

Contents

CHEMWATCH

(click on page numbers for links)

ENVIRONMENTAL RESEARCH

Fate of four phthalate esters with presence of <i>Karenia brevis</i> : Uptake and biodegradation	3
Assessment of the Environmental Impact and Economic Benefits of the Adoption of Cleaner Production in a Brazilian Metal Finishing Industry	4
Current status of agricultural soil pollution by heavy metals in China: A meta-analysis	4
Aerosol exposure to intermediate size Nipah virus particles induces neurological disease in African green monkeys	5
Effect of Fungicide on Pollen Foraging by Honeybees (Hymenoptera: Apidae) in Cranberry Differs by Fungicide Type	6

MEDICAL RESEARCH

Gut Microbiota Modulates Interactions Between Polychlorinated Biphenyls and Bile Acid Homeostasis	7
Analysis of real-world treatment patterns in a matched rheumatology population that continued innovator infliximab therapy or switched to biosimilar infliximab.....	7
Importance of <i>Propionibacterium acnes</i> haemolytic activity in human intervertebral discs: A microbiological study	8
Vitamin A to prevent bronchopulmonary dysplasia in extremely low birth weight infants: a systematic review and meta-analysis	9
3-Dimensional Quantification of Composite Pleural Plaque Volume in Patients Exposed to Asbestos Using High-resolution Computed Tomography: A Validation Study	10

OCCUPATIONAL RESEARCH

Long-term exposure to low level of fluoride induces apoptosis via p53 pathway in lymphocytes of aluminium smelter workers.....	11
Insecticide toxic effects and blood biochemical alterations in occupationally exposed individuals in Punjab, Pakistan	12
Pterostilbene Attenuates Hexavalent Chromium-Induced Allergic Contact Dermatitis by Preventing Cell Apoptosis and Inhibiting IL-1 β -Related NLRP3 Inflammasome Activation.....	13
Health care worker vaccination against Ebola: Vaccine acceptance and employment duration in Sierra Leone.....	14

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Contents

CHEMWATCH

Exposure duration and absorbed dose assessment in pesticide-exposed agricultural workers: Implications for risk assessment and modelling.....15

PUBLIC HEALTH RESEARCH

Cross-sectional associations between urinary triclosan and serum thyroid function biomarker concentrations in women.....16

Endocrine Disruptors and Autism Spectrum Disorder in Pregnancy: A Review and Evaluation of the Quality of the Epidemiological Evidence 17

Quantifying the effects of a low-ozone event and shallow stratocumulus clouds on ultraviolet erythemal radiation exposure17

Separating spatial patterns in pollution attributable to woodsmoke and other sources, during daytime and night-time hours, in Christchurch, New Zealand.....18

Passive exposure to pollutants from conventional cigarettes and new electronic smoking devices (IQOS, e-cigarette) in passenger cars.....19

ENVIRONMENTAL RESEARCH

Fate of four phthalate esters with presence of *Karenia brevis*: Uptake and biodegradation

2019-02-18

Phthalate esters (PAEs), one class of the most frequently detected endocrine-disrupting chemicals (EDCs) in marine environment, have aroused wide public concerns because of their carcinogenicity, teratogenicity, and mutagenicity. However, the environmental fate of PAEs in the occurrence of harmful algal blooms remains unclear. In this study, four PAEs with different alkyl chains, i.e., dimethyl phthalate (DMP), diethyl phthalate (DEP), diallyl phthalate (DAP), and dipropyl phthalate (DPrP) were selected as models to investigate toxicity, uptake, and degradation of PAEs in seawater grown with *K. brevis*, one of the common harmful red tide species. The 96-h median effective concentration (96h-EC50) values followed the order of DMP (over 0.257 mmol L⁻¹) > DEP (0.178 mmol L⁻¹) > DAP (0.136 mmol L⁻¹) > DPrP (0.095 mmol L⁻¹), and the bio-concentration factors (BCFs) were positively correlated to the alkyl chain length. These results indicate that the toxicity of PAEs and their accumulation in *K. brevis* increased with increasing alkyl chains, due to the higher lipophilicity of the longer chain PAEs. With growth of *K. brevis* for 96 h, the content of DMP, DEP, DAP, and DPrP decreased by 93.3%, 68.2%, 57.4% and 46.7%, respectively, mainly attributed to their biodegradation by *K. brevis*, accounting for 87.1%, 61%, 46%, 40% of their initial contents, respectively. It was noticed that abiotic degradation had little contribution to the total reduction of PAEs in the algal cultivation systems. Moreover, five metabolites were detected in the *K. brevis* when exposed to DEP including dimethyl phthalate (DMP), monoethyl phthalate (MEP), mono-methyl phthalate (MMP), phthalic acid (PA), and protocatechuic acid (PrA). While when exposed with to DPrP, one additional intermediate compound diethyl phthalate (DEP) was detected in the cells of *K. brevis* in addition to the five metabolites mentioned above. These results confirm that the main biodegradation pathways of DEP and DPrP by *K. brevis* included de-esterification, demethylation or transesterification. These findings will provide valuable evidences for predicting the environmental fate and assessing potential risk of PAEs in the occurrence of harmful algal blooms in marine environment.

Authors: Sun C, Zhang G, Zheng H, Liu N, Shi M, Luo X, Chen L, Li F, Hu S.

Full Source: *Aquatic Toxicology*. 2018 Nov 12; 206:81-90. doi: 10.1016/j.aquatox.2018.11.010. [Epub ahead of print]

In this study, four phthalate esters with different alkyl chains were selected as models to investigate toxicity, uptake, and degradation of phthalate esters in seawater grown with *K. brevis*.

Assessment of the Environmental Impact and Economic Benefits of the Adoption of Cleaner Production in a Brazilian Metal Finishing Industry

2019-02-18

The Metal Finishing Industry (MFI) uses water and several chemicals in its production chain, which generates both liquid and solid hazardous waste. The present study evaluates the economic and environmental advantages of implementing cleaner production (CP) in a Brazilian MFI specialised in chrome and zinc. For the economic assessment, the authors adopted the measures of return on investment and internal rate of return. In order to measure the environmental impact, the Mass Intensity Factor was used. A case study methodology was adopted, with data collected through observation and semi-structured interviews. The findings indicate that the adoption of CP in this sector encourages the deployment of a Rising Cascades System in Counterflow (RCSC) to minimise water consumption through the reuse and segregation of hazardous solid waste (sludge). The sludge generated may be sold as a by-product for the production of ceramics. The authors identified opportunities to reduce costs by minimising waste, although this does require investment. However, the return on such investments may enable the implementation of CP. The reduction in environmental impact on the ecosystem was significant, with large reductions in hazardous components contained in the sludge being dumped in the environment. The results may guide the development of public policies in Brazil, particularly in the adoption of CP in MFI to disseminate environmental education and increase governmental control.

Authors: de Oliveira Neto GC, Curvelo Santana JC, Filho MG, Chiappetta Jabbour CJ.

Full Source: Environmental Technology. 2018 Nov 22:1-32. doi: 10.1080/09593330.2018.1551426. [Epub ahead of print]

The present study evaluates the economic and environmental advantages of implementing cleaner production (CP) in a Brazilian Metal Finishing Industry specialised in chrome and zinc.

Current status of agricultural soil pollution by heavy metals in China: A meta-analysis

2019-02-18

In the last decades, agricultural soil pollution by heavy metals has been extensively investigated in China. However, nearly all studies were field monitoring in small regions and/or with limited samples, which may not represent soil pollution situation at the national scale. In this study, an attempt was made to provide a comprehensive report about heavy metal pollution in China based on meta-analysis of reviewed data. Given the characteristics of field monitoring studies, the weighted mean values

based on "sampling number", "study area", and "standard deviation" were calculated to represent national mean values. In addition, subgroup analysis and cumulative meta-analysis were applied to explore the spatial and temporal variations as well as the influence of cropping systems. 336 articles published from 2005 to 2017 were reviewed in the analysis. Eight heavy metals (cadmium (Cd), chromium (Cr), mercury (Hg), lead (Pb), arsenic (As), copper (Cu), zinc (Zn) and nickel (Ni)) were analysed. The contents of Cd and Hg were increased compared to background values, while the other six elements showed no significant accumulation. Little pollution was found in normal farmland, which was far from obvious anthropogenic emissions. However, Cd and Hg in mining & smelting areas and industrial areas continued to accumulate significantly. Moreover, the accumulation had slowed down or decreased since 2012, which might be due to reduced use of coals, non-ferrous metals and agro-chemicals. Heavy metal contents were generally higher in southwest and south coastal areas but lower in northwest regions, whereas vegetable and paddy fields had higher concentrations than upland and other land use. This study provides information on soil pollution caused by heavy metals and its affected regions and cropping systems on a national scale. The authors concluded that the findings from this study can be useful for developing heavy metal pollution control and management strategies in China.

Authors: Huang Y, Wang L, Wang W, Li T, He Z, Yang X.

Full Source: Science of the Total Environment. 2019 Feb 15;651(Pt 2):3034-3042. doi: 10.1016/j.scitotenv.2018.10.185. Epub 2018 Oct 15.

Aerosol exposure to intermediate size Nipah virus particles induces neurological disease in African green monkeys

2019-02-18

Nipah virus (NiV) infection can lead to severe respiratory or neurological disease in humans. Transmission of NiV has been shown to occur through contact with virus contaminated fomites or consumption of contaminated food. Previous results using the African green monkey (AGM) model of NiV infection identified aspects of infection that, while similar to humans, don't fully recapitulate disease. Previous studies also demonstrate near uniform lethality that is not consistent with human NiV infection. In these studies, aerosol exposure using an intermediate particle size (7 μ m) was used to mimic potential human exposure by facilitating virus deposition in the upper respiratory tract. Computed tomography evaluation found some animals developed pulmonary parenchymal disease including consolidations, ground-glass opacities, and reactive adenopathy. Despite

the lack of neurological signs, magnetic resonance imaging identified distinct brain lesions in three animals, similar to those previously reported in NiV-infected patients. Immunological characterisation of tissues collected at necropsy suggested a local pulmonary inflammatory response with increased levels of macrophages in the lung, but a limited neurologic response. These data provide the first clear evidence of neurological involvement in the AGM that recapitulates human disease. With the development of a disease model that is more representative of human disease, these data suggest that NiV infection in the AGM may be appropriate for evaluating therapeutic countermeasures directed at virus-induced neuropathogenesis.

Authors: Hammoud DA, Lentz MR, Lara A, Bohannon JK, Feuerstein I, Huzella L, Jahrling PB, Lackemeyer M, Laux J, Rojas O, Sayre P, Solomon J, Cong Y, Munster V, Holbrook MR.

Full Source: PLOS Neglected Tropical Diseases. 2018 Nov 21;12(11):e0006978. doi: 10.1371/journal.pntd.0006978. eCollection 2018 Nov.

Effect of Fungicide on Pollen Foraging by Honeybees (Hymenoptera: Apidae) in Cranberry Differs by Fungicide Type

2019-02-18

Honeybees (*Apis mellifera* Linnaeus) (Hymenoptera: Apidae) play a major role in the pollination of cranberry (*Vaccinium macrocarpon*; Ericaceae). However, fungicide applications during cranberry bloom may affect bees foraging behaviour. This study reports the amount of cranberry and noncranberry pollen brought back to hives immediately before and after two types of fungicide applications. The amount of cranberry pollen decreased while the amount of noncranberry pollen increased following a fungicide application. However, this relationship differed depending on the type of fungicide applied. Understanding how different fungicides specifically impact bee behaviour is essential to minimising bee exposure to potentially harmful chemicals.

Authors: Jaffe BD, Lois AN, Guédot C.

Full Source: Journal of Economic Entomology. 2018 Nov 21. doi: 10.1093/jee/toy353. [Epub ahead of print]

This study reports the amount of cranberry and noncranberry pollen brought back to hives immediately before and after two types of fungicide applications.

MEDICAL RESEARCH

Gut Microbiota Modulates Interactions Between Polychlorinated Biphenyls and Bile Acid Homeostasis

2019-02-18

The gut microbiome is increasingly recognised as a second genome that contributes to the health and diseases of the host. A major function of the gut microbiota is to convert primary bile acids (BAs) produced from cholesterol in the liver into secondary BAs that activate distinct host receptors to modulate xenobiotic metabolism and energy homeostasis. In this study, the authors investigated to what extent oral exposure to an environmentally relevant polychlorinated biphenyl (PCBs mixture), namely the Fox River mixture, impacts gut microbiome and BA homeostasis. Ninety-day-old adult female conventional (CV) and germ-free (GF) C57BL/6 mice were orally exposed to corn oil (vehicle), or the Fox River mixture at 6 or 30 mg/kg once daily for 3 consecutive days. The PCB low dose profoundly increased BA metabolism related bacteria *Akkermansia* (A.) *muciniphila*, *Clostridium* (C.) *scindens*, and *Enterococcus* in the large intestinal pellet (LIP) of CV mice (16S rRNA sequencing/qPCR). This correlated with a PCB low dose-mediated increase in multiple BAs in serum and small intestinal content (SIP) in a gut microbiota-dependent manner (UPLC-MS/MS). Conversely, at PCB high dose, BA levels remained stable in CV mice correlated with an increase in hepatic efflux transporters and ileal *Fgf15*. Interestingly, lack of gut microbiota potentiated the PCB-mediated increase in taurine conjugated α and β muricholic acids in liver, SIP, and LIP. Pearson's correlation identified positive correlations between 5 taxa and most secondary BAs. In conclusion, PCBs dose-dependently altered BA homeostasis through a joint effort between host gut-liver axis and intestinal bacteria.

Authors: Cheng SL, Li X, Lehmler HJ, Phillips B, Shen D, Cui JY.

Full Source: *Toxicological Science*. 2018 Dec 1;166(2):269-287. doi: 10.1093/toxsci/kfy208.

In this study, the authors investigated to what extent oral exposure to an environmentally relevant polychlorinated biphenyl (PCBs mixture), impacts gut microbiome and BA homeostasis.

Analysis of real-world treatment patterns in a matched rheumatology population that continued innovator infliximab therapy or switched to biosimilar infliximab

2019-02-18

This study compared treatment patterns of Turkish patients with a diagnosis of rheumatoid arthritis (RA) who were treated with innovator Remicade® (infliximab [IFX]) and either continued IFX or switched to CT-

P13. Adult RA patients with ≥ 1 IFX claim were identified from the Turkish Ministry of Health database. Eligible patients initiated and continued IFX treatment (continuers cohort [CC]) or initiated IFX and switched to CT-P13 (switchers cohort [SC]) during the study period. The initial IFX claim date was defined as the index date. The switch/reference date was defined as the CT-P13 switch date for the SC or a random IFX date during the period of CT-P13 availability for the CC. Cohorts were matched by age, sex, and number of IFX prescriptions during baseline. Patient demographics, discontinuation, and switching were summarised. The baseline period was defined as the period from the index date to the switch/reference date. The follow-up period ranged from the switch/reference date to the end of data availability. After matching, 697 patients were selected: 605 patients for the CC and 92 patients for the SC. Mean IFX duration for the baseline period was 422 days in the CC and 438 days in the SC. Median time on any infused tumour necrosis factor (TNF) antagonist therapy was 1,080 days in the CC and 540 days in the SC during the study period. During the follow-up period, discontinuation was lower in the CC (CC=33.9% vs SC=87.5%; $P < 0.001$). The mean time to discontinuation was longer in the CC (CC=276 days vs SC=132 days; $P < 0.001$). A switch to another biologic medication during the follow-up period was observed in 19.0% of patients in the CC ($n=115$) and 81.5% of patients in the SC ($n=75$; $P < 0.001$). The authors concluded that the treatment patterns differed between patients prescribed IFX and CT-P13. In Turkey, RA patients maintained on IFX had greater treatment persistence (ie, fewer and later discontinuations) than those who initiated IFX and switched to CT-P13.

Authors: Yazici Y, Xie L, Ogbomo A, Ellis LA, Goyal K, Teeple A, Simsek I.
Full Source: Biologics. 2018 Oct 25; 12:127-134. doi: 10.2147/BTT.S172337. eCollection 2018.

Importance of *Propionibacterium acnes* haemolytic activity in human intervertebral discs: A microbiological study

2019-02-18

Most patients with chronic lower back pain (CLBP) exhibit degenerative disc disease. Disc specimens obtained during initial therapeutic discectomies are often infected/colonised with *Propionibacterium acnes*, a Gram-positive commensal of the human skin. Although pain associated with infection is typically ascribed to the body's inflammatory response, the Gram-positive bacterium *Staphylococcus aureus* was recently observed to directly activate nociceptors by secreting pore-forming α -hemolysins that disrupt neuronal cell membranes. The haemolytic activity of *P. acnes* in cultured disc specimens obtained during routine

The haemolytic activity of *P. acnes* in cultured disc specimens obtained during routine therapeutic discectomies was assessed through incubation on sheep-blood agar.

therapeutic discectomies was assessed through incubation on sheep-blood agar. The β -haemolysis pattern displayed by *P. acnes* on sheep-blood agar was variable and phylogroup-dependent. Their molecular phylogroups were correlated with their haemolytic patterns. The findings raise the possibility that pore-forming proteins contribute to the pathogenesis and/or symptomology of chronic *P. acnes* disc infections and CLBP, at least in a subset of cases.

Authors: Capoor MN, Ruzicka F, Sandhu G, Rollason J, Mavrommatis K, Ahmed FS, Schmitz JE, Raz A, Brüggemann H, Lambert PA, Fischetti VA, Slaby O.

Full Source: PLoS One. 2018 Nov 29;13(11):e0208144. doi: 10.1371/journal.pone.0208144. eCollection 2018.

Vitamin A to prevent bronchopulmonary dysplasia in extremely low birth weight infants: a systematic review and meta-analysis

2019-02-18

Vitamin A (VA) supplementation reduces the risk of developing bronchopulmonary dysplasia (BPD). However, a previous meta-analysis showed that VA had minimal efficacy for preventing BPD in very low birth weight infants (VLBWIs). The present study elucidated the effects of VA supplementation for BPD prevention in extremely low birth weight infants (ELBWIs). This systematic review and meta-analysis followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The authors registered the protocol on PROSPERO, the international prospective registry of systematic reviews (registration number: CRD42016050887). The following five databases were searched: CINAHL, CENTRAL, EMBASE, MEDLINE, and PubMed; screened the reference lists of retrieved articles to identify randomised controlled trials (RCTs); and assessed the Cochrane Risk of Bias for each study. The certainty of the evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) guidelines. Four studies (total, 1,011 infants) were included. VA was administered intramuscularly in 3 studies and orally in 1 study. VA supplementation for ELBWIs had benefited oxygen dependency at the postmenstrual age of 36 weeks in survivors (pooled risk ratio, 0.88; 95% confidence intervals (CI), 0.77-0.99; 4 trials, 841 infants, moderate certainty of evidence), which is similar to the meta-analysis in VLBWIs. Length of hospital stay was reduced in the VA group (mean difference, -49.9; 95% CI, -88.78 to -11.02; 1 trial, 20 infants, low certainty of evidence). The meta-analysis showed no reduction in the risk of neonatal death, oxygen use at 28 days in survivors, duration

The present study elucidated the effects of vitamin A supplementation for BPD prevention in extremely low birth weight infants

of mechanical ventilation, intraventricular haemorrhage, retinopathy in prematurity, and necrotising enterocolitis. The authors concluded that VA supplementation for ELBWIs is potentially effective in decreasing oxygen dependency at the postmenstrual age of 36 weeks.

Authors: Araki S, Kato S, Namba F, Ota E.

Full Source: PLoS One. 2018 Nov 29;13(11):e0207730. doi: 10.1371/journal.pone.0207730. eCollection 2018.

3-Dimensional Quantification of Composite Pleural Plaque Volume in Patients Exposed to Asbestos Using High-resolution Computed Tomography: A Validation Study

2019-02-18

As pleural plaque has been reported as a risk factor in the occurrence of lung cancer and mesothelioma, a reproducible and precise method of measurement of pleural plaque volume (PPV) is needed to further describe these relationships. The aim of the study was to assess the reproducibility of a 3-dimensional computed tomography (3D-CT) volumetric analysis of PPV in patients with occupational exposure to asbestos. A total of 28 patients were retrospectively randomly selected from the multicentre APEXS (Asbestos Post Exposure Survey) study, which was held between 2003 and 2005. All patients underwent a 3D-CT scan. Two readers specialised in chest radiology completed the 3D semiautomated quantification of lung volume using dedicated software. They also had to categorise the visual extent of pleural plaque in terms of thickness and circumference. Reproducibility of the continuous PPV variable was assessed using the intraclass correlation coefficient (ICC) and Bland-Altman analysis. Reproducibility of categorical variables was assessed using the κ test. Intraobserver reproducibility of PPV was almost perfect (ICC=0.98 [95% interval: 0.97-0.99]), and interobserver reproducibility was very good (ICC=0.93 [0.88-0.97]). At Bland-Altman analysis, the mean differences were 0.1 (limit of agreement: -11.0 to 11.2) and 3.7 cc (-17.8 to 25.2), respectively. Visual analysis of both plaque in terms of thickness and circumference were fair to moderate, with κ values ranging from 0.30 to 0.60. 3D semiautomatic quantification of PPV is feasible and reproducible using CT in patients with occupational exposure

The aim of the study was to assess the reproducibility of a 3-dimensional computed tomography (3D-CT) volumetric analysis of PPV in patients with occupational exposure to asbestos.

Technical

CHEMWATCH

to asbestos. PPV measurement may be useful to correlate with other asbestos-related disease outcomes and prognosis.

Authors: Dournes G, Dubois A, Benlala I, Lacourt A, Paris C, Gislard A, Clin B, Pairon JC, Baldacci F, Laurent F.

3-Dimensional Quantification of Composite Pleural Plaque Volume in Patients Exposed to Asbestos Using High-resolution Computed Tomography: A Validation Study.

OCCUPATIONAL RESEARCH

Long-term exposure to low level of fluoride induces apoptosis via p53 pathway in lymphocytes of aluminium smelter workers

2019-02-18

Long-term occupational exposure to low level of fluoride can induce oxidative stress and apoptosis in many cells, including lymphocyte. However, the underlying mechanism remains unclear. In the present study, the authors explored the potential oxidative stress and apoptosis of long-term occupational exposure to low level of fluoride in aluminium smelter workers. A total of 120 aluminium smelter workers were recruited in control, low-, middle-, and high-fluoride exposure groups with 30 workers for each group. The peripheral blood samples were collected, centrifuged, and isolated to obtain serum and lymphocyte suspensions. The air and serum fluoride concentrations were detected by fluoride ion-selective electrode method. The lymphocytic apoptosis rate, DNA damage, oxidative stress, and mRNA levels of p53, Bcl-2, and Bax were assessed by Annexin V/PI staining, comet assay, attenuated total reflectance Fourier transform infrared spectroscopy and real-time polymerase chain reaction, respectively. Results showed that the air and serum fluoride concentrations of fluoride-exposed groups were higher than those of the control group ($p < 0.05$). Fluoride exposure might induce apoptosis, DNA damage and oxidative stress in a dose-dependent manner in lymphocytes ($p < 0.05$). The expression levels of p53 and Bax were increased with fluoride exposure in lymphocytes ($p < 0.05$), whereas the Bcl-2 expression was decreased but not significantly. Taken together, these observations indicate that long-term occupational exposure to low level of fluoride may lead to oxidative stress and induce apoptosis through the p53-dependent

In the present study, the authors explored the potential oxidative stress and apoptosis of long-term occupational exposure to low level of fluoride in aluminium smelter workers.

pathway in peripheral blood lymphocytes of aluminium smelter workers. Serum fluoride level may be the potential biomarker of fluoride exposure.

Authors: Wen P, Wei X, Liang G, Wang Y, Yang Y, Qin L, Pang W, Qin G, Li H, Jiang Y, Wu Q.

Full Source: Environmental Science & Pollution Research International. 2019 Jan;26(3):2671-2680. doi: 10.1007/s11356-018-3726-z. Epub 2018 Nov 26.

Insecticide toxic effects and blood biochemical alterations in occupationally exposed individuals in Punjab, Pakistan

2019-02-18

Biomonitoring of people exposed to hazardous materials provides opportunities for early identification of several diseases, particularly in those individuals who are constantly exposed to pesticides, such as pesticide operators and workers in pesticide manufacturing industry. However, data on this hot topic are limited in Pakistan. In this study, insecticide toxic effects and biochemical alterations (i.e., damage in DNA and enzyme activity) were studied in blood samples of occupationally exposed individuals from Punjab, Pakistan. Eight out of twenty-seven blood samples (29.6%) of the pesticide operators were found positive in five insecticides, with the maximum concentration found for chlorpyrifos-methyl (0.039 µg/mL). Eleven out of twenty-seven blood samples (40.7%) of the pesticide industry workers were found positive in eight insecticides, with the maximum concentration found for endosulfan (0.051 µg/mL). Comet tail length was 16.88 ± 4.57 µm in pesticide industry workers and 16.33 ± 3.78 µm in pesticide operators, which were significantly higher ($P < 0.01$) than that recorded in the control group (4.84 ± 2.21 µm). Values of serum cholinesterase (SChE) concentration were slightly lower ($P > 0.05$) in exposed individuals, whereas values of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) concentration were significantly higher ($P < 0.01$) in exposed individuals compared with control group. Exposure duration and total insecticide concentration in blood samples were positively associated with comet tail length, ALT activity, AST activity, and ALP activity, but negatively with SChE. DNA damage was higher in smokers vs. non-smokers. Also, a positive association was found between comet tail length and number of cigarettes per day. Overall, occupational exposure to insecticides can pose serious health risks to pesticide operators and workers in pesticide

In this study, insecticide toxic effects and biochemical alterations were studied in blood samples of occupationally exposed individuals from Punjab, Pakistan.

manufacturing industry, highlighting the necessity of personal protection in those groups for preventing exposure and resultant health disorders.

Authors: Hayat K, Afzal M, Aqueel MA, Ali S, Saeed MF, Qureshi AK, Ullah MI, Khan QM, Naseem MT, Ashfaq U, Damalas CA.

Full Source: Science of the Total Environment. 2019 Mar 10; 655:102-111.

doi: 10.1016/j.scitotenv.2018.11.175. Epub 2018 Nov 13.

Pterostilbene Attenuates Hexavalent Chromium-Induced Allergic Contact Dermatitis by Preventing Cell Apoptosis and Inhibiting IL-1 β -Related NLRP3 Inflammasome Activation

2019-02-18

Hexavalent chromium (Cr(VI)) is widely used in many industries but can induce contact dermatitis especially in cement industries. Many cement workers suffer from Cr(VI)-induced allergic contact dermatitis (ACD), and prevention and therapeutic strategies are still lacking. Pterostilbene (PT) is a natural compound predominantly found in blueberries. Studies indicate the potential use of PT as an effective anti-oxidative and anti-inflammatory agent. In this study, the authors investigated the possible mechanisms involved and whether chromium-induced ACD could be effectively inhibited by treating PT. In our in vivo study, epidermal Cr(VI) administration causes cutaneous inflammation in mice ear skin, and the pro-inflammatory cytokines, TNF- α and IL-1 β , were found in the epidermis, presenting the level of increase after Cr(VI) treatment. Meanwhile, the results of our in vitro experiment showed that apoptosis and endoplasmic reticulum (ER) stress were induced after treatment with different concentrations of Cr(VI) in HaCaT cells (human keratinocyte). Cr(VI) also induced TNF- α and IL-1 β mRNA expressions, through the activation of the p38 mitogen-activated protein kinase (MAPK)/MAPK-activated protein kinase 2 (MK2) pathway. Notably, the severity of the skin reactions in the epicutaneous elicitation test significantly diminished when the mouse was treated with PT. Likewise, PT intervention also ameliorated the inflammation and apoptosis of HaCaT cells in vitro. Furthermore, the current findings demonstrated that the NLRP3 inflammasome could be involved in the Cr(VI)-mediated inflammation and apoptosis of ACD. Thus, interrupting this mechanism with proper nontoxic agents, such as PT, could be a new option to improve occupational chromium toxicity and hypersensitivity.

Authors: Wang BJ, Chiu HW, Lee YL, Li CY, Wang YJ, Lee YH.

Full Source: Journal of Clinical Medicine. 2018 Nov 27;7(12). pii: E489. doi: 10.3390/jcm7120489.

In this study, the authors investigated the possible mechanisms involved and whether chromium-induced allergic contact dermatitis could be effectively inhibited by treating Pterostilbene

Health care worker vaccination against Ebola: Vaccine acceptance and employment duration in Sierra Leone

2019-02-18

Health care workers (HCW) are at high risk of Ebola virus disease (EVD) infection during epidemics and may contribute to onward transmission, and therefore HCW-targeted prophylactic vaccination strategies are being considered as interventions. To assess the feasibility of preventive HCW vaccination, the authors conducted a pilot survey on staff turnover and vaccine acceptance amongst 305 HCW in Freetown and Kambia districts of Sierra Leone. Multivariable logistic regression demonstrated which demographic and behavioural factors were associated with acceptance of a hypothetical new vaccine. The authors quantified the duration of employment of HCW, and used multivariable gamma regression to detect associations with duration of employment in current or any health care position. Finally, the populations of HCW were simulated, to determine the likely future immunisation coverage amongst HCW based on estimates of vaccine acceptance and employment duration. Most HCW we surveyed had a positive opinion of EVD vaccination (76.3%). It was found that being a volunteer HCW (vs being on the government payroll) was associated with increased vaccine acceptance. HCW were found to have stable employment, with a mean duration of employment in the health sector of 10.9 years (median 8.0 years). Older age and being on the government payroll (vs volunteer HCW) were associated with a longer duration of employment in the health sector. Assuming a single vaccine campaign, with 76.3% vaccine acceptance, 100% vaccine efficacy and no waning of vaccine-induced protection, immunisation coverage was sustained over 50% until 6 years after a vaccination campaign. If vaccine-induced immunity wanes at 10% per year, then the immunisation coverage among HCW would fall below 50% after 3 years. Vaccinating HCW against EVD could be feasible as employment appeared stable and vaccine acceptance high. However, even with high vaccine efficacy and long-lasting immunity, repeated campaigns or vaccination at employment start may be necessary to maintain high coverage.

Authors: Jendrossek M, Edmunds WJ, Rohan H, Clifford S, Mooney TA, Eggo RM.

Full Source: *Vaccine*. 2019 Feb 14;37(8):1101-1108. doi: 10.1016/j.vaccine.2018.12.060. Epub 2019 Jan 23.

Exposure duration and absorbed dose assessment in pesticide-exposed agricultural workers: Implications for risk assessment and modelling

2019-02-18

Absorbed dose assessment from dermal exposure involves multiplying skin contamination by the dermal absorption coefficient, which is usually defined for the standard workday of 8 h. This strategy may suffer from limitations when the duration of exposure is extremely variable, such as in agricultural exposure to pesticides. The aim of this study was to estimate the dose of mancozeb absorbed by agricultural pesticide applicators in a typical working day considering the real duration of exposure, to compare these estimates with those coming from the use of the Fixed Fractional Approach, and to assess the suitability of the dose estimates in the interpretation of biological monitoring results. In a series of real-life field studies on 29 workers applying mancozeb in vineyards for 38 work days, three sets of data were collected: information regarding work activities for each work day, potential (on clothes) and actual skin exposure using the "patch" methodology, and excretion of ethylenethiourea (ETU) in the 24-h pre-exposure and 24-h post-exposure urine samples. The statistical analyses were done using the R Language and Environment for Statistical Computing. Accounting for the duration of exposure led to a substantial reduction in the absorbed dose estimates, compared to the estimates coming from the Fixed Fractional Approach. In particular, absorbed dose by the body, hands' and total absorbed dose were reduced by 50%, 81%, and 80% respectively. The body dose estimated considering both approaches still correlated better with post-exposure 24-h urine ETU levels than the hands' dose, although more than 90% of the estimated total absorbed dose comes from the hands. An accurate estimate of the absorbed dose, carried out considering the real duration of exposure, can result in a higher correlation with a biomarker of occupational exposure, such as urine ETU, or at least yield more accurate results. This can facilitate the interpretation of biological monitoring data in pesticide-exposed agricultural workers despite the absence of biological exposure limits. ETU should be evaluated as a potentially relevant source of exposure due to ethylenebisdithiocarbamates' (EBDCs) degradation in the formulated product or spray mixture.

Full Source: Mandic-Rajcevic S, Rubino FM, Ariano E, Cottica D, Negri S, Colosio C.

Full Source: International Journal of Hygiene & Environmental Health. 2019 Jan 23. pii: S1438-4639(18)30487-5. doi: 10.1016/j.ijheh.2019.01.006. [Epub ahead of print]

The aim of this study was to estimate the dose of mancozeb absorbed by agricultural pesticide applicators in a typical working day considering the real duration of exposure

PUBLIC HEALTH RESEARCH

Cross-sectional associations between urinary triclosan and serum thyroid function biomarker concentrations in women

2019-02-18

Exposure to the antimicrobial agent triclosan is ubiquitous. Research in animals shows that triclosan can cause decreases in thyroxine concentrations. However, the potential effects of triclosan on thyroid function in humans are unclear. In this study, the authors estimated the association between urinary triclosan concentrations and serum thyroid function biomarkers in women seeking assisted reproduction treatment in the Environment and Reproductive Health (EARTH) Study. A cross-sectional study was conducted of 317 women enrolled in the EARTH Study, a prospective preconception cohort that recruits Boston area couples. Using samples collected at study entry, the authors quantified urinary triclosan and serum thyroid function biomarker concentrations, specifically free and total thyroxine and triiodothyronine, thyroid-stimulating hormone (TSH), and thyroid antibodies.

Covariate-adjusted differences were estimated in thyroid function biomarkers per 10-fold increase in triclosan using linear regression models. The effect modification by body mass index (BMI) and infertility diagnosis were examined. The median urinary triclosan concentration was 7.8 µg/L (IQR: 3.0-59 µg/L). Each 10-fold increase in triclosan was inversely associated with free triiodothyronine (T3) (β : -0.06 pg/mL; 95% CI: -0.1, -0.01), thyroperoxidase antibody (TPOAb) (-10%; 95% CI: -19, -0.4), and thyroglobulin antibody (TgAb) (-12%; 95% CI: -23,0.9) concentrations. BMI and infertility diagnosis modified the association of triclosan with free T3 and TPOAb, respectively. Urinary triclosan concentrations were inversely associated with specific serum thyroid function biomarkers in this cohort, suggesting that triclosan may affect thyroid homeostasis and autoimmunity.

Authors: Skarha J, Mínguez-Alarcón L, Williams PL, Korevaar TIM, de Poortere RA, Broeren MAC, Ford JB, Eliot M, Hauser R, Braun JM.

Full Source: Environment International. 2019 Jan; 122:256-262. doi: 10.1016/j.envint.2018.11.015. Epub 2018 Nov 23.

In this study, the authors estimated the association between urinary triclosan concentrations and serum thyroid function biomarkers in women seeking assisted reproduction treatment

Endocrine Disruptors and Autism Spectrum Disorder in Pregnancy: A Review and Evaluation of the Quality of the Epidemiological Evidence

2019-02-18

Exposure to environmental contaminants during pregnancy has been linked to adverse health outcomes later in life. Notable among these pollutants are the endocrine disruptors chemicals (EDCs), which are ubiquitously present in the environment and they have been measured and quantified in the foetus. In this systematic review, the objective was to summarise the epidemiological research on the potential association between prenatal exposure to EDCs and Autism Spectrum Disorder (ASD) published from 2005 to 2016. The Navigation Guide Systematic Review Methodology was applied. A total of 17 studies met the inclusion criteria for this review, including: five cohorts and 12 case-control. According to the definitions specified in the Navigation Guide, the authors rated the quality of evidence for a relationship between prenatal exposure to EDCs and ASD as “moderate”. Although the studies generally showed a positive association between EDCs and ASD, after considering the strengths and limitations, we concluded that the overall strength of evidence supporting an association between prenatal exposure to EDCs and later ASD in humans remains “limited” and inconclusive. Further well-conducted prospective studies are warranted to clarify the role of EDCs on ASD development.

Authors: Marí-Bauset S, Donat-Vargas C, Llópis-González A, Marí-Sanchis A, Peraita-Costa I, Llopis-Morales J, Morales-Suárez-Varela M.

Full Source: Children (Basel). 2018 Nov 23;5(12). pii: E157. doi: 10.3390/children5120157.

In this systematic review, the objective was to summarise the epidemiological research on the potential association between prenatal exposure to EDCs and Autism Spectrum Disorder (ASD) published from 2005 to 2016.

Quantifying the effects of a low-ozone event and shallow stratocumulus clouds on ultraviolet erythemal radiation exposure

2019-02-18

Meteorological and dosimetric ultraviolet (UV) erythemal radiation (UVER) measurements were performed in Didcot, England, on 6 and 7 April 2017. Both days were characterised by clear-sky conditions in the morning and the afternoon with development of shallow stratocumulus clouds (SSC) around noon. In addition, a low-ozone event occurred on 7 April characterised by a 34 DU (Dobson Unit) drop in total stratospheric ozone content. Compared to 6 April, the ozone mini-hole caused UVER increases of 2.67 standard erythema dose (SED) for diffuse and 4.32 SED

Technical

CHEMWATCH

for global radiation characterised by radiation amplification factors (RAF) of 1.62 and 1.52, respectively. The total global UVER dose reductions due to SSC coverage amount to 2.33 SED (6 April) and 2.81 SED (7 April). As innovation the RAF is decomposed into two parts, named cloud ozone factor (COF) and radiation amplification factor based on measured data (RAFm), to quantify the low-ozone event's effect and the SSC influence in independently modifying the UVER doses. Hereby, the weight of each of these two effects acting during the same low-ozone event is expressed by the new COF. In this case, the COF values range between -0.13 and -0.11 for diffuse UVER and -0.03 to -0.07 for the global UV and UV-B parts. A positive COF value (0.18) results for the global UV-A range.

Authors: Kelbch A, Wittlich M, Bott A.

Full Source: International Journal of Biometeorology. 2019 Jan 26. doi: 10.1007/s00484-018-01669-8. [Epub ahead of print]

Separating spatial patterns in pollution attributable to woodsmoke and other sources, during daytime and night-time hours, in Christchurch, New Zealand

2019-02-18

During winter nights, woodsmoke may be a predominant source of air pollution, even in cities with many sources. Since two major earthquakes resulted in major structural damage in 2010 and 2011, reliance on woodburning for home heating has increased substantially in Christchurch, New Zealand (NZ), along with intensive construction/demolition activities. Further, because NZ is a relatively isolated western country, it offers the unique opportunity to disentangle multiple source impacts in the absence of long-range transport pollution. Finally, although many spatial saturation studies have been published, and levoglucosan is an established tracer for woodburning emissions, few studies have monitored multiple sites simultaneously for this or other organic constituents, with the ability to distinguish spatial patterns for daytime vs. night-time hours, in complex urban settings. The authors captured seven-day integrated samples of PM_{2.5}, and elemental and organic tracers of woodsmoke and diesel emissions, during "daytime" (7 a.m. -5:30 p.m.) and "night-time" (7 p.m. - 5:30 a.m.) hours, at nine sites across commercial and residential areas, over three weeks in early winter (May 2014). At a subset of six sites, we also sampled during hypothesized "peak" woodburning hours (7 p.m. - 12 a.m.), to differentiate emissions during "active" residential woodburning, vs. overnight smouldering. Concentrations of PM_{2.5} were, on average, were twice as high during night-time than daytime [$\mu = 18.4$ (SD = 6.13) vs. 9.21 (SD = 6.13) $\mu\text{g}/\text{m}^3$], with much greater differences in

The authors captured seven-day integrated samples of PM_{2.5}, and elemental and organic tracers of woodsmoke and diesel emissions, during "daytime" (7 a.m. -5:30 p.m.) and "night-time" (7 p.m. - 5:30 a.m.) hours, at nine sites across commercial and residential areas, over three weeks in early winter

woodsmoke tracers (i.e., levoglucosan [$\mu = 1.83$ (SD = 0.82) vs. 0.34 (SD = 0.17) $\mu\text{g}/\text{m}^3$], potassium) and indicators of treated- or painted-wood burning (e.g., arsenic, lead). Only nitrogen dioxide, calcium, iron, and manganese (tracers of vehicular emissions) were higher during daytime. Levoglucosan and most PAHs were higher during “active” woodburning, vs. overnight smouldering. Our time-stratified spatial saturation detected strong spatial variability throughout the study area, which distinctly differed during daytime vs. night time hours, and quantified the substantial contribution of woodsmoke to overnight spatial variation in PM_{2.5} across Christchurch. Daytime vs. night-time differences were greater than those observed across sites. Traffic, especially diesel, contributed substantially to daytime NO₂ and spatial gradients in non-woodsmoke constituents.

Authors: Tunno B, Longley I, Somervell E, Edwards S, Olivares G, Gray S, Cambal L, Chubb L, Roper C, Coulson G, Clougherty JE.

Full Source: Environmental Research. 2019 Jan 16; 171:228-238. doi: 10.1016/j.envres.2019.01.033. [Epub ahead of print]

Passive exposure to pollutants from conventional cigarettes and new electronic smoking devices (IQOS, e-cigarette) in passenger cars

2019-02-18

Smoking in car interiors is of particular concern because concentrations of potentially harmful substances can be expected to be high in such small spaces. To assess the potential exposure for occupants, especially children, the authors performed a comprehensive evaluation of the pollution in 7 passenger cars while tobacco cigarettes and new electronic smoking products (IQOS, e-cigarette) were being smoked. Data on the indoor climate and indoor air pollution was collected with fine and ultrafine particles and volatile organic compounds while the cars were being driven. Smoking of an IQOS had almost no effect on the mean number concentration (NC) of fine particles (>300 nm) or on the PM_{2.5} concentration in the interior. In contrast, the NC of particles with a diameter of 25-300 nm markedly increased in all vehicles ($1.6-12.3 \times 10^4/\text{cm}^3$). When an e-cigarette was vaped in the interior, 5 of the 7 tested cars showed a strong increase in the PM_{2.5} concentration to 75-490 $\mu\text{g}/\text{m}^3$. The highest PM_{2.5} levels (64-1988 $\mu\text{g}/\text{m}^3$) were measured while tobacco cigarettes were being smoked. With the e-cigarette, the concentration of propylene glycol increased in 5 car interiors to 50-762 $\mu\text{g}/\text{m}^3$, whereby the German indoor health precaution guide value for propylene glycol was exceeded in 3 vehicles and the health hazard guide value in one. In

Smoking in car interiors is of particular concern because concentrations of potentially harmful substances can be expected to be high in such small spaces.

Technical

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4 vehicles, the nicotine concentration also increased to 4-10 $\mu\text{g}/\text{m}^3$ while the e-cigarette was being used. The nicotine concentrations associated with the IQOS and e-cigarette were comparable, whereas the highest nicotine levels (8-140 $\mu\text{g}/\text{m}^3$) were reached with tobacco cigarettes. Cigarette use also led to pollution of the room air with formaldehyde (18.5-56.5 $\mu\text{g}/\text{m}^3$), acetaldehyde (26.5-141.5 $\mu\text{g}/\text{m}^3$), and acetone (27.8-75.8 $\mu\text{g}/\text{m}^3$). Tobacco cigarettes, e-cigarettes, and the IQOS are all avoidable sources of indoor pollutants. To protect the health of other non-smoking passengers, especially that of sensitive individuals such as children and pregnant women, these products should not be used in cars.

Authors: Schober W, Fembacher L, Frenzen A, Fromme H.

Full Source: International Journal of Hygiene & Environmental Health. 2019 Jan 23. pii: S1438-4639(18)30827-7. doi: 10.1016/j.ijheh.2019.01.003. [Epub ahead of print]