Bulletin Board

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Bulletin Board

JUL. 05, 2019

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Technical

CHEMWATCH

ENVIRONMENTAL RESEARCH

Validation of quantitative real-time RT-PCR assays for the detection of six honeybee viruses

2019-06-10

Acute bee paralysis virus (ABPV), Black queen cell virus (BQCV), Chronic bee paralysis virus (CBPV), Deformed wing virus (DWV), Sacbrood virus (SBV) and Varroa destructor virus 1 (VDV1) are the six main honeybee viruses reported in Europe. In the present study, the authors assessed the accuracy (trueness and precision) of reverse transcriptase quantitative TaqMan® PCR methods (RT-qPCR) for quantifying ABPV, BQCV, DWV, VDV1 and SBV loads. Once the systematic bias in quantitative results had been corrected (overestimation in ABPV and BQCV quantification and underestimation in that of SBV and VDV1), measurements were taken to determine the viral load ranges for which quantification uncertainty was below ± 1 log10 equivalent of genome copies per bee (hereafter reported as genome copies/bee). The accuracy range of RT-qPCR was found to be between 6.4 and 10.4 log10 genome copies/bee for ABPV, between 3.0 and 10.0 log10 genome copies/bee for BQCV, between 2.4 and 10.4 log10 genome copies/bee for DWV and between 3.4 and 10.4 log10 genome copies/bee for SBV. Outside these ranges, the results' uncertainty is higher. VDV1 RT-qPCR accuracy was outside accuracy limits for all viral loads. Using these RT-qPCR methods, we quantified viral loads in naturally-infected honeybees. The viral load distribution and clinical signs reported with the honeybee samples allowed us to define a threshold that could be used to differentiate between covert and overt infections. These methods will be useful in diagnosing the main viral infections impairing honeybee health.

Authors: Schurr F, Tison A, Militano L, Cheviron N, Sircoulomb F, Rivière MP, Ribière-Chabert M, Thiéry R, Dubois E.

> In the present study, the authors assessed the accuracy of reverse transcriptase quantitative TaqMan® PCR methods for quantifying ABPV, BQCV, viral loads.

Review of remediation goals at contaminated sediment sites in the United States

2019-06-10

Remediation decisions for contaminated sediment sites are typically based on comparisons of in situ sediment concentrations to preliminary remediation goals (PRGs). PRGs are typically developed for protection of human health and the environment, with consideration of site-

specific factors that play an important role in determining the sediment concentrations that are consistent with the human health and environmental protection objectives. Remediation goals are selected from among the PRGs. Sediment remediation goals for four common contaminants (polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), lead, and mercury) at contaminated sediment sites throughout the United States were evaluated to determine significant trends and evaluate causes of those trends. Remediation goals were compiled from Records of Decision (RODs) and 5-year review reports for 77 contaminated sediment sites throughout the continental United States. Remediation goals were developed both as surface-weighted average concentrations (SWACs) and action levels (i.e., not-to-exceed values). One or both may be used to define areas requiring remediation. Remediation goals based on SWACs are typically applied to bioaccumulative chemicals for human health and wildlife receptors, while action levels are typically used for chemicals that result in an acute toxicity to small home range, sediment-dwelling biota. The findings from this review of remediation goals indicate that SWACs are an increasingly common approach for developing remediation goals, even for small home range, sediment-dwelling organisms. In addition, the findings from this review of remediation goals indicate that although remediation goals adopted for lead have become more stringent over time, no trend is evident for PCBs, PAHs, and mercury. Remediation goals for PCBs, PAHs, and mercury vary among a variety of factors, such geography, habitat, human or ecological risks, and other local factors.

Authors: Pelletier D, Sacks VP, Sorensen M, Magar V.
Full Source: Integratated Environmental Assessment & Management. 2019 Apr 26. doi: 10.1002/ieam.4162. [Epub ahead of print]

The effect of a multi-mineral preparation on the health and growth of spring born, dairy calves was investigated on four New Zealand pastoral farms.

Reduction in morbidity and mortality of dairy calves from an injectable trace mineral supplement

2019-06-10

The effect of a multimineral preparation on the health and growth of spring born, dairy calves was investigated on four New Zealand pastoral farms. Calves were randomly allocated injections within 24 hours of birth, 35 days and 70 days after birth. Injections contained 40 mg zinc, 10 mg manganese, 5 mg selenium, 15 mg copper and 5 mg chromium per ml (Multimin+Se+ Cu+Cr Cattle, Virbac South Africa) at 1 ml/50 kg body weight. Morbidity, mortality from natural challenge and growth rates were recorded for 140 days. There were no differences in morbidity and mortality within 48 hours of birth for treated calves compared with

controls, P=0.192. Morbidity and mortality were highest at 3-35 days (7.5 per cent [95 per cent CI 5.00 to 9.99] treated calves sick and 15.6 per cent [95 per cent CI 12.48 to 18.73] controls sick, P<0.001). For this period, mortality was lower at 4.4 per cent (95 per cent CI 2.49 to 6.41) treated calves and 10.4 per cent (95 per cent CI 7.78 to 13.03) controls, P<0.001. Allowing for potential confounders, the adjusted OR of treated calves scouring between 3 and 35 days was 0.44 (95 per cent CI 0.24 to 0.82, P=0.009). Allowing for potential confounders, from 0 to 140 days a second model predicted treatment approximately halved the probability of morbidity and mortality (P<0.001). There was no difference in the daily rate of gain (0.67 kg/day [95 per cent CI 0.66 to 0.67] for treated calves).
Authors: Bates A, Wells M, Laven RA, Simpson M.
Full Source: Veterinary Record. 2019 Apr 25. pii: vetrec-2018-105082. doi: 10.1136/vr.105082. [Epub ahead of print]

Effect of Individual and Combined Treatments of Pesticide, Fertiliser, and Salt on Growth and Corticosterone Levels of Larval Southern Leopard Frogs (Lithobates sphenocephala)

2019-06-21
Human activities have introduced a variety of chemicals, including pesticides, fertilisers, and salt, into the environment, which may have deleterious effects on the organisms inhabiting these areas. Amphibians are especially susceptible to absorption of chemical pollutants. To determine the possible combined effects of these chemicals on amphibian development and stress levels, Southern leopard frog (Lithobates sphenocephala) larvae were exposed to one of eight individual or combined treatments of atrazine, ammonium nitrate fertiliser, and sodium chloride salt. Stress levels, indicated by release of the stress hormone corticosterone, were measured premetamorphosis at week 8 of development. Water hormone samples were processed to analyse corticosterone levels. Changes in tadpole growth were determined by surface area measurements taken from biweekly photographs. The combined chemical treatment of atrazine, salt, and fertiliser had a significant interactive effect by increasing stress levels before metamorphosis (p=0.003). After a month of larval development, tadpoles exposed to ammonium nitrate had larger surface area (p=0.035). Tadpoles exposed to atrazine had a lower growth rate throughout larval development (p=0.025) and the lowest number of individuals reaching metamorphosis at 33%. However, the frogs in the atrazine treatment that did successfully metamorphose did so in fewer days (p=0.002). Because amphibians are exposed to multiple chemicals simultaneously in the

environment, assessing the effects of a combination of contaminants is necessary to improve application strategies and ecosystem health.

Environmental benchmarks based on ecotoxicological assessment with planktonic species might not adequately protect benthic assemblages in lotic systems

2019-06-21

Freshwater ecosystems face widespread diffuse and point-source contamination. Species Sensitivity Distributions (SSDs) have been used as a tool to determine chemical concentration benchmarks that represent protective levels for most species in the environment. In this study, the authors used a SSD approach to assess on the adequacy of standard planktonic organisms to reflect the response of benthic communities, critically supporting the structure and function of lotic ecosystems. For the purpose, SSDs reflecting non-lethal responses of standard planktonic and selected benthic organisms were built based on EC50 values (collected in the literature or estimated following testing herein) regarding three model contaminants: potassium dichromate (PD), 3,5-dichlorophenol (DCP) and lead chloride (LC). The derived HC5 estimates were discriminatory between chemicals and the uncertainty associated with the estimate was remarkably low. The HC5 estimates with corresponding uncertainty were generally within the same order of magnitude for the three chemicals tested, with better discrimination between chemicals regarding their hazardous potential being achieved for benthic organisms: DCP was clearly less hazardous than PD, but LC tends to be as hazardous as PD and DCP (assuming the confidence interval ranges). Moreover, benthic communities were more sensitive to both DCP and PD, in this later case the HC5 being lower by more than one order of magnitude than that found for planktonic communities; for LC, confidence intervals overlapped, preventing a feasible assumption regarding differential sensitivity of the compared communities. Microphytobenthos was highlighted as the most sensitive group to the three tested chemicals in SSDs covering the benthic compartment, while SSDs with planktonic organisms did not consistently show trends in sensitivity ordering. Overall, our results suggest that protective benchmarks retrieved from SSDs built with the responses of

In this study, the authors used a Species Sensitivity Distributions approach to assess on the adequacy of standard planktonic organisms to reflect the response of benthic communities, critically supporting the structure and function of lotic ecosystems.

standard planktonic organisms (which are the most commonly used for regulation purposes) do not adequately protect benthic communities.

MEDICAL RESEARCH

Evaluation of some biological, biochemical, and haematological aspects in male albino rats after acute exposure to the nano-structured oxides of nickel and cobalt

2019-06-10

Nanomaterial applications are a fast-developing field. In spite of their powerful advantages, many open questions regarding how these small-sized chemicals may influence the environment and human health. However, scarce reports are available on the potential hazards of combined nanoparticles, taken into consideration that nickel oxide (NiO) and cobalt (II, III) oxide (Co_3O_4) nanoparticles (NPs) are already used together in many applications. Hence, the present study was designed to investigate the probable changes in some biological, haematological, and serum biochemical variables throughout 2 weeks following an oral administration of 0.5g and 1.0 g of NiO-NPs or/and Co_3O_4-NPs per kilogram body weight of rats. As compared with the controls, the exposure to NiO-NPs or Co_3O_4-NPs solely caused significant elevations in the relative weights of brain (RBW), kidney (RKW) and liver (RLW), water consumption (WC), red blood cells (RBCs) count, haemoglobin (Hb) content, packed cell volume (PCV), and serum levels of low-density lipoprotein cholesterol (LDL-C), glucose, creatinine, urea, and uric acid as well as serum activities of aspartate and alanine aminotransferases (ASAT and ALAT). In addition, remarkable declines in the total body weight (TBW), feed consumption (FC), white blood cells (WBCs) count, serum levels of total protein (TP), albumin, albumin/globulin ratio, total cholesterol (TC), triglycerides (TG), and high-density lipoprotein cholesterol (HDL-C) were caused by administration of NiO-NPs or Co_3O_4-NPs, separately. On contrary, the co-administration of NiO-NPs and Co_3O_4-NPs together caused less noticeable changes in most of studied variables as compared with those administered NiO-NPs or Co_3O_4-NPs, individually. In conclusion, the exposure to a combination of NiO-NPs and Co_3O_4-

The present study was designed to investigate the probable changes in some biological, haematological, and serum biochemical variables throughout 2 weeks following an oral administration of NiO-NPs or/and Co_3O_4-NPs in rats.

NPs suppressed the adverse effects of the individual NPs on the studied variables.
Author: Ali AA.
Full Source: Environmental Science & Pollution Research International. 2019 Apr 24. doi: 10.1007/s11356-019-05093-2. [Epub ahead of print]

Metabolism and Lung Toxicity of Inhaled Naphthalene: Effects of Postnatal Age and Sex

2019-06-10
Human exposure to naphthalene (NA), an acute lung toxicant and possible human carcinogen, is primarily through inhalation. Acute lung toxicity and carcinogenesis are thought to be related because the target sites for both are similar. To understand susceptibility of the developing lung to cytotoxicity of inhaled NA, the authors exposed neonatal (7d), juvenile (3w), and adult mice to 5 or 10 ppm NA vapor for 4h. The authors measured vacuolated airway epithelium morphometrically, quantified NA and NA-GSH levels in plasma and lung, and quantified gene expression in microdissected airways. NA inhalation caused airway epithelial cytotoxicity at all ages, in both sexes. Contrary to a previous study that showed the greatest airway epithelial cytotoxicity in neonatal mice following intraperitoneal NA injection, it was observed that the most extensive airway epithelial toxicity in older, juvenile, animals exposed to NA by inhalation. Juvenile female animals were the most susceptible. Furthermore, NA inhalation in juvenile animals resulted in damage to conducting airway Club cells that was greater in proximal vs distal airways. In addition, the authors found NA tissue burden and metabolism differed by age. Gene expression pathway analysis was consistent with the premise that female juvenile mice are more predisposed to damage; DNA damage and cancer pathways were upregulated. The data demonstrate special susceptibility of young, juvenile mice to NA inhalation-induced cytotoxicity, highlight the importance of route of exposure and airway location in toxicity of chemicals in the developing lung, and provide metabolic and molecular insights for further identification of mechanisms underlying age and sex differences in NA toxicity.
Authors: Carratt SA, Kovalchuk N, Ding X, Van Winkle LS.
Full Source: Toxicological Science. 2019 Apr 24. pii: kfz100. doi: 10.1093/toxsci/kfz100. [Epub ahead of print]

Technical

CHEMWATCH

Pancreatic safety of vildagliptin in patients with type 2 diabetes mellitus: A European, noninterventional, post-authorisation safety study

2019-06-21

This cohort study assessed the pancreatic safety of vildagliptin versus other non-insulin antidiabetic drugs (NIADs) based on data from five European electronic health care databases. Patients with type 2 diabetes aged ≥18 years on NIAD treatment were enrolled. Adjusted incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were estimated separately for acute pancreatitis and pancreatic cancer for vildagliptin (± other NIADs) compared with other NIADs using negative binomial regression. Approximately 2.8% of the enrolled patients (n= 738 054) used vildagliptin during the study, with an average follow-up time of 1.4 years. For acute pancreatitis, adjusted IRRs ranged between 0.89 and 2.58 with all corresponding 95% CIs crossing 1. For pancreatic cancer adjusted IRRs ranged from 0.56 to 3.64, with the lower limit of 95% CIs >1 in some analyses. Post hoc sensitivity analyses taking latency time into account markedly lowered the risk estimates with corresponding 95% CIs crossing 1. Overall, the results do not suggest an increased pancreatitis risk with vildagliptin, while the observation for pancreatic cancer have to be interpreted carefully as this study was not designed to assess pancreatic cancer and rather be explained by certain underlying limitations including latency -time, chance findings and/or bias and confounding.

Authors: Williams R, Kothny W, Serban C, Lopez-Leon S, Schlienger R.
Full Source: Endocrinology, Diabetes & Metabolism. 2019 Jan 24;2(2): e00052. doi: 10.1002/edm2.52. eCollection 2019 Apr.

This cohort study assessed the pancreatic safety of vildagliptin versus other non-insulin antidiabetic drugs (NIADs) based on data from five European electronic health care databases.

Alzheimer and depressive cognitive-like behaviours in male and female rats: A new method for exposure to ambient air pollution

2019-06-10

In the previous studies regarding the effects of exposure to ambient air pollution on biological markers and/or behaviour of animals, the gaseous pollutants are not separated from the particulate matter (PM). Hence the synergetic effect of gaseous pollutants and PM was not considered. In this regard, current study was aimed to devolve a new method for separation of PM from gaseous pollutants. Also, the effect of exposure to fine particulate matter (PM2.5) on the Alzheimer and depressive cognitive-like behaviours in rats after 3 and 6 months were investigated. Three chambers were designed including exposure group 1 (PM2.5 plus

gaseous pollutants alone), exposure group 2 (gaseous pollutants alone) and control group (clean air). Exposure time was 5 h per day (9.00 a.m.-2.00 p.m.) for 4 days per week. The concentration of PM2.5 and gaseous pollutants (O3, NO2, and SO2) were monitored in the exposure hours, continuously. Concentration of PM2.5 by beta attenuation method and concentration of O3, NO2, and SO2 by UV fluorescence was monitored. Also, the concentration of metals including Al, Cr, Mn, Pb, Cd, Ni, Fe, and Cu and 16-polycyclic aromatic hydrocarbons (PAHs) bound PM2.5 by inductively coupled plasma mass spectrometry (ICP-MS) and gas chromatography-mass spectrometry (GC-MS) were analysed, respectively. Cognitive-like behaviour related to Alzheimer and depressive behaviours were determined by Y maze and Force swimming. The concentration of PM2.5 in the 3- and 6-months exposure was higher than WHO guideline, significantly (p-value <0.05). The concentration of O3, NO2 and SO2 in the 3- and 6-months exposure was lower than WHO guideline, significantly (p-value <0.05). The order of metals in the PM2.5 according to mean concentration $Al > Ca > Cu > Cd > Na > Fe > Cr > Ni > Mn > Pb$. Also, the sum concentration of 16-PAHs in the PM2.5 in the 3- and 6-months exposure was 45.7 ± 37.15 ng/m3 and 30.04 ± 25.27 ng/m3, respectively. Exposure to PM2.5 cannot significantly increase Alzheimer and depressive cognitive-like behaviours in the rats. Also, a significant difference between male and female in Alzheimer and depressive cognitive-like behaviours not observed. A new method for separation of PM2.5 from other PM in the ambient air by ECO-PM sampler was presented. A new method for separation of PM2.5 from gaseous pollutants in the ambient air by HEPA filter and active carbon was presented. Tow exposure groups including exposure 1: PM2.5 plus gaseous pollutants and exposure 2: gaseous pollutants only were designed for increased accuracy of the in-vivo study. Exposure to PM2.5 cannot cause significant increased Alzheimer and depressive cognitive-like behaviours in the rats.

Authors: Motesaddi Zarandi S, Shahsavani A, Khodagholi F, Fakhri Y.
Full Source: MethodsX. 2019 Mar 28; 6:690-703. doi: 10.1016/j.mex.2019.03.018. eCollection 2019.

Neurotoxicity Associated with Traumatic Brain Injury, Blast, Chemical, Heavy Metal and Quinoline Drug Exposure

2019-06-10

Chronic, excessive exposure, and accumulation of neurotoxic agents such as heavy metals (lead, mercury, cadmium), mefloquine (Lariam), and food additives such as monosodium glutamate and aspartame cause neurotoxicity and brain damage. This chemical-induced brain damage

Chronic, excessive exposure, and accumulation of neurotoxic agents such as heavy metals (lead, mercury, cadmium), mefloquine (Lariam), and food additives such as monosodium glutamate and aspartame cause neurotoxicity and brain damage.

closely resembles the pathophysiology of classical traumatic brain injury with decreased cognitive function, neurodegeneration, and increased psychiatric manifestations (depression, anxiety, sleep disturbances, and irritability). Current evidence supports a strong causal relationship between military-related exposure to specific neurotoxins, and the development of serious medical conditions and higher rates of suicide among service members. To address this current deficit in military health care, it is recommended that efficacious, nontoxic, neuroprotective, and neuroregenerative agents such as highly bioavailable magnesium, nutritional lithium, zinc, selenium, boron, ascorbate, tocopherols, heavy metal chelators, and glutathione precursors such as N-acetyl-cysteine be immediately used as a "protective shield" and to support critical healing processes in the brain and nervous system.

Authors: Marshall TM, Dardia GP, Colvin KL, Nevin R, Macrellis J.
Full Source: Alternative Therapies in Health and Medicine. 2019 Jan; 25(1):28-34.

Assessing in vitro dermal absorption of dry residues of agrochemical sprays using human skin within OECD TG 428

2019-06-10

The authors describe a novel experimental method that mimics exposure to dried agrochemical residues on contact surfaces during re-entry into crops. It includes the creation of dry dislodgeable residues and subsequent transfer to human skin for in vitro measurement of dermal absorption within a standard Organisation for Economic Co-operation and Development test guideline (OECD TG) 428 study. A pre-determined volume of spray containing 14C-labelled active substance is transferred onto a polytetrafluorethylene-coated septum and air-dried. The septum is then gently placed onto the pre-wetted skin mounted in a flow-through Franz diffusion chamber. The septum is gently rotated thrice to transfer the dose. Preliminary tests determined transfer efficiency to ensure the appropriate test concentration on the skin. Then, a standard dermal absorption study is performed according to OECD TG 428. Results from 10 compounds indicate that the methodology can be robustly incorporated into a standard TG study. These data show that the dermal absorption from a dry dislodgeable residue is lower than that from the equivalent dose of the aqueous spray, regardless of formulation type or active substance. Studies following the scenario described above can be a suitable tool to

The authors describe a novel experimental method that mimics exposure to dried agrochemical residues on contact surfaces during re-entry into crops.

Technical

better estimate dermal absorption from dry residues in re-entry worker and resident exposure assessment for agrochemicals.
Authors: Aggarwal M, Fisher P, Kluxen FM, Maas W, Morgan N, Parr-Dobrzanski R, Strupp C, Wiemann C.
Full Source: Regulatory Toxicology & Pharmacology. 2019 Apr 25; 106:55-67. doi: 10.1016/j.yrtph.2019.04.016. [Epub ahead of print]

OCCUPATIONAL RESEARCH

Occupational exposure to solvents and lung function decline: A population-based study

2019-06-10
While cross-sectional studies have shown associations between certain occupational exposures and lower levels of lung function, there was little evidence from population-based studies with repeated lung function measurements. In the present study, the authors aimed to investigate the associations between occupational exposures and longitudinal lung function decline in the population-based Tasmanian Longitudinal Health Study. Lung function decline between ages 45 years and 50 years was assessed using data from 767 participants. Using lifetime work history calendars completed at age 45 years, exposures were assigned according to the ALOHA plus Job Exposure Matrix. Occupational exposures were defined as ever exposed and cumulative exposure -unit- years. The authors investigated effect modification by sex, smoking and asthma status. Compared with those without exposure, ever exposures to aromatic solvents and metals were associated with a greater decline in FEV1 (aromatic solvents 15.5 mL/year (95% CI -24.8 to 6.3); metals 11.3 mL/year (95% CI -21.9 to - 0.7)) and FVC (aromatic solvents 14.1 mL/year 95% CI -28.8 to - 0.7; metals 17.5 mL/year (95% CI -34.3 to - 0.8)). Cumulative exposure (unit years) to aromatic solvents was also associated with greater decline in FEV1 and FVC. Women had lower cumulative exposure years to aromatic solvents than men (mean (SD) 9.6 (15.5) vs 16.6 (14.6)), but greater lung function decline than men. In addition, an association was found between ever exposures to gases/fumes or mineral dust and greater decline in lung function. Exposures to aromatic solvents and metals were associated with greater lung function decline. The effect of aromatic solvents was strongest in women. Preventive strategies should be implemented to reduce these exposures in the workplace.
Authors: Alif SM, Dharmage S, Benke G, Dennekamp M, Burgess J, Perret JL, Lodge C, Morrison S, Johns DP, Giles G, Gurrin L, Thomas PS, Hopper JL,

In the present study, the authors aimed to investigate the associations between occupational exposures and longitudinal lung function decline in the population-based Tasmanian Longitudinal Health Study.

Technical

Wood-Baker R, Thompson B, Feather I, Vermeulen R, Kromhout H, Jarvis D, Garcia Aymerich J, Walters EH, Abramson MJ, Matheson MC.

Continued increase in prevalence of r-type opacities among underground coal miners in the USA

2019-06-10

Respirable crystalline silica exposure has been implicated in the resurgence of coal workers' pneumoconiosis (CWP) in the USA. A 2010 report found an increasing prevalence of r-type opacities, which are associated with silicosis lung pathology, on the radiographs of working underground coal miners in central Appalachia. This analysis updates that report by assessing the prevalence of r-type opacities during 2010-2018 compared with earlier decades. Data from the Coal Workers' Health Surveillance Program were used to calculate the prevalence of r-type opacities on radiographs of working underground coal miners. The data were restricted to radiographs taken during 1 January 1980 to 15 September 2018. The presence of r-type opacities was defined as an r-type classification for either the primary or secondary shape/size of small opacities. Prevalence ratios for r-type opacities were calculated using log binomial regression. Radiograph classifications for 106 506 miners were included in analysis. For the USA overall, the prevalence of r-type opacities among miners with radiographs taken during 2010-2018 compared with 1980-1989 has increased (PR 2.4; 95% CI 1.9 to 3.0). For central Appalachia, the proportion of r-type opacities observed increased when comparing 1980-1989 to 2010-2018 (PR 6.0; 95% CI 4.6 to 7.9). The prevalence of r-type opacities on the radiographs of Appalachian underground coal miners continues to increase, implicating exposure to crystalline silica in respirable coal mine dust. The current findings underscore the importance of monitoring and controlling exposure to silica in coal mines.

Authors: Hall NB, Blackley DJ, Halldin CN, Laney AS.

> This analysis updates that report by assessing the prevalence of r-type opacities during 2010-2018 compared with earlier decades.

Technical

Low-dose computed tomography screening for lung cancer in people with workplace exposure to asbestos

2019-06-10

Smoking is the main risk factor for lung cancer, but environmental and occupational exposure to carcinogens also increase lung cancer risk. In the present study, the authors assessed whether extending low-dose computed tomography (LDCT) screening to persons with occupational exposure to asbestos may be an effective way reducing lung cancer mortality. A nested case-control study was conducted within the COSMOS screening program, assessing past asbestos exposure with a questionnaire. LDCT scans of asbestos-exposed participants were reviewed to assess the presence of pulmonary, interstitial and pleural alterations in comparison to matched unexposed controls. The authors also performed an exhaustive review, with meta-analysis, of the literature on LDCT screening in asbestos-exposed persons. Exposure to asbestos, initially self-reported by 9.8% of COSMOS participants, was confirmed in 216 of 544 assessable cases, corresponding to 2.6% of the screened population. LDCT of asbestos-exposed persons had significantly more pleural plaques, diaphragmatic pleural thickening and pleural calcifications, but similar frequency of parenchymal and interstitial alterations to unexposed persons. From 16 papers, including this study, overall lung cancer detection rates at baseline were 0.81% (95% CI 0.50-1.19) in asbestos-exposed persons, 0.94% (95% CI 0.47-1.53) in asbestos-exposed smokers (12 studies), and 0.11% (95% CI 0.00-0.43) in asbestos-exposed non-smokers (9 studies). Persons occupationally exposed to asbestos should be monitored to gather more information about risks. Although LDCT screening is effective in the early detection lung cancer in asbestos-exposed smokers, our data suggest that screening of asbestos-exposed persons with no additional risk factors for cancer does is not viable due to the low detection rate.

Authors: Maisonneuve P, Rampinelli C, Bertolotti R, Misotti A, Lococo F, Casiraghi M, Spaggiari L, Bellomi M, Novellis P, Solinas M, Dieci E, Alloisio M, Fontana L, Persechino B, Iavicoli S, Veronesi G.

This study, investigated the clinical and pathological features of 1,2-dichloroethane (DCE) toxic encephalopathy.

Technical

The clinical and pathological features of toxic encephalopathy caused by occupational 1,2-dichloroethane exposure

2019-06-10

This study, investigated the clinical and pathological features of 1,2-dichloroethane (DCE) toxic encephalopathy. The cases of 4 patients who were admitted to Xiangya hospital between January 8, 2008 and November 8, 2012 with diagnoses of DCE toxic encephalopathy were examined. The authors recorded data on gender, age of onset, exposure time to DCE, symptom onset to admission interval, symptom onset to worst symptom experience interval, and clinical manifestations, as well as cranial magnetic resonance imaging (MRI) and brain biopsy pathology results. All 4 patients had a history of DCE exposure and presented with symptoms of intracranial hypertension. Cranial MRI revealed extensive brain edema throughout the subcortical white matter, the bilateral globus pallidus, and the cerebellar dentate nuclei. The brain biopsy confirmed severe cerebral edema, including peripherovascular oedema, with swelling of various cell types, with extensive glial cell necrosis. After treatment with steroids and mannitol (3-10 weeks), all 4 patients recovered, partially or completely. Severe brain oedema and extensive glial cell necrosis were the main pathological features observed in the present cases, with a likely aetiology of DCE toxicity. Early, prompt, and long-term treatment with dehydrating agents and glucocorticoids was an effective treatment for this condition.

Authors: Dang J, Chen J, Bi F, Tian F.
Full Source: Medicine (Baltimore). 2019 Apr; 98(17):e15273. doi: 10.1097/MD.0000000000015273.

The industrial hygiene hierarchy of controls, including elimination and substitution, engineering controls, administrative controls, and safe work practices, and personal protective equipment, serves as a framework for infection prevention practices for at-risk workers discussed in this study.

Zika virus in workers: Considerations for ongoing exposure prevention

2019-06-10

Since at least 2015, a major Zika virus epidemic has impacted the Americas and the Caribbean. There is an ongoing risk of Aedes mosquito-borne transmission in more than 90 countries and territories worldwide. In these areas, as well as in places that are not experiencing active outbreaks, workers in a variety of jobs may be exposed to the virus. In addition to outdoor workers in places with ongoing, vector-borne transmission who may be exposed when bitten by Zika-infected mosquitoes, biomedical researchers studying the virus and health care workers and staff in clinical laboratories may encounter blood and infectious body fluids from

infected individuals, including travellers from Zika virus-affected areas. Because of potentially serious health outcomes, including reproductive effects, sometimes associated with Zika, the Occupational Safety and Health Administration and National Institute for Occupational Safety and Health previously issued guidance to help US employers protect workers from exposure to the virus on the job. This commentary summarizes the details of these recommendations and explains their rationale, which is important to understand when adapting and implementing workplace controls to prevent occupational Zika virus exposures and infections at individual worksites. The industrial hygiene hierarchy of controls, including elimination and substitution, engineering controls, administrative controls, and safe work practices, and personal protective equipment, serves as a framework for infection prevention practices for at-risk workers discussed in this study.

PUBLIC HEALTH RESEARCH

Phthalate exposure increases subclinical atherosclerosis in young population

2019-06-10
The link between phthalate exposure and the risk of subclinical atherosclerosis in young population remains unclear. This study investigated the association between phthalate exposure and subclinical atherosclerosis, in terms of carotid intima-media thickness (CIMT), in young population. From a nationwide mass urine screening for renal health, conducted in 1992-2000 among school children 6-18 years of age in Taiwan, we recruited 789 subjects to participate in the cardiovascular health examination in 2006-2008. Among them, 787 received measurements of 7 urinary phthalate metabolites and CIMT. Results showed both mean and maximal values of CIMT at all segments of carotid arteries significantly increased with the urinary mono-2-ethylhexyl phthalate (MEHP), ∑ di-(2-ethylhexyl) phthalate (DEHP), and mono-n-butyl phthalate (MnBP) in a dose-response relationship after adjustment for multiple linear regression models. Multivariate logistic regression analysis showed that higher quartiles of urinary concentrations of MEHP, ∑DEHP, and MnBP were associated with a higher risk of thicker CIMT. Compared to subjects with the lowest quartile (Q1) of urinary MEHP, the adjusted odds ratios (95% confidence interval) for thicker CIMT among subjects with

This study investigated the association between phthalate exposure and subclinical atherosclerosis, in terms of carotid intima-media thickness (CIMT), in young population.

higher urinary MEHP were 2.13 (1.18-3.84) at Q2, 4.02 (2.26-7.15) at Q3 and 7.39 (4.16-13.12) at the highest Q4. In conclusion, urinary phthalate metabolites of MEHP, ∑DEHP, and MnBP are strongly associated with CIMT in adolescents and young adults in Taiwan.

Association of Exposure to Persistent Organic Pollutants With Mortality Risk: An Analysis of Data From the Prospective Investigation of Vasculature in Uppsala Seniors (PIVUS) Study

2019-06-10

It has been suggested that persistent organic pollutants (POPs) are harmful to human health. This study investigated if POP levels in plasma are associated with future mortality. Cohort study using data from the population-based Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS) study, collected between May 2001 and June 2004 when participants reached age 70 years. Participants were followed up for 5 years after the first examination. Mortality was tracked from age 70 to 80 years. Data analysis was conducted in January and February 2018. Eighteen POPs identified by the Stockholm Convention, including polychlorinated biphenyls (PCBs), organochlorine pesticides, and a brominated flame retardant, were measured in plasma levels by gas chromatography-mass spectrometry. All-cause mortality. The study sample initially included 992 individuals (497 [50.1%] men) aged 70 years, who were examined between 2001 and 2004. At the second examination 5 years later, 814 individuals (82.1%; 412 [50.7%] women) completed follow-up. During a follow-up period of 10.0 years, 158 deaths occurred. When updated information on POP levels at ages 70 and 75 years was associated with all-cause mortality using Cox proportional hazard analyses, a significant association was found between hexa-chloro- through octa-chloro-substituted (highly chlorinated) PCBs and all-cause mortality (except PCB 194). The most significant association was observed for PCB 206 (hazard ratio [HR] for 1-SD higher natural log-transformed circulating PCB 206 levels, 1.55; 95% CI, 1.26-1.91; P < .001). Following adjustment for hypertension, diabetes, smoking, body mass index, and cardiovascular disease at baseline, most associations were no longer statistically significant, but PCBs 206, 189, 170, and 209 were still significantly associated with all-cause mortality (PCB 206: adjusted HR, 1.47; 95% CI, 1.19-1.81; PCB 189: adjusted HR, 1.29; 95% CI, 1.08-

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1.55; PCB 170: adjusted HR, 1.24; 95% CI, 1.02-1.52; PCB 209: adjusted HR, 1.29; 95% CI, 1.04-1.60). In a secondary analysis, these associations were mainly because of death from cardiovascular diseases rather than non-cardiovascular diseases. Three organochlorine pesticides, including dichlorodiphenyldichloroethylene, and the brominated flame retardant diphenyl ether 47 were also evaluated but did not show any significant associations with all-cause mortality. Higher levels of highly chlorinated PCBs were associated with an increased mortality risk, especially from cardiovascular diseases. These results suggest that public health actions should be undertaken to minimise exposure to highly chlorinated PCBs.
Authors: Lind PM, Salihovic S, Stubleski J, Kärrman A, Lind L.
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Serum carbohydrate antigen 125 levels and incident risk of type 2 diabetes mellitus in middle-aged and elderly Chinese population: The Dongfeng-Tongji cohort study

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The aim of this study was to investigate the association between serum carbohydrate antigen 125 concentrations and incident type 2 diabetes mellitus risk in a prospective cohort. The authors included 18,983 eligible participants aged 63.1 years derived from the Dongfeng-Tongji cohort at baseline from September 2008 to June 2010, and they were followed until October 2013. Cox proportional-hazards models were used to estimate the hazard ratios and 95% confidence interval of type 2 diabetes mellitus incidence in relation to carbohydrate antigen 125 concentrations. In all, 1594 incident cases of type 2 diabetes mellitus were observed after a median follow-up of 4.6 years. Carbohydrate antigen 125 concentrations were categorised into four groups according to the quartiles of distribution: <1.1, 1.1-5.6, 5.6-10.0 and 10 U/mL. Compared with participants in the lowest quartile, the hazard ratio (95% confidence interval) of type 2 diabetes mellitus was 0.97 (0.81-1.15), 1.23 (1.05-1.45) and 1.48 (1.27-1.74) for quartile 2-quartile 4 of carbohydrate antigen 125 concentrations after adjustment for potential confounders (p for trend < 0.001). With per-standard deviation increase in carbohydrate antigen 125 levels, the hazard ratio of type 2 diabetes mellitus increased 12% (95% confidence interval, 8-16). Findings from this study indicated that serum carbohydrate antigen 125 concentrations were positively

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correlated with incident type 2 diabetes mellitus risk among a middle-aged and elderly Chinese population.

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

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This technique for setting guideline values differs from that currently used by regulatory agencies throughout the world. Data for benzene were evaluated from epidemiological studies on human populations (29 studies). Exposure durations were evaluated in terms of Long-Term Exposure (LTE) and Lifetime Exposure. All data was reported as Lowest Observed Adverse Effect Levels (LOAEL) and converted into exposure doses using Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD). These values were plotted as a Toxicant Sensitivity Distribution (TSD) which was the cumulative probability of LOAEL-ADD and LOAEL-LADD. From the TSD plots, linear regression equations gave correlation coefficients (R^2) ranging from 0.69 to 0.97 indicating normal distributions. Guideline Values (GVs) for LTE (8hr/day) and Lifetime (24hr/70yrs) exposure to benzene were calculated using data from human epidemiological studies as 5% level of cumulative probability (CP) of LOAEL-ADD and LOAEL-LADD from the cumulative probability distributions (CPD). The derived guideline values from the human epidemiological studies were 92 μg/kg/day for LTE and 3.4 μg/kg/day for lifetime exposure. GV for LTE is appropriate for occupational exposure and GV derived for lifetime exposure appropriate for the general population. The guideline value for occupational exposure limit was below all the guideline values developed by regulatory agencies. But the general population guideline is within the range of values formulated by European Union, ATSDR, EPAQS, USEPA and OEHHA for air quality for the general population. This is an alternative method which eliminates the application of safety factors and other sources of errors in deriving guideline values for benzene.

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Technical

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

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

Authors: Yi SW, Moon SJ, Yi JJ.
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