

Bulletin Board

Contents

JUN. 28, 2024

(click on page numbers for links)

CHEMICAL EFFECTS

- Blood levels of persistent organic pollutants among women in France in the 90's: main profiles and individual determinants 3
- Nephrotoxicity of organophosphate flame retardants in patients with chronic kidney disease: A 2-year longitudinal study..... 4

ENVIRONMENTAL RESEARCH

- Association between exposure to specific PM2.5 constituents and environment, lifestyle, and clinical parameters in patients with COPD 5
- Metal(loid)s in urban soil from historical municipal solid waste landfill: Geochemistry, source apportionment, bioaccessibility testing and human health risks..... 5
- Association between environmental phthalates exposure and gut microbiota and metabolome in dementia with Lewy bodies 6

PHARMACEUTICAL/TOXICOLOGY

- Toxicity assessment of Cucurbita pepo cv Dayangua and its effects on gut microbiota in mice..... 7
- Associations of co-exposure to polycyclic aromatic hydrocarbons and lead (Pb) with IGF1 methylation in peripheral blood of preschool children from an e-waste recycling area..... 8

OCCUPATIONAL

- A follow-up study of vibration-induced injuries in workers exposed to transient and high frequency vibrations..... 9
- Effects of nanoplastic exposure routes on leaf decomposition in streams 10
- N-Acetyltransferase Metabolism and DNA Damage Following Exposure to 4,4'-Oxydianiline in Human Bronchial Epithelial Cells 11

CONTACT US

subscribers@chemwatch.net
tel +61 3 9572 4700
fax +61 3 9572 4777

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

Bulletin Board

Technical

JUN. 28, 2024

CHEMICAL EFFECTS

Blood levels of persistent organic pollutants among women in France in the 90's: main profiles and individual determinants

2024-06-20

Context and objectives: Persistent organic pollutants (POPs) are a group of organic chemical compounds potentially toxic to human health. The objectives of this study were 1) to describe the levels of POPs biomarkers in blood samples from French women collected during the 1990s and to compare them with levels measured in two more recent French studies, 2) to identify POPs exposure profiles, and 3) to explore their main determinants.

Methods: 73 POPs biomarkers were measured in the blood of 468 women from the French E3N cohort (aged 45 to 73 years), collected between 1994-1999: 28 per- and polyfluoroalkyl substances, 27 organochlorine pesticides, 14 polychlorinated biphenyls and 4 polybrominated diphenyl ethers. POPs biomarker levels were described and compared with levels measured in two more recent French studies conducted by the French National Public Health Agency, the ENNS and Esteban studies. Principal component analysis was performed on POPs quantified in at least 75% of samples to identify the main exposure profiles. Linear regression models were used to estimate the associations between anthropometric, socio-demographic and lifestyle characteristics and exposure to these profiles. Results: Among the 73 biomarkers measured, 41 were quantified in more than 75% of samples. Levels of most pollutants that were also measured in the Esteban of ENNS studies have decreased over time. Six POPs exposure profiles were revealed, explaining 62.1% of the total variance. Most of the characteristics studied were associated with adherence to at least one of these profiles.

Conclusion: This study highlighted that most of the pollutants for which a comparison was possible decreased over the 10 or 20 years following the E3N blood collection, and identified those which, on the contrary, tended to increase. The health effects of the profiles identified could be assessed in future studies. The determinants identified should be confirmed in larger populations.

Authors: P Frenoy, G Cano-Sancho, J P Antignac, P Marchand, C Marques, X Ren, G Severi, V Perduca, F R Mancini

Full Source: Environmental research 2024 Jun 20:119468. doi: 10.1016/j.envres.2024.119468.

Context and objectives: Persistent organic pollutants (POPs) are a group of organic chemical compounds potentially toxic to human health.

Bulletin Board

Technical

JUN. 28, 2024

Nephrotoxicity of organophosphate flame retardants in patients with chronic kidney disease: A 2-year longitudinal study

2024-06-21

Humans are extensively exposed to organophosphate flame retardants (OPFRs), an emerging group of organic contaminants with potential nephrotoxicity. Nevertheless, the estimated daily intake (EDI) and prognostic impacts of OPFRs have not been assessed in individuals with chronic kidney disease (CKD). In this 2-year longitudinal study of 169 patients with CKD, we calculated the EDIs of five OPFR triesters from urinary biomonitoring data of their degradation products and analyzed the effects of OPFR exposure on adverse renal outcomes and renal function deterioration. Our analysis demonstrated universal OPFR exposure in the CKD population, with a median EDI Σ OPFR of 360.45 ng/kg body weight/day (interquartile range, 198.35-775.94). Additionally, our study revealed that high tris(2-chloroethyl) phosphate (TCEP) exposure independently correlated with composite adverse events and composite renal events (hazard ratio [95 % confidence interval; CI]: 4.616 [1.060-20.096], p = 0.042; 3.053 [1.075-8.674], p = 0.036) and served as an independent predictor for renal function deterioration throughout the study period, with a decline in estimated glomerular filtration rate of 4.127 mL/min/1.73 m² (95 % CI, -8.127--0.126; p = 0.043) per log ng/kg body weight/day of EDITCEP. Furthermore, the EDITCEP and EDI Σ OPFR were positively associated with elevations in urinary 8-hydroxy-2'-deoxyguanosine and kidney injury molecule-1 during the study period, indicating the roles of oxidative damage and renal tubular injury in the nephrotoxicity of OPFR exposure. To conclude, our findings highlight the widespread OPFR exposure and its possible nephrotoxicity in the CKD population.

Authors: Kai-Fan Tsai, Fu-Jen Cheng, Wan-Ting Huang, Chih-Chao Yang, Shau-Hsuan Li, Ben-Chung Cheng, Chin-Chou Wang, Chia-Te Kung, Liang-Jen Wang, Wen-Chin Lee, Yu-Che Ou

Full Source: Ecotoxicology and environmental safety 2024 Jun 21:281:116625. doi: 10.1016/j.ecoenv.2024.116625.

Humans are extensively exposed to organophosphate flame retardants (OPFRs), an emerging group of organic contaminants with potential nephrotoxicity.

Bulletin Board

Technical

JUN. 28, 2024

ENVIRONMENTAL RESEARCH

Association between exposure to specific PM2.5 constituents and environment, lifestyle, and clinical parameters in patients with COPD

2024-06-23

This study investigated the correlation between the individual chemical constituents of particulate matter 2.5 μm (PM2.5) and respiratory parameters as well as the living environment and daily behaviors in patients with chronic obstructive pulmonary disease (COPD). Data were obtained from prospective COPD panel conducted in South Korea. Following collection via a microPEM, 18 metallic elements were determined using energy-dispersive X-ray fluorescence spectroscopy. All participants completed detailed questionnaires on living environments and lifestyle practices. Eighty-nine stable COPD patients (mean age 68.1 years; 94.4% male) were analyzed. Several constituents (titanium, aluminum, bromine, and silicone) were significantly associated with respiratory outcomes. Copper and manganese concentrations were significantly associated with the living environment. Increased ventilation time and air purifier operation were associated with lower concentrations of copper, silicone, barium, and titanium. These findings suggest varying relationships between PM2.5 constituents and clinical parameters in COPD patients, providing a basis for personalized interventions and future research.

Authors: Jieun Kang, Hajeong Kim, Ji Ye Jung, Jin-Young Huh, Hyun Woo Ji, Seon-Jin Lee, Hwan-Cheol Kim, Sei Won Lee

Full Source: International journal of environmental health research 2024 Jun 23:1-13. doi: 10.1080/09603123.2024.2368724.

Metal(loid)s in urban soil from historical municipal solid waste landfill: Geochemistry, source apportionment, bioaccessibility testing and human health risks

2024-06-21

Landfills, especially those poorly managed, can negatively affect the environment and human beings through chemical contamination of soils and waters. This study investigates the soils of a historical municipal solid waste (MSW) landfill situated in the heart of a residential zone in the capital of Slovakia, Bratislava, with an emphasis on metal(loid) contamination and its consequences. Regardless of the depth, many of the soils exhibited high metal(loid) concentrations, mainly Cd, Cu, Pb, Sb,

This study investigated the correlation between the individual chemical constituents of particulate matter 2.5 μm (PM2.5) and respiratory parameters as well as the living environment and daily behaviors in patients with chronic obstructive pulmonary disease (COPD).

Bulletin Board

Technical

JUN. 28, 2024

Sn and Zn (up to 24, 2620, 2420, 134, 811 and 6220 mg/kg, respectively), classifying them as extremely contaminated based on the geo-accumulation index ($I_{geo} > 5$). The stable lead isotopic ratios of the landfill topsoil varied widely (1.1679-1.2074 for 206Pb/207Pb and 2.0573-2.1111 for 208Pb/206Pb) and indicated that Pb contained a natural component and an anthropogenic component, likely municipal solid waste incineration (MSWI) ash and construction waste. Oral bioaccessibility of metal(loid)s in the topsoil was variable with Cd (73.2-106%) and Fe (0.98-2.10%) being the most and least bioaccessible, respectively. The variation of metal(loid) bioaccessibility among the soils could be explained by differences in their geochemical fractionation as shown by positive correlations of bioaccessibility values with the first two fractions of BCR (Community Bureau of Reference) sequential extraction for As, Cd, Mn, Ni, Pb, Sn and Zn. The results of geochemical fractionation coupled with the mineralogical characterisation of topsoil showed that the reservoir of bioaccessible metal(loid)s was calcite and Fe (hydr)oxides. Based on aqua regia metal(loid) concentrations, a non-carcinogenic risk was demonstrated for children ($HI = 1.59$) but no risk taking into account their bioaccessible concentrations ($HI = 0.65$). This study emphasises the need for detailed research of the geochemistry of wastes deposited in urban soils to assess the potentially hazardous sources and determine the actual bioaccessibility and human health risks of the accumulated metal(loid)s. Authors: Edgar Hiller, Tomáš Faragó, Martin Kolesár, Lenka Filová, Martin Mihaljevič, Lubomír Jurkovič, Rastislav Demko, Andrej Machlica, Ján Štefánek, Martina Vítková
Full Source: Chemosphere 2024 Jun 21:142677. doi: 10.1016/j.chemosphere.2024.142677.

Association between environmental phthalates exposure and gut microbiota and metabolome in dementia with Lewy bodies

2024-06-08

Background: Emerging evidence has shown the potential involvement of phthalates (PAEs) exposure in the development of dementia with Lewy bodies (DLB). Metabolomics can reflect endogenous metabolites variation in the progress of disease after chemicals exposure. However, little is known about the association between PAEs, gut microbiota and metabolome in DLB.

Objective: We aim to explore the intricate relationship among urinary PAEs metabolites (mPAEs), dysbiosis of gut bacteria, and metabolite profiles in DLB.

Background: Emerging evidence has shown the potential involvement of phthalates (PAEs) exposure in the development of dementia with Lewy bodies (DLB).

Bulletin Board

Technical

JUN. 28, 2024

Methods: A total of 43 DLB patients and 45 normal subjects were included in this study. Liquid chromatography was used to analyze the levels of mPAEs in the urine of the two populations. High-throughput sequencing and liquid chromatography-mass spectrometry were used to analyze gut microbiota and the profile of gut metabolome, respectively. The fecal microbiota transplantation (FMT) experiment was performed to verify the potential role of mPAEs on gut dysbiosis contribute to aggravating cognitive dysfunction in α -synuclein tg DLB/PD mice.

Results: The DLB patients had higher DEHP metabolites (MEOHP, MEHHP and MEHP), MMP and MnBP, lower MBP and MBzP than the control group and different microbiota. A significantly higher abundance of *Ruminococcus gnavus* and lower *Prevotella copri*, *Prevotella stercorea* and *Bifidobacterium* were observed in DLB. Higher 3 DEHP metabolites, MMP, MnBP and lower MBP and MBzP were significantly negatively associated with *Prevotella copri*, *Prevotella stercorea* and *Bifidobacterium*. Additionally, using metabolomics, we found that altered bile acids, short-chain fatty acids and amino acids metabolism are linked to these mPAEs. We further found that FMT of fecal microbiota from highest DEHP metabolites donors significantly impaired cognitive function in the germ-free DLB/PD mice.

Conclusion: Our study suggested that PAEs exposure may alter the microbiota-gut-brain axis and providing novel insights into the interactions among environmental perturbations and microbiome-host in pathogenesis of DLB.

Authors: Zhe Deng, Ling Li, Zhen Jing, Xi Luo, Fang Yu, Wenshuang Zeng, Wei Bi, Jing Zou

Full Source: Environment international 2024 Jun 8:190:108806. doi: 10.1016/j.envint.2024.108806.

PHARMACEUTICAL/TOXICOLOGY

Toxicity assessment of *Cucurbita pepo cv Dayangua* and its effects on gut microbiota in mice

2024-06-22

Background: *Cucurbita pepo cv Dayangua* (CPD) is an edible plant with diverse pharmacological properties. The current research on CPD has primarily focused on initial investigations of its chemical composition and pharmacological effects, and no comprehensive toxicity assessment has been conducted to date.

Methods: In the present study, the toxicity of CPD was evaluated through both acute and sub-chronic oral toxicity tests in mice. 16S rDNA

Bulletin Board

Technical

JUN. 28, 2024

sequencing was used to analyze the composition of the gut microbiota of mice at different time points to observe the effect of CPD on these microbial communities.

Results: In the acute toxicity test, CPD exhibited low toxicity, with a median lethal dose (LD50) > 2000 mg/kg. The sub-chronic toxicity test indicated that CPD administration at doses of 200, 400, and 600 mg/kg did not cause mortality or significant organ damage in mice. Furthermore, analysis of the gut microbiota after gavage administration of CPD at 400 and 600 mg/kg revealed an improved abundance of some beneficial gut bacteria.

Conclusions: In summary, no acute or sub-chronic toxic effects were observed in mice following the oral administration of CPD. CPD did not affect the structure and diversity of the gut microbiota and may contribute to an increase in the number of beneficial gut bacteria.

Authors: Huan Zhang, Yazhou Zhou, Zhiyuan Pan, Bikun Wang, Lei Yang, Nan Zhang, Baiyi Chen, Xiaona Wang, Zhiguang Jian, Likun Wang, Hui Ling, Xiaoming Qin, Zhelin Zhang, Teng Liu, Aiping Zheng, Yafang Tan, Yujing Bi, Ruifu Yang

Full Source: BMC complementary medicine and therapies 2024 Jun 22;24(1):243. doi: 10.1186/s12906-024-04551-w.

Associations of co-exposure to polycyclic aromatic hydrocarbons and lead (Pb) with IGF1 methylation in peripheral blood of preschool children from an e-waste recycling area

2024-06-18

Background: Childhood exposure to polycyclic aromatic hydrocarbons (PAHs) or lead (Pb) is associated with epigenetic modifications. However, the effects of their co-exposures on IGF1 (Insulin-like growth factor 1) methylation and the potential role in child physical growth are unclear. **Methods:** From our previous children study (N = 238, ages of 3-6), 75 children with higher total concentrations of urinary ten hydroxyl PAH metabolites (Σ 10OH-PAHs) from an e-waste recycling area, Guiyu, and 75 with lower Σ 10OH-PAHs from Haojiang (reference area) were included. Pb and IGF1 P2 promoter methylation in peripheral blood were also measured. Multivariable linear regression analyses were performed to estimate individual associations, overall effects and interactions of co-exposure to OH-PAHs and Pb on IGF1 methylation were further explored using Bayesian kernel machine regression.

Results: Methylation of IGF1 (CG-232) was lower (38.00 vs. 39.74 %, $P < 0.001$), but of CG-207 and CG-137 were higher (59.94 vs. 58.41 %; 57.60 vs. 56.28 %, both $P < 0.05$) in exposed children than the reference. The

Background: Childhood exposure to polycyclic aromatic hydrocarbons (PAHs) or lead (Pb) is associated with epigenetic modifications.

Bulletin Board

Technical

JUN. 28, 2024

elevated urinary 2-OHPhe was associated with reduced methylation of CG-232 ($B = -0.051$, 95 % CI: $-0.096, -0.005$, $P < 0.05$), whereas blood Pb was positively associated with methylation of CG-108 ($B = 0.106$, 95 % CI: $0.013, 0.199$, $P < 0.05$), even after full adjustment. Methylations of CG-224 and 218 significantly decreased when all OH-PAHs and Pb mixtures were set at 35th - 40th and 45th - 55th percentile compared to when all fixed at 50th percentile. There were bivariate interactions of co-exposure to the mixtures on methylations of CG-232, 224, 218, and 108. Methylations correlated with height, weight, were observed in the exposed children. Conclusions: Childhood co-exposure to high PAHs and Pb from the e-waste may be associated with IGF1 promoter methylation alterations in peripheral blood. This, in turn, may interrupt the physical growth of preschool children.

Authors: Xia Huo, Xijin Xu, Qihua Wang, Jian Zhang, Machteld N Hylkema, Zhijun Zeng

Full Source: Environment international 2024 Jun 18:190:108833. doi: 10.1016/j.envint.2024.108833.

OCCUPATIONAL

A follow-up study of vibration-induced injuries in workers exposed to transient and high frequency vibrations

2024-06-21

Background: In a previous study from 2018, 38 wheel loader assembly workers were examined, showing high exposures to transient and high-frequency vibrations. After the investigation, preventive measures were immediately implemented to reduce the vibration exposure. In 2022, a follow-up study was carried out to examine the effect of these measures. Methods: The follow-up study included 35 (27 men and 8 women) of the original 38 workers. They were divided into two groups, 24 workers with ongoing vibration exposure and 11 workers, not vibration exposed since 2018. All participants completed a questionnaire and underwent a thorough examination, including several neurophysiological tests and a comprehensive assessment of musculoskeletal symptoms. The questionnaire responses and on-site vibration level measurements formed the basis for the individual vibration exposure assessment.

Results: In 2018, clear differences were noted between the two groups regarding vibration perception thresholds (VPT), needle test, 2-PD (2-point discrimination), and monofilament test with deviating results in the unexposed group. The difference between the two groups was significantly smaller at the follow-up examination in 2022, where

Background: In a previous study from 2018, 38 wheel loader assembly workers were examined, showing high exposures to transient and high-frequency vibrations.

Bulletin Board

Technical

JUN. 28, 2024

differences remained for VPT and monofilament tests, with deviating test results in the unexposed group. When comparing variable values between 2018 and 2022 within the exposed and unexposed groups, respectively, the unexposed group showed mostly unchanged values, while a deterioration was observed for VPT, needle test and temperature sensitivity test among the exposed workers during follow-up. The prevalence of VWF (Vibration white fingers) was around 30-40% and neuropathy around 75% among exposed workers during follow-up compared to about 60% and 85% respectively, in the unexposed group. Conclusion: The overall categorization of white fingers and neuropathy, according to the Stockholm Workshop Scale, remained largely unchanged in both study groups from 2018 to 2022. The introduction of cost-effective and relatively simple preventive measures may have contributed to this result. Throughout the follow-up period, the number of exposed workers who developed musculoskeletal disorders and newly reported cases of vibration injuries at the factory decreased. Without this preventive program, increased vascular and nerve symptoms would most likely have occurred during follow-up due to continued vibration exposure.

Authors: Lars Gerhardsson

Full Source: Journal of occupational medicine and toxicology (London, England) 2024 Jun 21;19(1):27. doi: 10.1186/s12995-024-00425-6.

Effects of nanoplastic exposure routes on leaf decomposition in streams

2024-06-21

Polystyrene nanoparticles (PS NPs) released from plastic products have been demonstrated to pose a threat to leaf litter decomposition in streams. Given the multitrophic systems of species interactions, the effects of PS NPs through different exposure routes on ecosystem functioning remain unclear. Especially dietary exposure, a frequently overlooked pathway leading to toxicity, deserves more attention. A microcosm experiment was conducted in this study to assess the effects of waterborne and dietary exposure to PS NPs on the litter-based food chain involving leaves, microbial decomposers, and detritivores (river snails). Compared to waterborne contamination, dietary contamination resulted in lower microbial enzyme activities and a significantly higher decrease in the lipid content of leaves. For river snails, their antioxidant activity was significantly increased by 20.21%-69.93%, and their leaf consumption rate was significantly reduced by 16.60% through the dietary route due to the lower lipid content of leaves. Besides, the significantly decreased nutritional quality of river snails would negatively influence

Polystyrene nanoparticles (PS NPs) released from plastic products have been demonstrated to pose a threat to leaf litter decomposition in streams.

Bulletin Board

Technical

JUN. 28, 2024

their palatability to predators. The findings of this study indicate that dietary exposure to PS NPs significantly impacts microbial and detritivore activities, thus affecting their functions in the detritus food chain as well as nutrient cycling.

Authors: Jingjing Du, Xilin Wang, Tianying Tao, Yan Su, Xueting Zhang, Jing Shao, Yufan Zhang, Luyao Yu, Baodan Jin, Wenrui Qv, Xia Cao, Lan Wang, Yanqin Yang

Full Source: Environmental pollution (Barking, Essex : 1987) 2024 Jun 21:357:124418. doi: 10.1016/j.envpol.2024.124418.

N-Acetyltransferase Metabolism and DNA Damage Following Exposure to 4,4'-Oxydianiline in Human Bronchial Epithelial Cells

2024-06-19

Waterpipe smoking is increasingly popular and understanding how chemicals found in hookah smoke may be harmful to human bronchial epithelial cells is of great importance. 4,4'-Oxydianiline (ODA), is an aromatic amine which is present at comparatively high levels in hookah smoke. The metabolism and the subsequent toxicity of ODA to human bronchial epithelial cells remains unknown. Given that ODA is an aromatic amine, we hypothesized that ODA is N-acetylated and induces DNA damage following exposure to immortalized human bronchial epithelial cells (BEP2D cells). We measured the N-acetylation of ODA to mono-acetyl-ODA and the N-acetylation of mono-acetyl-ODA to diacetyl-ODA by BEP2D cells following separation and quantitation by high performance liquid chromatography. For ODA, the apparent KM in cells was $12.4 \pm 3.7 \mu\text{M}$ with a Vmax of $0.69 \pm 0.03 \text{ nmol/min/106 cells}$, while for mono-acetyl-ODA, the apparent KM was $111.2 \pm 48.3 \mu\text{M}$ with a Vmax of $17.8 \pm 5.7 \text{ nmol/min/106 cells}$ ODA exposure for 24h resulted in DNA damage to BEP2D cells following concentrations as low as $0.1 \mu\text{M}$ as measured by γH2Ax protein expression These results demonstrate that ODA, the most prevalent aromatic amine identified in hookah smoke, is N-acetylated and induces DNA damage in human bronchial epithelial cells.

Authors: James T F Wise, David W Hein

Full Source: Toxicology letters 2024 Jun 19:S0378-4274(24)00129-2. doi: 10.1016/j.toxlet.2024.06.005.

Waterpipe smoking is increasingly popular and understanding how chemicals found in hookah smoke may be harmful to human bronchial epithelial cells is of great importance.