects.

action on immune cells at cellular, molecular, and epigenetic levels was constructed.

Authors: Nowak K, Jabłońska E, Ratajczak-Wrona W.

Full Source: Environment International. 2019 Apr; 125:350-364. doi:

10.1016/j.envint.2019.01.078. Epub 2019 Feb 8.

Lipoxygenase Protein Expression and Its Effect on Oxidative Stress Caused by Benzidine in Normal Human Urothelial Cell Lines

2019-04-29

Metabolic activation of indirect-acting carcinogens in the target organ is an effective mechanism of carcinogenesis. Lipoxygenase (LOX) can co-oxidise the bladder carcinogen benzidine (BZ). However, it is not entirely clear whether BZ is activated and which enzyme is involved in its activation in bladder epithelial cells. The results showed that BZ induced 5-LOX protein expression but had no significant influence on the expression of 15-LOX-2, CYP1B1, and CYP2E1 in SV-40 immortalised human uroepithelial SV-HUC-1 cells. BZ induced oxidative stress in SV-HUC-1 cells by increasing reactive oxygen species (ROS) and malondialdehyde levels significantly in the 100 and 200 $\mu\text{mol/L}$ -BZ-treated groups and decreased the level of the antioxidant reduced glutathione significantly at 200 $\mu\text{mol/L}$ BZ. Concurrently, the activity of catalase was increased, while the activity of superoxide dismutase was increased at 50 $\mu\text{mol/L}$ BZ but gradually decreased with increasing concentrations of BZ ($P < 0.05$). However, the oxidative stress and damage in SV-HUC-1 cells caused by BZ were effectively inhibited by the 5-LOX-specific inhibitor AA861 at 10 $\mu\text{mol/L}$. Thus, 5-LOX is probably the major LOX isozyme to co-oxidise exogenous chemicals in SV-HUC-1 cells. AA861 has a protective effect on the oxidative stress and damage induced by BZ in SV-HUC-1 cells. The authors conclude that BZ can be activated by 5-LOX to produce ROS and oxidative stress, which may be associated with bladder cancer caused by BZ.

Authors: Huang Y, Huang S, Wu Y, Peng M, Zhang X, Wang J, Hu J.

Full Source: International Journal of Toxicology. 2019 Feb

10:1091581819827495. doi: 10.1177/1091581819827495. [Epub ahead of print]

Lipoxygenase (LOX) can co-oxidise the bladder carcinogen benzidine.

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Association of in utero hexachlorocyclohexane exposure with gestational age

2019-04-29

As endocrine disrupting chemicals, hexachlorocyclohexane (HCH) isomers were reported to impair the intrauterine growth. Although the findings of HCHs with preterm birth were well established, the associations with gestational age were limited. In the present study, the authors examined whether exposure to HCHs would influence gestational age. The study population included 1028 pregnant women and their offspring who were born in 2014-2015 from a birth cohort in Wuhan, China. Associations of the cord serum HCH levels with gestational age were estimated using generalised linear models. Higher HCH levels were found in pregnant women, who were elder, had higher body mass index (BMI) before pregnancy, received higher education, or were exposed to smoking passively. For term birth, the 3rd tertiles of α -HCH and γ -HCH were significantly associated with shorter gestational age [crude $\beta = -1.017$, confidence interval (CI): - 2.017, - 0.018 for α -HCH, crude $\beta = -1.068$, CI: - 2.067, - 0.070 for γ -HCH], and relationships were similar after adjusted by covariates. Stratified analysis showed positive associations between α -HCH and gestational age for mothers younger than 25 years old (adjusted $\beta = 0.610$, CI: 0.061, 1.158), while showing negative relationships for mothers elder than 35 years old (adjusted $\beta = -1.365$, CI: -2.414, -0.317). In summary, the findings indicated cord serum levels of HCHs were associated with gestational age at birth.

Authors: Fang J, Liu H, Zhao H, Zhou Y, Xu S, Cai Z.

Full Source: *Ecotoxicology & Environmental Safety*. 2019 Jun 15; 174:263-269. doi: 10.1016/j.ecoenv.2019.02.089. Epub 2019 Mar 1.

Associations between repeated measure of plasma perfluoroalkyl substances and cardiometabolic risk factors

2019-04-29

Perfluoroalkyl substances (PFAS) are persistent synthetic chemicals that may affect components of metabolic risk through the peroxisome proliferator-activated receptor but epidemiological data remain scarce and inconsistent. In the present study, the authors estimated the associations between repeated measurements of the main PFAS in plasma and total cholesterol, triglycerides and hypertension among the control subjects from a population-based nested case-control study on diabetes type 2 in middle-aged women and men. Participants (n = 187) were free of diabetes at both baseline and follow-up visits to the Västerbotten

In the present study, the authors estimated the associations between repeated measurements of the main PFAS in plasma and total cholesterol, triglycerides and hypertension among the control subjects from a population-based nested case-control study on diabetes type 2 in middle-aged women and men.

Intervention Programme, 10 years apart: during 1990 to 2003 (baseline) and 2001 to 2013 (follow-up). Participants left blood samples, completed questionnaires on diet and lifestyle factors, and underwent medical examinations, including measurement of blood pressure. PFAS and lipids were later determined in stored plasma samples. Associations for the repeated measurements were assessed using generalized estimating equations. Six PFAS exceeded the limit of quantitation. Repeated measures of PFAS in plasma, cardiometabolic risk factors and confounders, showed an average decrease of triglycerides from -0.16 mmol/l (95% confidence interval [CI]: -0.33, 0.02 for PFOA) to -0.26 mmol/l (95% CI: -0.50, -0.08 for PFOS), when comparing the highest tertile of PFAS plasma levels with the lowest. Associations based on average PFAS measurements and follow-up triglycerides revealed similar inverse associations, although attenuated. The estimates for cholesterol and hypertension were inconsistent and with few exceptions non-significant. This study found inverse associations between PFAS and triglycerides, but did not support any clear link with either cholesterol or hypertension.

Authors: Donat-Vargas C, Bergdahl IA, Tornevi A, Wennberg M, Sommar J, Koponen J, Kiviranta H, Åkesson A.

Full Source: Environment International. 2019 Mar; 124:58-65. doi: 10.1016/j.envint.2019.01.007. Epub 2019 Jan 10.

Renal function and isomers of perfluorooctanoate (PFOA) and perfluorooctanesulfonate (PFOS): Isomers of C8 Health Project in China

2019-04-29

Perfluoroalkyl substances (PFASs) are widely-utilised synthetic chemicals commonly found in industrial and consumer products. Previous studies have examined associations between PFASs and renal function, yet the results are mixed. Moreover, evidence on the associations of isomers of PFASs with renal function in population from high polluted areas is scant. To help to address this data gap, the authors used high performance liquid chromatography-mass spectrometry to measure serum isomers of perfluorooctanoate (PFOA), perfluorooctanesulfonate (PFOS), and other PFASs from 1612 adults residing in Shenyang, China, and characterised their associations with estimated glomerular filtration rate (eGFR) and chronic kidney disease (CKD). Results showed that after adjusted for multiple confounding factors, most of the higher fluorinated PFASs, except for PFOA and PFDA, were negatively associated with eGFR and positively associated with CKD. Compared with linear PFOS (n-PFOS), branched PFOS isomers (Br-PFOS) were more strongly associated with eGFR (Br-PFOS;

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$\beta = -1.22$, 95%CI: 2.02, -0.42; $p = 0.003$ vs. n-PFOS; $\beta = -0.16$, 95%CI: 0.98, 0.65; $p = 0.691$) and CKD (Br-PFOS; OR = 1.27; 95% CI: 1.02, 1.58; $p = 0.037$ vs. n-PFOS; OR = 0.98; 95% CI: 0.80, 1.20; $p = 0.834$). In conclusion, branched PFOS isomers were negatively associated with renal function whereas their linear counterparts were not. Given widespread exposure to PFASs, potential nephrotoxic effects are of great public health concern, Furthermore, longitudinal research on the potential nephrotoxic effects of PFASs isomers will be necessary to more definitively assess the risk.

Authors: Wang J, Zeng XW, Bloom MS, Qian Z, Hinyard LJ, Belue R, Lin S, Wang SQ, Tian YP, Yang M, Chu C, Gurram N, Hu LW, Liu KK, Yang BY, Feng D, Liu RQ, Dong GH.

Full Source: Chemosphere. 2019 Mar; 218:1042-1049. doi: 10.1016/j.chemosphere.2018.11.191. Epub 2018 Nov 28.

OCCUPATIONAL RESEARCH

Effect of thallium exposure and its interaction with smoking on lung function decline: A prospective cohort study

2019-04-29

Thallium (Tl) is a cumulative high toxicant in the environment, but few longitudinal studies have investigated the respiratory impairment of Tl exposure. This study aimed to evaluate the effect of Tl and its interaction with smoking on lung function decline, and explore the potential mechanisms.

METHODS: The baseline and follow-up lung functions were measured from a prospective cohort study of 1243 workers, who were followed from 2010 to 2014. Their baseline urinary levels of Tl were determined. The plasma C-reactive protein (CRP) and urinary 8-iso-prostaglandin-F2 α (8-iso-PGF2 α) was measured in a randomly selected subcohort of 474 subjects. The results showed that a 2-fold increase in urinary Tl was associated with 29.81 mL (95%CI: 3.83-55.80) increased decline in forced expiratory volume in 1 s (FEV1). The effect was more pronounced among heavy-smokers (≥ 15 pack-years) [β (95%CI) = 56.42 mL (9.66-103.19)]. In particular, compared to never-smokers with low Tl, heavy-smokers with high Tl had a separate 158.44 mL (95%CI: 54.88-262.00) and 4.58% (95%CI: 1.40-7.76) increased declines in FEV1 and percentage of predicted (ppFEV1), respectively. There was a significant interaction between Tl and smoking intensity on ppFEV1 decline ($P_{int} = 0.034$). More importantly, the increasing level of urinary Tl was correlated with elevated CRP and 8-iso-PGF2 α . The authors concluded that the prospective cohort study identified that exposure to high Tl had a deleterious effect on lung function, and this

This study aimed to evaluate the effect of Tl and its interaction with smoking on lung function decline, and explore the potential mechanisms.

effect may be enhanced by tobacco smoking. Increased inflammation may partly contribute to the joint effects of TI and smoking on impaired lung function, but the biological mechanisms need further explorations.

Authors: Dai J, Wu X, Bai Y, Feng W, Wang S, Chen Z, Fu W, Li G, Chen W, Wang G, Feng Y, Liu Y, Meng H, Zhang X, He M, Wu T, Guo H.

Full Source: Environment International. 2019 Mar 25; 127:181-189. doi: 10.1016/j.envint.2019.03.034. [Epub ahead of print]

Cytostatics as hazardous chemicals in healthcare workers' environment

2019-04-29

Cytostatics not only induce significant side-effects in patients treated oncologically but also pose a threat to the health of occupationally exposed healthcare workers: pharmacists, physicians, nurses and other personnel. Since the 1970s numerous reports from various countries have documented the contamination of working areas with cytostatics and the presence of drugs/metabolites in the urine or blood of healthcare employees, which directly indicates the occurrence of occupational exposure to these drugs. In Poland the significant scale of occupational exposure to cytostatics is also confirmed by the data collected in the central register of occupational carcinogens/mutagens kept by the Nofer Institute of Occupational Medicine. The assessment of occupational exposure to cytostatics and health risks constitutes employers' obligation. Unfortunately, the assessment of occupational risk resulting from exposure to cytostatics raises a number of concerns. Provisions governing the problem of workers' health protection are not unequivocal because they derive from a variety of law areas, especially in a matter of hazard classification and safety data sheets for cytostatics. Moreover, no legally binding occupational exposure limits have been set for cytostatics or their active compounds, and analytical methods for these substances airborne and biological concentrations are lacking. Consequently, the correct assessment of occupational exposure to cytostatics, the evaluation of health hazards and the development of the proper preventive strategy appear difficult. The authors of this study described and discussed the amendments to the European provisions concerning chemicals in the light of employers' obligations in the field of employees' health protection against the consequences of exposure to cytostatics. Some modifications

Cytostatics not only induce significant side-effects in patients treated oncologically but also pose a threat to the health of occupationally exposed healthcare workers: pharmacists, physicians, nurses and other personnel.

aimed at a more effective health protection of workers occupationally exposed to cytostatics were also proposed.

Authors: Pałaszewska-Tkacz A, Czerczak S, Konieczko K, Kupczewska-Dobecka M.

Full Source: International Journal of Occupational Medicine & Environmental Health. 2019 Apr 3;32(2):141-159. doi: 10.13075/ijomeh.1896.01248. Epub 2019 Mar 19.

Association of occupational exposures with cardiovascular disease among US Hispanics/Latinos

2019-04-29

Cardiovascular disease (CVD) is a leading cause of mortality and morbidity in the USA. The role of occupational exposures to chemicals in the development of CVD has rarely been studied even though many agents possess cardiotoxic properties. In the present study, the authors evaluated associations of self-reported exposures to organic solvents, metals and pesticides in relation to CVD prevalence among diverse Hispanic/Latino workers. Cross-sectional data from 7404 employed individuals, aged 18-74 years, enrolled in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) were analysed. Participants from four US cities provided questionnaire data and underwent clinical examinations, including ECGs. CVD was defined as the presence of at least one of the following: coronary heart disease, atrial fibrillation, heart failure or cerebrovascular disease. Prevalence ratios reflecting the relationship between each occupational exposure and CVD as well as CVD subtypes were calculated using Poisson regression models. Hispanic/Latino workers reported exposures to organic solvents (6.5%), metals (8.5%) and pesticides (4.7%) at their current jobs. Overall, 6.1% of participants had some form of CVD, with coronary heart disease as the most common (4.3%) followed by cerebrovascular disease (1.0%), heart failure (0.8%) and atrial fibrillation (0.7%). For individuals who reported working with pesticides, the prevalence ratios for any CVD were 2.18 (95% CI 1.34 to 3.55), coronary heart disease 2.20 (95% CI 1.31 to 3.71), cerebrovascular disease 1.38 (95% CI 0.62 3.03), heart failure 0.91 (95% CI 0.23 to 3.54) and atrial fibrillation 5.92 (95% CI 1.89 to 18.61) after adjustment for sociodemographic, acculturation, lifestyle and occupational characteristics. Metal exposures were associated with an almost fourfold (3.78, 95% CI 1.24 to 11.46) greater prevalence of atrial fibrillation. Null associations were observed for organic solvent exposures. The authors concluded that the results suggest that working with metals and pesticides could be risk factors for CVD among Hispanic/

Cardiovascular disease (CVD) is a leading cause of mortality and morbidity in the USA.

Latino workers. Further work is needed to evaluate these relationships prospectively.

Authors: Bulka CM, Daviglius ML, Persky VW, Durazo-Arvizu RA, Lash JP, Elfassy T, Lee DJ, Ramos AR, Tarraf W, Argos M.

Full Source: Heart. 2019 Mar;105(6):439-448. doi: 10.1136/heartjnl-2018-313463. Epub 2018 Dec 11.

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

2019-04-29

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 we 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) externalization 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.

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.

PUBLIC HEALTH RESEARCH

Urinary concentrations of phthalate biomarkers and weight change among postmenopausal women: a prospective cohort study

2019-04-29

Some phthalates are endocrine disrupting chemicals used as plasticisers in consumer products, and have been associated with obesity in cross-sectional studies, yet prospective evaluations of weight change are lacking. The objective of the present study was to evaluate associations between phthalate biomarker concentrations and weight and weight change among postmenopausal women. A cross-sectional (N = 997) and longitudinal analyses (N = 660) were performed among postmenopausal Women's Health Initiative participants. 13 phthalate metabolites and creatinine were measured in spot urine samples provided at baseline. Participants' weight and height measured at in-person clinic visits at baseline, year 3, and year 6 were used to calculate body mass index (BMI). The authors fit multivariable multinomial logistic regression models to explore cross-sectional associations between each phthalate biomarker and baseline BMI category. Longitudinal associations were evaluated between each biomarker and weight change using mixed effects linear regression models. In cross-sectional analyses, urinary concentrations of some biomarkers were positively associated with obesity prevalence (e.g. sum of di (2-ethylhexyl) phthalate metabolites [Σ DEHP] 4th vs 1st quartile OR = 3.29, 95% CI 1.80-6.03 [p trend < 0.001] vs normal). In longitudinal analyses, positive trends with weight gain between baseline and year 3 were observed for mono-(2-ethyl-5-oxohexyl) phthalate, monoethyl phthalate (MEP), mono-hydroxybutyl phthalate, and mono-hydroxyisobutyl phthalate (e.g. + 2.32 kg [95% CI 0.93-3.72] for 4th vs 1st quartile of MEP; p trend < 0.001). No statistically significant associations were observed between biomarkers and weight gain over 6 years. Certain phthalates may contribute to short-term weight gain among postmenopausal women.

Authors: Díaz Santana MV, Hankinson SE, Bigelow C, Sturgeon SR, Zoeller RT, Tinker L, Manson JAE, Calafat AM, Meliker JR, Reeves KW.

Full Source: Environmental Health. 2019 Mar 12;18(1):20. doi: 10.1186/s12940-019-0458-6.

The objective of the present study was to evaluate associations between phthalate biomarker concentrations and weight and weight change among postmenopausal women.

Public understanding of cigarette smoke chemicals: Longitudinal study of US adults and adolescents

2019-04-29

The United States Food and Drug Administration has increased communication efforts that aim to raise public awareness of the harmful constituents (i.e., chemicals) in cigarette smoke. The authors investigated whether the public's awareness of these chemicals has increased in light of such efforts. Participants were national probability samples of 11,322 US adults and adolescents recruited in 2014-2015 (Wave 1) and 2016-2017 (Wave 2). Cross-sectional telephone surveys assessed awareness of 24 cigarette smoke chemicals at both time points. The proportion of US adults aware of cigarette smoke chemicals did not differ between Waves 1 and 2 (25% and 26%, $p=0.19$). In contrast, awareness of chemicals among adolescents fell from 28% to 22% ($p<.001$), mostly due to lower awareness of carbon monoxide, arsenic, benzene, and four other chemicals. Belief that most of the harmful chemicals in cigarette smoke come from burning the cigarette was also lower in Wave 2 (adults: 31% vs. 26%; adolescents: 47% vs. 41%, both $ps<.05$). Participants were more likely to be aware of cigarette smoke chemicals if they had been exposed to anti-smoking campaign advertisements ($p<.05$) or had previously sought chemical information ($p<.05$). Cigarette smoke chemical awareness did not differ between smokers and non-smokers. Awareness of cigarette smoke chemicals has remained stable among adults and decreased among adolescents. The association of chemical awareness with information exposure via campaigns and information seeking behaviour is promising. More concerted communication efforts may be needed to increase public awareness of cigarette smoke chemicals, which could potentially discourage smoking. Awareness of the toxic chemicals in cigarette smoke may contribute to quitting. The US Food and Drug Administration is making efforts to increase public awareness of these chemicals. Two national surveys (2014-2017) found that chemical awareness was low among adults and adolescents. While awareness did not change among adults, awareness among adolescents dropped over time. Additionally, exposure to anti-smoking campaigns and chemical information seeking behaviour were associated with higher awareness of chemicals in cigarette smoke. Campaigns and other efforts may be needed to increase awareness of cigarette smoke chemicals.

Authors: Jeong M, Noar SM, Zhang D, Mendel JR, Agans RP, Boynton MH, Byron MJ, Baig SA, Ranney LM, Ribisl KM, Brewer NT.

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The authors investigated whether the public's awareness of harmful chemicals in cigarette smoke had increased in light of increased communication efforts.

Technical

CHEMWATCH

Prenatal exposure to benzophenones, parabens and triclosan and neurocognitive development at 2 years

2019-04-29

Benzophenones (BPs), parabens, and triclosan (TCS) are widely used in personal care products and may be neurotoxic to children, but limited studies have estimated the associations between exposure to these potential endocrine disrupting chemicals during pregnancy and child neurocognitive development. The aim of the present study was to evaluate the relationships of prenatal exposure to BPs, parabens and TCS with child neurocognitive development at age 2. From 2014 to 2015, 478 mother-child pairs from a longitudinal prenatal cohort in China were included in present study. We quantified BPs, parabens and TCS in three spot urine samples during pregnancy (in the first, second, and third trimester). The Bayley Scales of Infant Development (BSID) test to children was performed at 2 years. Multivariate linear regression models and generalised estimating equations were used to examine changes in mental developmental index (MDI) and psychomotor development index (PDI) per 2-fold increase in averaged and trimester-specific maternal urinary phenols, respectively. In the adjusted models, each 2-fold increase in average prenatal paraben concentration was associated with lower MDI scores among girls [-1.08 (95% CI: -2.10, -0.06) and -1.51 (95% CI: -2.69, -0.32) for methyl paraben (Mep) and Σ parabens, respectively], but the association was not statistically significant among boys [-0.24 (95% CI: -1.46, 0.99), Psex-int = 0.37 and 0.18 (95% CI: -1.28, 1.64), Psex-int = 0.10 for Mep and Σ parabens, respectively]. Increasing urinary 4-hydroxybenzophenone (4-OH-BP) concentration was associated with lower PDI scores among boys [-2.96 (95% CI: -4.48, -1.45)], not girls [-0.07 (95% CI: -1.57, 1.43)] and the association was significantly different in boys and girls (Psex-int = 0.01). No significant associations were observed between the average prenatal TCS exposure and BSID results. In trimester-specific analyses, increasing parabens was associated with lower girls' MDI only in the second trimester, while increasing 4-OH-BP was associated with lower boys' PDI in each trimester. The results suggest that prenatal exposure to BPs and parabens may be associated with impairment in child cognitive abilities at 2 years. Further human and animal studies are needed to verify our results and elucidate the biological mechanisms involved in these associations.

Authors: Jiang Y, Zhao H, Xia W, Li Y, Liu H, Hao K, Chen J, Sun X, Liu W, Li J, Peng Y, Hu C, Li C, Zhang B, Lu S, Cai Z, Xu S.

Full Source: Environment International. 2019 May; 126:413-421. doi: 10.1016/j.envint.2019.01.023. Epub 2019 Mar 2.

The aim of the present study was to evaluate the relationships of prenatal exposure to BPs, parabens and TCS with child neurocognitive development at age 2.

Phthalates and Phthalate Alternatives Have Diverse Associations with Oxidative Stress and Inflammation in Pregnant Women

2019-04-29

Exposure to environmental chemicals such as phthalates has been linked to numerous adverse pregnancy outcomes, potentially through an oxidative stress mediated mechanism. Most research examined urinary 8-iso-prostaglandin F2 α (8-iso-PGF2 α) as the oxidative stress biomarker. However, 8-iso-PGF2 α also originates from enzymatic sources linked to inflammation. Therefore, associations between phthalates and 8-iso-PGF2 α could have been misinterpreted. To clarify this, the 8-iso-PGF2 α /prostaglandin F2 α ratio approach was used to quantitatively distinguish between inflammation or oxidative stress derived 8-iso-PGF2 α and estimate their associations with phthalate metabolites in a cohort of 758 pregnant women from The Infant Development and Environment Study (TIDES). Most urinary phthalate metabolites were associated with a significant increase in 8-iso-PGF2 α . For example, a 22.4% higher 8-iso-PGF2 α concentration (95% confidence interval = 14.4, 30.9) was observed with an interquartile range increase in mono- n-butyl phthalate. For most metabolites, associations were observed solely with oxidative stress derived 8-iso-PGF2 α . In contrast, monocarboxy-isononyl phthalate and monoisononyl phthalate (MNP) were associated with both sources of 8-iso-PGF2 α . Metabolites of the phthalate alternative 1,2-cyclohexane dicarboxylic acid, diisononyl ester (DINCH), were only associated with inflammation-derived 8-iso-PGF2 α , which is interesting because DINCH metabolites and MNP have structural similarities. In conclusion, phthalates metabolites are not exclusively associated with oxidative stress derived 8-iso-PGF2 α . Depending on the metabolite structure, some are also associated with inflammation derived sources, which provides interesting insights in the toxicology of phthalates.

Authors: van T Erve TJ, Rosen EM, Barrett ES, Nguyen RHN, Sathyanarayana S, Milne GL, Calafat AM, Swan SH, Ferguson KK.

Full Source: Environmental Science & Technology. 2019 Mar 19;53(6):3258-3267. doi: 10.1021/acs.est.8b05729. Epub 2019 Mar 11.

Exposure to environmental chemicals such as phthalates has been linked to numerous adverse pregnancy outcomes, potentially through an oxidative stress mediated mechanism.

Technical

CHEMWATCH

Serum concentrations of PFASs and exposure-related behaviours in African American and non-Hispanic white women.

2019-04-29

Per- and polyfluoroalkyl substances (PFASs) are used in a wide range of consumer products for their water- and grease-resistant properties, but few studies have explored this exposure route. In this study, the authors used multiple regression to investigate associations between six self-reported behaviours hypothesised to influence PFAS exposure and serum concentrations of six PFAS chemicals in 178 middle-aged women enrolled in the Child Health and Development Studies, about half of whom are African American. Blood samples were collected in 2010-2013, and participants were interviewed about behaviour in 2015-2016. Results showed that African American women had lower levels of perfluorooctanoic acid (PFOA) and perfluorohexanesulfonic acid (PFHxS) compared with non-Hispanic white women. In African Americans, but not others, frequent consumption of prepared food in coated cardboard containers was associated with higher levels of four PFASs. Flossing with Oral-B Glide, having stain-resistant carpet or furniture, and living in a city served by a PFAS-contaminated water supply were also associated with higher levels of some PFASs. Product testing using particle-induced γ -ray emission (PIGE) spectroscopy confirmed that Oral-B Glide and competitor flosses contained detectable fluorine. Despite the delay between blood collection and interview, these results strengthen the evidence for exposure to PFASs from food packaging and implicate exposure from polytetrafluoroethylene (PTFE)-based dental floss for the first time.

Authors: Boronow KE, Brody JG, Schaidler LA, Peaslee GF, Havas L, Cohn BA.
Full Source: Journal of Exposure Science & Environmental Epidemiology.
2019 Mar; 29(2):206-217. doi: 10.1038/s41370-018-0109-y. Epub 2019 Jan 8.